White Paper: Greenroads

The Regional Vulnerability & Resilience Framework (RVRF) is a framework of data and processes to plan for issues of vulnerability, sensitivity and resilience in the KTMPO region. Sustainability is a complementary concept which can improve transportation projects both in their initial construction and in their long-term operations and maintenance. Progress towards sustainability can be measured through use of a sustainability rating system to guide planning and evaluate constructed projects. The Greenroads organization has developed a sustainability rating system which is available to members, and performs project evaluations for a fee.

Greenroads is a rating system designed to evaluate and score transportation construction projects. It is a higher standard to go beyond the minimum environmental regulations. The Greenroads system quantifies the sustainable features of project design, project management, and construction. In addition to promoting sustainable methods and materials in transportation projects, the Greenroads rating system endorses robust stakeholder involvement and accountability. Details and references to the Greenroads rating system are on their website at Greenroads.org.

In addition to rating constructed projects, the Greenroads system also provides for personal professional certification as a Sustainable Transportation Professional (STP) in four levels.

Project Rating

Case studies shown in **Figure 1** show the higher costs (in red) and the cost savings (in green) associated with sustainability strategies that are promoted through the Greenroads rating system.

Figure 1: Benefits & Costs from Greenroads Case Studies

Greenroads Benefits & Costs from Case Studies

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

Greenroads

With ratings completed for 120 projects in ten states and six countries, the system has demonstrated that sustainable practices in project construction can be cost-effective. Cost accounting of completed certified projects have shown that they can have:

- Reduced environmental impacts
- Lower initial costs
- Lower lifecycle costs
- Higher property values

The system rates transportation projects as Bronze, Silver, Gold, or Evergreen Certified. It defines in detail the components that promote sustainable projects, and rates them accordingly. **Figure 2** shows the seven categories used to evaluate a project.

Figure 2: Greenroads Project Rating Categories

CATEGORY NAME	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, efficient systems, improved mobility, 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 best practices that are unique and exceed performance expectations.

Points under each category are totaled to calculate the final project score. The score to attain each Greenroads certified category level is:

- Bronze rating for 40 points
- Silver rating for 50 points
- Gold rating for 60 points
- Evergreen rating for 80 points

Detailed tables of credits within each of the seven categories are shown in **Figure 3** through **Figure 9**. Each of the referenced credits is worth from one to five points.

Figure 3: Credits Under the Project Requirements Category

PROJECT REQUIREMENTS

NO.	TITLE	TYPE	DESCRIPTION
PR-1	Ecological Impact Analysis	REQ	Evaluate the ecological impacts of the Project through an informed decision-making process.
PR-2	Energy & Carbon Footprint	REQ	Disclose energy and emissions information for the Project's construction materials, activities and lifetime maintenance.
PR-3	Low Impact Development	REQ	Evaluate the feasibility of low-impact stormwater management practices on the Project.
PR-4	Social Impact Analysis	REQ	Evaluate the social and community impacts of the Project through an informed decision-making process.
PR-5	Community Engagement	REQ	Have a process in place to involve all community, agency and business stakeholders in Project decision-making.
PR-6	Lifecycle Cost Analysis	REQ	Evaluate financial impacts of the Project through an informed decision-making process.
PR-7	Quality Control	REQ	Have a process in place to monitor and manage quality of the Project's construction activities.
PR-8	Pollution Prevention	REQ	Have a process in place to monitor and prevent pollution from the Project's construction activities.
PR-9	Waste Management	REQ	Have a process in place to monitor and manage waste materials generated from the Project's construction activities.
PR-10	Noise & Glare Control	REQ	Have a process in place to monitor and manage disturbance to the Project's surroundings due to construction activities.
PR-11	Utility Conflict Analysis	REQ	Evaluate impacts of the Project's construction on public and private utilities.
PR-12	Asset Management	REQ	Maintain and preserve all capital assets and environmental quality for the Project's service life.

Figure 4: Credits Under the Environment & Water Category

ENVIRONMENT & WATER

NO.	TITLE	POINTS (11 min - 30 max)	DESCRIPTION
EW-1	Preferred Alignment	1-3	Minimize or avoid environmental impacts and climate change hazards.
EW-2	Ecological Connectivity	1-3	Upgrade or improve aquatic or wildlife habitat connections.
EW-3	Habitat Conservation	1-3	Preserve, restore, and create habitat.
EW-4	Land Use Enhancements	1-3	Reduce hardscape areas and promote revegetation to increase greenspace.
EW-5	Vegetation Quality	1-3	Encourage responsible vegetation management and landscaping choices.
EW-6	Soil Management	1-3	Minimize earthwork and improve soil conditions.
EW-7	Water Conservation	1-3	Reduce or eliminate the need for potable water sources.
EW-8	Runoff Flow Control	1-3	Reduce or eliminate stormwater flow impacts to receiving water bodies.
EW-9	Enhanced Treatment: Metals	1-3	Improve water quality of stormwater runoff beyond basic treatment.
EW-10	Oil & Contaminant Treatment	1-3	Improve water quality of stormwater runoff beyond enhanced treatment.

Figure 5: Credits Under the Construction Activities Category

CONSTRUCTION ACTIVITIES			
NO.	TITLE	POINTS (11 min - 20 max)	DESCRIPTION
CA-1	Environmental Excellence	1-3	Encourage environmental stewardship practices beyond minimum compliance.
CA-2	Workzone Health & Safety	1-2	Encourage practices beyond minimum compliance.
CA-3	Quality Process	1-3	Encourage environmental stewardship practices beyond minimum compliance.
CA-4	Equipment Fuel Efficiency	1	Reduce or avoid fossil fuel energy needs in construction equipment.
CA-5	Workzone Air Emissions	1	Reduce air emissions due to exhaust from construction equipment.
CA-6	Workzone Water Use	1-3	Have a process in place to monitor, manage, and reduce potable water during construction.
CA-7	Accelerated Construction	1-2	Reduce the time required to deliver projects and congestion in workzones.
CA-8	Procurement Integrity	1	Promote sustainable procurement through transparent, ethical and fair contracting methods
CA-9	Communications & Outreach	1	Provide ongoing engagement with local communities and media during construction.
CA-10	Fair & Skilled Labor	1-2	Encourage fair labor practices and local jobs.
CA-11	Local Economic Development	1	Stimulate economic development by providing equal opportunities for small businesses.

Figure 6: Credits Under the Materials & Design Category

MATERIALS & DESIGN			
NO.	TITLE	POINTS (6 min - 24 max)	DESCRIPTION
MD-1	Preservation & Reuse	1-5	Preserve and reuse existing materials within the Project boundary.
MD-2	Recycled & Recovered Content	1-5	Offset the Project's needs for the extraction and production of virgin materials.
MD-3	Environmental Product Declarations	2	Measure and disclose the environmental impacts of Project products and materials.
MD-4	Health Product Declarations	2	Measure and disclose the human health impacts of Project products and materials.
MD-5	Local Materials	1-5	Reduce impacts from transport of materials to the Project and stimulate local economies.
MD-6	Long Life Design	1-5	Promote long-lasting Projects that reduce maintenance and lifecycle costs.

Figure 7: Credits Under the Utilities & Controls Category

UTILITIES & CONTROLS			
NO.	TITLE	POINTS (8 min - 20 max)	DESCRIPTION
UC-1	Utility Upgrades	1-2	Improve surface and subsurface public and private utilities.
UC-2	Maintenance & Emergency Access	1	Improve mobility and safety for routine utility maintenance and emergency activities.
UC-3	Electric Vehicle Infrastructure	1-3	Reduce operational mobile-source emissions by promoting infrastructure to encourage low emission vehicles.
UC-4	Energy Efficiency	1-3	Reduce lifetime energy consumption of operational systems.
UC-5	Alternative Energy	1-3	Offset energy use of operational systems with alternative energy sources.
UC-6	Lighting & Controls	1-3	Improve environmental quality through controlled systems and technologies.
UC-7	Traffic Emissions Reduction	1-3	Reduce operational mobile-source emissions to improve air quality, mobility and human health.
UC-8	Travel Time Reduction	1-2	Reduce operational delay, queues and other types of congestion to improve mobility and user satisfaction.

Figure 8: Credits Under the Access & Livability Category

ACCESS & LIVABILITY			
NO.	TITLE	POINTS (12 min - 21 max)	DESCRIPTION
AL-1	Safety Audit	1-2	Evaluate existing and potential operational safety hazards on the Project through a systematic, transparent process.
AL-2	Safety Enhancements	1-2	Reduce existing and potential operational safety hazards on the Project through quantitative safety analysis methods.
AL-3	Multimodal Connectivity	1-2	Provide new or improved connections for multiple modes within the Project.
AL-4	Equity & Accessibility	1-2	Promote Projects that benefit disadvantaged communities and provide universal accessibility.
AL-5	Active Transportation	1-2	Improve Project facilities for pedestrian, bicycle and other active modes for healthier communities.
AL-6	Health Impact Analysis	2	Evaluate, measure and disclose the human health impacts of the Project.
AL-7	Noise & Glare Reduction	1-3	Minimize or eliminate disturbance to the Project's surroundings due to its operation and use.
AL-8	Culture & Recreation	1-2	Promote awareness and connection to a Project's local cultural and recreational resources.
AL-9	Archaeology & History	1-2	Promote awareness and connection to a Project's local archaeological and historical resources.
AL-10	Scenery & Aesthetics	1-2	Enhance the Project users' visual experience through pleasant views and aesthetic improvements.

Figure 9: Credits Under the Creativity & Effort Category

CREATIVITY & EFFORT

NO.	TITLE	POINTS (4 min - 15 max)	DESCRIPTION
CE-1	Educated Team	1-2	Encourage integrated teams throughout design and construction.
CE-2	Innovative Ideas	1-5	Recognize innovative design and construction practices.
CE-3	Enhanced Performance	1-5	Recognize performance achievements above and beyond stated Greenroads credit requirements.
CE-4	Local Values	1-3	Recognize the implementation of Projects that support policy, strategic goals, and local values.

Sample Completed Greenroads-Rated Projects in Texas

The Bagby St reconstruction project is a 0.62 mile, 9.6 million dollar project in Houston. It provided a rehabilitation of the pavement and an improvement to pedestrian facilities and parking. A concurrent traffic study found that the existing four lane cross section could be reduced to two lanes. This allowed for the installation of wider sidewalks with seating, planters, and bollards, and rain gardens for stormwater management. The concrete pavement mix replaced 25% of the mix with recycled materials.

The project was completed in 2013. When Hurricane Harvey impacted the Houston area in 2017, the Bagby St stormwater management features performed without flooding and demonstrated that sustainable strategies can be high-performing.

The Todd Lane project in Austin is a 0.68 mile corridor with a 7.8 million dollar budget to widen an existing street and add a center turn lane, sidewalks, bike lanes, a roundabout, bioswales and retention basins, and upgraded landscaping.

The area suffers from heavy clay soils, which were addressed with a cement and lime-stabilized subbase. Asphalt pavement used 88% recycled materials which were already in place. Stormwater bioswales were sized to control 90% of the expected runoff from the street. Landscaping is drought-tolerant native vegetation and trees.

Personal Certification

Personal professional certification as a Sustainable Transportation Professional (STP) is available in four levels. Levels are attained through experience and examination, and require ongoing education to maintain certification. Each STP level must demonstrate increasing proficiency in the five core content categories.

Level 1: Community Advocate – the exam covers the fundamentals of the Greenroads rating system. It demonstrates knowledge of the categories and their credits.

Level 2: Project Associate – this level progresses to knowledge of sustainable transportation. It establishes a common platform for sustainable transportation practices throughout the industry. The exam also covers principles of project management for sustainable projects.

Level 3: Project Manager – this STP level concentrates on demonstrated knowledge of specific sustainable practices for project management and for delivering a project using the Greenroads rating system.

Level 4: Registered Affiliate – the highest STP rating is for professionals who provide comprehensive local support for rating Greenroads projects.