# PILOT PROJECT SUMMARY REPORT

VERSION 1.0.1

## T.H. 95 MILL & OVERLAY

MINNESOTA DEPARTMENT OF TRANSPORATION (MN/DOT)


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**Date**

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UNIVERSITY of WASHINGTON®

# CONTENTS

Introduction ..... 1
Summary of Results ..... 2
Conclusions & Recommendations ..... 4
Project Description ..... 5
Credit Discussion by Category ..... 6
- Project Requirements (PR) ..... 6
- Environment & Water (EW) ..... 7
- Access & Equity (AE) ..... 8
- Construction Activities (CA) ..... 9
- Materials & Resources (MR) ..... 9
- Pavement Technologies (PT) ..... 10
- Potential Custom Credits ..... 11

Limitations ..... 12
References ..... 13

## FIGURES

Figure 1: Project Location .....5

## TABLES

Table 1: Summary of Raw Scores.....2

Table 2: Project Information.....5

## APPENDICES

Appendix A: About Greenroads

Appendix B: Greenroads Scorecard

# INTRODUCTION

This report summarizes the results of the Greenroads Pilot Project study completed for the Trunk Highway 95 (T.H. 95) Mill & Overlay project on behalf of the Minnesota Department of Transportation (Mn/DOT).

This report presents a description of the scope of the Pilot Project review, a summary of the project, a completed scorecard, a credit-by-credit discussion of the results, and a list of referenced documents. Recommendations are also included for applying the Greenroads sustainability performance metric to future Mn/DOT projects.

A detailed description of the Greenroads Rating System can be found in Appendix A, including a short list of Greenroads Project Requirements (PR) and Voluntary Credits (VC) for reference. A Greenroads Scorecard for the project is included in the Summary of Results section.

## SUMMARY OF RESULTS

The T.H. 95 Mill & Overlay project achieved 2 of 11 Project Requirements (PR) and 15 Voluntary Credit (VC) points. As scored, it did not reach any certification level, but with the addition of low or no-cost items it has the potential to meet all 11 PRs and score 38 VC points, which corresponds to a "Certified" rating. Based on our experience, a "certified" rating for a mill-and-fill project represents a significant sustainability accomplishment and is on the high end of what could be expected from jobs scoped similarly.

In order to achieve a level of certification in Greenroads, all of 11 Project Requirements (PR) must be completed and documented. Projects reviewed as Greenroads case studies and Pilot Projects have rarely completed all 11 PRs. Based on available documentation, this project does not appear to have met all 11 PRs. However, given the general nature of overlay jobs in Minnesota, it is probable that the T.H.95 Mill & Overlay project may have achieved more than the 2 listed PRs, however the reviewer was not able to verify these additional PRs because the associated documentation was not accessible. Occasionally, some PRs may also be documented retroactively if the practice was completed during the project even though it may not have been formally tracked by the owner, designer or contractor.

Generally, this project did not receive many points associated with Voluntary Credits (VC) either because the item was not attempted or documentation was not available. Similar to the PRs, some VCs may also be documented retroactively if the practice was completed during the project.

Table 1 summarizes the results of this Greenroads Pilot Project study. Note that PRs do not carry a point value, and they do not add to the total possible score (118 VC points). For reference, minimum scores for Greenroads achievement levels, including satisfying all 11 PRs, are as follows:

- **Certified:** 32 points
- **Silver:** 43 points
- **Gold:** 54 points
- **Evergreen:** 64 points

In summary, the T.H. 95 project would score as fairly average when compared to other Pilot Projects and case studies reviewed by Greenroads and the University of Washington if documentation for many of the credits in question were available. For comparison, projects we review typically achieve three to five Project Requirements and score in the 15-25 point range for Voluntary Credits.

**Table 1: Summary of Raw Scores**

| Project Name | PR | EW | AE | CA | MR | PT | CC | Raw Score | Eligible? | Award Potential |
|---|---|---|---|---|---|---|---|---|---|---|
| Achieved Score | 2 | 0 | 6 | 0 | 6 | 3 | 0 | **15** | No | **None** |
| Potential Score | 11 | 6 | 10 | 7 | 11 | 4 | 0 | **38** | Yes | **Certified** |
| Maximum Possible Score | 11 | 18 | 25 | 14 | 18 | 15 | 0 | **90** | Yes | **Evergreen** |
| **Total Possible** | **11** | **21** | **30** | **14** | **23** | **20** | **10** | **118** | | |

**Achieved Score:** This score reflects the amount of points that can be awarded based on the credits that were actually pursued on the project and for which proper documentation was provided.

**Potential Score:** Some of the points not achieved could be achieved with relatively low additional effort, in the best judgment of the reviewer. *This does not mean that the project team should have achieved those points*. Rather it means that these points might be considered attainable on future projects or might still be attainable on the project reviewed here. These points can typically be earned with additional person-hours dedicated to completing paperwork, forms or calculations. They would likely incur additional costs associated with person-hours expended, but they would likely not raise the project's construction bid price.

**Maximum Possible Score:** This score reflects the maximum number of points the project could have earned if they were willing to incur greater initial cost and/or life-cycle cost. This includes all credits except those that are not reasonable to include given project scope and intent. Achieving the maximum possible score would likely incur added expense both in person-hours and bid price for initial cost, but many items may still result in a lower life-cycle cost.

## CONCLUSIONS & RECOMMENDATIONS

1. The T.H. 95 Mill & Overlay project may have completed more than the one achieved Project Requirement that was awarded, but additional documentation would be needed to prove that. Minimal effort would be required to achieve all of the Project Requirements and be eligible for an award.
2. Generally, many of the Voluntary Credits (VC) could have been achieved but documentation is lacking for many of them. This makes it difficult to say how the project, as constructed, would score. It does appear however that a Mn/DOT project such as this could receive some sort of certification without a great increase in project cost or having to completely redesign.
3. Mill and Overlay projects do not usually score really high compared to other Greenroads projects. Many of the items, such as lighting, pedestrian and bicycle facilities, etc. often are not in the scope of these projects and often are for new or full reconstruction projects. These projects do usually score well in the Materials & Resources category however because of materials recycling and reuse.
4. Mn/DOT likely has many projects that would rate higher than T.H. 95. Urban projects would likely pursue a much different set of credits such as AE-7, EW-8 & MR-6
5. It appears that some minor changes would need to be made to documentation for Mn/DOT projects to score well in Greenroads.
6. The scoring indicates that this basic mill and overlay project could achieve a Certified rating without additional contract cost. This would however incur additional cost from person-hours of the project team or design consultant preparing the documentation.

Based on this Pilot Project study, the following recommendations are made for Mn/DOT:

- This project would not be a good candidate to try to pursue certification. Where documentation does not currently exist, it would not be difficult to create retroactively if done soon. Projects that are in the design phase could be tailored to include specific credit material from Greenroads and require documentation as mentioned in the Greenroads Manual. Any projects which could easily include sustainable storm water treatment or alternative transportation modes could make good candidates.
- If Mn/DOT would like to achieve certification at or above the Silver level, additional effort towards several sustainable practices would be required. To reach these levels, Mn/DOT would likely incur some additional contract costs. However, these credits that incur additional contract costs often can reduce lifecycle costs.
- Where documentation does not currently exist (such as for the Project Requirements), it would not be difficult to create retroactively if done soon.
- Many potential points, and therefore Greenroads achievement levels, are dependent on contract specifications or current owner policy. Any changes to these are ultimately made at owner-agency discretion. This is especially true for construction tracking documents. In general, it is expected that small changes in requirements to contract documents in order to incorporate select Greenroads standards would not add significantly to the contract price. Other agencies have created separate Greenroads Project Manuals or Specifications that would be included with the contract documents in the bid process for projects pursuing Greenroads certification. Mn/DOT could decide which credits should be pursued and create a similar document.
- More Pilot Projects or case studies of varying project types are needed to better reflect current Mn/DOT sustainability practices.

# PROJECT DESCRIPTION

The following section provides a description of the project. Table 2 below summarizes key project information.

**Table 2: Project Information**

| SDOT Project | Status | Designer | Prime Contractor | Pavement | Construction Cost |
|---|---|---|---|---|---|
| T.H. 95 Mill & Overlay | Complete | URS | Hardrives Inc. | HMA | $4.84 mil |

The T.H. 95 Mill & Overlay Project is located Northeast of Minneapolis, Minnesota. The route runs parallel to the St. Croix River and the Minnesota-Wisconsin border and provides access to the William O'Brien State Park and St. Croix National Scenic Riverway. The project begins 0.16 miles north of T.H. 97 in Scandia, MN and ends 0.7 miles South of Nelson Street East in Stillwater, MN.

The primary purpose of this project was resurfacing. A hot mix asphalt (HMA) mill-and-fill overlay was performed for a majority of the pavement. Improved storm sewer systems were installed and in Stillwater improvements were made to the pedestrian facilities.

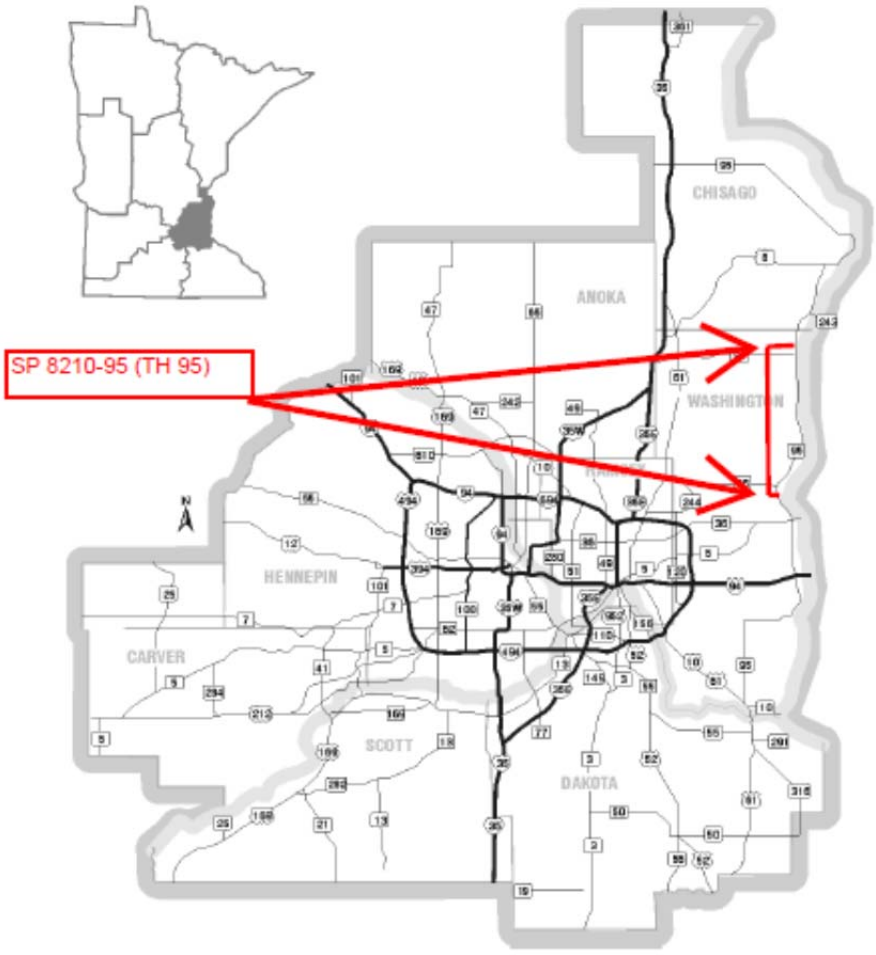


**Figure 1: Project Location**

# CREDIT DISCUSSION BY CATEGORY

This section contains a detailed review of credits that would be awarded and not awarded to the T.H. 95 Mill & Overlay project for Greenroads certification. Credit intent will not be discussed; the reader is referred to the *Greenroads Manual* for these details.

## PROJECT REQUIREMENTS (PR)

A number of these requirements can nearly be achieved by Mn/DOT projects due to current city codes and documentation, but most would require additional documentation.

### PR-1 Environmental Review Process

The Categorical Exclusion Determination document was provided that shows that an environmental review process had been completed for the project. Unfortunately it does not cover all the requirements described in the credit. Particularly it does not describe the public involvement opportunity in the environmental review process and description of the environmental decisions that were made. It would require very little effort to achieve this project requirement.

### PR-2 Lifecycle Cost Analysis (LCCA)

No documentation was provided for this credit

### PR-3 Lifecycle Inventory (LCI)

Not Attempted

### PR-4 Quality Control Plan

The state has a materials control schedule which details what testing and inspections are required for materials. This describes both the required contractor quality control testing and the agency acceptance testing. This is only part of what is required to meet the requirements of this credit. The QCP would have to also include when corrective action is required and what procedures will be implemented for corrective action. The materials control schedule is available here: http://www.dot.state.mn.us/materials/labmcs.html.

### PR-5 Noise Mitigation Plan

No documentation was provided for this credit

### PR-6 Waste Management Plan

No documentation was provided for this credit

### PR-7 Pollution Prevention Plan

The site plans included a Stormwater Pollution Prevention Plan Narrative sheet that described many of the items that are listed on the actual SWPPP. A copy of the actual plan would need to be submitted for credit.

### PR-8 Low-Impact Development (LID)

No documentation was provided for this credit

### PR-9 Pavement Management System

The Minnesota Department of Transportation tracks its roads with a Pavement Management System. Mn/DOT drives every road each year for conditions evaluation, which is better than the Greenroads requirement of measuring pavement condition at least every two years. This system also includes several measures to determine the remaining life of each road. It was not clear if preservation efforts were recorded somewhere in the pavement management system. Documentation available at: http://www.dot.state.mn.us/materials/pvmtmgmt.html.

### PR-10 Site Maintenance Plan

Information was provided in the Special Provisions but a stand-alone site maintenance plan was not provided.

### PR-11 Educational Outreach

No documentation was provided for this credit. A project website was available at the time of the project but it is no longer active. It would be very easy for the project to make presentations or install a sign if it was actively seeking Greenroads certification.

## ENVIRONMENT & WATER (EW)

In general, limited documentation was available to justify award of credits in this category for this project. Basic drainage information is not readily available on project websites. Additionally, many of these practices are beyond current environmental standards. Other practices, such as improvements for habitat or connectivity, are typically difficult for urban projects to achieve. Note that this difficulty, however, does not mean that such credits cannot be achieved.

### EW-1 Environmental Management System

No documentation was provided for this credit and it is unlikely that the contractor has ISO certification.

### EW-2 Runoff Flow Control

A document for Categorical Exclusion Determination was submitted. This documentation does not compute the 90th percentile average annual rainfall event runoff volumes and does not compute the percentage of predevelopment flow rate and total runoff volume achieved. A project drainage design report would need to be submitted, with all the listed requirements, in order to achieve this credit. The installed storm sewer improvements may have been sufficient to receive the full three credits, but this is not known given the documentation provided.

### EW-3 Runoff Quality

The Categorical Exclusion Determination document does not demonstrate that project BMPs meet the requirements of this credit. A project drainage design report would need to be submitted, listing BMPs installed, the design TSS removal efficiencies, and state the achieved percentage of water treatment. The installed storm sewer improvements may be sufficient to receive full credit but this is unknown given the documentation provided.

### EW-4 Stormwater Cost Analysis

No documentation was available for this credit. This credit typically can be completed for no additional cost to the contract price; however, minimal additional time during project design would be needed.

### EW-5 Site Vegetation

The project plans describe the requirements for plant installation but did not include information regarding non-invasive species, native plant species, or no water use.

### EW-6 Habitat Restoration

No documentation was available for this credit. This credit was likely out of scope as defined by the project, but could still be achieved and may be very practical for some projects, especially those in designated Environmentally Critical Areas or projects with a significant budget. This credit typically adds additional cost to the project in both design scope and construction price.

### EW-7 Ecological Connectivity

No documentation was available for this credit. This credit was likely out of scope as defined by the project, but could still be achieved and may be practical in some cases where ecological improvements could be completed

in tandem with road work. This credit typically adds additional cost to the project in both design scope and construction price.

### EW-8 Light Pollution

No documentation was available for this credit. This credit was outside of the scope of this project, as lighting was not included.

## ACCESS & EQUITY (AE)

Projects in urban environments typically score very well in this category. This project included a portion of highway through the town of Stillwater, which helps for some of the items to potentially be achieved.

### AE-1 Safety Audit

No documentation was available for this credit. It is possible that this credit has been completed for this project but that documentation was not provided. This credit typically adds a premium to the respective phase price if completed during design, construction or post-construction.

### AE-2 Intelligent Transportation Systems

No documentation was provided for this credit. It would be quite easy for a project such as this to achieve a few of the ITS categories, such as Traveler Information or Warning Systems. If ITS items were installed, a list of them would need to be submitted along with a photograph of the installed items.

### AE-3 Context Sensitive Solutions

Mn/DOT provided a website that indicated that CSS is considered on some of their projects. It was not clear if an actual CSS analysis is normally completed on projects and if they are, which of the 10 points in AE-3 would be met. For the purposes of this credit points are being given on the intent of performing CSS, but for actual certification a proper CSS document would need to be provided.
http://www.dot.state.mn.us/strategicplan/status/css.html.
http://contextsensitivesolutions.org/content/gen/state-profiles/MN

### AE-4 Traffic Emissions Reduction

No documentation was provided for this credit.

### AE-5 Pedestrian Access

This project would earn one point for the improvements made to the pedestrian facilities in the City of Stillwater. These improvements are primarily the installation of crosswalk ramps with truncated dome panels and new striping. To earn this credit for official certification, the project would have to earn the AE-3 Context Sensitive Solutions credit with submission of a CSS white paper.

### AE-6 Bicycle Access

This project did not attempt to improve bicycle access. Small portions of a bike path were repaved but this was done because small parts were removed to install the new storm sewer items. Any additions to the existing bike path would achieve two points along with CSS documentation and somehow improving or resurfacing the existing bike lane could earn one point.

### AE-7 Transit and HOV Access

This credit is not applicable to this project because there is not public transit in the area and installation of HOV facilities is not practical for this corridor.

### AE-8 Scenic Views

This credit was not pursued. This credit was possible as the road follows the St. Croix National Scenic Riverway and would likely provide good opportunity for scenic pullouts.

### AE-9 Cultural Outreach

No documentation was provided for this credit. It is likely this project is within 10 miles of a registered historic place and could earn one point with the installation of informational infrastructure. The project could also dedicate at least 1% of the project budget to art, but this would likely increase the contract price.

## CONSTRUCTION ACTIVITIES (CA)

Documentation has not been provided for any of the credits in this category. It is possible that one or two of these items were completed but credit cannot be awarded without documentation.

### CA-1 Quality Management System

No documentation was available for this credit that could show ISO certification, a contractor QMS document or of a Malcolm Baldridge National Quality Award. It is likely that Mn/DOT already requires contractors to submit a QMS for their projects.

### CA-2 Environmental Training

No documentation was available for this credit.

### CA-3 Site Recycling Plan

No documentation was available for this credit. A site recycling plan would most likely be included with a Waste Management Plan for a project, if one exists.

### CA-4 Fossil Fuel Reduction

No documentation was available for this credit.

### CA-5 Equipment Emission Reduction

No documentation was available for this credit. This credit is not typically achievable with contractors' existing equipment fleets. It would take significant changes to earn this credit.

### CA-6 Paving Emission Reduction

No documentation was available for this credit. It is possible that the pavers used for this project met the requirements of this credit. This is typically a no- or low-cost addition to the project contract price.

### CA-7 Water Use Tracking

No documentation was available for this credit. This credit is typically a no or low cost addition to a project. It is possible that water was acquired on the project primarily from hydrants where a water meter is often used to measure usage. To earn credit, the prime contractor must formally track water use throughout construction.

### CA-8 Contractor Warranty

No documentation was available for this credit. This credit typically adds a premium to the construction price.

## MATERIALS & RESOURCES (MR)

The Materials & Resources category is the highest scoring category for this project given the provided documentation. Pavement overlay projects typically do well in this category because of recycling and reuse of materials.

### MR-1 Lifecycle Assessment (LCA)

This credit was not attempted. This credit does not add to the contract price, but would increase design costs since usually this must be done by an LCA consultant.

### MR-2 Pavement Reuse

This project earns four points for pavement reuse based on most of the existing structure remaining in place. This mill and fill project proposes a 1.5 inch surface mill for 87% of the pavement and a 2 inch mill for the rest.

A description of the original road designs and any rehabilitation over time were provided as well as some cores of the road. This information shows an average pavement structure of about 11.5 inches. According to this information approximately 86% of the pavement structure will be reused, which would earn the project four points. There were a few other areas with complete removal of the roadway for installation of storm sewer items, but this would most likely not greatly affect the calculation. Note that actual calculations would be required showing total area reused if a project were applying for Greenroads certification.

### MR-3 Earthwork Balance

No documentation was available for this credit. It is likely that this credit was achieved because it is an overlay project but proper documentation would need to be provided.

### MR-4 Recycled Materials

A mix design document was provided that shows the mix design to be 30% RAP, which would be good enough to earn the project three points. To achieve the additional two points, a special mix design would likely be required and be a high cost item.

### MR-5 Regional Materials

No documentation was available for this project. It is possible that the project could have earned some points for this, especially if the paving materials came from a local supplier. It would not be surprising if this project earned one or two points

### MR-6 Energy Efficiency

Lighting was outside of the scope of this project.

## PAVEMENT TECHNOLOGIES (PT)

T.H. 95 Mill & Overlay did not earn any of the credits in the Pavement Technologies category. Specific information was not available to award or deny many of the credits. Also, one credit is not practical for this project due to the context.

### PT-1 Long Life Pavement

No documentation was available for this project. The pavement design could however already meet the requirements of this credit. Calculations of total percentage of trafficked lane pavement surface area that meet the long life requirements would need to be provided. This would require certain thicknesses for the expected lifetime ESALs of the pavement.

### PT-2 Permeable Pavement

Permeable pavement was not used on this project.

### PT-3 Warm Mix Asphalt

The use of WMA was approved for this project as a pilot project for Mn/DOT. This was proposed by the contractor as a means of improving the compaction ability for a cool late season paving job. It was estimated that this would cost an extra $33,000.

### PT-4 Cool Pavement

No documentation was available for this project. Since a HMA overlay was used for the road it seems unlikely that this credit could be obtained without a change of design or some sort of color treatment.

### PT-5 Quiet Pavement

Quiet pavement does not appear to be used on this project. It would likely required a mix design change to achieve.

### PT-6 Pavement Performance Tracking

No documentation was provided for this credit. Mn/DOT has a system for tracking the performance of their pavements, but it would also need to incorporate the construction quality measurements and correlate the data to meet this credit's requirements. It is possible that the Mn/DOT system already does this, but documentation provided did not indicate this to be so.

## POTENTIAL CUSTOM CREDITS

The T.H. 95 Mill & Overlay project has not proposed any new ideas that could potentially become custom credits. No information was provided indicating that any design or construction elements besides what is already included in Greenroads help to promote sustainable highways.

## LIMITATIONS

1. Results from this Pilot Project study have not been released to anyone outside the Greenroads development team at UW because they were originally intended for educational and informational purposes. Upon review, Mn/DOT may decide how it wishes to publicize this project, if at all.
2. Different Greenroads reviewers may interpret available information in a slightly different manner. Best efforts have been made to be transparent about logic behind decisions to award and deny credits in this review. However, not all subjectivity may have been removed.
3. Pilot Project study results are based only on project documents provided to the reviewers and those that are publicly available on project websites. This report provides only a small glimpse of current efforts on a specific project, and therefore study results may not accurately reflect the actual level of effort made toward sustainability within Mn/DOT.
4. If missing documentation becomes available, this report may be revised to accommodate new information and make corrections as needed.
5. Regulatory requirements tend to dictate many of the actions of most roadway project teams and transportation agencies. However, the intent of Greenroads is to encourage best practices that go above and beyond existing United States regulations and requirements. This means that basic compliance will not earn credit in Greenroads unless local jurisdictional regulations are more stringent than federal requirements. A list of current federal regulatory requirements is provided in the Introduction to the Greenroads Manual (Muench & Anderson, 2010).
6. Greenroads is continually under development. This study was completed under Greenroads version 1.0.1, and this project may not score equivalently under future versions of Greenroads.

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# APPENDIX A

## About the Greenroads Rating System

# ABOUT GREENROADS

This section details the Greenroads Sustainability Performance Metric, including a brief background on development of the system, the operating definition of sustainability used, and a brief description of how it works and can be implemented. More detailed information, including the Version 1.0.1 manual of requirements and credits can be found on the official Greenroads website: http://www.greenroads.us.

The list of credits including a brief description is included at the end of this appendix in Table A.1.

## BACKGROUND

Greenroads is a research project (Söderlund, 2007) that is jointly developed by the University of Washington (UW) and CH2M HILL. Greenroads is a collection of sustainability best practices that apply to roadway design and construction, much like the Leadership in Energy and Environmental Design (LEED) Rating System for Buildings that is administered by the United States Green Building Council (USGBC). In general, these sustainability best practices are divided into two types: required and voluntary. There is currently one required category with 11 required best practices called "Project Requirements" or PRs. At minimum, all of these best practices must be completed in order for a roadway to be considered a Greenroad.

### What is a Greenroad?

*A Greenroad is defined as roadway project that has been designed and constructed to a level of sustainability that is substantially higher than current common practice.*

### What is Sustainability?

Sustainability is the characteristic of a system that represents its capacity to support natural laws and human values. (Anderson, 2008; Muench et. al, 2010)

Projects that register using the Greenroads website are eligible to earn a certification award and will be able to display the Greenroads logo on their project to recognize their achievement.

## STRUCTURE OF THE METRIC

In general, the Greenroads sustainability best practices are divided into two types: required and voluntary. There is currently one required category with 11 required best practices called "Project Requirements" or PRs. At minimum, all of these best practices must be completed in order for a roadway to be considered a Greenroad. Thirty-seven (37) other voluntary best practices are characterized in five additional categories, called "voluntary credits" or VCs. After the PR requirements have been met, a number of different VCs may be achieved and points may be earned toward one of four ratings: *Certified, Silver, Gold* and *Evergreen*. Additionally, a sixth VC category is available to projects that demonstrate and implement innovative ideas or more sustainable practices and would like to write or submit their own customized or new ideas for points.

Following is a brief description of the seven categories in Greenroads. The relative weights of the five main VC categories are shown in Figure A.1.

### Project Requirements

This category contains all 11 Project Requirements (PR) that a Greenroads project must meet in order to be considered for a certification level award. The general intent of this category is to encourage environmentally responsible decision-making processes and to have management plans in place for construction, and to establish a minimum baseline for every project that applies for certification.

### Environment & Water (EW)

This category contains eight (8) voluntary credits worth up to 21 points. The intent of this category is to promote best practices related to stormwater management and ecological resources within the project boundary.

### Access & Equity (AE)

This category contains nine (9) voluntary credits worth up to 30 points. The intent of this category is to promote safety, access, and mobility to users of the roadway.

### Construction Activities (CA)

This category contains eight (8) voluntary credits worth up to 14 points. The intent of this category is to promote responsible construction management, reduce use of fossil fuels and improve health and safety of construction workers.

### Materials & Resources (MR)

This category contains six (6) voluntary credits worth up to 23 points. The intent of this category is to promote responsible materials and energy management by combinations of recycling, reusing and reducing both virgin and waste materials.

### Pavement Technologies (PT)

This category contains six (6) voluntary credits worth up to 20 points. The intent of this category is to highlight specific pavement engineering innovations and ideas or broad types of technologies or techniques which are well-established in practice and have direct sustainability benefits.

### Custom Credits (CC)

This category contains up to 10 credits which may be earned by a project that implements sustainable or innovative ideas. The project team may submit applications with a detailed description and explanation of the practice to earn credits in this category ranging in value from 1 to 5 points. Points awarded for the custom credit are determined through review and collaboration with Greenroads representatives. There is currently no limit established for how many custom credits a project may submit for review.

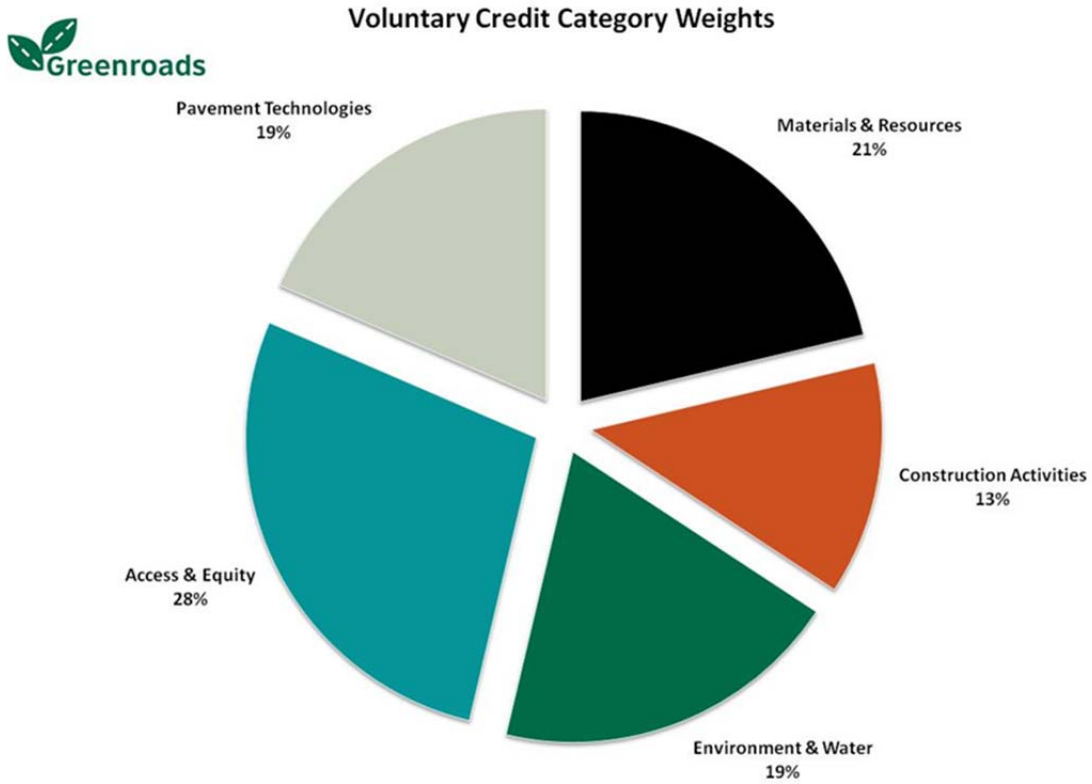


**Figure A.1. Relative Weights of Greenroads VC Categories (Muench et al. 2010)**

### Table A.1 Greenroads v1.0.1 List of Credits

| 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 | ISO 14001 certification for general contractor |
| EW-2 | Runff Flow Control | 1-3 | Reduce runoff quantity |
| EW-3 | Runoff Quality | 1-3 | Treat stormwater to a higher level of quality |
| EW-4 | Stormwater Cost Analysis | 1 | Conduct an LCCA for stormwater elements |
| EW-5 | Site Vegetation | 1-3 | Use native low/no water vegetation |
| EW-6 | Habitat Restoration | 3 | Restore habitat beyond what is required |
| EW-7 | Ecological Connectivity | 1 or 3 | Connect habitat across roadways |
| EW-8 | Light Pollution | 3 | Discourage light pollution |
| **Access & Equity (AE) – Up to 30 Points** | | | |
| AE-1 | Safety Audit | 1-2 | Perform roadway safety audit |
| AE-2 | Intelligent Transportation Systems (ITS) | 2-5 | Implement ITS solutions |
| AE-3 | Context Sensitive Solutions | 5 | Plan for context sensitive solutions |
| AE-4 | Traffic Emissions Reduction | 5 | Reduce emissions with quantifiable methods |
| AE-5 | Pedestrian Access | 2 | Provide/improve pedestrian accessibility |
| AE-6 | Bicycle Access | 2 | Provide/improve bicycle accessibility |
| AE-7 | Transit Access | 1-5 | Provide/improve transit accessibility |
| AE-8 | Scenic Views | 2 | Provide views of scenery or vistas |
| AE-9 | Cultural Outreach | 1-2 | Promote art/culture/community values |
| **Construction Activities (CA) – Up to 14 Points** | | | |
| CA-1 | Quality Management System | 2 | ISO 9001 certification for general contractor |
| CA-2 | Environmental Training | 1 | Provide environmental training |
| CA-3 | Site Recycling Plan | 1 | Have a plan to divert waste from landfill |
| CA-4 | Fossil Fuel Reduction | 1-2 | Use alternative fuels in construction equipment |
| CA-5 | Equipment Emissions Reduction | 1-2 | Meet EPA Tier 4 standards for non-road equip. |
| CA-6 | Paving Emissions Reduction | 1 | Use pavers that meet NIOSH requirements |
| CA-7 | Water Tracking | 2 | Develop data on water use in construction |
| CA-8 | Contractor Warranty | 3 | Warranty on the constructed pavement |
| **Materials & Resources (MR) – Up to 23 Points** | | | |
| MR-1 | Life Cycle Assessment (LCA) | 2 | Conduct a detailed LCA of the entire project |
| MR-2 | Pavement Reuse | 4-5 | Reuse existing pavement sections |
| MR-3 | Earthwork Balance | 1 | Use native soil rather than import fill |
| MR-4 | Recycled Materials | 5 | Use recycled materials for new pavement |
| MR-5 | Regional Materials | 5 | Use regional materials to reduce transportation |
| MR-6 | Energy Efficiency | 5 | Improve energy efficiency of operational systems |
| **Pavement Technologies (PT) – Up to 20 Points** | | | |
| PT-1 | Long-Life Pavement | 5 | Design pavements for long-life |
| PT-2 | Permeable Pavement | 3 | Use permeable pavement as a LID technique |
| PT-3 | Warm Mix Asphalt (WMA) | 3 | Use WMA in place of HMA |
| PT-4 | Cool Pavement | 5 | Contribute less to urban heat island effect (UHI) |
| PT-5 | Quiet Pavement | 3 | Use a quiet pavement to reduce noise |
| PT-6 | Pavement Performance Tracking | 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:** | **118** | |

# APPENDIX B

## Greenroads Scorecard

**Point Totals**
**A** = Achieved by this project
**P** = Potential achievable with low additional effort
**M** = Maximum achievable regardless of cost

**Certification Levels**
**C** = Certified (All PRs and ≥ 32 Points)
**S** = Silver (All PRs and ≥ 43 Points)
**G** = Gold (All PRs and ≥ 54 Points)
**E** = Evergreen (All PRs and ≥ 64 Points)

## Credit Scorecard

# T.H. 95 Mill & Overlay

| Project Requirements (PR) | | Possible | A | P | M |
|---|---|---|---|---|---|
| PR-1 | Environmental Review Process | Req | X | X | X |
| PR-2 | Lifecycle Cost Analysis | Req | | X | X |
| PR-3 | Lifecycle Inventory | Req | | X | X |
| PR-4 | Quality Control Plan | Req | | X | X |
| PR-5 | Noise Mitigation Plan | Req | | X | X |
| PR-6 | Waste Management Plan | Req | | X | X |
| PR-7 | Pollution Prevention Plan | Req | | X | X |
| PR-8 | Low-Impact Development | Req | | X | X |
| PR-9 | Pavement Management System | Req | X | X | X |
| PR-10 | Site Maintenance Plan | Req | | X | X |
| PR-11 | Educational Outreach | Req | | X | X |
| | **Total** | **11** | **2** | **11** | **11** |

| Environment & Water (EW) | | Possible | A | P | M |
|---|---|---|---|---|---|
| EW-1 | Environmental Management System | 2 | 0 | 2 | 2 |
| EW-2 | Runoff Flow Control | 1 - 3 | 0 | 0 | 3 |
| EW-3 | Runoff Quality | 1 - 3 | 0 | 0 | 3 |
| EW-4 | Stormwater Cost Analysis | 1 | 0 | 1 | 1 |
| EW-5 | Site Vegetation | 1 - 3 | 0 | 3 | 3 |
| EW-6 | Habitat Restoration | 3 | 0 | 0 | 3 |
| EW-7 | Ecological Connectivity | 1 - 3 | 0 | 0 | 3 |
| EW-8 | Light Pollution | 3 | 0 | 0 | 0 |
| | **Total** | **21** | **0** | **6** | **18** |

| Access & Equity (AE) | | Possible | A | P | M |
|---|---|---|---|---|---|
| AE-1 | Safety Audit | 1 - 2 | 0 | 2 | 2 |
| AE-2 | Intelligent Transportation Systems | 2 - 5 | 0 | 2 | 5 |
| AE-3 | Context Sensitive Solutions | 5 | 5 | 5 | 5 |
| AE-4 | Traffic Emissions Reduction | 5 | 0 | 0 | 5 |
| AE-5 | Pedestrian Access | 1 - 2 | 1 | 1 | 2 |
| AE-6 | Bicycle Access | 1 - 2 | 0 | 0 | 2 |
| AE-7 | Transit & HOV Access | 1 - 5 | 0 | 0 | 0 |
| AE-8 | Scenic Views | 2 | 0 | 0 | 2 |
| AE-9 | Cultural Outreach | 1 - 2 | 0 | 0 | 2 |
| | **Total** | **30** | **6** | **10** | **25** |

| Construction Activities (CA) | | Possible | A | P | M |
|---|---|---|---|---|---|
| CA-1 | Quality Management System | 2 | 0 | 2 | 2 |
| CA-2 | Environmental Training | 1 | 0 | 1 | 1 |
| CA-3 | Site Recycling Plan | 1 | 0 | 1 | 1 |
| CA-4 | Fossil Fuel Reduction | 1 - 2 | 0 | 0 | 2 |
| CA-5 | Equipment Emission Reduction | 1 - 2 | 0 | 0 | 2 |
| CA-6 | Paving Emission Reduction | 1 | 0 | 1 | 1 |
| CA-7 | Water Use Tracking | 2 | 0 | 2 | 2 |
| CA-8 | Contractor Warranty | 3 | 0 | 0 | 3 |
| | **Total** | **14** | **0** | **7** | **14** |

| Materials & Resources (MR) | | Possible | A | P | M |
|---|---|---|---|---|---|
| MR-1 | Lifecycle Assessment | 2 | 0 | 2 | 2 |
| MR-2 | Pavement Reuse | 4- 5 | 4 | 4 | 5 |
| MR-3 | Earthwork Balance | 1 | 0 | 1 | 1 |
| MR-4 | Recycled Materials | 1 - 5 | 2 | 2 | 5 |
| MR-5 | Regional Materials | 1 - 5 | 0 | 2 | 5 |
| MR-6 | Energy Efficiency | 5 | 0 | 0 | 0 |
| | **Total** | **23** | **6** | **11** | **18** |

| Pavement Technologies (PT) | | Possible | A | P | M |
|---|---|---|---|---|---|
| PT-1 | Long-Life Pavement | 5 | 0 | 0 | 5 |
| PT-2 | Permeable Pavement | 3 | 0 | 0 | 3 |
| PT-3 | Warm Mix Asphalt | 3 | 3 | 3 | 3 |
| PT-4 | Cool Pavement | 5 | 0 | 0 | 0 |
| PT-5 | Quiet Pavement | 2 - 3 | 0 | 0 | 3 |
| PT-6 | Pavement Performance Tracking | 1 | 0 | 1 | 1 |
| | **Total** | **20** | **3** | **4** | **15** |

| Custom Credit (CC) | | Possible | A | P | M |
|---|---|---|---|---|---|
| CC-1 | | 5 | 0 | 0 | 0 |
| CC-2 | | 5 | 0 | 0 | 0 |
| | **Total** | **10** | **0** | **0** | **0** |

| | | A | P | M |
|---|---|---|---|---|
| All 11 PR Met? | | No | No | No |
| Greenroads Total | 108 | 15 | 38 | 90 |
| Certification Level | | - | C | E |