

## **Benefit-Cost Assessment**

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SWRTA

# Benefit-Cost Assessment

Sumter Connectivity Initiative

## Benefits Summary

The City of Sumter, South Carolina proposes to reconstruct 3.1 miles of urban arterial roadway to improve its core area of downtown, providing improved accessibility, enhanced economic potential, and travel benefits in terms of safety and travel time delay savings. The project will also include a new section of greenway that allows a non-roadway access between the core area's employment and shopping opportunities with lower-income and minority residents to the south of downtown. Both quantifiable (primary and readily monetized) and non-quantifiable (secondary) benefits are described in this report. The qualitative benefits are critical to achieving a reinvigorated downtown to attract new and enhance existing business development in the area by improving the aesthetics in the roadway corridor including lighting, streetscaping, enhanced paving materials in walking areas, and mast arm signal replacement. Like FHWA, the City of Sumter is a strong proponent of performance-based investment, and our project has been assessed thoroughly and found to have a strong rate of return on the public investment.

### Primary Benefits

Primary benefits are those that are readily monetized, and conform easily to the methodologies described in the *TIGER Benefit-Cost Analysis (BCA) Resource Guide* (FHWA, 2014). The MS-Excel™ workbook included as part of our submission assesses two categories of primary benefits only: (1) traveler savings through reductions in personal travel delay created by smoother traffic flows and fewer turning movements; and (2) reduced costs associated with lowering the rates of crashes in the study corridor.

#### OUR BENEFITS METHODOLOGY

is straightforward and conservative. It does not rely on modal shifts, residual returns on investment, assumed secondary development, environmental benefits or other externalities. While these are tangible benefits of our project, they are encapsulated in a separate discussion on secondary benefits.

The figure on the next page describes the cash flow and performance assessment of our investment. All figures reflect a 7% annual discount rate to reach 2014 net present values. The payback period is the amount of time (in years) that the project will "break even," where the projected cash flow equals the initial capital investment plus annual maintenance costs.

Table 1. Discounted (7%) Benefit-Cost Results for Crash Reduction and Travel Delays

Years	Travel Time Benefits	Crash Reduction Benefits	Annual Maintenance Costs	Total Discounted Benefits
<b>2015-2017</b>				(\$13,606,113)
2018	\$881,743	\$4,766,750	(\$41,678)	\$5,648,493
2019	\$827,704	\$4,484,501	(\$38,760)	\$5,273,445
2020	\$776,910	\$4,218,965	(\$36,047)	\$4,959,828
2021	\$729,172	\$3,969,152	(\$33,524)	\$4,664,799
2022	\$684,310	\$3,734,130	(\$31,177)	\$4,387,263
2023	\$642,156	\$3,513,025	(\$28,995)	\$4,126,186
2024	\$602,550	\$3,305,012	(\$26,965)	\$3,880,596
2025	\$565,342	\$3,109,315	(\$25,078)	\$3,649,580
2026	\$530,392	\$2,925,206	(\$23,322)	\$3,432,276
2027	\$497,564	\$2,751,999	(\$21,690)	\$3,227,873
2028	\$466,733	\$2,589,048	(\$20,171)	\$3,035,609
2029	\$437,780	\$2,435,745	(\$18,759)	\$2,854,766
2030	\$410,594	\$2,291,520	(\$17,446)	\$2,684,667
2031	\$385,068	\$2,155,834	(\$16,225)	\$2,524,678
2032	\$361,105	\$2,028,183	(\$15,089)	\$2,374,198
2033	\$338,609	\$1,908,090	(\$14,033)	\$2,232,666
2034	\$317,493	\$1,795,108	(\$13,051)	\$2,099,551
2035	\$297,675	\$1,688,816	(\$12,137)	\$1,974,354
2036	\$279,075	\$1,588,818	(\$11,288)	\$1,856,606
2037	\$261,621	\$1,494,741	(\$10,497)	\$1,745,864
2038	\$245,242	\$1,406,235	(\$9,763)	\$1,641,714
2039	\$229,875	\$1,322,969	(\$9,079)	\$1,543,764
2040	\$215,458	\$1,244,633	(\$8,444)	\$1,451,647
<b>Total Benefit-Cost</b>	<b>\$57,664,310</b>			
<b>Benefit/Cost Ratio</b>	<b>4.82:1</b>			
<b>IRR</b>	<b>35.3%</b>			
<b>Payback Period</b>	<b>2.54</b>			

PAYBACK PERIOD..... 2.5yrs.

BENEFIT-COST RATIO..... 4.82:1

INTERNAL RATE OF RETURN..... 35.3%

## Secondary Benefits

While the primary benefits for this project are compelling, these are not the only – or even the principal – advantages to undertaking the Sumter Connectivity Initiative. The following is a summary of the benefits to our project that, while more challenging to monetize, are no less tangible to our community. **Low vehicle ownership rates, high unemployment, and the presence of elderly, low-income, and mobility-impaired persons in this area** make this investment a centerpiece of an overall economic and community development strategy.

**Increased Private Investment.** Based on our experience with the similar Liberty Street Enhancement Project, our community can expect to realize improved traffic to our existing businesses downtown, as well as provide more incentives for specialty retail, Class A/B office space, and service support industries to locate in Sumter. While this category of benefit is critical to the motivation for our community to undertake the Project, monetizing benefits, assumptions of relocation effects, and estimates and timing of actual investments are highly subjective and therefore more appropriately left out of the Primary Benefits section. However, several private investors in hotel and service industries have expressed a keen interest in locating to the corridor should the Project be completed as described herein. A recent streetscaping project for Liberty Street has resulted in new restaurants and national franchises locating to the area, and property owners are renovating their establishments.

**Improved Environmental Quality.** With many people living, working and shopping in and near the study corridor, a reduction in fuel consumption and emissions through less stop-and-go (“hard acceleration”) traffic patterns is expected as a direct result of our Project. The additional walking and cycling trips will also create emissions and fuel consumption reductions.

**Increased Transit Access and Ridership.** The project includes adding new and enhancing existing transit stops for Routes 4, 5 and 8 of the Santee Wateree Regional Transit Authority. Our assessment of the impacts to ridership is a 30% increase on these three lines, partially as a result of the Project; using the same 2014 wage rate (\$13.91) applied in the primary benefits section, we can calculate the added wages valued at over \$361,000 annually.

**Increased Active Mode Share.** The importance of higher levels of physical activity in the U.S. generally, and in the South Region in particular, is well documented by the Center for Disease Control (CDC) with respect to obesity levels. The complete

### THE SECONDARY BENEFITS

of our Project include reduced air emissions, reduced fuel consumption, improving accessibility to lower-income/minority populations, increased investment potential, and increasing the use of transit, walking, and cycling as healthy alternatives to private auto travel.

street-oriented redesign of Manning Avenue, as well as the companion greenway to the east, will facilitate more walking and bicycling in the corridor. Since our study corridor connects employment and job training centers in downtown with lower-income populations with lower rates of car ownership, these new trips will be utilized as much for transportation purposes as for recreation, if not more so.

## Methodology and Data Inputs

The Primary Benefits methodology and key data inputs are described below. **Wherever possible, our method adheres to the *TIGER Benefit-Cost Analysis (BCA) Resource Guide (2014)***; any deviations from those guidelines are noted in the following discussion. Our project workbook allows for quick substitutions for the following major variables in the analysis.

### Project Characteristics and Design (source: *City of Sumter, SC*)

The City of Sumter has calculated the project length and described the type of improvements that will be made to the study corridor. This information provides inputs to the project extents (length) as well as the construction schedule with construction assumed to be completed in 2017. Hence, the first full year of project benefits was assumed to be 2018.

### Project Cost (source: *City of Sumter, SC*)

The project cost has been detailed by the City of Sumter, including the following cost items broken out into three major segments of the project extent:

- Mobilization & Traffic Control
- Demolition
- Milling and Overlay
- Concrete Curb & Gutter
- Concrete Work
- Brick Border/Paving
- Landscaping (Canopy Tree, Sod)
- Ornamental Light Poles
- Striping
- Irrigation
- 50 Bus Stops and Shelters
- Lighting coordination w/ Progress Energy
- Utility Relocation and Removal

### THE BENEFITS WORKBOOK

provided offers the review team full transparency and access to our assessment calculations for primary benefits. All variables discussed in this section can be easily modified to test alternative assumptions.

Project costs were utilized in the calculation of internal rate of return (IRR), benefit-cost ratio (BCR), and the payback period, which is a measure in years of how long it will take to recover the initial investment from the discounted cash flow of primary benefits.

#### **Median Hourly Wage and Wage Increases (source: Bureau of Labor Statistics)**

Three BLS sources were utilized to develop median wage rates, wage index increase (CPI) from January 2013 to January 2014; and wage increases:

- Bureau of Labor Statistics (BLS), May 2013 Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates, May 2013, Sumter, SC Metropolitan Area;
- CPI BLS, Detailed Report Data for January, 2014, page 93, Table 24; and
- Bureau of Labor Statistics, National Compensation Survey for South Carolina (average of 1998-2006 salary changes in four SC metropolitan areas). Although this source was used to calculate a value of 3.4% for annual wage increases, the age of the data set and the goal of keeping to a straightforward set of assumptions led to this figure being set to zero and wages were held constant to the initial 2014 value.

The adjusted BLS wage rate (13.41 in 2014\$) was justified instead of the FHWA recommended cost of travel wage rate (12.98 in 2013\$) because of the currency and specificity of the BLS data to the region in which the Project is located, compared to the national-level FHWA guidance value, and because of the higher level of professional workers, truck drivers, and bus drivers utilizing the corridor that would increase the wage rate.

#### **Average Annual Daily Traffic, Forecasts and Vehicular Delay (source: SCDOT)**

The South Carolina Department of Transportation (SCDOT) Traffic Engineering Design Review Office has provided forecasts of 2040 volumes as well as base year (2012) volumes that were interpolated on an equal share basis between 2012 and 2040 for this economic performance study. An important strength of our study is that we have assessed the roadway component of the Sumter Connectivity Initiative in three segments in order to provide more accurate estimates of both travel delay and crash benefits.

#### **Discount Rate (source: FHWA TIGER Benefit-Cost Analysis (BCA) Resource Guide)**

The FHWA guidance was utilized to apply a 7% discount rate to the revenues for both crash reductions and travel delay.

#### **Cost of Crashes (sources: National Safety Council, Estimating the Costs of Unintentional Injuries: Costs of Motor Vehicle Injuries ([www.nsc.org](http://www.nsc.org)))**

Crash data available for this corridor was not broken down by either the AIS or KABCO system that prevented the use of the FHWA guidance. Hence the average cost of property-damage only (PDO) and injury accidents were applied

using the NSC figures. However, a reasonable “middle ground” of the FHWA-recommended AIS values would likely exceed that shown in the analysis for injury accidents (\$78,900), further lending a conservative element to the results.

**Value of Statistical Life/Fatal Crash (source: *Guidance on Treatment of the Economic Value of a Statistical Life in U.S. Department of Transportation Analyses (2014)*)**

There were no fatalities that occurred in the most recent one-year crash history in this corridor; hence, the VLS figure was not used in the calculation. However, since a fatal crash is not precluded in the future, the MS-Excel™ workbook does include this value as a variable in the calculations. It is currently set to “0” and has no effect on the benefits calculations.

**Estimated Crash Reduction (source: *FHWA, Desktop Reference for Crash Reduction Factors, Table 7. Median Countermeasures*)**

The number of conflict points will be reduced by 47% as a result of replacing a center turning lane with a planted median. Conflict points, and therefore crashes, will be reduced as well. Our conservative estimate was that the number of crashes reduced would be on the order of 25% based on the FHWA *Desktop Reference for Crash Reduction Factors*, as well as considering the overall traffic calming effects of the Project.

**Estimated Maintenance Costs (sources: *South Carolina Department of Transportation, 2012-2013 Accountability Report. September 16, 2013; and City of Greenville, SC, Trails & Greenways Master Plan, Chapter 6. August 2007.*)**

Costs for maintenance of both the roadway (SCDOT Accountability Report, 2012-2013) and typical greenway (City of Greenville) were applied to each year of the forecast period. Figures used for this analysis are applied using the same discount rate (7%) as the revenue elements in the analysis.

## **Benefit/Cost Analysis for SWRTA Transit Improvements**

### **Introduction**

**The City of Sumter plans to apply TIGER 6 Discretionary Grant for 2014. One of the elements of the project improvements for the Sumter Connectivity Initiative is transit improvement. The application proposes to install bus stops, ADA compliant bus shelters with benches, along the service routes, and Electronic Message Display Board and bike racks at the Clyburn Intermodal Transportation Center/bus terminal on Harvin Street in Sumter.**

**The proposed cost of these items including materials and labor for installation is \$286,389.**

**The project corridor is located in the area with the City's highest unemployment population, high percentage of elderly people and disabled people, and the lowest vehicle ownership population per the recent ACS study (U.S. Census).**

**SWRTA fixed bus routes 4, 5 and 8 covers most of the Project Corridor from Manning Ave to N Main Street. However, South Main Street Bus Route 5 connects the down town Sumter with the disadvantaged population in South Sumter at Manning Avenue.**

**The Sumter Connectivity Initiative will connect the disadvantaged population with the employment centers, government social services, state job "re-employment" center and job training facility, county adult education for GED certification and soft skills.**

**The new construction will facilitate the public in choosing to ride transit instead of waiting for a family member to drive them or take a taxicab at a higher cost than public transit. In a rainy day, a bus stop with shelter helps a commuter to incline to ride on a bus instead of calling a taxicab. The bus schedule posted on bus stop sign poles helps visitors in town know how long the waiting time is before the bus arrives. The bench inside the bus shelter helps travelers with limited mobility, such as age or physical impairment feel comfortable waiting**

for transit services. The bicycle racks at the Clyburn Intermodal Transportation Center provide bicyclists the convenience to lock their bikes and ride. Increase in ridership is apparently inevitable as the result of these investments.

Many performance factors can be measured for the return on the investments. For example, reduction of carbon monoxide for better air quality, reduction in vehicle accidents for safety and access to employment places for economic uplift.

In light of the fact Sumter is one of the highest unemployment cities in the State of South Carolina. Therefore, in this paper, employment trips should be used as the measurement for rate of return on investment. (See *Florida Transportation Disadvantaged Services: Return on Investment Study*, March 2008)

#### Estimated percentage of ridership increment

In the summer of 2010, Santee Wateree Regional Transportation Authority (SWRTA) in cooperation with the Santee-Lynches Regional Council of Governments (SLCOG) conducted an extensive survey on transit ridership and produced a report, *Santee Wateree Regional Transportation Authority Public Transportation Study, 2010*. The report concluded, among other things, ridership can be increased substantially if certain ridership initiatives are implemented. Results are conclusive that ridership can increase at least 15% by implementing ridership initiatives such as a fare free day designed to entice choice riders to try and continue using public transit.

In accordance with the latest SWRTA ridership data, Bus Route 5 (South Main), the average monthly passenger trips rise from 496 per month in 2013 to 605 trips per month in 2014. To this end, a 22% increase in ridership this year without this TIGER grant transit improvements reflects the increasing needs for public transit.

**With the transit improvements in place, one can reasonably to believe the increase in ridership can be as high as 30%. The estimate is a conservative number.**

**Benefit/Cost Analysis**

**In order to evaluate the benefit and cost of \$286,389 investment, a look of ridership on Route 5 (South Main), Route 4 (North Main) and Route 8 (Vocational Rehab) is necessary to assess the rise of ridership.**

**In accordance with the most recent SWRTA ridership report as of February 2014, the passenger trips and ridership for Bus Route 5, 4 and 8 are shown below:**

**Bus Route 5**

**Passenger trips per month: 605**

**Number of passenger per bus day (Monday to Friday): 15**

**Projected new riders/passengers: 5**

**Bus Route 4**

**Passenger trips per month: 981**

**Number of passenger per bus day: 25**

**Projected new riders/passengers: 7**

**Bus Route 8**

**Passenger trips per month: 109**

**Number of passenger per bus day: 3**

**Projected new riders/passenger: 1**

**A total 13 new passengers are projected from the investment.**

**Total passenger trips per year for all three routes before improvement: 20,340**

**Total passenger trips per year for all three routes after improvement: 27,100**

**The calculation of economic benefits is based upon the annual salary of the new employment trips. The formula is as follow:**

**New Riders x avg Hr wage x 8 hrs day x # of work days x total number of weeks  
= Total Benefit**

**In accordance with State Department of Commerce, the average hourly wage for Sumter County is \$16.49.**

**13 x 16.49 x 8 x 5 x 52 = \$445,890**

**B/C =445890/286389=1.56 or 156% return on investment**