

An Introduction to Greenroads
Slide Deck for General Use – 2013 Updates



Provided by
Greenroads Foundation

The Greenroads[®] Rating System



What is the Greenroads Rating System?

- Third-party certification process similar to LEED®
 - Applies to new and reconstructed road projects
 - Recognizes and quantifies roadway sustainability
 - Awards points for sustainable practices

What can I do on my project tomorrow to be more sustainable?



How We Got Here

- Development:
 - Began in 2007 at University of Washington
 - Industry, local and DOT research support
 - 5 years, over 100 people, 120+ test projects



- Managed by Greenroads Foundation since 2010
 - Independent 501(c)(3) non-profit organization

Sasobit Warm Mix Asphalt
I-90 near George, WA
23 June 2008



more sustainable roads for a better transportation future

What can Greenroads do?

- Define what roadway project features contribute to sustainability.
- Provide an accounting tool for sustainability benchmarking.
- Communicate sustainability efforts to key stakeholders.
- Help manage and improve roadway sustainability.
- Stimulate the market for sustainable practices and products

Overall goal: improve roadway sustainability

Quiet Pavement
SR 520 Near Bellevue, WA
14 July 2007



more sustainable roads for a better transportation future

Greenroads is a project-oriented system

It focuses on design and construction.



What are the benefits of greening our roads?

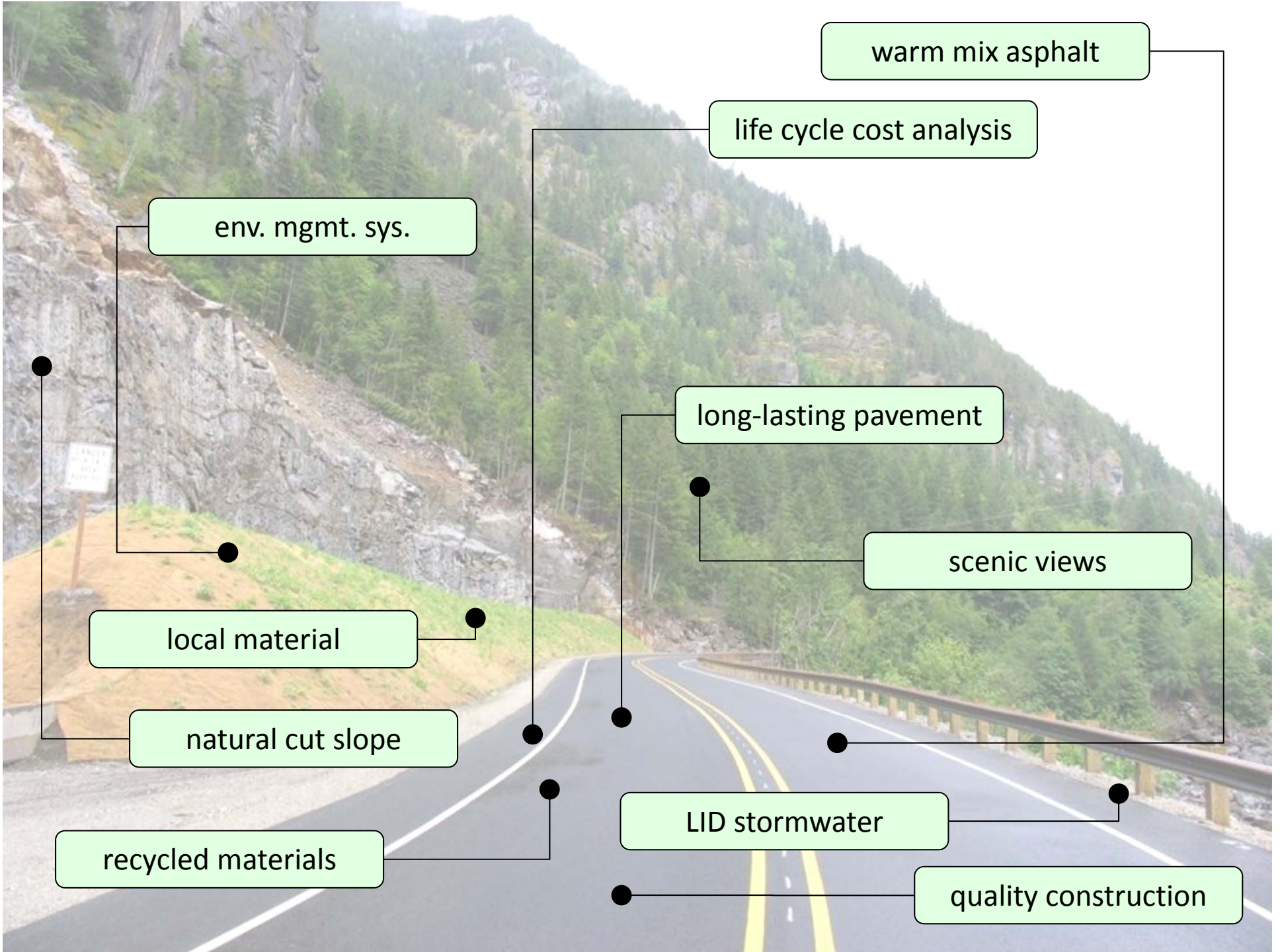
Greenroads do good things:

- Lower initial cost
- Lower lifecycle costs
- Lower user cost
- Strengthened local economies
- Higher property values
- Healthier communities and people
- Reduced environmental impacts



So what does a Greenroad look like?





warm mix asphalt

life cycle cost analysis

env. mgmt. sys.

long-lasting pavement

scenic views

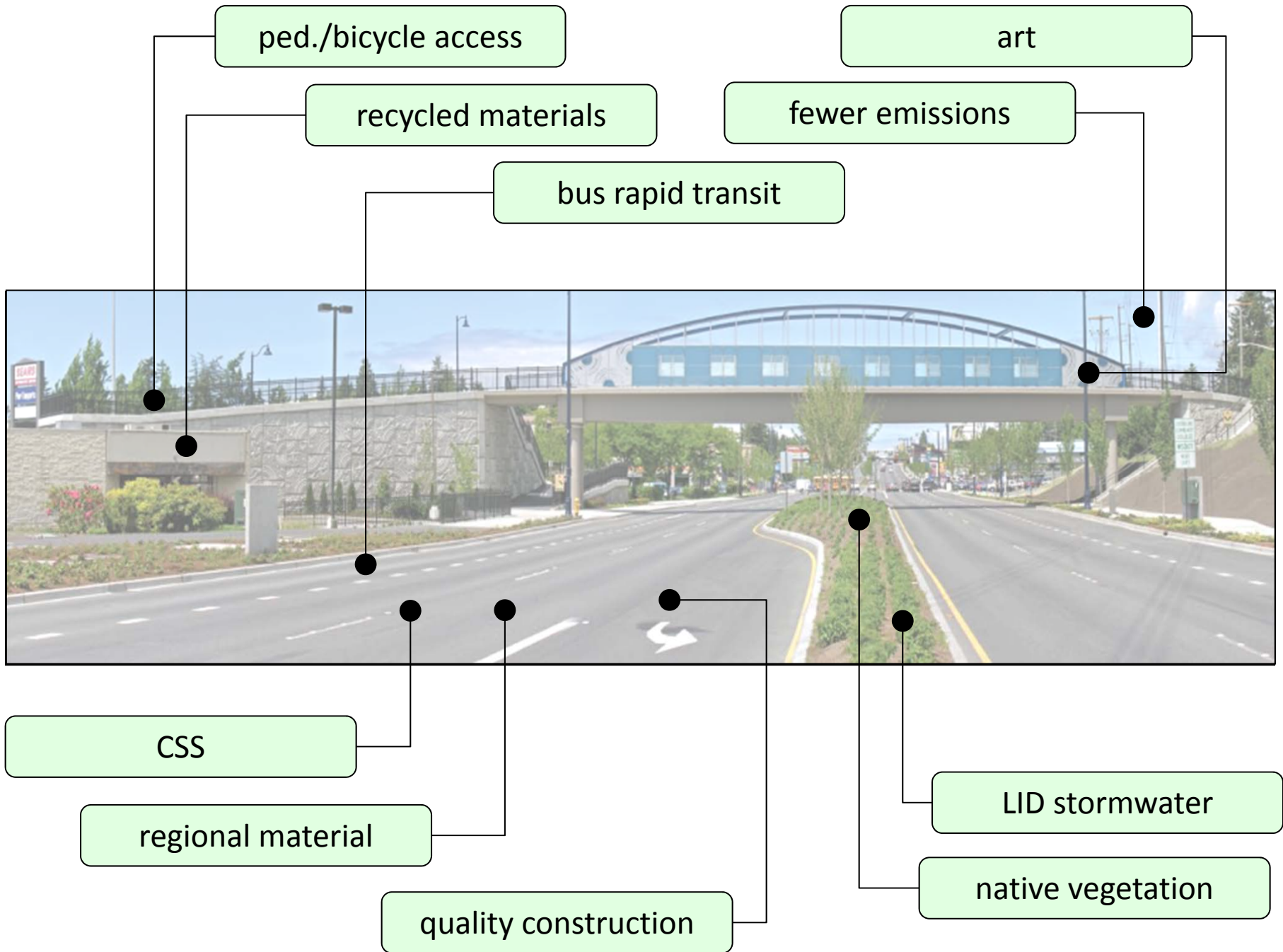
local material

natural cut slope

recycled materials

LID stormwater

quality construction



The Greenroads Manual



- Version 1.5 manual published February 2011
- Errata for version 1.0.1 to version 1.5 published
- Download free at: www.greenroads.org

What's inside?

- Each Project Requirement or Voluntary Credit has these:
 - Goal
 - Requirements to meet the credit intent
 - Documentation to submit
 - Supporting information
 - Suggested approaches and strategies
 - Examples
 - Potential issues
 - Research
 - Glossary
 - References
 - Relationships to related credits, sustainability components and measureable benefits

ENVIRONMENTAL REVIEW PROCESS

GOAL

Evaluate impacts of roadway projects through an informed decision-making process.

REQUIREMENTS

Perform and document a comprehensive environmental review of the roadway project. This review should clearly and concisely document:

1. Project name and location.
2. Names and contact information of key players in the decision making process, including (but not limited to): the owner agency, agency representatives responsible for completing the environmental review process, other stakeholders, and relevant professionals involved.
3. Intent and purpose of the roadway project.
4. Descriptions of potential environmental, economic and social impacts of the intended roadway project.
5. Detailed descriptions of the extent of the significance of these impacts with respect to the decision-making process and feasible performance expectations.
6. Description of the public involvement opportunity in the environmental review process; document this opportunity and the results of input in the final decisions.
7. Any jurisdictional requirements for more detailed environmental review documents such as environmental impact statements (EIS) or environmental assessments (EA) to determine the significance of environmental impacts.
8. Description of the final environmental decisions made.

Details

An environmental review process is a method of decision-making used in project development. The basic intent of the process is to promote informed decision-making by explaining the project in a comprehensive, concise and understandable way. This explanation involves an evaluation of environmental, social and economic impacts in order to meet existing regulations and public stakeholder needs. These impacts, regulations, and needs shape basic decision criteria, vary significantly in complexity between projects, and dictate the effort required during the review process and project implementation. The National Environmental Policy Act (NEPA) provides formal guidelines for federally funded roadway projects, and many states have environmental review processes similar to NEPA.

DOCUMENTATION

- Copy of the final decision document that demonstrates an environmental review process has been completed for the project, with all appropriate agency or jurisdiction representative signatures. Any of the following documents will suffice:
 - Executive summary of the EA or EIS, the Record of Decision (ROD) or Finding of No Significant Impact (FONSI), or jurisdiction equivalent of these documents.
 - Completed copy of the Washington State Department of Ecology State Environmental Policy Act (SEPA) Checklist (or local equivalent). Note: this is recommended for projects exempt from a formal environmental review.



REQUIRED

RELATED CREDITS

- ✓ PR-2 Lifecycle Cost Analysis
- ✓ PR-3 Lifecycle Inventory
- ✓ AE-3 Context Sensitive Solutions
- ✓ MR-1 Lifecycle Assessment

SUSTAINABILITY COMPONENTS

- ✓ Ecology
- ✓ Economy
- ✓ Equity
- ✓ Extant
- ✓ Expectations
- ✓ Experience
- ✓ Exposure

BENEFITS

- ✓ Reduces Air Emissions
- ✓ Reduces Wastewater Emissions
- ✓ Reduces Soil/Solid Waste Emissions
- ✓ Improves Human Health & Safety
- ✓ Improves Business Practice
- ✓ Increases Awareness
- ✓ Increases Aesthetics



Greenroads Categories: Version 1.5

Category	Description	Points
Project Requirements	Minimum requirements for a Greenroad	Req.
Voluntary Credits		
Environment & Water	Stormwater, habitat, vegetation	21
Access & Equity	Modal access, culture, aesthetics, safety	30
Construction Activities	Construction equipment, processes, quality	14
Materials & Resources	Material extraction, processing, transport	23
Pavement Technology	Pavement design, material use, function	20
Total Voluntary Credit Points		108
Custom Credits	Write your own credit for approval	10
Total Points		118



Project Requirements

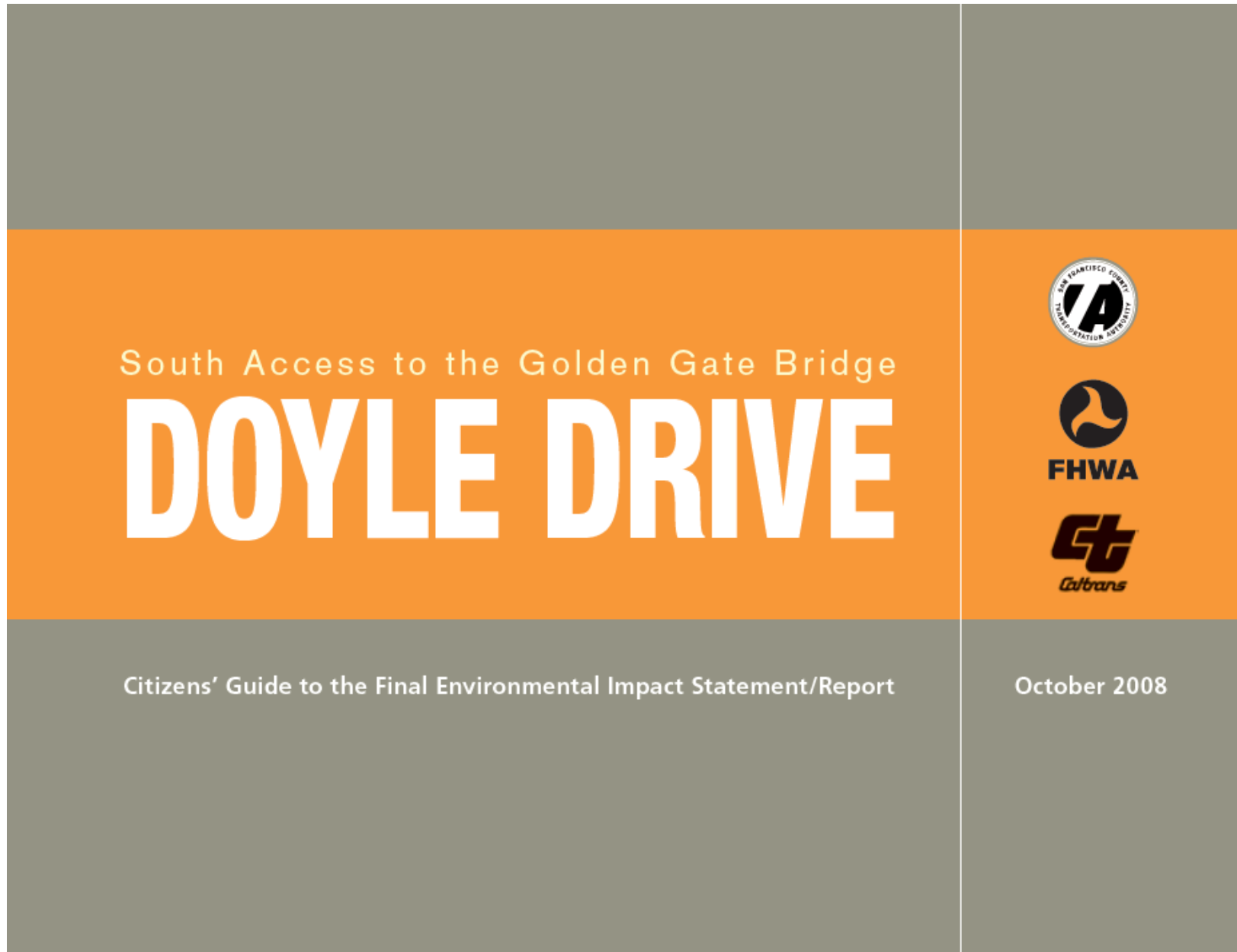
Requirement

Description

PR-1	Environmental Review Process	Complete and environmental review process
PR-2	Life Cycle Cost Analysis	Perform LCCA for pavement section
PR-3	Life Cycle Inventory	Perform LCI of pavement section using a tool
PR-4	Quality Control Plan	Have a formal contractor quality control plan
PR-5	Noise Mitigation Plan	Have a construction noise mitigation plan
PR-6	Waste Management Plan	Have a formal plan to divert C&D waste from landfill
PR-7	Pollution Prevention Plan	Have a TESC/SWPPP
PR-8	Low-Impact Development	Feasibility study for LID stormwater management
PR-9	Pavement Mgmt. System	Have a pavement management system
PR-10	Site Maintenance Plan	Have a site maintenance plan
PR-11	Educational Outreach	Publicize sustainability information for project

PR-1 Environmental Review Process

Evaluate impacts of roadway projects through an informed decision-making process.



PR-8 Low Impact Development

Use low-impact development (LID) stormwater management solutions where appropriate to better mimic pre-development hydrological conditions.

Photo: Perteet, Inc.



Photo: C. Weiland

Filterra stormwater unit (left) in Oak Harbor, WA and pervious concrete sidewalk (right) in Bellingham, WA



Environment & Water

Voluntary Credit		Pts.	Description
EW-1	Environmental Mgmt. Sys.	2	ISO 14001 or eq. cert. for general contractor
EW-2	Runoff Flow Control	3	Capture stormwater/reduce runoff quantity
EW-3	Runoff Quality	3	Treat stormwater to a higher level of quality
EW-4	Stormwater Cost Analysis	1	Conduct an LCCA for stormwater BMP/LID
EW-5	Site Vegetation	3	Use native low/no water vegetation
EW-6	Habitat Restoration	3	Create new habitat beyond what is required
EW-7	Ecological Connectivity	3	Connect habitat across roadways
EW-8	Light Pollution	3	Discourage light pollution
Total		21	

EW-3 Runoff Quality

Improve water quality of stormwater runoff leaving the roadway Right-of-Way (ROW).



Photo: KPG, Inc.

New biofiltration pond and swale at Cheney Stadium, Tacoma, WA



Access & Equity

Voluntary Credit		Pts.	Description
AE-1	Safety Audit	2	Perform roadway safety audit
AE-2	Intelligent Transp. Sys. (ITS)	5	Implement ITS solutions
AE-3	Context Sensitive Design	5	Plan for context sensitive solutions
AE-4	Traffic Emissions Reduction	5	Reduce VMT or SOV travelers
AE-5	Pedestrian Access	2	Provide/improve pedestrian accessibility
AE-6	Bicycle Access	2	Provide/improve bicycle accessibility
AE-7	Transit/HOV Access	5	Provide/improve transit/HOV accessibility
AE-8	Scenic Views	2	Provide views of scenery or vistas
AE-9	Cultural Outreach	2	Promote art/culture/community values
Total		30	

AE-5 Pedestrian Access

Promote walkable communities by providing or improving pedestrian facilities.





Construction Activities

Voluntary Credit	Pts.	Description
CA-1	2	Quality Management Sys. ISO 9001 cert. or eq. for general contractor
CA-2	1	Environmental Training Provide environmental training
CA-3	1	Site Recycling Plan On-site recycling and trash collection
CA-4	2	Fossil Fuel Use Reduction Use alt. fuels in construction equipment
CA-5	2	Eqpt. Emission Reduction Meet EPA Tier 4 stds. for nonroad equipment
CA-6	1	Paver Emission Reduction Use pavers that meet NIOSH requirements
CA-7	2	Water Use Tracking Develop data on water use in construction
CA-8	3	Contractor Warranty Warranty on the constructed pavement
Total	14	

CA-2 Environmental Training

Provide construction personnel with the knowledge to identify environmental issues and best practice methods to minimize environmental impact.



Sea-to-Sky Highway Project, British Columbia, Canada



Materials & Resources

Voluntary Credit		Pts.	Description
MR-1	Life Cycle Assessment (LCA)	2	Conduct a detailed LCA of the entire project
MR-2	Pavement Reuse	5	Reuse existing pavement sections
MR-3	Earthwork Balance	1	Balance cut/fill quantities
MR-4	Recycled Materials	5	Use recycled materials for new pavement
MR-5	Regional Materials	5	Use regional materials
MR-6	Energy Efficiency	5	Improve energy eff. of operational systems
Total		23	

MR-2 Pavement Reuse

Reuse existing pavement materials.



Placing the HMA wearing course over cold-in-place recycled base. Monterey Road Reconstruction, San Jose, CA



Pavement Technologies

Voluntary Credit		Pts.	Description
PT-1	Long-Life Pavement	5	Design pavements for long-life
PT-2	Permeable Pavement	3	Use permeable pavement as a LID technique
PT-3	Warm Mix Asphalt (WMA)	3	Use WMA in place of HMA
PT-4	Cool Pavement	5	Contribute less to urban heat island effect
PT-5	Quiet Pavement	3	Use a quiet pavement to reduce noise
PT-6	Pvmt. Performance Tracking	1	Relate construction to performance data
Total		20	

PT-1 Long-Life Pavement

Minimize life cycle costs by promoting design of long-lasting pavement structures.





Custom Credits

Custom Credits		Pts.	Description
CC-X	Your Title Here	1-5	Write your own credit
CC-1	Alternative Energy	1-5	Use renewable energy in operations
CC-2	Low Emitting Materials	1-2	Use materials with low VOCs
CC-3	Freight Access	1-5	Improve mobility for freight
CC-4	Design for Disassembly	1-5	Plan for deconstruction at end-of-life
CC-5	<i>Aesthetics & Visual Quality</i>	<i>1</i>	<i>Use aesthetic treatments or enhancements</i>
CC-6	Workzone Safety	1-2	Improve safety of the construction site
CC-7	Electric Vehicle Infrastructure	1-5	Encourage development of EV infrastructure
CC-8	Pavement Smoothness	1-5	Extend roadway life and improve ride quality
CC-9	<i>Native Revegetation</i>	<i>1-3</i>	<i>Restore local areas habitat disturbed by roads</i>
CC-10	<i>Educated Professionals</i>	<i>1-5</i>	<i>Have a team of credentialed STPs</i>
Total		10	Max

CC-5 Electric Vehicle Infrastructure

Promote the expansion of electric vehicle (EV) infrastructure to encourage EV technology and reduce environmental impacts of fossil fuel vehicles.



Two types of EV stations being tested by the City of San Jose, CA. Left is a demo – Right is installed.

Certification Levels

Version 1.5: 108 Voluntary Credit Points



32-42 points

PR + 30% VC



43-53 points

PR + 40% VC



54-63 points

PR + 50% VC



64+ points

PR + 60% VC

Why bother?



A few key ideas:

- Greenroads is a higher standard
 - Go beyond environmental regulations
 - Involve the whole team
 - Track sustainability performance
- Green is the color of money
 - Address highest agency costs/policies
 - Save money
 - Get funded
- Get recognized for doing good work
 - Track green jobs for transportation
 - Show your commitment to sustainability



Set a higher standard for roads and bridges.

Some examples from green buildings:



City of San José

Adopted first green building resolutions in 2001 to meet a minimum LEED® certification.

Santa Clara County

Adopted new policies for third-party ratings of buildings in 2008, including the new CALGreen Code.



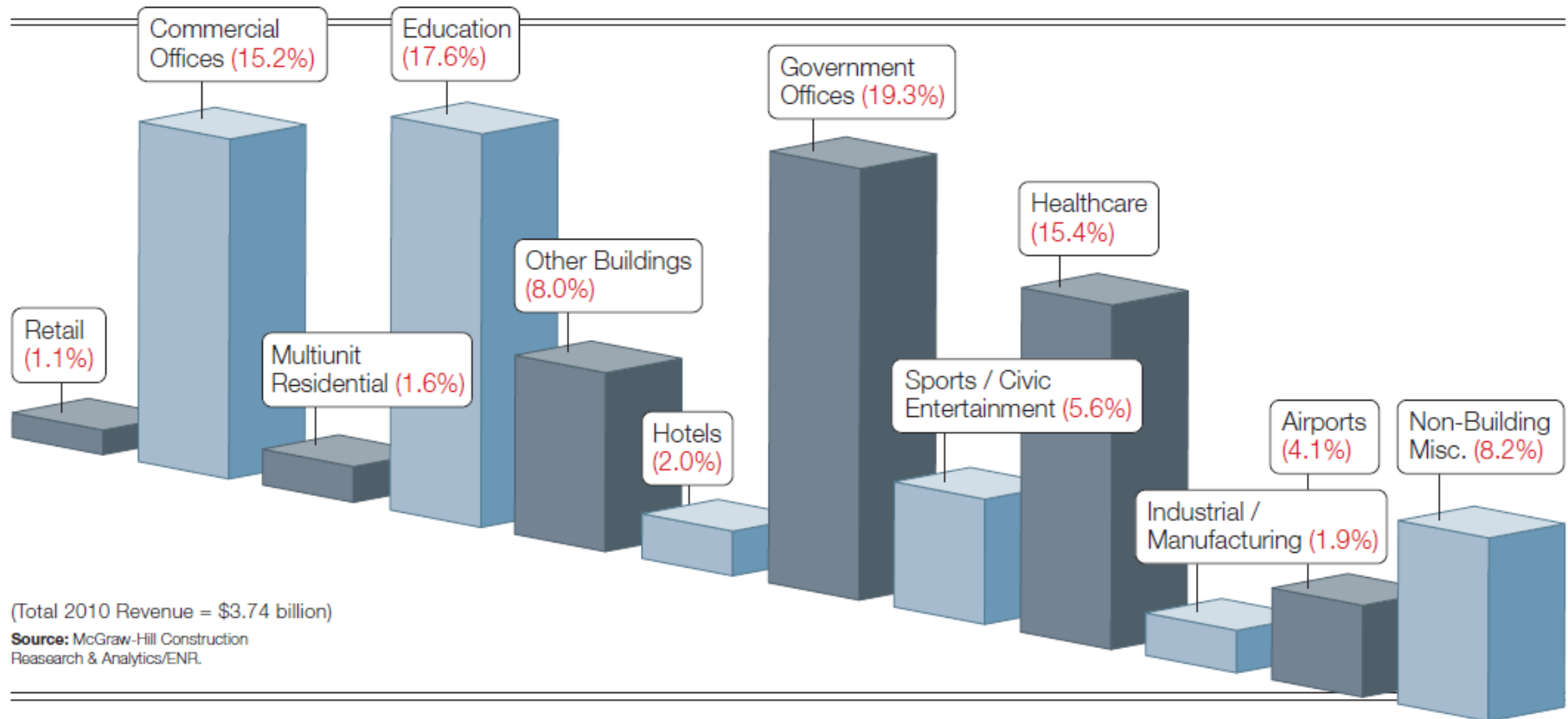
California State

Since 2004, all State funded building projects have a goal of LEED silver.

Save money.

Credit		Cost & Savings	Source
PR-8	Low-Impact Development	15-80% initial cost savings Lower initial cost	EPA
EW-5	Site Vegetation	30% premium on initial const. 15% savings per year Payback in 2 years	Santa Monica, CA
AE-1	Safety Audit	\$1,000-\$8,000 initial cost B/C ratio: 3:1 or more Payback in 1 year	NCHRP Synthesis 336
MR-4	Recycled Materials	17% savings for materials 10% savings for HMA in-place Lower initial cost	Kristjansdottir et al. (2007) using 20% RAP
PT-1	Long-Life Pavement	\$65,000 premium on initial const. \$165,000/lane-mile over 50 yrs Payback in 20 yrs	Muench et al. (2004) for 2-lane road
PT-3	Warm Mix Asphalt	\$50,000 initial investment \$0.35-\$5.00 savings/ton Payback in 10,000-145,000 tons	Kristjansdottir et al. (2007) for foaming plant attachments

Tell people (If you are a Designer).



ENR's Top 100 Green Designers (2010)

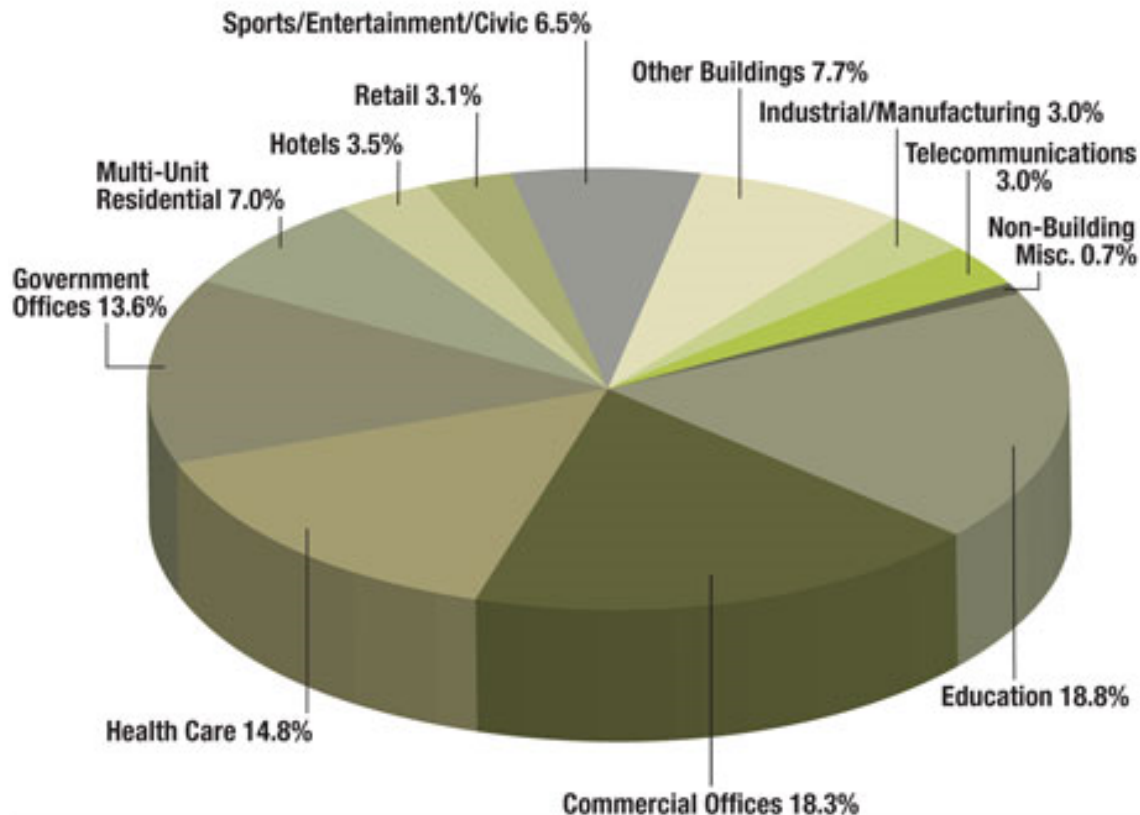
Total = \$3.74 bil design revenue

Up 19.4% in USA – increasing in public sector

Tell people (if you are a Contractor).

HOW GREEN ARE THE MARKETS

(Total 2009 revenue = \$43.05 billion)



Quick Statistics

- \$43 billion 2009 revenue
- Up 11.3% from 2009
- 33.6% of total revenue
- Biggest sector = Education (\$8 billion)
- Owners to green to save money

Tell people (if you are an Owner).

“Resulting Glory” – Slide adapted from 2012 APWA Congress Presentation by Freeman Anthony, Project Engineer, City of Bellingham Public Works

Greenroads™ Summary

Silver Certified

Meador Kansas Ellis Trail
City of Bellingham, WA

Total Score*	44
Project Requirements	11/11
Environment & Water	7/21
Access & Equity	11/30
Construction Activities	3/14
Materials & Resources	15/23
Pavement Technologies	8/20
Custom Credits	0/10

*Score does not include Project Requirements

Popular Mechanics

TRY: Lawn C

AUTOMOTIVE
TECHNOLOGY
SCIENCE
HOME HOW-TO

Homepage / Home How-To / Projects & Plans / Masonry / Gray to Green: How to Make Cleaner Concrete

Gray to Green: How to Make Cleaner Concrete

Because it's cheap and strong, concrete is one of the most widely used construction materials in the world—people use about 6 billion tons of it every year. But for every cubic meter of concrete that's poured, as much as 1050 pounds of carbon dioxide is released into the atmosphere. Here's how some people are trying to make concrete more environmentally friendly.

BY SARAH FECHT

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 Tweet

5 of 7



Search

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Web

Search English pages

Poticrete- City of Bellingham, WA

www.cob.org/government/departments/pw/p

Poticrete Crushing Toilets for Poticrete. Th practices. One creative project involved recy

CERAMIC TECH TODAY

ACerS Ceramic Materials, Applications & Business Blog

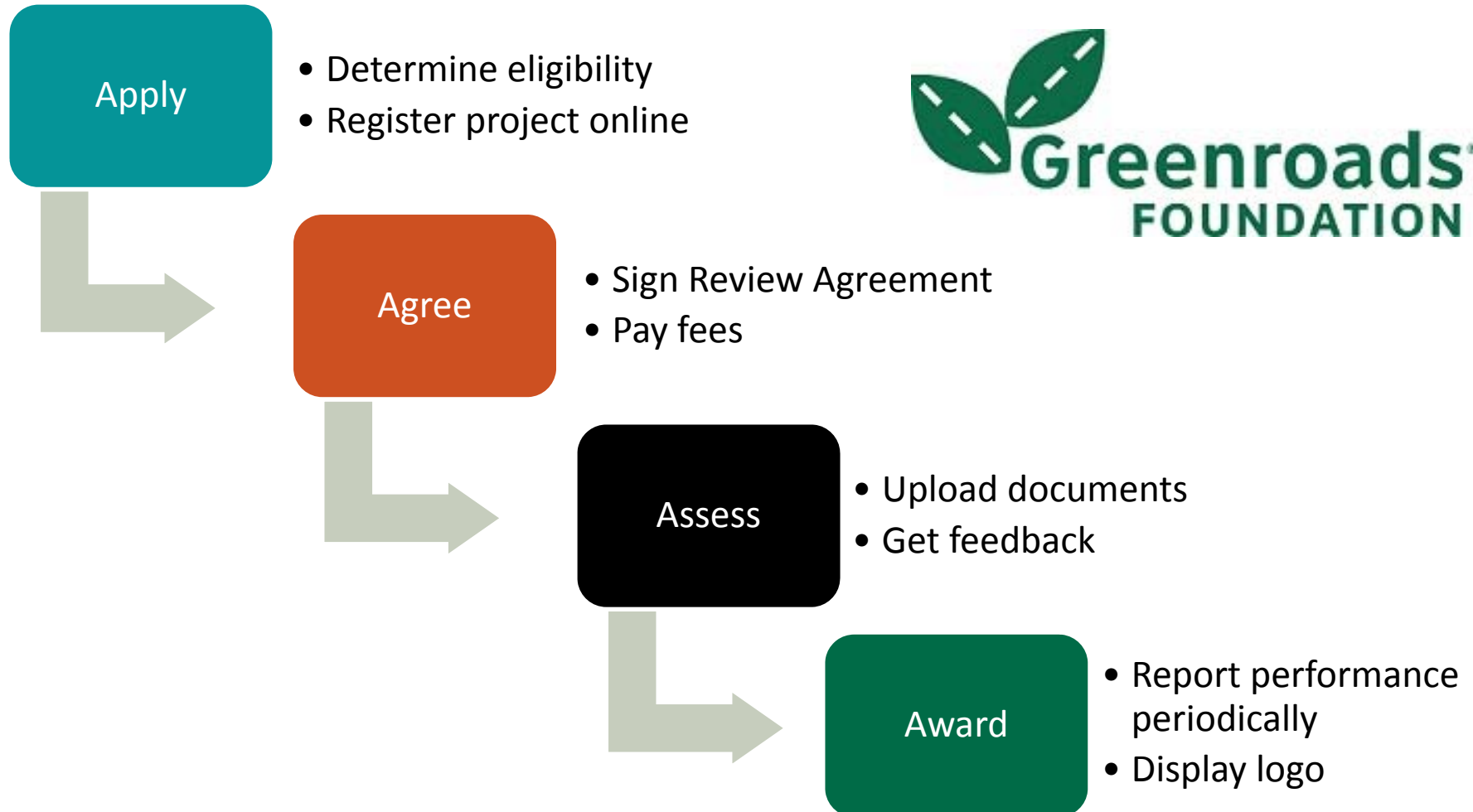
Greenroads groups award first LEEDs-type certification to 'Poticrete' project

Edited By Peter Wray • March 20, 2012

So, how do I get my project rated?



Certification Process



Steps for Small Projects (<\$10 mil)

1. Application
2. Registration
3. Submittals
 - Preliminary Submittal
 - Final Submittal
4. Certification Award

Steps for Large Projects

1. Application
2. Registration
3. Certification Assessment
 - Detailed Assessment (= Detailed Pilot Project)
 - Certification Plan
 - Master Submittal
4. Segment Ratings
 - Preliminary Submittal
 - Final Submittal
 - Certification Awards
5. Composite Rating (if Desired)

Roles & Responsibilities

- Project Team
 - Team Manager
 - Team Members
 - Design
 - Contractor
 - Subconsultants
 - Project Owner
 - Owner's Representative
- Team Manager can grant permissions to Team:
 - View, edit and manage

Roles & Responsibilities

- Greenroads Team
 - Greenroads Reviewer
 - Greenroads Trainer
 - Certification Committee (Board of Directors)
 - Web help: support@greenroads.org



Certification Plan – What to Expect

- Segment = fundamental unit of Greenroads
- Some examples of what makes multiple segments:
 - Different designers
 - Different prime contractors
 - Different specs
 - Disjointed/not connected to each other
 - Multiple phases
 - Change in functional class
 - Street/Road name change
- List of credits for Master Submittal vs. Segments
- Suggested boundaries for credit calcs

Documenting Your Project

Standard Project Documents – Required

- Specifications & Special Provisions
- Project plans
- Schedule of costs & change orders
- Bid information
- Environmental review documents
- Pavement and bridge design reports (if any)
- Hydraulic , drainage and geotechnical reports (if any)

Documenting Your Project

Credit-Specific Documents

- Most credits can be shown in Standard docs
 - Provide page number reference to Reviewer
- Narratives/cover letters are helpful
 - Does not have to be separate file, can use website “Feedback” tab
 - Take time to explain to us what you were thinking re: credit
 - Usually lead to faster review turnaround with fewer revisions
- Every credit attempted needs some sort of doc
 - Link
 - Comment
 - Page reference
 - Actual document

Documenting Your Project

Custom Credits

- Iterative process for new ones
 - Open communication with Greenroads early if interested
- About 7 currently exist, 3 being finalized
 - May be used by active projects
 - Can only earn up to 10 points
- Documentation needs are similar to regular credits

Performance Reporting

- Reporting is required for certified projects
 - Sublicense requirement for UW trademark
 - Owner commits to provide this feedback to Greenroads
- Two options: informal annual or formal 5-year
 - Water & electricity use
 - Pavement performance (e.g. PR-9) & contractor fixes
 - Scheduled site maintenance activities (e.g. PR-10) & cost
 - ADT & safety incidents (if any)
 - How the educational outreach is going
 - Your opinion, satisfaction and community's perception

www.greenroads.org

Recent Greenroads News

- **Project Rating Program**
 - Tested Greenroads on 150+ projects
 - Mostly in U.S., some internationally
 - 30+ registered Projects in 7 states and countries
 - 10+ pending Registration in 9 states and countries
 - Working with 6 countries to expand standard
- **Exciting new educational partners (APWA! ITE!)**
- **Sustainable Transportation Education Program**
 - Greenroads STP Credential now available (free to members)
- **Membership program growing all over world**



Contact Us

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- Greenroadsfoundation (Gmail and Google+ Hangout)
 - Monthly hangouts on 2nd Friday of month
- Greenroadsglobal (Skype)
- www.facebook.com/greenroads
 - Latest news and updates.
- Sign up for the newsletter on the website!

www.greenroads.org

