Sustainable Road Design And Multimodal Roads

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Roadways – more than just mobility

- **Perspectives from a former City Engineer**
- **LEED for Buildings made a Public Agency change its approach**
- **Envision for Roadways**

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Beyond ‘Business as Usual’

US Federal Highway Administration defines sustainable roadways as those that:

- Consider life cycle costs
- Reduce consumption of natural resources
- Enhance the natural environment
- Provide access to all people and goods
- Provide transportation choices
- Promote safety and raise comfort for walking, cycling, and transit

Recognition that technical design excellence alone is not enough to guarantee an optimal end result

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What does a sustainable road look like?

Image courtesy of the Greenroads Foundation

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‘Complete Streets’

A set of design principles for transportation planning intended to:

- Provide travel options for all users in a safe and accessible manner
- Forma network that allows for efficient and high quality travel experiences
- Be adaptable to accommodate present and future needs
- Contribute to environmental sustainability and resiliency
- Consider life cycle costs

-taken from City of Edmonton *Complete Streets Guidelines*

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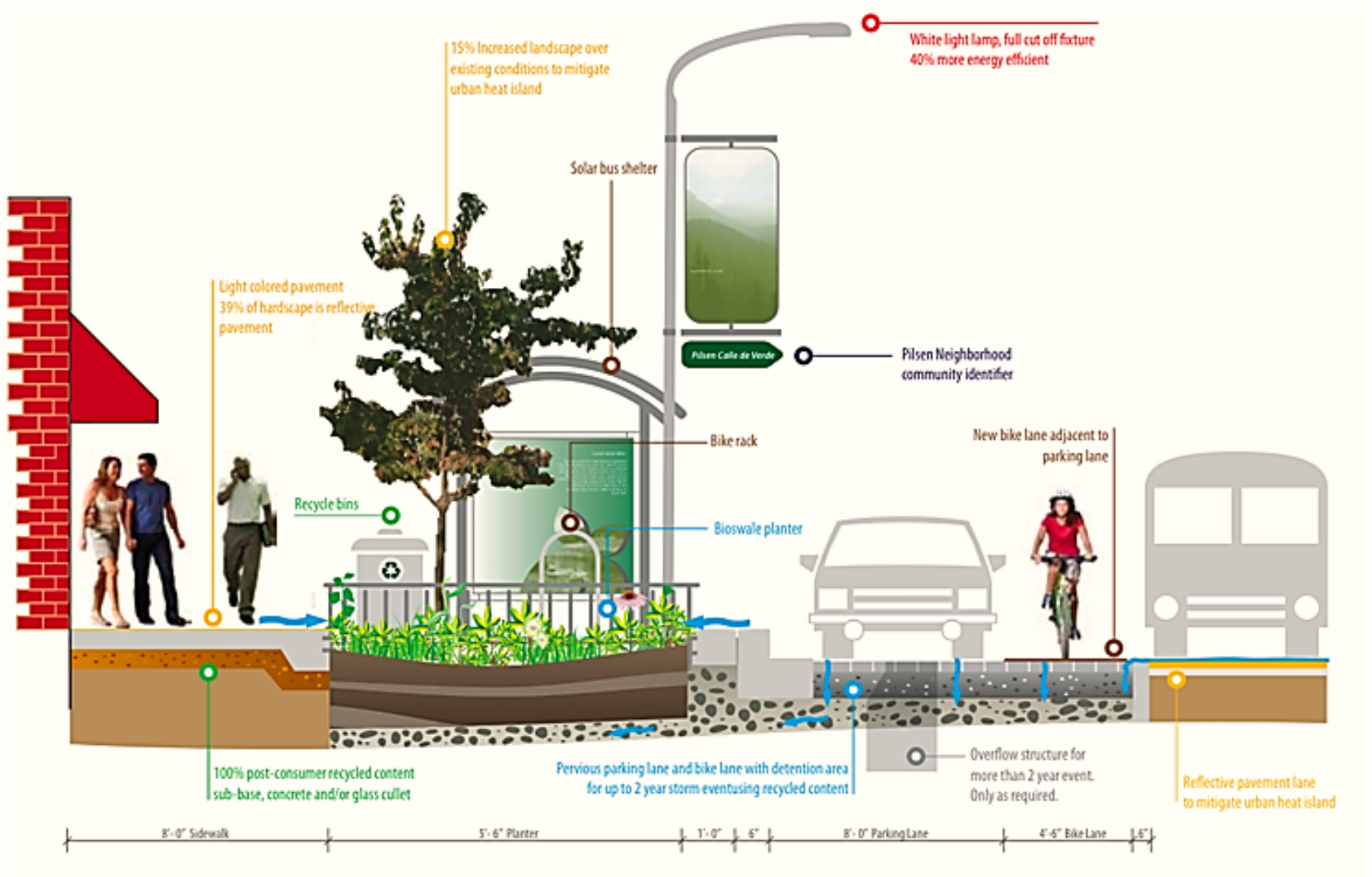
What does a sustainable road look like?



Cermak Road – Chicago, IL

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Rating Sustainability

- **Ratings frameworks and systems can benefit the design process in the following ways by:**
    1. Providing best practice guidance
    2. As a platform for considering design alternatives
    3. As a communications and stakeholder engagement tool
    4. As a method for verifying performance

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Rating Sustainability

- **Many transportation-specific tools available to assist with technical design:**

GreenLITES Evergreen

New York State DOT

I-LAST™

Illinois State DOT

INVEST
ECONOMIC • SOCIAL • ENVIRONMENTAL

US Federal Highway Administration

Greenroads

Greenroads Foundation

PEACH Roads
Preserving Environment And Community Heritage

Cobb County, GA

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Rating Sustainability

What about situations where issues beyond transportation-related challenges need to be considered?

Introducing Envision™

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Introducing Envision™

Envision™ provides a holistic framework for planning, evaluating and rating the community, environmental, and economic benefits of all types and sizes of infrastructure projects. It gives recognition to infrastructure projects that use transformational and collaborative approaches to assessing sustainable performance over the course of a project's life cycle.

- Institute for Sustainable Infrastructure

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A Joint Collaboration

INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE

ISI

ZOFNASS PROGRAM FOR SUSTAINABLE INFRASTRUCTURE

Graduate School of Design
Harvard University

ISI Founding Organizations

APWA
American Public Works Association
Your Comprehensive Public Works Resource

ASCE
American Society of Civil Engineers

ACEC
American Council of Engineering Companies
100 Years of Excellence

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The Envision™ Framework

In a nutshell:

- **Think LEED®** (for buildings), only **enhanced** and more **broadly applicable**, more **flexible**, more **adaptable**, more focused on **community priorities** and a project's **lifecycle**
- From planning and design framework to validation and recognition
- Uses outcome-based objectives (with the goal of no net impact or restorative performance)
- **55 credits (plus 5 innovation) across 5 categories**

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The Envision™ Framework

Envision™ can add value to design through:

- Helping to determine the **right** project to pursue
- Consideration of the **full project lifecycle**
- **Incorporating stakeholder needs** and concerns
- **Facilitating integration** with existing assets & networks
- **Identifying synergies** and cost efficiencies

THE ENVISION™ RATING SYSTEM

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Envision addresses the ***public*** side of infrastructure

- Infrastructure is a public asset not a private commodity
- No single responsible entity
- Multiple stakeholders with different agendas, schedules, customers
- Taxpayer funding predominates
- Integration is essential for achieving optimal performance across the entire infrastructure network

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Relationship to other standards

- Envision is not intended to supplant existing, sector-specific infrastructure rating systems
- Envision draws on niche standards to create a consolidated standard for ALL infrastructure in North America

THE ENVISION RATING SYSTEM


A Practical Example
Low Level Road
North Vancouver, Canada

Low Level Road

- Stantec worked with Port Metro Vancouver and the City of North Vancouver as Prime Design Consultant on the realignment of 2.2 km of rail tracks and a major east-west artery known as the Low Level Road
- This roadway and rail represents a vital transportation link that enables the Port to move cargo in and out of its facilities, and required expansion to meet projected increases in demand
- Expansion and realignment of the Low Level Road was constrained by limited space, steep slopes, and the close proximity of local residential homes and parkland in a heavily urbanized area
- Development was also complicated by significant geotechnical risks (including landslides and earthquakes)

Key project aspects:

- ✓ Extensive stakeholder engagement
- ✓ Minimization of noise/lighting impacts
- ✓ Expansion of pedestrian and cyclist networks
- ✓ Slope stabilization
- ✓ Preservation of Bald Eagle habitat

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Project Challenges

Increased rail traffic to Port facilities outstripped existing rail infrastructure

Roadway bordered by private residences immediately to the north with significant concerns around lighting/noise

Endangered Bald eagles maintained nests on the project site

The City desired to expand cycling networks to enable connection with transit facilities

Project site presented an opportunity for linking existing trailways and green spaces known as the Spirit Trail

Site lies in an earthquake fault zone and was determined to have unstable slopes and suffered from rockfalls onto road surface

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What we did

- Eliminated three at-grade rail crossings
- Stabilized slopes with tiered retaining walls
- Raised roadway above projected 200 year flood levels
- Mitigated environmental damage through off-site remediation, preservation, and installation of artificial eagle nesting poles
- Expanded pedestrian/cyclist access and reconfigured lanes
- Installed noise walls to reduce impact on local residents
- Engaged extensively with local community, First Nations, and stakeholders
- Eliminated invasive species on site and planted native species
- Selected high efficiency LED streetlights
- Incorporated work by local artists and vegetated retaining walls to raise aesthetic value

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Noise walls

Vegetated walls and public art

Overpass

Expanded rail track network

Moodyville Park

Stabilized retaining walls

Spirit Trail & pedestrian overpass

Diverging diamond intersection

All images courtesy of PMV

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Low Level Road & Envision

- Project currently undergoing Envision certification process, targeting highest level of achievement (Platinum)
- First transportation-based project to undergo certification
- This project will serve as a case study for sustainable roadway design at Stantec

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Envision For Roadways

- Takes the focus from a department and brings all the stakeholders together
- Provides an approach to allow all stakeholder a voice
- Balances the playing field for all users and stakeholders

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