USING PERFORMANCE MEASURES/INDICATORS TO CALCULATE THE TRIPLE BOTTOM LINE

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WHAT IS SUSTAINABILITY?

CONCEPTUAL FRAMEWORK

Economic
- Productivity
- Business activity
- Employment
- Tax burden
- Trade

Social
- Equity
- Human health
- Community livability
- Cultural and historic values
- Public involvement

Environmental
- Pollution emissions
- Climate change
- Biodiversity
- Habitat preservation
- Aesthetics

Currently working on two related research projects to synthesize:

- Sustainable Return on Investment Tools
- Place-Specific Sustainability Indicators

Provide background on the research projects

Present preliminary findings

Discuss challenges and opportunities
**Background: Origin and Purpose of Research**

- North Carolina Department Of Transportation’s Sustainability Blueprint
  - NCDOT desired a means to ascertain if sustainable practices were justifiable
  - Also interested in indicators of sustainability to be used as performance measures
ROI DATABASE ORGANIZATION:
CATEGORIZATION OF RESEARCH FINDINGS

- Searchable Database
- Organized into following descriptive fields
  - Scale
  - Sub-Type of Sustainability
  - Type of Measurement
  - Focus of Tool
  - Applicable Project Types
  - Immediate Applicability to Transportation ROI
  - Transportation Decision-Making Phase
  - Methodology
Distribution of Tools

**Type of Measurement**
- Qualitative: 22%
- Financial: 27%
- Other quantitative: 33%
- Score: 6%
- Emissions: 9%
- Mitigated Fuel Cost: 3%

**Focus of Tool**
- Co-benefit: 36%
- Efficiency: 30%
- General Cost/Benefit: 25%
- Longevity: 7%
- Multimodal: 7%

**Applicable Project Types**
- Highway and Roads: 26%
- Transit and Freight: 19%
- Safety: 12%
- Parking: 1%
- Bicycle and Pedestrian: 12%
- Airport/Air travel: 3%
- Rail: 3%
- Management: 20%
- Maritime and Other Coastal: 3%

**Methodology**
- Optimization: 23%
- Life-Cycle Assessment: 18%
- Cost-Benefit Analysis: 15%
- Environmental Impact: 13%
- Other (Indirect): 9%
SUSTAINABLE RETURN ON INVESTMENT: FHWA SUSTAINABLE HIGHWAYS

http://www.sustainabhhighways.org/

<table>
<thead>
<tr>
<th>Credit</th>
<th>Title</th>
<th>Score</th>
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<tr>
<td>PD-1</td>
<td>Cost Benefit Analysis</td>
<td>0</td>
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<tr>
<td>PD-2</td>
<td>Highway and Traffic Safety</td>
<td>0</td>
</tr>
<tr>
<td>PD-4</td>
<td>Lifecycle Cost Analysis</td>
<td>0</td>
</tr>
<tr>
<td>PD-5</td>
<td>Freight Mobility</td>
<td>0</td>
</tr>
<tr>
<td>PD-6</td>
<td>Educational Outreach</td>
<td>0</td>
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<tr>
<td>PD-7</td>
<td>Tracking Environmental Commitments</td>
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<td>PD-8</td>
<td>Habitat Restoration</td>
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<td>PD-9</td>
<td>Stormwater</td>
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<td>PD-10</td>
<td>Ecological Connectivity</td>
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<tr>
<td>PD-11</td>
<td>Recycle &amp; Reuse Materials</td>
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<td>PD-14</td>
<td>Pedestrian Access</td>
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<td>PD-16</td>
<td>Bicycle Access</td>
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<td>PD-17</td>
<td>Historical, Archaeological, and Cultural Preservation</td>
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<td>PD-19</td>
<td>Low-Emitting Materials</td>
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<td>PD-20</td>
<td>Energy Efficient Lighting</td>
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<td>PD-21</td>
<td>ITS for System Operations</td>
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<td>PD-22</td>
<td>Long-Life Pavement Design</td>
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<td>PD-27</td>
<td>Construction Equipment Emission Reduction</td>
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<td>PD-28</td>
<td>Construction Noise Mitigation</td>
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<tr>
<td>PD-29</td>
<td>Construction Quality Control Plan</td>
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</table>

Project Development Score: 0

Number of Points Required for Each Level Basic Scorecard

<table>
<thead>
<tr>
<th>Level</th>
<th>%</th>
<th>Points Required</th>
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<tbody>
<tr>
<td>Total # Points</td>
<td>85</td>
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<tr>
<td>BRONZE (30%)</td>
<td>26</td>
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<tr>
<td>SILVER (40%)</td>
<td>34</td>
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<tr>
<td>GOLD (50%)</td>
<td>43</td>
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<tr>
<td>PLATINUM (60%)</td>
<td>51</td>
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Sustainable Return on Investment and the Triple Bottom Line: HDR’s SROI

Denver Metro Waste Water - Overview

http://www.hdrinc.com/about-hdr/sustainability/sustainable-return-on-investment
Sustainable Return on Investment: Opportunities

- Provide long-term returns
- Identify cascading benefits
- Justify sustainable practices

Images originally produced by FHWA
Sustainable Return on Investment: Challenges

- Differentiating and addressing causal and correlated connections
- Data Needs
- Messaging
- Establishing a means to link indicators to ROI tools
Indicators and tools conceptually linked

An indicator database could inform what tools are used

Indicators can be generated from ROI tool outputs

Tools can be improved with a better set of indicators to provide guidance
THE IMPORTANCE OF PLACE
# Context Sensitive Transportation Indicators

## Defining Place

<table>
<thead>
<tr>
<th>Place Type Indicator</th>
<th>Built Environment</th>
<th>Economic Function</th>
<th>Development Suitability</th>
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</thead>
<tbody>
<tr>
<td>Intersection Density</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patent density</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Average lot size</td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Ratio of building value to land value</td>
<td></td>
<td></td>
<td>X</td>
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</tbody>
</table>
## Context Sensitive Transportation Indicators

- **Indicator Database**

<table>
<thead>
<tr>
<th>Performance Indicator</th>
<th>Environmental Capital</th>
<th>Human and Social Capital</th>
<th>Financial and Built Capital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per Capita Impervious Surface</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access to Basic Services</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Percentage of Household Income Spent on Transportation</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Network/Intersection Density</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
SUSTAINABLE TRANSPORTATION INDICATORS AND ROI: OVERLAP

- Research envisioned as an alternative analysis process
- Graphic shown presents one way that the databases will be used
- The specifics of the databases will continue to evolve as research continues
ROI TOOLS AND INDICATORS:
WHERE DO WE GO FROM HERE

- Best way to organize tools for integration into phases of transportation decision making
- Identifying useful data sources
- Research on causal links
- Culture change: moving to non-traditional measures for decision making