Transit and Sustainability: Yes, Spoken in the Same Breath!

Purdue Road School
Wednesday March 7, 2018

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Learning Objectives

- Explain the need for rating infrastructure
- Describe the various third-party rating systems available.
- List five main Envision infrastructure rating system credit categories
- Describe the benefits of using Envision as a project guidance tool
- Apply Envision to in-progress projects using the rating system
<table>
<thead>
<tr>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
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</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>THE NEED FOR RATING INFRASTRUCTURE</td>
<td>THIRD-PARTY RATING SYSTEMS</td>
<td>PROJECT EXAMPLES</td>
<td>THE FUTURE OF ENVISION</td>
<td>ENVISION AND ME</td>
<td>Q&amp;A</td>
</tr>
</tbody>
</table>
Introduction
The Value of Measuring Sustainability

- Evaluate conceptual projects or alternatives
- Quantify soft benefits
- Meet sustainability goals
- Assess costs and benefits over a project’s expected lifecycle
- Promote multi-modal transportation options
- Stakeholder’s request it

How do we measure sustainability?
02 The Need For Rating Infrastructure
LEED® Transformed the Building Industry

- Redefined building value
  - Building customers (owners, tenants, residents, the public) recognize value of building “green”
  - Low 1st costs = lower life cycle costs

- Developed value metrics
  - System for measuring, assessing and recognizing building performance
  - Better LEED-defined performance = higher value

- Created the brand

- Instituted LEED-ND

Source: Daniel Goleman, Ecological Intelligence, Broadway Books, New York, 2009
What about Infrastructure?

A different challenge than buildings:

- Building design and construction – usually controlled by a single organization
- Infrastructure projects are more public in nature and they affect or benefit macro ecosystems, communities and regions
- Infrastructure projects must consider:
  - Public stakeholder expectations and support
  - Environmental responsibility
  - Impact on public life
  - Use of public funds – sustainability needs to pay for itself!
Need – System for all Civil Infrastructure

ENERGY
- Geothermal
- Hydroelectric
- Nuclear
- Coal
- Natural gas
- Oil/refinery
- Wind
- Solar
- Biomass
- Other

WATER
- Water Supply
- Capture and storage
- Water reuse
- Stormwater management
- Pipelines
- Flood Control
- Other

WASTE
- Solid waste
- Recycling
- Hazardous waste
- Collection and transfer
- Other

TRANSPORTATION
- Airports
- Roads/highways
- Bike/pedestrians
- Railways
- Public transit
- Ports
- Waterways
- Other

LANDSCAPE
- Public realm
- Parks
- Ecosystem services
- Community development
- Other

INFORMATION
- Telecommunications
- Internet/phones
- Satellites
- Data centers
- Sensors
- Other
State of Infrastructure and Need for Rating

- North American infrastructure is in decline.
- We’re building 2070 today with changing concepts of sustainability.
- Infrastructure must be designed to integrate into community, take into account changes in environment, be resilient, embrace resource conversation, etc.
- Need to be able to address and measure the triple bottom line impacts; social, economic and environmental.
03 Third-Party Rating Systems
Third-Party Rating Systems

- LEED ND
- INVEST
- Greenroads
- Envision
INVEST

A web-based **self-evaluation** tool that covers the full lifecycle of **transportation services**. [Infrastructure Voluntary Evaluation Sustainability Tool]
For FHWA, a sustainable approach to highways considers

- Access (not just mobility)
- Movement of people and goods (not just vehicles)
- Provision of transportation choices, such as safe and comfortable routes for walking, bicycling, and transit
- Efficient use of funding
- Incentives for construction quality
- Regional air quality and climate change
- Environmental management systems, among other considerations.
INVEST is...

- Voluntary - Use it how and where the agency wants
- Private - Data belongs to the user
- Practical - Relates to projects and planning the agency does every day
- Free - No licenses and no limits
INVEST Workspace

Source: sustainablehighways.org
Greenroads

Sustainability rating system used to measure and manage sustainability on transportation projects.
## GREENROADS CREDIT CATEGORIES & INTENT

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project Requirements</strong></td>
<td>Mandatory baseline activities to be considered &quot;sustainable&quot;</td>
</tr>
<tr>
<td>Environment &amp; Water</td>
<td>Promote environmental best practices related to land use, habitat, water, and other ecological resources.</td>
</tr>
<tr>
<td>Construction Activities</td>
<td>Promote environmental, social, and economic best practices for construction beyond minimum compliance.</td>
</tr>
<tr>
<td>Materials &amp; Design</td>
<td>Promote responsible practices for materials management to lower costs, extend service life, and reduce maintenance.</td>
</tr>
<tr>
<td>Utilities &amp; Controls</td>
<td>Promote best practices for improved operations, improved mobility, efficient systems, and enhanced user experience.</td>
</tr>
<tr>
<td>Access &amp; Livability</td>
<td>Promote best practices for improved quality of life—including safety, human health, accessibility, social justice, and placemaking.</td>
</tr>
<tr>
<td>Creativity &amp; Effort</td>
<td>Promote practices that are unique and exceed performance expectations.</td>
</tr>
</tbody>
</table>
Greenroads v2 Project Checklist

Email
Send a complete copy of this checklist to yourself.
Your email

PR-3 Low Impact Development
PR-4 Social Impact Analysis
PR-5 Community Engagement
PR-6 Lifecycle Cost Analysis
PR-7 Quality Control
PR-8 Pollution Prevention
PR-9 Waste Management
PR-10 Noise & Glare Control
PR-11 Utility Conflict Analysis
PR-12 Asset Management

Environment & Water
EW-1 Preferred Alignment
3 points
EW-2 Ecological Connectivity
1-3 points
EW-3 Habitat Conservation
1-3 points
EW-4 Land Use

Utilities & Controls
UC-1 Utility Upgrades
1-2 points
UC-2 Maintenance & Emergency Access
1 point
UC-3 Electric Vehicle Infrastructure
1-3 points

MD-2 Recycled & Recovered Content
1-5 points
MD-3 Environmental Product Declarations
2 points
MD-4 Health Product Declarations
2 points
MD-5 Local Materials
1-5 points
MD-6 Long-Life Design
1-5 points

Attempts and My Score

SEND  Print
Envision
Sustainable best practices and rating system for planning, designing, building and maintaining civil infrastructure.
Envision – a Collaborative Process

ENVISION DEVELOPERS

FOUNDING ORGANIZATIONS
What is Envision?

A system of tools for planning, designing, constructing, operating and rating civil infrastructure

- A self-assessment Checklist
- The Envision Rating Tool
- A credential program for individuals
- A project verification program
- A recognition program
Five Categories, 14 Topic Areas, 60 Credits

1 PURPOSE
Q1.1 Improve Community Quality of Life
Q1.2 Stimulate Sustainable Growth & Development
Q1.3 Develop Local Skills and Capabilities

2 WELLBEING
Q2.1 Enhance Public Health and Safety
Q2.2 Minimize Noise and Vibration
Q2.3 Minimize Light Pollution
Q2.4 Improve Community Mobility and Access
Q2.5 Encourage Alternative Modes of Transportation
Q2.6 Improve Site Accessibility, Safety & Wayfinding

3 COMMUNITY
Q3.1 Preserve Historic and Cultural Resources
Q3.2 Preserve Views and Local Character
Q3.3 Enhance Public Space
Q3.0.0 Innovate or Exceed Credit Requirements

1 QUALITY OF LIFE
13 Credits

1 LEADERSHIP
10 Credits

1.1 Provide Effective Leadership & Commitment
1.2 Establish a Sustainability Management System
1.3 Foster Collaboration and Teamwork
1.4 Provide for Stakeholder Involvement

2 MANAGEMENT

2.1 Pursue By-Product Synergy Opportunities
2.2 Improve Infrastructure Integration

3 PLANNING

3.1 Plan for Long-Term Monitoring & Maintenance
3.2 Address Conflicting Regulations and Policies
3.3 Extend Useful Life
3.0 Innovate or Exceed Credit Requirements

1 RESOURCE ALLOCATION
14 Credits

1.1 Reduce Net Embodied Energy
1.2 Support Sustainable Procurement Practices
1.3 Use Recycled Materials
1.4 Use Regional Materials
1.5 Divert Waste from Landfills
1.6 Reduce Excavated Materials Taken Off Site
1.7 Provide for Deconstruction and Recycling

2. ENERGY

2.1 Reduce Energy Consumption
2.2 Use Renewable Energy
2.3 Commission and Monitor Energy Systems

3 WATER

3.1 Protect Fresh Water Availability
3.2 Reduce Potable Water Consumption
3.3 Monitor Water Systems
3.0.0 Innovate or Exceed Credit Requirements

1 NATURAL WORLD
15 Credits

1.1 Preserve Prime Habitat
1.2 Protect Wetlands and Surface Water
1.3 Preserve Prime Farmland
1.4 Avoid Adverse Geology
1.5 Preserve Foodprint Functions
1.6 Avoid Unvalued Development on Steep Slopes
1.7 Preserve Greenfields

2 LAND + WATER

2.1 Manage Stormwater
2.2 Reduce Pesticides and Fertilizer Impacts
2.3 Prevent Surface and Groundwater Contamination

3 BIODIVERSITY

3.1 Preserve Species Biodiversity
3.2 Control Invasive Species
3.3 Restore Disturbed Soils
3.4 Maintain Wetland and Surface Water Functions
3.0.0 Innovate or Exceed Credit Requirements

1 CLIMATE AND RISK
8 Credits

1.1 Reduce Greenhouse Gas Emissions
1.2 Reduce Air Pollutant Emissions

2 RESILIENCE

2.1 Assess Climate Threat
2.2 Avoid Traps and Vulnerabilities
2.3 Prepare for Long-Term Adaptability
2.4 Prepare for Short-Term Hazards
2.5 Manage Heat Island Effects
2.0.0 Innovate or Exceed Credit Requirements
Envision as a Design Tool

Inherent to Project:
- Noise and Odor Control
- Stakeholder Involvement
- Infrastructure Renewal
- Capacity Enhancement
- Flexible Operations
- Resiliency

Identify opportunities for incremental improvements in sustainable performance.

Roof: Vegetated, Solar, High Reflectance?

Vegetation: Local, Non-invasive, Natural Pesticides?

Energy: Efficiency, Renewable?

Materials: Regional, Recycled, Reclaimed?

Stormwater: Cistern, Rain Garden?
Envision – Online Scoring Sheet

Terry's Test Project
Utah, DC

Purpose
- QL1.1 Improve Community Quality of Life
- QL1.2 Stimulate Sustainable Growth and Development
- QL1.3 Develop Local Skills and Capabilities

Wellbeing
- QL2.1 Enhance Public Health and Safety
- QL2.2 Minimize Noise and Vibration
- QL2.3 Minimize Light Pollution
- QL2.4 Improve Community Mobility and Access
- QL2.5 Encourage Alternative Modes of Transportation
- QL2.6 Improve Site Accessibility, Safety and Wayfinding

Community
- QL3.1 Preserve Historic and Cultural Resources
- QL3.2 Preserve Views and Local Character
- QL3.3 Enhance Public Space

Innovate or Exceed
- QL6.0 Innovate or Exceed Credit Requirements

Project progress
25 of 181 Possible points – 14%

Download selected credit attachments
## Third-Party Rating Systems Comparison

<table>
<thead>
<tr>
<th>Applicability</th>
<th>Envision V2</th>
<th>LEED ND V4</th>
<th>Greenroads V2</th>
<th>INVEST V1.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Design</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Construction</td>
<td>〇</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Operations</td>
<td>〇</td>
<td>〇</td>
<td>〇</td>
<td>✔</td>
</tr>
<tr>
<td>Neighborhoods</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Infrastructure support facilities</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
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<tr>
<td>Roadways</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Transit</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Highways</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Bridges, tunnels, walls</td>
<td>✔</td>
<td>✗</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>System and program level</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
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<tr>
<td>Other civil infrastructure</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
</tbody>
</table>

**LEGEND**
- ✔ Applicable
- 〇 Somewhat applicable
- ✗ Not applicable
- ^ separate module of rating system, existing or planned
Project Examples
INVEST
A web-based self-evaluation tool that covers the full lifecycle of transportation services. [Infrastructure Voluntary Evaluation Sustainability Tool]
I-20/26/126 Corridor Improvements – Carolina Crossroads; South Carolina DOT

- Profound capacity and operational deficiencies for a transportation corridor:
  - 14 miles of Interstate freeway (166 lane miles on three interstates—I-20, I-26, and I-126)
  - 12 interchanges
  - 19 bridges

- Identify and assess the impacts of solutions to:
  - Reduce congestion
  - Improve traffic operations
  - Increase safety
  - Increase capacity

- Integrating the INVEST and Envision sustainability rating systems into EIS process
TriMet

- INVEST Modules: Project Development and O&M
- Evaluated Portland Milwaukie Light Rail
- Saw INVEST as opportunity to use federally-tested set of metrics to assess effectiveness of TriMet sustainability strategies and their integration into the project
  - PD custom scorecard – achieved Gold
  - Selected 7 of 14 OM criteria as applicable to transit project – scored Bronze.
- TriMet recommendations resulting from INVEST:
  - Embed RFP process with sustainability language and expectations to ensure data collected and goals met
  - Use INVEST in synergy with other sustainability evaluation tools

Source: sustainablehighways.org
Greenroads
Sustainability **rating system** used to measure and manage sustainability on **transportation projects**.
West Dowling Road Phase II

- The Alaska Department of Transportation & Public Facilities first **Pilot Project**
- New, $46.8 million highway corridor in the City of Anchorage
- Improving mobility for all modes and upgrading stormwater and sewer utilities
- Built dedicated snow storage and created systems to clean snow near Tina Lake
- The project is registered to pursue certification
Smokey Point Transit Center
Arlington, WA

- Community Transit’s flagship Project for Greenroads and the first transit-only facility to earn Certification.
- Team originally considered pursuing LEED, but found that the facility did not meet the eligibility requirements for conditioned spaces and determined Greenroads’ transportation focus was a better fit.
- Designed with transit users and vehicles in mind, with a focus on responsible, safe, and pleasant site design for durability and accessibility.
- Huge on-site raingarden infiltrates 99.5% of the stormwater, treating 80.4% of it to enhanced levels to remove dissolved metals.
- Community Transit has already registered its next planned transit center facility.

Source: Greenroads Manual
Envision

Sustainable best practices and **rating system** for planning, designing, building and maintaining **civil infrastructure**.
Kansas City Streetcar  
Kansas City, MO

- Alternatives Analysis built around four goals directly tied to the needs and objectives of the local community: Connect, Develop, Thrive, Sustain
- Improves mobility and accessibility for a heavily developed urban area, within walking distance to a mix of commercial, office and residential uses
- Provides “last mile” connectivity to other regional transit services
- $1.8 billion in economic development initiated in the vicinity of the streetcar corridor
- Nearly 90 percent of the Singleton Yard (vehicle maintenance facility) construction waste diverted from landfill.
## KC Streetcar: Envision Platinum

<table>
<thead>
<tr>
<th>CREDIT CATEGORY</th>
<th>AVAILABLE POINTS</th>
<th>AWARDED POINTS</th>
<th>INNOVATION PTS</th>
<th>% OF AVAILABLE POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALITY OF LIFE</td>
<td>181</td>
<td>157</td>
<td>8</td>
<td>91%</td>
</tr>
<tr>
<td>LEADERSHIP</td>
<td>121</td>
<td>75</td>
<td>0</td>
<td>62%</td>
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<tr>
<td>RESOURCE ALLOCATION</td>
<td>182</td>
<td>49</td>
<td>0</td>
<td>27%</td>
</tr>
<tr>
<td>NATURAL WORLD</td>
<td>127</td>
<td>32</td>
<td>0</td>
<td>25%</td>
</tr>
<tr>
<td>CLIMATE &amp; RISK</td>
<td>122</td>
<td>55</td>
<td>0</td>
<td>43%</td>
</tr>
<tr>
<td><strong>TOTAL PROJECT POINTS</strong></td>
<td><strong>733</strong></td>
<td><strong>366</strong></td>
<td><strong>8</strong></td>
<td><strong>51%</strong></td>
</tr>
</tbody>
</table>

### Infographic Highlights

1. **17th Envision rated project**
   - One of only two streetcar systems in the country with 100% low-floor vehicles providing 100% access.

2. **1st Transit project**
   - 2.2-mile streetcar route carries over 6,000 passengers per day.
   - Replaced or upgraded 100-year-old water & sewer lines along much of the streetcar route during construction.

3. **$1.8 Billion** in economic activity since the streetcar project was announced.

4. **13 community kiosks** located on the streetcar line—part of the Smart City initiative.

5. **Diverted nearly 88% of Vehicle Maintenance Facility construction waste from the landfill.**

6. **$100,000** to support artists in developing innovative, original art for select stops.

As part of Kansas City’s One Percent for Art Program, the city provided funding.
Kansas City Streetcar

- **QL1.1 – Improve community quality of life**
  - Built on a series of previous local and regional planning efforts
  - Significant community engagement and incorporated feedback
  - Upgrades to adjacent infrastructure
- **RA1.3 – Use recycled materials**
  - 47% of VMF materials contain recycled content
  - 845 tons of rail – all steel used included recycling of metal scrap
- **NW3.2 – Control invasive species**
  - VMF Built on a grayfield site
  - Approx. 27,700 SF restored to natural areas
  - Planted with native/adapted plants
  - Measures deter and control the establishment of invasive species on the project site
OC Streetcar
Orange County, CA

- Located in Santa Ana & Garden Grove, California
- 4.15 mile route
- 10 stops in each direction
- Opening planned for 2020

- Offers a connection to and from the Santa Ana Regional Transportation Center Station – OC’s 2nd busiest rail station with 65+ daily train connections
- Connections to 18 OCTA bus routes
- Eliminates transit gaps
- Creates a vital link in Orange County’s extensive transportation network – an integral part of the region’s mobility future
OC Streetcar

- QL 3.1 - Preserve historic & cultural resources
  - Extensive research compiled regarding historic and cultural resources in the project area
  - Letter from OHP concurs with finding that the project will result in no adverse effect to historical properties
  - Special consideration given to historic significance of Pacific Electric Santa Ana River Bridge and possible effects on the bridge due to the project
  - Working with local preservation groups resulted in alternative that preserves bridge at its current location

OC Streetcar is the first modern streetcar project to be built in Orange County and will serve Santa Ana’s historic and thriving downtown, which includes federal, state and local courthouses, government offices, colleges, an artists’ village and a thriving restaurant scene. Expected to begin carrying passengers in late 2020, it will operate along a 4.15-mile route that connects the Santa Ana Regional Transportation Center (SARTC) and a new transit hub at Harbor Boulevard and Westminster Avenue in Garden Grove.

Through Transit Extensions to Metrolink, a Measure M program, Santa Ana and Garden Grove pioneered the streetcar project. In cooperation with those cities, OCTA became the lead agency in 2014 for project development, engineering, construction, operations, and maintenance.
I-4 Ultimate Improvement, Florida

- Signature corridor:
  Connecting Communities, Improving Economies and Enhancing Livability
- 21 miles of interstate reconstruction, including:
  o 15 major interchanges
  o Widening 13 bridges, replacing 74 bridge, adding 53 new bridges
  o General use lanes
  o 4 new variable-priced lanes
# I-4 Ultimate Improvement: Envision Platinum

<table>
<thead>
<tr>
<th>Credit Category</th>
<th>Applicable Points</th>
<th>Awarded Points</th>
<th>Innovation Points</th>
<th>Percentage of Applicable Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>QUALITY OF LIFE</td>
<td>181</td>
<td>144</td>
<td>3</td>
<td>81%</td>
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<tr>
<td>LEADERSHIP</td>
<td>113</td>
<td>87</td>
<td>2</td>
<td>79%</td>
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<tr>
<td>RESOURCE ALLOCATION</td>
<td>182</td>
<td>43</td>
<td>5</td>
<td>26%</td>
</tr>
<tr>
<td>NATURAL WORLD</td>
<td>182</td>
<td>80</td>
<td>0</td>
<td>44%</td>
</tr>
<tr>
<td>CLIMATE AND RISK</td>
<td>122</td>
<td>28</td>
<td>0</td>
<td>23%</td>
</tr>
<tr>
<td><strong>Total Points</strong></td>
<td><strong>780</strong></td>
<td><strong>382</strong></td>
<td><strong>10</strong></td>
<td><strong>50%</strong></td>
</tr>
</tbody>
</table>
I-4 Ultimate Improvement, Florida

- **QL0.0 – Quality of Life Innovation**
  - $1.5 million endowment fund for the arts to define the Signature Corridor and $750k fund for public awareness of alternative modes.

- **LD0.0 – Leadership Innovation**
  - Exceptional coordination with local agencies and commitment to aesthetic enhancement program.

- **RA0.0 – Resource Allocation Innovation**
  - Extensive use of recycled demo’d concrete as new aggregate, heavy equipment fuel monitoring systems, and reduced machine hours.

- **QL1.3 – Develop Local Skills and Capabilities**
  - On the job training program (250 people).
05 Future of Envision
Envision Tools

- v3 will be released Spring 2018
- ISI tools and resources will be updated
- ISI will also be working on an on-line training that current ENV SPs will need to take in order to keep their credential current
- Project timing
Envision and me?
What Makes a Good Envision Candidate?

**Stated Environmental and/or Sustainability Goals**
- Established design guidelines for sustainability
- Principles reference environmental stewardship
- Desire to implement strategies that reduce risk
- Desire to design for durability and long-term operational savings

**Interested in Metrics and Environmental Reporting**
- Has a ‘green projects’ portfolio
- Wants to do the “right project”
- Interested in third-party verification
- Stated importance of ripple-bottom-line metrics

**Highly Engaged with the Community and Local Government**
- Public approval is important
- Responsive to local government sustainability issues
- Invites significant stakeholder engagement
- Seeks substantial stakeholder engagement

**Progressive Leader in their Industry**
- Strives to demonstrate sustainability leadership
- Interest in broadly contributing to sustainability
QUESTIONS?