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Making Neighborhoods Great Together

Measuring Access to Opportunity: 21st Century Transportation Performance Measurement

New Partners for Smart Growth

Baltimore, MD

January 31, 2015

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Smart Growth

Smart growth means building urban, suburban and rural communities with **housing and transportation choices near jobs, shops and schools**.

These strategies **support thriving local economies** and protect the environment.

What I hear about smart growth

Wengen

Smart growth is ugly.

Riomaggiore, Italy

We have no history with it.

Mesa Verde, CO

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Nobody would want to live there.

Aspen, CO

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It just doesn't work here.

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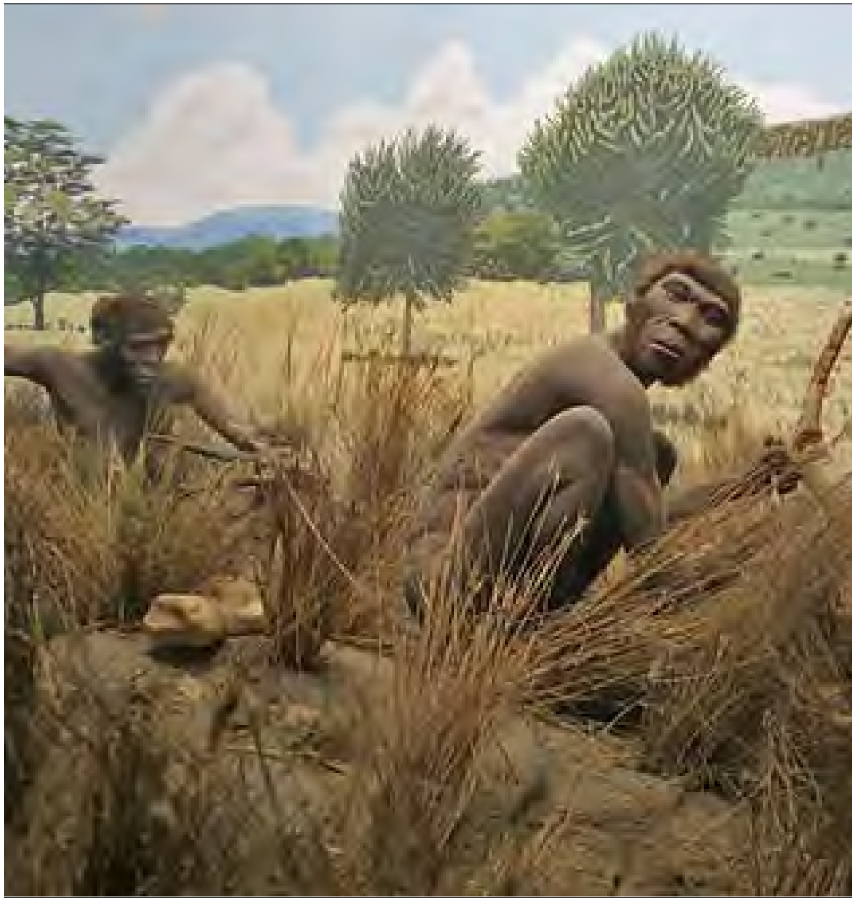
Shut up and drive!

"Trend is not destiny."

-Lewis Mumford



Presentation Overview

- **Scope and approach of study**
- **Summary, ROI results, and implications for MnDOT "Test Case" projects:**
  - Winona Bridge Rehabilitation and Expansion
- **Next Steps**

Scope and Approach of this Study

- Build on previous MnDOT studies
- Develop initial criteria and related metrics and data requirements
- Conduct “test” application of expanded ROI Approach
- Consider how ROI Approach can be integrated into MnDOT programs

Return on Investment (ROI) Approach

- "ROI" concept borrowed from financial investment analysis – a measure of feasibility and profitability
- Expanded in the public investment and public decision-making context to include broader economic and other non-financial measures
- Now common in establishing and evaluating federal, statewide, regional, and local transportation investment priorities and funding

Return on Investment (ROI) Approach

- MnDOT has previously evaluated its State Highway Program with ROI measures focusing on life cycle cost and benefit/cost measures
- Current effort explores expanding ROI evaluation to include broader economic, social, environmental criteria

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Previous MnDOT ROI Evaluation

ROI Category	Average Investment (millions)	ROI Point Estimate	Low/High ROI Range
Safety-Spot Improvement at High-Risk Locations	$1,240	4.1	2.2 to 6.6
Pavement Preservation-Corridor	$2,641	2.0	1.4 to 2.8
Pavement Reconstruction-Corridor	$394	0.9	0.4 to 1.5
Pavement Reconstruction-Urban/Main Street	$683	1.4	0.6 to 2.5
Bridge-Repair	$622	1.5	1.1 to 1.9
Bridge-Replacement	$1,451	1.0	0.4 to 1.8
Congestion Mitigation-General	$1,351	5.5	2.5 to 9.6
Capacity Development	$2,392	1.2	0.6 to 2.0
Active Traffic Management (ATM)	$193	8.9	6.7 to 12.0
MnPASS	$1,544	3.5	2.3 to 5.1
Total	$12,510	2.5	2.0 to 3.2

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Safety, Transportation Infrastructure, and System Performance
•Travel safety
•Network size and condition
•Efficiency, reliability, and safety
•Multi-modal connectivity
•Lifecycle costs
Livability
•Support for "placemaking"
•Access to cultural, educational, recreational resources
•Improved commute experience
Public Health
•Access to public health services
•Reduced exposure to pollutants
•Support for active lifestyles / physical exercise
Environmental Stewardship
•Pollution reduction
•Ecosystem services
•Energy efficiency
•Habitat, ag., open space preservation
Social Equity
•Access for disadvantaged groups / regions
•Differential exposure to pollutants (air, noise)
Economic Development and Competitiveness
•Reduced transportation costs
•Improved access to markets
•Agglomeration economies

Rationale for ROI Evaluation in Transportation

- Increasing diversity of transportation investments
- Increasing concern for environmental, economic, and social effects of transportation investments
- Increasing demand for “transparency” in setting transportation investment priorities

Rationale for ROI Evaluation in Transportation

- Concern that limited funding is invested in the most cost-effective and efficient manner
- Need to bolster public support for adequate transportation system funding

How is Transportation ROI Typically Used?

- Providing a public case for transportation investments and related public funding and financing measures
- Guiding long-range transportation planning efforts
- Setting investment priorities and benchmarks based upon rational policy-based criteria and technical metrics

How is Transportation ROI Typically Used?

- Engaging stakeholders in transportation policy through analysis and disclosure of ROI results
- Allocating given funding source(s) to the best performing (given the ROI criteria) transportation projects

Key ROI System Components and Procedures

Criteria: ROI evaluation requires articulation of measurable criteria corresponding to the matters of concern and linkage of these criteria to the underlying policy objectives, statutory requirements, engineering standards, and established methods of measurement

Weighting: Some criterion may be determined to be more important relative to the other criteria so a "weighing factor" is applied that affects the composite score and ranking

Metrics: Each criterion must have a clear and objective method of "quantification"

Scoring: Scoring is the application of the metrics to the selected list of projects and referencing the linked or related data sets or information to produce a composite score

Ranking: Following scoring candidate projects can be compared based upon their individual composite criteria score

Vetting: Initial scoring often leads to questions regarding the application of criteria, weighting, and scoring. It is necessary to review the method in view of the results

Common Stakeholder Roles in ROI

- ROI Program development
- Selection and refinement of ROI criteria and related measurement
- Review of technical scoring and ranking of projects
- Support for resulting programs and project priorities

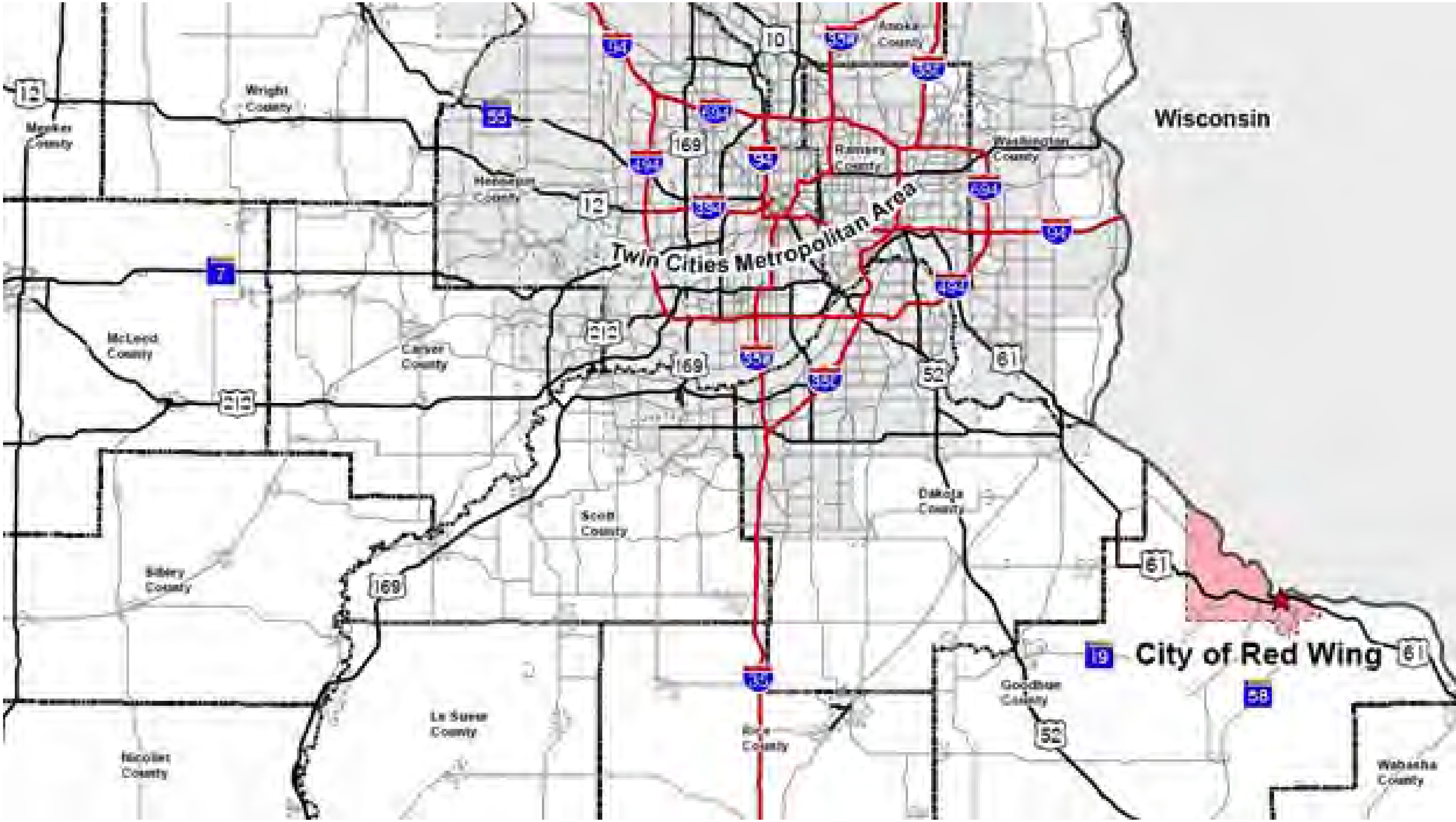
Selected MnDOT "Test Case" Projects

- **Downtown Red Wing Main Street/US 61 "Complete Streets":** Multiple improvements to section of US 61 in downtown Red Wing that support multi-modal accessibility, safety, economic development, and the environment.
- **Winona Bridge Rehabilitation and Expansion**: Rehab of a historic and potentially unsafe bridge over the Mississippi and construct separate and adjacent span with improved bike/ped facilities.

Red Wing Main “Complete Streets” Project Context

- .7 mile segment of Hwy 61 (aka Main St.) is poorly configured and unsafe
- Serves as the primary transportation corridor through a thriving downtown, that is:
  - A unique, historic tourist destination
  - Linked to nearby residential and recreational amenities

Red Wing "Complete Streets" Project Location



Red Wing "Complete Streets" Project Area

Red Wing Main "Complete Streets" Project Components

$5.4 million joint MnDOT/City investment includes:

- Pavement reconstruction and utilities replacement
- New median islands, ADA facilities, bike/ped amenities (bump-outs, seating, waste receptacles, bike racks)
- Closure of 12 driveway accesses, narrowing overall roadway
- Mid-block pedestrian crossings, including median refuge and HAWK signal system

Overview of Red Wing "Complete Streets" ROI

ROI Category	Monetized Impacts	Equity
Economic Competitiveness		• The primary beneficiaries are residents of rural communities in and around Red Wing with a mean household income of ≈ 95% of State Avg.
• Travel time savings	**$2,423,000**	
• Improved travel reliability	**$626,000**	
• Vehicle operating costs	Likely small	
• Improved market access	Potentially high but overlap with livability estimates below	
• Market agglomerations		
Environmental Stewardship		
• Pollution reduction	Likely moderate	
• Land preservation	Likely small	
• Stormwater run-off	**$722,000**	
• Habitat preservation	Negligible	

Overview of Red Wing "Complete Streets" ROI -- Continued

ROI Category	Monetized Impacts	Equity
Public Health		
• Travel safety	**$5,395,000**	• Project also improves ADA facilities.
• Active transportation choices	**$1,600,000**	
• Access to health care	Likely small	
• Exposure to contaminants	Negligible	
Livability		
• "Place-making" efforts	Captured below	
• Access to Amenities	**$1,900,000**	
• The commute experience	Likely moderate	

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Red Wing Main "Complete Streets" Public Health Benefits

- Accessibility improvements increases walking rates over baseline with monetary health benefits calculated using third party research data.

Item	Assumptions		Estimate
Average Red Wing Miles Walked Per Year			9,051,832
Walking Mile Impact for Project	2%	Increase	181,037
Value of Increased Walking on Health Impacts	**$0.55**	**per Mile**	**$100,000**
Net Present Value			**$1,600,000**

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Red Wing "Complete Streets" Livability Benefits

- Improved bike/ped circulation and amenities supports a "sense of place" that is projected to increase adjacent / nearby property values.

Item	Assumption		Estimated Valuation
Impacted Commercial Property	46	Properties	$68,400,000
Impacted Residential Property	820	Single Family Homes	$122,500,000
Property Value Impact	1%	Increase	
Increase in Commercial Property Value			$700,000
Increase in Residential Property Value			$1,200,000
Total Increase for Impacted Properties			**$1,900,000**

Red Wing ROI Methodological Considerations

Findings rely on "benefit transfer" methodology, with uncertainties related to:

- How comparable are the improvements?
- How similar are the affected populations?
- Other similarities / differences (e.g. existing uses, climate)?

Use of property value impacts in ROI must be cognizant of potential "double counting":

- Market access
- Stimulus effect
- Market capture from other locations

Implications for Future MnDOT Analysis

- **Comprehensive ROI analysis can help document broad based, multi-dimensional benefits of "complete streets" and related projects**

- **Monetization of livability and public health impacts generally requires more nuanced, case specific analysis**

- **Future ROI accuracy can be improved with better tracking, data, and analysis of "before-after" conditions including:**
  - **Bike/ped participation rates**
  - **Amount, type, and economic performance of affected land uses**

Winona Bridge Project Context

- 1.5-mile Bridge provides only crossing of Mississippi for 25 - 35 miles, connecting rural communities and important regional routes in MN and WI

- State laws passed in aftermath of I-35W collapse requires Bridge be brought up to higher safety standard

- Built in 1942, Bridge is eligible for listing on the National Register of Historic Places, and contributes to a larger district that includes Downtown.

Image courtesy of MnDOT

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Winona Bridge Project Location

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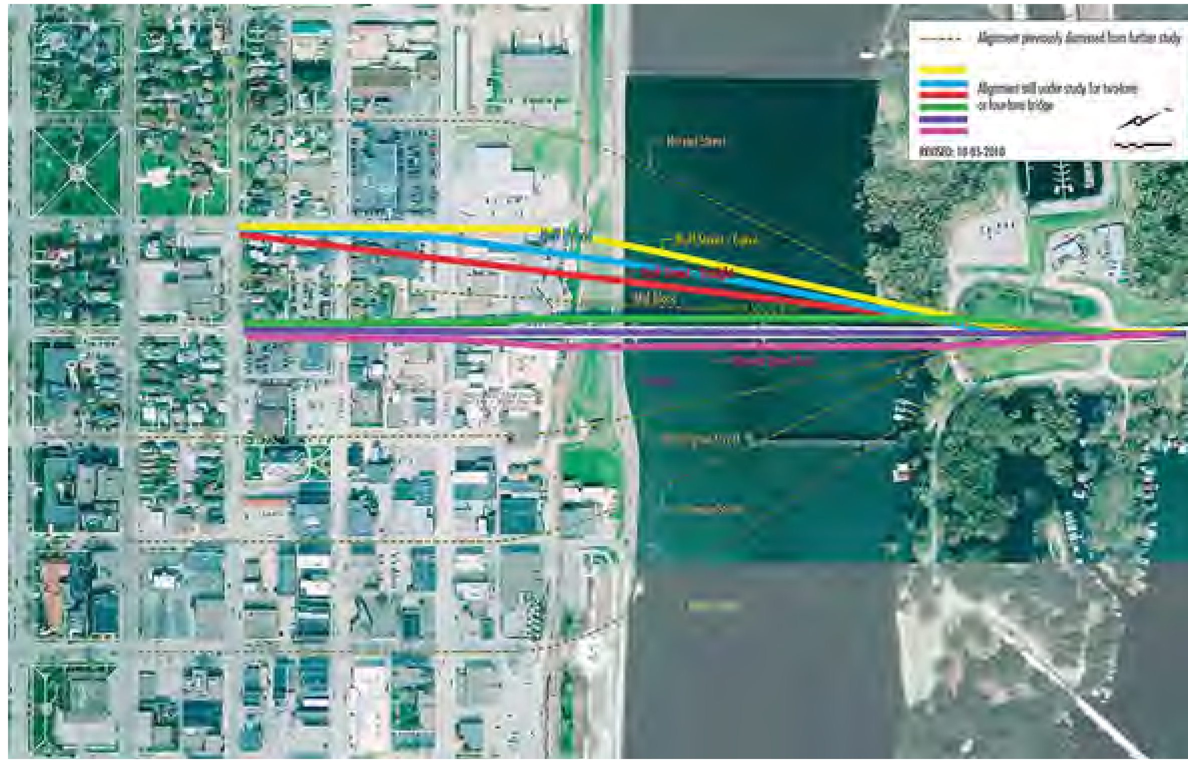
Winona Bridge Project Components

Numerous alternatives Considered. The $150-$175 million "Recommended Alternative" calls for "two -bridge solution":



- Rehabilitate existing bridge to carry 2-lanes of traffic while maintaining historic character.

- Build new, 2-lane girder-type bridge immediately upstream with significantly enhanced bike / ped accommodations

Overview of Winona Bridge ROI Results

ROI Category	Monetized Impacts	Equity
Economic Competitiveness		
Travel time savings	Likely high	• The primary beneficiaries are residents of relatively rural communities with a mean household income ≈ 80% of State Avg.
Improved travel reliability	Likely moderate	
Vehicle operating costs	Negligible	
Improved market access	Likely small	
Market agglomerations		
Environmental Stewardship		
Pollution reduction	Likely moderate / Short-term	
Land preservation	Likely small	
Stormwater run-off	Likely moderate (-)	
Habitat preservation	Likely moderate (-)	

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Overview of Winona Bridge ROI -- Continued

ROI Category	Monetized Impacts	Equity
Public Health		
Improved Travel Safety	Likely Significant	
Active transportation choices	**$2,600,000**	• According to the EA "There are no readily-identifiable low-income or minority populations (adversely) affected by the Project"
Access to health care	Likely small	
Exposure to contaminants	Negligible	
Livability		
Supporting "Place-making"	**$1,700,000**	
Access to local amenities	Likely high	
The commute experience	Likely small	

Winona Bridge Public Health Benefits

- Improvements to active transportation infrastructure lead to increased bicycle and pedestrian participation for local population, improving public health outcomes.

Item	**Assumption**		**Estimate**
Annual Recreational Walking Miles			10,980,472
Annual Ride Miles			7,016,078
Increase Due to Winona Bridge Project	2%		
Value of Increased Walking on Health Impacts	$0.55	per Mile	$120,000
Value of Increased Biking on Health Impacts	$0.22	per Mile	$30,000
Annual Bike/Ped Health Benefits			**$150,000**
Net Present Value			**$2,600,000**

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Winona Bridge Rehabilitation "Historic Value"

Cultural Asset	Willingness to Pay Amount	/ Unit	Translation to Winona Bridge: County (20,000 residents)	State (2.1 million households)
Preservation of Bulgarian Monastaries	$0.80	annual / household	$272,377	$28,599,589
Preservation of Hulton Getty Picture Library, UK	$7.00	annual / household	$2,383,299	$250,246,404
Value of Surrey Histry centre, UK	$26.83	annual / household	$9,133,143	$958,979,971
Preservation of Northern Hotel, Fort Collins	$106.00	One-time / household	$2,120,000	$222,600,000
Value of St. Louis public libraries,	$4.00	annual / household	$1,361,885	$142,997,945
Preservation of St. Genevieve Academy	$5.50	One-time / household	$110,000	$11,550,000
Preservation of Monuments in Washington, DC	$23.00	One-time / household	$460,000	$48,300,000
Civilisation, Quebec, Canada	$8.00	annual / household	$2,723,770	$285,995,891
Median			**$1,740,943**	**$182,798,973**

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Winona Bridge ROI Methodological Considerations

- **While cost of Recommended Alternative far exceed monetized benefits, ROI excludes:**
  - Safety benefits
  - Benefits of avoided detour (e.g. travel time, O&M)
  - Benefits from increased bridge capacity / market access
- **Monetary value of historic preservation and public health highly dependent on size of affected populations**
  - Additional considerations may be appropriate for poor, under-served, rural communities

Implications for Future MnDOT Analysis

- Winona Bridge excellent example of the important role ROI can play in evaluating the relative merits of various project alternatives and attributes.
  - Environmental Assessment included less expensive alternatives consistent with State law
  - Recommended Alternative justified based on historic preservation, bike / ped. Improvements, avoided detour, and capacity expansion
  - An itemized cost / benefit analysis of each of these components would inform MnDOT policy and budgeting
- Distributional and equity considerations, including economic development, while legitimate, can be more explicit

Next Steps

- Partnership for implementation
- Scope and schedule
  - Standard guidance
  - Competitive grant programs
  - MnSHIP update
- Stakeholder engagement

Thank you!

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/Technical Assistance

/DOT Innovation

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