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CITY OF CINCINNATI

CINCINNATI STREETCAR PROJECT

TIGER III DISCRETIONARY GRANT PROGRAM

ECONOMIC ANALYSIS SUPPLEMENTARY DOCUMENTATION

OCTOBER 31, 2011

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1. Introduction

This document provides detailed technical information on the economic analyses conducted in support of the Grant Application for the Cincinnati Streetcar Project.

Section 2, Methodological Framework, introduces the conceptual framework used in the Benefit-Cost Analysis (BCA). Section 3, Project Overview, describes the project as well as a brief description of existing conditions and proposed alternatives; a summary of cost estimates and schedule; and a description of the types of effects that the Cincinnati Streetcar is expected to generate. Section 4, General Assumptions, discusses the general assumptions used in the estimation of project costs and benefits. Section 5, Demand Projections, provides estimates of travel demand and traffic growth for the project. Section 6, Benefits Measurement, Data and Assumptions documents specific data elements and assumptions pertaining to the long-term outcome selection criteria, along with associated benefit estimates. Section 7, Summary of Findings and BCA Outcomes, presents estimates of the project's Net Present Value (NPV), its Benefit/Cost ratio (BCR) and other project evaluation metrics. Section 8, Economic Impact Analysis presents detailed economic impact estimates, along with descriptions of the data sources and modeling tools used in the analysis. Finally, Section 9, Supplementary Data Tables provides additional data tables, including annual estimates of benefits and costs, as well as intermediate values to assist US DOT in its review of the application.[1]

2. Methodological Framework

Benefit-Cost Analysis (BCA) is a conceptual framework that quantifies in monetary terms as many of the costs and benefits of a project as possible. Benefits are broadly defined. They represent the extent to which conditions are improved for people impacted by the project, as measured by their own willingness-to-pay. In other words, central to BCA is the idea that people are best able to judge what is "good" for them, what improves their well-being or welfare.

BCA also adopts the view that a net increase in welfare (as measured by the summation of individual welfare changes) is a good thing, even if some groups within society are made worse-off. A project or proposal would be rated positively if the benefits to some are large enough to compensate the losses of others.

Finally, BCA is typically a forward-looking exercise, seeking to anticipate the welfare impacts of a project or proposal over its entire life-cycle. Future welfare changes are weighted against today's changes through discounting, which is meant to reflect society's general preference for the present, as well as broader inter-generational concerns.

The specific methodology developed for this application was developed using the above BCA principles and is consistent with the TIGER guidelines. In particular, the methodology involves:

- Establishing existing and future conditions under the build and no-build scenarios, and considering two alternatives for the build scenario;

[1] While the models and software themselves do not accompany this appendix, greater detail can be provided, including spreadsheets presenting additional interim calculations and discussions on model mechanics and coding, if requested.

- Assessing benefits with respect to each of the five long-term outcomes identified in the Notice of Funding Availability (NOFA)[2];
- Measuring benefits in dollar terms, whenever possible, and expressing benefits and costs in a common unit of measurement;
- Using US DOT guidance for the valuation of travel time savings, safety benefits and reductions in air emissions, while relying on industry best practice for the valuation of other effects;
- Discounting future benefits and costs with the real discount rates recommended by the US DOT (7 percent, and 3 percent for sensitivity analysis); and
- Conducting a sensitivity analysis to assess the impacts of changes in key estimating assumptions.

3. Project Overview

Transportation investment in the Hamilton County, Ohio area over the years has usually supported roads, freeways, and other infrastructure projects which utilize the personal automobile. As there is no passenger rail system in the region that connects to its urban core, the City of Cincinnati aims to develop a streetcar transit system that serves as an urban circulator for Downtown Cincinnati and its adjoining neighborhoods.

The alignment is a 3.1-mile corridor connecting downtown Cincinnati and Findlay Market in the Over-the-Rhine neighborhood. In this BCA the results for the 2.4 track-mile uptown extension are also included. The streetcars will run on parallel streets, occupying one of four existing lanes along its proposed route in the downtown area. In the uptown connector, bi-directional streetcar traffic will exist on the existing connecting road. Aside from improving local circulation, the Cincinnati Streetcar is expected to bring about long-term impacts that will support sustainable community and economic development, and complement other components of the local and regional transportation system.

3.1 Base Case and Alternatives

The project's main route is concentrated in the central business district and includes a downtown portion and an Over-the-Rhine portion. In the Base Case (No-Build Scenario), the downtown portion is served by Main and Walnut streets. Both are one-way streets, with Main traveling north and Walnut traveling south. At the southern most point of both corridors is The Great American Ballpark (baseball stadium of the Cincinnati Reds). Both corridors mostly serve commuters to-and-from downtown and spectators of the Reds .

In the Base Case, the Over-the-Rhine portion is served primarily by Race and Elm streets. Both are one-way streets, with Elm traveling north and Race traveling south. They are bounded by Henry Street to the north and 12th St. and Central Parkway to the south with Findlay Market

[2] U.S. Federal Register, Federal Register / Vol. 76, No. 156 / Friday, August 12, 2011 / Notices, Notice of Funding Availability for the Department of Transportation's National Infrastructure Investments Under the Full-Year Continuing Appropriations, 2011; and Request for Comments.

near the northern end. The two corridors primarily serve market and local personal travel. Each Street has on-street parking on both curb lanes.

In the Uptown area, from Race/Elder and Race/Findlay intersections up Vine Street to Corry Street, Vine Street is currently a three-lane road with two northbound lanes. It serves mostly a residential area and open spaces with Inwood Park near the end of the line. This corridor also provides access to the University of Cincinnati (the University) area from the downtown of Cincinnati.

Under the Full-Build alternative, the streetcar will function as an urban circulator or pedestrian accelerator to promote "walkable urbanism" in Cincinnati's downtown. The streetcar delivers short-haul transportation to the downtown area, including Findlay Market and the central business district. The streetcar runs in a figure 8 loop between downtown and Over-the–Rhine on Main, Elm, Walnut, and Race Streets down to 2nd St. near the Great American Ballpark. The Full-Build alternative is planned to connect via Vine St., the uptown and University residential areas to the rest of the alignment (Over-the-Rhine, central business district, and baseball stadium).

This analysis assesses the Full Build as the main alternative and also provides an assessment of a Partial Build for comparison. Both are assessed against the no-build base case. Under the Partial Build Alternative, the streetcar will run in a loop between the downtown and Over-the–Rhine portion on Main, Elm, Walnut, and Race streets all the way down to 2nd St. near the Great American Ballpark. The uptown portion is not included in the Partial Build and its northern boundary is Henry Street.

The body of this document focuses on the Full Build alternative. Results and tables for the Partial Build alternative can be found at the back of this document on page 39.

3.2 Project Cost and Schedule[3]

Table 1: Alternatives Costs and Schedules

Alternatives		2012	2013	2014	2015
Full Build	Capital Costs	$53,463,768	$89,476,770	$13,382,077	$0
	O&M Costs				$3,230,000

In the Full Build scenario, construction would begin in 2012 and end in 2014 with the next year being the first full year of operations. The total construction cost is $156.32 million (2011 dollars) with over 90 percent being spent in the first two years of construction. Annual operation and maintenance cost for the streetcar begins in the first year of operation (2015) and is estimated to be $3.23 million. It is anticipated that portions of the project will be operational in 2014, however for the purposes of this BCA, 2015 is considered as the first full year of operations.

[3] All cost estimates in this section are in millions of dollars of 2011, discounted to 2011 using a 7 percent real discount rate.

3.3 Effects on Long-Term Outcomes

Users of the streetcar will experience benefits of this project such as travel time savings, vehicle operating savings and accident reductions. Local residents of Cincinnati will also experience benefits such as community development, pavement maintenance savings and congestion and pollution reduction.

The main benefit categories associated with the project are mapped into the five long-term outcome criteria set forth by the DOT in Table 2.

Table 2: Expected Effects on Long Term Outcomes and Benefit Categories

Long-Term Outcomes	Benefit Categories	Description	Monetized	Quantified	Qualitative
State of Good Repair	Pavement Maintenance Savings	Reductions in pavement maintenance costs due to changes in roadway usage	Yes	Yes	No
	Travel Time Savings	Door-to-door travel time savings to transit users and remaining roadway users	Yes	Yes	Yes
Economic Competitiveness	Out-of-Pocket Cost Savings	Reductions in monetary costs to drivers switching to public transit	Yes	Yes	No
Livability	Community Development	Option value and amenity value of proposed transit alignment, as measured in property appreciation (net of capitalized travel cost savings)	Yes	Yes	Yes
	Benefits to Low Income Households	Portion of travel time savings and out-of-pocket cost savings to low income households	Yes	Yes	No
Environmental Sustainability	Reductions in Air Emissions	Reductions in pollutants and green house gasses due to changes in private vehicle use relative to base case	Yes	Yes	Yes
Safety	Accident Reduction	Reductions in property losses, injuries and deaths due to modal shifts	Yes	Yes	Yes

4. General Assumptions

The BCA measures benefits against costs throughout a period of analysis beginning at the start of construction and including 20 years of operations. The monetized benefits and costs are estimated in 2011 dollars with future dollars discounted in compliance with TIGER requirements using a 7 percent real rate, and sensitivity testing at 3 percent. The methodology makes several important assumptions and seeks to avoid overestimation of benefits and underestimation of costs. Specifically:

- Input prices are inflated to 2011 dollars.
- For the Full Build alternative, the period of analysis begins in 2012 and ends in 2034. It includes project development and construction years (2012-2014) and 20 years of operations (2015-2034). Note: It is anticipated that portions of the project will be operational in 2014; however this BCA begins accounting for benefits in 2015 as the first full year of operations.
- For the Partial Build alternative, the period of analysis begins in 2012 and ends in 2033. It includes project development and construction years (2012-2013) and 20 years of operation (2014-2033).
- A constant 7 percent real discount rate is assumed throughout the period of analysis. A 3 percent discount rate is used for sensitivity analysis.
- Opening year demand is an input to the BCA and is assumed to be fully realized in 2015 for the Full-Build alternative and 2014 for the Partial Build alternative.
- Unless specified otherwise, the results shown in this document correspond to the effects of the full build alternative (alignment from 2nd St. to Uptown).

5. Demand Projections

The success of a transit system hinges on its ability to provide local and regional connectivity and generate societal welfare in the long run. In quantifying the system's Study Period utilization as well as its induced economic worthiness, its level of and growth in demand must be analyzed, given other existing transportation alternatives.

Throughout this BCA, various long-term outcomes of the Cincinnati Streetcar Project are monetized using the outputs of the travel demand model. In particular, traffic volumes of different modes are translated into vehicle-miles traveled (VMT). Given average trip length or other roadway assumptions, existing and projected travel conditions are estimated. Ultimately, economic benefits that stem from the reduction in demand for motorized vehicles are computed as changes in VMT and speed improvements throughout the network.

For the Cincinnati Streetcar project, demand for multiple modes of transportation (automobiles, bus, and taxis) in the form of average annual daily traffic (AADT) were estimated by HDR Engineering using a travel demand model. Such a model estimates the level of demand of potential riders by first estimating the cost of traveling in various transportation options, using local factors such as income, mobility, and origin and destination pairs. Travel demand is then estimated by aggregating the number of potential riders who have the lowest general cost of traveling in each mode. Specifically, the estimates are for both peak and off-peak periods and special events such as sporting events.

5.1 Methodology

The framework used in the estimation of user benefits is based upon the theory of demand, and involves the estimation of changes in consumer surplus.

The demand for travel is an inverse relationship between the number of trips "demanded" and the generalized cost of travel, which includes both travel time and out-of-pocket costs (such as vehicle operating and parking costs for auto users, or fare payments for transit riders). That relationship is depicted in Figure 1 below. The term "consumer surplus" refers to the area between the demand curve and the actual cost of travel at any point in time. It is a measure of welfare to the extent that people who are traveling at that cost are "paying" less than what they would be willing to pay; in other words the value they are placing on a trip (as measured by their willingness-to-pay along the demand curve) is higher than what they are actually paying.

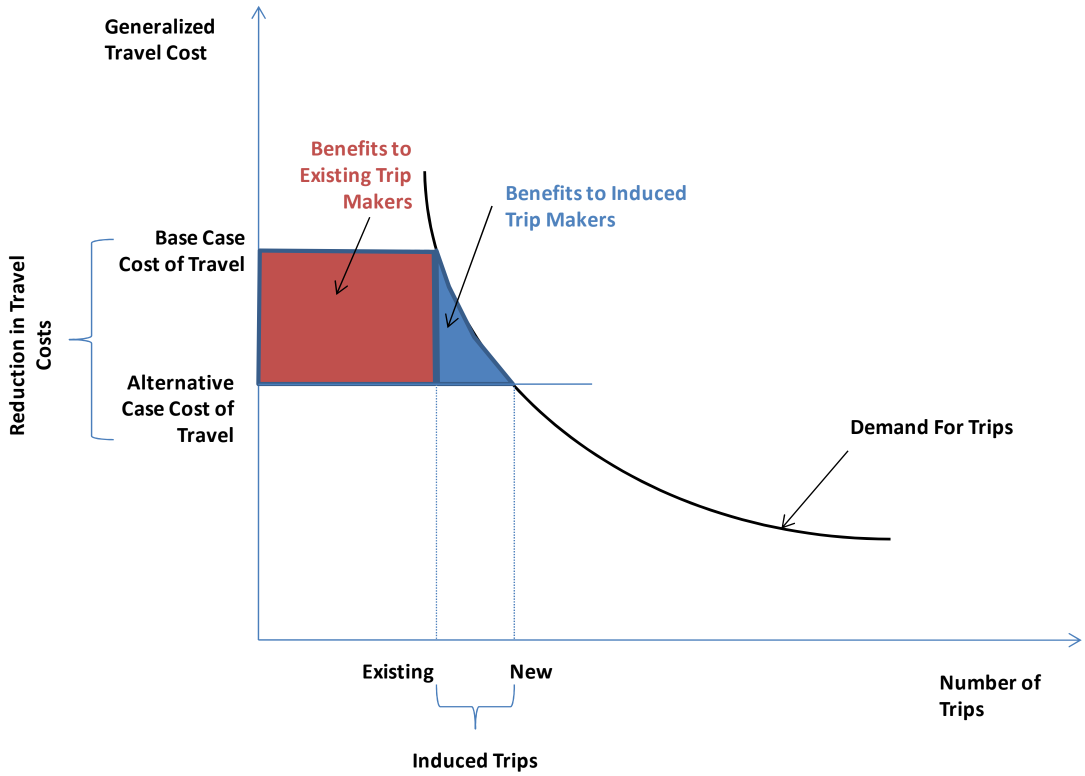
The proposed transportation investment would reduce the general cost of travel and result in benefits to both existing and new trip-makers.

Benefits to existing trip-makers are represented by the red rectangle in **Figure 1**. They are estimated as the difference between the generalized cost of travel in the base case and the generalized cost of travel in the build scenario *times* the number of existing trips.

In addition, as the generalized cost of travel is being reduced, additional trips (beyond those diverted from other modes) are expected. These induced trip-makers represent a portion of all potential trip-makers who did not make a trip (or as many trips) in the no-build scenario, but are now "attracted" to the lower generalized cost allowed by the investment.

User benefits resulting from new trips are depicted by the blue triangle in Figure 1. They are estimated using the "rule-of-a-half". Please note that the change in generalized cost from no-build to build conditions only represents the change in user costs (travel time plus out-of-pocket costs). Social costs, including air emissions, accident occurrences, and congestion externalities are assumed not to affect trip making or modal decisions in this analysis. The elasticity of demand (the slope of the demand curve) is estimated based on existing knowledge about travel costs in the corridor and ridership forecasts developed by the Project Team.

Figure 1: Framework for the Estimation of User Benefits



5.2 Assumptions

Throughout this BCA, various long-term outcomes of the Project are monetized using the outputs of the travel demand model. In particular, traffic volumes of different modes are translated into vehicle-miles traveled (VMT). Given average trip length or other roadway assumptions, existing and projected travel conditions are estimated. Ultimately, economic benefits that stem from reduction in demand for motorized vehicles are computed as changes in VMT and speed improvements throughout the network.

While travel demand models have been used to accurately forecast demand, other assumptions on the implied ridership estimates are made. The first assumption is that the diversion breakdown of ridership from multiple modes of transportation will remain the same throughout the study. The table below lists the assumed percentages of diversion for each mode of transportation for the opening year. These estimates change throughout the study period due to differing rates of growth for some groups of riders.

Table 3: Diversion Rates to Streetcar

Mode of Transportation	Opening Year Percentage of Total Ridership	Source
Diverted from Autos	41%	HDR Travel Demand Model
Diverted from Other Transit (Bus)	23%	
Diverted from Taxi	4%	
Induced Riders	32%	

Percentages change throughout the planning horizon due to different levels of growth for induced and diverted traffic.

5.3 Demand Estimates and Projections

Ridership forecasts account for population and employment in a quarter mile radius around the streetcar alignment. It is assumed that auto trips diverted to the streetcar will remain constant during the analysis horizon, but that the new trips in the study area would likely be more 'transit-oriented', which reflects the propensity of developments around transit to induce a higher amount of internal capture, walking, biking and transit use – as opposed to auto use.

Vehicle-miles traveled was also forecasted. Accordingly, it is estimated that 2,060 daily auto trips are diverted to the streetcar during the opening year. Estimates of capacity and average speeds on competing roadways and standard speed-flow curve equations (Bureau of Public Roads Updated Speed-Flow Curve) were used to estimate the effect of diversion on remaining roadway users. Table 4 indicates the estimated daily ridership in selected years by mode and in total. Daily ridership per year is shown on page 29 for the scenario of $1.00 streetcar fare.

Table 4: Demand Estimates and Projections

Total Ridership	2015	2024	2034
Total Daily Trips	6,292	8,301	9,169
Diverted from Auto	2,575	2,844	3,142
Diverted from Bus	1,459	1,612	1,780
Diverted from Taxi	257	284	314
Induced Demand	2,000	3,561	3,933

Table 5 indicates the estimated daily net reduction in VMT and auto trips for these same years. The table shows at least 2,000 daily auto trips are reduced. These are calculated from the riders assumed to be using the streetcar. The 2,575 riders diverted from autos in 2015 would have previously taken vehicle trips. At a vehicle occupancy rate of 1.25, this translates into 2,060 vehicles off the road per day. Since the average trip length is about a one and half miles, the daily VMT reduced because of streetcar is over 150 percent that of the daily auto trips reduced.

Table 5: Daily Net VMT and Auto Trip Reduction

Evaluation Metric	2015	2024	2034
Daily VMT without Streetcar	13,901	15,354	16,960
Daily VMT with Streetcar	10,517	11,617	12,832
Daily Auto Trips Reduced	2,060	2,275	2,513

6. Benefits Measurement, Data and Assumptions

This section describes the measurement approach used for each benefit category identified in Table 1 and provides an overview of the associated methodology, assumptions, and estimates. *Note: Results presented in this section represent the Full Build Alternative.*

6.1 State of Good Repair

To quantify the benefits associated with maintaining the existing transportation network in a state of good repair, improvements to the condition of existing transportation facilities, with particular emphasis on projects that minimize life-cycle costs are quantified. In the case of the Cincinnati Streetcar, the fewer trips made on competing parallel routes by autos generate pavement maintenance cost savings. The value of the remaining useful life of the streetcar project at the end of the analysis horizon is also included.

6.1.1 Methodology

The measurement for benefits are defined as changes in pavement maintenance cost are calculated as the difference between total costs in the base case and total costs in the alternate, build scenario.

6.1.2 Assumptions

The analysis combined and estimated per-unit savings of pavement maintenance costs, estimated at $0.0015 per vehicle-mile avoided[4], with the estimated reduction in VMT.

In terms of the residual value of the project, it is assumed that the BCA only evaluates up to the project's half-life. The specific components that are not expected to be depleted after 20 years of operation include guideway and track elements, stations, support facilities, right-of-way, and the associated unallocated contingency amount. Depreciation of these components is assumed to be linear while there is none for right-of-way.

6.1.3 Benefit Estimates

The opening year savings in pavement maintenance is calculated at approximately $1,015; amounting to $22,545 for the study period. Results by calendar year of operation are shown on page 31.

Table 6: Estimates of VMT Reduction and Pavement Maintenance Savings

Evaluation Metric	Opening Year	Study Period
VMT Avoided	1,014,979	22,545,417
Pavement Maintenance Savings, in 2011 Dollars	$1,015	$22,545
Pavement Maintenance Savings, discounted at 7 percent	$829	$10,197

[4] See Addendum to the 1997 Federal Highway Cost Allocation Study Final Report (http://www.fhwa.dot.gov/policy/hcas/addendum.htm).

Table 7: Estimate of Residual Value of Project after 20 Years of Operation

Evaluation Metric	2034
Residual Value (discounted at 7 percent, in Millions of 2011 Dollars)	$2.64

6.2 Economic Competitiveness

The proposed project would contribute to enhancing the economic competitiveness of the Nation through improvements in the mobility of people and goods within the study area. In this analysis, two measures of mobility are presented: travel-time savings and out-of-pocket transportation cost savings.

6.2.1 Methodology

Travel-time savings for travelers are dependant on their value of time (VOT) and the reduction of time spent on traveling (travel-time). For travelers who remain auto users after streetcar operation begin, they experience a reduction in travel-time as a result of less congestion. Travelers who divert from autos or buses may experience a reduction in travel-time depending on their origin and destination. VOT is then applied to each reduction in travel-time to estimate the travel-time savings. VOT varies between modes of transportation due to multiple factors such as income of riders and level of comfort. Therefore, while a mode may have the most reduction in travel-time, it may not have the greatest travel-time savings because it has a low VOT. The BCA calculates reduction in travel-time and VOT as an average for each mode.

Savings in out-of-pocket costs apply only to auto users and are experienced by remaining auto users and streetcar riders who diverted from autos. Out of pocket costs are composed of four costs; fuel, oil, tires, maintenance, and depreciation. The consumption rates for these costs are derived from the average speed and combined with unit costs for each to estimate total out-of-pocket costs per mile and out-of-pocket costs per trip. The out-of-pocket costs are combined with parking to estimate the total out-of-pocket cost per trip for auto users. The decrease in out-of-pocket cost in the alternative from the base case scenario represents out-of-pocket cost savings for remaining auto users. For travelers who divert from auto to streetcar, the out-of-pocket savings are estimated by subtracting the fare from out-of-pocket costs.

6.2.2 Assumptions

As described above, travel-time savings are due to VOT and reduction in travel-time. The VOT is estimate by a weighted average of personal and business VOT.

Table 8: VOT Assumption

Evaluation Metric	Value	Source
Value of Time (Local Travel), $ per hour	$13.0	US Census, BLS, US DOT
Real Growth Rate	1.6%	US DOT

The reduction in travel-time is a function of speed and distance. The speeds for all modes vary throughout the study horizon as more travelers divert to streetcars and congestion on the roads decreases. The average trip length is based on the total number of ridership and the total miles traveled for both alternatives.

Table 9: Average Trip Length

Alternative	Value (miles)	Source
Full-Build	1.64	HDR Travel Demand Model

Out of pocket costs are estimated using consumption rates for fuel, oil, tires, maintenance, and depreciation and are a function of vehicle speed. Unit costs are then applied to these consumption rates to calculate out-of-pocket costs. The table below lists these unit costs along with other out-of-pocket costs such as parking and streetcar fares.

Table 10: Out of Pocket Cost Assumptions, in 2011 Dollars

Out of Pocket Cost Components	Value	Source
Fuel ($ per gallon) *	$3.46	AAA Fuel Gauge, 2011
Oil ($ per liter)	$8.7	US DOT, FHWA HERS-ST
Tires ($ per 4 tires)	$367.8	US DOT, FHWA HERS-ST
Maintenance ($ per 1000 mi)	$157.8	US DOT, FHWA HERS-ST
Depreciation (avg. depreciable cost per vehicle)	$21,258	US DOT, FHWA HERS-ST
Parking	$5.39	HDR Assumption
Streetcar Fare	$1.00	City of Cincinnati

*Note: * the fuel cost estimate used in this BCA includes taxes but does not include any external costs, such as those considered by NHTSA in its regulatory impact analysis of corporate average fuel economy standards. This cost increases based on Annual Energy Outlook published by the Energy Information Administration 2011.*

6.2.3 Benefit Estimates

Travel-time cost combined with out-of-pocket cost make up the general trip cost for each traveler. The table below lists the estimated general travel cost per mile for autos, bus, and streetcar for the opening and final years of analysis. Results by calendar year for generalized cost of travel are shown on page 32.

Table 11: Generalized Cost of Travel by Mode, in 2011 Dollars

Mode of Transportation	Opening Year Cost per Trip	Final Year Cost per Trip
Auto (Base Case)	**$4.46**	**$5.31**
Time	$0.98	$1.72
Out of Pocket	$3.48	$3.59
Auto (Alternative)	**$4.34**	**$4.84**
Time	$0.87	$1.30
Out of Pocket	$3.47	$3.54
Bus	**$1.11**	**$1.37**
Time	$0.50	$0.76
Out of Pocket (Fare)	$0.61	$0.61
Streetcar	**$1.11**	**$1.37**
Time	$0.50	$0.76
Out of Pocket (Fare)	$0.61	$0.61

The second table lists the savings calculated from each traveler who remain auto users and those who divert to streetcar. The estimate $38.9 million Study Period cost savings (when low-income passengers are included) translate to per automobile trip avoided saving of $2.84. Induced riders are included in these benefits. Since induced riders previously did not travel, and therefore have no generalized trip cost, their willingness to pay is assumed to be half of the "next best" alternative ("rule of the half"). The next best alternative is considered to be bus because it is the cheapest transit other than streetcar.

Table 12: Generalized Cost of Travel Savings by Mode, in Millions of 2011 Dollars

Beneficiaries	Opening Year	Over the Project Study Period	
		In Constant Dollars	Discounted at 7 Percent
Remaining Roadway Users	$237,965	$11,741,475	$4,557,389
Diverted from Autos	$1,526,035	$36,373,724	$16,181,571
Diverted from Bus	$28,063	$1,400,095	$541,187
Diverted from Taxi	$668,577	$14,952,371	$6,750,968
Economic Value to Induced Riders	$30,883	$2,430,559	$920,520
Total Generalized Travel Cost Savings	**$2,491,523**	**$66,898,224**	**$28,951,636**

This table does not include benefits to low-income passengers. These benefits are catalogued under Low-Income Mobility located in Table 21. They are separated due to the categorization of TIGER benefits.

6.3 Livability

Community cohesiveness stems from individuals' mobility and goods and services' accessibility. The proposed project would contribute to enhancing livability and quality of life in the study area through community development and low income mobility.

6.3.1 Methodology

A majority of benefits from the transit alignment result from economic development of the community and appreciation of land and building values to nearby properties. This type of benefits is associated with the amenity effect of the transit line, which is found to induce property value appreciation that is often referred to as transit premium.

For a new[5] property near the transit alignment, its market price or rental rate at the time of purchase or lease is assumed to capture the expected Study Period stream of benefits. The amount of transit premium is then realized by the property owner or lessee annually at an increasing rate to reflect growing certainty over time. As a result of these two assumptions, the transit premium rate (as a percentage of property value) is applied once to the price of new

[5] A new property is one that is newly impacted by transit. All existing properties are considered new in the first year of transit operation, while only those that are newly constructed in subsequent years will be considered for the remaining Study Period of the transit alignment.

property only, and the dollar amount of benefits is spread over the analysis horizon, subject to time discounting.

There are five key components in estimating transit premium: property number and growth rate, property value and growth rate, and transit premium rate. The first four are derived through historic, current, and forecast (or planned) land use and property data of the impact area. These estimates are assumed to remain unchanged with or without transit. The last component, transit premium rate, is estimated based on current literature of transit impacts on property value generated by comparable systems. Since many studies rely on data after transit opening, this analysis only applies the transit premium rates to new properties after streetcar opening and not during construction.

To standardize the results from the various studies, the premium rates found are weighted by each the corresponding system ridership and city population. Table 13 provides the list of geographically relevant studies and corresponding premiums applied in this BCA.

Table 13: Transit Premium Studies

System	City	Ridership	City Population	Rider/ Population Ratio	Premium Applicable	
					Residential	Commercial
DART	Dallas, TX	229,200	2,412,827	9.50%	12.20%	
LRT-Downtown	San Diego, CA	103,900	3,001,072	3.46%	5.10%	4.40%
LRT- North	San Diego, CA	103,900	3,001,072	3.45%		71.90%
LRT	Los Angeles, CA	136,400	3,849,378	3.54%		0.65%
LRT	San Jose, CA	34,400	929,936	3.70%	45%	
LRT	St. Louis, MO	59,000	347,181	16.99%	32%	
LRT	Metro, AZ	42,300	1,512,986	2.80%	7%	

- Weinstein, Bernard and Clower, Terry (2002), “An Assessment of the DART LRT on taxable property valuations and transit oriented development.” *Center for Economic Development and Research, University of North Texas*.
- Cervero R and Duncan M (2002c) “Land Value Impacts of Rail Transit Services in San Diego County.” *Report prepared for the National Association of Realtor and the Urban Land Institute.*
- Cervero, R and Duncan, M (2002a), “Transit’ Value-added: Effects of Light and Commuter Rail Services on Commercial Land Values.” *Transportation Research Record* 1805, 1-18.
- Weinberger, R. "Light Rail Proximity: Benefit Or Detriment in the Case of Santa Clara County, California?" *Transportation Research Record* 1747, (2001): 104-113.
- Garrett, T., 2004. “Light-Rail Transit in America: Policy Issues and Prospects for Economic Development.” *St. Louis: Federal Reserve Bank of St. Louis*, pp.1-30.
- Atkinson-Palombo, C. (2010). "Comparing the Capitalisation Benefits of Light-rail Transit and Overlay Zoning for Single-family Houses and Condos by Neighbourhood Type in Metropolitan Phoenix, Arizona". *Urban Studies*, Vol (47) No11.

Property prices are multiplied by the transit premium rates to compute lifetime amount of value appreciation due to the streetcar project. For any property, it will take 20 years (assumption based on average mortgage term for residential homes) for all premiums to be realized, independent of this BCA's horizon. The rate at which premium amount is realized over time is computed following Table 14. The first ten years of streetcar service is assumed to be a ramp-up period and the ramp-up parameters (*a* and *b*) are chosen for formulation continuity.

Table 14: Economic Development Estimation

Time Horizon	Formulation
First Ten Years	a * Property Price* Transit Premium Rate / b + (1-a) Property Price* Transit Premium Rate / b *(Years of Service+1)/ (Years of Gradual Realization+1)
Rest of Realization Years (=20)	Property Price* Transit Premium Rate / b
Parameters: a=0.3, b=26.5	

In terms of Low Income Mobility, it is the portion of General Travel Cost Savings from low income riders and is not additive to the estimated overall benefits. Low income riders tend to benefit the most from additional transit implementation in urban areas.

6.3.2 Assumptions

The following tables show the assumptions for the estimation of livability benefits. Unless noted otherwise, all the average values provided here are weighted estimates by streetcar analysis zone- the definition of these zones and assumptions by zone are presented in Section 9.10.

Presented in Table 15 are the opening year baseline property data obtained from the City of Cincinnati, mapped to the study area using a 0.25-mile buffer from the alignment using ESRI ArcGIS. A full data set for property values and growth rates are located in the back of the document on page 37. The values used in the tables for this section are weighted averages that summarize the zones near the alignment.

Table 15: Property Assumptions by Type

In Year 2010	Property Type			
	Residential	Commercial	Condos	Total
Property Number	2,683	3,338	393	6,414
Average Property Value, in 2011 Dollars	$283,893	$713,982	$219,246	$503,742

In terms of future property value growth, the estimates for residential homes are based on Federal Housing Finance Agency Home Price Index Price Index from 2001 to 2041, adjusted for inflation. As for commercial properties, the rates are estimated from Moody's Real Commercial Price Index (excluding apartments) from 2001 to 2011, adjusted for inflation. Since there is no updated construction rate forecast from the City of Cincinnati, the rates at which construction grows are based on projected value growth rates as discussed. The growth rate for construction of commercial property however, is adjusted downwards to reflect the number of distressed properties that are underdeveloped. These estimates are uniform across all zones and are reported in Table 16.

Table 16: Property Growth Rates

Property Number Growth Rate			Property Value Growth Rate		
Residential	Commercial	Condos	Residential	Commercial	Condos
2.37%	2.21%	2.97%	2.37%	2.51%	2.97%

Based on the state of the real estate market recovery in Ohio, the transit premium rates selected from the list of studies presented earlier are of the conservative range. The rates that are applied reflect the economic development potential due to the streetcar and they are presented in Table 17.

Table 17: Transit Premium Rates

Residential	Commercial	Condos
5.62%	8.8%	3.39%

Generalized travel cost savings to low income riders are considered as Livability Benefits in this BCA. Low Income Mobility benefits stems from the diversion of low income riders comes from bus, another inexpensive transit option. The table lists the assumption made on the percentage of low income riders on the Cincinnati Streetcar.

Table 18: Low Income Ridership

Evaluation Metric	Value	Source
Low Income Ridership	21.9%	U.S. Census Bureau, 2009 American Community Survey

6.3.3 Benefit Estimates

Over the study horizon there will be $407.7 million non-discounted economic development benefits generated by the streetcar project. The majority of the estimated premium amount will be due to commercial development, summing to about $330 million, which is over 81 percent of the total for all property types. Table 19 provides the estimated transit premium amount by property type.

Table 19: Community Development Benefits, in Millions of 2011 Dollars

Property Type	Over the Project Study Period		Percent Total
	In Constant Dollars	Discounted at 7 Percent	
Residential	$250.8	$72.1	18%
Commercial	$1,145.6	$330.1	81%
Condos	$19.2	$5.5	1%
Total	**$1,415.7**	**$407.7**	**100%**

The community development benefits presented so far may capture other impacts of the streetcar that are also capitalized in property values. These other impacts are indeed estimated in this analysis and they include travel-time savings as well as vehicle-operating cost savings. To avoid double-counting and provide to the conservative estimates in the BCA, only 50 percent of the estimated amount is included in the BCA[6] and this amounts to about $203.8 million. Details of the estimation can be found in Table 20.

Table 20: Benefits of Community Development, Discounted at 7 Percent, in Millions of 2011 Dollars

Property Type	Average Property Value in Year 2015 (discounted 2011$)	Number of Properties Affected in Year 2015	20-Year Lifecycle Benefits ($ millions, discounted 2011$)	20-Year Lifecycle Benefits NET of Capitalized Travel Cost Savings ($ millions, discounted 2011$)
Residential	$865,197	3,020	$72.1	$36.1
Commercial	$775,800	3,670	$330.1	$165.0
Condos	$275,173	460	$5.5	$2.7
Total	**$835,076**	**7,150**	**$407.7**	**$203.8**

The Low Income Mobility General Travel Cost Savings are listed in the table below.

Table 21: Low Income General Travel Cost Savings, in Millions of 2011 Dollars

Low Income General Travel Cost Savings	Opening Year	Over the Project Study Period	
		In Constant Dollars	Discounted at 7 Percent
Diverted from Autos	$109,099	$2,600,434	$1,156,854
Diverted from Bus	$29,620	$1,477,743	$571,201
Diverted from Taxi	$84,681	$1,893,852	$855,071
Economic Value to Induced Riders	$8,660	$681,552	$258,123
Total	**$232,060**	**$6,653,581**	**$2,841,249**

6 Lewis-Workman, S. and D. Brod. 1997. Measuring the Neighborhood Benefits of Rail Transit Accessibility. Transportation Research Record 1576. P.147-153.

6.4 Environmental Sustainability

By reducing local and regional dependency on other forms of motorized vehicles and thus improving energy efficiency, the proposed streetcar project generates positive environmental impacts in addition to the roadway impacts.

6.4.1 Methodology

Reduction in emission volumes are dependent upon the reduction in vehicle-miles resulting from diversion to the streetcar. The emission rates used in this BCA are obtained from Motor Vehicle Emission Simulator (MOVES)- a tool provided by the Environmental Protection Agency. Per-unit emission costs are applied to the emission reduction volumes due to the reduction in VMT caused by modal shifts. Emissions from streetcar operations are assumed negligible.

6.4.2 Assumptions

There are six types of emissions being measured; carbon monoxide (CO), volatile organic compounds (VOC), nitrogen oxide (NOx), fine particulate matter (PM 2.5), sulfur dioxide (SO2), and carbon dioxide (CO2). The value of each of these emissions is shown in the table below.

Table 22: Emissions Cost

Pollutant	Cost per Metric Ton*	Source
Carbon Monoxide (CO)	-	Negligible
Volatile Organic Compound (VOC)	$1,543	Final Regulatory Impact Analysis Corporate Average Fuel Economy for MY 2012-MY 2016 Passenger Cars and Light Trucks, March 2011; inflated to 2011 Dollars
Nitrogen Oxides (NOx)	$ 6,305	
Fine Particulate Matter (PM2.5)	$344,737	
Sulfur Dioxide (SO2)	$36,850	
Carbon Dioxide (CO2)	$37	Interagency Working Group on the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866; inflated to 2011 Dollars; average over 2015 – 2050

*Note: * Converted from source into 2011 Dollars.*

6.4.3 Benefit Estimates

Table 23 shows the emissions reductions in metric tons.

Table 23: Emissions Reductions

Pollutant	Opening Year Tons Reduced	Study Period Tons Reduced
Nitrogen Oxides (NOx)	0.81	7.85
Particulate Matter (PM)	0.03	1.14
Sulfur Dioxide (SO2)	0.02	0.42
Volatile Organic Compound (VOC)	0.13	1.43
Carbon Dioxide (CO2)	1453.35	28,454.81

Table 24 indicates the monetized values for the Study Period of the project in discounted and non-discounted values. Total Study Period emissions reductions savings accrue to $892,004. Details of annual emissions reductions and savings are shown on pages 34 and 35, respectively. The total emissions reduction savings per automobile trip avoided amount to about $0.09.

Table 24: Emissions Cost Savings, Opening Year and Study Period, in Millions of 2011 Dollars

Pollutant	Over the Project Study Period	
	In Constant Dollars	Discounted at 7 Percent
Nitrogen Oxides (NOx)	$37,078	$20,202
Particulate Matter (PM)	$160,755	$70,633
Sulfur Dioxide (SO2)	$20,114	$8,936
Volatile Organic Compound (VOC)	$1,903	$999
Carbon Dioxide (CO2)	$1,174,768	$791,235
Total	**$1,394,617**	**$892,004**

6.5 Safety

An efficient and reliable transit system eliminates the likelihood of surface transportation-related accidents, as other forms of motorized vehicles are expected to reduce in number.

6.5.1 Methodology

The reduction of accident costs, like other variable costs, is dependant on the reduction of vehicle-miles traveled. The reduction in vehicles on the road is combined with a multiplier or per-unit of cost accident. This multiplier is a weighted average of fatal, injury, and property damage only (PDO) accidents.

6.5.2 Assumptions

The number of accidents that are expected to be reduced due to the project are estimated using inputs from the Bureau of Transportation Statistics[7] and the cost associated with each type of accidents are as stated in NOFA. A real income-adjusted growth rate of 0.88% is applied to the costs applied.

Table 25: Accident Cost Savings Assumption

Type of Accident	per 100 Million VMT	Type of Cost	2011$ per Injury
Injured Persons	78.9	MAIS 1 - Minor injury	$18,600
		MAIS 2 - Moderate injury	$291,400
		MAIS 3 - Serious injury	$651,000
		MAIS 4 - Severe injury	$1,649,200
		MAIS 5 - Critical injury	$3,676,600
Fatality	1.3	MAIS 6 - Fatal	$6,200,000
Crashes*	195.4	PDO - Highway accidents	$3,368

*Note:*Includes injuries and fatality.*

6.5.3 Benefit Estimates

In the analysis, the 13.7 million automobile trip reductions (which equates to 17.2 million diverted riders) will generate over $3.6 million in discounted benefits over twenty years, which amounts to almost $0.32 per automobile trip avoided. Page 36 shows the annual results.

Table 26: Accident Cost Savings

Evaluation Metric	Opening Year	Study Period
VMT Avoided	1,014,979	22,545,417
Accident Cost Savings, in 2011 Dollars	$333,962	$8,096,433
Accident Cost Savings, discounted at 7 percent	$272,612	$3,591,748

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[7] BTS National Transportation Statistics 2008 BTS Motor Vehicle Safety Data Table 2-17 (http://www.bts.gov/publications/national_transportation_statistics/#chapter_2)

7. Summary of Findings and BCA Outcomes

The table below summarizes the BCA findings. Annual costs and benefits are computed over a long-run planning horizon and summarized over the study period of the analysis. The project is assumed to have a useful life of at least 40 years; here, the time horizon is used in the analysis is 20. Construction is expected to be completed in 2014 but operating costs continue through the whole horizon of the project. Benefits also accrue during the full operation of the project.

Included in the total benefits from State of Good Repair, Economic Competitiveness, Livability, Environmental Sustainability, and Safety – are Fare Revenues. Fare revenues, or Agency Benefits are included because agencies use this income to offset operational costs. While fare revenue is considered a transfer of funds between the riders and the agency, not including it in the benefits could lead to double-counting of operational costs.

Details of annual BCA results are shown on page 28.

Table 27: Overall Results of the Benefit Cost Analysis- Full Alignment

Project Evaluation Metric	7% Discount Rate	3% Discount Rate
Total Discounted Benefits (millions $)	$264.72	$458.19
Total Discounted Costs (millions $)	$178.66	$198.24
Benefit / Cost Ratio	1.48	2.31
Net Present Value (millions $)	$86.06	$259.95
Internal Rate of Return (%)	9.65%	
Payback Period (years)*	13	

*Notes: * Estimated on the basis of non-discounted benefits and costs*

Considering all monetized benefits and costs, the estimated rate of return is 9.6 percent. At a seven percent discount rate, a $178.7 million investment is expected to result in $264.7 million benefits and with benefit to cost ratio of approximately 1.48. At a three percent discount rate, a $198.2 million investment results in over $458.2 million in benefits and with the benefit to cost ratio of approximately 2. 31.

The following table shows the benefits estimates of the full alignment by category. Community development, at $203.8 million discounted at 7 percent, is the largest benefit category for the Cincinnati Streetcar. User cost savings of $29.0 million discounted at 7 percent is the next largest.

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Table 28: Benefit Estimates by Long-Term Outcome for the Full Alignment

Long-Term Outcomes	Benefit Categories	7% Discount Rate	3% Discount Rate
State of Good Repair	Pavement Maintenance Savings	$0.01	$0.02
	Residual Value	$2.64	$6.35
Economic Competitiveness	User Cost Savings*	$28.95	$45.54
Livability	Community Development	$203.84	$361.33
	Low Income Mobility**	$2.84	$4.50
Environmental Sustainability	Reductions in Air Emissions	$0.89	$0.94
Safety	Accident Reduction	$3.59	$5.57
Agency Benefits	Fare Revenues	$21.96	$33.95
Total Benefits		**$264.72**	**$458.19**

*Notes: * travel time savings plus out-of-pocket cost savings; ** benefits of low income mobility are not calculated in the total, as they are a subset of User Cost Savings.*

To demonstrate how the benefits of the project might be distributed, the following table shows the distribution of benefits by US Census Tract population. These areas of City of Cincinnati have been greatly impacted by the real estate market. Analysis of American Community Survey 2005-2009 data shows the weighted average of the median household income for all tracts (weighted by population) within the streetcar study area is less than Cincinnati. The following table shows these socioeconomic variables and the distribution of benefits by tract and it suggests that over sixty percent of the benefits from the project will be distributed to residents with less than average income (tract 1, 2, 6, and 7) in the City of Cincinnati.

Table 29: Distribution of Benefits and Assessment of Equity Impacts

Analysis Zone	Median Household Income ($2011)	Median Owner Occupied Home Value ($2011)	Non-While Population Percentage	Total Benefits (Millions of 2011$)	Distribution of Benefits*
Census Tract 1	$43,515	$366,875	9%	$7.8	3%
Census Tract 2	$38,179	$223,345	48%	$47.2	18%
Census Tract 3	$34,970	$138,294	64%	$6.6	3%
Census Tract 4	$12,096	$121,008	90%	$8.5	3%
Census Tract 5	$30,261	$208,528	61%	$14.7	6%
Census Tract 6	$12,621	$259,302	78%	$12.8	5%
Census Tract 7	$9,701	$83,569	84%	$22.7	9%
Census Tract 8	$7,776	-	84%	$9.1	3%
Census Tract 9	$16,187	$111,129	72%	$18.1	7%
Census Tract 10	$25,927	$137,702	25%	$31.9	12%
Census Tract 11	$24,794	$161,804	17%	$58.0	22%
Census Tract 12	$14,929	-	41%	$27.2	10%
Area Average	**$23,952**	**$148,975**	**46%**	**$264.7**	**100%**

*Note: * Weighted average of Census Tract Population*

8. Economic Impact Analysis

8.1 Short-Term Economic Impacts from Project Development and Construction Spending

The Minnesota IMPLAN Group's input-output model has been used to estimate the direct, indirect and induced effects of the Cincinnati Streetcar, in terms of employment, labor income and value added. Employment represents full-time and part-time jobs created for a full year. This section describes the approach and presents the results for the Full Build Alternative.

Labor income consists of employee compensation (wage and salary payments as well as health and life insurance, retirement payments and any other non-cash compensation) and proprietary income (payments received by self-employed individuals as income). Value added represents total business sales (output) minus the cost of purchasing intermediate products and is roughly equivalent to gross regional/domestic product.

The project is expected to generate 1,580 job-years during the development phase. Job years are defined by the total number of labor hours created divided by a standard annual labor output per worker (2,080 hours). It is also expected to create $107.3 million in value added, including $80.4 million in labor income. A breakdown of short-term impacts by type of effect (direct, indirect and induced) is provided in Table 30 below.

Table 30: Direct, Indirect, and Induced Impacts during Project Development Phase

	Spending (Millions of 2011 Dollars)	Direct	Indirect	Induced	Total
Employment*	$116.3***	900	308	372	1,580
Labor Income**		$47.0	$17.6	$15.9	$80.4
Value Added**		$53.3	$25.7	$28.3	$107.3

*Note: * Employment impacts from IMPLAN reflect total employment (full time plus part time). On average, the ratio of FTE to total employment is estimated at 90 percent. **Millions of Dollars of 2011. ***Only construction costs expected to create local employment are applied, which is less than total costs.*

Another method to estimate job-years from additional spending uses the Council of Economic Advisors' (CEA) methodology as presented in a 2009 analysis[8]. This method assumes that for every $92,000 of government spending, one job-year is created. The following table shows the difference in job-year estimates using the IMPLAN and CEA methodologies. Note that the employment impacts are lower (1,264 job years) when using CEA's approach.

[8] Executive Office of the President, Council of Economic Advisers, "Estimates of Job Creation from the American Recovery and Reinvestment Act of 2009," Washington, D.C., May 11, 2009.

Table 31: Job Year Estimates with IMPLAN and CEA Methodology

	Spending (Millions of 2011 Dollars)	Direct	Indirect	Induced	Total
IMPLAN *	$116.3	900	308	372	**1,580**
CEA		809		455	**1,264**

*Note: * Employment impacts from IMPLAN reflect total employment (full time plus part time). On average, the ratio of FTE to total employment is estimated at 90 percent. **Millions of Dollars of 2011.*

A breakdown of short-term economic impacts (IMPLAN estimates) in terms of employment (job-hours), labor income and value added is provided by quarter in Table 32 below.

Table 32: Short-Term Economic Impacts Resulting from Project Development

Period	Spending (Millions of 2011 Dollars)*	Total Job-Hours**	Direct Job-Hours**	Total Labor Income (Millions of 2011 Dollars)	Total Value Added (Millions of 2011 Dollars)
2012 - Q1	$4.39	106,363	60,571	$3.0	$4.1
2012 - Q2	$4.39	106,363	60,571	$3.0	$4.1
2012 - Q3	$8.76	212,241	120,866	$6.1	$8.1
2012 - Q4	$7.68	186,075	105,965	$5.3	$7.1
2013 - Q1	$10.97	265,786	151,358	$7.6	$10.1
2013 - Q2	$14.25	345,256	196,614	$9.9	$13.1
2013 - Q3	$14.25	345,256	196,614	$9.9	$13.1
2013 - Q4	$20.47	495,957	282,434	$14.2	$18.9
2014 - Q1	$7.76	188,013	107,068	$5.4	$7.2
2014 - Q2	$14.62	354,220	201,719	$10.1	$13.5
2014 - Q3	$8.77	212,484	121,004	$6.1	$8.1
Total	**$116.3**	**2,818,014**	**1,604,784**	**$80.4**	**$107.3**

*Notes: * Includes engineering ($14.9 million), construction ($63.7 million), and utilities ($37.7 million); ** Assuming average weekly hours of 34.3 (Bureau of Labor Statistics estimate).*

Table 33 below presents the short-term increase in employment and labor income resulting from the project development in key industries employing low-income people. 1,156 cumulative job-years (or 73 percent of total job-years) are expected to be created in those industries by the end of 2014, bringing in an additional $54.7 million in labor income.

Table 33: Short-Term Impacts in Key Industries Employing Low-Income People

Sectors	Employment (Job-Years)	Labor Income (Millions of 2011 Dollars)
Agriculture, forestry, fishing and hunting	0	$0.0
Construction	905	$47.2
Retail trade	86	$2.8
Truck transportation	10	$0.5
Administrative and support and waste management and remediation services	65	$1.9
Nursing and residential care facilities, home health care services	30	$0.9
Accommodation and food services	51	$1.1
Personal and laundry services	9	$0.4
Total	**1,156**	**$54.7**

8.2 Long-Term Economic Impacts from New Operations

In addition to short-term job creation, the operation and maintenance of the Cincinnati Streetcar is expected to generate long-term employment opportunities. Unlike jobs associated with the development and construction of the project, these jobs are expected to exist throughout the useful life of the project (20 years).

Table 34 below presents estimates of the long-term employment impacts resulting from the operation and maintenance of the project.

Table 34: Long-Term Job Creation

	Annually	Total over 20 Years of Operations
Net incremental spending (Millions of 2011 Dollars)	$3.2	$64.6
Total Annual jobs created	27	

9. Supplementary Data Tables

This section breaks down all benefits associated with the five long-term outcome criteria (State of Good Repair, Economic Competiveness, Livability, Sustainability, and Safety) in annual form for the Cincinnati Streetcar Project. Supplementary data tables are also provided for some specific benefit categories. For example, tables providing estimates of annual emission reductions (in tons) are provided under Environmental Sustainability.

9.1 Annual Estimates of Total Project Benefits and Costs

Calendar Year	Project Year	Total Undiscounted Benefits	Total Undiscounted Costs	Undiscounted Net Benefits	Discounted Net Benefits at 7%	Discounted Net Benefits at 3%
2012	1	$0	$53,463,768	-$53,463,768	-$53,463,768	-$53,463,768
2013	2	$0	$89,476,770	-$89,476,770	-$83,623,149	-$86,870,650
2014	3	$0	$13,382,077	-$13,382,077	-$11,688,424	-$12,613,891
2015 – opening year	4	$9,467,952	$3,230,000	$6,237,952	$5,096,312	$5,708,610
2016	5	$10,957,337	$3,230,000	$7,727,337	$5,900,661	$6,865,639
2017	6	$12,570,900	$3,230,000	$9,340,900	$6,666,578	$8,057,542
2018	7	$14,394,517	$3,230,000	$11,164,517	$7,447,104	$9,350,107
2019	8	$16,455,881	$3,230,000	$13,225,881	$8,245,120	$10,753,851
2020	9	$18,658,063	$3,230,000	$15,428,063	$8,988,905	$12,179,056
2021	10	$21,139,714	$3,230,000	$17,909,714	$9,752,195	$13,726,304
2022	11	$23,942,879	$3,230,000	$20,712,879	$10,540,716	$15,412,327
2023	12	$27,092,125	$3,230,000	$23,862,125	$11,348,848	$17,238,507
2024	13	$30,638,263	$3,230,000	$27,408,263	$12,182,509	$19,223,604
2025	14	$34,682,450	$3,230,000	$31,452,450	$13,065,306	$21,417,588
2026	15	$37,600,910	$3,230,000	$34,370,910	$13,343,992	$22,723,220
2027	16	$40,831,635	$3,230,000	$37,601,635	$13,643,575	$24,135,059
2028	17	$44,431,488	$3,230,000	$41,201,488	$13,977,614	$25,675,405
2029	18	$48,404,939	$3,230,000	$45,174,939	$14,323,357	$27,331,581
2030	19	$52,804,580	$3,230,000	$49,574,580	$14,690,347	$29,119,841
2031	20	$57,698,923	$3,230,000	$54,468,923	$15,084,890	$31,062,866
2032	21	$63,141,032	$3,230,000	$59,911,032	$15,506,681	$33,171,286
2033	22	$69,190,576	$3,230,000	$65,960,576	$15,953,613	$35,457,060
2034	23	$75,933,229	$3,230,000	$72,703,229	$16,433,993	$37,943,270
2035	24	$12,524,363	$0	$12,524,363	$2,641,975	$6,345,992
Total		**$722,561,756**	**$220,922,614**	**$501,639,142**	**$86,058,953**	**$259,950,406**

9.2 Annual Demand Projections

Year	Project Year	Total Daily Trips	Diverted from Auto	Diverted from Bus	Diverted from Taxi	Induced Demand
2015 – opening year	4	6,292	2,575	1,459	257	2,000
2016	5	6,802	2,607	1,477	261	2,458
2017	6	7,123	2,640	1,496	264	2,724
2018	7	7,473	2,673	1,514	267	3,019
2019	8	7,856	2,706	1,533	271	3,346
2020	9	7,943	2,733	1,549	273	3,388
2021	10	8,031	2,760	1,564	276	3,430
2022	11	8,120	2,788	1,580	279	3,473
2023	12	8,210	2,816	1,596	282	3,517
2024	13	8,301	2,844	1,612	284	3,561
2025	14	8,384	2,872	1,628	287	3,596
2026	15	8,467	2,901	1,644	290	3,632
2027	16	8,552	2,930	1,660	293	3,669
2028	17	8,638	2,959	1,677	296	3,705
2029	18	8,724	2,989	1,694	299	3,742
2030	19	8,811	3,019	1,711	302	3,780
2031	20	8,899	3,049	1,728	305	3,817
2032	21	8,988	3,080	1,745	308	3,856
2033	22	9,078	3,110	1,763	311	3,894
2034	23	9,169	3,142	1,780	314	3,933
Total		**163,862**	**57,193**	**32,409**	**5,719**	**68,541**

9.3 Annual Demand and Revenue to Transit Agency

Calendar Year	Project Year	Annual Ridership	Non Discounted Revenue	Revenue Discounted at 7%
2015 – opening year	4	1,887,515	$1,887,515	$1,540,775
2016	5	2,040,733	$2,040,733	$1,556,866
2017	6	2,136,926	$2,136,926	$1,523,599
2018	7	2,241,982	$2,241,982	$1,493,927
2019	8	2,356,841	$2,356,841	$1,467,722
2020	9	2,382,919	$2,382,919	$1,386,881
2021	10	2,409,290	$2,409,290	$1,310,494
2022	11	2,435,955	$2,435,955	$1,238,316
2023	12	2,462,920	$2,462,920	$1,170,115
2024	13	2,490,186	$2,490,186	$1,105,673
2025	14	2,515,088	$2,515,088	$1,043,672
2026	15	2,540,239	$2,540,239	$985,149
2027	16	2,565,642	$2,565,642	$929,907
2028	17	2,591,298	$2,591,298	$877,762
2029	18	2,617,211	$2,617,211	$828,542
2030	19	2,643,383	$2,643,383	$782,082
2031	20	2,669,817	$2,669,817	$738,227
2032	21	2,696,515	$2,696,515	$696,831
2033	22	2,723,480	$2,723,480	$657,756
2034	23	2,750,715	$2,750,715	$620,873
Total		**49,158,657**	**$49,158,657**	**$21,955,167**

9.4 State of Good Repair: Annual Benefit Estimates

Calendar Year	Project Year	Annual VMT Avoided	Pavement Maintenance Savings, non-discounted	Pavement Maintenance Savings, discounted at 7%
2015 – opening year	4	1,014,979	$1,015	$829
2016	5	1,027,666	$1,028	$784
2017	6	1,040,512	$1,041	$742
2018	7	1,053,518	$1,054	$702
2019	8	1,066,687	$1,067	$664
2020	9	1,077,354	$1,077	$627
2021	10	1,088,128	$1,088	$592
2022	11	1,099,009	$1,099	$559
2023	12	1,109,999	$1,110	$527
2024	13	1,121,099	$1,121	$498
2025	14	1,132,310	$1,132	$470
2026	15	1,143,633	$1,144	$444
2027	16	1,155,069	$1,155	$419
2028	17	1,166,620	$1,167	$395
2029	18	1,178,286	$1,178	$373
2030	19	1,190,069	$1,190	$352
2031	20	1,201,970	$1,202	$332
2032	21	1,213,989	$1,214	$314
2033	22	1,226,129	$1,226	$296
2034	23	1,238,391	$1,238	$280
Total		**22,545,417**	**$22,545**	**$10,197**

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9.5 Economic Competitiveness: Annual Benefit Estimates

Calendar Year	Project Year	Total Annual User Cost Savings Benefits, non-discounted	Total Annual User Cost Savings Benefits, discounted	Non-Discounted: Annual User Cost Savings Benefits to Remaining Auto Users	Non-Discounted: Annual User Cost Savings Benefits Street Car Users	Discounted at 7%: Annual User Cost Savings Benefits to Remaining Auto Users	Discounted at 7%: Annual User Cost Savings Benefits Street Car Users
2015 - opening	4	$2,491,523	$2,033,825	$237,965	$2,253,558	$194,251	$1,839,575
2016	5	$2,564,669	$1,956,574	$261,367	$2,303,303	$199,395	$1,757,179
2017	6	$2,642,966	$1,884,398	$288,075	$2,354,891	$205,393	$1,679,005
2018	7	$2,723,845	$1,815,013	$316,178	$2,407,667	$210,683	$1,604,330
2019	8	$2,810,608	$1,750,305	$347,056	$2,463,551	$216,129	$1,534,176
2020	9	$2,882,672	$1,677,741	$375,602	$2,507,070	$218,604	$1,459,138
2021	10	$2,956,503	$1,608,142	$405,998	$2,550,504	$220,836	$1,387,305
2022	11	$3,040,516	$1,545,644	$440,610	$2,599,905	$223,984	$1,321,660
2023	12	$3,123,515	$1,483,959	$475,974	$2,647,541	$226,132	$1,257,827
2024	13	$3,214,695	$1,427,363	$514,661	$2,700,033	$228,516	$1,198,847
2025	14	$3,307,918	$1,372,668	$555,690	$2,752,228	$230,591	$1,142,077
2026	15	$3,409,765	$1,322,366	$601,968	$2,807,797	$233,453	$1,088,912
2027	16	$3,517,330	$1,274,842	$649,916	$2,867,413	$235,560	$1,039,283
2028	17	$3,630,824	$1,229,886	$702,981	$2,927,844	$238,124	$991,762
2029	18	$3,754,307	$1,188,518	$760,544	$2,993,763	$240,769	$947,749
2030	19	$3,875,248	$1,146,546	$819,168	$3,056,079	$242,362	$904,184
2031	20	$4,010,536	$1,108,947	$884,985	$3,125,550	$244,706	$864,241
2032	21	$4,155,324	$1,073,815	$955,911	$3,199,412	$247,026	$826,789
2033	22	$4,309,555	$1,040,814	$1,032,192	$3,277,363	$249,288	$791,526
2034	23	$4,475,906	$1,010,271	$1,114,633	$3,361,274	$251,587	$758,684
Total		**$66,898,224**	**$28,951,636**	**$11,741,475**	**$55,156,749**	**$4,557,389**	**$24,394,247**

9.6 Livability: Annual Benefit Estimates

Calendar Year	Project Year	Total Discounted Benefits at 7%			
		Residential	Commercial	Condos	Total
2015 (opening)	4	$1,264,446	$5,937,322	$89,428	$7,291,197
2016	5	$1,516,357	$7,092,933	$107,813	$8,717,103
2017	6	$1,775,095	$8,274,166	$126,843	$10,176,103
2018	7	$2,040,987	$9,482,167	$146,554	$11,669,709
2019	8	$2,314,377	$10,718,136	$166,989	$13,199,503
2020	9	$2,595,624	$11,983,326	$188,192	$14,767,142
2021	10	$2,885,103	$13,279,044	$210,208	$16,374,355
2022	11	$3,183,208	$14,606,658	$233,087	$18,022,953
2023	12	$3,490,354	$15,967,596	$256,880	$19,714,830
2024	13	$3,806,973	$17,363,350	$281,643	$21,451,966
2025	14	$4,133,519	$18,849,570	$307,434	$23,290,522
2026	15	$4,249,188	$19,348,044	$318,666	$23,915,898
2027	16	$4,370,397	$19,880,016	$330,575	$24,580,987
2028	17	$4,497,411	$20,447,315	$343,201	$25,287,927
2029	18	$4,630,507	$21,051,872	$356,590	$26,038,969
2030	19	$4,769,978	$21,695,720	$370,785	$26,836,483
2031	20	$4,916,129	$22,381,003	$385,836	$27,682,969
2032	21	$5,069,279	$23,109,981	$401,795	$28,581,055
2033	22	$5,229,763	$23,885,035	$418,717	$29,533,514
2034	23	$5,397,933	$24,708,673	$436,658	$30,543,264
Total		**$72,136,629**	**$330,061,927**	**$5,477,894**	$407,676,450

Note: Benefits in this table are inclusive of user cost savings. To avoid double counting, user cost savings are deducted from the total community development benefits when these are included in the BCA calculations.

9.7 Environmental Sustainability: Annual Emissions Avoided, in Metric Tons

Calendar Year	Project Year	Nitrogen Oxides (NOx)	Particulate Matter 2.5 (PM2.5)	Sulfur Dioxide (SO2)	Volatile Organic Compounds (VOC)	Carbon Dioxide (CO2)
2015 - opening year	4	0.81	0.03	0.02	0.13	1,453
2016	5	0.70	0.03	0.02	0.11	1,442
2017	6	0.58	0.03	0.02	0.09	1,429
2018	7	0.51	0.03	0.02	0.08	1,421
2019	8	0.44	0.03	0.02	0.07	1,413
2020	9	0.40	0.03	0.02	0.07	1,405
2021	10	0.36	0.03	0.02	0.06	1,397
2022	11	0.35	0.03	0.02	0.06	1,394
2023	12	0.33	0.03	0.02	0.06	1,390
2024	13	0.32	0.03	0.02	0.06	1,390
2025	14	0.31	0.03	0.02	0.06	1,390
2026	15	0.31	0.03	0.02	0.06	1,390
2027	16	0.31	0.03	0.02	0.06	1,396
2028	17	0.31	0.03	0.02	0.06	1,403
2029	18	0.31	0.03	0.02	0.06	1,410
2030	19	0.31	0.03	0.02	0.06	1,420
2031	20	0.31	0.03	0.02	0.07	1,430
2032	21	0.31	0.03	0.02	0.07	1,442
2033	22	0.29	0.03	0.02	0.06	1,512
2034	23	0.29	0.03	0.02	0.06	1,526
Total		**1.43**	**7.85**	**0.54**	**0.42**	**28,455**

9.8 Environmental Sustainability: Annual Benefit Estimates

Calendar Year	Project Year	Nitrogen Oxide (NOx)	Particulate Matter 2.5 (PM2.5)	Sulfur Dioxide (SO2)	Volatile Organic Compound (VOC)	Carbon Dioxide (CO2)	Total Non-Discounted Savings	Total Discounted Benefits at 7%
2015 - opening year	4	$4,656	$6,706	$927	$219	$43,354	$55,862	$49,885
2016	5	$3,916	$6,773	$919	$182	$43,891	$55,681	$47,991
2017	6	$3,156	$6,840	$911	$144	$44,415	$55,467	$46,193
2018	7	$2,699	$6,945	$905	$124	$45,080	$55,753	$44,865
2019	8	$2,230	$7,051	$900	$103	$45,738	$56,022	$43,593
2020	9	$1,965	$7,130	$895	$93	$46,438	$56,521	$42,527
2021	10	$1,694	$7,210	$890	$83	$47,184	$57,061	$41,535
2022	11	$1,558	$7,325	$887	$79	$48,098	$57,947	$40,796
2023	12	$1,419	$7,441	$885	$75	$49,022	$58,842	$40,080
2024	13	$1,375	$7,535	$886	$74	$50,173	$60,044	$39,573
2025	14	$1,330	$7,631	$887	$73	$51,348	$61,270	$39,083
2026	15	$1,285	$7,727	$889	$72	$52,547	$62,519	$38,607
2027	16	$1,234	$7,891	$889	$70	$53,727	$63,810	$38,140
2028	17	$1,069	$8,787	$1,209	$65	$74,691	$85,822	$50,315
2029	18	$1,055	$8,920	$1,215	$65	$76,715	$87,970	$49,977
2030	19	$1,053	$9,049	$1,224	$66	$78,955	$90,346	$49,748
2031	20	$1,050	$9,179	$1,232	$67	$80,941	$92,470	$49,347
2032	21	$1,057	$9,297	$1,243	$68	$83,087	$94,751	$49,017
2033	22	$1,630	$10,594	$1,155	$90	$78,609	$92,077	$45,509
2034	23	$1,646	$10,726	$1,165	$91	$80,753	$94,382	$45,221
Total		**$37,078**	**$160,755**	**$20,114**	**$1,903**	**$1,174,768**	**$1,394,617**	**$892,004**

9.9 Safety: Annual Benefit Estimates

Calendar Year	Project Year	Annual VMT Avoided	Annual Accident Cost Savings, non-discounted	Annual Accident Cost Savings, discounted
2015 -opening year	4	1,014,979	$333,962	$272,612
2016	5	1,027,666	$341,112	$260,233
2017	6	1,040,512	$348,415	$248,415
2018	7	1,053,518	$355,875	$237,134
2019	8	1,066,687	$363,494	$226,366
2020	9	1,077,354	$370,360	$215,553
2021	10	1,088,128	$377,355	$205,256
2022	11	1,099,009	$384,482	$195,451
2023	12	1,109,999	$391,744	$186,115
2024	13	1,121,099	$399,144	$177,225
2025	14	1,132,310	$406,683	$168,759
2026	15	1,143,633	$414,364	$160,698
2027	16	1,155,069	$422,191	$153,021
2028	17	1,166,620	$430,165	$145,712
2029	18	1,178,286	$438,290	$138,751
2030	19	1,190,069	$446,568	$132,123
2031	20	1,201,970	$455,003	$125,812
2032	21	1,213,989	$463,597	$119,802
2033	22	1,226,129	$472,354	$114,080
2034	23	1,238,391	$481,276	$108,630
Total		**22,545,417**	**$8,096,433**	**$3,591,748**

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9.10 Detailed Tables for Livability Benefit Assumptions and Estimates

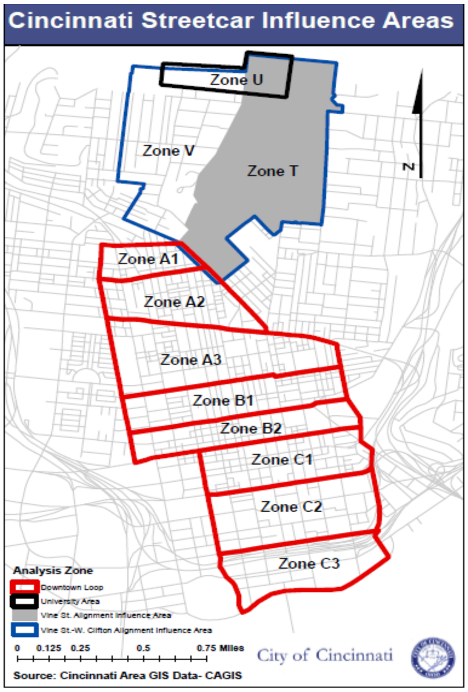
The analysis area for the project is defined by a three-city blocks buffer. The distance specified aligns with hedonic pricing literature on measuring consumer willingness to pay for the accessibility and nuisance impacts of a transit system.

There are eight zones within the Downtown Loop analysis area, and three additional zones in the Uptown Extension analysis area.

Each zone is land use and zoning-specific (if not neighborhood-specific) so that their respective development potential can be reflected in the economic development benefits.

Figure 2 is a map of the analysis zones and Table 13 provides each zone's street boundaries.

BCA Zones with respect to Project Route



Streetcar Zones Location

Streetcar Zones	Location
A1	Riverfront to 3rd Street, East to beyond Broadway, West to Elm
A2	3rd Street to 6th Street, East to beyond Broadway, West to Elm
A3	6th to 9th, East to beyond Broadway, West to Elm
B1	9th to Central Parkway, East to Broadway, West to Elm
B2	Central Parkway to 13th, East to Broadway, West to Central Parkway
C1	13th to Liberty, East to Broadway, West to beyond Central Avenue
C2	Liberty to Findlay, East to Broadway, West to beyond Central Avenue
C3	Findlay to McMicken , East to Broadway, West to beyond Central Avenue
T	Vine Street Up the Hill, West to Ohio Avenue, East to Auburn Avenue
U	University of Cincinnati Campus
V	Clifton Avenue North, West to Victor Street, East to Ohio Avenue

Baseline Property Number and Value

Streetcar Zones	Property Number			Property Value		
	Residential	Commercial	Condos	Residential	Commercial	Condos
A1	381	347	100	$111,003	$120,086	$136,476
A2	150	342	1	$81,098	$67,707	$253,250
A3	39	83	7	$61,111	$115,580	$234,690
B1	47	366	15	$339,457	$531,298	$304,446
B2	172	462	117	$146,437	$306,408	$197,584
C1	200	38	1	$1,676,044	$1,676,044	$235,694
C2	28	619	51	$2,483,736	$1,693,926	$341,030
C3	33	648	55	$2,587,953	$710,955	$305,272
T	614	274	38	$99,518	$1,216,371	$185,707
V	1,020	159	8	$110,690	$413,728	$182,893
Total	**2,683**	**3,338**	**393**	**$283,893**	**$713,982**	**$219,246**

Transit Premium Rates for the Full Alignment

Streetcar Zones	Transit Premium Rates		
	Residential	Commercial	Condos
A1	6.00%	9.37%	3.61%
A2	5.69%	8.70%	3.43%
A3	5.40%	8.50%	3.25%
B1	4.97%	7.66%	2.99%
B2	5.85%	9.11%	3.52%
C1	6.57%	10.39%	3.96%
C2	5.95%	9.70%	3.59%
C3	5.88%	9.32%	3.54%
T	4.97%	7.66%	2.99%
V	4.97%	7.66%	2.99%

Economic Development Benefits for the Full Alignment, in Millions of 2010 Dollars unless Specified Otherwise

Streetcar Zones	Residential	Commercial	Condos	Total By Zone	Percent Total
A1	$4.03	$5.96	$0.90	$10.88	**2.67%**
A2	$1.10	$3.07	$0.02	$4.19	**1.03%**
A3	$0.20	$1.24	$0.09	$1.53	**0.38%**
B1	$1.26	$22.73	$0.25	$24.24	**5.95%**
B2	$2.34	$19.64	$1.47	$23.45	**5.75%**
C1	$34.88	$10.12	$0.02	$45.02	**11.04%**
C2	$6.55	$155.21	$1.13	$162.90	**39.96%**
C3	$8.04	$65.47	$1.07	$74.58	**18.29%**
T	$4.82	$38.95	$0.45	$44.22	**10.85%**
V	$8.91	$7.67	$0.08	$16.66	**4.09%**
Total By Property	**$72.1**	**$330.1**	**$5.5**	***$407.68***	**100.00%**
Percent Total, %	**18%**	**81%**	**1%**	**100.00%**	

9.11 Partial Build Tables

Cost Schedule

Alternatives		2012	2013	2014
Partial Build	Capital Costs	$45,261,850	$67,892,775	$0
	O&M Costs			$2,540,000

Diverted Mode Split

Mode of Transportation	Opening Year Percentage of Total Ridership	Source
Diverted from Autos	43%	HDR Travel Demand Model
Diverted from Other Transit (Bus)	24%	
Diverted from Taxi	4%	
Induced Riders	28%	

Streetcar Daily Trips

Total Ridership	2014	2023	2033
Total Daily Trips	3,702	5,208	5,752
Diverted from Auto	1,597	1,768	1,953
Diverted from Bus	905	1,002	1,107
Diverted from Taxi	160	177	195
Induced Demand	1,041	2,261	2,497

Autos and VMT Reduction

Evaluation Metric	2014	2023	2033
Daily VMT Without Streetcar	9,555	10,580	11,687
Daily VMT Reduced Because of Streetcar	8,094	8,963	9,901
Daily Auto Trips Reduced	1,277	1,414	1,562

Pavement Maintenance

Evaluation Metric	Opening Year	Study Period
VMT Avoided	438,068	9,749,201
Pavement Maintenance Savings, in 2011 Dollars	$438	$9,749
Pavement Maintenance Savings, discounted at 7 percent	$383	$4,717

User Costs by Mode

Mode of Transportation	Opening Year Cost per Trip	Final Year Cost per Trip
Auto (Base Case)	**$3.90**	**$4.47**
Time	$0.67	$1.16
Out of Pocket	$3.24	$3.31
Auto (Alternative)	**$3.84**	**$4.24**
Time	$0.61	$0.96
Out of Pocket	$3.23	$3.29
Bus	**$1.38**	**$1.69**
Time	$0.51	$0.82
Out of Pocket (Fare)	$0.87	$0.87
Streetcar	**$1.38**	**$1.69**
Time	$0.51	$0.82
Out of Pocket (Fare)	$0.87	$0.87

User Costs by Savings

Beneficiaries	Opening Year	Over the Project Lifecycle	
		In Constant Dollars	Discounted at 7 Percent
Remaining Roadway Users	$124,623	$6,238,802	$2,587,013
Diverted from Autos	$830,421	$19,313,921	$9,250,746
Diverted from Bus	$8,205	$416,529	$171,876
Diverted from Taxi	$413,974	$9,227,900	$4,462,587
Economic Value to Induced Riders	$7,574	$734,044	$294,940
Total Generalized Travel Cost Savings	**$1,384,796**	**$35,931,197**	**$16,767,162**

Low-Income User Costs by Savings

Low Income General Travel Cost Savings	Opening Year	Over the Project Study Period	
		In Constant Dollars	Discounted at 7 Percent
Diverted from Autos	$59,369	$1,380,793	$661,355
Diverted from Bus	$8,660	$439,630	$181,408
Diverted from Taxi	$52,434	$1,168,797	$565,227
Economic Value to Induced Riders	$2,124	$205,833	$82,704
Total	**$122,586**	**$3,195,052**	**$1,490,694**

Emission Reduction by Tons

Pollutant	Opening Year Tons Reduced	Study Period Tons Reduced
Nitrogen Oxides (NOx)	0.43	3.63
Particulate Matter (PM)	0.01	0.49
Sulfur Dioxide (SO2)	0.01	0.19
Volatile Organic Compound (VOC)	0.07	0.65
Carbon Dioxide (CO2)	636.67	12,625.76

Emission Reduction by Savings

Pollutant	Over the Project Study Period	
	In Constant Dollars	Discounted at 7 Percent
Nitrogen Oxides (NOx)	$18,409	$10,605
Particulate Matter (PM)	$68,409	$30,200
Sulfur Dioxide (SO2)	$9,139	$4,377
Volatile Organic Compound (VOC)	$978	$562
Carbon Dioxide (CO2)	$522,507	$362,908
Total	**$619,441**	**$408,652**

Accident Savings

Evaluation Metric	Opening Year	Study Period
VMT Avoided	438,068	9,749,201
Accident Cost Savings, in 2011 Dollars	$142,882	$3,470,692
Accident Cost Savings, discounted at 7 percent	$124,798	$1,646,915

BCA Outputs

Project Evaluation Metric	7% Discount Rate	3% Discount Rate
Total Discounted Benefits (millions $)	$138.06	$229.47
Total Discounted Costs (millions $)	$133.86	$147.87
Benefit / Cost Ratio	1.03	1.55
Net Present Value (millions $)	$4.20	$81.60
Internal Rate of Return (%)	6.49%	
Payback Period (years)*	14	

Benefits by Categories

Long-Term Outcomes	Benefit Categories	7% Discount Rate	3% Discount Rate
State of Good Repair	Pavement Maintenance Savings	$0.00	$0.01
	Residual Value	$2.17	$5.02
Economic Competitiveness	User Cost Savings*	$16.77	$25.28
Livability	Community Development	$101.00	$172.27
	Low Income Mobility**	$1.49	$2.25
Environmental Sustainability	Reductions in Air Emissions	$0.41	$0.43
Safety	Accident Reduction	$1.65	$2.46
Agency Benefits	Fare Revenues	$14.58	$21.75
Total Benefits		**$138.06**	**$229.47**

Direct, Indirect, and Induced Impacts during Project Development Phase

	Spending (Millions of 2011 Dollars)	Direct	Indirect	Induced	Total
Employment*	$79.1	612	210	253	1074
Labor Income**		$31.9	$11.9	$10.8	$54.7
Value Added**		$36.2	$17.4	$19.3	$72.9

Job-Year Estimates with IMPLAN and CEA Methodology

	Spending (Millions of 2011 Dollars)	Direct	Indirect	Induced	Total
IMPLAN *	$79.1	612	210	253	**1074**
CEA		550		309	**859**

Short-Term Economic Impacts Resulting from Project Development

Period	Spending (Millions of 2011 Dollars)*	Total Job-Hours**	Direct Job-Hours**	Total Labor Income (Millions of 2011 Dollars)	Total Value Added (Millions of 2011 Dollars)
2012 - Q1	$3.1	76,077	43,324	$2.2	$2.9
2012 - Q2	$6.3	152,155	86,648	$4.3	$5.8
2012 - Q3	$11.5	279,112	158,947	$8.0	$10.6

Period	Spending (Millions of 2011 Dollars)*	Total Job-Hours**	Direct Job-Hours**	Total Labor Income (Millions of 2011 Dollars)	Total Value Added (Millions of 2011 Dollars)
2012 - Q4	$15.7	380,387	216,620	$10.9	$14.5
2013 - Q1	$15.7	380,145	216,482	$10.8	$14.5
2013 - Q2	$23.6	570,581	324,930	$16.3	$21.7
2013 - Q3	$3.2	77,047	43,876	$2.2	$2.9
Total	**$79.1**	**1,915,504**	**1,090,828**	**$54.7**	**$72.9**

Short-Term Impacts in Key Industries Employing Low-Income People

Sectors	Employment (Job-Years)	Labor Income (Millions of 2011 Dollars)
Agriculture, forestry, fishing and hunting	0	$0.0
Construction	615	$32.1
Retail trade	59	$1.9
Truck transportation	7	$0.4
Administrative and support and waste management and remediation services	44	$1.3
Nursing and residential care facilities, home health care services	20	$0.6
Accommodation and food services	35	$0.7
Personal and laundry services	6	$0.2
Total	**786**	**$37.2**

Long-Term Economic Impacts from New Operations

	O&M Expenditures
Estimated incremental spending (Millions of 2011 Dollars)	$2.5
Total jobs *	21