I-LAST™

Illinois - Livable and Sustainable Transportation Rating System and Guide











Illinois Department of Transportation
Division of Highways

In conjunction with the
Illinois Joint Sustainability Group

I-LAST™
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Rating System and Guide

Table of Contents

Acknowledgements

I-LAST was developed in a cooperative effort between the Illinois Department of Transportation and the engineering and construction community. The effort was initiated by ACEC – IL and was joined by other organizations in the industry, which provided reviews and suggestions.

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Introduction

In the years since the National Environmental Policy Act was signed into law in 1970, the range of concerns about the relationship between the highway and its associated effects on the surrounding environment has expanded. The approach of sustainability and I-LAST is to incorporate a broader range of issues into the development and completion of state highway projects.

This document is titled *Illinois Livable and Sustainable Transportation (I-LAST) Rating System and Guide* and is a sustainability performance metric system developed by the Joint Sustainability Group of the Illinois Department of Transportation (IDOT), the American Council of Engineering Companies (ACEC) and the Illinois Road and Transportation Builders Association (IRTBA). The intent is that this rating system and guide will be revised as the state of the art evolves – utilizing the input of industry users.

The I-LAST Construction Practices Section was drafted by a task force comprised of various contractor and supplier members from the IRTBA Green Council. The mission of the Green Council is to establish IRTBA as a leader in promoting sustainable, sensible, and innovative environmental objectives and practices.

Purpose

The purpose of this guide is fourfold:

- Provide a comprehensive list of practices that have the potential to bring sustainable results to highway projects.
- Establish a simple and efficient method of evaluating transportation projects with respect to livability, sustainability, and effect on the natural environment.
- Record and recognize the use of sustainable practices in the transportation industry.
- Encourage the use of innovative and experimental sustainable concepts.

The use I-LAST is purely voluntary on the part of the jurisdictional agency for which a project is being developed and completed. Joint issuance of the guide on the part of the Illinois Department of Transportation shall not be construed as a requirement of its use on any state highway project.

What is Sustainability?

The most widely accepted definition of sustainability comes from the United Nations, Bruntland Commission in 1987. The commission defines sustainability as: *"Meeting the needs of the present generation without compromising the ability of future generations to meet their own needs."* The goals of providing sustainable features in the design and construction of highway projects are to:

- Minimize impacts to environmental resources
- Minimize consumption of material resources
- Minimize energy consumption
- Preserve or enhance the historic, scenic and aesthetic context of a highway project
- Integrate highway projects into the community in a way that helps to preserve and enhance community life
- Encourage community involvement in the transportation planning process
- Encourage integration of non-motorized means of transportation into a highway project
- Find a balance between what is important:
    - to the transportation function of the facility
    - to the community
    - to the natural environment, and
    - is economically sound

- Encourage the use of new and innovative approaches in achieving these goals.

Use of this Guide

I-LAST is not an official policy or procedure of the Illinois Department of Transportation. It is purely advisory in nature, intended to ascertain and document sustainable practices proposed for inclusion on state highway projects. Any other or higher use of this guide on state highway projects is strictly at the discretion of the department and its highway districts. No other authorized use should be inferred for use on state highway projects.

I-LAST is not a substitute for IDOT and/or AASHTO design and construction standards, or an invitation to violate them. All plans, specifications and construction should continue to comply with appropriate IDOT and/or AASHTO requirements.

Project Execution

This guide contains a checklist of potentially sustainable practices. Following the checklist is a description of the intent of each section and the rationale and measures of effectiveness for each item. There are lists of source materials and additional background resources for each item to assist in understanding and applying the practices.

This guide contains a wide variety of potential sustainable practices and features and every highway project presents a different set of conditions. As a result there will be items that don't apply on every project. The goal should be to identify and document practices that are applicable and effective for a particular project.

Project teams can review the items in the guide during project scoping to determine which may be applicable to a particular project, and follow up by evaluating the effectiveness of those items during the design. The guide is not intended to provide "cookbook" solutions to complex problems, but to foster and identify where creative thought may lead to innovative solutions and more sustainable projects.

Project Evaluation

I-LAST includes a point system for evaluating the sustainable measures included in a project. Due to the varying nature of highway projects and the range of items in I-LAST, there will often be a large number of points that are not applicable on an individual project. Therefore comparing the absolute score of different projects would not be indicative of the level of sustainability for those projects. Projects can be evaluated based on the inclusion of the practices that were applicable to the project. Therefore the evaluation can consist of three steps:

1. At the beginning of the project, the project team can determine which elements are applicable to the project. Those items that are applicable can be noted and considered in the development of the project.

   For instance, on a highly urban project there may be no wetlands in the project corridor, and the wetland items would not be applicable to the project. On other routes there may be no transit along or near the route and none being considered by the transit agencies. Therefore transit items would not be applicable to the project.

2. At the end of the design phase, the team can determine which of the applicable items were included in the project plans. This evaluation can then be included in the project's file.

3. During construction, the contractor can utilize sustainable construction practices and techniques. The use of I-Last can capture actual practices used by the contractor for the project. The contractor may also identify additional sustainable opportunities within the limits of the specifications.

The scoring is intended to be relatively simple and require minimal time and effort.

I-LAST Project Environmental Sustainability Rating System Scorecard

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
Planning	P-1 Context Sensitive Solutions	P-1a	Identify Stakeholders and develop Stakeholders Involvement Plan		2	
		P-1b	Engage Stakeholders to conduct Context Audit and develop project purpose		2	
		P-1c	Involve Stakeholders to develop and evaluate alternatives		2	
		P-1d	Employ Stakeholder involvement techniques to achieve consensus for Preferred Project Alternative		2	
	P-2 Land Use/ Community Planning	P-2a	Promote reduction in vehicle trips by accommodating increased use of public transit		2	
		P-2b	Accommodate multi-modal transportation uses (e.g. transit riders, pedestrians, and bicyclists)		2	
		P-2c	Increase transportation efficiencies for moving freight through features such as dedicated rail or intermodal facilities		2	
		P-2d	Partnerships that provide environmental or technological advancements while promoting environmental stewardship		2	
		P-2e	Project is consistent with regional plans and local managed growth-based Master or Comprehensive Plans		2	
		P-2f	Project is compatible with local efforts for Transit Oriented Design		1	
Design	D-1 Alignment Selection	D-1a	Avoid impacts to high quality undeveloped lands			
			D-1a-1	Avoid all impacts	2	
			D-1a-2	Avoid significant impacts	1	
		D-1b	Provide buffer between highway and high quality wetlands/water resources			
			D-1b-1	Provide 100 foot buffer to resources	2	
			D-1b-2	Avoid resource with less than 100 foot buffer	1	
		D-1c	Avoid impacts to environmental resources, such as INAI sites and sites with threatened or endangered species			
			D-1c-1	Avoid all impacts	2	
			D-1c-2	Avoid significant impacts	1	
		D-1d	Avoid impacts to socioeconomic resources			
			D-1d-1	Avoid all impacts	2	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
Design	D-1 Alignment Selection		D-1d-2	Avoid significant impacts	1	
		D-1e	Cross section minimizes overall construction "footprint" to eliminate R.O.W. takes		2	
		D-1f	Minimize total earthwork by matching proposed vertical alignments as closely as possible to existing grades		1	
		D-1g	Utilize brownfield locations		2	
	D-2 Context Sensitive Design	D-2a	Adjust highway features using design flexibility		2	
		D-2b	Incorporate locally produced or native materials			
			D-2b-1	Over 95% of materials sourced in US	1	
			D-2b-2	Over 60% of materials sourced in metro area	2	
		D-2c	Visual enhancements		2	
		D-2d	Items fit context of surroundings		1	
		D-2e	Bridge aesthetics		1	
		D-2f	Reduce urban “heat island” effect		1	
Environmental	E-1 Protect, Enhance or Restore Wildlife and its Habitat	E-1a	Avoid habitat fragmentation		3	
		E-1b	Minimize habitat fragmentation		2	
		E-1c	Mitigate habitat fragmentation		1	
		E-1d	Wetland restoration/mitigation		1 to 3	
		E-1e	Provide nesting locations		2	
		E-1f	Provide wildlife crossings		2	
		E-1g	Provide fish passage		2	
		E-1h	Provide mussel relocation prior to construction		2	
		E-1i	Provide right-of-way wildlife barriers		1	
		E-1j	Provide mowing markers		1	
		E-1k	Schedule construction to avoid wildlife disruption		1	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
Environmental	E-2 Trees and Plant Communities	E-2a	Avoidance/protection of individual and contiguous stands of specimen trees and localized areas of established, desirable vegetation		2	
		E-2b	Designs which demonstrate an anticipated ultimate net increase in tree species			
			E-2b-1	Increase tree species through preservation and new planting	2	
			E-2b-2	Coordination with local stakeholders to create a plant palette in context with community	2	
			E-2b-3	Historic native plantings are re-established	1	
		E-2c	Re-establish/expand native vegetation in reclaimed work areas or abandoned old alignments		2	
		E-2d	Use of plant material in lieu of or enhance structural such as living snow fences, sight screens (viburnum, dogwood, etc.)		1	
		E-2e	Use of native species for plugs, seed mixes, perennial and other plantings		2	
		E-2f	Planting trees, shrubs and/or native plant material in highway right-of-way		2	
		E-2g	Tree replacement ratios at greater than 1:1		2	
		E-2h	Minimize potential salt splash impacts through use of berms or vegetative screening		2	
	E-2 Trees and Plant Communities	E-2i	Removal of undesirable plant species, removal of invasive species		1	
		E-2j	Topsoil preservation		2	
	E-3 Noise Abatement	E-3a	Construction of noise barriers			
			E-3a-1	Specialized noise barrier construction	2	
			E-3a-2	Typical noise barrier	1	
		E-3b	Incorporate traffic system management techniques to reduce existing noise levels		2	
		E-3c	Provide a buffer zone for adjacent receptors		2	
		E-3d	Provide sound insulation to public or non-profit institutional structures		1	
		E-3e	Tining of pavement to reduce noise levels		1	
		E-3f	Provide plantings or sight screen to separate receptors from roadway		1	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
Water Quality	W-1 Reduce impervious area	W-1a	Use of ditches		2	
		W-1b	Replacement of paved median		2	
		W-1c	Reduction of paved shoulder areas		2	
		W-1d	Shoulders constructed of permeable pavement		2	
		W-1e	Replacement of paved bike paths with permeable pavement or permeable material		2	
	W-2 Storm water treatment	W-2a	Use of bioretention cells		2	
		W-2b	Use of constructed wetlands		2	
		W-2c	Use of bioswales		2	
		W-2d	Use of mechanical storm water treatment systems		2	
		W-2e	Use of catch basins		1	
		W-2f	Use of infiltration trenches		1	
		W-2g	Use of rain gardens		1	
		W-2h	Use of sand filters		1	
		W-2i	Use of ditch checks		1	
		W-2j	Use of sediment traps and fore bays		1	
		W-2k	Use of temporary inlet protection devices		1	
	W-3 Design practices to protect water quality	W-3a	Analysis of pollutants in storm water		1	
		W-3b	Stream bank restoration		2	
		W-3c	Practices to protect highly erodible soils			
			W-3c-1	Special provisions for soil erosion control at stream crossings	2	
			W-3c-2	Meet NPDES requirements	1	
		W-3d	Implementation of erosion control practices		1	
		W-3e	Staging construction to minimize soil exposure		1	
		W-3f	Provide storm water detention		1	
		W-3g	Reduce use of fertilizers and herbicides		1	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
Water Quality	W-3 Design practices to protect water quality	W-3h	Protection from materials entering waterway on bridge demolition and construction		1	
Transportation	T-1 Traffic Operations	T-1a	Special use lane: High Occupancy Vehicle, reversible		2	
		T-1b	Innovative intersection/interchange design		2	
		T-1c	Expansion of or connection to a Traffic Management Center (TMC)		2	
		T-1d	Installation of coordinated signal system			
			T-1d-1	Installation of closed-loop system	1	
			T-1d-2	Timing plans developed for weekend or special events	1	
			T-1d-3	Advanced logic system such as adaptive control	1	
			T-1d-4	Inclusion of transit vehicle priority	1	
		T-1e	Limiting or consolidating access points along highway		1	
		T-1f	Bus turnouts		1	
	T-2 Transit	T-2a	Provide new Park-and-Ride lots			
			T-2a-1	Evaluate demand and effectiveness of potential Park-and-Ride lots	1	
			T-2a-2	Construction of Park-and-Ride lots	1	
		T-2b	Operational improvements of an existing Park-and-Ride lot		1	
		T-2c	Provide bike accommodations at Park-and-Ride lots & transit stations		1	
		T-2d	Improved shading through vegetation at Park-and-Ride lots		1	
		T-2e	Provide new multi-modal connections		1	
		T-2f	Include bus stops with shelters or pads and pedestrian access		1	
		T-2g	Installation of a transit express system		3	
	T-3 Improve Bicycle & Pedestrian Facilities	T-3a	Assess Conditions –Perform bicycle and pedestrian Level of Service analysis within the roadway corridor		1	
		T-3b	Improved intersection designs for pedestrians		1 to 2	
p o r	T-3	T-3c	Provide new or rehabilitate existing sidewalks or bikeways			

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
	Improve Bicycle & Pedestrian Facilities		T-3c-1	Provide new sidewalks or bikeways	2	
			T-3c-2	Rehabilitate sidewalks or bikeways	1	
		T-3d	Sidewalk or bikeway widening			
			T-3d-1	Widen sidewalk or bikeway	1	
			T-3d-2	Provide parkway separation	1	
	T-3 Improve Bicycle & Pedestrian Facilities	T-3e	Designated space for cyclists (shared lanes)		1	
		T-3f	Striped bike lanes within roadway		2	
		T-3g	Restore or pave shoulders for bicycling		2	
		T-3h	Create parallel bike routes		1	
		T-3i	Align the roadway to facilitate the development of future multi-use paths and facilities		1	
		T-3j	Provide new grade-separated (bridge or underpass) bike/pedestrian crossing structure		3	
		T-3k	Install bikeway signs		1	
		T-3l	Install bicycle racks		1	
Lighting	L-1 Reduced Electrical Consumption	L-1a	Use of alternative energy source to power street lighting, warning signs, and remote Intelligent Transportation Systems (ITS) components		2	
		L-1b	Retrofit existing street lighting with high efficiency types		2	
		L-1c	Replace signs with retro reflective signs to eliminate sign lighting		2	
		L-1d	Retrofit existing sign lighting with high efficiency types		1	
		L-1e	Use of high efficiency street lighting on new installations		2	
		L-1f	Use of alternative energy source for bus stops		2	
		L-1g	Use of high efficiency (such as LED) traffic signals		1	
	L-2 Stray Light Reduction	L-2a	Retrofit existing roadway lighting fixtures using cut off or full cut off fixtures		2	
		L-2b	New roadway lighting using cut off or full cut off fixtures		2	
Materials	M-1	M-1a	Reuse of top soil		1	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
	Materials	M-1b	Balance cuts and fills			
			M-1b-1	Balance cuts and fills for the project	1	
			M-1b-2	Balance cuts and fills per stage	1	
		M-1c	Reuse spoils within project corridor to minimize material in and out of site		2	
		M-1d	Allow rubblization of concrete shoulder and concrete pavements		1	
		M-1e	Allow flexibility in design with the use of recycled or salvaged non-hazardous material			
			M-1e-1	Allow the processing of demolished concrete to reclaim scrap metals to create useable aggregate.	1	
			M-1e-2	Allow the use of milled HMA pavements for capping stone.	1	
			M-1e-3	Allow the use of recycled crushed pavements for temporary aggregate for areas like driveways or access roads	1	
			M-1e-4	Allow the use of recycled crushed pavements for shoulder stone	1	
		M-1e	M-1e-5	Allow the use of recycled crushed pavements as aggregate for subgrade, sub base, or base lifts	1	
			M-1e-6	Allow reclaiming sub base granular material	1	
			M-1e-7	Provide for optional reuse of reclaimed scrap materials for various items (sheeting, guard rail, etc.)	1	
		M-1f	Allow locally produced byproducts to be reused in the construction of embankments, hot mix asphalt and Portland cement concrete mixtures			
			M-1f-1	Allow the use of fly ash, ground granulated blast furnace slag cement, and microsilica in concrete mixtures	1	
			M-1f-2	Allow the use of ternary concrete mixtures in the construction of concrete pavements, shoulders and various structural items	2	
			M-1f-3	Allow the use of foundry sand or bottom ash as part of a material in the construction of embankments	1	
Materials	M-1 Materials	M-1f	M-1f-4	Allow the use of slag aggregate in the production of HMA mixtures (SMA Designs and “F” Mix).	1	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
			M-1f-5	Allow the use of Recycled Asphalt Shingles (RAS) in the production of all HMA mixtures	2	
			M-1f-6	Obtain and implement a project specific use for the innovative reuse of waste materials other than the ones listed above.	1	
		M-1g	Allow the use of recycled asphalt pavement (RAP) in the construction of new hot mix asphalt pavements			
			M-1g-1	Allow the use of recycled asphalt pavement (RAP) in hot mix asphalt (HMA)	1	
			M-1g-2	Allow the use of fractionated recycled asphalt pavement (FRAP) at a higher percentage in the manufacturing of hot mix asphalt.	2	
		M-1h	Allow inclusion of environmentally acceptable and permitted sites in the contract documents for the disposal of surplus excavated material to an off-site location		1 to 2	
		M-1i	Allow the salvage / moving of buildings		2	
		M-1j	Soil stabilization with geosynthetics		1	
		M-1k	Soil stabilization with cementitious and recycled materials		2	
		M-1l	Consider locally available materials (such as local seed stock and plants) in developing specifications for the project		1	
		M-1m	Extended pavement life; design and rehabilitation strategies			
			M-1m-1	Specify the use of perpetual HMA pavement design	2	
			M-1m-2	Specify the use of 30 year design life concrete pavement	2	
			M-1m-3	Specify the use of 40 year design life concrete pavement	3	
			M-1m-4	Specify the use of pulverization of HMA pavement for a base	1	
			M-1m-5	Specify the use of various pavement preservation processes such as chip seal, seal coat, micro resurfacing, etc	1	
		M-1m	M-1m-6	Selecting hot-in-place or cold-in-place recycling of hot mix asphalt	2	
Innovation	I-1 Innovation	I-1a	Use of Experimental Feature(s) to improve the sustainability of a project		1 to 3	

CATEGORY		ID	DESCRIPTION	Available Points	Project Points
Construction	CE-1 Protect, Enhance, Restore Wildlife Habitat	CE-1a	Land Disturbance	2	
		CE-1b	Equipment Spill Impact Prevention	1	
	CE-2 Trees and Plant Communities	CE-2a	Invasive Species Prevention	1 to 3	
		CE-2b	Minimize Soil Compaction	1 to 2	
		CE-2c	Wetland and Greenspace Protection	2	
		CE-2d	Vegetative Re-establishment	1 to 3	
	CE-4 Maximize Trucking Efficiency	CE-4a	Heavy truck route concept	1	
		CE-4b	Proximity to the Job	1	
		CE-4c	Recycling removed pavement onsite	1	
		CE-4d	Efficient use of backhauls	1	
	CS-1 Certified Suppliers	CS-1a	Use of asphalt plants with Diamond Achievement Commendation	3	
		CS-1b	Use of concrete plants with Green Star Certification	3	
	CW-1 Reduce Impervious Area	CW-1a	Prevent runoff with infiltration system	2	
	CW-2 Stormwater Treatment	CW-2a	Stormwater treatment systems to treat runoff from disturbed areas during construction	2	
		CW-2b	Method of Demolition	3	
	CW-3 Construction Practices to Protect Water Quality	CW-3a	Constructive changes to the erosion and sediment control practices	1 to 3	
		CW-3b	Certified professionals for erosion and sediment control (CPESC)	1	
		CW-3c	Temporary Storm Water Pollution Prevention Plan (SWPPP) devices that are reusable or biodegradable	2	
		CW-3d	Use of a non-mechanical sediment or erosion control practice (Anoinic Polymer)	2	
Construction	CW-3 Construction Practices to Protect	CW-3e	Substitution of non-structural solutions	2	
		CW-3f	Treatment of flows from dewatering operations	2	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
	Water Quality	CW-3g	Reduction of use of potable water		1	
	CM-1 Construction Practices	CM-1a	The use of recycled or salvaged non-hazardous material during the construction phase		1 to 7	
		CM-1a-1	The use and the processing of demolished concrete to reclaim scrap metals and to create usable aggregate		1	
		CM-1a-2	The use of milled HMA pavements for capping stone		1	
		CM-1a-3	The use of recycled crush pavements for temporary aggregate for areas like driveways or access roads		1	
		CM-1a-4	The use of recycled crushed pavements for shoulder stone		1	
		CM-1a-5	The use of recycled crushed pavements as aggregate for subgrade, subbase, or base lifts.		1	
		CM-1a-6	The reclaiming and reuse of subbase granular material		1	
		CM-1a-7	The reuse of reclaimed scrap metals for various items (e.g. sheeting, guard rail, etc.)		1	
		CM-1b	The use of locally produced by-products to be incorporated in the construction of embankments, hot mix asphalt and portland cement concrete mixtures		**1 to 7**	
		CM-1b-1	The use of fly ash, ground granulated blast furnace slag cement, and microsilica in concrete mixtures		1	
			CM-1b-2	The use of ternary concrete mixtures in the construction of concrete pavements, shoulders and appropriate structural items	1	
			CM-1b-3	The use of foundry sand or bottom ash as part of a material in the construction of embankments	1	
			CM-1b-4	The use of slag aggregate in the production of HMA mixtures (SMA Designs and “F” Mix”)	1	
			CM-1b-5	The use of Recycled Asphalt Shingles (RAS) in the production of Stone Matrix Asphalt mixtures (SMA) or the production of HMA	1	
			CM-1b-6	The use of Ground Rubber Tire (GTR) in the production of new HMA	1	
Con stru ctio	CM-1 Construction Practices		CM-1b-7	Obtain and implement a project specific plan for the innovative reuse of waste materials other than the ones listed above	1	

CATEGORY		ID	DESCRIPTION		Available Points	Project Points
		CM-1c	Use of reclaimed asphalt pavement (RAP) in the construction of new hot mix asphalt pavements		**1 to 2**	
			CM-1c-1	One point will be awarded for the use of recycled asphalt pavement (RAP) in hot mix asphalt (HMA)	1	
			CM-1c-2	One additional point will be awarded the use of fractionated recycled asphalt pavement (FRAP) at a higher percentage in the manufacturing of hot mix asphalt.	2	
		CM-1d	Utilization of environmentally acceptable and permitted sites in the construction phase of the project for the disposal of surplus excavated material to an offsite location		1 to 2	
		CM-1e	Salvage or move of buildings		2	
		CM-1f	Use of locally available materials (such as local seed stock and plants) in developing specifications for the project		1	

P-1: Context Sensitive Solutions

Intent

The objective of this section is to consider processes that identify and address stakeholder concerns and engage public participation throughout the development process.

Rationale

Context Sensitive Solutions (CSS) is an interdisciplinary approach that seeks effective, multimodal transportation solutions by working with stakeholders to develop, build, and maintain cost-effective transportation facilities which fit into and reflect the project's surroundings – its "context". Through early, frequent, and meaningful communication with stakeholders, and a flexible and creative approach to design, the resulting projects should improve safety and mobility for the traveling public, while seeking to preserve and enhance the scenic, economic, historic, and natural qualities of the settings through which they pass. CSS principles emphasize the importance of an effective public involvement process for identifying transportation and community concerns and values that need to be considered for a project.

The goals of CSS are to provide projects that meet transportation needs, exist in harmony with their surroundings, and add lasting value to the communities that they serve. CSS seeks to provide safe, cost effective transportation facilities which involve a balance between mobility, community needs, and the environment. CSS involves stakeholders in the decision making process early and throughout the development of the project and applies flexibility in design and incorporates aesthetics as part of the basic design.

Key to a successful a CSS approach is stakeholder participation in certain phases of the project. The items in this section measure the use of stakeholder involvement techniques and their participation in particular phases of the process.

Stakeholder involvement techniques may include, but are not limited to the following:

- Group briefings
- Open houses
- Workshops
- Informational meetings
- Advisory committees
- Technical advisory groups
- Elected officials meetings
- Interest group meetings
- Focus groups
- Public opinion surveys
- Charrettes
- Speakers bureaus
- Newsletters
- Information hotlines
- Websites

P-1a Identify Stakeholders and develop Stakeholders Involvement Plan (2 Points)

Criteria

- Two points will be awarded to projects that research and compile a list of stakeholders and develop a Stakeholder Involvement Plan that identifies who the stakeholders are, how they are going to be reached, and a tentative schedule of meetings.

P-1b Engage Stakeholders to conduct Context Audit and develop Project Purpose (2 Points)

Criteria

- Two points will be awarded to projects that utilize stakeholders to identify characteristics that define the context of the project. The audit aids in defining the project purpose or transportation problem to be addressed. The audit considers not

only the area's history and heritage, but environmental conditions, as well as community goals. Stakeholder involvement in the Context Audit improves the overall quality of the audit.

P-1c Involve Stakeholders to develop and evaluate alternatives (2 Points)

Criteria

- Two points will be awarded to projects that engage stakeholders for suggestions on how to address project problems and identify alternative solutions that would address stakeholder concerns within engineering and budget constraints.

P-1d Employ Stakeholder involvement techniques to achieve consensus for Preferred Project Alternative (2 Points)

Criteria

- One point will be awarded to projects that employ at least two (2) stakeholder involvement techniques to achieve consensus for the preferred alternative.
- Two points will be awarded to projects that employ at least four (4) stakeholder involvement techniques to achieve consensus for the preferred alternative.

Sources

State of Illinois Public Act 093-0545 effective January 1, 2004

Illinois Department of Transportation – Department Policy D&E 21 issued August 1, 2005

Illinois Department of Transportation – BDE Procedure Memorandum Number 48-06 – Design Flexibility and the Stakeholder Process for Context Sensitive Solutions (CSS) dated March 1, 2006

Additional Resources

Federal Highway Administration. *Flexibility in Highway Design.* 1997.

NCHRP Report 480: A Guide to Best Practices for Achieving Context Sensitive Solutions. Transportation Research Board, National Cooperative Highway Research Program. 2002.

An ITE Proposed Recommended Practice Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walk able Communities. Institute of Transportation Engineers. 2006.

www.contextsensitivesolutions.org . The online resource center for context sensitive solutions for transportation. (Accessed July 2009).

P-2: Land Use / Community Planning

Intent

The objective of this section is to consider balancing community goals and transportation needs through increased consideration of transportation alternatives that accommodate a broad perspective of community interests.

Rationale

Sustainable transportation alternatives can emphasize the relationship between land use and transportation planning. Local and Regional planners are incorporating sustainable design principles into their development plans, thus reflecting the diverse goals and interests of communities. Social and environmental issues, such as congestion, greenhouse gas emissions, and energy consumption, can be addressed through consideration of managed growth planning initiatives. The growing concern for the environment is leading to the objective of developing multi-modal transportation solutions that address mobility needs in an effective, efficient, and responsible manner. By focusing on land use and transportation planning from a holistic perspective and considering all users, transportation projects can achieve higher levels of sustainability.

P-2a Promote reduction in vehicle trips by accommodating increased use of public transit (2 points)

Criteria

- Two points will be awarded for incorporation of design elements offering alternatives to single occupancy vehicular usage such as Park-and-Ride lots, dedicated bus lanes or use of Bus on Shoulder arrangements, or High Occupancy Vehicle (HOV) lanes.

P-2b Accommodate multi-modal transportation uses (e.g. transit riders, pedestrians, and bicyclists) (2 points)

Criteria

- Two points will be awarded to projects applying “Walkable Communities” and/or the “Complete Streets” concepts by providing safe access for all users including pedestrians, bicyclists, motorists, and transit riders of all ages and abilities. These designs include considerations for older people, children, and people with disabilities.

P-2c Increase transportation efficiencies for moving freight through features such as dedicated rail or intermodal facilities (2 points)

Criteria

- Two points will be awarded to projects including features that promote the reduction of traditional truck traffic on the roadway system, such as grade crossing elimination, rail line connections, and dedicated freight connector roadways.

P-2d Partnerships that provide environmental or technological advancements while promoting environmental stewardship (2 points)

Criteria

- Two points will be awarded to partnerships that encourage cooperative efforts to meet community environmental goals. An example would be a partnership between IDOT and a municipality to upgrade project features associated with medians,

sidewalks, etc. Project should balance social, environmental, and economic considerations and focus on innovative solutions to transportation problems.

P-2e Project is consistent with regional plans and local managed growth-based Master or Comprehensive Plans (2 points)

Criteria

- Two points will be awarded to projects based on consistency with sustainable design principles included in regional and local planning documents.

P-2f Project is compatible with local efforts for Transit Oriented Design (1 point)

Criteria

- One point will be awarded to project designs that optimize transportation facilities compatible with land use development patterns.

Sources & Resources

- AASHTO. *A Guide for Achieving Flexibility in Highway Design* May 2004.
- FHWA*, Flexibility in Highway Design*, 1997. http://www.fhwa.dot.gov/environment/flex/index.htm.
- IDOT Departmental Policies. *Context Sensitive Solutions*, August 1, 2005.
- ITE. *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walk able Communities,* 2006.
- Northeastern Illinois Planning Commission. *Transit-Oriented Development – Building A Regional Framework,* January 2001.http://www.nipc.org/planning/pdf/nipc_transit.pdf.
- National Complete Streets Coalition. http://www.completestreets.org.

D-1: Alignment Selection

Intent

The objective of this section is to consider avoiding routes through ecologically sensitive areas where alternative routes are practicable and to minimize impacts to the environment where alternative routes are not available, or where the project involves improvements to an established route.

Rationale

"Alignment" in this sub-category considers the horizontal and vertical roadway alignment center line and the general location of all cross-sectional features in the project footprint (e.g., shoulder, ditch, slopes, and right-of-way). The objective is to minimize impacts due to highway project alignment selection, for both new projects and for existing routes, such as shoulder and ditch realignments. In evaluating this category, consideration will be given to what was possible given the particular project's scale and context; choices made during alignment selection, both on the macro and micro level, can have a substantial effect on wetlands, forest preservation, historic resources, avoidance of impacts to open spaces and wildlife, and other environmental issues.

For new construction, select a roadway alignment that avoids the following:

- Prime farmland as defined by the United States Department of Agriculture in 7 CFR 657.5.
- Previously undeveloped land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA (Federal Emergency Management Agency).
- Land that is specifically identified as habitat for any species on Federal or State threatened or endangered lists.
- Within 100 feet of any wetlands as defined by United States Code of Federal Regulations 40 CFR, Parts 230-233 and Part 22, and isolated wetlands or areas of special concern identified by state or local rule, OR within setback distances from wetlands prescribed in state or local regulations, as defined by local or state rule or law, whichever is more stringent.
- Previously undeveloped land that is within 50 feet of a water body, defined as lakes, rivers, streams and tributaries which support or could support fish, recreation or industrial use, consistent with the terminology of the Clean Water Act.

D-1a Avoid impacts to high quality undeveloped lands (1 to 2 points)

Criteria

- **D-1a-1** Two points will be awarded to project designs that avoid impact to Prime Farmland or forested tracts over 10 acres in size via alignment selection decisions above and beyond typical considerations, such as selection of an alternate which skirts the edge of a resource, rather than bisecting the resource.
- **D-1a-2** One point will be awarded where complete avoidance was not achieved, but impacts were minimized, if the remaining impacts are not deemed significant.

D-1b Provide buffer between highway and high quality wetlands/water resources (1 to 2 points)

Criteria

- **D-1b-1** Two points will be awarded to project designs that provide 100 feet buffer between roadway and high quality wetlands/aquatic resources as defined by the Advanced Identification (ADID) process.
- **D-1b-2** One point will be awarded to project designs that avoid high quality wetlands/aquatic resources as defined by the Advanced Identification (ADID) process without providing a buffer.

D-1c Avoid impacts to high quality environmental resources, such as Illinois Natural Areas Inventory (INAI) sites and sites with threatened or endangered species (1 to 2 points)

Criteria

- **D-1c-1** Two points will be awarded to project designs that avoid direct impact via alignment selection decisions above such as re-routing of the alignment, using retaining wall to minimize right of way takes, or bridging of the resource.
- **D-1c-2 One** point will be awarded where complete avoidance was not achieved, but impacts were minimized; techniques for minimizing also include use of retaining wall, berms, plantings, and reducing right of way footprint.

D-1d Avoid impacts to socioeconomic resources (1 to 2 points)

Criteria

- **D-1d-1 Two** points will be awarded to project designs that avoid impact to socioeconomic resources such as parks, historic sites, recreation areas, residential buildings and commercial buildings providing employment via alignment selection decisions above and beyond typical considerations.
- **D-1c-2** One point will be awarded where complete avoidance was not achieved, but impacts were minimized, if the remaining impacts are not deemed significant.

D-1e Cross section minimizes overall construction "footprint" to eliminate R.O.W. takes (2 points)

Criteria

- Two points will be awarded to project designs that avoid impact via profile selection decisions above and beyond typical considerations. Where criteria dictate an increase in profile elevation, two points shall be awarded to project designs which use extraordinary methods, such as retaining structures, to minimize R.O.W. takes.

D-1f Minimize total earthwork by matching proposed vertical alignments as closely as possible to existing grades (1 point)

Criteria

- One point will be awarded to project designs that maintain the proposed profile within one (1) foot of the existing profile over 90 percent of the proposed project length.

D-1g Utilize brownfield locations (2 points)

Criteria

- Two points will be awarded to project designs that utilize significant portions of brownfield sites in lieu of other resources.

Sources

Illinois Department of Transportation, Bureau of Design and Environment Manual, Chapter 26, *SPECIAL ENVIRONMENTAL ANALYSES*, http://www.dot.state.il.us/desenv/BDE%20Manual/BDE/pdf/chap26.pdf

US Environmental Protection Agency. *Rating the environmental impact of the action*. http://www.epa.gov/compliance/nepa/comments/ratings.html#rating

Prime Farmlands - Code of Federal Regulations Title 7, Part 657 *PRIME AND UNIQUE FARMLANDS*, http://edocket.access.gpo.gov/cfr_2003/7CFR657.5.htm

Wetlands - Five parts of 40 CFR pertain to wetlands protection. 40 CFR Parts 22, 230, 231, 232, and 233 each deal with a different aspect of wetlands protection. Part 22 relates to Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties and the Revocation or Suspension of Permits. Part 230 relates to Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Part 231 relates to Section 404(c) Procedures. Part 232 relates to 404 Program Definitions; Exempt Activities Not Requiring 404 Permits. Part 233 relates to 404 State Program Regulations. http://www.epa.gov/wetlands/40cfr/ Mapping is sometimes available directly from county offices.

Clean Water Act - http://www.epa.gov/oecaagct/lcwa.html

Resources

FEMA 100 year flood mapping is available at http://msc.fema.gov/webapp/wcs/stores/servlet/FemaWelcomeView?storeId=10001&catalogId=10001&langId=-1

D-2: Context Sensitive Design

Intent

The objective of this section is to consider design flexibility that responds to the project area's unique character. This includes design features, aesthetics, and lighting.

Rationale

Design Flexibility

Geometric design encompasses various design criteria established in the IDOT Bureau of Design and Environment Manual, AASHTO A Policy on Geometric Design of Highways and Streets, and other design resources. For many of the design criteria, there are a range of acceptable values. Utilizing values within the acceptable range instead of the minimum or maximum value may lead to designs that avoid sensitive or important features near or within the project. The design itself can also provide a final improvement that works well within the physical context of the terrain and location. Examples could include the coordination of horizontal and vertical alignments to prevent broken back curves, sharp angular alignments, short consecutive curves instead of one larger smooth curve, short sag or crest vertical curve in a horizontal tangent or horizontal curve that introduces a visual break, dips in the roadway due to vertical curves in a tangent alignment, rolling profiles without visual restrictions on the inside of vertical curves, poorly combined horizontal and vertical curvature that leads to poor pavement drainage.

In more scenic locations, it may be beneficial to utilize alignments that "fit" or follow the physical feature as long as safety is not compromised. Such alignments could be in proximity to rivers, bluffs, forests, lakes, and other natural features important to the community. The terrain and location of the roadway can influence driver perceptions and the driver's behavior. Providing a design that accounts for this context of the physical environment can help meet driver expectations and provide a safe improvement.

If design is modified to accommodate a unique feature and this causes geometric elements to approach minimum or maximum values or in some cases cause a value to be used outside of the suggested range of design values, then the design should provide mitigation for this limiting design value. A design exception may be needed when a design value does not fall within the required design range. This rating system in no way encourages the use of designs requiring design exceptions. The following is a list of a few examples of some mitigation techniques for some limited design features:

- Tight Curvature
  - Increase signing
  - Provide delineation
  - Increase superelevation
  - Widen the lane
  - Widen the shoulder
  - Pave the shoulder
  - Increase the clear zone
- Steep Grades
  - Wider shoulders
  - Climbing lanes
  - Escape ramps
  - Wider clear zones
  - Increased superelevation
  - Increased horizontal curve at bottom of down grade
- Limited Stopping Sight Distance
  - Removal of items in sight lines
  - Spot widening of pavement or shoulder
  - Signing
  - Lighting
  - Delineation
- Limited Intersection Sight Distance
  - Eliminate sight restrictions
  - Turn restrictions
  - Relocation of intersection
  - Advance signing
  - Traffic signal control
- Limited Passing Sight Distance
  - Add passing lanes

  - Truck auxiliary lanes on long upgrades
  - Intermittent turn-outs
- Insufficient Decision Sight Distance
  - Addition of traffic control devices.
- Narrow Lanes
  - Wider shoulders
  - Improved roadsides
  - Lane widening at horizontal curves
  - Edge delineation
  - Rumble strips
  - Use of medians in urban sections
- Narrow Shoulders
  - Wider clear zone
  - Milder side slopes
  - Traversable ditches
  - Intermittent full width turnouts.

During the public involvement process, certain features may be identified that the community would like to avoid or add to a project. Providing a design that meets these public involvement requests can be accounted for in this section as long as they pertain to a design feature.

D-2a Adjust highway features using design flexibility (2 Points)

Criteria

- Two points will be awarded if the project incorporates highway features to respond to the unique character of the project specifically (if they are applicable):
  - Does the design fit within the physical context of this location?
    a. Design works well with the existing terrain.
    b. Is a scenic view provided, or an unsightly view obstructed?
  - Does the design eliminate any visually unappealing roadway combinations?
  - Was the design able to avoid sensitive or important existing features of the community?
  - Did the design include any design features in order to meet a request of the community?
  - Was a minimum or maximum design value utilized or was a design exception generated? If so, did the design mitigate this limiting design feature?

D-2b Incorporate locally produced or native materials (1 to 2 Points)

Rationale

Utilizing local and native materials reduces transportation costs to the project site. This reduction in material transportation can also reduce the amount of fuel used and potential pollution introduced by the transport of materials. Some local materials may require less maintenance. An example may be the use of plants native to the area. Introducing plants from outside the local area may require additional watering or care or may unintentionally introduce a harmful species.

Criteria

- **D-2b-1** One point will be awarded if over 95% of the materials are sourced from within the United States. The percentage is based on the engineer's engineering experience/judgment.
- **D-2b-2** Two points will be awarded to projects where 60% of the materials are sourced from within the 50 miles in urban areas and 100 miles in rural areas.

D-2c Visual enhancements (2 Points)

Rationale

Providing a scenic view helps preserve vistas and landscapes that could otherwise be lost through development.

Criteria

Two points will be awarded if a scenic view is provided or if an objectionable view is obstructed. The project provides the traveling public an opportunity to see a scenic view either during travel or by providing a stopped observation point. The project hides unpleasant or distracting views. Such visual enhancements to block views can be permanent, during construction, or both.

D-2d Items fit context of surroundings (1 Point)

Rationale

These types of items can improve safety or comfort for non-motorized users of the transportation facility. This can result in mode shift from passenger vehicles and lead to lower emissions and less fuel utilization.

Criteria

One point will be awarded if any particular street furniture, lighting or appurtenances are identified as part of a roadway project by the local community.

D-2e Bridge Aesthetics (1 Point)

Rationale

This design feature can enhance a significant project element to fit better within the context of a community.

Criteria

One point will be awarded when aesthetics for these structural items are incorporated into the design. This section would also be applicable to other types of structures such as box culverts, large headwalls, and retaining walls. Elements that should be considered when evaluating the structure's aesthetics include Visual Design Elements and Aesthetic Design Qualities. Visual Design Elements include: line, shape, form, color, and texture. Aesthetic Design Qualities include: order, proportion, rhythm, harmony, balance, contrast, scale, illusion, and unity.

D-2f Reduce urban "heat island" effect (1 Point)

Rationale

<u>Heat Islands</u>
As urban areas develop, changes occur in their landscape. Buildings, roads, and other infrastructure replace open land and vegetation. Surfaces that were once permeable and moist become impermeable and dry. These changes can cause urban regions to become warmer than their rural surroundings, forming an "island" of higher temperatures in the landscape.

Elevated temperature from urban heat islands, particularly during the summer, can affect a community's environment and quality of life. While some heat island impacts seem positive, such as lengthening the plant-growing season, most impacts are negative and can include:

- Increased energy consumption
- Elevated emissions of air pollutants and greenhouse gases
- Compromised human health and comfort
- Elevated stream temperatures.

Paved areas with full exposure to the sun can be significant heat generators. Reducing paved areas or shading them with tree cover can reduce their heat impact. Darker pavements produce more heat than whiter pavements.

Criteria

One point will be provided if the design includes any mitigation for urban "heat island" effects from the project. These mitigation techniques include increasing the amount of vegetative or tree cover, replacing pavement with planted areas, or using cool "high albedo" pavements.

Sources

D-2a Adjust highway features using design flexibility

IDOT Departmental Policies. *Context Sensitive Solutions*, August 1, 2005.

AASHTO. *A Guide for Achieving Flexibility in Highway Design*, May 2004.

D-2b Incorporate locally produced or native materials

IDOT *Bureau of Design and Environment Manual Chapter 59, Landscape Design and Erosion Control.* December 2002.

IDOT BDE Procedure Memo 62-08 "Control of Emerald Ash Borer on Department Owned Lands."

FHWA Memorandum. "Buy America Requirements" July 6, 1989 and revised July 7, 2007.

FHWA "Buy America Section 1605" Applies to American Recovery and Reinvestment Act of 2009 funded projects.

D-2d Items fit context of surroundings

IDOT BDE Procedure Memorandum 48-06, "Design Flexibility and the Stakeholder Involvement Process for Context Sensitive Solutions (CSS)" March 1, 2006.

IDOT BDE Manual, "Sections: 2-2, 3-2, 3-4, and 11-1.01(b)". December 2002.

D-2f Reduce urban "heat island" effect

U.S. EPA, www.epa.gov/hiri/about/index.htm Accessed June 10, 2009

U.S. EPA, *Reducing Urban Heat Islands: Compendium of Strategies – Cool Pavements*. http://www.epa.gov/hiri/resources/pdf/CoolPavesCompendium.pdf Accessed June 10, 2009.

U.S. EPA, *EPA Cool Pavements Study – Task 5 Draft Report* Cambridge Systematics. June 2005.
http://www.epa.gov/hiri/resources/pdf/CoolPavementReport_Former%20Guide_complete.pdf
Accessed June 10, 2009.

Additional Resources

D-2a Adjust highway features using design flexibility

Institute of Transportation Engineers, *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walk able Communities.* 2006.

D-2c Visual enhancements

National Transportation Enhancement Clearinghouse, *Transportation Enhancement categories: Acquisition of scenic or historic easements and sites; scenic or historic highway programs; landscaping and scenic beautification*, www.enhancements.org/ Accessed May 19, 2009.

National Transportation Enhancements Clearinghouse, US DOT, and Rails to Trails Conservancy. *Enhancing America's Communities, A Guide to TE*. 2007.

National Transportation Enhancements Clearinghouse, US DOT, and Rails to Trails Conservancy, *Communities Benefit! The Economic and Social Benefits of Transportation Enhancements,* 2005

D-2d Items fit context of surroundings

Institute of Transportation Engineers, *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walk able Communities,* 2006.

D-2e Bridge aesthetics

New York State Department of Transportation, *NYSDOT Bridge Manual 4th Edition. Chapter 23 – Aesthetics*, Revised January, 2008.

Transportation Research Board Bridge Aesthetics Subcommittee, www.bridgeaesthetics.org Accessed June 10, 2009.

Roads and Traffic Authority, *Bridge Aesthetics: Design Guidelines to Improve the Appearance of Bridges in NSW*, ISBN No 0731054067, 2004

Alberta Infrastructure and Transportation, *Bridge Aesthetics Study,* Version 1.0, April 2005.

Gauvrea, Paul, *The Three Myths of Bridge Aesthetics*, http://www.civ.utoronto.ca/pg/Publications/3%20Myths%2002%2005%2023%202.pdf Accessed July 20, 2009.

Gauvreau, Paul, *Innovation and Aesthetics in Bridge Engineering*, Canadian Civil Engineer 23.5 (Winter 2006-2007): 10-12.

Gottemoeller, Frederick, Bridgescape, *The Art of Designing Bridges*, 2nd edition. John Wiley & Sons, 2004

D-2f Reduce urban "heat island" effect

TR News Number 253, Transportation Research Board, "Paving Materials and the Urban Climate" November – December 2007
http://onlinepubs.trb.org/onlinepubs/trnews/trnews253.pdf

City of Chicago, *The Chicago Green Alley Handbook*, CDOT
http://egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/GreenAlleyHandbook.pdf Accessed July 20, 2009.

Sustainable Skylines – Dallas, Urban Heat Island, http://www.sustainableskylines.org/Dallas/heatisland.html Accessed July 20, 2009.

E-1: Protect, Enhance or Restore Wildlife Communities

Intent

The objective of this section is to consider methods that can be used in project design to protect, enhance, or restore the natural habitat for terrestrial and aquatic species. The physical setting and magnitude of the project affects the applicability of these measures; however, elements of these measures can be applied even in an urban environment. Mitigation and minimization measures have been valued differently but both could apply to a project as each provides a benefit to maintaining the ecosystem connectivity.

E-1a to E-1c Mitigate habitat fragmentation

Rationale

Maintaining ecological connectivity through habitat preservation and reduction in fragmentation is critical to wildlife movement. The sensitive habitat areas of forested tracts, streams, and greenways associated with streams require special consideration as they provide corridors for wildlife movement. Roadways can divide or fragment prairies, forested tracts, and riparian areas of streams, all of which potentially provide a continuous path for wildlife movement. In planning mitigation of habitat fragmentation, measures are considered that maintain or create larger contiguous parcels.

E-1a Avoid habitat fragmentation (3 points)

- Three points will be awarded to the project that avoids impact to wildlife habitat. Specifically: Use of lands that are part of a significant contiguous wildlife habitat is avoided by shifting the proposed alignment of the roadway. This would include large forested tracts, open lands, and streams.

E-1b Minimize habitat fragmentation (2 points)

- Two points will be awarded to the project that protects, enhances, or restores wildlife habitat in a way that extends beyond required measures. Specifically:
  - Minimize habitat fragmentation by reducing the roadway footprint through the use of retaining walls or bridging in areas of prairie, wetland, forested tract, or riparian areas of streams.
  - Use conservation easements to protect existing habitat as part of the mitigation option for wetlands or forested tracts
  - Use of lands that are part of a significant wildlife habitat are minimized by shifting the roadway.

E-1c Mitigate habitat fragmentation (1 point)

Criteria

- One point will be awarded to the project that includes measures to mitigate wildlife habitat beyond traditional techniques. This would include acquisition of parcels within the watershed or parcels identified by resource agencies that provide special protection and enhancement of these greenways.

E-1d Wetland restoration/mitigation (1 to 3 points)

Rationale

Wetlands represent a unique habitat difficult to replace, that provides functions related to storm water detention, nutrient uptake, wildlife habitat, and unique vegetation. This resource is protected by state and federal regulations but there may be opportunities to enhance this resource. The replacement of this resource within the watershed of the project area can be a key factor as the sustainability of watersheds is an important ecological goal. There may be opportunities to utilize a variety of wetland restoration techniques in one project. These criteria recognize the importance of wetlands within the watershed and the opportunities to provide a project solution that incorporates variable conditions.

Criteria

- Three points will be awarded to the project that protects, enhances, or restores wetlands beyond requirements. Specifically:
    - Wetland restoration, enhancement, or establishment that is above and beyond what is required by the Illinois Wetland Protection Act (IWPA) could provide special benefits to habitat. The IWPA establishes minimum acceptable replacement ratios based upon the type of wetland and the location of the wetland replacement option. All wetland restoration occurs within the watershed of the project.
    - Protection of recharge areas for fens or seeps can be critical to sustaining a sensitive resource. Fens and seeps rely upon groundwater to maintain their unique qualities. This groundwater is generated in an area upstream of the fen. Techniques to protect this resource may consist of purchase of land in the recharge area, establishing a conservation easement in the recharge area, or working with the community to establish development ordinances that incorporate Requirements for storm water management to maintain infiltration of surface waters.
- Two points will be awarded to the project that protects, enhances, or restores wetlands beyond required measures. Specifically:
    - Wetland mitigation measures are consistent with IWPA Requirements; however, all mitigation occurs within the project watershed.
- One point will be awarded to the project that protects, or restores wetlands as required by resource agencies. Specifically:
    - Wetland restoration or establishment that is required under the IWPA is achieved.

E-1e to E-1k Enhance and protect wildlife habitat

Rationale

Measures that maintain the movement of terrestrial and aquatic species can sustain ecological systems affected by roadway projects. Eliminating barriers to movement, maintaining a safe environment, protecting habitat and corridors for safe movement are important elements of wildlife protection.

E-1e Provide nesting locations (2 points)

Criteria

- Two points will be awarded for providing enhancements to existing wildlife habitat with additional nesting locations (e.g. bird and bat houses, nesting boxes, and turtle nesting areas)

E-1f Provide wildlife crossings (2 points)

Criteria

- Two points will be awarded for providing wildlife crossings that allow for the safe passage of wildlife across highways without their crossing directly on the roadway. Examples include wildlife underpasses and amphibian tunnels.

E-1g Provide fish passage (2 points)

Criteria

- Two points will be awarded for minimizing fish impacts through techniques, such as placing culverts more than three inches below flow lines to accommodate aquatic species passage, use of natural bottomed culverts, or other design modifications to enhance fish passage.

E-1h Provide mussel relocation prior to construction (2 points)

Criteria

- Two points will be awarded for relocation of mussels prior to construction, where their presence has been documented in surveys, to prevent loss of species.

E-1i Provide right-of-way wildlife barriers (1 point)

Criteria

- One point will be awarded for the provision of right-of-way barriers, such as fences, plantings, and deer reflectors, to prevent wildlife from entering the right-of-way.

E-1j Provide mowing markers (1 point)

Criteria

- One point will be awarded for the provision of mowing markers to protect natural areas and wetlands from being disturbed during maintenance operations.

E-1k Schedule construction to avoid wildlife disruption (1 point)

Criteria

- One point will be awarded if there is a commitment to schedule construction to avoid disrupting sensitive wildlife, such as neotropical migrant birds.

Sources

Protection of Wetlands. Executive Order 11990, May 1977.

US 40 CFR Parts 22, 230, 231, 232, and 233 Wetlands – Five parts of 40 CFR pertain to wetlands protection. Part 22 relates to Consolidated Rules of Practice Governing the Administrative Assessment of Civil Penalties and the Revocation or Suspension of Permits. Part 230 relates to Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material. Part 231 relates to Section 404(c) Procedures. Part 232 relates to 404 Program Definitions; Exempt Activities Not Requiring 404 Permits. Part 233 relates to 404 State Program Regulations. http://www.epa.gov/wetlands/40cfr/

Clean Water Act – http://www.epa.gov/oecaagct/lcwa.html

IDOT Bureau of Design and Environment, Manual, Environmental Procedures. Part III, Sections 25-27., June 2008.

Illinois Inter Agency Wetland Protection Act of 1989. Updated June 1997.

Resources

Migratory Bird Treaty Act of 1918. Updated October 1998.

Endangered Species Act (state and federal). December 1973.

Ecological – An Ecosystem Approach to Developing Infrastructure Projects. U.S. Department of Transportation, 2006.

E-2: Protect, Enhance, Restore Native Plant Communities

Intent

The objective of this section is to consider methods to capable of avoiding damage to ecologically sensitive vegetation, promote planting of native plant material as part of a project, revegetate areas of abandoned alignment and remove invasive species. Other measures that can improve vegetative community include replacing turf areas that require maintenance with low maintenance native plant material (including shrubs, grasses, vines, and perennial plants), selection of plant materials tolerant of salt, and designing plant materials and berms to minimize salt spray to adjacent plant materials and protect existing vegetative communities. Native plants are defined as plants indigenous and original to an area.

Rationale

This section is intended to stress the importance of balancing the natural elements of a design with its functional elements. Selection of native materials can help restore the project area to conditions that have been lost over time or due to previous planning techniques. Design decisions can include selection and placement of plant materials that can sustain themselves in a salt environment and removal of species that are not native or require maintenance. The goal is to provide a design that maintains or compensates for the loss of significant trees, uses native plant species, reduces maintenance and enhances long term sustainability. Use of native species and use of deeper rooted species should be the focus of the designer. Design decisions can also be made to help ensure survivability, resistance to disease and supplement existing native material that may be subject to attack from pathogens.

E-2a Avoidance/protection of individual and contiguous stands of specimen trees and localized areas of established, desirable vegetation (2 points)

Criteria

- Two points will be awarded for avoidance of or preservation of local specimen trees, as defined by IDOT D&E 18, Preservation and Replacement of Trees.

E-2b Designs which demonstrate an anticipated ultimate net increase in tree species (1 to 5 points)

Criteria

- **E-2b-1** Two points will be awarded for projects that through preservation and new planting increase the number of tree species in the project area.
- **E-2b-2** Two points will be awarded to the project where coordination with the local stakeholders establishes a planting palette that considers the context of the local community plantings.
- **E-2b-3** One point will be awarded if historic native plantings are re-established. The designer shall research historic soil types and re-establish the soil by mixture.

E-2c Re-establish/expand native vegetation in reclaimed work areas or abandoned old alignments (1 point)

Criteria

- One point will be awarded to projects which include native and local plant material selection to benefit wildlife and biodiversity in reclaimed work areas or old

alignments.

E-2d Use of plant material in lieu of or to enhance structural features, such as living snow fences, sight screens (viburnum, dogwood, etc.) (1 point)

Criteria

- One point will be awarded to projects utilizing living snow fences in more than 50% of the roadway where snow fences are needed or where plantings are added to enhance the visual perception of structural features, such as sight screens.

E-2e Use of native species for plugs, seed mixes, perennial and other plantings (2 points)

Criteria

- Two points will be awarded for use of 5 or more native species in plantings that increase biodiversity and native habitat of wildlife.

E-2f Planting trees, shrubs and/or native plant material in highway right-of-way (2 points)

Criteria

- Two points will be awarded to projects that utilize native plantings in place of turf grass, add biodiversity, and are low maintenance. (IDOT seed mixtures 3, 4 and 5, or similar)

E-2g Tree replacement ratios equal to or greater than 1:1 (1 to 2 points)

Criteria

- One point will be awarded if D&E 18 is met.
- Two points will be awarded to projects with a replacement ratio exceeding D&E 18.

E-2h Minimize potential salt splash impacts through use of berms or vegetative screening (2 points)

Criteria

- Two points will be awarded if the design minimizes salt spray, or incorporates a border of salt tolerant low maintenance plantings, or protects existing salt sensitive species by applying a sustainable solution.

E-2i Removal of undesirable plant species, removal of invasive species (1 point)

Criteria

- One point will be awarded to projects complying with U.S. Army Corp of Engineers National Invasive Species Management Plan.

E-2j Topsoil Preservation (2 points)

Criteria

- One point will be awarded where topsoil depth is maintained or increased in planting areas, appropriate for the proposed plant community.
- One point will be awarded for designs that minimize or eliminate the requirement for fertilizer nutrients.

Sources

Illinois Department of Transportation, Bureau of Design and Environment Manual, Chapter 26, *Special Environmental Analyses,* http://www.dot.state.il.us/desenv/BDE%20Manual/BDE/pdf/chap26.pdf

Illinois Department of Natural Resources, *Forestry*, http://dnr.state.il.us/conservation/forestry/Urban/Index.htm

Wetlands - Five parts of 40 CFR pertain to wetlands protection, http://www.epa.gov/wetlands/40cfr/

U.S. Army Corp of Engineers, *National Invasive Species Management Plan*

IDOT D&E-18, Preservation and Replacement of Trees, September 6, 2002

USDOT, FHA Roadside Use of Native Plants

USDOT, Roadside Weed Management

Additional Resources

Illinois Tree Selection, http://urbanext.illinois.edu/treeselect/index.html

Illinois Native Plant Selection, http://www.il.nrcs.usda.gov/technical/plants/npg/index.html

E-3: Noise Abatement

Intent

The objective of this section is to consider options for reducing noise associated with vehicles. Evaluating noise impacts is required as part of the environmental assessment process; however, there are elements of noise management that can provide opportunities for sustainable practices. Noise levels can be reduced by altering the source of the noise (engine and exhaust noise and tire/pavement interaction) or by protecting the receptors. Consideration of the traffic characteristics could potentially eliminate the traffic noise impacts through avoidance rather than mitigation. Methods to reduce noise levels by altering pavement surface with tining or other patterns can also be considered. Noise levels reaching sensitive receptors, such as schools, may be reduced by noise barriers or other methods such as buffers or sound insulation. Increasing the distance between the sensitive land uses and the roadway also reduces the noise levels at those locations.

E-3a Construction of noise barriers (1 to 2 points)

Rationale

Traffic noise abatement is considered for impacted sensitive receptors as part of the NEPA process. Mitigation is considered for implementation when the abatement method is determined to be feasible and reasonable as part of the FHWA Requirements. Therefore, a point is awarded when noise abatement is included in the project to mitigate noise impacts.

An additional point is awarded when the noise barrier design is considered part of the sustainable design including the re-use of an existing noise wall, the use of recycled materials, or the use of a noise wall purchased locally to reduce transportation demands. Using excavated soils from the project to construct an earth berm potentially limits transportation from both bringing in earth for the berm and hauling excavated soils to a disposal site.

Criteria

Traffic noise analyses are considered for projects involving construction of a highway in a new location, or the physical alteration of an existing highway which significantly changes either the horizontal or vertical alignment or increases the number of through lanes. All noise barrier designs must meet IDOT's feasible and reasonable criteria to be considered.

Two points will be awarded for any of the following:

- Construct a new noise barrier using recycled materials.
- Re-use an existing noise wall previously constructed within the project limits. Over 75% of the existing noise wall material needs to be re-used to be considered.
- Construct an earthen berm using over 80% of excavated soils generated from within the project limits.
- Construct a vegetative barrier approximately 100 feet or more in thickness

One point will be awarded for any of the following project features:

- Construct a new noise barrier.
- Construct an earthen berm.

E-3b Incorporate traffic system management techniques to reduce existing noise levels (2 points)

Rationale

Some of the factors affecting noise include vehicle type, traffic volume, and traffic speed. Trucks can contribute significantly to noise levels depending on the average daily volumes occurring. At 55 miles per hour (mph), one truck is equivalent to 28 cars. Lowering traffic speeds can also lower traffic noise. Generally, a 20 mph reduction can reduce traffic noise levels by 5 dBA. Incorporation of these elements into the roadway design can potentially reduce the traffic noise impacts.

Criteria

Two points will be awarded to a project where traffic noise reductions can be achieved by implementing any traffic management options:

- Truck traffic limitations by establishing truck routes that divert truck traffic away from noise sensitive areas
- Roadway geometry design or traffic control elements that develop free-flow traffic
- Speed limit reductions
- Signage for prohibiting air braking
- Coordinated signals
- Use of roundabouts

Incorporation of traffic management measures should be considered on a regional basis and the impacts on the designated uses of the project roadway should be considered. Truck traffic limitations typically only serve to direct truck traffic from one roadway to another roadway. Consequently, traffic noise levels along the roadway carrying the diverted truck traffic can potentially increase. The mitigation approach could therefore only relocate the impact and would be considered a sustainable approach if the land use receiving higher noise levels did not have noise sensitive receptors.

Similarly, alteration of traffic controls and vehicle speeds potentially impacts level of service, air quality, and hardships on the motoring public and local businesses. These traffic management measures for the purpose of reducing traffic noise need to avoid these impacts in order to qualify for the points.

E-3c Provide a buffer zone for adjacent receptors (2 points)

Rationale

As the distance between the noise source and the receptor increases, the noise levels decrease. Each time the distance between the source and the receptor is doubled, the noise level decreases 4.5 dBA over soft surfaces (e.g. grass) or 3.0 dBA over hard surfaces (e.g. asphalt or water). Moving the roadway a sufficient distance away from sensitive land uses potentially avoids traffic noise impacts and therefore would not

require the construction of noise barriers. The preservation of land such that sensitive land uses cannot be developed in the future can prevent future noise impacts.

Buffer zones are generally created by increasing the distance between the noise receiver and the noise source. The distance or size of the buffer zone required is dependent on the traffic noise levels being generated and should generally incorporate lands with noise levels exceeding 65 dBA.

Criteria

Two points will be awarded to projects that utilize one of the following approaches:

- Selection of an alternative that is not within close proximity to sensitive land uses or compared to other alternatives has the least amount of noise impacts.
- Shift of the alignment within the right-of-way or adjustment of right-of-way to move the roadway away from sensitive land uses.
- Purchase of unimproved property or coordination with local officials to create or preserve compatible land uses adjacent to the roadway.

E-3d Provide sound insulation to public or non-profit institutional structures (1 point)

Rationale

Insulation to reduce noise levels in a school, church, library, hospital, etc. is one technique for mitigating noise impact. Since the building insulation typically only mitigates interior noise levels, it is preferable to first attempt mitigation using noise barriers, which also can mitigate outside activity areas. However, given the nature of the building use, noise barriers may be determined to be not cost-effective, leaving the noise impact unabated.

Criteria

- One point will be awarded to projects applying insulation to any structure to reduce noise levels. The noise levels need to be reduced by at least 8 db based on the interior build noise levels before and after the sound insulation is installed.

E-3e Tining of pavement to reduce noise levels (1 point)

Rationale

Changes to pavement surface are being evaluated as a possible noise reduction tool. Consideration of various pavement alterations, such as tining, can be evaluated in addition to the noise barrier analysis but does not necessarily replace the need for a noise barrier. Where noise barriers are not feasible, consideration of pavement surface changes may be beneficial to the community and sensitive receptors.

Criteria

- One point will be awarded for projects that use pavement modifications, such as tining or pavement selection for noise reduction.

E-3f Provide plantings or sight screen to separate receptors from roadway (1 point)

Rationale

Plantings or sight screens do not typically provide a perceivable change in noise reduction; however, they are beneficial in that roadway visibility is reduced.

Criteria

- One point will be awarded to projects that include one of the following:
    - Construction of a sight screen.
    - Develop plantings to screen homes, school, or other sensitive receptors from roadway.

Sources

Procedures for Abatement of Highway Traffic Noise and Construction Noise. 23 CFR Part 772*.*

US DOT, April 2006.

Noise Analyses. Manual Section 26-6. DOT Bureau of Design and Environment, June 14, 2011.

Highway Traffic Noise Assessment Manual, IDOT, June 2011. IDOT Bureau of Materials and Physical Research, June 2009.

W-1: Reduce Impervious Area

Intent

The objectives of this section are to recognize methods capable of reducing storm water volumes and quantities of pollutants in typical highway runoff discharged into adjacent water resources. The pollutants associated with highway runoff include sediment, oil and grease, deicing salts, and metals.

By reducing storm water runoff volumes, the project can more closely approximate original site conditions by returning water to natural pathways that recharge groundwater. In addition, smaller facilities can be designed for treating or holding storm water from the roadway.

Rationale

Reducing storm water volumes can provide an opportunity for more storm water to infiltrate and thus recharge the groundwater system. Detention basins reduce peak discharges but do not necessarily reduce the volume of water discharged. As impervious areas increase, pollutant removal and reduction in storm water volumes become factors in protecting streams and their aquatic ecosystems. Reducing impervious area also can reduce the temperature effects of storm water on streams as more water reaches the stream as groundwater flow. Materials and area required for constructing storm water basins can be reduced with a volume reduction.

W-1a Use of ditches or infiltration promoting devices (2 Points)

Requirement

- Two points will be awarded for the use of ditches to contain storm water versus the use of curb and gutter capture of storm water, or for the use of open-bottomed pipe alternatives for the purpose of recharging or infiltrating collected stormwater into the substrate.

W-1b Replacement of paved median (2 Points)

Requirement

- Two points will be awarded for the replacement of the paved median with natural areas

W-1c Reduction of paved shoulder areas (2 Points)

Requirement

- Two points will be awarded for projects where there is a reduction of paved shoulder areas

W-1d Shoulders constructed of permeable pavement (2 Points)

Requirement

- Two points will be awarded for project designs where shoulders are constructed of permeable pavement

W-1e Replacement of paved bike paths with permeable pavement or permeable material (2 Points)

Requirement

- Two points will be awarded where paved bike paths/lanes are replaced with permeable pavement

Sources and Resources

Federal Water Pollution Control Act (1972) as amended by the Clean Water Act 1977 and 1987

IDOT Bureau of Design and Environment Manual, Part III Environmental Procedures. June 2008.

U.S. Department of Transportation, *Evaluation and Management of Highway Runoff Water Quality,* 1996.

WERF, *Performance and Whole Life Costs of Best Management Practices and Sustainable Urban Drainage Systems,* 2005.

Additional Resources

CULTEC Stormwater products for infiltration: http://www.cultec.com/stormwater_systems.html

W-2: Storm water Treatment

Intent

Pollutant removal can be an important component of protecting stream water quality. Traditional methods have focused upon water quantity management rather than pollutant removal; however, design features that focus upon pollutant removal can provide benefits of both volume reduction and water quality protection.

Rationale

As additional methods for treating storm water are developed, the importance of infiltration to recharge groundwater and the pollutant removal efficiencies of vegetative filtering have been identified. Detention basins have traditionally been used to reduce peak discharges and remove pollutants. Pollutant removal through the use of storm water treatment systems has been well documented as an important element of protecting streams and their aquatic ecosystems.

W-2a Use of bioretention cells **(2 Points)**

Criteria

- Two points will be awarded for projects that use bioretention cells for treating storm water.

W-2b Use of constructed wetlands **(2 Points)**

Criteria

- Two points will be awarded for projects utilizing constructed wetlands that improve water quality and retain storm water.

W-2c Use of bioswales **(2 Points)**

Criteria

- Two points will be awarded for projects that utilize bioswales to manage storm water.

W-2d Use of mechanical storm water treatment systems **(2 Points)**

Criteria

- Two points will be awarded to projects utilizing storm water treatment systems (e.g., oil/grit separators, mechanical devices, such as Vortex).

W-2e Use of catch basins **(1 to 2 Points)**

Criteria

- One point will be awarded to projects utilizing catch basins.
- Two points will be awarded to projects utilizing temporary storm water treatment systems at inlets that will treat any flow entering them.

W-2f Use of infiltration trenches **(1 Point)**

Criteria

- One point will be awarded to projects utilizing infiltration trenches or basins.

W-2g Use of rain gardens **(1 Point)**

Criteria

- One point will be awarded to projects utilizing rain gardens.

W-2h Use of sand filters **(1 Point)**

Criteria

- One point will be awarded to projects utilizing sand filters for storm water treatment.

W2i Use of ditch checks **(1 Point)**

Criteria

- One point will be awarded to projects utilizing ditch checks to slow storm water flows.

W-2j Use of sediment traps and forebays **(1 Point)**

Criteria

- One point will be awarded to projects utilizing sediment traps and forebay features.

W-2k Use of temporary inlet protection devices **(1 point)**

Criteria

- One point will be awarded to projects utilizing temporary storm water treatment systems at inlets that will treat any flow entering them.

Sources and Resources

Federal Water Pollution Control Act (1972) as amended by the Clean Water Act 1977 and 1987

IDOT Bureau of Design and Environment Manual, Part III Environmental Procedures. June 2008.

U.S. Department of Transportation, *Evaluation and Management of Highway Runoff Water Quality,* 1996.

WERF, *Performance and Whole Life Costs of Best Management Practices and Sustainable Urban Drainage Systems,* 2005.

W-3: Design Practices to Protect Water Quality

Intent

Water quality in streams during construction can also be affected by the erosion control practices implemented. Storm water pollution prevention plans (SWPPP) are required under the NPDES program to specify best management practices; however, there are measures that provide additional protection to streams during and after construction and improve storm water quality.

Rationale

Reducing sedimentation during construction and in areas adjacent to streams during construction can help protect water quality. Best Management Practices established in the SWPPP include standard methods, such as silt curtains and silt fence. When special consideration is provided for soils at stream crossings, the temporary impacts of construction can be minimized. Analysis of pollutant loadings in storm water provides information that is valuable in assessing the appropriate combination of storm water management tools.

W-3a Analysis of pollutants in storm water (1 Point)

Criteria

- One point will be awarded for projects where pollutant loadings are assessed and which demonstrate, through the use of models, a reduction of pollutant loadings to adjacent water resources by the use of best management practices. These methods are used for areas that are biologically significant and Class A streams in diversity or integrityor for highways with traffic volumes greater than 30,000 ADT.

W-3b Stream bank restoration (2 Points)

Criteria

- Two points will be awarded to projects that improve water quality through stream bank restoration/enhancement.

W-3c Practices to protect highly erodible soils (1 to 2 Points)

Criteria

- **W-3c-1** Two points will be awarded to project designs that include special provisions for highly erodible soil erosion control practices at stream crossings.
- **W-3c-2** One point will be awarded for project designs that meet NPDES Requirements, and include standard storm water pollution mitigation practices.

W-3d Implementation of erosion control practices (1 Point)

Criteria

- One point will be awarded to project designs that include sound erosion and sediment control practices.

W-3e Staging construction to minimize soil exposure (1 Point)

Criteria

- One point will be awarded to projects that include requirements for staged construction so that less than five acres of bare soil are exposed at any given time and site runoff is controlled.

W-3f Provide storm water detention (1 Point)

Criteria

- One point will be awarded to projects that provide storm water detention as required by IDOT policy.

W-3g Reduce use of fertilizers and herbicides (1 Point)

Criteria

- One point will be awarded to projects that reduce use of fertilizers and herbicides in ROW.

W-3h Protection from materials entering waterway on bridge demolition and construction. (1 Point)

Criteria

- One point will be awarded to projects that include requirements for capture of bridge demolition or construction materials before entering waterways.

Sources and Resources

Federal Water Pollution Control Act (1972) as amended by the Clean Water Act 1977 and 1987

IDOT Bureau of Design and Environment Manual, Part III Environmental Procedures. June 2008.

U.S. Department of Transportation, *Evaluation and Management of Highway Runoff Water Quality,* 1996.

WERF, *Performance and Whole Life Costs of Best Management Practices and Sustainable Urban Drainage Systems,* 2005.

T-1: Traffic Operations

Intent

The objective of this section is to consider increasing traffic efficiency on roadways. Increased efficiency reduces delay and can reduce fuel consumption. Improving traffic operations can increase the amount of traffic that the roadway can handle, potentially reducing the need for additional traffic lanes and thereby reducing construction impacts. These measures may be most applicable to highly congested arterial and/or expressways. The effectiveness of any individual measure on a particular route should be established by operational analysis.

T-1a Special use lane: High Occupancy Vehicle, reversible (2 Points)

Rationale

HOV lanes can maximize person flow while minimizing overall person delay by providing priority lanes for higher occupancy vehicles. They can also increase the effectiveness of transit operations by removing them from main traffic lanes.

Reversible lanes can increase effectiveness of the traffic lanes in highly directional traffic situations by reversing the traffic in one or more lanes to serve the predominant movement.

High occupancy vehicle (HOV) lanes are those dedicated, for a portion of the day, to provide priority treatment for HOV's (e.g., carpools, vanpools, buses). HOV facilities can provide efficiencies for maximizing person flow while minimizing overall person delay. Therefore, in general, HOV lanes are congestion-dependent improvements and can produce substantial benefits where extreme congestion occurs regularly on freeways. HOV facilities can be considered in these situations to encourage motorists to shift from single occupancy vehicles (SOV) to high occupancy vehicles.

HOV and reversible lanes can be constructed in a separated roadway, concurrent-flow lane, or in a contra-flow lane.

HOV facilities can be part of a complete ridesharing program that includes the provision of support facilities and programs (e.g., park-and-ride lots, park and pool lots), and information services to facilitate both bus and rideshare needs.

Criteria

- Two points will be awarded for projects including development of a new HOV or reversible lane or the extension of existing lanes through the project. Traffic analysis should be used to show that the inclusion of the special lanes will be effective at increasing the capacity of the facility.

T-1b Innovative intersection/interchange design (2 Points)

Rationale

At locations where unusual traffic patterns or a constrained site would cause impacts in order to achieve a high level of service, the use of an innovative intersection or interchange form may provide improved operations.

The number, type and location of access points and traffic signals can have a direct impact on the capacity, speed and safety of a highway. Arterial access points create

conflict points and turning vehicles can interfere with through traffic potentially reducing the capacity of the through lanes.

Criteria

- Two points will be awarded for projects incorporating an innovative intersection or interchange design where traffic operational analysis shows it can provide a substantial operational improvement over conventional designs. For the purposes of this credit, designs will be considered innovative when they are not included in the current IDOT BDE manual, but are acceptable to IDOT and FHWA.

T-1c Expansion of or connection to a Traffic Management Center (TMC) (2 Points)

Rationale

A TMC is a tool for reducing congestion and improving safety. Through the use of technology, Traffic Engineers have quicker access to more information about the cause of traffic problems. Faster access to more data for decision making can mean engineers will be able to address more traffic problems quickly by adjusting traffic signals and rerouting traffic if necessary. Coordinating responses by establishing communications links can improve safety by both improving the response time to an incident and the duration of the incident impacts the roadway design. Shorter incident duration can account for reduced secondary incidents and less exposure time for emergency personnel.

Criteria

- Two points will be awarded for projects that create a link to a TMC and provide the necessary equipment to permit remote monitoring and traffic signal operations.

  Provide equipment to gather information about current roadway conditions through the use of Intelligent Transportation Systems (ITS), such as vehicle detection systems, closed circuit television (CCTV) surveillance cameras, and roadway weather information systems (RWIS).

  Roadway information should be communicated back to a central location or a group of interconnected TMCs. At the TMC the data should be processed, verified, and disseminated to identify and address operational issues. TMC staff can implement pre-programmed responses or use knowledge of the project area to address operational issues.

  Potential responses include:

  - Adjusting the timing of signals
  - Providing traveler information via Dynamic Message Signs (DMS), Highway Advisory Radio (HAR), and/or the Internet (1 point for distributing real time traveler information)
  - Coordinating incident response with other agencies including police, fire, maintenance and tow truck dispatch centers
  - Coordinating responses to freeway operations centers.

T-1d Installation of coordinated signal system (1 to 4 Points)

Rationale

A coordinated signal system consists of two or more traffic signals interconnected to each other and connected to a master controller or central system operating a system

timing plan. Coordinated systems can improve corridor progression and mobility, minimize vehicle stops and reduce vehicle idling which reduces vehicle emissions.

Coordinated signal systems typically consist of vehicle detectors which provide near real-time and historical data on the operation of the corridor. Advanced coordinated systems include a library of preprogrammed signal timing plans and logic that allows the system to select an appropriate timing plan based on the traffic conditions.

Coordinated signal systems can decrease vehicle stops at signals and delay by up to 40% with a resulting reduction in fuel consumption of 6-13% according to the US DOT.

Criteria

Points will be awarded for each advanced step taken to interconnect and implement advanced timing solutions on a coordinated signal system.

- One point will be awarded for the installation of a closed-loop interconnected signal system or addition of signal to an existing system in the project. A minimum of three timing plans developed based on a traffic operational analysis are required to receive credit for this point.
- An additional point will be awarded if additional timing plans (in addition to the three plans from the previous bullet point) are developed for weekend operations, special events, incident management, or if the coordinated system is being incorporated into a staffed traffic management center that permits real-time timing adjustments.
- An additional point will be awarded if advanced logic is included in the coordinated system enabling the central system/master controller to dynamically select an appropriate timing plan using system vehicle detection. Examples include adaptive traffic control systems and closed loop traffic responsive systems.
- An additional point will be awarded if the coordinated signal system provides for transit vehicle priority.

T-1e Limiting or consolidating access points along highway (1 Point)

Criteria

- One point will be awarded if the project incorporates access control into the design of the roadway. An access analysis shall be completed to balance providing reasonable access to abutting properties with the safe and efficient flow of traffic on the roadway.

T-1f Bus turnouts (1 Point)

Rationale

Bus turnouts allow buses to pull out of the travel lane at bus stops. Elimination of the bus from the travel lane can reduce delays on the roadway.

The ROW for the bus turnout and accompanying bus stop will limit installation in many urban locations. A bus turnout may be appropriate when one or more of the following situations exist:

  - Vehicle speeds in excess of 40 mph
  - High peak hour volumes
  - High accident rate, particularly rear-end accidents
  - Frequent bus stops
- High passenger boardings

- Need for dwelling time

The ability of the bus to safely re-enter traffic flow should be considered in the design.

Criteria

- One point will be awarded for the installation of bus turnouts at bus stops within the project. The appropriateness of the installation should be based on coordination with the transit agency and site conditions.

Sources

T-1a Special use lane

Bureau of Design and Environment Manual, Illinois Department of Transportation, 2002 Edition, Section 44-3.02 HOV Lanes

Guide for High-Occupancy Vehicle (HOV) Facilities American Association of State Highway and Transportation Officials, October 2004

T-1b Innovative intersection/interchange design

Bureau of Design and Environment Manual, Illinois Department of Transportation, 2002 Edition, Chapter 36, Intersections and Chapter 37, Interchanges

T-1c Expansion of or connection to a Traffic Management Center

Traffic Control Systems Handbook, FHWA-HOP-06-006, US Department of Transportation, October 2005, http://www.spcregion.org/downloads/ops/FHWA_TrafficControlSystemsHandbook_10-2005-FINAL.pdf

T-1d Installation of coordinated signal system

Traffic Control Systems Handbook, FHWA-HOP-06-006, US Department of Transportation, October 2005, http://www.spcregion.org/downloads/ops/FHWA_TrafficControlSystemsHandbook_10-2005-FINAL.pdf

Additional Resources

T-1e Limiting or consolidating access points

*Access Management***,** Arterial Management Program, Office of Operations, Federal Highway Administration, http://ops.fhwa.dot.gov/access_mgmt/index.htm**,** Accessed July 2, 2009

T-1f Bus turnouts

Highway Design Manual 2003, Oregon Department of Transportation, Chapter 12, Design Guidelines for Public Transportation**,** ftp://ftp.odot.state.or.us/techserv/roadway/web_drawings/HDM/navigator.pdf

T-2: Transit

Intent

The objective of this section is to consider promoting increased transit use through facilities on or adjacent to highways.

Rationale

Increased use of bus and ride share on highways can increase the capacity of the highway, can reduce congestion and fuel consumption. Increased use of rail transit can reduce traffic on highways in the most congested areas, potentially reducing congestion, and fuel consumption. Park-and-Ride lots serve as an intermodal staging location for transfers between modes. Well placed and designed lots encourage ride share and transit use. Increased amenities at the lots make them more attractive and useable to a wider range of patrons. Shelters, either on street or in Park-and-Ride lots improve the experience for transit users and can encourage transit use in a wider range of weather conditions. Easy access to transit facilities, such as bus shelters, is important. Sidewalks can improve safety and accessibility. In snow and rain, sidewalks become more important for safe access to the facilities. Installation of transit express or bus rapid transit lanes gives buses priority and faster service. This increases desirability of the bus service and increases the total capacity of the system.

T-2a Provide new Park-and-Ride lots (1 to 2 Points)

Criteria

If transit buses are to use the lot, coordination with the transit company to determine number and frequency of service is important. Appropriate parking and loading areas for the projected service will be provided.

- **T-2a-1** One point will be awarded for evaluating the demand for and effectiveness of possible locations for Park-and-Ride lots within the project.
- **T-2a-2** One additional point will be awarded for projects where new Park-and-Ride lots are included in the project. Lots should be designed for the projected demand and vehicular types.

T-2b Operational improvements to an existing Park-and-Ride lot (1 Point)

Criteria

- One point will be awarded for projects that make improvements to an existing Park-and-Ride lot including:
  - Improved access and signing
  - Increased size where the existing lot is insufficient
  - Shelters for waiting passengers
  - Sidewalks and loading areas

T-2c Provide bike accommodations at Park-and-Ride lots & transit stations (1 Point)

Criteria

- One point will be awarded for projects that provide bicycle accommodations at Park-and-Ride lots and transit stations in order to increase their use and to reduce automotive traffic to the facilities. Reducing automotive traffic to the facilities reduces

traffic on approach roadway and can reduce paved areas for parking. Facilities users traveling less than 3 miles to the facility are good potential bike patrons.

- Safe bicycle access routes from neighborhoods
- Secure bike parking at the station. Bike lockers or sheltered storage units are preferred as they provide maximum security and protection from the elements.

T-2d Improve shading through vegetation at Park-and-Ride lots (1 Point)

Criteria

- One point will be awarded for projects that increase vegetation at Park-and-Ride lots that can provide shading for pavement and vehicles in order to potentially:
  - Reduce the heat island effect
  - Reduce the heating of parked and waiting vehicles, so as to reduce the use of vehicular air conditioning

T-2e Provide new multi-modal connections (1 Point)

Criteria

- One point will be awarded for projects that provide improved connections to transit stations located along or adjacent to the route such that the route provides access to the station or acts as a deterrent to those crossing the route to access the station. Actions include:
  - Signal placement and timing to allow improved access to and from transit stations and transit parking
  - Improved signing for transit stations
  - Pedestrian routes along and across the roadway for access to transit stations

T-2f Include bus stops with shelters or pads and pedestrian access (1 Point)

Criteria

- One point will be awarded for projects that require working with the local transit agency to determine appropriate locations of existing or proposed bus stops within the project. Bus stops should include:
  - If roadway pavement is asphalt, consider placement of concrete bus pad to eliminate pavement rutting at the stop
  - Consider ability of bus to pull out of and into the traffic flow
  - Provide either a shelter or pad for riders
  - Provide ADA compliant pedestrian access route to bus stop

T-2g Installation of a transit express system (3 Points)

Criteria

- Three points will be awarded for projects that include systems to speed transit movement within the project. These can consist of:
  - Queue Jump bus lanes at signalized intersections
  - Use of Bus Signal Priority systems at intersections

- Dedicated bus lanes
- Provisions for shoulder riding for buses
- Bus only entrances and/or exits

Sources

Guide for Park-and-Ride Facilities, American Association of State Highway and Transportation Officials, November 2004

T-3: Improve Bicycle and Pedestrian Facilities

Intent

The objective of this section is to consider approaches for improving conditions for bicycle and pedestrian travel within roadway improvement projects. Conditions within project corridors can provide sufficient comfort and safety level in order to encourage pedestrian and bicycle movements, thereby reducing the need for driving (and accompanying energy usage) for many short distance trips.

Rationale

In order to understand the likely pedestrian and bicycle movements within a project area, it is important to identify the potential travel generators and to diagram likely movements, such as from a residential subdivision to a school or a park, or from an office complex to a group of restaurants across the roadway. If pedestrian accommodations are provided, for example, to cross the roadway, this walking trip may replace a vehicular trip.

Further, within the roadway corridor, it's important to understand how well the current roadway accommodates pedestrian and bicycle movements, as well as how well the proposed roadway will accommodate conditions for bicycling and walking.

T-3a Assess Conditions –Perform bicycle and pedestrian Level of Service analysis within the roadway corridor (1 point)

Criteria

- One point will be awarded to projects analyzing the bicycle and pedestrian level of service by utilizing the following methods as appropriate: Bicycle Level of Services, Pedestrian Level of Service and/or Multimodal LOS for Urban Streets models.

  Bicycle and Pedestrian Level of Service analyses evaluate current and proposed conditions for bicycling and walking within a roadway corridor. These analyses are performed by collecting information such as lane width, number of lanes, ADT, % trucks, presence of parking, parking turnover, and parkway width to determine the relative comfort level of bicyclists or pedestrians riding or walking along the roadway. The analyses provide a baseline value of the existing conditions, and allow the designer the opportunity to evaluate the change in bicyclist or pedestrian conditions as a result of the project. The methodology allows the advantage of evaluating various designs and their respective effects on these travelers.

T-3b to 3l Improved facilities to accommodate pedestrian and bicyclist movements

Rationale

To encourage travelers to substitute walking or bicycling for short vehicular trips, designers can provide comfortable and safe accommodations to these users to enable them to cross an intersection or a roadway, or walk along a roadway. Chapter 17 *Bicycle and Pedestrian Accommodations* of the BDE Manual indicates appropriate accommodations for pedestrians and bicyclists within roadway projects.

T-3b Improved intersection designs for pedestrians (1 to 2 points)

Criteria

- One to two points will be awarded to projects that improve pedestrian intersections including elements beyond simple crosswalks, such as countdown signal heads, narrower lanes (to shorten crossing distance) and pedestrian median or corner refuge islands. Points vary according to level of accommodations.

T-3c Provide new or rehabilitate existing sidewalks or bikeways (1 to 2 points)

Criteria

- **T-3c-1** Two points will be awarded to projects that provide new sidewalks, potentially improving pedestrians' ability to utilize a roadway corridor.
- **T-3c-2** One point will be awarded to projects rehabilitating sidewalks.

T-3d Sidewalk or bikeway widening (1 to 2 points)

Criteria

- **T-3d-1** One point will be awarded to projects providing widened sidewalks, which in some cases, can improve conditions for bicyclists as well as pedestrians.
- **T-3d-2** An additional point (1) will be awarded for parkway separation.

T-3e Designated space for cyclists (shared lanes) (1 point)

Criteria

- One point awarded for providing shared lane space within roadway (per BDE manual).

T-3f Striped bike lanes within roadway (2 points)

Criteria

- Two points will be awarded for project designs including striped bike lanes. These lanes can provide significantly improved bicycling conditions, especially in mid-speed and mid-volume roadways.

T-3g Restore or pave shoulders for bicycling (2 points)

Criteria

- Two points will be awarded to projects providing paved shoulders for bicycling. Paved shoulders can be the rural equivalent to bike lanes on urban sections.

T-3h Create parallel bike routes (1 point)

Criteria

- One point will be awarded for parallel bike routes where state highways are not suitable for less experienced bicyclists. On some routes it can be difficult to accommodate bicyclists. Parallel routes may provide adequate substitute routes, but many factors need to be considered, such as total adverse travel, the types of businesses located along the primary route, and will cyclists still want access to these destinations, etc. See BDE 17-6 Bicycle Checklists – Form for Bicycle Travel Assessment

T-3i Develop the roadway cross-section to facilitate the development of future multi-use paths and facilities (1 point)

Criteria

- One point will be awarded to projects providing space for multi-use paths and sidewalks. If local participation is not possible at the time of construction, the roadway can continue to be designed and constructed (i.e., a sidewalk 'platform' can be graded and seeded) with the understanding that sidewalks may be retrofitted (at minimal expense) at a future date.

T-3j Provide new grade-separated (bridge or underpass) bike/pedestrian crossing structure (3 points)

Criteria

- Three points will be awarded to projects providing a grade-separated bike/pedestrian crossing.

T-3k Install bikeway signs (1 point)

Criteria

- One point will be awarded to projects installing bikeway signs. Bikeway signs are important elements for bicyclists.

T-3l Install bicycle racks (1 point)

Criteria

- One point will be awarded to projects installing bicycle racks. When cyclists arrive at their destination, it can be important to ensure adequate and secure parking, often on public property.

Sources and Resources

IDOT *BDE Manual Chapter 17, Bicycle and Pedestrian Accommodations*, particularly *17-1.04 Assessment of Bicycle Travel Within Highway Projects*

TRB Publication: *NCHRP Report #616 Project: NCHRP 03-70*. *Multimodal LOS for Urban Streets*. (to be included in the 2010 edition of the Highway Capacity Manual)

AASHTO *Guide for the Development of Bicycle Facilities*, 1999

AASHTO *Guide for the Planning, Design, and Operation of Pedestrian Facilities*, 2004

L-1: Reduced Electrical Consumption

Intent

The objective of this section is to consider incorporation of new technology that can not only reduce power consumption from the utility grid but can also minimize the environmental impact of providing power at the point of use (including trenching, backfill, replanting, etc).

Additionally, incorporation of these new technologies could result in reduced: operating costs, maintenance tasks/requirements and overall system life cycle costs (but may have an increased acquisition cost over currently adopted practices).

L-1a Use of alternative energy source to power street lighting, warning signs, and remote Intelligent Transportation Systems (ITS) components (2 Points)

Rationale

Not all 'illuminated' street and roadway features are candidates for currently and commercially available alternative energy sources. However, those that are practical can be considered and incorporated in the design of a roadway system.

Illuminated signage, warning signals (e.g. flashing indicators mounted on warning signs) and ITS components are candidates for alternative energy sources and can be considered. The safety of vehicular and pedestrian traffic should not be compromised.

Consider the adjustment or incorporation of roadway features utilizing current technology to reduce grid power consumption but meet IDOT standards.

Criteria

Two points will be awarded to the project if the following criteria are met:

- Reduces grid-fed power at each location,
- Meets the lighting/indicator objectives as defined for that application,
- Does not compromise or jeopardy safety,
- Has a positive return on investment when including operating costs.

L-1b Retrofit existing street lighting with high efficiency types (2 Points)

Rationale

In its most basic definition, high efficiency lighting is any lighting source that can measurably reduce power consumption (kilowatt hours). An additional benefit from incorporating this technology is that many high efficiency sources also have a longer life cycle and require less maintenance. Thus, a higher initial acquisition cost may be offset by a reduced life cycle cost.

High efficiency street lighting sources include (but are not limited to):

- Light Emitting Diodes (LED)
- Induction Lamps
- New High Intensity Discharge (HID) Lamp and Ballast combinations

Consider incorporating roadway lighting that is more energy efficient, but also meets the lighting objectives as identified by IDOT standards. IDOT standards list multiple

requirements for not only measurable light output on the street surfaces, but also include specific language and content regarding ancillary topics such as ‘glare’.

Criteria

Two points will be awarded to the project that meets the following criteria:

- Eliminates or reduces power consumption at each location
- Meets all IDOT standards.
- Has a positive return on investment when including operating costs.

L-1c Replace signs with retro reflective signs to eliminate sign lighting (2 Points)

Rationale

Retro reflective technology currently exists and can improve visibility of roadway signage as well as eliminate a light source altogether where one is not needed. This can eliminate both power consumption and light pollution.

Criteria

Two points will be awarded to the project that meets the following criteria:

- Eliminates the need for a powered illumination source at each location
- Meets current IDOT criteria
- Has a positive return on investment when including operating costs.

L-1d Retrofit existing sign lighting with high efficiency types (1 Point)

Rationale

In its most basic definition, high efficiency lighting is any lighting source that can measurably reduce power consumption (kilowatt hours). An additional benefit from incorporating this technology is that many high efficiency sources also have a longer life cycle and require less maintenance thus, a higher initial acquisition cost may be offset by a reduced life cycle cost.

High efficiency sign lighting sources include (but are not limited to):

- Light Emitting Diodes (LED)
- New High Intensity Discharge (HID) Lamp and Ballast combinations

Consider incorporating sign lighting that is more energy efficient, but also meets the lighting objectives as identified by IDOT standards.

Criteria

One point will be awarded to the project that meets the following criteria:

- Eliminates or reduces power consumption at each location
- Meets all IDOT standards
- Has a positive return on investment when including operating costs.

L-1e Use of high efficiency street lighting on new installations (2 Points)

Rationale

In its most basic definition, high efficiency lighting is any lighting source that can measurably reduce power consumption (kilowatt hours). An additional benefit from incorporating this technology is that many high efficiency sources also have a longer life cycle and require less maintenance thus, a higher initial acquisition cost may be offset by a reduced life cycle cost.

These high efficiency street and sign lighting sources include (but are not limited to):

- Light Emitting Diodes (LED)
- Induction Lamps
- New High Intensity Discharge (HID) Lamp and Ballast combinations

Consider incorporating roadway lighting that is more energy efficient, but also meets the lighting objectives as identified by IDOT standards. IDOT standards list multiple requirements for not only measurable light output on the street surfaces, but also include specific language and content regarding ancillary topics such as 'glare'.

Criteria

Two points will be awarded to the project if the designer and reviewer are able to answer these questions in the affirmative (if they are applicable):

- Reduces grid-fed power at each location,
- Meets the lighting/indicator objectives as defined for that application,
- Does not compromise or jeopardy safety,
- Has a positive return on investment when including operating costs.

L-1f Use of alternative energy source for bus stops (2 Points)

Rationale

Installing lighting for bus stops and shelters can improve safety for those using the transit service. Using an alternative energy source for the lighting can allow the installation of lighting without the costs and impacts of providing grid power to the location.

Criteria

Two points will be awarded to the project that meets the following criteria:

- Reduces grid-fed power at each location,
- Meets the lighting/indicator objectives as defined for that application,
- Does not compromise or jeopardy safety,
- Has a positive return on investment when including operating costs.

L-1g Use of high efficiency (such as LED) traffic signals (1 Point)

Rationale

Traffic signals are designed and installed to:

- Ensure safe and orderly flow of traffic
- Protect pedestrians and vehicles at busy intersections
- Reduce the severity and frequency of accidents between vehicles entering intersections

No compromises can be made to reduce power consumption that would negatively impact either public safety or the ability of the LED traffic signal to interface with multi-jurisdictional control systems that include cities, counties or IDOT. However, efforts to incorporate traffic signals that are more energy efficient, but also meet all IDOT standards are encouraged.

Criteria

Incorporate traffic signal lighting that is more energy efficient, but also meets the illumination/indicator and control systems objectives as identified by IDOT standards.

One point will be awarded to the project that meets the following criteria:

- Reduces power consumption over conventional signals
- Meets IDOT Standards
- Has a positive return on investment when including operating costs.

Sources

Illinois Department of Transportation. *Bureau of Design and Environment Manual, Chapter 56, Highway Lighting*. 2002 ed. Web. http://www.dot.il.gov/desenv/BDE%20Manual/BDE/pdf/chap56.pdf

IDOT District 1 - *General Guidelines for Lighting Design, Plan Preparation, and Highway Lighting by Permit.*

Federal Highway Administration. *Manual on Uniform Traffic Control Devices, Section 2A.08 – Retro reflectivity and Illumination*. 2003 ed. http://mutcd.fhwa.dot.gov/pdfs/2003r1/Ch2A.pdf

Additional Resources

Bullough, John D., Jeremy D. Snyder, Aaron M. Smith, and Terence R. Klein. *National Cooperative Highway Research Program (NCHRP) Web-Only Document 146: Replacement Processes for Light Emitting Diode (LED) Traffic Signals*. Transportation Research Board, Aug. 2009. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w146.pdf

Urbanik II, Thomas. *LED Traffic Signal Monitoring, Maintenance, and Replacement Issues: A Synthesis of Highway Practice*. TRANSPORTATION RESEARCH BOARD, 2008. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_387.pdf .

Illumination Engineering Society of North America (IESNA) Documents

- IESNA RP-8-00 Roadway Lighting
- IESNA RP-19-01 Sign Lighting
- IESNA RP-22-05 Tunnel Lighting

- IESNA RP-33-99 Lighting for Exterior Environments
- IESNA G-1-03 Guideline on Security Lighting for People, Property, and Public Spaces
- IESNA DG-19-08 Roundabout Lighting

Model Lighting Ordinance (MLO) – Draft. International Dark-Sky Association (IDA) and the Illuminating Engineering Society (IES), 7 Feb. 2009
http://docs.darksky.org/MLO/MLOPublicReview020909.pdf

IMERC Fact Sheet Mercury Use in Lighting. Northeast Waste Management Officials Association (NEWMOA), Aug. 2008.
http://www.newmoa.org/prevention/mercury/imerc/factsheets/lighting.pdf

Izzett, Conor. "Transit shelters : not just a bus stop anymore." *Metro* 104.5 (2008): 68-73.

"Largest solar power installation of its kind in the U.S. realizes significant savings in electricity for Los Angeles Metro." *Urban transportation monitor* 20.14 (2006): 3.

L-2: Stray Light Reduction

Intent

The objective of this section is to consider incorporating cut off or full cut off roadway light fixtures to reduce adverse effects of artificial light including excessive sky glow, glare, light trespass, and light clutter.

Rationale

Past roadway lighting designs have been focused on ensuring safety and security as a top priority. Stray light was not considered a design flaw, but simply a byproduct. Recent attention to additional light (including light trespass, sky glow, etc.) has raised the awareness of the public and lighting manufacturers. Thus, cut off and full cut off fixtures are now readily available to the market that can reduce stray light and can also comply with IDOT lighting objectives when properly designed and installed.

L-2a Retrofit existing roadway lighting fixtures using cut off or full cut off fixtures (2 Points)

Criteria

Two points will be awarded to the project that meets the following criteria:

- Eliminates existing light trespass from the project area onto adjacent properties
- Meets IDOT lighting requirements

L-2b New roadway lighting using cut off or full cut off fixtures (2 Points)

Criteria

Two points will be awarded to the project that meets the following criteria:

- Meets IDOT lighting requirements
- Prevents light trespass onto adjacent properties

Sources

Illinois Department of Transportation. *Bureau of Design and Environment Manual, Chapter 56, Highway Lighting*. 2002 ed. http://www.dot.il.gov/desenv/BDE%20Manual/BDE/pdf/chap56.pdf

Additional Resources

Illumination Engineering Society of North America (IESNA) Documents

- IESNA RP-8-00 Roadway Lighting
- IESNA RP-19-01 Sign Lighting
- IESNA RP-22-05 Tunnel Lighting
- IESNA RP-33-99 Lighting for Exterior Environments
- IESNA G-1-03 Guideline on Security Lighting for People, Property, and Public Spaces
- IESNA DG-19-08 Roundabout Lighting

Model Lighting Ordinance (MLO) – Draft. International Dark-Sky Association (IDA) and the

Illuminating Engineering Society (IES), 7 Feb. 2009.
http://docs.darksky.org/MLO/MLOPublicReview020909.pdf

M-1: Materials

Intent

The objectives of this section are to consider designs that will allow and give the flexibility to the contractors to reduce waste generation, and reuse and recycle materials in beneficial ways. The anticipated benefits in this section can include but are not limited to:

- preserving natural resources and protecting the environment by reducing the use of natural resources and increasing the use of recycle/reuse materials;
- finding ways to reduce the carbon footprint for the project by minimizing hauling;
- building cost effective pavement systems by using recycle and/or reuse materials; and
- providing support for innovative thinking to create sustainable pavement systems.

The specification of materials in construction documents must conform to IDOT Standard Specifications, Special Provisions, District Special Provisions or other IDOT approved provisions. The items included within this section are not to imply that IDOT requirements need not be met.

M-1a Reuse of top soil (1 Point)

Rationale

Minimize trucking to reduce the carbon footprint and pollution generated.

Criteria

- One point will be awarded to projects that allow the reuse of top soil removed for grading and reuse of this material on site as long as it is determined non-hazardous material.

M-1b Balance cuts and fills (1 to 2 Points)

Rationale

Balancing cuts and fills can reduce the need for borrow excavation, which can reduce the vehicle emissions and pollution generated by the transportation of soils in and out of the project corridor.

Criteria

- **M-1b-1** One point will be awarded to projects that minimize the total amount of grading so that cuts and fills are close to balanced.
- **M-1b-2** One additional point will be awarded for designs balancing “cuts and fills” per construction stage so that traffic can be maintained on the existing pavement during construction.

M-1c Reuse spoils within project corridor to minimize material in and out of site (2 points)

Rationale

Reuse of spoil within the project corridor reduces vehicle emissions and pollution generated by the transportation of materials out of the project corridor. Reducing the transportation may also reduce the construction costs.

Criteria

- Two points will be awarded to projects that utilize spoil material as fill as specified in plans and specifications within project limits or at locations specified in the plans.

M-1d Allow rubblization of concrete shoulder and concrete pavements (1 Point)

Rationale

Minimize the hauling of useable construction material from the tag site for processing and hauling back for reuse, to potentially minimize pollution, emission, and to potentially extend the use of natural resources.

Criteria

- One point will be awarded to projects providing for a pavement design that will incorporate rubblization of existing pavement and building a new pavement structure over it when conditions permit.

M-1e Allow flexibility in design with the use of recycled or salvaged non-hazardous material (1 to 7 points)

Rationale

Minimize the use of scarce natural resources. Minimize the hauling of aggregate, reduce emission and pollution. Build cost effective structures.

Criteria

One point will be awarded for each of the following reuse and recycling practices for existing pavement elements during construction of the proposed new pavement structure. This shall include all types of concrete pavements and HMA.

- **M-1e-1** Allow the processing of demolished concrete to reclaim scrap metals and to create useable aggregate.
- **M-1e-2** Allow the use of milled HMA pavements for capping stone.
- **M-1e-3** Allow the use of recycled crushed pavements for temporary aggregate for areas like driveways or access roads.
- **M-1e-4** Allow the use of recycled crushed pavements for shoulder stone.
- **M-1e-5** Allow the use of recycled crushed pavements as aggregate for subgrade, sub base, or base lifts.
- **M-1e-6** Allow reclaiming sub base granular material.
- **M-1e-7** Provide for optional reuse of reclaimed scrap materials for various items (e.g., sheeting, guard rail, etc.)

M-1f Allow the use of locally produced by-products to be reused in the construction of embankments, hot mix asphalt and Portland cement concrete mixtures (1 to 8 Points)

Rationale

To potentially improve the use of existing construction materials and minimize their production impact on the environment, such as cement cast iron or other products produced locally, improve the local air quality, reduce the carbon footprint of cement production facility and reduce emission in general.

Consider providing for the use of ternary concrete mixtures that incorporate fly ash, slag cement, or microsilica as a partial substrate to cement in the production of concrete mixtures. Ternary mixes, like those of Portland, fly ash and slag cement, have been used in practically every concrete application. Ternary mixtures can be designed for high strength, low permeability, sulfate resistance and alkali-silica reactivity resistance just to name a few. Furthermore, the use of these additional cementitious materials can help to reduce emissions, energy and virgin material requirements when compared with 100% Portland mixtures. By moving to these types of ternary mixtures, we can not only produce a greener concrete, but can also work together to become more environmentally friendly.

Provide for the use of alternative materials in the construction of embankments as partial additions to or replacement of natural aggregates.

Criteria

One or possibly two points will be awarded for each of the following practices related to the use of alternative materials.

- **M-1f-1** Allow the use of fly ash, ground granulated blast furnace slag cement, and microsilica in concrete mixtures**.**
- **M-1f-2** Allow the use of ternary concrete mixtures in the construction of concrete pavements, shoulders and appropriate structural items.
- **M-1f-3** Allow the use of foundry sand or bottom ash as part of a material in the construction of embankments.
- **M-1f-4** Allow the use of slag aggregate in the production of HMA mixtures (such as SMA Designs or "F" Mix) where friction aggregate is a requirement.
- **M-1f-5** Allow the use of Recycled Asphalt Shingles (RAS) in the production of all HMA mixtures.
- **M-1f-6** Obtain and implement a project specific plan for the innovative reuse of waste materials other than the ones listed above.

M-1g Allow the use of recycled asphalt pavement (RAP) in the construction of new hot mix asphalt pavements (1 to 3 Points)

Rationale

Consider providing for better use of natural resources and minimize the dumping of RAP in landfills. Consider improving land use, reducing pollution by minimizing trucking and hauling of RAP to landfills, and protecting the environment in general**.**

Criteria

The following practices provide for the use of fractionated RAP so higher percentages of RAP can be incorporated in the production of hot mix asphalt.

- **M-1g-1** One point will be awarded for allowing the use of recycled asphalt pavement (RAP) in hot mix asphalt (HMA).
- **M-1g-2** One additional point will be awarded for allowing the use of fractionated recycled asphalt pavement (FRAP) at a higher percentage in the manufacturing of hot mix asphalt.

M-1h Allow inclusion of environmentally acceptable and permitted sites in the contract documents for the disposal of surplus excavated material to an off-site location (1 to 2 points)

Rationale

Consider minimizing the amount of surplus excavated material disposed in landfills or dump sites.

Criteria

- One point will be awarded to projects that identify locations where excess excavated material that cannot be used within the project corridor can be reused (IEPA Approved sites).
- One point will be awarded to projects with contract documents that identify other state / public entities or non-profit organizations that could benefit from the use of the excess / surplus material hauled off the project limits.

M-1i Allow the salvage / moving of buildings (2 points)

Rationale

Consider allowing the salvage / moving of buildings rather than demolition, to reduce the amount of materials disposed in landfills.

Criteria

- Two points will be awarded to projects with contract documents that identify buildings or materials that could be salvaged and specify the approach to do so.

M-1j Soil stabilization with geosynthetics (1 Point)

Rationale:

The term geosynthetic is used to refer to geotextile and geogrid. Geotextiles increase the stability and improve performance of weak subgrade soils primarily by separating the aggregate from the subgrade. Geogrids as well as some geotextiles can provide strength through friction or interlock developed between the aggregate and the geosynthetic.

Geosynthetics can be used both for temporary and permanent road and pavement construction. When used over soft subgrade, geosynthetics may provide the following benefits for a sustainable roadway:

- Reducing the depth of excavation required for the removal of unsuitable (soft) materials for subgrade, thus reducing energy spent for construction;
- Reducing the thickness of aggregate required to stabilize the subgrade, thus reducing the less use of natural material such as aggregate; and
- Allowing an increase in subgrade strength over time, thus ultimately increasing the life of the roadway.

Criteria:

One point will be awarded to projects that incorporate the use of geosynthetics:

- to reduce the thickness of aggregate required for stabilization of the subgrade during construction activities;

- or to reduce the thickness of aggregate above that required for structural support due to susceptibility of subgrade soils to pumping and base course intrusion.

M-1k Soil stabilization with cementitious and recycled materials (2 Points)

Rationale:

Allowing the use of recycled materials for subgrade improvement or base course will contribute to reducing the use of natural materials and may reduce the cost of the project. Recycled materials refer to materials such as bituminous aggregate mixtures, cement aggregate mixtures (with Portland cement and aggregate), pozzolanic stabilized mixtures (with lime, Portland cement, fly ash, emulsified asphalt, or concrete admixtures), cement kiln dust, bottom ash, foundry slag, and recycled base aggregate.

It must be confirmed or demonstrated that any recycled materials will not have an adverse affect on the environment or users.

Criteria:

- Two points will be awarded for projects that allow the use of cementitious and/or recycled materials for soil stabilization for pavement construction, if it can be demonstrated that this process will reduce the use of natural aggregate (virgin aggregate or material hauled from off-site source) use for stabilization.

M-1l Consider locally available materials (such as local seed stock and plants) in developing specifications for the project (1 point)

Rationale

Considering local materials can yield a higher possibility for growing success for plants, cost effectiveness,, and a decrease of pollutants from the cutback in vehicle emissions and pollution generated by the transportation of material into the project corridor.

Criteria

- One point will be awarded to projects with specifications that support the use of local materials depending on the location of the project, whenever practical.

M-1m Extended pavement life design and rehabilitation strategies (1 to 11 Points)

Rationale

The design of extended pavement life for both HMA and concrete pavements will in the long run require fewer natural resources, preserve the environment, and improve the quality of life for the community. These pavements require higher quality materials.

Criteria

One to three points will be awarded to projects where pavement specifications meet the following criteria:

- **M-1m-1** two points for specifying the use of perpetual HMA pavement with 30 or more year of design life.
- **M-1m-2** two points for specifying the use of 30 year design life concrete pavement.
- **M-1m-3** three points for specifying the use of 40 year design life concrete pavement
- **M-1m-4** one point for specifying the use of pulverization of HMA pavement for a base.

- **M-1m-5** one point for specifying the use of various pavement preservation processes such as chip seal, seal coat, and micro resurfacing.
- **M-1m-6** two points for selecting hot-in-place recycling or cold-in-place recycling of hot mix asphalt where possible.

Sources

IDOT, Standard Specifications for Road and Bridge Construction, Article 210. http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Standard Specifications for Road and Bridge Construction, Article 211. http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Standard Specifications for Road and Bridge Construction, Article 312 http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Standard Specifications for Road and Bridge Construction, Article 350 http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Bureau of Design and Environment, Design Manual, Chapter 54 http://www.dot.il.gov/desenv/BDEManual/BDE/pdf/chap54.pdf

IDOT, BDE Special Provisions, Special Provision for Rubbilizing PCC Pavement

IDOT, Standard Specifications for Road and Bridge Construction, http://www.dot.il.gov/desenv/stdspecs07.html

IDOT, Bureau of Bridges & Structures, Documents, Manuals and Procedures, Subgrade Stability Manual, May 1st, 2005 http://www.dot.il.gov/bridges/pdf/SubgradeStabilityManual.exe

IDOT, Bureau of Bridges & Structures, Documents, Manuals and Procedures, Geotechnical Manual, http://www.dot.il.gov/bridges/pdf/GeotechnicalManual.exe

IDOT, BDE Special Provisions, Cement. http://www.dot.il.gov/desenv/pdf/80166.pdf

IDOT, BDE Special Provisions, Concrete *Inlay and Overlay.*

http://www.dot.il.gov/desenv/specrev/80210.pdf

IDOT, BDE Special Provisions, Special Provision for Preventive Maintenance-Bituminous Surface Treatment. http://www.dot.il.gov/desenv/pdf/80218.pdf

IDOT, BDE Special Provisions, Concrete Mix Designs. http://www.dot.il.gov/desenv/pdf/80226.pdf

IDOT District One Special Provisions for:

- Aggregate Subgrade, 12; (300 MM) Effective May 1st 1990, Revised August 1st 2008
- Porous Granular Embankment, Subgrade Effective September 30th 1985, Revised Aug 1st 2008
- Lightweight Expanded Blast Furnace Slag Aggregate
- Embankment I, Effective January 1st 2007
- Use of RAP (Dist 1) Effective: January 1, 2007, Revised: January 7, 2009
- Stone Matrix Asphalt (SMA) Effective April 1st 1997, Revised January 1st 2007.
- Pulverization Special provision

- Extended Life PCC Pavement (30 year and 40 year)

Additional Resources

IDOT, Physical Research Reports, Evaluation for Crack and Seat Method of Resurfacing Concrete Pavements. http://www.dot.il.gov/materials/research/pdf/104.pdf

IDOT, Physical Research Reports, Recycling Old PCC Pavements, http://www.dot.il.gov/materials/research/pdf/113.pdf

IDOT, Physical Research Reports, Evaluation of Reclaimed Rubber in Bituminous Pavements. http://www.dot.il.gov/materials/research/pdf/117.pdf

IDOT, Physical Research Reports, Evaluation of Stone Matrix Asphalt http://www.dot.il.gov/materials/research/pdf/121.pdf

IDOT, Physical Research Reports, Alternative Materials for the Modification and Stabilization of Unstable Subgrade Soils- Laboratory Testing Report. http://www.dot.il.gov/materials/research/pdf/125.pdf

IDOT, Physical Research Reports, Performance of Thin Bonded Concrete Overlays in Illinois.

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IDOT, Physical Research Reports, Rubbilizing with Bituminous Concrete Overlay, http://www.dot.il.gov/materials/research/pdf/137.pdf

IDOT, Physical Research Reports, Performance of an Unbonded Concrete Overlay on I-74 http://www.dot.il.gov/materials/research/pdf/140.pdf

IDOT, Physical Research Reports, Utilization of Recycled Materials in Illinois Highway Construction. http://www.dot.il.gov/materials/research/pdf/142.pdf

IDOT, Physical Research Reports, Bonded Concrete Overlay Performance in Illinois http://www.dot.il.gov/materials/research/pdf/143.pdf

IDOT, Physical Research Reports, White Topping Construction and Early Performance in Illinois http://www.dot.il.gov/materials/research/pdf/144.pdf

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IDOT, Physical Research Reports, White Topping Performance in Illinois http://www.dot.il.gov/materials/research/pdf/148.pdf

FHWA-HI-95-038, Geosynthetic Design and Construction Guidelines http://www.fhwa.dot.gov/PAVEMENT/pub_details.cfm?id=1

A Lighter Shade of Gray. http://www.pavement.com/News_and_Advocacy/STM/STM-05-04.pdf

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Asphalt Institute, Proper Rubblization, http://www.moasphalt.org/facts/asphalt/rubblization

Asphalt Institute, Executive Offices and Research Center Research Park Drive P.O. Box 14052 Lexington, KY 40512-4052 USA Telephone 859-288-4960 FAX No. 859-288-4999

Blast Furnace Slag-User Guidelines. http://www.tfhrc.gov/hnr20/recycle/waste/bfs3.htm

DeJong, J.T., Mortensen, B.M., Martinez, B.C., and Nelson, D.C. "Bio-Mediated Modification of Subsurface Properties" *Ecological Engineering"*, 2009 (in press).

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Ground Granulated Blast Furnace Slag Cement. http://en.wikipedia.org/wiki/Slag_cement

Long-Life Concrete Pavements. http://www.pavement.com/Downloads/LLCP.pdf

Microsilica Concrete Properties and Applications. http://cedb.asce.org/cgi/www.display.cgi

Mitchell, J.K. and Santamarina, J.C. (2005). "Biological Considerations in Geotechnical Engineering." *Journal of Geotechnical and Geoenvironmental Engineering*, Vol. 131 (10): 1222-1233.

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https://www.nysdot.gov/programs/greenlites/repository/GreenLITESCertificationProgram-FullDoc-Final.pdf .

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I-1: Innovation

Intent

The objective of this section is to consider the use of materials, processes, methods, equipment items, traffic operational devices, or other features which have not yet been sufficiently tested under actual field and operational conditions to merit acceptance without reservations in normal highway construction. Typically these will be items for which IDOT does not have a standard specification or special provision, or is not addressed in the current BDE Manual.

In order to utilize such features on state projects it may be necessary to get approval through the Experimental Features Process. If this process is not followed the cost of the item may not be eligible for Federal participation. Therefore the use of an unapproved material, etc. requires planning and a well supported justification.

Rationale

There is ongoing research in all fields of transportation and it is important that the industry be cognizant of new materials and methods and bring that knowledge to products to improve the overall quality and in particular, as they relation to this document, the sustainability of projects.

At the same time IDOT and FHWA must use unproven materials and methods carefully to protect public safety and investment. The Experimental Feature process is used to review and regulate the introduction of new materials and methods.

I-1a Use of Experimental Feature(s) to improve the sustainability of a project (1 to 3 Points)

Criteria

One to three points may be awarded for projects where the Experimental Feature process is used to include new materials or methods in order to improve the sustainability of the project in one or more ways. An Experimental Feature Work Plan will be required in accordance with Construction Memorandum No. 00-2 "*Construction Projects Incorporating Experimental Features*."

The number of points should be relative to both the sustainability benefits and the level of effort to research and support the incorporation of the innovative feature in the project.

Sources

IDOT, Construction Memorandum No. 00-2 "Construction Projects Incorporating Experimental Features" (Appendix 10A)

Physical Research Experimental Features:
www.dot.il.gov/materials/research/expfeatures.html#a

Additional Resources

FHWA, Federal-Aid Highway Program Manual (Vol. 6-4-2-4)

C-1: Construction Practices

The Construction Practices Section recognizes existing and new sustainable materials and methods in the transportation industry, specifically in the construction phase of a project. . The Construction Practices Section is meant to be used as a guideline and to foster sustainable practices and innovation. In many cases, the sustainable practices result in a choice by the contractor, not necessarily implemented as a result of a contract requirement.

Some technologies and suggestions offered in this document are recent developments or new practices. In some instances, the contractor may want or need to discuss sustainable options with the Department before implementation. The reader is referred back to the section called "Use of this Guide" for various limitations

This document goes beyond the utilization of commonly used sustainable practices by providing for opportunities of developing new or improving sustainable practices in the transportation industry. This document is one of the few aimed at construction and we hope to see the industry embrace these green initiatives.

This document is structured as a point system with an accompanying chart that can also be used as a check list. Points are awarded for using the specific I-LAST techniques during the process of construction. The topic identification given in the chart corresponds with a more detailed description complete with rationale, criteria, courses, and resources provided later in the document. By using these techniques in the construction of roadways, Illinois will be a frontrunner in creating a more sustainable infrastructure.

Intent

The objectives of this section are to consider construction practices that will allow and give the flexibility to the contractors to reduce waste generation, reuse and recycle materials in beneficial ways. The anticipated benefits in this section can include but are not limited to:

- Preserving natural resources and protecting the environment by reducing the use of natural resources and increasing the use of recycle/reuse materials;
- Finding ways to reduce the carbon footprint for the project by minimizing hauling;
- Constructing cost effective pavement systems by using recycle and/or reuse materials; and
- Providing support for innovative thinking to construct sustainable pavement systems.

The specification of materials in construction documents must conform to IDOT Standard Specifications, Special Provisions, District Special Provisions or other IDOT approved provisions. The items included within this section are not to imply that IDOT requirements need not be met.

CE-1: Protect, Enhance, Restore Wildlife Habitat

Intent

The objective of this section is to consider methods in the construction phase capable of avoiding damage to ecologically sensitive vegetation, promoting planting of native plant material as part of a project, revegetating areas of abandoned alignment, and removing invasive species.

Rationale

There are construction practices considered Best Management Practices that minimize potential disruptions to roadside habitat. These practices are consistent with and enhance designs proposed to reduce the footprint of disturbance and to minimize these effects.

CE-1a Land Disturbance (2 points)

Intent
This item is intended to credit the contractor for minimizing disturbance to the land area and shall include methods of reducing impacts to aquifers, flora, and fauna.

Rationale
Compaction of underlying soil strata reduces the ability of water to be absorbed by the soil and to infiltrate the substrata and available aquifers. This directly affects the C and CN value of the land, which increases the rate at which stormwater runs off the property and resultant flooding impacts. Ground compaction also affects the land's ability to recharge groundwater levels in underlying aquifers. Aquifer drawdown and the inability to recharge the aquifers are responsible for groundwater quality impacts and often leads to to ground instability.

Criteria

- Utilize methods to minimize impacts as follows:
    - Off-siting of construction staging areas in previously developed area to eliminate land disturbance outside of the constructed project limits (2 points)
    - Minimization of land use and staging outside of that required for the proposed project footprint, and use of low-pressure tires to reduce compaction of underlying soil strata (1 point)

CE-1b Equipment Spill Impact Prevention (2 points)

Intent
This item is intended to credit the contractor for prevention of impacts from oils and chemicals used in construction equipment to minimize or eliminate impacts due to spills on the project site.

Rationale
Diesel fuel and petroleum spills will contaminate and damage sensitive areas if proper storage and handling as well as spill containment are not utilized. Utlilizing materials that biodegrade and have lower toxicity to plants and animals is protective of the environment.

Criteria:

- When working in or adjacent to water bodies, two points will be awarded for replacing petroleum- based oils in equipment with more environmentally friendly oils, such as corn or vegetable oils, to reduce potential for spill contamination or contact contamination **(2 Points)**

CE-2: Trees and Plant Communities

Intent

The objective of this section is to consider methods in the construction phase to avoid damage to existing tree and plant communities, promote planting of native plant material as part of a project, revegetate areas of abandoned alignment and remove invasive species.

Rationale

Maintaining the natural environment during construction includes two elements: avoidance of disruption and re-establishment of native plant communities as expeditiously as possible. Construction practices can enhance re-establishment. Reducing the opportunities for invasive species that adversely affect natural communities can be accomplished through a variety of practices. In addition, use of native materials promotes re-establishment of disturbed areas.

CE-2a Invasive Species Prevention (1 to 3 points)

Rationale
Native species are preferred over invasive species. Invasive species are opportunistic in disturbed areas and once established can overwhelm and replace the natural plant community.

Criteria:

- One point will be awarded for washing down equipment offsite and bringing only equipment free of dirt, mud and organics onto sensitive sites, such as wetlands, prairies, and water bodies. **(1 Point)**
- One additional point will be awarded where the Contractor meets performance criteria of limiting invasive species to less than 20 percent of the plant community. **(1 point)**
- One additional point will be awarded for use of "clean" landscape materials, such as mulch and topsoil. **(1 point)**

CE-2b Minimize Soil Compaction (1 to 3 points)

Rationale

Reducing the soil compaction is important in re-establishing plant communities in disturbed areas after construction. Compaction affects the ability of native plant species to successfully revegetate an area.

Criteria

- One point will be awarded for limiting areas of soil compaction to either the 404 permit limits or to less than 15 feet outside of the construction limits of the project. **(1 point)**
- One additional point will be awarded for the use of timber mats to diminish compaction impacts of construction equipment to natural areas **(1 point)**

CE-2c Wetland and Greenspace Protection **(2 points)**

Rationale
Where design (borrow pit, or staging or storage area) requires encroachment onto a sensitive area, the contractor can take steps to minimize impact of construction equipment consistent with NPDES and 404 permit requirements.

Criteria:
- One point will be awarded for reuse of top soil on site. **(1 point)**

CE-2d Vegetative Re-establishment **(1 to 3 points)**

Rationale
When vegetation consisting of both trees and native plant species is re-established, the plant communities prior to construction are redeveloped or enhanced.

Criteria

- One point will be awarded when a botanist or landscape architect has been used for the design implementation or inspection of plant communities. **(1 point)**
- One additional point will be awarded when trees are acquired from local sources within 100 miles of the project area. **(1 point)**
- One additional point will be awarded when a performance criteria of achieving 70 percent vegetative cover within one year is utilized to assess the success of plant community development. **(1 point)**

Sources and Resources
International Erosion Control Association (www.ieca.org)
Presto Geosystems (www.reynoldspkg.com)
IUM (www.aiswcd.org)
Stone, Sand and Gravel Review, May/June 2009
http://nssga.org/sustainability

CE-4: Maximize Trucking Efficiency

Intent
The objective for this section is to reduce the negative impact of trucking. Excess trucking increases energy demand leads to great congestion, decreases air quality and increases safety concerns. This section aims to reduce the environmental impact of the construction job.

Rationale
By allowing heavier loads on a specified truck route, utilizing raw materials and production that are within a close proximity and crushing and processing removed pavement onsite helps reduce the environmental impact of the job.

CE-4a Heavy truck route concept **(2 points)**

Criteria

- Maximize trucking efficiency by filling trucks completely within load limits to avoid multiple trips.

CE-4b Proximity to the Job **(1 point)**

Criteria

- Utilize materials and production facilities that are within the 20 miles in urban areas and 50 miles in rural areas.

CE-4c Recycling removed pavement onsite **(1 point)**

Criteria

- Establish onsite recycling of materials into the new construction to eliminate hauling materials offsite.

CE-4d Efficient use of backhauls **(1 point)**

Criteria

- Establish a materials hauling plan to make efficient use of backhauls, maximizing efficiency and decreasing the amount of "empty" trucks

CS-1: Certified Suppliers

Intent

Ready mixed concrete and asphalt constitute a large percentage of the materials used on highway construction projects. The plants that are producing these materials are typically located near the construction site. The practices used at these plants can also have an impact on the surrounding community.

Rationale

Both the National Asphalt Paving Association and the National Ready Mixed Concrete Association recognize the importance of the practices used at their plants. Rather than duplicate in this document lists of in-plant practices I-Last encourages the use of plants that meet the criteria established for certification by these organizations as a method of increasing the use of sustainable practices on projects.

CS-1a Use of asphalt plants with Diamond Achievement Commendation **(3 points)**

Criteria

- Three points will be awarded to projects that utilize asphalt plants with Diamond Achievement Commendation for 100% of the asphalt placed in the project.

CS-1b Use of concrete plants with Green Star Certification **(3 points)**

Criteria

- Three points will be awarded to projects that utilize concrete plants with Green Star Certification for 100% of the ready mixed concrete placed in the project.

CW-1: Reduce Impervious Area

Intent

The objectives of this section are to recognize methods in construction to reduce stormwater volumes and quantities of pollutants in typical highway runoff discharged into adjacent water resources. The pollutants associated with highway runoff include sediment, oil and grease, deicing salts, and metals.

By reducing stormwater runoff volumes, the project can more closely approximate original site conditions by returning water to natural pathways that recharge groundwater. In addition, smaller facilities can be designed for treating or holding stormwater from the roadway.

Rationale

Reducing stormwater volumes can provide an opportunity for more stormwater to infiltrate and thus recharge the groundwater system. Detention basins reduce peak discharges but do not necessarily reduce the volume of water discharged. As impervious areas increase, pollutant removal and reduction in stormwater volumes become factors in protecting water resources. Reducing impervious area also can reduce the temperature effects of stormwater on streams as more water reaches the stream as groundwater flow. Materials and area required for constructing stormwater basins can be reduced with a volume reduction.

CW-1a Prevent runoff with infiltration system (2 points)

Criteria

- Two points will be awarded to projects that utilize trenches and basins for stormwater collection that include pervious bottoms or other features to enhance infiltration.

CW-2: Stormwater Treatment

Intent

Pollutant removal can be an important component of protecting stream water quality. Traditional methods have focused upon water quantity management rather than pollutant removal; however, design features that focus upon pollutant removal can provide benefits of both volume reduction and water quality protection.

Rationale

As additional methods for treating stormwater are developed, the importance of infiltration to recharge groundwater and the pollutant removal efficiencies of vegetative filtering have been identified. Detention basins have traditionally been used to reduce peak discharges and remove pollutants. Pollutant removal through the use of stormwater treatment systems has been well documented as an important element of protecting streams and their aquatic ecosystems.

CW-2a Stormwater treatment systems to treat runoff from disturbed areas during construction (2 points)

Criteria

- Two points will be awarded for mechanical or chemical treatment systems that will treat the whole flow and not just the first flush.

CW-2b Method of Demolition (3 points)

Criteria

- Two points will be awarded when the contractor plans and executes project-specific demolition plans which contain methods to minimize storm water quality impacts. These methods include minimizing exposed soil by sequencing demolition, managing material stockpiles with berming to reduce stormwater runoff, and reducing fugitive dust by appropriate dust suppression methods, such as water spray and chemical suppression.

Sources and Resources

Suntree (www.suntreetech.com)

CW-3: Construction Practices to Protect Water Quality

Intent

Water quality in streams during construction can also be affected by the erosion control practices implemented. Stormwater pollution prevention plans (SWPPP) are required under the NPDES program to specify best management practices; however, there are measures that provide additional protection to streams during and after construction and improve stormwater quality.

Rationale

Reducing sedimentation during construction and in areas adjacent to streams during construction can help protect water quality. Best Management Practices established in the SWPPP include standard methods, such as silt curtains and silt fence. When special consideration is provided for soils at stream crossings, the temporary impacts of construction can be minimized. Analysis of pollutant loadings in stormwater provides information that is valuable in assessing the appropriate combination of stormwater management tools.

CW-3a Constructive changes to the erosion and sediment control practices (1 to 3 points)

Criteria

- All SWPPPs are living documents to control runoff and pollutants. These plans will need to be updated as the project is built and BMPs added or subtracted as needed

to protect the environment. One point will be awarded for full compliance with the SWPPP and SECP as assessed by regulatory agencies **(1 point)**

- One additional point will be awarded for enhancements to the SWPPP that represent enhanced or innovative erosion control measures as described by the USEPA technical manuals before construction begins. **(1 point)**
- One additional point will be awarded for preparing a documented stormwater plan that minimizes exposure of unprotected soil surfaces during the progression of construction. **(1 point**)

CW-3b Certified professionals for erosion and sediment control (CPESC) (1 point)

- One point will be awarded for use of a CPESC on site to document compliance with SWPPP implementation

CW-3c Temporary Storm Water Pollution Prevention Plan (SWPPP) devices that are reusable or biodegradable (2 points)

- One point will be awarded for use of best management practices to control run off and sediment that are reusable or biodegradable. Some of these are ditch checks, inlet protection, concrete washouts, and devices for stabilized construction entrances.

CW-3d Use of a non-mechanical sediment or erosion control practice (Anionic Polymer) (2 points)

- Two points will be awarded for the use of anionic polymers for erosion and sediment control. Anionic polymers shall be used to enhance current BMPs or be used as a stand-alone practice. A reduction of at least 95% turbidity must be shown for a one-year storm event.

CW-3eSubstitution of non-structural solutions: (2 points)

- Two points will be awarded for approved design and implementation of turf reinforcement mats in place of more impervious solutions at the point of discharge to existing sensitive resources, such as streams.

CW-3f Treatment of flows from dewatering operations: (2 points)

- Two points will be awarded for use of filter bags for treating flows to reduce turbidity from pumped or gravity-fed excavation or dewatering operations.

CW-3g Reduction of use of potable water: (1 point)

- One point will be awarded for reducing the use of potable water by recycling wash water of vehicles

Sources and Resources

International Erosion Control Association (www.ieca.org)
Applied Polymer Systems (www.siltstop.com)
Envirocert International, Inc. (www.envirocert.org)
IUM (www.aiswcd.org)

CM-1a The use of recycled or salvaged non-hazardous material during the construction phase. (1 to 7 points)

Rationale

Minimize the use of scarce natural resources. Minimize the hauling of aggregate, reduce emission and pollution. Build cost effective structures.

Criteria

One point will be awarded for each of the following reuse and recycling practices for existing pavement elements during construction of the proposed new pavement structure. This shall include all types of concrete pavements and HMA.

- **CM-1a-1** The use and the processing of demolished concrete to reclaim scrap metals and to create useable aggregate.
- **CM-1a-2** The use of milled HMA pavements for capping stone.
- **CM-1a-3** The use of recycled crushed pavements for temporary aggregate for areas like driveways or access roads.
- **CM-1a-4** The use of recycled crushed pavements for shoulder stone.
- **CM-1a-5** The use of recycled crushed pavements as aggregate for subgrade, sub base, or base lifts.
- **CM-1a-6** The reclaiming and reuse of sub base granular material.
- **CM-1a-7** The reuse of reclaimed scrap materials for various items (e.g., sheeting, guard rail, etc.)

CM-1b Use of locally produced by-products to be incorporated in the construction of embankments, hot mix asphalt and portland cement concrete mixtures (1 to 7 Points)

Rationale

To improve the use of existing construction materials and reduce the production impact on the environment.

Use ternary concrete mixtures that incorporate fly ash, slag cement, or microsilica as a partial substrate to cement in the production of concrete mixtures. Ternary mixes, like those of Portland, fly ash and slag cement, have been used in practically every concrete application. Ternary mixtures can be designed for high strength, low permeability, sulfate resistance and alkali-silica reactivity resistance just to name a few. Furthermore, the use of these additional cementitious materials can help to reduce emissions, energy and virgin material requirements when compared with 100% Portland mixtures. By moving to these types of ternary mixtures, we can not only produce a greener concrete, but can also work together to become more environmentally friendly.

Incorporate alternative materials in the construction of embankments as partial additions to or replacement of natural aggregates.

Criteria

One point will be awarded for each of the following practices related to the use of alternative materials.

- **CM-1b-1** The use of fly ash, ground granulated blast furnace slag cement, and microsilica in concrete mixtures**.**
- **CM-1b-2** The use of ternary concrete mixtures in the construction of concrete pavements, shoulders and appropriate structural items.
- **CM-1b-3** The use of foundry sand or bottom ash as part of a material in the construction of embankments.
- **CM-1b-4** The use of slag aggregate in the production of HMA mixtures (SMA Designs and "F" Mix).
- **CM-1b-5** The use of Recycled Asphalt Shingles (RAS) in the production of Stone Matrix Asphalt mixtures (SMA) or the production of HMA.
- **CM-1b-6** The use of Ground Rubber Tire (GTR) in the production of new HMA.
- **CM-1b-7** Obtain and implement a project specific plan for the innovative reuse of waste materials other than the ones listed above.

CM-1c Use of reclaimed asphalt pavement (RAP) in the construction of new hot mix asphalt pavements (1 to 2 Points)

Rationale

Implement a better use of natural resources and minimize the dumping of RAP in landfills. Implement an improved land use, reduce pollution by minimizing trucking and hauling of RAP to landfills, and to protect the environment in general**.**

Criteria

Implement t practices that provide for the use of fractionated RAP so higher percentages of RAP can be incorporated in the production of hot mix asphalt.

- **CM-1c-1** One point will be awarded for the use of recycled asphalt pavement (RAP) in hot mix asphalt (HMA).
- **CM-1c-2** One additional point will be awarded the use of fractionated recycled asphalt pavement (FRAP) at a higher percentage in the manufacturing of hot mix asphalt.

CM-1d Utilization of environmentally acceptable and permitted sites in the construction phase of the project for the disposal of surplus excavated material to an off-site location (1 to 2 points)

Rationale

Minimize the amount of surplus excavated material disposed in landfills or dump sites.

Criteria

- One point will be awarded to projects that minimizes excess excavated material that cannot be used within the project corridor can be reused (IEPA Approved sites).
- One point will be awarded to projects with a contractor identifying other state / public entities or non-profit organizations that could benefit from the use of the excess / surplus material hauled off the project limits.

CM-1e Salvage or move of buildings (2 points)

Rationale

The construction phase shall include the salvage / moving of buildings rather than demolition, to reduce the amount of materials disposed in landfills.

Criteria

- Two points will be awarded to a project when the contractor salvages or moves a building instead of demolishing it.

CM-1f Use of locally available materials (such as local seed stock and plants) in developing specifications for the project (1 point)

Rationale

The contractor shall use local materials which can have a higher possibility for growing success for plants, cost effectiveness, and a decrease of pollutants from the cutback in vehicle emissions and pollution generated by the transportation of material into the project corridor.

Criteria

- One point will be awarded to a project that incorporates local materials depending on the location of the project, whenever practical.

Sources

IDOT, Standard Specifications for Road and Bridge Construction, Article 210. http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Standard Specifications for Road and Bridge Construction, Article 211. http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Standard Specifications for Road and Bridge Construction, Article 312 http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Standard Specifications for Road and Bridge Construction, Article 350 http://www.dot.il.gov/desenv/stdspecs1.html

IDOT, Bureau of Design and Environment, Design Manual, Chapter 54 http://www.dot.il.gov/desenv/BDEManual/BDE/pdf/chap54.pdf

IDOT, Standard Specifications for Road and Bridge Construction, http://www.dot.il.gov/desenv/stdspecs07.html

IDOT, Bureau of Bridges & Structures, Documents, Manuals and Procedures, Subgrade Stability Manual, May 1st, 2005 http://www.dot.il.gov/bridges/pdf/SubgradeStabilityManual.exe

IDOT, Bureau of Bridges & Structures, Documents, Manuals and Procedures, Geotechnical Manual, http://www.dot.il.gov/bridges/pdf/GeotechnicalManual.exe

IDOT, BDE Special Provisions, Cement. http://www.dot.il.gov/desenv/pdf/80166.pdf

IDOT, BDE Special Provisions, Concrete *Inlay and Overlay.*

http://www.dot.il.gov/desenv/specrev/80210.pdf

IDOT, BDE Special Provisions, Concrete Mix Designs. http://www.dot.il.gov/desenv/pdf/80226.pdf

IDOT District One Special Provisions for:

- Aggregate Subgrade, 12; (300 MM) Effective May 1st 1990, Revised August 1st 2008

- Porous Granular Embankment, Subgrade Effective September 30th 1985, Rev Aug 1st 2008
- Lightweight Expanded Blast Furnace Slag Aggregate
- Embankment I, Effective January 1st 2007
- Use of RAP (Dist 1) Effective: January 1, 2007, Revised: January 7, 2009
- Stone Matrix Asphalt (SMA) Effective April 1st 1997, Revised January 1st 2007.
- Pulverization Special provision
- Extended Life PCC Pavement (30 year and 40 year)

Additional Resources

IDOT, Physical Research Reports, Recycling Old PCC Pavements, http://www.dot.il.gov/materials/research/pdf/113.pdf

IDOT, Physical Research Reports, Evaluation of Reclaimed Rubber in Bituminous Pavements. http://www.dot.il.gov/materials/research/pdf/117.pdf

IDOT, Physical Research Reports, Evaluation of Stone Matrix Asphalt http://www.dot.il.gov/materials/research/pdf/121.pdf

IDOT, Physical Research Reports, Utilization of Recycled Materials in Illinois Highway Construction. http://www.dot.il.gov/materials/research/pdf/142.pdf

A Lighter Shade of Gray. http://www.pavement.com/News_and_Advocacy/STM/STM-05-04.pdf

Asian Development Bank. (January 2007). *Southern Transport Corridor Rehabilitation Project Kyrgyz Republic; Revised Environmental Examination (IEE).* Available: www.adb.org/Documents/RRPs/KGZ/36257-KGZ-RRP.pdf - . Last accessed 30 June 2009.

Blast Furnace Slag-User Guidelines. http://www.tfhrc.gov/hnr20/recycle/waste/bfs3.htm

DeJong, J.T., Mortensen, B.M., Martinez, B.C., and Nelson, D.C. "Bio-Mediated Modification of Subsurface Properties" *Ecological Engineering"*, 2009 (in press).

Gardner, Kevin. (2009). *National Green Highway Activities & Resources to Support Recycling and Reuse.* Available: http://www.epa.gov/osw/rcc/resources/meetings/rcc-2009/gardner-grnhwy.pdf. Last accessed 30 June 2009.

Goktepe, A. Burak & Lav A. Hilmi (2003). Method for Balancing Cut-Fill and Minimizing the Amount of Earthwork in the Geometric Design of Highways. *Journal of Transportation Engineering,* Volume 129, Issue 5, p 564-571.

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www.Recycle-Steel.org

American Institute of Steel Construction www.AISC.org

Concrete Reinforcing Steel Institute www.CRSI.org

Naylor Pipe www.NaylorPipe.com

American Concrete Institute www.aci.org

Illinois Asphalt Pavement Association www.iapa.org

Illinois Association of Aggregate Producers www.iaap.com

Revision Log

Version	Changes
Version 1.01	Corrections in Section **M-1f** item numbering
Version 2.0	Addition of Construction section