

Kentucky: Green.....No Kidding?

A Green Analysis of a Typical Kentucky Roadway Project



 U.S. Department of Transportation
Federal Highway Administration

 Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool



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UNIVERSITY of
WASHINGTON



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Agenda

- Why the push to go Green?
- What is Sustainability
- How can we measure Green?
 - Greenroads
 - Sustainable Highways
- Case Study to Determine Where KYTC Stands



Where Did The Movement Come From?



- ***GREEN IS COMING!***
 - Federal Emphasis on Green
- LEED & GSA ~must achieve ~~Silver~~ **GOLD!**
Certification
- AASHTO Survey of Green Practices
 - Tasked by FHWA
- FHWA Calls on Greenroads...
 - Completed end of 2010

Where Did The Movement Come From?



- The construction of an average single lane-mile of freeway produces 1,200 tons of CO₂!
 - Equals the annual emission of 210 cars!
- 2007 U.S. built 37,000 lane-miles!
- 94% of the 3.2 billion tons aggregate used annually is virgin material!
- 20% of HMA and PCC end up in landfills!

What is Sustainability?



- Sustainability is...

“...sustain economic prosperity and a high quality of life for all while protecting the natural systems of the planet.”

*Must consider three components,
“economic, environmental and social.”*

What is *Greenroads*?



- “A performance metric for roadway design and construction that awards points for more sustainable practices. Greenroads helps quantify the sustainable attributes of a roadway project.”



Greenroads Categories (Version 1.0)



Category	Description	Points
Project Requirements	Minimum requirements for a Greenroad	Req
Environment & Water	Stormwater, habitat, vegetation	21
Access & Equity	Modal access, culture, aesthetics, safety	30
Construction Activities	Construction equipment, quality, use	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
Grand Total		118

Award Levels



- Certified: All project requirements met plus 30 – 39% of Voluntary Credits (32)
- Silver: All project requirements met plus 40 – 49% of Voluntary Credits (43)
- Gold: All project requirements met plus 50 – 59% of Voluntary Credits (54)
- Evergreen: All project requirements met plus 60% or more of Voluntary Credits (64)

Greenroads
certified



Greenroads
certified



SILVER

Greenroads
certified



GOLD

Greenroads
certified



EVERGREEN

Project Requirements (PR)



- PR-1 Environmental Review Process
- PR-2 Lifecycle Cost Analysis
- PR-3 Lifecycle Inventory
- PR-4 Quality Control Plan
- PR-5 Noise Mitigation Plan
- PR-6 Waste Management Plan
- PR-7 Pollution Prevention Plan
- PR-8 Low-Impact Development
- PR-9 Pavement Management System
- PR-10 Site Maintenance Plan
- PR-11 Education Outreach



Environment & Water (EW)



- EW-1 Environmental Management System (2)
- EW-2 Runoff Flow Control (1-3)
- EW-3 Runoff Quality (1-3)
- EW-4 Stormwater Cost Analysis (1)
- EW-5 Site Vegetation (1-3)
- EW-6 Habitat Restoration (3)
- EW-7 Ecological Connectivity (1-3)
- EW-8 Light Pollution (3)

(POINTS POSSIBLE)



Access & Equity (AE)



- AE-1 Safety Audit (1-2)
- AE-2 Intelligent Transportation Systems (2-5)
- AE-3 Context Sensitive Solutions (5)
- AE-4 Traffic Emissions Reduction (5)
- AE-5 Pedestrian Access (1-2)
- AE-6 Bicycle Access (1-2)
- AE-7 Transit & HOV Access (1-5)
- AE-8 Scenic Views (2)
- AE-9 Cultural Outreach (1-2)

(POINTS POSSIBLE)



Construction Activities (CA)

- CA-1 Quality Management System (2)
- CA-2 Environmental Training (1)
- CA-3 Site Recycling Plan (1)
- CA-4 Fossil Fuel Reduction (1-2)
- CA-5 Equipment Emission Reduction (1-2)
- CA-6 Paving Emission Reduction (1)
- CA-7 Water Use Tracking (2)
- CA-8 Contractor Warranty (3)



(POINTS POSSIBLE)



VS



Material Resources (MR)



- MR-1 Lifecycle Assessment (2)
- MR-2 Pavement Reuse (4-5)
- MR-3 Earthwork Balance (1)
- MR-4 Recycled Materials (1-5)
- MR-5 Regional Materials (1-5)
- MR-6 Energy Efficiency (5)

(POINTS POSSIBLE)



Pavement Technologies (PT)



- PT-1 Long-Life Pavement (5)
- PT-2 Permeable Pavement (3)
- PT-3 Warm Mix Asphalt (3)
- PT-4 Cool Pavement (5)
- PT-5 Quiet Pavement (2-3)
- PT-6 Pavement Performance Tracking (1)



(POINTS POSSIBLE)

What is Sustainable Highways?



- “FHWA Sustainable Highways Self-Evaluation Tool identifies characteristics of sustainable highways and provides information and techniques to help agencies and organizations integrate sustainability best practices into highway and other roadway projects. The Tool is intended to provide a method for practitioners to evaluate their transportation projects and to encourage progress in the sustainability arena. **It is not required and it is not intended to encourage comparisons** across transportation agencies and projects.”

– <https://www.sustainablehighways.org/1/home.html>



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Sustainable Highways Self-Evaluation Tool

Sustainable Highways Self-Evaluation Tool



- **Basic Scorecard (20 Credits)**
 - Small reconstruction and bridge replacement projects that do not expand capacity of the roadway
 - Preservation projects (3R) for extending service life of existing facilities and for safety enhancements
 - Restoration projects (2R) for restoring pavement structure, ride quality, and spot safety
- **Extended Scorecard (30 Credits)**
 - New construction projects for a new roadway facility or structure where nothing of its type currently exists
 - Major reconstruction projects that add travel lanes to an existing roadway or bridge
 - <https://www.sustainablehighways.org/124/score.html>



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Sustainable Highways Self-Evaluation Tool

Credit by Principles and Project Scoring Tool Categories

Credit Number and Title	Triple Bottom Line Principles			Project Scoring Tool Categories	
	Environmental	Social	Economic	Basic (20)	Extended (30)
PD-1: Cost Benefit Analysis (3)	✓	✓	✓	●	●
PD-2: Highway and Traffic Safety (4-10)		✓	✓	●	●
PD-3: Context Sensitive Project Development (5)	✓	✓	✓		●
PD-4: Lifecycle Cost Analyses (1-3)	✓		✓	●	●
PD-5: Freight Mobility (1-7)	✓		✓	●	●
PD-6: Educational Outreach (2)	✓	✓	✓	●	●
PD-7: Tracking Environmental Commitments (3-5)	✓	✓		●	●
PD-8: Habitat Restoration (3)	✓			●	●
PD-9: Stormwater (1-9)	✓			●	●
PD-10: Ecological Connectivity (2 or 3)	✓	✓	✓	●	●
PD-11: Recycle & Reuse Materials (1-8)	✓		✓	●	●
PD-12: Create Renewable Energy (1-6)	✓		✓		●
PD-13: Site Vegetation (1-3)	✓		✓		●
PD-14: Pedestrian Access (1 or 2)	✓	✓	✓	●	●
PD-15: Bicycle Access (1 or 2)	✓	✓	✓	●	●

Credit by Principles and Project Scoring Tool Categories

Credit Number and Title	Triple Bottom Line Principles			Project Scoring Tool Categories	
	Environmental	Social	Economic	Basic (20)	Extended (30)
PD-16: Transit & HOV Access (1-5)	✓	✓	✓		●
PD-17: Historical, Archaeological, and Cultural Preservation (2)		✓		●	●
PD-18: Scenic, Natural, or Recreational Qualities (2)		✓			●
PD-19: Low-Emitting Materials (2)	✓	✓		●	●
PD-20: Energy Efficient Lighting (1-5)	✓		✓	●	●
PD-21: ITS for Systems Operations (1-5)	✓	✓	✓	●	●
PD-22: Long-Life Pavement Design (5)	✓		✓	●	●
PD-23: Reduced Energy and Emissions in Pavement Materials (3)	✓	✓	✓		●
PD-24: Contractor Warranty (1 or 3)	✓		✓		●
PD-25: Earthwork Balance (1 or 3)	✓		✓		●
PD-26: Construction Environmental Training (1)	✓				●
PD-27: Construction Equipment Emission Reduction (1 or 2)	✓	✓		●	●
PD-28: Construction Noise Mitigation (1-2)	✓	✓		●	●
PD-29: Construction Quality Control Plan (5)	✓		✓	●	●
PD-30: Construction Waste Management (1)	✓		✓		●

Award Levels of Sustainable Highways



**Number of Points
Required for Each Level
Basic Scorecard**

Total # Points	85
BRONZE (30%)	26
SILVER (40%)	34
GOLD (50%)	43
PLATINUM (60%)	51

**Number of Points
Required for Each Level
Extended Scorecard**

Total # Points	117
BRONZE (30%)	35
SILVER (40%)	47
GOLD (50%)	59
PLATINUM (60%)	70



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Sustainable Highways Self-Evaluation Tool

System Comparisons



- Greenroads:
 - 11 Project Requirements
 - 37 Voluntary Credits + 2 Custom Credits
- Sustainable Highways:
 - Basic Scorecard 20 Credits
 - Extended Scorecard 30 Credits

Credit Comparison



Sustainable Highways	Greenroads
PD-1: Cost Benefit Analysis (B & E)	
Complete a Cost Benefit Analysis or Economic Impact Analysis for the project to show the expected user benefits exceed life-cycle costs (construction, maintenance, social, and environmental). (3 Points)	No comparing requirement or credit.
HD 103: Highway Design Policy – ...adequately serve the existing and planned future traffic of the highway in a manner that is conducive to safety, durability, and economy of maintenance... <i>Not Formalized</i>	

Sustainable Highways	Greenroads
<p>PD-2: Highway & Traffic Safety (B & E)</p>	<p>AE-1: Safety Audit</p>
<p>Complete a Road Safety Audit, use statistically reliable predictive methods in decision making to evaluate safety effects for scope improvements, use quantitative safety measures in project design tasks, and/or perform an evaluation of the safety effectiveness of the project. (1-10 Points)</p>	<p>Conduct a Road Safety Audit at preconstruction, construction, and or post-construction. (1-2 Points)</p>
<p>HD-202: Pre-Design Activities – Crash data studied to improve safety... <i>Not Formalized and not an independent audit as recommended by FHWA for a RSA...has been done for HSIP projects.</i></p>	

Sustainable Highways	Greenroads
PD-3: Context Sensitive Project Development (E)	AE-3: Context Sensitive Solutions
<p>Evidence the principles of CSS were applied in project development through a formal CSS program or an equivalent. (5 Points)</p>	<p>Create a narrative describing that the design of the project was according to CSS. (5 Points)</p>
HD 103: Highway Design Philosophy – Context Sensitive Design is a key principle used by the Kentucky Transportation Cabinet.	

Sustainable Highways	Greenroads
PD-4: Lifecycle Cost Analyses (B & E)	PR-2 Lifecycle Cost Analysis
<p>Show calculations of a LCCA for pavement structures, stormwater systems, major project features, or the entire project. (1-3 Points)</p>	<p>Show calculations of a LCCA for all pavement structure alternatives. (Required)</p>
<p>HD 1001: Pavement Design – The Pavement Design folder will contain a cost comparison of alternatives (initial and life cycle).</p>	

Sustainable Highways	Greenroads
PD-5: Freight Mobility (B & E)	
<p>Implement one or more features with the goal of decreasing the impacts of freight movement, i.e. rest area construction, no-idling policies, freight specific safety improvements, etc. (1-7 Points)</p>	<p>No comparing requirement or credit.</p>
<p>KYTC Committed to Keeping Rest Areas Open/Accessible. Rest Areas/Weigh Stations, etc. are dealt with when within project limits or by separate projects.</p>	

Sustainable Highways	Greenroads
PD-6: Educational Outreach (B & E)	PR-11: Educational Outreach
Install/perform a minimum of two educational elements, i.e. a project website, stakeholder guide, sustainability presentations, etc. (2 Points)	Install/perform a minimum of three educational elements, i.e. a project website, stakeholder guide, sustainability presentations, etc. (REQUIRED)
HD 600: The Project Development Team develops a public involvement plan. This plan includes any outreach, educational, etc. techniques, i.e. a project website, brochure, presentations, etc.	

Sustainable Highways	Greenroads
<p>PD-7: Tracking Environmental Commitments (B & E)</p>	<p>EW-1: Environmental Management System</p>
<p>Use a comprehensive environmental tracking system to identify how environmental commitments were identified, fulfilled, and verified. (3 Points)</p> <p>Require the principle project constructor to have a documented environmental management system (EMS) meeting ISO 14001:2004 standards. (2 Points)</p>	<p>Require the principle project constructor to have a documented environmental management system (EMS) meeting ISO 14001:2004 standards. (2 Points)</p>
<p>HD 403: Details the Environmental Documents process for a project. This process would identify issues regarding environmental commitments. There is no system for requiring the Prime Contractor to have an EMS.</p>	

Sustainable Highways	Greenroads
<p>PD-8: Habitat Restoration (B & E)</p>	<p>EW-6: Habitat Restoration</p>
<p>Evaluate the disturbed natural system. For project requiring mitigation of habitat, restore and/or preserve an additional 5% over legal requirements. For projects not requiring mitigation, implement a habitat restoration effort to restore area, implement ecological design elements, and document responsible parties for monitoring and funding. (3 Points)</p>	<p>Complete a biological assessment to determine an Index of Biological Integrity. Then implement a restoration plan with a plan to restore an equal disturbed area, establish a planned post project IBI, implement ecological design elements, and document responsible parties for monitoring and funding. (3 Points)</p>
<p>HD 505: Provides for mitigation efforts to be as recommended from the Division of Environmental Analysis, who will assist in fulfilling obligations concerning all social, economic, biological, historical, and archaeological conditions of a permit.</p>	

Sustainable Highways	Greenroads
PD-9: Stormwater (B & E)	EW-2: Runoff Flow Control
<p>Improve water quality, control peak flows, limit impervious areas, implement low impact development techniques, and manage runoff from the project. Points determined by a combination of these efforts. (1-9 Points)</p>	<p>Implement a stormwater management plan using BMP's to reduce/manage runoff. Points allocated based on percentage of predevelopment runoff. (1-3 Points)</p>
	<p>EW-3: Runoff Quality</p> <p>Implement a stormwater management plan using BMP's to treat and improve quality of runoff and run on. Points allocated based on percentage flow treated. (1-3 Points)</p>
<p>DR 202: The drainage manual deals with stormwater management. Goals include minimizing runoff, minimize degradation of water quality, and managing flood plains. KYTC attempts to treat 100 % of project runoff; at least trap 80% sediment by standard specification 213.03.01.</p>	

Sustainable Highways	Greenroads
PD-10: Ecological Connectivity (B & E)	EW-7: Ecological Connectivity
<p>Conduct a ecological study (as provided in NEPA documentation) and take actions as appropriate based on existing alignments (2 Points) or new alignments (3 Points).</p>	<p>Conduct a site-specific wildlife assessment for the roadway project and take actions as appropriate based on existing alignments (1 Point) or new alignments (3 Points).</p>
<p>KYTC has incorporated these features into some projects when the NEPA process and partnering agencies have determined it appropriate.</p>	

Sustainable Highways	Greenroads
<p>PD-11: Recycle & Reuse Materials (B & E)</p>	<p>MR-2: Pavement Reuse</p>
<p>Use recycled materials (to reduce virgin material usage) or reuse materials. Points determined by percentage for recycled and/or reused amounts. (Points 1-8)</p>	<p>Reuse a minimum percentage of existing pavement material by estimated volume (HMA, PCC, or base material). Points based on percentage reused. (4-5 Points)</p>
	<p>MR-4: Recycled Materials</p>
	<p>Use recycled materials (to reduce virgin material usage). Points determined by percentage for recycled amounts. (Points 1-5)</p>
<p>KYTC standard specifications allow for pavement materials to be reused onsite and for asphalt mixtures to include reclaimed materials.</p>	

Sustainable Highways	Greenroads
<p>PD-12: Create Renewable Energy (E)</p>	
<p>Provided operational energy for the project's electrified components using autonomous, on-site, renewable energy sources. Points awarded based on percentage of total lifetime energy provided by renewable sources. (1-6 Points)</p>	<p>No comparing requirement or credit.</p>
<p>KYTC has made use of solar powered ITS devices but their implementation has not formalized policy.</p>	

Sustainable Highways	Greenroads
PD-13: Site Vegetation (E)	EW-5: Site Vegetation
<p>Implement features providing no mowing, no long-term irrigation, and/or using only native species. (1-3 Points)</p>	<p>Use non-invasive plant species, species requiring no irrigation after establishment, and/or only native species. (1-3 Points)</p>
<p>KYTC permanent seeding mixture number 1 per specification meets these requirements. KYTC also allows some non-native and invasive seedings for erosion control purposes.</p>	

Sustainable Highways	Greenroads
PD-14: Pedestrian Access (B & E)	AE-5: Pedestrian Access
<p>Implement or improve features for pedestrian facilities. (1 Point) Implement physical changes to the roadway to enhance pedestrian access. (2 Points)</p>	<p>Implement or improve features for pedestrian facilities. (1 Point) Implement physical changes to the roadway to enhance pedestrian access. (2 Points)</p>
<p>HD 1502: It is the Kentucky Transportation Cabinet's policy to enhance operational efficiency, promote program goals, and enrich the quality of life through the development of a Pedestrian and Bicycle Travel Program.</p>	

Sustainable Highways	Greenroads
PD-15: Bicycle Access (B & E)	AE-6: Bicycle Access
<p>Implement or improve features for bicycle facilities. (1 Point)</p> <p>Implement physical changes to the roadway to enhance bicycle access. (2 Points)</p>	<p>Implement or improve features for bicycle facilities. (1 Point)</p> <p>Implement physical changes to the roadway to enhance bicycle access. (2 Points)</p>
<p>HD 1502: It is the Kentucky Transportation Cabinet's policy to enhance operational efficiency, promote program goals, and enrich the quality of life through the development of a Pedestrian and Bicycle Travel Program.</p>	

Sustainable Highways	Greenroads
PD-16: Transit & HOV Access (E)	AE-7: Transit & HOV Access
Install appropriate facilities consistent with purpose and need for transit and HOV access. (1-5 Points based on facilities installed or improvements made)	Install appropriate facilities consistent with purpose and need for transit and HOV access. (1-5 Points based on facilities installed or improvements made)

Sustainable Highways	Greenroads
<p>PD-17: Historical, Archaeological, and Cultural Presentation (B & E)</p>	<p>AE-9: Cultural Outreach</p>
<p>If part of the project is on the National Register of Historic Places or is part of a National or State Scenic Byway, minimize adverse effects of the project and protect, preserve and/or enhance historic, archaeological, or cultural resources. (2 Points)</p>	<p>If any item within 10 miles of the project is on the National Historic Register or subject to be eligible, indicate such within project limits. (1 Point)</p> <p>Dedicate a minimum of 1% of the total project budget (not to exceed \$200,000) to art or community culture installations along the roadway right-of-way (ROW). (2 Points)</p>
<p>HD 505: Provides for mitigation efforts to be as recommended from the Division of Environmental Analysis, who will assist in fulfilling obligations concerning all social, economic, biological, historical, and archaeological conditions of a permit.</p>	

Sustainable Highways	Greenroads
<p>PD-18: Scenic, Natural, or Recreational Qualities (E)</p>	<p>AE-8: Scenic Views</p>
<p>Designate the route as a National or State Scenic Byway if recognized as such, or provide access from the project to designated areas for traffic to stop and experience natural or recreational features along the roadway. (2 Points)</p>	<p>Designate the route as a National or State Scenic Byway if recognized as such, or provide access from the project to designated areas for traffic to stop and experience natural or recreational features along the roadway. (2 Points)</p>
<p>HD 103: Design decisions should consider equally safety, mobility, and preserving scenic, aesthetic, historic, environmental, and community values.</p>	

Sustainable Highways	Greenroads
PD-19: Low-Emitting Materials (B & E)	
<p>Do not allow the use of cutback asphalts and all paints and coatings must comply with GS-11 Green Seal Environmental Standards for Paints and Coatings. (2 Points)</p>	<p>No comparing requirement or credit.</p>
<p>No comparing KYTC policy.</p>	

Sustainable Highways	Greenroads
PD-20: Energy Efficient Lighting (B & E)	MR-6: Energy Efficiency
<p>Reduce energy usage through using efficient lighting systems. Points award by percentage reduction of the system as compared to a system providing the same lighting standards but constructed using high-pressure sodium luminaires. (1-5 Points)</p>	<p>Install lighting systems with luminaires that meet or exceed the 2009 Energy Star standard for roadway lighting. (5 Points)</p>
KYTC's current policies involve using high-pressure sodium.	

Sustainable Highways	Greenroads
<p>PD-21: ITS for Systems Operations (B & E)</p>	<p>AE-2: Intelligent Transportation Systems</p>
<p>Install Intelligent Transportation System applications listed in the FHWA & Research and Innovative Technology Administration's Joint Program Office for ITS Applications. Points based on the number of applications installed from separate categories. (1-5 Points)</p>	<p>Install Intelligent Transportation System applications listed in the FHWA & Research and Innovative Technology Administration's Joint Program Office for ITS Applications. Points based on the number of applications installed from separate categories. (2-5 Points)</p>
<p>KYTC has used various ITS applications. Several different applications are determined in the HD 900 Intersections policies or the traffic operations manual.</p>	

Sustainable Highways

PD-22: Long-Life Pavement Design (B & E)

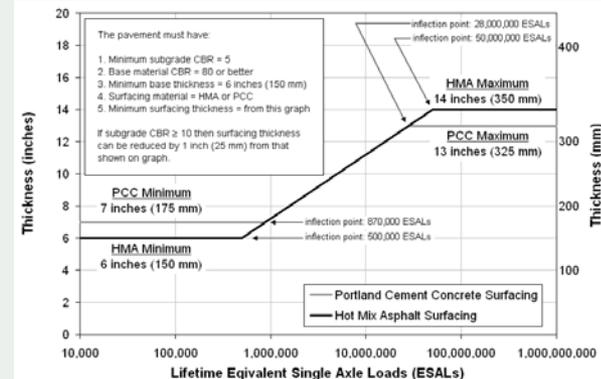
Design at least 75% of new or reconstructed pavement surface for the regularly trafficked lanes to meet long-life pavement design criteria (min. 40-year design life) and complete the pavement design in accordance with a formally recognized, adopted, and documented procedure.

(5 Points)

Greenroads

PT-1: Long-Life Pavement

Design at least 75% of the total new or reconstructed pavement surface area for regularly trafficked lanes of pavement to meet long-life pavement design criteria according to



(5 Points)

HD 1001: Details the policies covering pavement design. ESAL's are typically based on a 20-year design for responsibility determination but design criteria assumptions are higher.

Sustainable Highways	Greenroads
<p>PD-23: Reduced Energy & Emissions in Pavement Materials (E)</p>	<p>PT-3: Warm Mix Asphalt</p>
<p>For 50% (by weight) of the total project pavement, use a low-energy material according to one of the following:</p> <ul style="list-style-type: none"> •Warm Mix Asphalt •Energy Star Certified Cement Production Plant •Burn recycled oil, waste materials, or other fuel savings technology (reduce fuel use 25%) in HMA or cement production (3 Points) 	<p>Reduce the mixing temperature of hot mix asphalt by a minimum of 50°F from that recommended as the mixing temperature by the asphalt binder supplier. This reduced temperature mix must comprise a minimum of 50% of the total project pavement (hot mix asphalt or Portland cement concrete) by weight. (3 Points)</p>
<p>KYTC Standard Specifications allow Warm Mix Asphalt and some contracts have specified its use as well.</p>	

Sustainable Highways	Greenroads
PD-24: Contractor Warranty (E)	CA-8: Contractor Warranty
<p>3-Year Warranty: 1 Point 5-Year Warranty: 3 Points</p>	<p>Minimum 3-Year Warranty: 3 Points</p>
<p>KYTC has implemented warranties on projects but maintenance of those warranties has been cumbersome and has not been favored within the Cabinet.</p>	

Sustainable Highways	Greenroads
PD-25: Earthwork Balance (E)	MR-3: Earthwork Balance
<p>Balance cut and fill volumes such that the percent difference in these volumes is less than 10% of the average total volume of material moved (in design and construction). (3 Points; 1 Point if construction banking between projects is needed to meet the criteria)</p>	<p>Balance earthwork cut and fill quantities to within A% (by volume) for the entire project. AND Do not import more than B% of the fill material by volume. AND Do not export more than C% of the cut material by volume. AND Demonstrate that $A\% + B\% + C\% \leq 10\%$ (1 Point)</p>
<p>HD 205: The designer shall endeavor to provide an approximate "balanced" grade; however, some situations preclude this possibility...<i>Not formalized.</i></p>	

Sustainable Highways	Greenroads
<p>PD-26: Construction Environmental Training (E)</p>	<p>CA-2: Environmental Training</p>
<p>Develop an environmental awareness training plan to list personnel to be trained, types, goals and objectives of the training, a training tracking plan, and a process to measure training effectiveness (assessment). (1 Point)</p>	<p>Develop an environmental awareness training plan to list personnel to be trained, types, goals and objectives of the training, and training tracking plan. (1 Point)</p>
<p>KYTC policies require a KY Erosion Prevention & Sediment Control Roadway Inspector (KEPSC-RI) for project erosion control inspections but has no formal training plan as required here.</p>	

Sustainable Highways	Greenroads
<p>PD-27: Construction Equipment Emission Reduction (B & E)</p>	<p>CA-5: Equipment Emission Reduction</p>
<p>Use non-road construction equipment either having engines meeting EPA Tier 3 (or Interim Tier 4) emission standards or having diesel retrofit devices for after-treatment pollution control verified by the EPA or California Air Resources Board. (1 Point at least 50% of the fleet; 2 Points for at least 75% of the fleet)</p>	<p>Use non-road construction equipment having engines or retrofits meeting EPA Tier 4 emission standards. (1 Point at least 50% of the fleet; 2 Points for at least 75% of the fleet)</p>
<p>KYTC has no standard specifications covering anything beyond legal requirements.</p>	

Sustainable Highways	Greenroads
<p>PD-28: Construction Noise Mitigation (B & E)</p>	<p>PR-5: Noise Mitigation Plan</p>
<p>Establish, implement, and maintain a formal Noise Mitigation Plan (NMP) during construction for the prime contractor. (1 Point; 2 Points for urban projects greater than \$100 million)</p>	<p>Establish, implement, and maintain a formal Noise Mitigation Plan (NMP) during construction for the prime contractor. (REQUIRED)</p>
<p>HD 402: The designer should also keep in mind that noise impacts during construction may be mitigated by using alternative construction practices, and should include them when practical by notes on the plans or in the proposal.</p>	

Sustainable Highways	Greenroads
<p>PD-29: Construction Quality Control Plan (B & E)</p>	<p>PR-4: Quality Control Plan</p>
<p>Require the Contractor to establish, implement, and maintain a formal QCP to cover the entire project; not just the pavement. (5 Points)</p>	<p>The prime contractor shall establish, implement, and maintain a formal construction Quality Control Plan (QCP). (REQUIRED)</p>
<p>KYTC standard specification for Quality Control/Quality Assurance requires having a Quality Control Plan yet this system is not instituted for every project.</p>	

Sustainable Highways	Greenroads
<p>PD-30: Construction Waste Management (E)</p>	<p>PR-6: Waste Management Plan</p>
<p>Require the Contractor to establish, implement, and maintain a formal Construction and Demolition Waste Management Plan. (1 Point)</p>	<p>Establish, implement, and maintain a formal Construction and Demolition Waste Management Plan (CWMP) during roadway construction. (REQUIRED)</p>
	<p>CA-3: Site Recycling Plan</p>
	<p>Establish, implement, and maintain a formal Site Recycling Plan as part of the Construction and Demolition Waste Management Plan (CWMP) during construction. (1 Point)</p>
<p>KYTC has no policies for requiring a Construction Waste Management Plan.</p>	

Sustainable Highways

No Matching Credits; Maybe in Operations & Maintenance or Expected through other FHWA/State DOT Requirements

Greenroads

PR-1: Environmental Review Process
PR-3: Lifecycle Inventory
PR-7: Pollution Prevention Plan
PR-8: Low-Impact Development
PR-9: Pavement Management System
PR-10: Site Maintenance Plan
EW-4: Stormwater Cost Analysis
EW-8: Light Pollution
AE-4: Traffic Emissions Reduction
CA-1: Quality Management System
CA-4: Fossil Fuel Reduction
CA-6: Paving Emission Reduction
CA-7: Water Use Tracking
MR-1: Lifecycle Assessment
MR-5: Regional Materials
PT-2: Permeable Pavement
PT-4: Cool Pavement
PT-5: Quiet Pavement
PT-6: Pavement Performance Tracking
CC-1/4: Custom Credits

New July 2011

Transportation Systems, Management, Operations and Maintenance Criteria

Criteria	Title	Score
OM-1	Sustainability Plan	0
OM-2	Tracking Environmental Commitments System	0
OM-3	Pavement Management System	
OM-4	Bridge Management System	
OM-5	Maintenance Management System	
OM-6	Highway Infrastructure Maintenance	0
OM-7	Roadside and Facilities Infrastructure Maintenance	
OM-8	Traffic Control Infrastructure Maintenance	0
OM-9	Snow and Ice Control	
OM-10	Work Zone Traffic Control	
OM-11	Transportation Management and Operations	0
OM-12	Safety Management	0
OM-13	Renewable Energy Use	0
OM-14	Fuel Efficiency	0
OM-15	Recycle and Re-use	

Operations & Maintenance for Sustainable Highways



- KYTC Sustainable Activities
 - Reuse of RAP (shouldering & mixes)
 - Biodiesel in some vehicles
 - Re-galvanize, reuse, or recycle guardrail
 - Many systems and plans already in place align with the Sustainable Highways requirements (Operations Management System, Pavement Management System, 511, Operations Center (“War Room”))

A KYTC Case Study to See Where We Stand



- KY 1830 (Jimtown Road) – Graves County
- Reconstruction project from KY 121 to US 45 in Mayfield KY
- Construction: May 2007 thru November 2008
- Cost: \$7.1 million
- Prime Contractor: Jim Smith Contracting

Project Photos



Greenroads Project Checklist



Project Requirements (PR)			PR Subtotal: 11	5	11	11	Construction Activities (CA)			CA Subtotal: 14	1	4	8
				A	P	M					A	P	M
PR-1	Environmental Review Process	Req	X	X	X		CA-1	Quality Management System	2	0	0	0	
PR-2	Lifecycle Cost Analysis	Req	X	X	X		CA-2	Environmental Training	1	0	1	1	
PR-3	Lifecycle Inventory	Req		X	X		CA-3	Site Recycling Plan	1	0	1	1	
PR-4	Quality Control Plan	Req		X	X		CA-4	Fossil Fuel Reduction	1 - 2	0	0	0	
PR-5	Noise Mitigation Plan	Req		X	X		CA-5	Equipment Emission Reduction	1 - 2	0	0	1	
PR-6	Waste Management	Req		X	X		CA-6	Paving Emission Reduction	1	1	1	1	
PR-7	Pollution Prevention Plan	Req	X	X	X		CA-7	Water Use Tracking	2	0	1	1	
PR-8	Low-Impact Development	Req		X	X		CA-8	Contractor Warranty	3	0	0	3	
PR-9	Pavement Management System	Req	X	X	X		Materials & Resources (MR)						
PR-10	Site Maintenance Plan	Req	X	X	X		MR Subtotal: 23						
PR-11	Educational Outreach	Req		X	X					A	P	M	
							MR-1	Lifecycle Assesment	2	0	0	2	
Environment & Water (EW)			EW Subtotal: 21	5	9	12	MR-2	Pavement Reuse	4 - 5	0	0	0	
				A	P	M	MR-3	Earthwork Balance	1	0	1	1	
EW-1	Environmental Management System	2	0	2	2		MR-4	Recycled Materials	1 - 5	1	3	5	
EW-2	Runoff Flow Control	1 - 3	0	0	3		MR-5	Regional Materials	1 - 5	3	4	4	
EW-3	Runoff Quality	1 - 3	2	3	3		MR-6	Energy Efficiency	5	0	0	5	
EW-4	Stormwater Cost Analysis	1	0	1	1		Pavement Technologies (PT)						
EW-5	Site Vegetation	1 - 3	3	3	3		PT Subtotal: 20						
EW-6	Habitat Restoration	3	0	0	0					A	P	M	
EW-7	Ecological Connectivity	1 - 3	0	0	0		PT-1	Long-Life Pavement	5	5	5	5	
EW-8	Light Pollution	3	0	0	0		PT-2	Permeable Pavement	3	0	0	0	
Access & Equity (AE)			AE Subtotal: 30	8	13	16	PT-3	Warm Mix Asphalt	3	0	3	3	
				A	P	M	PT-4	Cool Pavement	5	0	0	5	
AE-1	Safety Audit	1 - 2	0	2	2		PT-5	Quiet Pavement	2 - 3	0	0	3	
AE-2	Intelligent Transportation Systems	2 - 5	2	3	5		PT-6	Pavement Performance Tracking	1	0	0	1	
AE-3	Context Sensitive Solutions	5	5	5	5		Custom Credit (CC)						
AE-4	Traffic Emissions Reduction	5	0	0	0		CC Subtotal: 10						
AE-5	Pedestrian Access	1 - 2	1	1	2					A	P	M	
AE-6	Bicycle Access	1 - 2	0	2	2		CC-1	Custom Credit Title	1 - 5	?	?	?	
AE-7	Transit & HOV Access	1 - 5	0	0	0		CC-2	Custom Credit Title	1 - 5	?	?	?	
AE-8	Scenic Views	2	0	0	0		All 11 PR Met						
AE-9	Cultural Outreach	1 - 2	0	0	0		Total: 118						
										23	42	70	

KY 1830 Summary for Greenroads



- Project met 5 of the 11 project requirements – as built
- Met 23 Voluntary Credits – as built (Not Certified)
- Could achieve 42 credits for approximately \$110K (2% of project cost - additional) – (1 Credit Away from Gold)
- Maximum achievable for project is 70 credits at cost of approximately \$2.1 million (30% of project cost - additional) – (Evergreen)

KY 1830 Summary for Sustainable Highways

- AS-IS

Number of Points Required for Each Level	
Extended Scorecard	
Total # Points	117
BRONZE (30%)	35
SILVER (40%)	47
GOLD (50%)	59
PLATINUM (60%)	70

Federal Highway Administration, U.S. Department of Transportation
Sustainable Highways Self-Evaluation Tool

[Home](#) [Learn](#) [Browse](#) [Score](#) [Home](#) > Scorecard

Scorecard

Your Scorecard has been pre-filtered to show only the applicable credits for your Basic or Extended Project. Currently scored credits for your project are displayed below. To filter the credits or show all, use the Help Me Build It section.

To score a credit, click on the credit and go to the score tab. Answer the questions and the Self-Evaluation Tool will help add up your points. Your Total Score will be shown in the upper right hand box and will indicate if you have reached one of the achievement levels.

All your entries will be saved and available when you return.

To output a copy of your current scorecard, you may print the page. If you wish to download a PDF copy of a blank scorecard, click Download Scorecard to the right.

If you'd like to switch projects, select a project above to jump to a different Project Scorecard or create a new project.

Project: ****TEST PROJECT**** Reconstruction of Jimtown Road (KY 1830) in Mayfield [edit](#)

↓ Download

All Credits

Basic Scorecard

Extended Scorecard

Project Score

27

Your Rating: Not Rated

KY 1830 Summary for Sustainable Highways

- Bronze Rating-no added cost

Number of Points Required for Each Level	
Extended Scorecard	
Total # Points	117
BRONZE (30%)	35
SILVER (40%)	47
GOLD (50%)	59
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Project: ****TEST PROJECT**** Reconstruction of Jintown

↓ Download

All Credits

Basic Scorecard

Extended Scorecard

Project Score

39

Your Rating: Bronze

KY 1830 Summary for Sustainable Highways

- Gold Rating-approx 2% added

	Number of Points Required for Each Level
	Extended Scorecard
Total # Points	117
BRONZE (30%)	35
SILVER (40%)	47
GOLD (50%)	59
PLATINUM (60%)	70

Federal Highway Administration, U.S. Department of Transportation
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Project: ****TEST PROJECT**** Reconstruction of Jimtown Road (KY 1830) in Mayfield [edit](#)

[Download](#)

[All Credits](#)

[Basic Scorecard](#)

[Extended Scorecard](#)

Project Score ▼

68

Your Rating: Gold

Conclusions



- Greenroads and Sustainable Highways certifications are within reach given current KYTC standards or with minimal additional project expense (approx. 2%).
- Higher levels could inflate project costs an additional 30% which becomes irresponsible.
- To achieve these certifications, KYTC **MUST** ensure additional documentation both at cabinet level and contractor level is completed.

Conclusions



- Additional time would need to be considered between project development and project delivery to accommodate some concepts.
- KYTC could create templates for contractors to follow as part of project submittals for credits.
- This is not just about implementing green standards into projects but also ensuring green standards are considered.

Conclusions



- Requires a team effort...
 - Need Contractor buy-in early on...before bid would be of benefit for some credits
 - Need design buy-in and lots of documentation
- Key Points to Take Away
 - Kentucky is more GREEN than BLUE.
 - It is about being responsible!

Conclusions



- ***GREEN IS COMING!***
 - Federal Emphasis on Green
- **LEED** (developed 1993 by USGBC) **& GSA**
 - Started with Certified in 2000 with the goal of requiring Silver, in 2008 went to Silver.
 - As of October 2010~GSA new projects must achieve GOLD!!! Certification
- **AASHTO Survey of Green Practices**
 - Tasked by FHWA (2010)
- **FHWA Calls on Greenroads...(2010)**
 - Pilot, now voluntary, *Sustainable Highways*

FAQ from Sustainable Highways Website



- **“Will using this tool, or required achievement levels/scores, be a pre-requisite for Federal funding of projects in the future?”**
- “No. The tool is to provide information regarding sustainable best practices, and to further industry dialogue about evaluating sustainable highways. In addition, the FHWA has no intention of requiring project owners or agencies to use this tool, or to require use of the tool for compliance with environmental requirements and/or regulation.”
 - <https://www.sustainablehighways.org/140/faq.html>
- *ONLY TIME WILL TELL...*



Questions?