

## I. Results of Benefits-Cost Analysis

### Executive Summary

The proposed cantilevered sidewalk on the East Haddam/Haddam Swing Bridge (the Bridge), and additional sidewalk improvements, provides significant quantifiable benefits across a number of categories. The project will: reduce the need for vehicle miles traveled by residents and visitors who can now walk or bike freely through the area, greatly improve safety across and around the bridge, promote active recreation and health, spur economic development, and improve the lives and experience of the residents and visitors of Haddam and East Haddam. Overall the project creates benefits well over its costs. The quantified value of each of the benefits described below represents the economic value lost by failing to construct the cantilevered sidewalk.

**Table 1 – Benefit Summary Table**

<b>Long-Term Outcome</b>	<b>Associated Benefit Types</b>
State of Good Repair	Reduced Vehicle Operating Costs Reduced Road Maintenance Costs Reduced Vehicle Accident Property Damage
Economic Competitiveness	Reduced Oil Imports Property Value Increase Health Benefits Reduced Fuel Costs
Environmental Sustainability	Car Air Pollution Reduction
Safety	Reduced Traffic Injuries Pedestrian and Cyclist Accident Reduction
Quality of Life	Recreation Benefits Improved User Experience

### Baseline Assumptions

The BCA compares the proposed project against the baseline over a span of forty years. The baseline projection used in this BCA assumes that the sidewalk improvements are not constructed and the East Haddam/Haddam Swing Bridge remains unpassable to pedestrians, and extremely dangerous for cyclists.

### Background

The area around the Bridge is full of many attractions, businesses, tourist destinations, and other amenities. On the west side of the bridge, the Eagle Landing State Park launches the Adventure Cruise lines, and a number of other operations. These activities attract at least 12,000 guests each year. The

CT Valley Railroad Steam Train also stops on the west side of the Bridge; this major tourist attraction draws over 150,000 visitors each year. Also located near the bridge are a marina, a brewery and pub, a large parking lot (available as overflow parking to the east side of the Bridge), and the village of Tylerville where most essential services (e.g. pharmacy, convenience stores, and other such services) are located. On the east side, East Haddam is home to the Goodspeed Opera House, the Gelston House event venue, and a number of restaurants and boutique retail businesses.

Each of the above businesses and destinations have healthy synergy with one another. However, in order to capitalize on that synergy, a visitor at one attraction must be able to freely access each of the others. With the current design of the Bridge, this is impossible. The restriction of pedestrian traffic effectively isolates each side of the river as two distinct areas, as there is no alternative pedestrian crossing for many miles.

This lack of pedestrian and cyclist accessibility is a clear gap of essential transportation for a rural community. That gap continues to cause real economic detriment to the residents and businesses of that community. By improving the Bridge to include pedestrian and cyclist access, the project is really creating a stronger more robust community. Infrastructure improvements like these are essential for the continued health of rural communities like Haddam and East Haddam.

### Project Costs

The construction cost of the project is estimated at \$18 million. 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 projected labor cost down by 15 percent to account for the effect of non-market conditions in the project costs.<sup>1</sup> After the market price adjustment, the present value of the project cost is \$15.9 million.

The analysis below monetizes the benefits listed in Table 1 and values those benefits in dollar terms over forty years. Benefits are then discounted to 2018 dollars and compared to project costs to calculate the cost benefit ratio. This detailed Benefit-Cost Analysis (BCA) approach indicates that the quantifiable benefits are 1.7 to 5.4 times the total costs of the project, as shown in Table 2.

---

<sup>1</sup> 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 - Benefit Cost Summary**

<b>Metric</b>	<b>Nominal Sum</b>	<b>Present Value (3%)</b>	<b>Present Value (7%)</b>
Present Value of Benefits	\$85,276,567	\$43,974,782	\$22,650,827
Present Value of Costs	\$15,880,000	\$14,536,682	\$12,982,598
<b>Net Present Value</b>	<b>\$69,396,567</b>	<b>\$29,438,100</b>	<b>\$9,668,229</b>
<b>Benefit / Cost Ratio</b>	<b>5.4</b>	<b>3.0</b>	<b>1.7</b>

**1. State of Good Repair**

Approximately 11,000 vehicle trips are made over the Bridge each day. While many of those trips are through-traffic from the surrounding area, a sizeable portion of those trips can be attributed to locals and visitors. A number of complementary attractions and essential services exist on either side of the bridge, as noted above. With viable pedestrian access, some of these trips would be completed without a vehicle. This creates state of good repair benefits by reducing road maintenance costs, reducing vehicle maintenance and depreciation, and reducing property damage from reduced car accidents.

Avoided Car Maintenance Costs

Reducing vehicle miles (VMT) reduces the depreciation and required maintenance associated with those marginal trips. These savings are estimated at \$24,415 per year.

Avoided Road Maintenance (Reduced VMT)

Less vehicle miles across a discreet portion of road directly reduces the amount of damage and wear on that road. This effectively extends the useful life of the road, as it reduces the required maintenance associated with damage from use. The incremental savings from this reduction in damage are estimated at \$2,058 per year.

Reduced Car Accidents – Property Damage

The reduction in VMT also leads to fewer car accidents. This reduces future property damage costs incurred by the avoided accidents. These incremental savings are estimated at \$688 per year.

**Table 3 – State of Good Repair Benefit Cost Summary**

<b>State of Good Repair</b>	<b>Average Annual Value</b>	<b>Nominal Value</b>	<b>3% Discount Value</b>	<b>7% Discount Value</b>
Reduced Vehicle Operating Costs	\$24,415	\$1,049,837	\$520,221	\$251,580
Reduced VMTs - Road Maintenance Costs	\$2,058	\$88,495	\$43,851	\$21,207
Reduced Car Accidents - Property Damage	\$688	\$29,564	\$14,650	\$7,085
<b>Subtotal</b>	<b>\$27,160</b>	<b>\$1,167,896</b>	<b>\$578,723</b>	<b>\$279,871</b>

## **2. Economic Competitiveness**

As previously noted, the area around the Bridge attracts a healthy number of visitors, and is home to a small community of local residents. The benefits created by this project will directly affect all of those people in turn, creating economic benefits for those individuals in a number of ways. The reduction in VMT noted above will create additional benefits from consuming less fuel and importing less oil. Bridging the gap in transportation service will also create additional recreational use (running, jogging, biking), which will confer active recreation benefits, as well as promoting significant additional spending at local businesses, which will improve property values in the area.

### Fuel Cost Savings

Residents choosing to travel by foot or bicycle because of the Bridge improvements will benefit from a reduction in fuel usage costs. Assuming an average fuel efficiency of 20.3 miles per gallon<sup>2</sup>, we estimate that the reduction in VMTs will save 4,064 gallons and generate in \$10,289 in associated savings.

### Reduced Oil Imports

The reduction in commuting by automobile as described above translates to a reduction in gasoline usage, which, in turn, translates into the need to import less oil. This results in a range of savings in terms of direct macroeconomic costs, national security costs, and environmental extraction costs. These incremental savings are estimated at \$12,349 per year.

### Health Benefits

The proposed improvements will create a connected and accessible pedestrian and bicycle pathway and thus encourage visitors and residents to exercise more, which has extensive proven health benefits. These health benefits include reduced direct and indirect healthcare costs, direct and indirect workers compensation costs, and lost productivity costs. Using population data from the surrounding area and visitation estimates, we estimate that there will be 540 new walkers/runners and 270 recreational bikers<sup>3</sup>. We assume that 80 percent of the exercise will be a result of the improvements and that 33 percent of

---

<sup>2</sup> Average of short and long wheel base light duty vehicles from:  
[http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national\\_transportation\\_statistics/html/table\\_04\\_23.html](http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_statistics/html/table_04_23.html)

<sup>3</sup> We assume that 4 percent of the population walk/run and that 2 percent bike ride.

those who do exercise, do so at a level that will generate positive health impacts. Based on data from the literature, we estimate that these incremental savings will amount to \$191,013 per year.

### Property Value Increase

The sidewalk improvements to the Bridge have direct and indirect value to users and residents. Walkability in communities is a heavily researched topic, and a significant body of literature exists which quantifies the marginal increase in home values associated with nearby improvements to walkability. For this effect on property values, it is important to understand that though the physical size of this improvement is relatively small (less than a mile), it represents a complete shift from absolute zero walkability, to reliable, safe, attractive walkability between the communities around the Bridge. Such a large margin confers sizeable benefits to nearby properties.

For commercial properties, the sidewalk improvements would allow a large body of visitors and tourists to freely access either side of the Bridge, which will allow for significant additional spending within the area. Further, the improvements will also allow free access to the overflow parking on the west side of the bridge. This access will permit additional programming at the Opera House, the Gelston house, and other programming along the waterfront. The increase in commercial income from these effects is capitalized into property value, creating a one-time enduring increase in economic vitality for the area. Overall, residential and commercial property value increase is valued at \$4,680,258.

**Table 4 – Economic Competitiveness Benefit Cost Analysis**

<b>Economic Competitiveness</b>	<b>Average Annual Value</b>	<b>Nominal Value</b>	<b>3% Discount Value</b>	<b>7% Discount Value</b>
VTM reduction - Reduced oil imports	\$12,349	\$531,011	\$263,130	\$127,250
Property Value Increase	N/A	\$4,680,258	\$4,037,231	\$3,336,959
Health Benefits	\$191,013	\$8,213,553	\$4,070,027	\$1,968,272
Reduced Fuel Costs	\$10,289	\$442,423	\$219,232	\$106,021
<b>Subtotal</b>	<b>\$4,893,908</b>	<b>\$13,867,244</b>	<b>\$8,589,620</b>	<b>\$5,538,502</b>

### **3. Quality of Life**

#### Recreation Benefits

Safe accessible biking and walking paths, such as the one created by these improvements, are considered to be an amenity for local residents, visitors, and general users. In addition to the health benefits mentioned above, the new recreation users have a direct value for space to exercise safely, which is commonly measured by a user's willingness-to-pay (WTP) for a public good. Aesthetically, the significant improvement to connectivity from the Bridge sidewalk improvements would likely command above-average willingness-to-pay values. Using information from the Army Corp of Engineers and other

sources on willingness-to-pay for recreational assets, total benefits from recreation users are \$212,251 per year.

#### Improved Experience

In addition to those that benefit from exercise and recreation, there are far more residents, tourists, and visitors, that benefit from being able to travel freely and safely across the Bridge. The WTP for walkability and connectivity is a well-supported and studied concept. People value access and safety not only in terms of the tangible benefits it provides (access to services, and avoided harm), but also mentally and psychologically; there is clear value for the right to travel with ease, and to do so without stress or concern of injury. Further, the drivers on the road also value that same reduction in stress. Being able to drive without the risk of injuring or killing a pedestrian or cyclist is a significant benefit to drivers above and beyond the avoided tangible damages. The reduced concern of pain and suffering, and reduction of stress while driving have notable value to drivers. Together, these experiential benefits are valued at \$1,094,334 per year.

**Table 7 – Quality of Life Benefit Cost Analysis**

Quality of Life	Average Annual Value	Nominal Value	3% Discount Value	7% Discount Value
Recreation Benefits	\$212,251	\$9,126,807	\$4,522,568	\$2,187,122
Improved Experience	\$1,094,334	\$47,056,373	\$23,317,647	\$11,276,454
<b>Subtotal</b>	<b>\$1,306,586</b>	<b>\$56,183,179</b>	<b>\$27,840,215</b>	<b>\$13,463,576</b>

#### **4. Environmental Sustainability**

The reduction in VMTs due to an increase in pedestrian trips reduces costs associated with air pollution. Avoided emissions (NO<sub>x</sub>, SO<sub>2</sub>, CO, PM10, etc.) yield incremental savings estimated at \$5,509 per year.

**Table 5 – Environmental Sustainability Benefit Cost Analysis**

Environmental Sustainability	Average Annual Value	Nominal Value	3% Discount Value	7% Discount Value
Car Air Pollution Benefits	\$5,509	\$236,906	\$117,393	\$56,772
<b>Subtotal</b>	<b>\$5,509</b>	<b>\$236,906</b>	<b>\$117,393</b>	<b>\$56,772</b>

## 5. Safety

Safety benefits from sidewalk improvements on the Bridge are accounted for by measuring the reduction in injuries and fatalities as a result of reduced car accidents, and reduced pedestrian accidents as a result of the sidewalk improvements.

### Reduced Traffic Accidents

As noted earlier, the reduction in VMTs reduces traffic accidents, effectively reducing injuries and deaths.

Based on a national average of 1.14 deaths per 100 million VMTs and 80 non-fatal injuries per 100 million VMTs, we estimate that the reduction in VMTs will result in 0.004 prevented deaths and 0.301 prevented injuries.<sup>4</sup> Based on the value of the statistical life (VSL) and injury valuation data from the BUILD Benefit-Cost Analysis Resource Guide, we estimate these annual savings at \$24,975 per year.

### Reduced Pedestrian and Bicycling Accidents

Currently, pedestrian traffic across the bridge is prohibited. That prohibition does not completely prevent pedestrians from crossing, however. Anecdotal evidence from the area clearly identifies pedestrian crossing as an uncommon, but regular occurrence. Considering the complete lack of shoulder or room to maneuver, a crash scenario would likely result in serious injury or loss of life. Further, cyclists on the bridge have no protection or room as cars pass them. Again, the lack of maneuverability and shoulder make this an extremely dangerous situation. No reported accident has occurred recently, but the continued pedestrian crossings, and the unsafe condition of the bridge, are serious risks of injury and mortality. The proposed sidewalk improvements, however, would almost completely reduce the risk of these occurrences. Studies from various state level DOT's point to 90% accident reductions from sidewalks like the one proposed here. Using a conservative estimate of one incident in four years, avoided pedestrian and cyclist accidents generate \$296,451 in benefits each year.

**Table 6 – Safety Benefit Cost Analysis**

<b>Safety</b>	<b>Average Annual Value</b>	<b>Nominal Value</b>	<b>3% Discount Value</b>	<b>7% Discount Value</b>
Pedestrian and Bicycling Accident Reduction	\$296,451	\$12,747,413	\$6,316,672	\$3,054,753
Reduced Car Accidents - Injuries and Fatalities	\$24,975	\$1,073,927	\$532,159	\$257,353
<b>Subtotal</b>	<b>\$321,427</b>	<b>\$13,821,340</b>	<b>\$6,848,831</b>	<b>\$3,312,106</b>

---

<sup>4</sup> National Highway Traffic Safety Administration (NHTSA) of US DOT, 2012 Quick Facts (Republished 2014)

## Results of the Benefit-Cost Analysis

**Table 8 – Benefit Cost Summary**

<b>Metric</b>	<b>Nominal Sum</b>	<b>Present Value (3%)</b>	<b>Present Value (7%)</b>
Present Value of Benefits	\$85,276,567	\$43,974,782	\$22,650,827
Present Value of Costs	\$15,880,000	\$14,536,682	\$12,982,598
<b>Net Present Value</b>	<b>\$69,396,567</b>	<b>\$29,438,100</b>	<b>\$9,668,229</b>
<b>Benefit / Cost Ratio</b>	<b>5.4</b>	<b>3.0</b>	<b>1.7</b>