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DRAFT

Sustainability Rating of Bridge Projects

The United States transportation infrastructure industry has, within the last year, begun adopting methods of scoring projects for sustainability. This process has been driven by the federal government, which now includes sustainability as a selection criterion when awarding grants to fund construction.

There are several new sustainability rating systems that are being applied to projects, including: FHWA Sustainable Highways, Greenroads, GreenLITES,, EnvISIon. These systems seek to achieve in the bridge and highway industries success analogous to what the LEED Green Building Rating System has already achieved in the realm of building architecture.

Two case studies are presented herein to explore the application of sustainability rating systems to bridge projects. The two case studies are: the Arthur Ravenel Jr. Bridge in Charleston, South Carolina and the St. Croix River Bridge in Stillwater, Minnesota.

Using the FHWA Sustainable Highways system, the Ravenel Bridge rated a Silver Award and the St. Croix bridge rated a Platinum Award. These high-performance ratings can be attributed to the fact that both bridges are major, high-profile projects that underwent rigorous public involvement

According to the U.S. Federal Highways Administration, sustainability is "the capacity to endure" and applies the "Triple Bottom Line" concept of social equity, environmental ecology, and economy.

In a practical sense, sustainability rating systems take the form of checklists of accepted best practices. For bridge projects, these best practices include: use of the context sensitive solutions process, accommodating alternative transportation modes, recycled materials, construction waste management, lifecycle assessment, providing ecological connectivity, habitat restoration, and more.

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IMPETUS FOR THE CREATION AND USE OF SUSTAINABILITY RATING SYSTEMS

The desire to quantify sustainability has been driven by the US federal government, which has used sustainability as a criteria for deciding which projects will receive funding, most notably with the $1.5 Billion TIGER grants and $600 Million TIGER II grants. TIGER is an acronym for Transportation Investment Generating Economic Recovery; these grants were part of the $275 Billion American Recovery and Reinvestment Act of 2009.

According to the U.S code of ethics, Professional Engineers "are encouraged to adhere to the principles of sustainable development in order to protect the environment for future generations." According to the U.S. Federal Highways Administration, sustainability is "the capacity to endure" and applies the "Triple Bottom Line" concept of social equity, environmental ecology, and economy.

Sustainability rating systems seek to translate these abstract and subjective concepts into actionable guidance during design and quantify the results.

OVERVIEW OF AVAILABLE SUSTAINABILITY RATING SYSTEMS

In a practical sense, sustainability rating systems take the form of checklists of accepted best practices. For bridge projects, these best practices include: use of the context sensitive solutions process, accommodating alternative transportation modes, recycled materials, construction waste management, lifecycle assessment, managing stormwater runoff, providing ecological connectivity and more.

The U.S. Green Building Council (USGBC) LEED standards are the most notable and successful systems. LEED standards apply to occupied buildings, and more recently, neighborhood development. However, USGBC does not publish a standard or rating system that is applicable to bridge projects or other heavy infrastructure.

Several organizations recognized the vacuum and developed their own sustainability rating systems for transportation infrastructure. These systems seek to achieve success analogous to what the LEED Green Building Rating System has already achieved in the realm of building architecture.

Four sustainability rating systems are considered herein and used to rate the two case study bridges. The four systems are: FHWA Sustainable Highways, Greenroads, GreenLITES, and envISIon. See Table 1. None of these rating systems are bridge specific. The first three systems were developed for highways. The later system is broadly conceived to apply to all physical infrastructure.

No one system has yet clearly emerged as a leader. FHWA Sustainable Highways is well positioned to see wide-spread use among the bridge and highways industries. Greenroads, since it is more rigorous and costly, will likely appeal to a progressive niche; such as municipalities where voters and taxpayers highly value sustainability. GreenLITES does not appear well suited to bridge projects outside of New York.

Table 1 – Summary of Sustainability Rating Systems Available for Bridge Projects

Sustainability Rating System	Developer	Scope	Organization	Review
FHWA Sustainable Highways	US Federal Highways Administration	Highways	Checklist Format - 30 credits; total of 117 points	Self-assessment
Greenraods	University of Washington	Highways	Checklist Format - 11 project requirements; 6 categories; 37 credits; 118 total points	Fee-based third party review
GreenLITES	New York State DOT	Highways	Checklist Format – 5 categories; 19 credits; 180 total points	Self-assessment
envISIon	Institute of Sustainable Infrastructure	Infrastructure	Checklist Format (Level 1) and Rating Matrix (Level 2); 10 categories; 75 credits; 1000 total points	Fee-based third party review

CASE STUDY – ARTHUR RAVENEL JR. BRIDGE

The Arthur Ravenel Jr. Bridge in Charleston, South Carolina is the longest cable stay bridge in North America; its construction was completed in 2005 using design-build project delivery.

CASE STUDY – ST. CROIX RIVER BRIDGE,

The St. Croix River Bridge is a proposed new crossing between Stillwater, Minnesota and Wisconsin. Preliminary design was completed in 2010. In response to a lawsuit by the Sierra Club, the National Park Service found that the project "would have direct and adverse effects on the scenic and recreational values of the Lower St. Croix National Scenic Riverway." The project is currently stalled awaiting special permission from the US Congress to proceed.

Table 2 – Results for Sustainability Rating of Case Study Bridges

	Ravenel Bridge (Points, Award)	St.Croix Bridge (Points, Award)
FHWA Sustainable Highways	57 of 117, Silver	74 of 117, Platinum
Greenroads	38 of 118, Certified*	46 of 118, Silver*
GreenLITES	63 of 276, Evergreen	62 of 276, Evergreen
EnvISIon	Not Yet Released	Not Yet Released

*While sufficient credits were earned to qualify for a Greenroads award, not all the pre-requisites were met. Specifically, the Ravenel Bridge and St. Croix Bridge did not meet PR-3 Lifecycle Inventory. Ravenel Bridge also did not meet PR-8 Feasibility Study for Low Impact Development.

Note – Case Study ratings were performed by the author based on the best available information, including interviews with the project engineers. The author's employer, Parsons Brinckerhoff, designed both of the case-study bridges, but the author was not directly involved with either project. Any errors in the project ratings are the sole responsibility of the author.

See the Appendix A for the scorecards for each bridge and rating system. Significant sustainable features of the two case study projects are discussed below.

SIGNIFICANT SUSTAINABLE FEATURES OF THE CASE-STUDY BRIDGES

The four considered rating systems contain a total of 161 credits (many of which overlap), a list much too lengthy to discuss each credit in detail herein. Therefore, seven sustainability features that are significant for bridge projects were selected for further consideration: use of the context sensitive solutions process, accommodating alternative transportation modes, recycled materials, construction waste management, lifecycle assessment, providing ecological connectivity, and habitat restoration.

Context Sensitive Solutions

Context Sensitive Solutions is a process of fostering communication between project stakeholders to strive for consensus in project decision-making.

Ravenel Bridge: The owner and constructor encouraged stakeholder dialogue by using interviews and meetings to understand the concerns of the impacted residents. A community bridge office was opened at the bridge site to act as a public information point.

Design changes were made to the Ravenel Bridge based on the stakeholder dialog, including: incorporating a pedestrian and cycle lane, lighting improvements, and selecting the diamond tower design among other options.

St. Croix Bridge: A visual quality review committee, with member participation from the stakeholder groups, was established. In addition, a public open house was held to gather input for the aesthetic development of the bridge.

Table 3 – Credits for Context Sensitive Solutions

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	5, 11%	5, 11%	PD-3
Greenroads	5, 13%	5, 13%	AE-3
GreenLITES	9, 30%	7, 23%	S-2 & S-3
EnvISIon	Not Yet Released	Not Yet Released	--

Alternative Transportation

Alternative transportation credits encourage modes other than single occupancy motor vehicles, including: pedestrians, cyclists, busses, transit, freight, car pools, and low-emission vehicles. Both case study bridges received credits for providing a combined sidewalk/bikepath.

Table 4 – Credits for Alternative Transportation

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	4, 9%	4, 9%	PD-14&15
Greenroads	4, 9%	4, 9%	AE-5 & 6
GreenLITES	21, 70%	25, 83%	E-4
EnvISIon	Not Yet Released	Not Yet Released	--

Recycled Materials

Recycled materials credits seek to reduce impacts from extraction and production of virgin materials. Recycled materials that have seen successful use on bridge projects include: steel, Pozzolan cement, recycled aggregates, reclaimed pavement, and recycled plastic piles.

Steel: Structural and reinforcing steel in the U.S. contain 96% total recycled content (59% post-consumer). Steel recycling is economically driven by a scrap value of approximately $0.25 per pound. It is to steel's benefit that it is highly recycled, however, it remains an energy intensive process. Worrell (1999) documents many opportunities for improving the energy efficiency of the steel industry. Achieving these efficiencies will be driven by government regulations and market conditions, not by revisions to bridge steel specifications.

Cement: Portland cement is energy intensive to produce from virgin limestone. Pozzolan cements are encouraged because they require no energy to produce. Use of naturally occurring Pozzolan cements (volcanic soils) dates back to the Roman Empire, as documented by Vitruvius in 25 B.C. Similar natural Pozzolan cements were used for the substructures of the Oakland-Bay Bridge and Golden Gate Bridge; both constructed in California in the mid-1930's. Modern Pozzolan cement, referred to as Supplementary Cementing Materials (SCM) or mineral admixtures, are typically not volcanic in origin, but industrial by-products such as fly-ash, blast furnace slag, and silica fume.

Concrete: Concrete made with a blend of Portland cement and SCM admixtures has been well established in the bridge industry for over 50 years. Typical specifications call for fifteen percent of the cement, by weight, to be fly-ash with the remainder Portland cement. High performance concrete commonly uses silica flume admixtures of up to ten percent.

The majority of concrete bridges recently built with high percentages (up to 85%) of SCM have been design-build projects with construction cost savings and improved physical properties driving the mix design. The reduced energy use and emissions associated with SCMs, when compared with Portland cement, has merely been a happy side effect. Procuring from an Energy Star certified cement production plant is encouraged.

Recycled Aggregates: When locally available, by product aggregates including waste rock from quarries, mines, or mills are preferred to virgin aggregates.

Reclaimed Pavement: Many states use reclaimed asphalt pavement to be recycled into hot-mix or warm-mix pavement and for reclaimed concrete pavement to be recycled as aggregate for new pavements. Concrete made with reclaimed concrete aggregate has reduced strength, but is suitable for barriers, pavements, and non-structural applications. Crushed waste concrete is also commonly recycled (downcycled) for use in highway base courses or fill.

Recycled Plastic Piles and Lumber: Several states have successfully used recycled plastic materials to construct bridge pier protection fenders. The US Navy has used recycled plastic piles with internal steel reinforcing bars at installations around the world to replace timber fender systems.

Ravenel Bridge: uses steel reinforced concrete for the towers, deck, piers, and drilled shaft foundations. Steel is used for the main span girders and cables. The concrete mix for Ravenel bridge used up to 43% fly ash; the low permeability of this concrete allowed for the use of uncoated rebar to meet a 100-year design life.

St. Croix Bridge: The concrete mix design will be developed according to the project requirements, not the state standard specifications. The I-35W Bridge which was recently constructed nearby used up to 85% fly ash and blast-furnace slag.

Table 5 – Credits for Recycled Materials

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	6, 13%	7, 15%, PD-11	PD-11
Greenroads	3, 7%	3, 7%, MR-4	MR-4
GreenLITES	0, 0%	0, 0%	M-1 & 2
EnvISIon	Not Yet Released	Not Yet Released	--

Construction Waste Management

Concrete has no scrap value. When demolishing existing concrete structures, the waste concrete will likely be landfilled unless the contract documents require recycling. The reinforcing steel, however, is likely to be recycled regardless. Per the Steel Recycling Institute, 65% of the reinforcing steel from concrete structures demolished in the U.S. in 2006 was recycled. To remove the reinforcing steel, the concrete must first be crushed.

Ravenel Bridge: The existing bridges were demolished using explosives. More than 80% of the material from the demolished bridges was barged to sea to create artificial reefs.

St.Croix Bridge: The proposed bridge will be located on a new alignment, with no demolition of existing structures.

Table 6 – Credits for Construction Waste Management

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	1, 2%	0, 0%	PD-30
Greenroads	Pre-Requisite	Pre-Requisite	PR-6
GreenLITES	3, 10%	0, 0%	M-1 & 2
EnvISIon	Not Yet Released	Not Yet Released	--

Lifecycle Cost Analysis & Lifecycle Assessment

The resources associated with construction and maintenance have a similar order of magnitude over a 100 year life of a bridge. This is based on typical annual bridge maintenance costs of 1% of bridge replacement costs, as reported by Yanev (2007) of the New York City DOT. Since a large proportion of maintenance resources are used to maintain paint, joints, and drainage, bridge designs that minimize or eliminate this work are preferred.

Bridge Life Cycle Cost analysis is mandated in the US by SAFETEA-LU legislation; NCHRP Report 483 provides guidance. The total life cycle cost includes agency, user, and vulnerability costs. The agency costs include design, construction, maintenance, rehabilitation, and salvage/disposal.

Carnegie Mellon University has developed free software, available at www.eiolca.net, which is well suited for the assessment of bridge projects. Lifecycle costs are the inputs used by the www.eiolca.net software to determine project outputs in terms of energy use, global warming potential, conventional pollution, toxic releases, as well as employment and economic activity. Other lifecycle assessment software are also available.

Ravenel Bridge: Lifecycle cost analysis was used during the type study phase of the project to select between various alternatives.

St.Croix Bridge: Lifecycle cost analysis was used during the type study phase of the project to select between various alternatives. The eight extradosed main spans of the bridge were designed to be continuous, resulting in 3,460 feet of structure between expansion joints.

Table 7 – Credits for Lifecycle Cost Analysis & Lifecycle Assessment

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	1, 2%	1, 2%, PD-4	PD-4
Greenroads	Pre-Requisite	Pre-Requisite	PR-2
GreenLITES	n/a	n/a	none
EnvISIon	Not Yet Released	Not Yet Released	--

Ecological Connectivity

Provide or improve wildlife mobility across the roadway facility boundries.

Ravenel Bridge: Bridge lights were designed to minimize potential impacts on nesting loggerhead sea turtles and migratory birds.

St.Croix Bridge: The author is not aware of proposed measures regarding ecological connectivity for the St. Croix Bridge.

Table 8 – Credits for Ecological Connectivity

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	6, 13%	0, 0%	PD-8
Greenroads	3, 7%	0, 0%	EW-7
GreenLITES	6, 14%	6, 14%	S-4 & 5
EnvISIon	Not Yet Released	Not Yet Released	--

Habitat Restoration

Projects are encouraged to offset the loss and alteration of natural habitat caused by construction.

Ravenel Bridge: After construction, disturbed wetlands were restored to their natural condition and sections of the old bridges were excavated and rehabilitated to wetlands. In areas where original wetlands could not be restored, mitigation banks were created. Twenty mature trees affected by the project were relocated.

St.Croix Bridge: The author is not aware of proposed measures regarding habitat restoration for the St. Croix Bridge.

Table 9 – Credits for Habitat Restoration

	Ravenel Bridge (Points, %Silver)	St.Croix Bridge (Points, %Silver)	Credit (Ref.)
FHWA Sustainable Highways	6, 13%	0, 0%	PD-8
Greenroads	3, 7%	0, 0%	EW-6
GreenLITES	6, 14%	0, 0%	S-4 & 5
EnvISIon	Not Yet Released	Not Yet Released	--

CONCLUSIONS

Sustainability Rating Systems serve (at least) three functions. First, they are a design tool that can help direct the design process and inform decision making. Second, by rating completed projects they provide feedback and, perhaps, an opportunity to learn lessons that can be applied to the next project. Third, they are a communication tool to inform the public if the project is conforming to best practices.

Neither of the case study bridges used a sustainability rating system as a design tool. However, both bridges rated quite well. Using the FHWA system, the Ravenel Bridge rated a Silver Award and the St. Croix bridge rated a Platinum Award.

These high-performance ratings can be attributed to the fact that both bridges are major, high-profile projects that underwent rigorous public involvement via the Context Sensitive Solutions process. Public involvement steered the projects towards designs that accommodate alternative transportation, more durable designs, and more ecological designs. More conventional projects with less public involvement may be tempted to favor lowest-construction-cost designs which often prove more expensive over the life-cycle and would not rate well for sustainability.

APPENDIX A
SCORECARDS FOR THE CASE-STUDY BRIDGES

FHWA
Sustainable Highways Self-Evaluation Tool
Pilot Project Version - Extended Scorecard

Project Name: ~~Enter Project Name Here~~ ARTHUR RAVENEL JR. BRIDGE & ST. CROIX BRIDGE
Evaluator: Enter Your Name Here SCOTT SNELLING
Date: Enter Date Here JUNE 23, 2011

The official self-evaluation tool is online at www.sustainablehighways.org. This self-evaluation scoring sheet may not be consistent with the current credits available online and has not been tested for accuracy or completeness.

ARTHUR RAVENEL JR. BRIDGE / ST. CROIX BRIDGE

Project Development Credits

Credit	Title	Score		
PD-1	Cost Benefit Analysis	0	3	3
PD-2	Highway and Traffic Safety	0	9	10
PD-3	Context Sensitive Project Development	0	5	5
PD-4	Lifecycle Cost Analysis	0	3	3
PD-5	Freight Mobility	0	0	4
PD-6	Educational Outreach	0	2	2
PD-7	Tracking Environmental Commitments	0	5	5
PD-8	Habitat Restoration	0	0	0
PD-9	Stormwater	0	6	7
PD-10	Ecological Connectivity	0	0	0
PD-11	Recycle & Reuse Materials	0	3	6
PD-12	Create Renewable Energy	0	0	0
PD-13	Site Vegetation	0	0	2
PD-14	Pedestrian Access	0	2	2
PD-15	Bicycle Access	0	0	0
PD-16	Transit and HOV Access	0	0	2
PD-17	Historical, Archaeological, and Cultural Preservation	0	0	4
PD-18	Scenic, Natural, or Recreational Qualities	0	0	2
PD-19	Low-Emitting Materials	0	0	5
PD-20	Energy Efficient Lighting	0	0	0
PD-21	ITS for System Operations	0	0	0
PD-22	Long-Life Pavement Design	0	0	0
PD-23	Reduced Energy and Emissions in Pavement Materials	0	0	0
PD-24	Contractor Warranty	0	0	0
PD-25	Earthwork Balance	0	0	0
PD-26	Construction Environmental Training	0	0	0
PD-27	Construction Equipment Emission Reduction	0	0	0
PD-28	Construction Noise Mitigation	0	0	0
PD-29	Construction Quality Control Plan	0	5	5
PD-30	Construction Waste Management	0	1	1
	Project Development Score	**0**	57	74

SILVER PLATINUM

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

RATED BY: SCOTT SNELLING
JUNE 23, 2011

GREENROADS RATING SYSTEM

LIST OF CREDITS (v1.5)

ARTHUR RAVENEL JR BRIDGE | ST. CROIX BRIDGE

No.	Title			Pts.	Description
Project Requirements (PR) – Mandatory for all projects					
PR-1	Environmental Review Process	✓	✓	Req	Complete a comprehensive environmental review
PR-2	Lifecycle Cost Analysis (LCCA)	✓	✓	Req	Perform LCCA for pavement section
PR-3	Lifecycle Inventory (LCI)	✗	✗	Req	Perform LCI of pavement section
PR-4	Quality Control Plan	✓	✓	Req	Have a formal contractor quality control plan
PR-5	Noise Mitigation Plan	✓	✓	Req	Have a construction noise mitigation plan
PR-6	Waste Management Plan	✓	✓	Req	Have a plan to divert C&D waste from landfill
PR-7	Pollution Prevention Plan	✓	✓	Req	Have a TESC/SWPPP
PR-8	Low Impact Development (LID)	✗	✓	Req	Complete a LID feasibility study
PR-9	Pavement Management System	✓	✓	Req	Have a pavement management system
PR-10	Site Maintenance Plan	✓	✓	Req	Have a roadside maintenance plan
PR-11	Educational Outreach	✓	✓	Req	Publicize sustainability information for project
Environment & Water (EW) – Up to 21 Points					
EW-1	Environmental Management System	2	2	2	ISO 14001 certification for general contractor
EW-2	Runff Flow Control	0	0	1-3	Reduce runoff quantity
EW-3	Runoff Quality	0	3	1-3	Treat stormwater to a higher level of quality
EW-4	Stormwater Cost Analysis	0	0	1	Conduct an LCCA for stormwater elements
EW-5	Site Vegetation	0	0	1-3	Use native low/no water vegetation
EW-6	Habitat Restoration	0	0	3	Restore habitat beyond what is required
EW-7	Ecological Connectivity	3	3	1-3	Connect habitat across roadways
EW-8	Light Pollution	3	3	3	Discourage light pollution
Access & Equity (AE) – Up to 30 Points					
AE-1	Safety Audit	2	2	1-2	Perform roadway safety audit
AE-2	Intelligent Transportation Systems (ITS)	0	0	2-5	Implement ITS solutions
AE-3	Context Sensitive Solutions	5	5	5	Plan for context sensitive solutions
AE-4	Traffic Emissions Reduction	0	0	5	Reduce emissions with quantifiable methods
AE-5	Pedestrian Access	2	2	1-2	Provide/improve pedestrian accessibility
AE-6	Bicycle Access	2	2	1-2	Provide/improve bicycle accessibility
AE-7	Transit Access	0	0	1-5	Provide/improve transit accessibility
AE-8	Scenic Views	0	2	1-2	Provide views of scenery or vistas
AE-9	Cultural Outreach	0	2	1-2	Promote art/culture/community values
Construction Activities (CA) – Up to 14 Points					
CA-1	Quality Management System	2	2	2	ISO 9001 certification for general contractor
CA-2	Environmental Training	0	1	1	Provide environmental training
CA-3	Site Recycling Plan	1	1	1	Have a plan to divert waste from landfill
CA-4	Fossil Fuel Reduction	2	0	1-2	Use alternative fuels in construction equipment
CA-5	Equipment Emissions Reduction	0	0	1-2	Meet EPA Tier 4 standards for non-road equip.
CA-6	Paving Emissions Reduction	0	0	1	Use pavers that meet NIOSH requirements
CA-7	Water Tracking	0	0	2	Develop data on water use in construction
CA-8	Contractor Warranty	0	3	3	Warranty on the constructed pavement
Materials & Resources (MR) – Up to 23 Points					
MR-1	Life Cycle Assessment (LCA)	0	0	2	Conduct a detailed LCA of the entire project
MR-2	Pavement Reuse	0	0	1-5	Reuse existing pavement sections
MR-3	Earthwork Balance	0	0	1	Use native soil rather than import fill
MR-4	Recycled Materials	3	3	1-5	Use recycled materials for new pavement
MR-5	Regional Materials	3	3	1-5	Use regional materials to reduce transportation
MR-6	Energy Efficiency	3	3	1-5	Improve energy efficiency of operational systems
Pavement Technologies (PT) – Up to 20 Points					
PT-1	Long-Life Pavement	0	5	5	Design pavements for long-life
PT-2	Permeable Pavement	0	0	3	Use permeable pavement as a LID technique
PT-3	Warm Mix Asphalt (WMA)	0	0	3	Use WMA in place of HMA
PT-4	Cool Pavement	0	0	5	Contribute less to urban heat island effect (UHI)
PT-5	Quiet Pavement	0	0	2-3	Use a quiet pavement to reduce noise
PT-6	Pavement Performance Tracking	0	0	1	Relate construction to performance data
Custom Credits (CC) – Available for all projects based on context and innovation, subject to approval					
CC-1	Custom Credit 1			1-5	Design a new voluntary credit
CC-2	Custom Credit 2			1-5	Design a new voluntary credit
	Greenroads Total Points:	38	46	118	

CERTIFIED | SILVER

AWARD SCALE
32-42 : CERTIFIED
43-53 : SILVER
54-63 : GOLD
64+ : EVERGREEN

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

Please fill in all yellow highlighted cells and follow all instructions in red text.

Project: | PIN: | Type: | Contact Name: | Ph #: | Element Specific?

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS	ARTHUR RAVENEL JR. BRIDGE	ST. CROIX BRIDGE	EXPLANATION OR COMMENTS (optional)
Sustainable Sites (S) — S-1 *Alignment Selection*	S-1a	Avoidance of previously undeveloped lands (open spaces or "greenfields").	2		<= Please enter 0 or 2	2	0	
	S-1b	Selecting an alignment that establishes a minimum 100-foot buffer zone between the edge of pavement and a natural watercourse or significantly sized natural wetland to serve the purpose of stormwater filtration.	2		<= Please enter 0 or 2	0	0	
	S-1c	Alignments which minimize overall construction "footprint." Examples: use of retaining walls, selecting design option with minimal footprint.	2		<= Please enter 0 or 2	0	0	
	S-1d	Design vertical alignments which minimize total earthwork. (Applicable only for projects modifying existing vertical alignments.)	1		<= Please enter 0 or 1	0	0	
	S-1e	Adjust alignment to avoid or minimize impacts to social/environmental resources (avoidance of parklands, wetlands, historic sites, farmlands, residential and commercial buildings, etc.).	1		<= Please enter 0 or 1	0	1	
	S-1f	Alignments that optimize benefits among competing constraints. (The goal is not always the minimum-length alignment, but the one with the best benefit overall.)	1		<= Please enter 0 or 1	0	1	
	S-1g	Micro-adjustments that do not compromise safety or operation but make the difference in providing sufficient clear area for tree planting.	1		<= Please enter 0 or 1	0	0	
	S-1h	Clear zones seeded with seed mixtures that help to reduce maintenance needs and increase carbon sequestration.	1		<= Please enter 0 or 1	0	0	
	S-1i	Provide a depressed roadway alignment.	1		<= Please enter 0 or 1	0	0	
	S-1j	Use of launched soil nails as a more cost effective option to stabilize a slope rather than, for example, closing a road to construct a retaining wall which may negatively affect traffic flow and neighboring properties.	1		<= Please enter 0 or 1	0	0	
S-2 *Context Sensitive Solutions*	S-2a	Adjust or incorporate highway features to respond to the unique character or sense of place (both natural and built) of the area ("Unique character" means whatever identifiable elements make a place distinctive, memorable, important to the community, etc. - landmarks, views, historic bridges & buildings, parkways, characteristic use of materials, a notable stand of trees, etc.).	2		<= Please enter 0 or 2	2	2	
	S-2b	Incorporate local or natural materials for substantial visual elements (e.g., bridge fascia, retaining walls).	2		<= Please enter 0 or 2	2	2	
	S-2c	Visual enhancements (screening objectionable views, strategic placement of vegetation, enhancing scenic views, burying utilities, etc.).	2		<= Please enter 0 or 2	2	2	
	S-2d	Period street furniture/lighting/appurtenances.	1		<= Please enter 0 or 1	1	1	
	S-2e	Inclusion of visually-contrasting (colored and/or textured) pedestrian crosswalk treatments.	1		<= Please enter 0 or 1	0	0	
	S-2g	Incorporates guidance from *Section 23 - Aesthetics* of the NYS Bridge Manual.	1		<= Please enter 0 or 1	0	1	
	S-2h	Site materials selection & detailing to reduce overall urban "heat island" effect.	1		<= Please enter 0 or 1	0	0	
	S-2i	Permanently protect viewsheds via environmental or conservation easements.	1		<= Please enter 0 or 1	0	0	
	S-2j	Color anodizing of aluminum elements (ITS cabinets, non-decorative light poles, etc.)	1		<= Please enter 0 or 1	0	0	
	S-2k	Decorative bridge fencing (in lieu of standard chain link).	1		<= Please enter 0 or 1	0	0	
	S-2l	Use of concrete form liners (for bridge approach barriers, parapet walls, retaining walls, noise walls, bridge piers & abutments, etc.)	1		<= Please enter 0 or 1	0	0	
	S-2m	Imprinted concrete/asphalt mow strips, gores and/or snow storage areas.	1		<= Please enter 0 or 1	0	0	
S-3 *Land Use/*	S-3a	Use of more engaging public participation techniques (e.g. charette, task force).	2		<= Please enter 0 or 2	2	2	

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

Please fill in all yellow highlighted cells *and follow all instructions in* red text.

Project: ARTHUR BRIDGE / FENENEL ST. / ST. CROIX BRIDGE

PIN: Type: Element Specific?

Contact Name: Ph #:

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS		EXPLANATION OR COMMENTS *(optional)*
Sustainable Sites (S) — *Community Planning*	S-3b	Enhanced outreach efforts (e.g. newsletters, project-specific Web page, communications issued in multiple languages).	2		<= Please enter 0 or 2	2	2
	S-3c	Projects better enabling use of public transit (e.g. bus shelters, 'Park &Ride').	2		<= Please enter 0 or 2	0	0
	S-3d	Projects applying "Walkable Communities" and/or "Complete Streets" concepts.	2		<= Please enter 0 or 2	2	2
	S-3e	Projects that increase transportation efficiencies for moving freight through features such as dedicated rail or intermodal facilities or the use of unit trains to remove trucks from highways and conserve fuel.	2		<= Please enter 0 or 2	0	0
	S-3f	Project-specific formal agreement with public or private entities enabling environmental betterment, technological advancement, or financial assistance or relief to the Department.	2		<= Please enter 0 or 2	0	0
	S-3g	Project is consistent with local and regional plans beyond those generated by the MPO; (e.g., waterfront revitalization plans, greenway plans, the Scenic Byway program, and other statewide non-transportation plans with regional components) and/or local Smart Growth-based master/comprehensive plans.	2		<= Please enter 0 or 2	2	0
	S-3h	Project reports and community outreach materials available online other than the standard project specific web page.	1		<= Please enter 0 or 1	1	0
	S-3j	Establishment of a new recreational access facility (trailhead parking, car top boat launch, info/map kiosk).	2		<= Please enter 0 or 2	2	2
	S-3k	Establishment of a new recreational facility (pocket park, roadside overlook, roadside picnic rest area, etc.).	2		<= Please enter 0 or 2	2	2
	S-3l	Enhancement of an existing recreational facility or enhancement of an existing recreational facility access.	1		<= Please enter 0 or 1	0	0
	S-4a	Mitigation of habitat fragmentation through use of significant techniques such as consolidated stream, wetland or ecological mitigation areas, or creation of dedicated "eco viaducts." (Raised roadways that serve to avoid impacts to ecologically important areas such as rare plant communities, diminishing habitats and wildlife migration corridors.).	3		<= Please enter 0 or 3	3	3
Protect, Enhance or Restore Wildlife Habitat	S-4b	Providing for enhancements to existing wildlife habitat (e.g. bird & bat houses, nesting boxes, osprey poles, turtle nesting areas, avoiding piping plover habitat).	2		<= Please enter 0 or 2	0	0
	S-4c	Partial mitigation of habitat fragmentation through techniques (United States Army Corp of Engineers (USACE) regional conditions) such as over-sizing culverts to accommodate aquatic and non-aquatic species passage.	2		<= Please enter 0 or 2	0	0
	S-4d	Use of natural-bottomed culverts.	2		<= Please enter 0 or 2	0	0
	S-4e	Wildlife crossings that are structures that allow for the safe passage of wildlife across highways without their crossing directly on the roadway. Examples include wildlife overpass/underpass and amphibian tunnels.	2		<= Please enter 0 or 2	0	0
	S-4f	Wetland restoration, enhancement, or establishment that is above and beyond what is required to obtain a wetland-related permit.	2		<= Please enter 0 or 2	2	0
	S-4g	Minimize use of lands that are part of a significant contiguous wildlife habitat.	1		<= Please enter 0 or 1	1	1
	S-4h	Use of wildlife mortality reduction measures such as right-of -way fence, moose signs, etc.	1		<= Please enter 0 or 1	0	0
	S-4k	Stream restoration/enhancement.	1		<= Please enter 0 or 1	1	0
	S-4l	Installation of mowing markers to protect natural areas and wetlands.	1		<= Please enter 0 or 1	0	0
	S-4m	Inclusion of scheduling and logistic requirements to avoid disrupting wildlife nesting or breeding activities.	1		<= Please enter 0 or 1	1	1
	S-4n	Permanently protects the new or expanded habitat through an environmental or conservation easement.	1		<= Please enter 0 or 1	0	0

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

Please fill in all yellow highlighted cells *and follow all instructions in* red text.

Project: ARTHUR KILL BRIDGE REPLACEMENT JR ST. CROIX BRIDGE

PIN: Type:

Contact Name: Ph #:

Element Specific?

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS		EXPLANATION OR COMMENTS *(optional)*
Sustainable Sites (S) — S-5 *Protect, Plant or Mitigate for Removal of Trees & Plant Communities*	S-5a	Avoidance/protection of significant contiguous stands of established, desirable trees/veg communities, especially those showing signs of self-regeneration.	2		<= Please enter 0 or 2	0	0
	S-5b	Designs which demonstrate, through a combination of preservation and new planting, an anticipated ultimate (new trees at projected maturity) net increase in tree canopy cover within the project limits.	2		<= Please enter 0 or 2	0	0
	S-5c	Re-establishment or expansion of native vegetation into reclaimed work areas or abandoned roadway alignments. (e.g. native seed mixes, "re-forestation" approach w/ multiple seedlings rather than traditional large nursery stock, etc.).	2		<= Please enter 0 or 2	2	0
	S-5d	Use of trees, large shrubs or other suitable vegetation (beach rose, honeysuckle & shrub willows) as living snow fences.	2		<= Please enter 0 or 2	0	0
	S-5e	Use of native species for seed mixes and other plantings.	1		<= Please enter 0 or 1	0	0
	S-5f	Avoidance/protection of individual significant trees and localized areas of established desirable vegetation.	1		<= Please enter 0 or 1	1	1
	S-5g	Designs which demonstrate, through a combination of preservation and new planting, no ultimate (new trees at projected maturity) net loss of tree canopy within the project limits (minimum one-to-one replacement of trees lost) or, if overall available planting area has been reduced, mitigation with trees to the extent possible (either on or off-site) for trees lost.	1		<= Please enter 0 or 1	1	0
	S-5h	Planting trees, shrubs and/or plant material in lieu of traditional turf grass.	1		<= Please enter 0 or 1	0	0
	S-5i	Removal of undesirable plant species, in particular removal/burial of invasive species, to preserve desirable overall species diversity.	1		<= Please enter 0 or 1	0	0
	S-5j	Preserving, replacing, or enhancing vegetation associated with historic properties or districts, or which maintain the character of unique areas.	1		<= Please enter 0 or 1	0	0
Water Quality (W) — W-1 *Stormwater Management (Volume & Quality)*	W-1a	Improve water quality and/or nearby habitat through the use of stormwater retrofitting, stormwater crediting strategies, stream restoration, additional wetland protection, and inclusion of permanent stormwater mgt practices.	2		<= Please enter 0 or 2	0	2
	W-1b	Detecting and eliminating any non-stormwater discharges from unpermitted sanitary or other residential, commercial or industrial sources that enter the Right-Of-Way or flows that ultimately discharge to the ROW.	2		<= Please enter 0 or 2	0	0
	W-1c	Demonstrate, through the use of models, a reduction of pollutant loadings to adjacent water resources by the use of Best Management Practices (BMPs).	2		<= Please enter 0 or 2	0	0
	W-1d	Reduction in overall impervious area (post-project impervious surface area to be less than existing).	2		<= Please enter 0 or 2	0	0
	W-1f	Requirements for staged construction so that less than five acres of bare soil are exposed at any given time and site runoff is controlled.	1		<= Please enter 0 or 1	0	0
	W-1g	Detecting and documenting non-stormwater discharges from unpermitted sanitary or other residential, commercial or industrial sources that enter the right-of-way or flows that ultimately discharge to the right-of-way but which cannot be eliminated for reasons beyond our control.	1		<= Please enter 0 or 1	0	0
Water Quality (W) — W-2 *Best Management Practices (BMPs)*	W-2a	Design features that make use of highly permeable soils to remove surface pollutants from runoff through infiltration trenches or basins, bioretention cells or rain gardens, grass buffers and stormwater wetlands that treat water quality and water quantity requirements in accordance with NYSDOT Highway Design Manual Chapter 8, Appendix B, subsections 2.3.2 and 2.3.3.	2		<= Please enter 0 or 2	0	0
	W-2b	Use of other structural BMPs including wet or dry swales, sand filters, filter bags, stormwater treatment sys (e.g., oil/grit separators and hydrodynamic devices), underground detention systems or catch basin inserts.	2		<= Please enter 0 or 2	0	0
	W-2c	Inclusion of "permeable pavement" such as grid pavers where practical.	2		<= Please enter 0 or 2	0	0
	W-2d	Minimize the project's overall impervious surface area increase.	1		<= Please enter 0 or 1	1	0

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Project:
PIN: Type:
Contact Name: Ph #:
Element Specific?

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS	ARTHUR RAVENEL	ST CROIX BRIDGE	EXPLANATION OR COMMENTS *(optional)*
	W-2e	Include grass channels, where appropriate.	1		*<= Please enter 0 or 1*	0	0	
	W-2f	Designate qualified environmental construction monitor to provide construction oversight in sensitive environmental areas.	2		*<= Please enter 0 or 2*	0	0	
Materials & Resources (M) M-1 *Reuse of Materials*	M-1a	Specify that 75% or more of topsoil removed for grading is reused on site.	2		*<= Please enter 0 or 2*	0	0	
	M-1b	Design the project so that "cut-and-fills" are balanced to within 10 percent.	2		*<= Please enter 0 or 2*	0	0	
	M-1c	Reuse of excess fill ("spoil") within the project corridor to minimize project site material in and material out.	2		*<= Please enter 0 or 2*	0	0	
	M-1d	Specify rubblizing or crack and seating of Portland Cement Concrete pavement.	2		*<= Please enter 0 or 2*	0	0	
	M-1e	Reuse of previous pavement as subbase during full-depth reconstruction projects.	2		*<= Please enter 0 or 2*	0	0	
	M-1f	Arranging for the reuse of excess excavated material, asphalt pavement millings, or demolished concrete by another municipality or state agency.	2		*<= Please enter 0 or 2*	0	0	
	M-1g	Specify the processing of demolished concrete to reclaim scrap metals and to create a usable aggregate material.	2		*<= Please enter 0 or 2*	0	0	
	M-1h	Salvaging removed trees for lumber or similar uses other than standard wood-chipping (e.g. - milling valuable heartwood from ash trees whose outer wood was infected by ash borers, necessitating removal).	2		*<= Please enter 0 or 2*	0	0	
	M-1i	Use surplus excavated material on nearby state highways for slope flattening to eliminate guide rail or as fill in areas designated by Park officials as acceptable for spoil disposal.	2		*<= Please enter 0 or 2*	0	0	
	M-1j	Use surplus excavated material, demolished concrete, or millings at nearby abandoned quarries to help fulfill an approved DEC reclamation plan.	2		*<= Please enter 0 or 2*	0	0	
	M-1k	Specify that 50% or more of topsoil removed for grading is reused on site.	1		*<= Please enter 0 or 1*	0	0	
	M-1l	Design the project so that cut and fills are balanced to within 25 percent.	1		*<= Please enter 0 or 1*	0	0	
	M-1m	Reuse (i.e., remove and reset versus remove and replace) of granite curbing.	1		*<= Please enter 0 or 1*	0	0	
	M-1n	Reuse of elements of the previous structure (stone veneer, decorative railing, etc.).	1		*<= Please enter 0 or 1*	0	0	
	M-1o	Designing an on-site location for chipped wood waste disposal from clearing and grubbing operations.	1		*<= Please enter 0 or 1*	0	0	
	M-1p	Specifying the recycling of chipped untreated wood waste for use as mulch and/or ground cover. (Pressure/preservative-treated or painted/coated wood cannot be used as mulch and must be disposed properly).	1		*<= Please enter 0 or 1*	0	0	
	M-1q	Project documents make scrap metals available for reuse or recycling.	1		*<= Please enter 0 or 1*	1	0	
	M-1r	Identify approved, environmentally acceptable and permitted sites in the contract documents for the disposal of surplus excavated material.	1		*<= Please enter 0 or 1*	1	0	
	M-1s	Obtain and implement a project specific DEC Beneficial Use Determination for the innovative re-use of otherwise waste material from a location within NYS.	1		*<= Please enter 0 or 1*	0	0	
	M-1t	Specify the salvage/moving of houses rather than demo for disposal in landfills.	1		*<= Please enter 0 or 1*	1	0	
	M-1u	Reuse of major structural elements such as bridge piers, bridge structure, etc. if warranted and appropriate and does not compromise the feature life cycle.	2		*<= Please enter 0 or 2*	0	0	
M-2 *Recycled Content*	M-2a	Use tire shreds in embankments.	2		*<= Please enter 0 or 2*	0	0	
	M-2b	Use recycled plastic extruded lumber or recycled tire rubber (e.g. for noise barriers).	2		*<= Please enter 0 or 2*	0	0	

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Project:
PIN: Type:
Contact Name: Ph #:
Element Specific?

	CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS	ARTHUR BRIDGE	RAVENEL JR. / ST. CROIX BRIDGE	EXPLANATION OR COMMENTS *(optional)*
Materials & Resources (M)		M-2c	Specify hot-in-place or cold-in-place recycling of hot mix asphalt pavements.	2		<= Please enter 0 or 2	0	0	
		M-2d	Specify use of recycled glass in pavements and embankments, as drainage material or filter media where adequate local sources can be obtained.	2		<= Please enter 0 or 2	0	0	
		M-2e	Specify asphalt pavement mixes containing Recycled Asphalt Pavement (RAP).	2		<= Please enter 0 or 2	0	0	
		M-2f	Specify PCC pavement mixes containing Recycled Concrete Aggregate (RCA).	2		<= Please enter 0 or 2	0	0	
		M-2g	Use crumb rubber or recycled plastic for noise barrier material.	2		<= Please enter 0 or 2	0	0	
		M-2h	Use of porous pavement systems in light duty situations (e.g. sidewalks, truck turnarounds, rest stops, parking lots, police turnarounds).	2		<= Please enter 0 or 2	0	0	
	M-3 *Local Materials*	M-3a	Specify locally available natural light weight fill. Contact Geotechnical staff to help in locating these materials.	2		<= Please enter 0 or 2	0	0	
		M-3b	Specify local seed stock and plants.	2		<= Please enter 0 or 2	0	0	
	M-4 *Bio-engineering Techniques*	M-4a	Project designs that utilize soil bioengineering treatments (the reliance on plant material for slope protection, rebuilding, stabilization, and erosion control) along water bodies/wetlands.	2		<= Please enter 0 or 2	0	0	
		M-4b	Project designs utilizing soil biotechnical engineering treatments (combination of plant materials and structural elements to achieve slope protection, rebuilding, stabilization, and erosion control) along water bodies/wetlands. Examples are: vegetated crib wall, vegetated gabion, and vegetated mats.	2		<= Please enter 0 or 2	0	0	
		M-4c	Projects using targeted biological control methods to reduce invasive species, such as the release of specific types of beetles to control purple loosestrife.	2		<= Please enter 0 or 2	0	0	
		M-4d	Project designs utilizing soil biotechnical engineering treatments (combination of plant materials and structural elements to achieve slope protection, rebuilding, stabilization, and erosion control) NOT along water bodies or wetlands. Examples include vegetated: crib walls, gabions, Geosynthetic Reinforced Earth Systems (GRES), geocells, and mats.	1		<= Please enter 0 or 1	0	0	
		M-4e	Project designs that utilize soil bioengineering treatments or soil biotechnical engineering treatments in upland areas.	1		<= Please enter 0 or 1	0	0	
Materials & Resources (M)	M-5 *Hazardous Material Minimization*	M-5a	Project design substantially minimizes the need to use hazardous materials (e.g. steel or conc RR ties instead of treated wood), or increases the interval before reconstruction must be performed using hazardous or toxic materials, or improves durability of components containing hazardous substances.	2		<= Please enter 0 or 2	0	0	
		M-5b	Project design specifies less hazardous materials or avoids generating contaminated wastes by reducing the volatile organic compounds (VOCs) or hazardous air pollutants (HAPs) emitted during project construction (e.g., use of non-solvent traffic or bridge paints, lower VOC/nonhazardous air pollutant bridge deck sealers) and by eliminating or reducing toxic metals/components.	2		<= Please enter 0 or 2	0	0	
		M-5c	Removing and disposing of contaminated soils beyond what is necessary for project construction.	2		<= Please enter 0 or 2	0	0	
	E-1 *Improved Traffic Flow*	E-1a	Special use lane (HOV/Reversible/Bus Express).	3		<= Please enter 0 or 3	0	0	
		E-1b	Innovative interchange design and/or elimination of freeway bottlenecks (diverging diamond, single point urban).	3		<= Please enter 0 or 3	0	3	
		E-1c	Specify new roundabout(s).	3		<= Please enter 0 or 3	0	0	
		E-1d	Implementation of a robust Traffic Management Center / Traveler Information System operation (e.g., TMC, CCTV, VMS freeway detection, ramp metering, road weather info system and/or weigh in motion devices, travel time signs).	3		<= Please enter 0 or 3	0	0	
		E-1e	Installation of a closed-loop coordinated signal system.	2		<= Please enter 0 or 2	0	0	

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

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Project: ARTHUR BABIN / LIONEL JR ST. CROIX BRIDGE

PIN: Type: Element Specific?

Contact Name: Ph #:

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS		EXPLANATION OR COMMENTS *(optional)*
Energy & Atmosphere (E)	E-1f	Installation of a transit express system (queue jumper, pre-emptive signals, etc)	2		<= Please enter 0 or 2	0	0
	E-1g	Expansion of a Traffic Management Center / Traveler Information System operation; for example increasing system coverage significantly (installation of new CCTV, VMS, freeway detection, ramp metering, road weather information system and/or weigh in motion devices, travel time signs, etc.).	2		<= Please enter 0 or 2	0	0
	E-1h	Implementation of a corridor-wide access management plan.	2		<= Please enter 0 or 2	0	0
	E-1i	Limiting/consolidating access points along highway.	1		<= Please enter 0 or 1	0	0
	E-1j	Improving a coordinated signal system and other signal timing and detection systems.	1		<= Please enter 0 or 1	0	0
	E-1k	Adding bus turnouts.	1		<= Please enter 0 or 1	0	0
	E-1l	Installing higher capacity controllers (model 2070s) with features to improve flow and reduce delay at intersections.	1		<= Please enter 0 or 1	0	0
	E-1m	Infill and/or preparation for Traffic Management/Traveler Information System operation (installation of VMS, CCTV, etc.) with existing system coverage to increase or improve density of devices, installation of conduit in anticipation of future Traffic Management/Traveler Information System need, etc.	1		<= Please enter 0 or 1	0	0
	E-1n	Inclusion of an integrated traffic/incident management/traveler information systems or strategies to manage traffic during construction (queue or speed warning, VMS with real time construction information, tow/HELP vehicles on site/standby, CCTV monitoring of construction zone, etc.).	1		<= Please enter 0 or 1	0	0
	E-1o	Installation of isolated systems to provide for spot warning (queue warning, truck rollover, low bridge, no trucks allowed, etc.).	1		<= Please enter 0 or 1	0	0
	E-1p	Road Diet (reduction of travel lanes to incoporate a single bidirectional center turn lane and wider right-hand lanes to accommodate bicycles).	2		<= Please enter 0 or 2	0	0
	E-2 *Reduce Electrical Consumption*	E-2a	Solar/battery powered street lighting or warning signs.	2		<= Please enter 0 or 2	0	0
		E-2b	Replace overhead sign lighting with higher type retro-reflective sign panels.	2		<= Please enter 0 or 2	0	2
		E-2c	Use of LED street lighting.	2		<= Please enter 0 or 2	0	2
		E-2d	Solar bus stops.	2		<= Please enter 0 or 2	0	0
		E-2e	Use of LED warning signs/flashing beacons	1		<= Please enter 0 or 1	0	1
		E-2e	Retrofit existing street/sign lighting with high efficiency types.	1		<= Please enter 0 or 1	1	0
Energy & Atmosphere (E)	E-3 *Reduce Petroleum Consumption*	E-3a	Provide new Park & Ride lots.	3		<= Please enter 0 or 3	0	0
		E-3b	Provide new intermodal connections.	3		<= Please enter 0 or 3	0	0
		E-3c	Increase bicycle amenities at Park & Rides and transit stations (bike lockers/shelters, Web-based reservations system for lockers, providing showers or partnering with health clubs for these services).	2		<= Please enter 0 or 2	2	0
		E-3e	Operational improvements of an existing Park & Ride lot.	1		<= Please enter 0 or 1	0	0
		E-3f	Improve an existing intermodal connection (e.g. add BRT station, kiosks, etc.).	1		<= Please enter 0 or 1	0	0

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

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Project:

PIN: Type:

Contact Name: Ph #:

Element Specific?

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS	ARTHUR BRIDGE	RAVENEL JR. ST CROIX BRIDGE	EXPLANATION OR COMMENTS *(optional)*
Energy & Atmosphere (E)	E-3g	Reduce mowing areas outside of the clear zone, reestablishing natural ground cover and/or seeding with low maintenance seed species. Example: Incorporation of Conservation Alternative Mowing Practices (CAMPS) techniques/guidance into design plans.	1		<= Please enter 0 or 1	0	0	
	E-3h	Use of warm mix asphalt.	1		<= Please enter 0 or 1	0	0	
	E-3i	Documented analysis proving the project design reduces either the Department's or the local community's carbon footprint (Send analysis to the GreenLITES Program Manager for determination of eligibility).	1		<= Please enter 0 or 1	0	0	
	E-3j	Documented analysis proving the Work Zone Traffic Control scheme chosen is the alternative that overall requires the least amount of petroleum (Send analysis to the GreenLITES Program Manager for determination of eligibility).	1		<= Please enter 0 or 1	0	0	
	E-3k	Improved shading through vegetation at Park & Ride lots to cut down on heat island effect and the use of automotive air conditioning by waiting motorists.	1		<= Please enter 0 or 1	0	0	
E-4 *Improve Bicycle & Pedestrian Facilities*	E-4a	New grade-separated (bridge or underpass) bike/pedestrian crossing structure (this item is not for replacements or rehabs).	3		<= Please enter 0 or 3	3	3	
	E-4b	Separate bike lane at intersection.	2		<= Please enter 0 or 2	2	2	
	E-4c	New separated bike path or shoulder widening to provide for on-road bike lane.	2		<= Please enter 0 or 2	2	2	
	E-4d	Create new or extend existing sidewalks.	2		<= Please enter 0 or 2	2	2	
	E-4e	New pedestrian signals.	2		<= Please enter 0 or 2	2	2	
	E-4f	Align roadway and other highway features/structures within ROW as to enable future development of separated multi-use paths or other bike/ped facilities.	2		<= Please enter 0 or 2	2	2	
	E-4g	Work with local communities to create parallel bike routes where state roads are not suitable for less experienced cyclists.	2		<= Please enter 0 or 2	0	2	
	E-4h	Sidewalk or bikeway rehabilitation, widening, realignment or repair.	1		<= Please enter 0 or 1	1	1	
	E-4i	Upgrading pedestrian signals - inclusion of pedestrian buttons and/or addition of audible signal, countdown timers.	1		<= Please enter 0 or 1	1	1	
	E-4j	Installation of bikeway signs, "Share the Road" signs, and/or *Sharrow* (shared lane) pavement markings.	1		<= Please enter 0 or 1	1	1	
	E-4k	Shoulder restoration for bicycling.	1		<= Please enter 0 or 1	1	1	
	E-4l	Inclusion of five-rail bridge rail system for bicyclists.	1		<= Please enter 0 or 1	1	1	
	E-4m	Installation of permanent bicycle racks.	1		<= Please enter 0 or 1	0	0	
	E-4n	New crosswalks.	1		<= Please enter 0 or 1	1	1	
	E-4o	New curb bulb-outs.	1		<= Please enter 0 or 1	1	1	
	E-4p	New raised medians/pedestrian refuge islands.	1		<= Please enter 0 or 1	0	1	
	E-4q	New speed hump/speed table/raised intersection.	1		<= Please enter 0 or 1	0	0	
	E-4r	New curbing (where none previously existed), to better define the edge of a roadway and to provide vertical separation of pedestrian facilities; does not include flush, mountable or bridge curbing.	1		<= Please enter 0 or 1	0	1	
	E-4s	New or relocated highway barrier or repeating vertical elements (trees, lampposts, bollards, rural mailboxes, etc) between roadway & walk/bikeway to better separate/delineate motorized and non-motorized travel ways.	1		<= Please enter 0 or 1	1	1	

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

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Project: ARTHUR J. RAVENEL JR. BRIDGE

PIN: Type: ST. CROIX BRIDGE

Contact Name: Ph #:

Element Specific?

CATEGORY	ID	DESCRIPTION	POINTS Available	POINTS Scored	INSTRUCTIONS			EXPLANATION OR COMMENTS *(optional)*
Energy & Atmosphere (E)	E-4t	Installation of bicycle detectors (quadrupoles) at signalized intersections.	1		<= Please enter 0 or 1	0	0	
	E-4u	"All Stop" phase programmed into a traffic signal and/or button actuated "No Turn on Red" LED sign.	1		<= Please enter 0 or 1	0	0	
	E-4v	Permanent digital "Your Speed is XX" radar speed reader signs.	1		<= Please enter 0 or 1	0	0	
	E-4w	Overhead flashing beacon, lighted "Crosswalk" sign, half signal, or pedestrian hybrid ('hawk') signal at pedestrian crossing.	1		<= Please enter 0 or 1	0	0	
	E-4x	Advanced warning of crosswalk with signs and yield pavement markings (white triangles).	1		<= Please enter 0 or 1	0	1	
	E-4y	In street plastic pylon "State law - Yield to Pedestrians within Crosswalk" signs and/or pedestrian self service crosswalk flags.	1		<= Please enter 0 or 1	0	0	
	E-4z	Use of durable cast iron detectible warning units embedded in concrete (rather than surface applied polyurethane, stamped concrete, concrete brick, etc.).	1		<= Please enter 0 or 1	0	0	
	E-4aa	Add/replace crosswalks with high visibility, reduced wear, staggered ladder bar crosswalks (a modified Type L which avoids wheel paths, and is sometimes referred to as a 'piano key' type crosswalk).	1		<= Please enter 0 or 1	0	0	
	E-5 *Noise Abatement*							
	E-5a	Construction of a new noise barrier.	2		<= Please enter 0 or 2	2	2	
	E-5b	Incorporate traffic system management techniques to reduce prior noise levels (e.g. use of truck routes, progressive traffic signals, lowering speeds).	2		<= Please enter 0 or 2	0	0	
	E-5c	Provide a buffer zone for adjacent receptors.	2		<= Please enter 0 or 2	0	0	
	E-5d	Provide sound insulation to public schools.	2		<= Please enter 0 or 2	0	0	
	E-5e	Diamond grinding of existing Portland Cement Concrete (PCC) pavement.	1		<= Please enter 0 or 1	0	0	
	E-5f	Rehabilitation of an existing noise wall.	1		<= Please enter 0 or 1	0	0	
	E-5g	Berms designed to reduce noise.	1		<= Please enter 0 or 1	0	0	
	E-5h	Provide planting to improve perceived noise impacts.	1		<= Please enter 0 or 1	0	1	
	E-6 *Stray Light Reduction*							
	E-6a	Retrofit existing light heads with full cut-offs.	2		<= Please enter 0 or 2	0	0	
	E-6c	Use cut-offs on new light heads.	1		<= Please enter 0 or 1	1	0	
vation/Unlisted (I)	Incorporation of *new or improved* ways to provide a more environmentally, economically and/or socially sustainable transportation system (subject to review by **GreenLITES** Review Team). *Up to 4 pts total.*							
	I-1 *Innovation*	I-1a		4		<= Please enter 0,1,2,3 or 4		
	Incorporation of items/methods into the project which might contribute to sustainability *but are not specifically listed above* (subject to review by **GreenLITES** Review Team). *Up to 2 pts each, no total limit.*							
	I-2 *Unlisted*	I-2a		2		<= Please enter 0,1 or 2		

GreenLITES Project Environmental Sustainability Rating System Scorecard v 2.1.0

Please fill in all yellow highlighted cells *and follow all instructions in* red text.

			POINTS		Project:		Element Specific?	
					PIN:	Type:		
						Contact Name:	Ph #:	
CATEGORY	ID	DESCRIPTION	Available	Scored	INSTRUCTIONS		EXPLANATION OR COMMENTS *(optional)*	
Inno								
	Incorporation of items from the NYCDOT Street Design Manual *which are not specifically covered under items listed above* (list Page & Section #'s in the description). *Up to 3 pts total.*							
	I-3 *NYCDOT Street Design Manual*	I-3a	1		<= *Please enter 0 or 1*			
		Total points scored:		0	***Please finish entering data***			

TOTALS

ARTHUR RAVENEL JR. BRIDGE	ST. CROIX BRIDGE
63	62
EVERGREEN	EVERGREEN

A11

AWARD SCALE

0-14	NON-CERTIFIED
15-29	CERTIFIED
30-44	SILVER
45-59	GOLD
60+	EVERGREEN

APPENDIX B
REFERENCES

Federal Highways Administration, U.S. Department of Transportation (2011), *Sustainable Highways Self-Evaluation Tool – Pilot Project Version*, www.sustainablehighways.org, accessed June 24, 2011

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Skanska (2008), *Aspects of Sustainability – Case Study 12 – Cooper River Bridge*, skanska-sustainability-case-studies.com/index.php/Cooper-River-Bridge-U.S.A.html, accessed June 24, 2011

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