

Appendix 5a. Benefit / Cost Analysis (Quantitative Benefits)

Background

The proposed project includes a reconstruction of busy street that leads to the train station and downtown Waterbury into a complete street that also includes green stormwater infrastructure, reconfiguration several intersections in the area of the Waterbury train station into a more pedestrian and bike friendly environment, and the construction of a walking and biking trail along the Naugatuck River.

The detailed Benefit-Cost Analysis indicates that quantifiable benefits are 1.2 to 1.8 times the total costs of the project, as shown in Table 1.

Table 1 - Benefit Cost Summary

Metric	Nominal Sum	Present Value (3%)	Present Value (7%)
Present Value of Benefits	\$87,415,817	\$46,652,644	\$24,564,222
Present Value of Costs	\$32,410,000	\$26,002,333	\$21,359,517
Net Present Value	\$55,005,817	\$20,650,311	\$3,204,705
Benefit / Cost Ratio	2.7	1.8	1.2

Costs

The combined project will cost approximately \$28.8 million (see Table 1). However, for benefit-cost purposes the most appropriate cost to use is not the actual construction cost but the opportunity cost of the resources used to build the project. In instances in which minimum labor rates are set by law, for example, wages paid to workers are greater than the wages they could command in the open, unregulated labor market. The unregulated wage rate is the appropriate rate to use for benefit cost purposes. In this case, we have adjusted the cost down by 15 percent to account for the effect of non-market conditions in the project costs.¹ We also exclude from the benefit-cost analysis, the costs associated with right-of-way acquisition, rather than being a cost in cost-benefit terms this is a transfer and as such should be excluded from the analysis. After the market price adjustment and other adjustments, the value of the construction cost for the benefit-cost model is \$23.3 million.

¹ See, e.g., Leef, George C, "Prevailing Wage Laws: Public Interest or Special Interest Legislation?", Cato Journal, Vol. 30, No.1 (Winter 2010) [<http://www.cato.org/pubs/journal/cj30n1/cj30n1-7.pdf>]

Table 2 - Project Cost Summary

Cost Breakdown	Actual Costs	Included Costs	Capital Costs
Greenway	\$8.6	\$8.6	\$8.6
Freight Street	\$4.8	\$4.8	\$4.8
Jackson Street	\$5.3	\$5.3	\$5.3
Library Crossing	\$2.6	\$2.6	\$2.6
Meadow Street	\$1.5	\$1.5	\$1.5
Final Design	\$1.3	\$1.3	--
Right of Way	\$1.4	--	--
Administration	\$1.0	\$1.0	--
REI	\$2.3	\$2.3	--
Total Project Costs	\$28.8	\$27.4	\$22.8
Operating Costs			\$228,000

In addition to the capital costs, the project will also generate on-going annual maintenance costs. For purposes of this analysis we assume that the ongoing maintenance costs are equally to 1% of the capital construction cost per year, or \$228,000. In addition, the proposed roadway improvements of Freight Street are likely to result in reduced maintenance expenses. Freight Street is well beyond its useful life and has been in need of a major reconstruction for a number of years. As such, the road currently requires significant annual maintenance due to its age and condition; it is likely that after the complete reconstruction proposed as part of this project, the annual maintenance needs of the roadway will be reduced. Accordingly, we do not quantify roadway maintenance expenses.

We assume that the proposed project begins construction during the fourth quarter of 2014 and lasts for three years. We further assume that proposed trail opens to the public during the fourth quarter of 2017 and that the first full year of benefits is 2018.

Benefits

The project will generate benefits for several different classes of users. The improvements on Freight Street will improve traffic flow and also generate safety benefits for bicyclist and pedestrians. The traffic and intersection improvements near the train station will make it easier for train riders to get to the station, thereby increasing ridership and allowing people to substitute rail travel for automobile travel. This substitution of rail travel for automobile travel will result in a decrease in Vehicle Miles Traveled (VMT), which has several types of impacts, as discussed in more detail in the sections on State of Good Repair, Economic Competitiveness, Environmental Sustainability, and Safety. We have calculated the reduction in VMT based on automobiles not driving between the Waterbury Station and New York City. It is unlikely that all new users will travel to New York City; as such we conservatively assume that the reduction in VMT is equal to 75% of the driving distance between Waterbury and New York City, or 65 miles each way.

The walking and biking trail will also generate a whole host of benefits for the users of the trail as well as residents living near the trail. These benefits are discussed in the Quality of Life section below.

State of Good Repair

The project brings two benefits related to the state of good repair, the reduction in automobile maintenance expenses and the reduction in property damage caused by auto accidents, both of which are due to the reduction in VMT. The reduction in maintenance costs arises from less wear and tear on automobiles, reduced insurance and less need for servicing. These costs are largely proportional to the number of miles driven. The property damage refers to automobile and other damage from auto accidents. The reduction VMT means there will be fewer accidents and hence less property damage.

Economic Competitiveness

The improvement in economic competitiveness comes from a reduction in fuel consumption and the resulting reduction in oil imports from the reduced vehicle miles travelled from those individuals that switch from automobile travel to train travel as a result of pedestrian and bicycle safety improvements in the station area.

The reduction of fuel consumption is calculated by applying average fuel usage for sedans to the number of reduced VMT. The value is reflected in the price, which reflects the market cost of extracting, transporting, refining, and marketing gasoline. Environmental externalities generated by gasoline consumption are addressed in the “Environmental Sustainability” section.

Environmental Sustainability

The reduction in gasoline consumption and automobile travel has air quality benefits. The reduced gasoline consumption means there are fewer operational emissions, and that there is less particulate matter generated by tire and brake wear.

The reconstruction of Freight Street will also include the construction of green stormwater infrastructure to manage the stormwater runoff that will be generated by the improved roadway. In addition to reducing the runoff volume that will be generated by Freight Street, the bio-retention swales that will be part of the green infrastructure will also improve water quality by removing a number of pollutants from the stormwater runoff before it reaches the Naugatuck River. Stormwater runoff will be further reduced by decreasing the amount of impervious surface along Freight Street by reducing the overall roadway width from 54 to 35 feet.

Safety

The reduction in VMT will result in fewer car crashes, and hence fewer injuries and deaths from car crashes. We have used nationwide averages for deaths and injuries per VMT.

In addition, the proposed improvements to the intersections in the station area will generate additional safety benefits from a decrease in the number of car/car, car/pedestrian, and car/bike accidents in the local station area. We have used data on the number of historic accidents to conservatively estimate the number of accident reductions that will result from the improved intersections.

Quality of Life

Biking and walking trails such as the one proposed here are considered to be an amenity for local residents that generate a number of benefits.

As an amenity, the people will be willing to pay more to live near an entrance to the trail. This increased willingness-to-pay will lead to higher house prices for those houses located within a half-mile of an

entrance to the trail. To a lesser extent, the trail will be source of pride for Waterbury resident and local residents will also derive benefits just from knowing of the existence of the trail, whether or not they live near the trail.

The proposed trail will also provide a source of recreation for local residents. This will generate both recreational and health benefits for those individuals that use the trail for walking, running, and biking. In addition, the trail will also help open the Naugatuck River up to local residents and visitors alike for recreation, including fishing, kayaking and canoeing. We used commonly accepted methods from the US Army Corp of Engineers to estimate the recreational benefits. We used data on potential healthcare cost savings from increased exercise to estimate the potential healthcare cost savings that will result from the trail.