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

Purdue Road School

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HDR, Engineering, Inc.

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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

01 INTRODUCTION

02 THE NEED FOR RATING INFRASTRUCTURE

03 THIRD-PARTY RATING SYSTEMS

04 PROJECT EXAMPLES

05 THE FUTURE OF ENVISION

06 ENVISION AND ME

07 Q&A

01 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

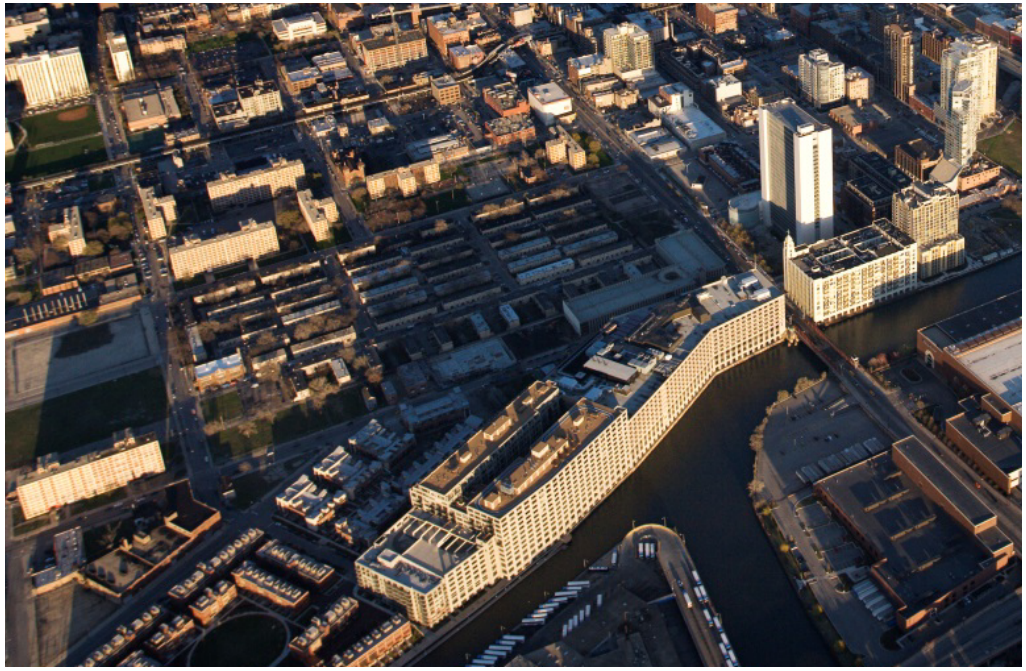
- Redefined building value
  - Building customers (owners, tenants, residents, the public) recognize value of building "green"
  - Low 1st costs = lower life cycle costs
- Developed value metrics
  - System for measuring, assessing and recognizing building performance
  - Better LEED-defined performance = 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!

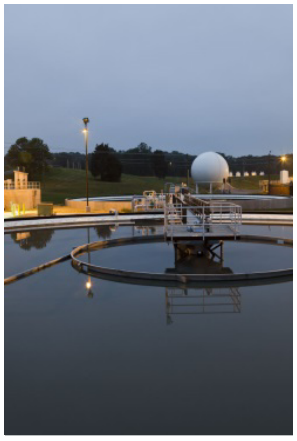


Need – System for all Civil Infrastructure

ENERGY

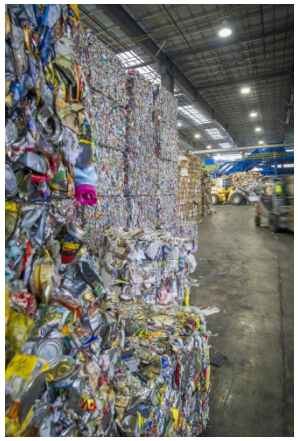
- Geothermal
- Hydroelectric
- Nuclear
- Coal
- Natural gas
- Oil/refinery
- Wind
- Solar
- Biomass
- Other

WATER



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

WASTE

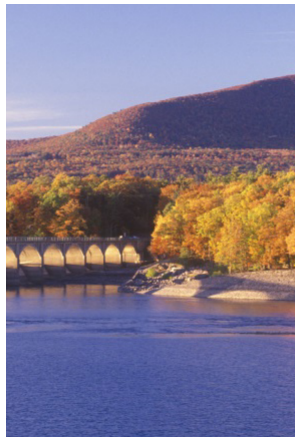


- Solid waste
- Recycling
- Hazardous waste
- Collection and transfer
- Other

TRANSPORTATION

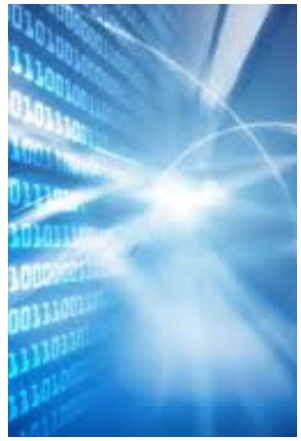
- Airports
- Roads/highways
- Bike/pedestrians
- Railways
- Public transit
- Ports
- Waterways
- Other

LANDSCAPE



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

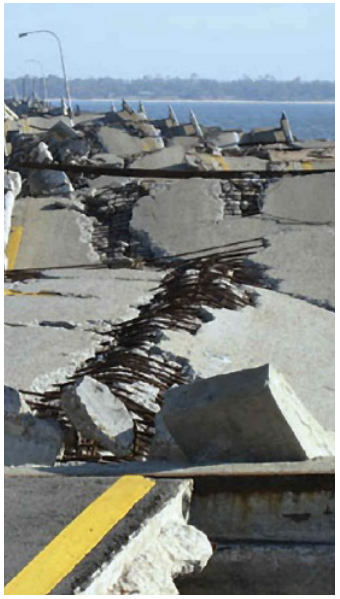
INFORMATION

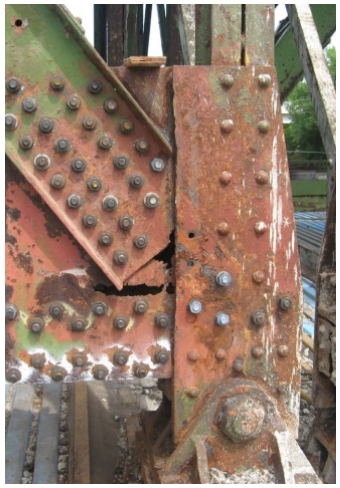
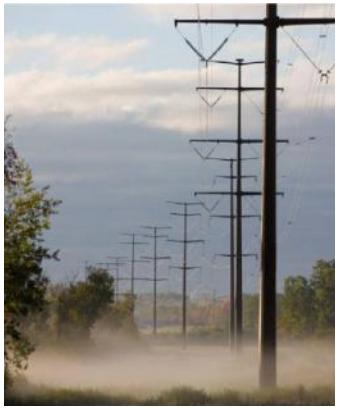


- Telecommunications
- Internet/phones
- Satellites
- Data centers
- Sensors
- Other

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

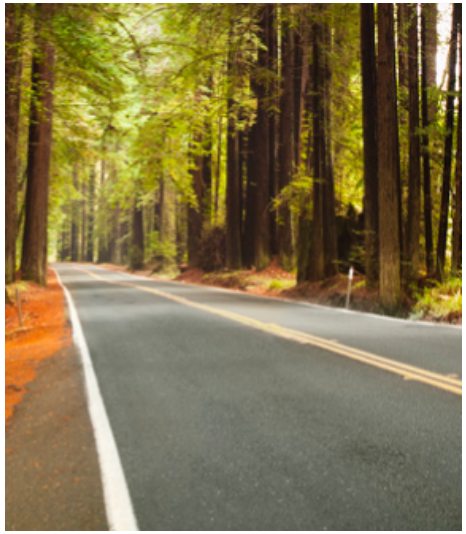
- LEED ND
- INVEST
- Greenroads
- Envision

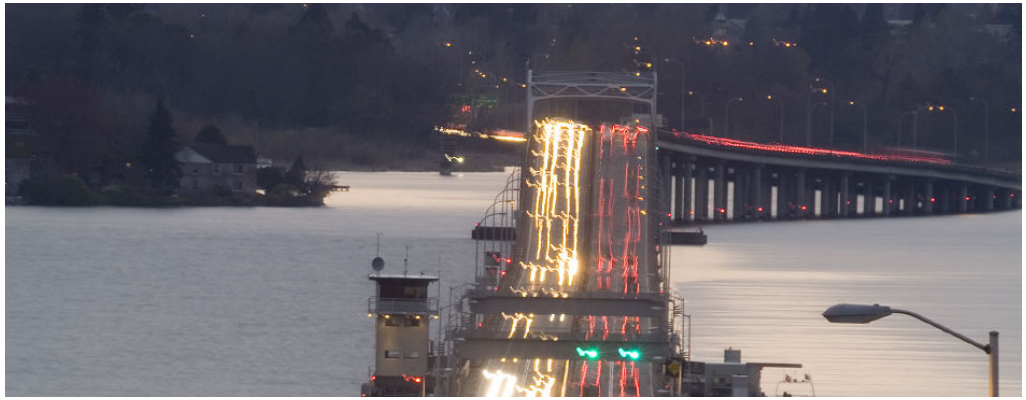
INVEST

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

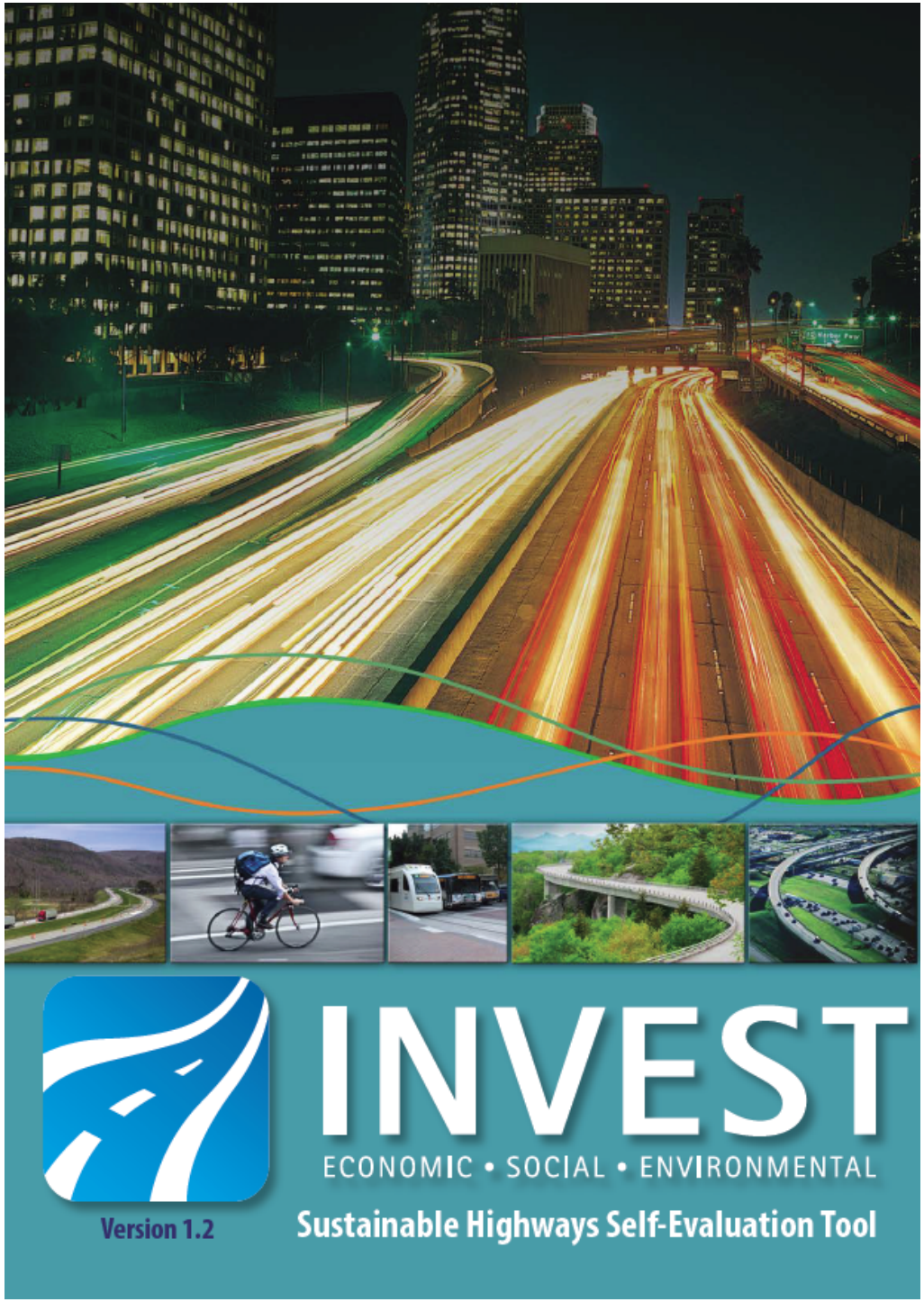
- Access (not just mobility)
- Movement of people and goods (not just vehicles)
- Provision of transportation choices, such as safe and comfortable routes for walking, bicycling, and transit
- Efficient use of funding
- Incentives for construction quality
- Regional air quality and climate change
- Environmental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





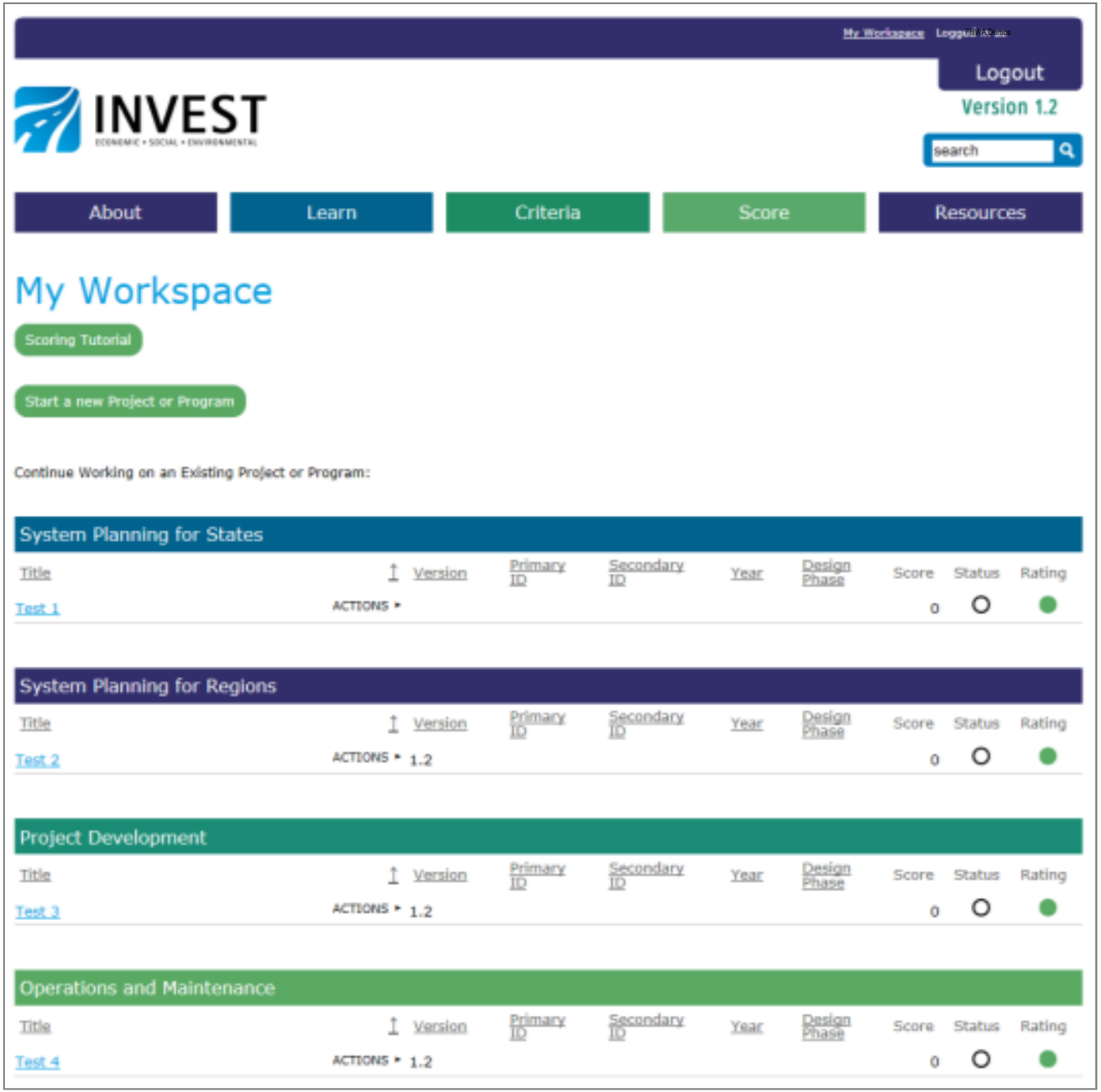
INVEST is…

- 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



Source: sustainablehighways.org

INVEST Workspace



Source: sustainablehighways.org

Greenroads

Sustainability **rating system** used to measure and manage sustainability on **transportation projects**.

GREENROADS CREDIT CATEGORIES & INTENT

Project Requirements	**Mandatory baseline activities to be considered "sustainable"**
Environment & Water	Promote environmental best practices related to land use, habitat, water, and other ecological resources.
Construction Activities	Promote environmental, social, and economic best practices for construction beyond minimum compliance.
Materials & Design	Promote responsible practices for materials management to lower costs, extend service life, and reduce maintenance.
Utilities & Controls	Promote best practices for improved operations, improved mobility, efficient systems, and enhanced user experience.
Access & Livability	Promote best practices for improved quality of life—including safety, human health, accessibility, social justice, and placemaking.
Creativity & Effort	Promote practices that are unique and exceed performance expectations.

Greenroads v2 Project Checklist

Email

Send a complete copy of this checklist to yourself.

Your email

SEND Print

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	Attempting	My Score
EW-1 Preferred Alignment 3 points		
EW-2 Ecological Connectivity 1-3 points		
EW-3 Habitat Conservation 1-3 points		
EW-4 Land Use		

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		

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

Envision

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

Envision – a Collaborative Process

ENVISION DEVELOPERS

Institute for Sustainable Infrastructure

ZOFNASS PROGRAM FOR SUSTAINABLE INFRASTRUCTURE
Graduate School of Design
Harvard University

FOUNDING ORGANIZATIONS

AMERICAN PUBLIC WORKS ASSOCIATION
APWA
Your Comprehensive Public Works Resource

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

ACEC
American Council of Engineering Companies
100 Years of Excellence

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

Pre-assessment Checklist

Envision
Pre-Assessment Checklist

Envision Rating Tool

QL1.1 IMPROVE COMMUNITY QUALITY OF LIFE

INTENT:
Improve the net quality of life of all communities affected by the project and mitigate negative impacts to communities.

LEVELS OF ACHIEVEMENT

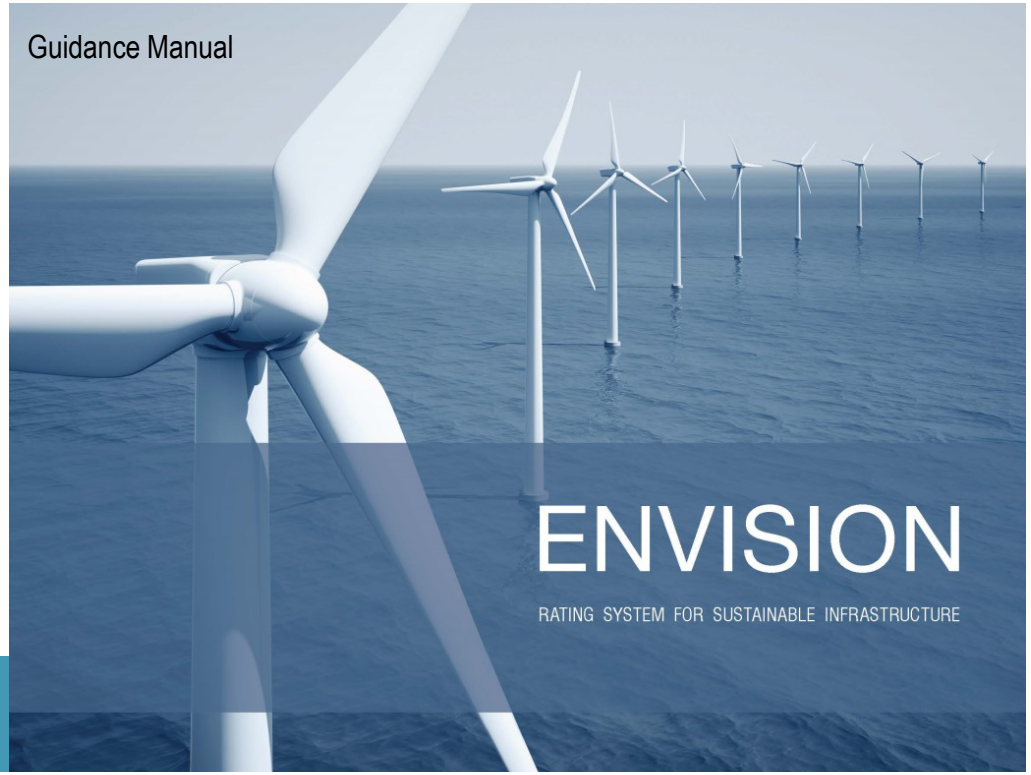
IMPROVED	ENHANCED	SUPERIOR	CONSERVING	RESTORATIVE
(2) Inferred focus.	(3) Community linkages.	(10) Broad community alignment.	(20) Holistic assessment and collaboration.	(25) Community revolutions.

DESCRIPTION

ADVANCING TO HIGHER ACHIEVEMENT LEVELS

EVALUATION CRITERIA AND DOCUMENTATION

Guidance Manual



Five Categories, 14 Topic Areas, 60 Credits

QUALITY OF LIFE
13 Credits

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

2 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 & Wayfinding

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

QL0.0 Innovate or Exceed Credit Requirements

LEADERSHIP
10 Credits

1 COLLABORATION
LD1.1 Provide Effective Leadership & Commitment
LD1.2 Establish a Sustainability Management System
LD1.3 Foster Collaboration and Teamwork
LD1.4 Provide for Stakeholder Involvement

2 MANAGEMENT
LD2.1 Pursue By-Product Synergy Opportunities
LD2.2 Improve Infrastructure Integration

3 PLANNING
LD3.1 Plan for Long-Term Monitoring & Maintenance
LD3.2 Address Conflicting Regulations and Policies
LD3.3 Extend Useful Life

LD0.0 Innovate or Exceed Credit Requirements

RESOURCE ALLOCATION
14 Credits

1 MATERIALS
RA1.1 Reduce Net Embodied Energy
RA1.2 Support Sustainable Procurement Practices
RA1.3 Use Recycled Materials
RA1.4 Use Regional Materials
RA1.5 Divert Waste from Landfills
RA1.6 Reduce Excavated Materials Taken Off Site
RA1.7 Provide for Deconstruction and Recycling

2 ENERGY
RA2.1 Reduce Energy Consumption
RA2.2 Use Renewable Energy
RA2.3 Commission and Monitor Energy Systems

3 WATER
RA3.1 Protect Fresh Water Availability
RA3.2 Reduce Potable Water Consumption
RA3.3 Monitor Water Systems

RA0.0 Innovate or Exceed Credit Requirements

NATURAL WORLD
15 Credits

1 SITING
NW1.1 Preserve Prime Habitat
NW1.2 Protect Wetlands and Surface Water
NW1.3 Preserve Prime Farmland
NW1.4 Avoid Adverse Geology
NW1.5 Preserve Floodplain Functions
NW1.6 Avoid Unsuitable Development on Steep Slopes
NW1.7 Preserve Greenfields

2 LAND+WATER
NW2.1 Manage Stormwater
NW2.2 Reduce Pesticides and Fertilizer Impacts
NW2.3 Prevent Surface and Groundwater Contamination

3 BIODIVERSITY
NW3.1 Preserve Species Biodiversity
NW3.2 Control Invasive Species
NW3.3 Restore Disturbed Soils
NW3.4 Maintain Wetland and Surface Water Functions

NW0.0 Innovate or Exceed Credit Requirements

CLIMATE AND RISK
8 Credits

1 EMISSIONS
CR1.1 Reduce Greenhouse Gas Emissions
CR1.2 Reduce Air Pollutant Emissions

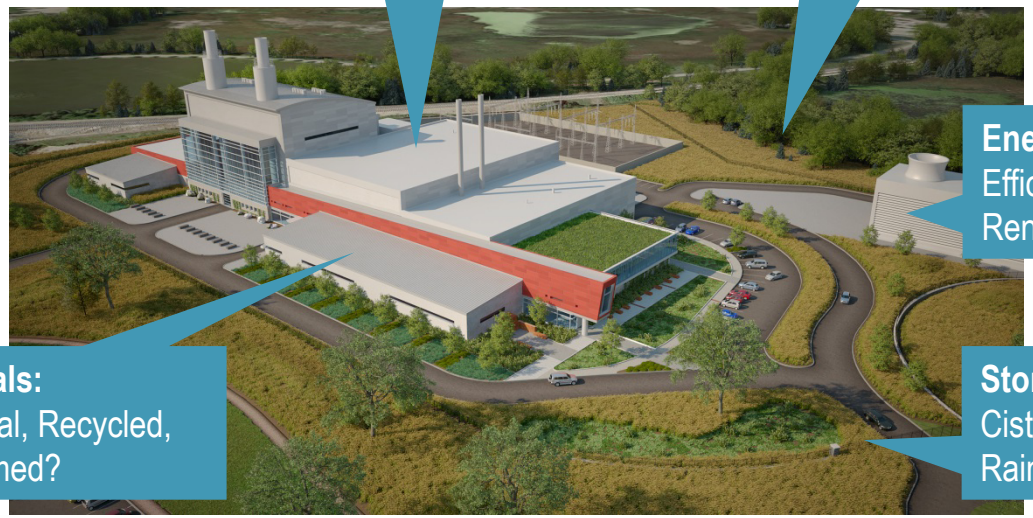
2 RESILIENCE
CR2.1 Assess Climate Threat
CR2.2 Avoid Traps and Vulnerabilities
CR2.3 Prepare for Long-Term Adaptability
CR2.4 Prepare for Short-Term Hazards
CR2.5 Manage Heat Island Effects

CR0.0 Innovate or Exceed Credit Requirements

Envision as a Design Tool

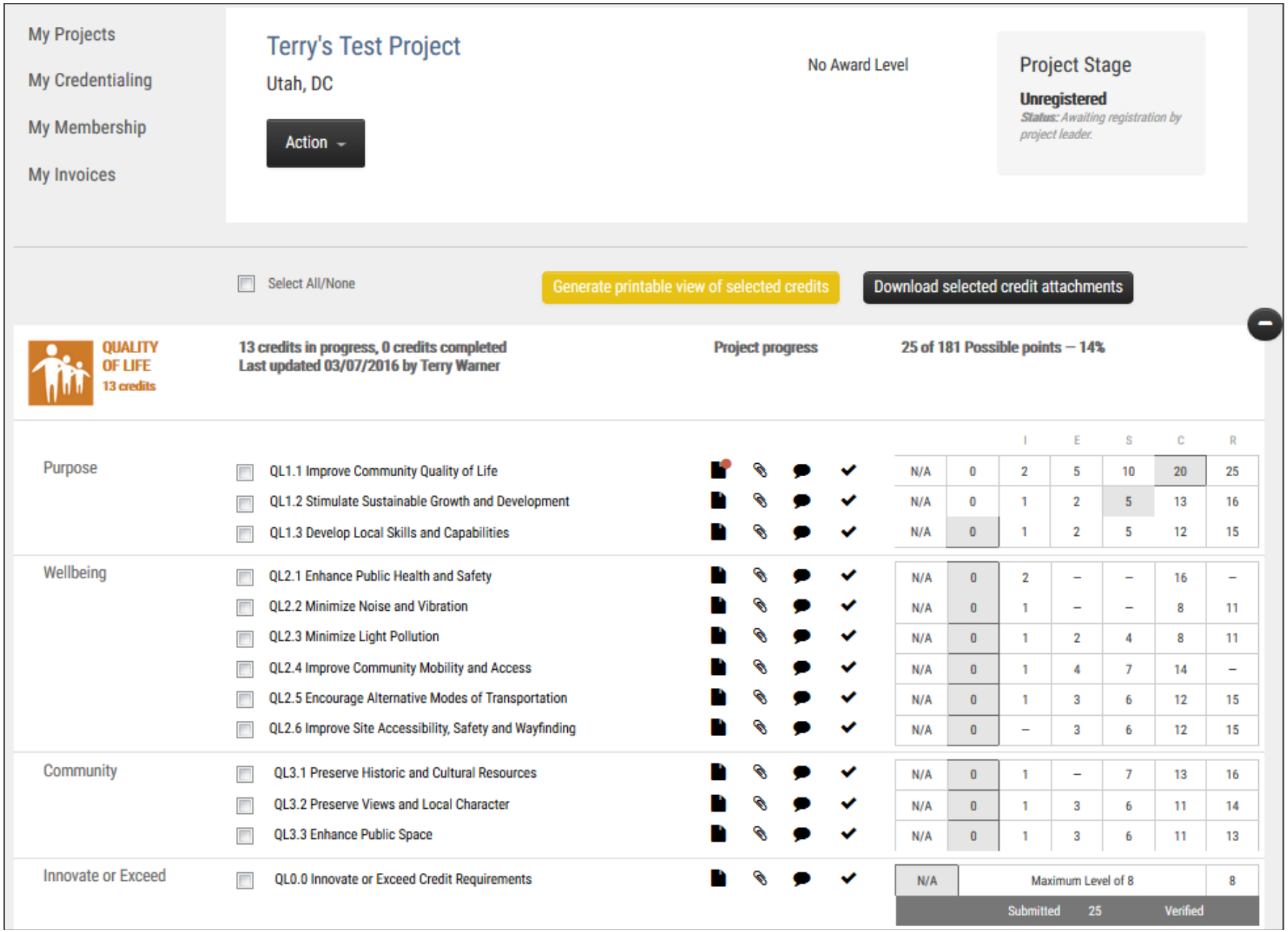
Inherent to Project:

- Noise and Odor Control
- Stakeholder Involvement
- Infrastructure Renewal
- Capacity Enhancement
- Flexible Operations
- Resiliency



Identify opportunities for incremental improvements in sustainable performance

Envision – Online Scoring Sheet



My Projects
My Credentialing
My Membership
My Invoices

Terry's Test Project
Utah, DC
Action

No Award Level

Project Stage
Unregistered
Status: Awaiting registration by project leader.

Select All/None | Generate printable view of selected credits | Download selected credit attachments

QUALITY OF LIFE
13 credits

13 credits in progress, 0 credits completed
Last updated 03/07/2016 by Terry Warner

Project progress

25 of 181 Possible points – 14%

			I	E	S	C	R
Purpose	QL1.1 Improve Community Quality of Life	N/A 0	2	5	10	20	25
	QL1.2 Stimulate Sustainable Growth and Development	N/A 0	1	2	5	13	16
	QL1.3 Develop Local Skills and Capabilities	N/A 0	1	2	5	12	15
Wellbeing	QL2.1 Enhance Public Health and Safety	N/A 0	2	–	–	16	–
	QL2.2 Minimize Noise and Vibration	N/A 0	1	–	–	8	11
	QL2.3 Minimize Light Pollution	N/A 0	1	2	4	8	11
	QL2.4 Improve Community Mobility and Access	N/A 0	1	4	7	14	–
	QL2.5 Encourage Alternative Modes of Transportation	N/A 0	1	3	6	12	15
	QL2.6 Improve Site Accessibility, Safety and Wayfinding	N/A 0	–	3	6	12	15
Community	QL3.1 Preserve Historic and Cultural Resources	N/A 0	1	–	7	13	16
	QL3.2 Preserve Views and Local Character	N/A 0	1	3	6	11	14
	QL3.3 Enhance Public Space	N/A 0	1	3	6	11	13
Innovate or Exceed	QL0.0 Innovate or Exceed Credit Requirements	N/A	Maximum Level of 8				8

Submitted 25 Verified

Third-Party Rating Systems Comparison

Applicability	Envision® V2	LEED ND V4	Greenroads V2	INVEST V1.2
Planning	✓	✓	✓	✓^
Design	✓	✓	✓	✓
Construction	◐^	✓	✓	✓
Operations	◐^	◐	◐	✓^
Neighborhoods	✓	✓	✗	✗
Infrastructure support facilities	✓	✗	✗	✗
Roadways	✓	✓	✓	✓
Transit	✓	✓	✓	✓
Highways	✓	✗	✓	✓
Bridges, tunnels, walls	✓	✗	✓	✓
System and program level	✓	✓	✓	✓
Other civil infrastructure	✓	✗	✗	✗

LEGEND
✓ Applicable
● Somewhat applicable
× Not applicable
^ separate module of rating system, existing or planned

04 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

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

Source: Greenroads Manual

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

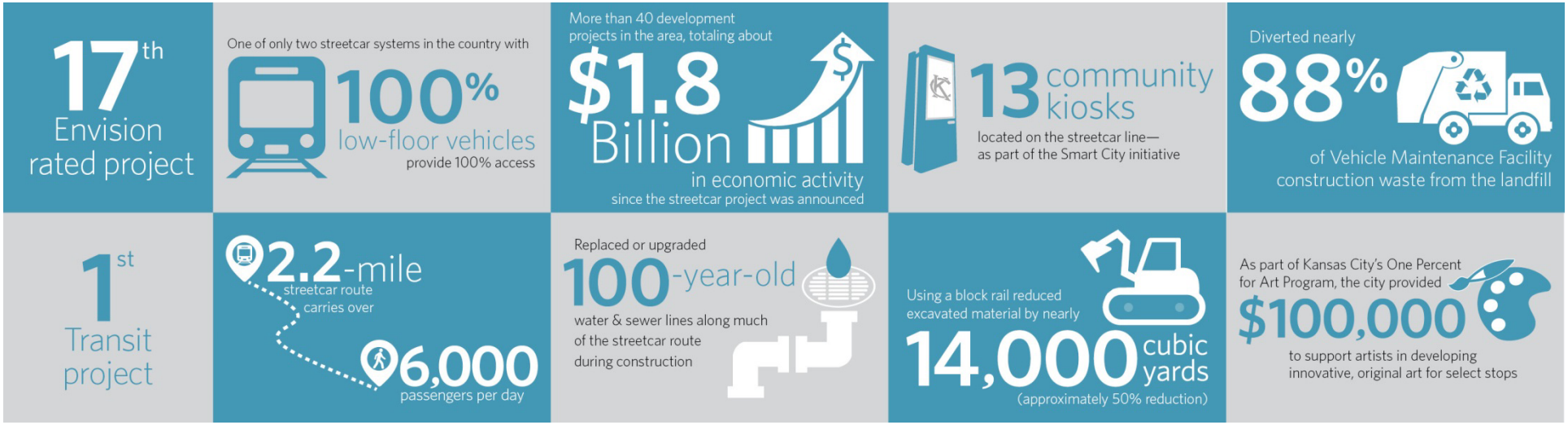
Sustainable best practices and **rating system** for planning, designing, building and maintaining **civil infrastructure**.

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

CREDIT CATEGORY	AVAILABLE POINTS	AWARDED POINTS	INNOVATION PTS	% OF AVAILABLE POINTS
QUALITY OF LIFE	181	157	8	91%
LEADERSHIP	121	75	0	62%
RESOURCE ALLOCATION	182	49	0	27%
NATURAL WORLD	127	32	0	25%
CLIMATE & RISK	122	53	0	43%
TOTAL PROJECT POINTS	733#	366	8	51%



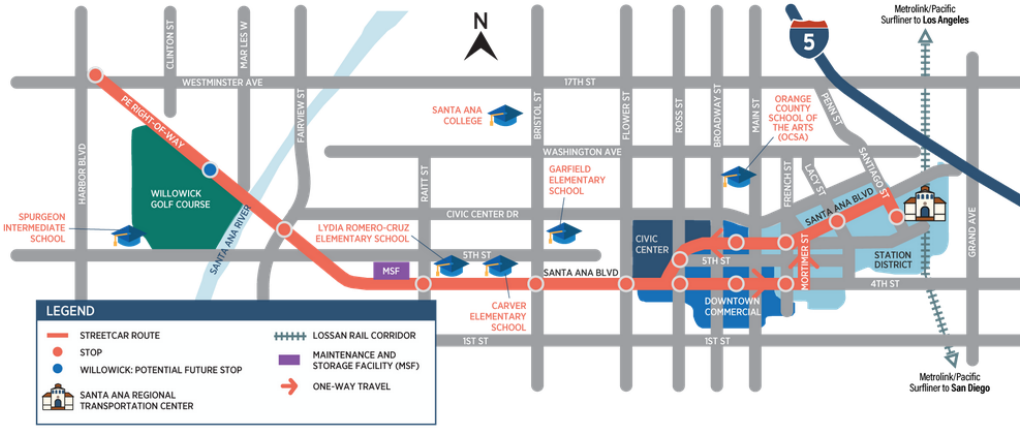
Kansas City Streetcar

- 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



Source: octa.net

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

I-4 Ultimate Improvement, Florida

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

I-4 Ultimate Improvement: Envision Platinum

Credit Category	Applicable Points	Awarded Points	Innovation Points	Percentage of Applicable Points
QUALITY OF LIFE	181	144	3	81%
LEADERSHIP	113	87	2	79%
RESOURCE ALLOCATION	182	43	5	26%
NATURAL WORLD	182	80	0	44%
CLIMATE AND RISK	122	28	0	23%
Total Points	**780***	**382**	**10**	**50%**

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

06 Envision and me?

ped./bicycle access
art
recycled materials
fewer emissions
bus rapid transit
CSS
regional material
quality construction
LID stormwater
native vegetation

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 riple-bottom-line metrics

Progressive Leader in their Industry

- Strives to demonstrate sustainability leadership
- Interest in broadly contributing to sustainability

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

QUESTIONS?
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