2014 TIGER Discretionary Grant: Appendix B: Benefit-Cost Analysis

City of Des Moines:
Downtown Transportation Restoration

Requested Amount: $22 million
Location:
Des Moines, Iowa, Polk County
Iowa U.S. Congressional District 3
Project Type:
Municipal Government
Urban Area- Capital
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### Appendix A

Spreadsheets available on the City of Des Moines website:

[http://www.dmgov.org/DEPARTMENTS/ENGINEERING/Pages/DTR.aspx](http://www.dmgov.org/DEPARTMENTS/ENGINEERING/Pages/DTR.aspx)

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1. Introduction

The City of Des Moines has proposed improvements to the downtown transportation system, including the replacement of two bridges, the rehabilitation of five bridges, and the rehabilitation of the historic river wall balustrade. The project area is located along the Des Moines and Raccoon Rivers in downtown Des Moines near the central business district. The project area is shown in Figure 1-1. This report summarizes the results of a benefit-cost analysis performed for the Downtown Transportation Restoration project. The benefit-cost analyses were performed by applying the net present value (NPV) method. The costs and benefits shown in this report are presented in year 2013 dollars.

Each project component is described below.

1.1 Proposed Project Description

1.1.1 Grand Avenue over Des Moines River Bridge Replacement

The existing Grand Avenue Bridge was constructed in 1918 and last rehabilitated in 1968. The structurally deficient, scour-critical bridge is 441 feet long and 82 feet wide, comprising five closed-span concrete arches. Over the past decade the bridge has experienced, both a significant increase in the rate and the extent of deterioration with main load carrying members in a state of severe deterioration. The proposed improvement includes the replacement of this bridge.

1.1.2 Locust Street over Des Moines River Bridge Replacement

The Locust Street Bridge was constructed in 1909 and was rehabilitated in 1967. The structurally deficient, scour-critical bridge is 447 feet long and 68 feet wide, comprising five closed-span concrete arches. Over the past decade the bridge has experienced a significant increase in the rate and extent of deterioration, resulting in an average condition rating of 4–poor, on a scale of 0–9 per National Bridge Inspection Standards (NBIS). Due to the poor condition of the structure the proposed improvement includes a replacement of this bridge.

1.1.3 Court Avenue over Des Moines River Bridge Historic Rehabilitation

The Court Avenue crossing is the location of the City’s first permanent bridge crossing the Des Moines River and maintained its importance as a key crossing. Built in 1918, the 496-foot-long by 102-foot-wide, 5-span concrete open-spandrel arch bridge was the fifth concrete structure to span the Des Moines River and, at the time, was recognized as a pivotal crossing to unite the east and west sides of Des Moines by providing a direct connection between the State House and the new municipal courthouse.

The structural condition of the bridge continues to degrade and exhibits extensive concrete deterioration of the concrete bridge deck, sidewalks, and railings. Extensive rehabilitation efforts are needed again on the structurally deficient bridge to correct and preserve the historic and iconic river crossing. Maintaining and preserving the unique characteristics of this bridge is essential to the vitality of the downtown community by providing an historical and cultural connection of the City’s past to the importance of the Des Moines River and maintaining a reliable transportation network for the community and providing quick access for emergency responders.
Figure 1-1
Project Location
1.1.4 **Principal Riverwalk Red Multi-Use Trail Bridge over Des Moines River Rehabilitation**

The bridge was built in 1891 for the Wabash Railroad, an affiliate of the Des Moines Union Railway. The bridge underwent a major rehabilitation in 2005 and was converted into a multi-use trail bridge. Rehabilitation included painting the steel truss red and installing a wooden walking surface, glass panel railing, architectural lighting, and a cantilever pedestrian overlook at the center of the bridge, transforming the bridge into an iconic river crossing and is now commonly known as the Red Bridge.

Following the 2008 Des Moines River flood, the U.S. Army Corps of Engineers conducted the Des Moines River Regulated Flow Frequency Study to estimate the frequency and magnitude of future Saylorville Reservoir outflows and downstream river flows. The results of the study, completed in November 2010, showed that flood flow frequencies have increased over previous Corps’ estimates, and that floods similar to the 1993 and 2008 events are more likely to occur than previously estimated. In addition to identifying the higher risk of flooding, the study showed that the levees in downtown Des Moines do not provide the required freeboard for a 100-year flood, thus affecting accreditation of the levees and affecting FEMA flood hazard mapping. The bridge is a hydraulic constriction identified as a controlling element of the regulatory flood profile. As a flood mitigation strategy, the proposed improvement includes raising the structure’s low chord to reduce head loss, resulting in a significant elevation drop in the regulatory flood profile. The mitigation project will retain the bridge foundations and raise the bridge about 4 feet, including new accessible trail connections.

1.1.5 **Scott Avenue Bridge over Des Moines River Bridge Rehabilitation**

The Scott Avenue Bridge built in 1937 is an eight-span concrete arch with the pier and abutment foundations of the bridge incorporated into a low head dam, located near the confluence of the Des Moines and Raccoon Rivers. This structurally deficient bridge continues to deteriorate with the bridge sufficiency rating decreasing over 40 percent through the course of the past seven biennial bridge inspections. Proposed improvements to the bridge include rehabilitating structurally deficient components where there is deterioration, spalling, and leaching of the bridge deck, concrete arches, abutment, and piers.

1.1.6 **Southwest 1st Street Multi-Use Trail Bridge over Raccoon River Rehabilitation**

The Southwest 1st Street Bridge, originally known as Riverside Drive, was built in 1937 with funding from the Works Project Administration. The structure was rehabilitated in 1974 and then converted to a multi-use trail bridge in 2006. This bridge is a contributing structure to the Civic Center Historic District (NRHP, 1988). The bridge is a five-span concrete arch structure on concrete piers and abutments. The condition of the bridge exhibits significant deterioration and cracking of the sidewalks, curbs, deck, arches, piers, and transverse frame. The proposed improvements include the rehabilitation of the deficient areas to maintain structural integrity.

1.1.7 **Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge over Raccoon River Rehabilitation**

Built in 1898 as a roadway bridge for primarily horse-drawn wagons, the three-span, pin-connected Pratt through truss is one of only three pinned through trusses in an urban setting in Iowa. The bridge is listed on the National Register of Historic Places (NRHP). The steel truss bridge remained in service for many years, transitioning through a series of load restrictions and structural repairs. In 1993, the bridge was closed to vehicular traffic and in 1998 it was opened for pedestrian and bicycle traffic. Continued structural deterioration of the fracture-critical bridge has resulted in the bridge...
being closed to all use in 2013 for safety concerns. Rehabilitation of this bridge will restore this critical connection in the downtown multi-use trail network.

1.1.8 Des Moines and Raccoon River Balustrade Rehabilitation

The river walls and balustrade along the Des Moines and Raccoon Rivers were built during the 1930s as the culmination of long-sought plans related to the City Beautiful Movement, early city planning, engineering, and various federal programs established by the New Deal. The balustrade was constructed on top of the river walls and is listed on the NRHP as a contributing element to the Civic Center Historic District (CCHD). The balustrade runs 4,695 feet on the west bank and 4,715 feet on the east bank of the Des Moines River, 840 feet on the north bank, and 1,875 feet on the south bank of the Raccoon River. The river walls and balustrade visually unite the CCHD and serve as protective railing for the adjacent trail section and public safety for the adjacent recreation areas. Throughout the length of the system, sections of the balustrade have deteriorated significantly, with crumbling, cracking, and spalling concrete. Improvements include rehabilitation of the deteriorated sections.
2. Project Baseline Scenarios

Costs and benefits for the Downtown Transportation Restoration projects are measured against a baseline of a “no build” case. The City would perform basic maintenance, such as filling potholes and minor concrete repair to walkways, to keep the bridges in service as long as possible as part of the baseline. This would lead to structures being load posted or restricting lanes of traffic and eventually result in each of the bridges being closed to traffic and ultimately demolished. However, for the purpose of analyzing for the Downtown Transportation Restoration projects components, each with independent utility, it is conservatively assumed in the base case for each bridge that all six of the other bridges will be rehabilitated or reconstructed.

One exception to this analytical approach of separately evaluating the merits of each bridge is necessitated by the cost interdependences between the Principal Riverwalk Red Multi-Use Trail Bridge and the Grand Avenue and Locust Street Bridges due to the flood management components of each of these projects. To ensure against double counting, this analysis includes the full cost of the flood mitigation components of the Grand Avenue and Locust Street bridges in their respective scenarios. If raised as proposed, the Principal Riverwalk Multi-Use Trail Bridge would reduce the flood mitigation cost components of constructing the Grand Avenue and Locust Street Bridges. These cost-savings are shown in the Principal Riverwalk Multi-Use Trail Bridge cost worksheet.

The following provides an overview of the base case scenario for each bridge:

- **Grand Avenue Bridge base case scenario** would be a No-Build condition where the bridge would eventually be closed to all modes of traffic and demolished. This would require street improvements to accommodate permanent traffic detours on the local network.

- **The Locust Street Bridge base case scenario** would also be a No-Build condition where the bridge would eventually be closed to all modes of traffic and demolished; requiring traffic detours on the local network and associated street improvements.

- **The Court Avenue Bridge base case scenario** would include a No-Build condition where no rehabilitation or historic renovations would be completed on this bridge. Once the bridge has deteriorated significantly it would be closed to all modes of traffic. This would require street improvements to accommodate permanent changes in traffic patterns.

- **The Principal Riverwalk Red Multi-Use Trail Bridge base case scenario** would include no improvements; the bridge would not be raised to improve hydraulic capacity.

- **The Scott Avenue Bridge base case scenario** would include a No-Build condition where no rehabilitation work would be conducted. Once the bridge has deteriorated significantly it would be closed to all modes of traffic. This would require street improvements to accommodate permanent changes in traffic patterns.

- **The Southwest 1st Street Multi-Use Trail Bridge base case scenario** would include a No-Build condition where the bridge would eventually be closed to bicycle and pedestrian traffic along the Meredith Trail.

- **The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge base case scenario** would include a No-Build condition. Currently this bridge is closed to bicycle and pedestrian traffic across the Raccoon River; should the proposed improvements not be incorporated into this bridge, the bridge would be demolished.
• Des Moines and Raccoon River Balustrade base case scenario would include a No-Build condition where the river wall and balustrade would deteriorate, disintegrate, and literally crumble to the ground. The river wall balustrade would require fencing to keep pedestrians and trail users away from the wall at deteriorated locations.
3. Benefit-Cost Analysis

3.1 Project Justification

Completion of the Downtown Transportation Restoration projects in the City of Des Moines will maintain current connectivity of downtown, enhance and improve mobility, access, safety, economic opportunities, quality of life, environmental sustainability, and historic preservation. Without these bridges the City of Des Moines would be divided by the Des Moines and Raccoon Rivers. By severing the city, this would represent a giant step backward in all modes of commerce and mobility, including walkability, accessibility, and connectivity to the detriment of the city’s residents, employees, businesses and visitors. This would undermine the City’s planning efforts including the:

- The Riverfront Development Plan (1974) completed by the City of Des Moines Riverfront Improvement Commission and Plan and Zoning Commission, called for the improvement of riverfront areas in the City of Des Moines. This included all areas on the Des Moines and Raccoon Rivers in Des Moines. The plan states that “the plan seeks to guide growth to specific areas along the riverfront, and calls for a system of scenic river drives, bikeways and walkways as connections between areas of development.”

- The Des Moines Bicycle and Trail Master Plan (2011) was adopted by City Council as an element of the City’s overall 2020 Community Character Plan and presents a twenty-year vision of a fully-developed bicycle system throughout the city, serving residents, commuters, children, and visitors. The bicycle and trail network will connect neighborhoods, schools, public facilities, business districts, and environmental features. The plan is the City’s first master plan that seeks to accommodate the bicycle as a legitimate and functional form of transportation in the City.

- The Tomorrow Plan is the product the Des Moines regional area (through the DMAMPO) being awarded a $2 million planning grant to create a regional plan for sustainable development and a response to the “livability principals” outlined by HUD. The plan was prepared under HUD’s Sustainable Communities Regional Planning Grant program. The grant project was jointly funded by HUD, DOT, and EPA in 2010. The project is consistent with the goals, initiatives and strategies that were developed as part of The Tomorrow Plan to create a resilient regional economy, invest in rehabilitation of existing infrastructure, and use transportation funding to maintain infrastructure and increase availability of bike/pedestrian networks.

- The Des Moines Area Metropolitan Planning Organization adopted the Horizon Year 2035 Metropolitan Transportation Plan in 2009. This is a multi-modal transportation plan for the greater Des Moines, Iowa, Metropolitan Planning Area. This multimodal plan provides guidance on integrating all modes of transportation into a transportation system that ensures efficient movement of both people and goods. This transportation system includes streets and highways, bicycle and pedestrian facilities, public transportation systems, airports, and railroads. These bridges are an important component of the regional transportation system included in this plan.

The purpose of the proposed improvements is to extend the service life of these bridges, since they provide the critical connection uniting the east, west and south sides of downtown Des Moines. Under the base case, or No-Build scenario, the lack of bridge improvements would result in the closure and removal of these bridges. While this would pose a major eyesore to the beautifully landscaped and aesthetically pleasing historical riverfront, it would pose many costs to the City of Des Moines, its residents, businesses, attractions, and the environment. In order to maintain the historic relevance of the Civic Center Historic District and provide safe modes of travel, access, and
continuity from the east, west, and south sides of Des Moines, it is essential that the proposed Downtown Transportation Restoration projects are constructed.

The following sections identify the costs and benefits of the proposed improvements, monetized in fiscal year 2013 dollars. While not all costs and benefits can be monetized in terms of dollars; this section will focus on those which can be assigned a dollar value or described in qualitative terms to inform a decision about a benefit-cost ratio. This can be used to assist the City of Des Moines, the Iowa DOT, and FHWA to determine whether the benefits of the proposed improvements would outweigh the costs and to help guide the allocation of available and planned funding sources.

3.2 Project Costs

The costs associated with this analysis include the up-front rehabilitation or replacement costs of each bridge along with annual estimates for ongoing operations and maintenance throughout the project life (which varies for each bridge per the type of work being proposed). The costs considered for this analysis include the cost of engineering and design, utility relocation, annual maintenance, bridge inspection, transit detours, and construction. The total estimated costs for each project are included in Table 3-1.

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<tr>
<th>Project</th>
<th>Construction</th>
<th>Engineering &amp; Design</th>
<th>Utility Relocation</th>
<th>Annual Maintenance</th>
<th>Bridge Inspection</th>
<th>Bus Detour</th>
<th>Total</th>
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<td>Grand Avenue over Des Moines River Bridge Replacement</td>
<td>$7,277,394</td>
<td>$1,059,853</td>
<td>$1,143,927</td>
<td>$158,282</td>
<td>$10,447</td>
<td>$326,859</td>
<td>$9,976,763</td>
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<td>$457,571</td>
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<td>$6,771,060</td>
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<td>$12,890</td>
<td>$0</td>
<td>$8,022,090</td>
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<td>$688,863</td>
<td>$0</td>
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<td>$25,780</td>
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<td>$4,150,673</td>
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<td>$193,610</td>
<td>$19,335</td>
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<td>$0</td>
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<td>$2,199,085</td>
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Costs are presented as the net present value (NPV) in 2013 dollars with a discount rate of 3 percent. While the following table only shows the costs associated with the proposed improvements; the costs were also calculated for the No-Build condition for comparison, and can be viewed in the Appendix of this report.

Under the No-Build Condition the costs typically include the amount required for general maintenance and operations or minor rehabilitation in order to keep the bridge in safe working order and open to the public; however, ultimately, without the proposed improvements each of these bridges would require closure and ultimately removed. The Principal Riverwalk Red Multi-Use Trail Bridge would require some additional costs under the No-Build condition where levee work would be required if the bridge was not raised.
Construction Cost—The construction costs include the cost to construct the proposed improvement for each project. The construction costs vary among the projects, with bridge replacements having a greater cost compared to the bridges requiring minor rehabilitation. Minor rehabilitation primarily includes repairs to bridge decks, joint replacements, sidewalk repairs, and addresses any other deficiencies required to extend the service life of the bridge and maintaining a safe means of travel for all users.

Engineering & Design Cost—The engineering and design costs include the costs for engineering studies which are required to evaluate and identify bridge alternatives, address site specific issues, constraints, and select a preferred alternative which best suits the project and is the most cost-effective. The cost of design is estimated to be 20 percent of the construction cost except in cases where more detailed cost information was available at the time of this analysis.

Utility Cost—Each of the bridges host a varying degree of utilities, from standard street lighting and minor communications to large electrical transmission lines and emergency 911 communication lines. The major utility crossings occur at Grand Avenue and Locust Street with each housing up to 10 different utilities, including; electrical, gas, fiber optics, telecommunications, emergency services, etc. The other bridge crossings also facilitate important utility crossings, but do not elevate to the level of Grand Avenue and Locust Street. Removing key river crossings will require extensive permanent relocation expenses for utilities. By replacing the bridges, the expenses incurred by the utilities are reduced as the relocations are of a temporary nature. The bridges undergoing rehabilitation will maintain the integrity of the crossing and accommodate the existing utilities present.

Maintenance Cost—Annual maintenance includes the costs associated with the upkeep of the bridge every year. Annual maintenance and operation costs are calculated for the expected life of the bridge. These costs typically include general repairs such as patching, pothole repairs, painting, debris cleanup, and any minor rehabilitation required. As shown in the costs table, the Grand Avenue, Locust Street, Court Avenue and Scott Avenue bridges have the highest costs associated with annual maintenance. This is because these bridges carry vehicular traffic making them more susceptible to cracking, potholes, and other deficiencies associated with vehicular traffic and weathering.

Bridge Inspection Cost—Grand Avenue, Locust Street, Court Avenue, and Scott Avenue Bridges currently require biennial bridge inspections pursuant to national bridge inspection regulations. All four bridges are on a biennial inspection frequency. For cost analysis, it was assumed that the bridges remain on a biennial inspection frequency, although further condition deterioration could warrant additional inspections. Currently, Grand Avenue and Locust Street Bridges have significantly higher inspection costs due to confined space inspection requirements. The replacement of these two bridges with the preferred alternative will dramatically reduce the bridge inspection costs as confined space inspection would no longer be required. The bridge inspection costs for Court Avenue and Scott Avenue Bridges do not change between the no-build case and the rehabilitation case. Due to the unique characteristics and importance of the multi-use trail bridges, these structures also receive biennial bridge inspections, although not required by federal regulations. The cost of bridge inspections for the multi-use trail bridges do not vary between the different alternates.

Bus Detour Cost—The costs associated with detours to public transportation are incorporated into Net Present Value (NPV) cost table. In addition to increased travel distance and time, the Grand Avenue and Locust Street Bridges carry Des Moines Area Regional Transit Authority (DART) bus lines, which are heavily relied upon for commuters and travel for entertainment, shopping, and
recreation in downtown and surrounding communities. DART lines were included as part of this analysis because there is a high population of low to moderate income, minority, and disabled persons located in downtown Des Moines and surrounding neighborhoods. The closure or removal of these bridges would be a major burden to disadvantaged groups. The cost to detour the bus routes during construction would range from $262,000 to $326,000 over life of the project.

3.3 Project Benefits

The following sub-sections identify the monetized net present value of benefits for each bridge in 2013 dollars, discounted at 3 percent. The results at a 7 percent discount rate lead to the identical preferred alternative. The estimated benefits of the preferred build alternative are expressed relative to the no build base case and are shown in Table 3-2. There are several benefits where a dollar value cannot be assigned, however they are as equally important as the calculated benefits; therefore, these are discussed in a qualitative manner. Although the costs of each of the preferred build alternatives were summarized in the preceding section, some of the cost categories are revisited in this section to show the net difference in costs between the preferred build alternative and the base case. In some instances the build alternative results in a cost savings, by reducing costs associated with rerouting utility lines, for example. Such cost-savings are a project benefit. In other instances the preferred build alternative will almost always have higher costs than the no build alternatives. The net present value of annual operation and maintenance costs fall into this category. Replacing or rehabilitating a bridge will provide a benefit in terms of reducing the annual expenditures on maintenance (i.e., “state of good repair”), but closing and demolishing a bridge can eliminate these costs altogether. For this reason, the difference in the net present value of annual operation and maintenance costs between the build and no build alternatives is expected to be positive (i.e., not result in a cost savings) and is thus not included in the benefit discussion.

3.3.1 Grand Avenue Bridge

State of Good Repair—Net Estimated Benefits: $218,000

- The bridge serves as a major utility corridor for several utilities. Without it, utilities would have to cross the river some other way. The costs of relocating the utilities on a permanent basis are higher than on a temporary basis during construction. Cost savings of the build alternative relative to the no build base case are estimated at $218,000.

- Replacement will provide 100 years of service life. This results in a net gain of 90 years over the base case, where the bridge would need to be closed by 2026.

- Access across the Des Moines River would be maintained. Grand Avenue is the only continuous downtown east/west street connecting the west suburbs to the east suburbs.

- A new bridge would have a reduced impact to the Des Moines River, improving hydraulics and reducing the risk of flood in downtown.

- A new bridge would be designed to with scour safe foundations and provide resilient and safe river crossing during flood events.
### Table 3-2. Net Benefits By Selection Criteria (Relative to Base)

<table>
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<tr>
<th>Selection Criteria</th>
<th>NPV @3% in $2013</th>
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<tr>
<td></td>
<td>Grand Ave</td>
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<tr>
<td><strong>State of Good Repair and Resiliency</strong></td>
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<td>Additional service life (compared to Base)</td>
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<td>Access to roads and trails over river</td>
<td>Qualitative</td>
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<tr>
<td>Improved hydraulics</td>
<td>Qualitative</td>
</tr>
<tr>
<td>Utilities (cost savings)</td>
<td>$218,000</td>
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<tr>
<td>Maintenance and Repair and Inspection Savings</td>
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<td><strong>Economic Competitiveness</strong></td>
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<td>Property values</td>
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<tr>
<td>Bus route (Cost savings)</td>
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<td>Special events</td>
<td>Qualitative</td>
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<td>Retail, entertainment, shopping</td>
<td>Qualitative</td>
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<tr>
<td>Employment- jobs created</td>
<td>Qualitative</td>
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<td>Travel time savings</td>
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<td>Economic development in land opportunities</td>
<td>Qualitative</td>
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<tr>
<td><strong>Quality of Life</strong></td>
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<td>Increased Pedestrian, bicycle, transit use</td>
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<tr>
<td>Improved access for disadvantaged groups</td>
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<td>School bus drop-off/staging spot</td>
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<td>Recreation</td>
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<td>Promote historic preservation</td>
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<tr>
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Economic Competitiveness—Net Estimated Benefits: $192,832,000

- Travel time savings from avoiding rerouting automobile and truck traffic are estimated at $184,912,000. Truck traffic accounts for approximately 2 percent of the crossings. It is conservatively assumed that automobiles account for 98 percent of the traffic counts. Bus travel counts are not included in this number. A large share of the bridge crossings are for commuting purposes as more than 80,000 people come to the downtown to work every week day, compared to 8,000 residents who live downtown and weekend visitors who come downtown for recreation and entertainment. Thus the value of time delays per hour is comparatively high. The travel detours, changes in mileage (VMT), and travel time delays were provided by the City of Des Moines Traffic and Transportation Division and based upon existing and future volumes from the Iowa DOT and the Des Moines Area Metropolitan Planning Organization. These data were also used to support the estimates of changes in vehicle operating costs and the costs related to air emissions for each of the vehicular bridges.

- Avoiding bridge closure also avoids land use/city street modifications changes that are costly. The costs to the city are included in the construction cost. In addition, permanently rerouting transit routes would increase costs to transit operations. Change in transit routes is estimated to cost additional $7,920,000.

- Property values of nearby businesses and residences would remain stable or increase. The current pace of development would continue as projected. The Grand Avenue Bridge contributes to both economic competitiveness and quality of life through improved walkability and accessibility of downtown neighborhoods and thus positively impacts property values. Des Moines neighborhoods in the vicinity of Grand Avenue Bridge, the Downtown Des Moines and East Village neighborhoods, have high walk scores (82 and 77), respectively. Cortright (2009) used hedonic regression techniques to assess the contribution of walk scores to property values in 15 cities across the U.S. He found a positive and significant relationship for 13 of these cities. Using meta-analysis techniques to weight the walk score coefficients by their standard errors, it is possible to apply the results from the Cortright study to the City of Des Moines (Borenstein et. al., 2009). By way of illustration, using the median housing values of $85,000 for Census Track 51, Block Group 3 in 2000, just a one point decrease in the walk score would dampen property values by $650. Depending upon the extent to which the closure of Grand Avenue Bridge would decrease walk scores due to the loss of connectivity between the east and west sides of the river, the losses in residential property values could multiply quickly. The average walk score for all neighborhoods in Des Moines is 42 and bridge removal would reverse continuing efforts by the city to improve walkability and connectivity.

- Residential property values are not the only properties to benefit from higher walk scores. Pivo and Fisher (2010) also found that an increase in walk score increases office and retail property values by up to 9% depending on property type. For example, all else being equal, an office or retail building with a score of 80 is worth 54% more per square foot than one scoring 20. The benefit estimates for the Grand Avenue are underestimated because they do not include the positive impact to commercial property values due to its contributions to walkability and accessibility to the neighborhoods on both sides of the Des Moines River. The property values would continue to benefit from maintaining both vehicular and pedestrian connectivity. The monetized benefits of the Grand Avenue Bridge replacement are underestimated as they do not include this significant economic benefit.

- Downtown commerce would remain stable or increase, thus protecting jobs.

- Grand Avenue is a key truck route in downtown Des Moines.
• Improvements to the bridge would encourage and promote future events along the riverfront, such as music, entertainment, arts, charity, cultural events and gatherings.

Quality of Life—Net Estimated Benefits: $38,433,000
• The bridge avoids increases in Vehicle Miles travelled (VMT) from rerouting traffic with resultant savings in vehicular operating costs of $38,433,000.
• The bridge provides access over the river for bike, pedestrian, transit, and Americans with Disabilities Act (ADA) users. It provides the closest connection to east from the nearby Iowa Department for Blind.
• Residential downtown Des Moines and the central business district on the western side of the River are connected to such amenities as the Brenton Skate Plaza, the Argonne Armory and World War Memorial Building, and City Hall on the East side of the River. The residents of the East Village mixed use area are connected to such amenities as the Iowa Events Center, Hy-Vee Hall, and the Wells Fargo Center on the western side of the river. Losing this bridge would weaken the connectivity for all traffic, but especially pedestrians.
• The bridge is part of the DART bus lines, which provides low-cost transportation. It is relied upon by commuters, including disadvantaged persons throughout the city.
• The Grand Avenue Bridge serves low income and minority populations, including block groups with median incomes that are below poverty level and minority populations that exceed 50 percent of the population.

Environmental Sustainability—Net Estimated Benefits: $17,444,920
• The Grand Avenue Bridge Replacement avoids the increases in Green House Gas (GHG) emissions and the increases in emissions of criteria air pollutants due to increases in VMT from Bridge closure. The benefit of reducing emissions is estimated at $17,444,920.
• The reductions in air emissions are underestimated as they do not include the potential increases in VMT due to the changes in the land use configuration with the loss in connectivity and walkability that would result from bridge removal.

Safety—Net Estimated Benefits: Qualitative
• Grand Avenue is a key emergency route for police, fire, and ambulance services. A permanent closure would have adverse long term impacts on emergency response times with associated adverse consequences for public safety and health. The benefits of replacing Grand Avenue Bridge are underestimated as they do not account for avoiding these losses.
• The bridge provides safe convenient travel between the east and west side of the Des Moines River for vehicles, pedestrians and bicyclists.
• The Iowa DOT is developing a Traffic Incident Management Plan for incidents that occur on their major interstates and highways in the region. The Grand Avenue Bridge is the designated emergency detour in the event of an incident on I-235 between 2nd / 3rd to E 14th/E 15th Streets.
• There is a reduction in crash potential expected when traffic can take a direct route instead of diverting through a series of turning movements at intersections which create vehicle-vehicle and vehicle-pedestrian conflicts.
3.3.2 Locust Street Bridge

**State of Good Repair—Net Estimated Benefits: $223,000**

- The bridge serves as a major utility corridor for several utilities. Without it, utilities would have to cross the river some other way. The costs of relocating the utilities on a permanent basis are higher than on a temporary basis during construction. Cost savings of the build alternative relative to the no build base case are estimated at $223,000.

- Complete replacement would provide a bridge with 100 years of service life, for a net gain of 90 years over the no build case.

- The bridge would provide access to the east and west sides of downtown Des Moines.

- A new bridge would have a reduced impact to the Des Moines River, improving hydraulics and reducing the risk of flood in downtown.

- A new bridge would be designed to withstand the strong current south of the Center Street dam. The existing bridge is scour critical.

**Economic Competitiveness—Net Estimated Benefits: $119,071,000**

- Travel time savings from avoiding rerouting automobile and truck traffic are estimated at $116,174,000.

- Avoiding bridge closure also avoids land use/city street modifications changes that are costly. The costs to the city are included in the construction cost. In addition, permanently rerouting transit routes would increase costs to transit operations. Change in transit routes is estimated to cost additional $2,897,000.

- Property values of nearby businesses and residences would remain stable or increase. Similar to the property value discussion for the Grand Avenue Bridge, the Locust Street Bridge contributes to the connectivity and walkability of downtown Des Moines. Losing this connection would depress the walk score of proximate neighborhoods, which has been shown to decrease property values. The property values would continue to benefit from maintaining both vehicular and pedestrian connectivity. The monetized benefits of the Locust Street Bridge replacement are underestimated as they do not include this significant economic benefit.

- The new bridge would encourage and promote events downtown along the riverfront, such as music, entertainment, arts, and charity gatherings.

- Downtown commerce would remain stable or increase, thus protecting jobs.

- Locust Street is a key retail street in downtown Des Moines.

**Quality of Life—Net Estimated Benefits: $10,141,000**

- The Locust Street Bridge avoids increases in VMT from rerouting traffic with resultant savings in vehicular operating costs of $10,141,000.

- The Locust Street Bridge is part of the DART bus lines, which provides low-cost transportation. It is relied upon by commuters, including disadvantaged persons throughout the city.

- The Locust Street Bridge provides parking for school busses and allows them to phase drop-off and pick-up of students during events held at the Civic Center. There are roughly 18 of such events annually. The bridge is used for the school bus staging to safely and efficiently get children to these events.
• The Locust Street Bridge provides direct access to the capitol and is a popular landmark point for most photos showing the State Capitol building because of the direct line of sight heading eastbound over the bridge.

• The Locust Street Bridge serves low income and minority populations, including block groups with median incomes that are below poverty level and minority populations that exceed 50 percent of the population.

Environmental Sustainability—Net Estimated Benefits: $4,633,000

• The Locust Street Bridge Replacement avoids the increases in GHG emissions and the increases in emissions of criteria air pollutants due to increases in VMT from Bridge closure. The estimated benefits of reducing emissions are estimated at $4,633,000. These reductions in air emissions are underestimated as they do not include the potential increases in VMT due to the changes in the land use configuration with the loss in connectivity and walkability that would result from bridge removal.

Safety—Net Estimated Benefits: Qualitative

• The bridge provides safe convenient travel between the east and west side of the Des Moines River for vehicles, pedestrians and bicyclists.

• There is a reduction in crash potential expected when traffic can take a direct route instead of diverting through a series of turning movements at intersections which create vehicle-vehicle and vehicle-pedestrian conflicts.

3.3.3 Court Avenue Bridge

State of Good Repair—Net Estimated Benefits: Qualitative

• Rehabilitation and renovation would give the bridge 40 additional years of service life relative to the no build base case. Access across the Des Moines River would be maintained.

• The bridge serves as a major utility corridor for several utilities. Without it, utilities would have to cross the river some other way. The costs of relocating the utilities on a permanent basis are higher than on a temporary basis during construction. Cost savings of the build alternative relative to the no build base case were not estimated.

Economic Competitiveness—Net Estimated Benefits: $112,443,000

• Travel time savings from avoiding rerouting automobile and truck traffic are estimated at $112,443,000 using the results from the transportation modeling provided by City of Des Moines Traffic and Transportation Division.

• Court Avenue provides access to downtown entertainment, shopping, restaurants in the Court Avenue Entertainment District, and local events such as the Downtown Farmer’s Market.

• Downtown commerce would remain stable or increase, thus protecting jobs.

• Court Avenue is a truck route.

• Property values of nearby businesses and residences would remain stable or increase due to the connectivity provided for vehicular, pedestrian and bicycling traffic. This beneficial category is described in greater detail under the Grand Avenue Bridge description and as with Grand Avenue, the benefits of Court Avenue Bridge are underestimates as they do not include the monetized property values.
• Improvements to the bridge would encourage and promote future events along the riverfront, such as music, entertainment, arts, charity, cultural events and gatherings.

**Quality of Life—Net Estimated Benefits: $10,632,000**

• The bridge avoids increases in VMT from rerouting traffic with resultant savings in vehicular operating costs of $10,632,000.

• The Court Avenue Bridge serves low income and minority populations, including block groups with median incomes that are below poverty level and minority populations that exceed 50 percent of the population.

• Historic renovation would help maintain the status of this bridge on the NRHP and as a contributing structure to the CCHD. The monetized benefits of the Court Avenue Bridge are underestimates as they do not include the value of historic preservation.

• Rehabilitation of the bridge and balustrade would promote historic preservation, retaining the original design of the bridge as it was built in 1918 during the City Beautiful Movement.

• Connecting the east and west sides of the city of Des Moines is itself a key component of the city’s history dating back to 1918 and was recognized as a pivotal crossing to unite the east and west sides of Des Moines and provide connection between the State House and the new municipal courthouse.

**Environmental Sustainability—Net Estimated Benefits: $2,673,000**

• The Court Avenue Bridge Rehabilitation avoids the increases in GHG emissions and the increases in emissions of criteria air pollutants due to increases in VMT from Bridge closure. The estimated benefits of reducing emissions are $2,673,000. These reductions in air emissions are underestimated as they do not include the potential increases in VMT due to the changes in the land use configuration with the loss in connectivity and walkability that would result from bridge removal.

**Safety—Net Estimated Benefits: Qualitative**

• The bridge provides critical access for emergency responses by the City’s Police Department in the downtown district, located at the east end of the bridge.

• There is a reduction in crash potential expected when traffic can take a direct route instead of diverting through a series of turning movements at intersections which create vehicle-vehicle and vehicle-pedestrian conflicts.

3.3.4 **Principal Riverwalk Red Multi-Use Trail Bridge**

**State of Good Repair—Net Estimated Benefits: $4,276,000**

• Raising this bridge will improve the Des Moines River hydraulics and reduce the risk of flooding in downtown Des Moines. It would reduce the NPV construction cost associated with the other flood mitigation strategies required to obtain FEMA accreditation of the downtown levees by an estimated $4,251,000. Raising the bridge would preserve the Principal Riverwalk Red Multi-Use Trail Bridge and all of the associated benefits that it currently provides. These benefits are summarized in qualitative terms below.

• Raising the Principal Riverwalk Red Multi-Use Trail Bridge would decrease the net present value of the annual operations and maintenance cost by $25,000.
Rehabilitation would retain the Des Moines River crossing of the Principal Riverwalk Trail. This bridge is the southern river crossing that forms the 1.2 mile loop for the trail. The northern crossing is located above the Center Street dam.

**Economic Competitiveness—Net Estimated Benefits: -$144,247**

- Raising the bridge would result in a loss of $98,000 due to special bridge events that would be canceled during construction. This alternative would preserve the value from special events held in all non-construction years.
- The bridge connects east and west Des Moines and offers safe access to employment for pedestrians and bicyclists. Rehabilitation would largely maintain this benefit except during construction, when it would lose $46,247 in the value of pedestrian commuting time relative to the no alterations base case.
- Raising the Bridge would maintain property values.
- Raising the bridge reduces flood risk upstream, including downtown and the Historic East Village. By raising the bridge, the goal of keeping accredited levees and affordable flood insurance can be achieved. This contributes to keeping employers and residents in the area, as well as allowing further in-fill development.

**Quality of Life—Net Estimated Benefits: No change from the Base Case**

- The bridge provides scenic views of the historic riverfront and downtown Des Moines, which would be maintained for the use and enjoyment of pedestrians and bicyclists.
- The Principal River Walkway was built with the vision of connecting the downtown historic districts on both sides of the Des Moines River. It provides the critical connection to form a 1.2-mile loop in the mixed-use trail and promenade of the Principal Riverwalk Trail. Amenities include a skating rink, art, two signature bridges, gardens and plazas, and a trail segment to accommodate in-line skating, running, walking and bicycling. The Riverwalk connects to the Meredith Trail near Court Avenue as well as the John Pat Dorrian Trail near the Center Street Dam. This trail provides connectivity to local and regional trails, sidewalks, and the skywalk system throughout downtown. The combined trails provide access to many recreational facilities downtown including Principal Park, the Greater Des Moines Botanical Garden, the Des Moines River, Simon Estes Amphitheater, and Brenton Skating Plaza. These local facilities also connect with larger trail networks such as the Neal Smith Trail. The Neal Smith Trail connects from the John Pat Dorrian Trail downtown north 24.7 miles to Saylorville Lake and Big Creek State Park, providing access to the northern portions of the city and neighboring cities. The American Discovery Trail, a coast-to-coast non-motorized trail, is also routed using these trails and bridges through downtown Des Moines.
- The Des Moines River Principal Riverwalk Red Multi-use Trail Bridge would continue to provide connectivity for low income and minority populations, who are over-represented in the block groups served by this bridge.
- This bridge is an iconic and historical river crossing creating a rich and vibrant connection to the river, enhancing the cultural integrity of the City.

**Environmental Sustainability—Net Estimated Benefits: -$750,000**

- Recreational trail uses losses valued at $750,000 would be incurred during construction. In all other years, recreational trail usage would continue with no change from the base case.
• The Des Moines River Principal Riverwalk Red Multi-use Trail Bridge would continue to reduce VMT by maintaining connectivity and providing a multi-use trail alternative to vehicular travel.

**Safety—Net Estimated Benefits: No Change from the Base Case**
• The Principal Riverwalk Red Multi-Use Trail Bridge would continue to provide a safer alternative for bicycle and pedestrian access over the Des Moines River, since there is no vehicular traffic.

### 3.3.5 Scott Avenue Bridge

**State of Good Repair—Net Estimated Benefits: Qualitative**
- Rehabilitation would provide 40 additional years of service life relative to the no build base case.
- The bridge is tied into the dam, which helps regulate water flow at the confluence of the Des Moines and Raccoon Rivers.
- The bridge provides access to several trails on both sides of the river including the John Pat Dorrian, Meredith, and Des Moines River Regional trail.
- The bridge serves as a major utility corridor for several utilities. The costs of relocating the utilities on a permanent basis are higher than on a temporary basis during construction.

**Economic Competitiveness—Net Estimated Benefits: $68,086,000**
- Travel time savings from avoiding rerouting automobile traffic are estimated at $68,086,000.
- The bridge provides access to the east side of downtown Des Moines, where there are many large employers from the government, business, medical, and entertainment/service industries.
- Downtown commerce would remain stable or increase, thus protecting jobs.
- Property values of nearby businesses and residences would remain stable or increase. The current pace of development would continue as projected. The Scott Avenue Bridge contributes to both economic competitiveness and quality of life through improved walkability and accessibility of downtown neighborhoods and neighborhoods on the south side of the city and thus positively impacts property values. This benefit is described in greater detail in the Grand Avenue Bridge section.
- Scott Avenue is a truck route.
- Improvements to the bridge would encourage and promote future events along the riverfront, such as music, entertainment, arts, charity, cultural events and gatherings.

**Quality of Life—Net Estimated Benefits: $14,686,000**
- The bridge avoids increases in VMT from rerouting traffic with resultant savings in vehicular operating costs of $14,686,000.
- The bridge provides access over the river for bike, pedestrian, transit, and ADA users.
- The bridge is a recreational spot where people gather to fish over the bridge along the south side of the dam.
- The bridge provides scenic views of the Scott Avenue Dam and downtown Des Moines for motorists and pedestrians.
- The Scott Avenue Bridge contributes to the city’s history of connecting the east and west sides of the city.
• Rehabilitation of the bridge would help maintain the status of this bridge as a contributing structure to the CCHD (NRHP, 1988).

Environmental Sustainability—Net Estimated Benefits: $3,732,000

• The Scott Avenue Bridge Rehabilitation avoids the increases in GHG emissions and the increases in emissions of criteria air pollutants due to increases in VMT from Bridge closure. The estimated benefits of reducing emissions are approximately $3,732,000.

• These reductions in air emissions are underestimated as they do not include the potential increases in VMT due to the changes in the land use configuration with the loss in connectivity and walkability that would result from bridge removal.

Safety—Net Estimated Benefits: Qualitative

• Scott Avenue provides a safe crossing for bicycle and pedestrians with bike lanes and a sidewalk on the south side of the bridge.

• There is a reduction in crash potential expected when traffic can take a direct route instead of diverting through a series of turning movements at intersections which create vehicle-vehicle and vehicle-pedestrian conflicts.

3.3.6 Southwest 1st Street Multi-Use Trail Bridge

State of Good Repair—Net Estimated Benefits: $69,000

• Cost savings from avoiding permanent relocation of utilities amount to $69,000.

• Rehabilitation would provide 50 years of service life, which would extend its life 38 years beyond the demolition base case and provide opportunities for additional rehabilitation in the future.

• The Southwest 1st Street Multi-Use Trail Bridge is a key pedestrian and bicycle connection, providing access from south neighborhoods to the downtown. The bridge provides key connections to the other trails including the John Pat Dorrian Trail, Des Moines River Trail, Martin Luther King Jr Trail, and the Principal Riverwalk Trail.

Economic Competitiveness—Net Estimated Benefits: $4,381,000

• An estimated $3,683,000 in travel time savings are from avoiding rerouting pedestrian traffic due to permanent bridge closure.

• The bridge hosts a number of events each year, providing a safe crossing of the Raccoon River for large numbers of event participants with no disruptions to traffic. These special events are valued at $698,000.

• The Southwest 1st Street Multi-Use Trail Bridge carries the Meredith Trail, which provides access to many downtown amenities including Principal Park, Court Avenue entertainment, and the historical riverfront.

• Property values of nearby businesses and residences would remain stable or increase. The current pace of development would continue as projected. The Southwest 1st Street Bridge contributes to both economic competitiveness and quality of life through improved walkability and accessibility of downtown neighborhoods and thus positively impacts property values.

• The bridge encourages and promotes local events (especially those held at Principal Park) with its proximity to the east, west, and south sides of downtown at the confluence of the Des Moines and Raccoon Rivers. People often park south of the river and use it to walk to the events.
Quality of Life—Net Estimated Benefits: Qualitative

- Southwest 1st Street Multi-Use Trail Bridge provides convenient pedestrian and bicycling access to the trails and downtown amenities as it has parking nearby. It is thus a popular point of access for visitors as well as nearby residents.
- The bridge’s location at the confluence of two rivers offers scenic viewing opportunities.
- It provides automobile operating cost savings by facilitating travel by foot and bicycle.
- Originally built in 1937 for vehicle access over the Raccoon River, it was rehabilitated in 1974 and then converted to a multi-use trail bridge in 2006. The bridge is a contributing structure to the Civic Center Historic District. Rehabilitation of the multi-use trail bridge would help preserve the CCHD.

Environmental Sustainability—Net Estimated Benefits: $7,091,000

- The Meredith Trail extends 1.7 miles from the Red Bridge and crosses the Raccoon Bridge on the Southwest 1st Street Multi-Use Trail Bridge and continues to Gray’s Lake Park, the City’s most popular park. Thus, the Southwest 1st Street Multi-Use Trail Bridge is an important link in the Meredith Trail accounting for a significant share in the total recreational trail usage. This function generates an estimated $7,091,000 in recreational trail use value.
- By providing multi-use connectivity, the bridge contributes to a pattern of land use that encourages alternatives to vehicular travel, thus reducing VMT and associated costs.

Safety—Net Estimated Benefits: Qualitative

- The Southwest 1st Street Multi-Use Trail Bridge provides a safe alternative for bicyclists and pedestrians.

3.3.7 Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge

State of Good Repair—Net Estimated Benefits: Qualitative

- Rehabilitation will re-open the bridge and provide 50 additional years of service life.
- The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge carries the Meredith Trail and is a critical crossing over the Raccoon River providing the link to add about 0.5 trail miles to the 1.7 mile trail. In so doing, it forms a 0.9 mile loop in the Meredith trail with the second crossing of the Raccoon River provided by the Southwest 1st Street Bridge.
- The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge is part of the American Discovery Trail. The American Discovery Trail is a coast-to-coast non-motorized trail. Absent the bridge, this link in non-motorized trails is broken.

Economic Competitiveness—Net Estimated Benefits: $5,063,000

- The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge reduces travel time for pedestrian commuters. The estimated value of time saved is $4,392,000.
- In addition to contributing to trail usage, the Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge attracts special events involving large numbers of pedestrians and/or bicyclists. The estimated value of these events is $671,000.
- The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge would contribute to the walkability and thus the property values of the neighborhoods and businesses on both sides of the Raccoon River. The benefit estimates for the Southwest 5th street Bridge are underestimated.
because they do not include the positive impact to residential and commercial property values due to its contributions to walkability and accessibility.

- The bridge is along popular routes for walk and run events in downtown Des Moines, promoting downtown events which are good for the local economy.

**Quality of Life—Net Estimated Benefits: Qualitative**

- The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge carries the Meredith Trail and is a critical crossing over the Raccoon River. It is also part of the American Discovery Trail. It thus contributes to pedestrian and bicycling use.

- It provides access to scenic views over the Raccoon River.

- It provides connectivity between residential and recreational areas and business district.

- It provides automobile operating cost savings by facilitating travel by foot and bicycle.

- Built in 1898, this is one of the oldest bridges in downtown Des Moines and is listed on the NRHP. Rehabilitating the bridge would allow it to go back in service to bicycle and pedestrian users, while promoting historical integrity.

**Environmental Sustainability—Net Estimated Benefits: $6,583,000.**

- Rehabilitating and reopening the bridge would extend the Meredith Trail and restore the unique trail loop over the Raccoon River accounting for an estimated $6,583,000 in recreational trail use value.

- The Southwest 5th Street (Jackson Avenue) Bridge provides the most direct and safe pedestrian and bicycle access between the residential areas south of the Raccoon River and downtown. Thus it provides an alternate to vehicular commutes reducing the costs associated with VMT in this part of the city. This benefit is not quantified in monetary terms, indicating that the benefits of this alternative are underestimated.

**Safety—Net Estimated Benefits: Qualitative**

- The Southwest 5th Street (Jackson Avenue) Multi-Use Trail Bridge provides a safe alternative for bicyclists and pedestrians for commuting special events, and for accessing the amenities and services of downtown Des Moines.

**3.3.8 Des Moines and Raccoon River Balustrade**

**State of Good Repair—Net Estimated Benefits: Qualitative**

- Throughout the length of the system, sections of the balustrade have deteriorated significantly, with crumbling, cracking, and spalling concrete. Repairing the balustrade will prevent even costlier repairs in the future.

**Economic Competitiveness—Net Estimated Benefits: Qualitative**

- By keeping the trail open, the Principal Riverwalk Trail will continue to provide safe convenient access to downtown businesses.

- By keeping the trail open, pedestrians and bicyclists can continue to use the trail to commute safely to work and avoid unnecessary road crossings and travel delays.

**Quality of Life—Net Estimated Benefits: $10,803,000**

- With the rehabilitation of the balustrade, the Principal Riverwalk on the west side of the Des Moines River would remain open and the entire trail would continue to function as a mixed-use
trail loop connecting the east and west sides of the Des Moines River in downtown Des Moines. With the closure of the west side, recreational trail use would be limited to the east side of the river, thus curtailing recreational trail usage. It is conservatively estimated that recreational use of the trail would be reduced by half at a loss of $10,803,000.

- The balustrade is aesthetically pleasing and is visually congruent with the other structures in the viewscape and CCHD.
- The western connectivity with all other trails and amenities along the Principal Riverwalk trail would be preserved by avoiding trail closure.
- The river wall balustrade is one of the key elements which unite all of the structures within the Civic Center Historic District and rehabilitation of the historic river wall balustrade will promote historic preservation, retaining the original design as it was built in the 1930’s.
- Rehabilitation of the river wall balustrade will ensure its status as a historical place and a contributing structure to the CCHD as listed on the NRHP.

Safety—Net Estimated Benefits: Qualitative

- The river wall balustrade is a key safety component, providing a physical barrier between pedestrians along the Principal Riverwalk and Meredith Trails and the turbulent waters from the Center Street and Scott Avenue Dams.
- The river walls and balustrade are a public safety feature for the open green space directly adjacent to the eight foot tall river walls.

3.4 Summary

Table 3-3 shows the net present value (NPV) for the no-build or base case and the preferred build alternative in the first two rows of data for each proposed bridge; the third row shows the difference. In all cases the preferred build alternative generates an increase in NPV over the base case and these results are highlighted in green. The gains in NPV range from $1,457,033 for raising the Principal Riverwalk Red Multi-Use Trail Bridge to $252,355,843 for replacing the Grand Avenue Bridge over the Des Moines River. The supporting documentation for the calculations and assumptions are provided in the Appendix and excel worksheets attached.

Table 3-3 also summarizes the benefits of each proposed improvement in terms of the net gain over the base case. The NPV results at a 3 percent discount rate are shown, as this rate is consistent with the long-term rate on federal borrowing. However, for purposes of sensitivity analysis, the results at a 7 percent discount rate are provided in the Appendix. This rate yields similar conclusions but with lower NPV estimates.

The proposed improvements bring many benefits to the City of Des Moines, benefitting the local economy, transportation users, recreation users, residents, visitors, entertainment seekers, and safety proponents. Each of the four vehicular bridges (Grand Avenue, Locust Street, Court Avenue, and Scott Avenue) are primarily justified in monetary terms by the reductions in costs related to Vehicle Miles Travelled (VMT) and travel time. The bridges provide other significant benefits, such as maintaining property values by maintaining connectivity, access to employment and services, and contributing to the quality of life of all users including providing better access for minority and low income populations to these services.
Table 3-3. Benefit Cost Analysis: Net Present Value (NPV)@3%

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<tr>
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<td><strong>Principal Riverwalk Red Multi-Use Trail Bridge Alternatives</strong></td>
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<tr>
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<td><strong>Des Moines and Raccoon River Balustrade Alternatives</strong></td>
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The three multi-use trail bridges provide significant monetized benefits in terms of pedestrian commuting travel time saved, recreational trail usage and as destinations for community events. These bridges provide significant additional economic benefits, such as increases in property values and safety, which are described in qualitative terms.

The primary benefit of raising the Principal Riverwalk Red Multi-Use Trail Bridge is the cost-savings in flood mitigation measures relative to the no-alterations base case. By raising the bridge the public would continue to reap all of the benefits of the current structure in addition to reduced flood risk and ultimately accredited flood protection.

Finally, the bridges provide connectivity to employment centers, leisure opportunities, and community services for low income and minority populations by providing alternate means of accessing the downtown destinations in close proximity to their residences.
References


Joe Cortright, Impresa, Inc. 2009. Walking the Walk, CEOs for Cities


