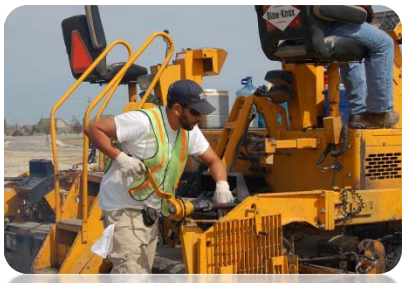
# *I-LAST*™

## *Illinois – Livable and Sustainable Transportation*

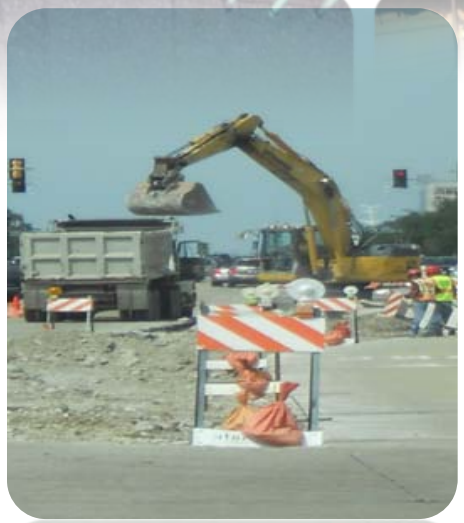
# *Construction Practices Addendum*

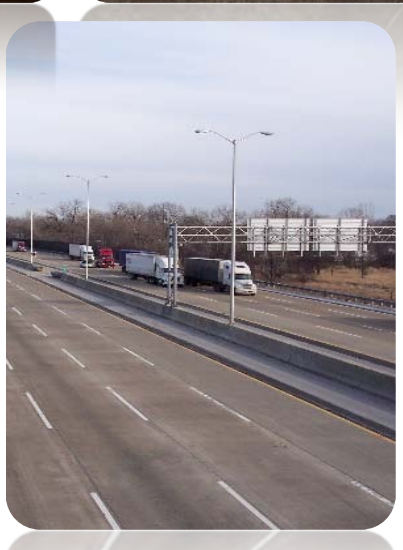
## *Rating System and Guide*











Illinois Road and Transportation Builders Association • Green Council

**design green ● build green ● live green**

I-LAST Construction Practices Addendum V 1.01 Released January 20, 2011

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# I-LAST Construction Practices Addendum

The Construction Practices Addendum recognizes existing and new sustainable materials and methods in the transportation industry, specifically in the construction phase of a project. The addendum follows the I-LAST model, keeping the checklist and the narrative consistent. The Construction Practices Addendum is meant to be used as a guideline, to foster continued sustainable practices and innovation among the industry.

The Construction Practices Addendum 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 the IRTBA as a leader in promoting sustainable, sensible and innovative environmental objectives and practices. High priorities for the Green Council include initiating and promoting innovative ideas and solutions throughout the industry. They also aim to advocate for acceptance of more sustainable technical and regulatory practices. The task force is carrying out these goals by developing a system to measure the sustainability of a project. The guideline highlights those practices that are currently in place and are not recognized as "green". The Construction Practices Addendum also encourages companies and agencies to promote innovations, and experiment or utilize ideas and concepts that may not be included in the current specifications but should not be entirely ruled out. This is simply a tool for considering unique opportunities.

The Construction Practices Addendum also includes a unique feature – the Innovations section. The Innovations section is meant to foster creativity and continued growth within the green transportation industry. This is a place to highlight experimental options. This section allows the industry to see what options are available and earn points for their creativity.

Once complete, the task force will turn this document over to the Steering Committee for further review. The task force encourages agencies and contractors to use the document as a tool for measuring sustainability. The task force intends to utilize this document on small projects and hopes to see some of the addendum suggestions considered for specifications or options on roadways.

This document would not be complete without a mild disclaimer. The technologies and suggestions offered in this document are experimental at this time. The use of these ideas is the sole responsibility of the parties involved. While potential technologies are mentioned, they may not be approved by your local agency.

The intent of this document is to foster continuous improvement in developing sensible sustainable practices in the transportation industry. The point system simply acts as a guideline. 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. Points are awarded for using the specific I-LAST techniques during the process of construction. The ID given in the chart corresponds with a more detailed description complete with rationale, criteria, and courses and resources. By using these techniques in the construction of roadways, Illinois will be a frontrunner in creating a more sustainable infrastructure.

| I-LAST Category | ID | Description | Points Awarded | Maximum Points Possible |
|---|---|---|---|---|
| Environmental | E-1: Protect, Enhance or Restore Wildlife Habitat | E-1k: Land Reclamation | | 1 |
| | | E-1l: Certified Wildlife Habitats | | 1 |
| | E-2: Trees and Plant Communities | E-2l: Wetland Management | | 1 |
| | | E-2m: Greenspace Management | | 1 |
| | E-4: Reduce Energy Performance | E-4a: Paved stockpile reduce aggregate moisture content | | 1 |
| | | E-4b: Reduced material/exit gas temperatures | | 1 |
| | | E-4c: Insulating dryer shells | | 1 |
| | | E-4d: Bag house captures fine particulate matter from entering atmosphere | | 1 |
| | | E-4e: HMA production using variable frequency drives on large motors. | | 1 |
| | | E-4f: Use of Warm-mix asphalt reduces fuel consumption, production of emissions, and production of green house gases. | | 1 |
| | | E-4g: High Albedo: higher reflectivity reduces the amount of artificial light necessary to light a highway, lowers the urban heat island, ultimately lower energy costs, safer | | 1 |
| | E-5: Lower Emissions/Reduce Petroleum Consumption | E-5a: Emissions control devises capture emissions – burn in front | | 1 |
| | | E-5b: Enclosed load area (silo) | | 1 |
| | | E-5c: Use of diesel retrofit technology | | 1 |
| | | E-5d: No idling policies | | 1 |
| | | E-5e: Efficient use of backhauls | | 1 |
| | | E-5f: On-site disposal of excess earth by reducing realignment and/or constructing landscaped earth berms. | | 1 |
| | | E-5g: Smooth Pavement: Better fuel economy, less noise, safer | | 1 |

| | | | | |
|---|---|---|---|---|
| | | E-5h: Alternate fuels: natural gas, ethanol, bio diesel, etc. have all been talked about as fuel sources for trucks and equipment | | 2 |
| | E-6: Maximize Trucking Efficiency | E-6a: Heavy truck route concept | | 2 |
| | | E-6b: Close proximity to the job | | 1 |
| | | E-6c: Recycling Concrete Onsite | | 1 |
| Water Quality | W-1: Reduce Impervoius Area | W-1f.i: Porous base courses | | 2 |
| | | W-1f.ii: Recycle process water | | 2 |
| | | W-1g: Permeable Pavement Maintenance | | 1 |
| | W-2: Stormwater Treatment | W-2k: Use of mechanical treatment system to treat the whole flow | | 3 |
| | | W-2l: Use of permanent inlet protection devices | | 1 |
| | | W-2m: Method of demolition | | 3 |
| | W-3: Construction Practices to Protect Water Quality | W-3l: Design includes required erosion and seciment control practices | | 3 |
| | | W-3j: certified professionals for erosion and sediment control | | 1 |
| | | W-3k: Temporary SWPPP devices that are reuseable | | 2 |
| | | W-3l: Use of nonchemical sediment or erosion control practice | | 2 |
| Materials and Resource | M-1 Materials | M-1e: Use of Fractionalized Recycled Asphalt Pavement | | 3 |
| | | M-1f: Use of Recycled Ashalt Shingles | | 2 |
| | | M-1g: Use of Recycled Slag as an aggregate | | 2 |
| | | M-1h: Use of Ground Tire Rubber | | 3 |
| | | M-1i: Use of Recycled Glass | | 3 |
| | | M-1m.i:Use of Recycled Steel generated from demolition | | 1 |
| | | M-1m.ii: Use of Recycled Steel to produce reinforcement bar | | 1 |
| | | Release agents | | 1 |
| | | M-1n: Recycling concrete pavement as a base | | 1 |
| | | M-1o: Recycling concrete materials into PCC | | 1 |

| | | | | |
|---|---|---|---|---|
| | | M-1p.i: Reduce cement in PCC with metakaolin | | 1 |
| | | M-1p.11: Reduce cement in PCC with slag | | 1 |
| | | M-1p.iii: Reduce cement in PCC with micro silica | | 1 |
| | | M-1p.iv: Reduce cement in PCC with greater clinker replacement | | 1 |
| | | M-1p.v: Reduce cement in PCC with limestone dust or fillers | | 1 |
| | | M-1q: Replace Fine Aggregate in concrete with limestone screenings | | 1 |
| | | M-1r: Reuse concrete forms | | 1 |
| Innovation | I-1: Innovation | I-1a: Pipe material with recycled content | | 1 |
| | | I-1b: Use of recycled tree material for plant mulch | | 1 |
| | | I-1c: Use of recycled materials for erosion blankets or hydro-mulch | | 1 |
| | | I-1d.i: Soil stabilization with geosynthestics | | 1 |
| | | I-1d.ii: Soil stabilization with cement stabilization | | 1 |
| | | I-1d.iii: Soil stabilization with fly-ash | | 2 |
| | | I-1d.iv: Soil stabilization with mineral filler bag house fines | | 1 |
| | | I-1e: Hot-in-place asphalt | | 1 |
| | | I-1g: Longer pavement life cycle | | 2 |
| | | I-1h: Cement Stabilization | | 1 |

## *E-1: Protect, Enhance, Restore Wildlife Habitat*

### Intent

The objective of this section is to consider methods 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 the 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-1k Land Reclamation** **(1 point)**

**Criteria**

- Utilize methods to maintain or compensate for the loss of land.

**E-1l Certified Wildlife Habitats** **(1 point)**

**Criteria**

- Utilize methods to preserve wildlife habitats.

## *E-2: Trees and Plant Communities*

### Intent

“Sustainability is a business approach that integrates environmental, social and economical aspects of a company’s business model that ensures the long term supply of aggregate materials to society.”

### Rationale

The aggregate industry typically receives permission to operate in communities through land use planning and zoning laws. Being an active member of the local business community and staying in touch with neighborhoods and local municipalities, the aggregate operator is viewed as an asset. “Companies showing a true commitment to sustainability appear to outperform their industry peers in

the financial markets as a result companies are implementing sustainability into their core business operations, values and strategies." Three points will be awarded for each of the following activities related to sustainability:

- Enhance outreach effort
- Wetland Management
- Greenspace Management
- Land Reclamation

**E-2l Wetland Management (1 point)**

**Criteria**

- Design and implement turf reinforcement mats in concentrate flows in place of hard solutions.

**E-2m Greenspace Management (1 point)**

**Criteria**

- A plant specialist has been used for the design, implementation or inspection of plant communities.
- Vegetation shall be used for the wall face in place of a hard face. The wall face should be at least 95% vegetated.

**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

## *E-4: Reduce Energy Performance (HMA)*

**Intent**

The objectives of this section are to reduce energy consumption associated with the production of Hot Mix Asphalt. The section represents significant opportunities for energy conservation including:

- Reducing the energy required for drying materials
- Use of alternate fuels
- Reduction of power consumption

**Rationale**

The most energy consumed in HMA production is used in drying aggregate, and the moisture content of the aggregate significantly affects the quantity of the fuel required. A rule of thumb would be that with every 1 percent change in the aggregate moisture content from the benchmark condition of 5 percent moisture, the energy or fuel requirements change 10 percent.

**E-4a Paved Stockpile reduce aggregate moisture content (1 point)**

**Criteria**

- **E-4a.i** Sloping the grade under the stockpile to promote drainage away from the face being used to feed the plant.

- **E-4a.ii** Paving under the stockpile to accelerate drainage and reduce standing water and prevent it from "wicking up" into the stockpile.

- **E-4a.iii**Covering the stockpiles so precipitation does not infiltrate the aggregate stockpiles – especially the fine aggregate, which do not drain as readily as course materials.

**Sources and Resources**
National Asphalt Pavement Association, Quality Improvement Series 126, Printed 12/07

**E-4b Energy Reduction Achieved by Reducing Material Temperatures (1 point)**

**Criteria**

- Energy models also show a reduction of the fuel consumption of 2 to 3 percent for every 10 degrees Fahrenheit of final material temperature. It is common for producers to increase the production temperature 10 degrees Fahrenheit or more above the target design temperature to improve workability for placement and compaction, or to ensure that the mix does not arrive at the job site below the target temperature. This is especially true when producers are dealing with polymer-modified binders or coarse-graded mixtures. Oftentimes, increasing the temperature is not as effective at improving the workability as adjusting other job parameters such as lift thickness or timing the compaction such that the breakdown roller follows immediately behind the paver. Excess mix temperature can also prematurely age the HMA, making it more difficult to compact and more brittle and more prone to cracking in service. Raising the mix temperature 15 to 20 degrees above target design can result in a 4 to 5 percent energy expenditure. Coordination of production temperatures and placement temperatures should be carefully managed to the current specifications. Ensure job site mix temperatures do not exceed material specifications.

**Sources and Resources**
National Asphalt Pavement Association, Quality Improvement Series 126, Printed 12/07
Asphalt Pavement Environmental Council, EC 101, printed 04/00

**E-4c Insulating Dryer Shells (1 Point)**

**Criteria**

- Fuel consumption models for calculating energy requirements for drying and heating aggregates assume a heat loss from the “casing” or “shell” of the drying drum. This is referred to as “casing loss”. Most models assume heat loss to be between 5 and 10 percent. Insulating the shell of the drying drum reduces this energy loss and decreases energy consumption.
- Insulate the dryer drum. Most manufacturers offer insulated dryers and drum mixers as an option. In addition, after market suppliers are available who will insulate a dryer shell.

**Sources and Resources**

National Asphalt Pavement Association, Quality Improvement Series 126, Printed 12/07
*Thermal Insulation Handbook*, Turner and Malloy, Robert E. Krieger Publishing Company, Inc., 1976 & 1981

**E-4d Bag House captures fine particulate matter from entering atmosphere (1point)**

**Criteria**

- More efficient bag house operations will result in a reduced energy consumption. The ways to be efficient are to maintain, clean and replace bags on a scheduled maintenance program.
- Replace or clean bags on a regular basis

**E-4e HMA Production Using Variable Frequency Drives on Large Motors (1 point)**

**Criteria**

- The variable speed frequency drive changes the frequency of the current going to the AC motor, which turns a constant speed motor instead to a variable speed motor. This technology is commonly used on feed bin motors and AC pump motors on hot mix plants to regulate flow. Changing the frequency reduces energy consumption.
- Utilizing variable frequency drives (VDFs) allow conservation of electrical energy on large fan motors by slowing the fan instead of using dampers to restrict air flow.

**Sources and Resources**

National Asphalt Pavement Association, Quality Improvement Series 126, Printed 12/07

**E-4f Use of Warm Mix Asphalt (2 points)**

**Criteria**

- Warm Mix Asphalt requires 15-20% less energy than traditional Hot Mix Asphalt. The use of this material reduces fuel consumption, emissions and green house gases.
- Incorporating various technologies to obtain the enhanced properties of Warm Mix Asphalt. This would include Foaming, Chemical or Organic additives.

**Source and Resources**
Federal Highway Administration Technical Bulletin on Warm Mix Asphalt

**E-4g Use of High Albedo Pavements (1 point)**

**Criteria**

- Higher reflectivity reduces the amount of artificial light necessary to light a highway, lowers the urban heat island, ultimately lower energy costs.
- Incorporate alternative materials available to create a more reflective surface. These materials may include Granulated Ground Blast Furnace Slag, Whiter Cement, Light Colored Aggregate and Chemical Additives.

**Source and Resources**
City of Chicago Department of Transportation "Best Practices for Green Alley" Published in 2009

## *E5: Lower Emissions/reduce Petroleum Consumption*

**Intent**

The objective of this section is to encourage contractors to find ways to reduce the use of fuel and reduce diesel emissions. The anticipated benefits in this section include but are not limited to:

- Reducing green house gas emissions
- Conserving energy and resources
- Reducing diesel emissions
- Finding ways to reduce the carbon footprint for the project

**Rationale**

Emissions from diesel exhaust can lead to serious health conditions, such as asthma and allergies, and can also worsen heart and lung disease, especially for vulnerable populations such as children and older individuals. EPA estimates that every $1 spent on clean diesel projects produces up to $13 of public health benefitsreduce emission and pollution. Diesel engines are a major source of pollution, emitting particulate matter (soot); nitrogen oxides which contribute to the production of ground-level ozone (smog) and acid rain; hydrocarbons; and air toxics. These emissions can damage plants, animals, crops, and water resources. HMA aggregate dryers can also burn recycled oils very effectively, and producers of this fuel have found an effective market among hot-mix producers. From an emissions standpoint his fuel burns very cleanly. Burning Reclaimed Fuel Oil (RFO) provides an opportunity to preserve natural resources while recycling a reclaimed product.

**E-5a Emissions control devises capture emissions (1 point)**

**Criteria**

- Utilize emission control devices that capture exit gases and redirect to the front of the drum

**E-5b Enclosed load area for silos (1 point)**

**Criteria**

- Utilize an enclosed load area for silos

**E-5c Diesel retrofit technology (1 point)**

**Criteria**

- Utilize diesel retrofit technology as appropriate

**E-5d Use of "No idling policies" (1 point)**

**Criteria**

- Adhere to "no idling policies" set forth by agency or company

**E-5e Efficient use of backhauls (1 point)**

**Criteria**

- Encourage efficient use of backhauls, maximizing efficiency and decreasing the amount of "empty" trucks

**E-5f Onsite Excavation (1 point)**

**Criteria**

- Onsite disposal of excess earth excavation to avoid off site trucking and utilizing existing material to create landscape berms

**E-5g Utilize smooth pavement technologies (1 point)**

**Criteria**

- Utilize smooth pavement technologies for better fuel economy, less noise and improved safety

**E-5h Alternate fuels (2 points)**

**Criteria**

- Most aggregate dryer burners are designed to burn both liquid and gaseous fuels, and many are equipped with manifolds so they can easily switch between these fuel types. Reclaimed oil typically has the characteristics of a No. 4 or No. 5 fuel oil, which has more energy per gallon (142,000 to 150,000 Btu) then No. 2 diesel fuel (132,000 Btu). It is more viscous than No. 2 diesel fuel. Similar to a No. 4 or No. 5 fuel oil, it typically has to be heated. This requires an in-line heater which reduces the energy value of the fuel by the amount required to heat it to the required viscosity. Additional filters are required to protect the pumping system from particulates associated with reclaimed fuel.

**Sources and Resources**

http://www.illinoisgreenfleets.org/index.html
http://www.epa.gov/midwestcleandiesel/index.html
http://www.epa.gov/cleandiesel/
http://www.dieselforum.org/policy/retrofit/diesel-emissions-reduction-act
California Air Resources Board (CARB) (http://www.arb.ca.gov/diesel/verde/verdev.htm
National Asphalt Pavement Association, Quality Improvement Series 126, Printed 12/07

## *E6: 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.

**E-6a Heavy truck route concept** **(2 points)**

**Criteria**

- **Maximize trucking efficiency by filling trucks completely to avoid multiple trips.**

**E-6b Proximity to the Job** **(1 point)**

**Criteria**

- **Utilize materials and production facilities that are near the jobsite**

**E-6c Recycling removed pavement onsite** **(1 point)**

**Criteria**

- **Utilize onsite recycling methods to eliminate the environmental impact**

## *W-1: Reduce Impervious Area*

### Intent

The objectives of this section are to recognize methods capable of reducing 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 streams and their aquatic ecosystems. 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.

**W-1f**

**W-1f.i Porous base courses** **(2 points)**

Criteria

- Utilize porous base courses to avoid pools of contaminated water

W-1f.ii Recycle process water (2 points)

Criteria

- Recycle process water to eliminate pollutants

**W-1g Permeable Pavement Maintenance** **(1 point)**

**Criteria**

- One point will be awarded for permeable pavements used that can be easily maintained by flushing or with a vacuum truck. Pavements that require removal and replacement of any material for maintenance will not apply.

## *W-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.

**W-2k Use of mechanical stormwater treatment systems that treat the whole flow**

**(3 points)**

**Criteria**

- Two points will be awarded for mechanical treatment systems that will treat the whole flow and not just the first flush (such as suntree)

**W-2l Use of permanent inlet protection devices**

**(1 point)**

**Criteria**

- Two points will be awarded to projects utilizing permanent stormwater treatment systems at inlets that will treat any flow entering them.

**W-2m Method of Demolition** **(3 points)**

**Criteria**

- Various methods of demolition can be utilized to preserve storm water quality.

**Sources and Resources**

Suntree (www.suntreetech.com)

## *W-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.

**W-3i Design includes required erosion and sediment control practices**

**(3 points)**

**Criteria**

- All SWPPP's are living documents to control runoff and pollutants. These plans will need to be updated as the project is built and BMP's added or subtracted as needed to protect the

environment. One point will be given for constructive changes to the SWPPP before construction begins.

**W-3j Certified professionals for erosion and sediment control (CPESC)**

**(1 point)**

**Criteria**

- Use of a CPESC for SWPPP design, implementation and inspection.

**W-3k Temporary SWPPP devices that are reusable**

**(2 points)**

**Criteria**

- To use best management practices to control run off and sediment that are reusable. Some of these are ditch checks, inlet protection, concrete washouts, and devices for stabilized construction entrances.

**W-3l Use of a nonmechanical sediment or erosion control practice (Anoinic Polymer)**

**(2 points)**

**Criteria**

- The use of anionic polymers for erosion and sediment control. Anoinic polymers shall be used to enhance current BMP's or be used as a stand alone practice. A reduction of at least 95% turbidity must be shown.

**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)

## *M1: Material and Resources*

**Intent**

The objectives of this section are to encourage contractors to find ways to use materials on projects which will reduce waste generation, and reuse and recycle materials in beneficial ways. The anticipated benefits in this section 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;
- Conserving energy and resources
- Reducing solid, liquid and gaseous waste
- Finding ways to reduce the carbon footprint for the project by minimizing hauling;
- Providing support for innovative thinking to create sustainable pavement systems.

**Rationale**

**M-1e Use of Fractionalized Recycled Asphalt Pavement (3 points)**

**Criteria**

- The use of FRAP in lieu of grindings or traditional crushed recycled asphalt pavement

**M-1f Use of Recycled Asphalt Shingles (2 points)**

**Criteria**

- The use of RAS obtained from tear off roofing materials incorporated into hot or warm mix asphalt.

**M-1 g Use of Recycled Slag as an aggregate (2 points)**

**Criteria**

- The use of recycled slag as an aggregate replacement of virgin friction aggregate

**M-1h Use of Ground Tire Rubber (3 points)**

**Criteria**

- The use of GTR obtained from disposed car and truck tires incorporated into hot or warm mix asphalt

**M-1i Use of Recycled Glass (3 points)**

**Criteria**

- The use of recycled glass obtained from recycling centers incorporated into hot or warm mix asphalt.

**M-1m.i Use of Recycled Steel generated from demolition (1 point)**

**Criteria**

- The use of recycled steel generated from demolition to replace the amount of virgin iron ore needed in steel production.

**M-1m.ii Use of Recycled Steel to produce reinforcement bar (1 point)**

**Criteria**

- The use of recycled steel generated from demolition to replace the amount of virgin iron ore needed in reinforcement bar production.

**M-1n Recycling concrete pavement as a base (1 point)**

**Criteria**

- The use of recycled concrete pavement as a base saving virgin aggregate

**M-1o Recycling concrete materials into PCC (1 point)**

**Criteria**

- The use of recycled concrete materials into Portland Concrete Cement saving virgin aggregate

**M-1p.i Reduce Cement in PCC with metakaolin (1 point)**

**Criteria**

- Utilize metakaolin in PCC to reduce the amount of cement required.

**M-1p.ii Reduce Cement in PCC with slag (1 point)**

**Criteria**

- Utilize slag in PCC to reduce the amount of cement required

**M-1p.iii Reduce Cement in PCC with micro silica (1 point)**

**Criteria**

- Utilize microsilica in PCC to reduce the amount of cement required

**M-1p.iv Reduce Cement in PCC with greater clinker replacement (1 point)**

**Criteria**

- Utilize greater clinker replacement in PCC to reduce the amount of cement required.

**M-1p.v Reduce Cement in PCC with limestone dust (1 point)**

**Criteria**

- Utilize limestone dust in PCC to reduce the amount of cement required

**M-1q Replace Fine Aggregate in PCC with limestone screenings (1 point)**

**Criteria**

- Utilize limestone screenings in PCC to save natural sand

**M-1r Reuse Forms (1 point)**

**Criteria**

- Utilize concrete forms on more than one construction project

**Sources and Resources**

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

## *I1: Innovation*

### Intent

The objectives of this section are to consider designs that will allow and give the flexibility to the contractors to reduce waster 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.

### Rationale

The Innovations section is meant to foster creativity and continued growth within the green transportation industry. This is a place to highlight experimental options. This section allows the industry to see what options are available and earn points for their creativity. However, the technologies and suggestions offered in this document are experimental at this time. The use of these ideas is the sole responsibility of the parties involved. While potential technologies are mentioned, they may not be approved by your local agency.

**I-1a Pipe material with recycled content (1 point)**

**Criteria**

- Use pipe material that has recycled content in it. This may be plastic, metal or concrete materials.

**I-1b Use of recycled tree material for plant mulch (1 point)**

**Criteria**

- Recycle any ground up plant material for tree mulch to protect new trees that are being planted.

**I-1c Use of recycled materials for erosion blankets or hydro mulch (cotton, straw, wood, and paper) (1 point)**

**Criteria**

- When blanketing or hydro mulching to establish plant communities use materials that are recycled to help grow new vegetation and hold the soil in place.

**I-1d.i Soil stabilization with recycled geosynthetics (1 point)**

**Criteria**

- Utilize recycled geosynthetic fabrics to minimize the amount of soil excavation needed

**I-1d.ii Soil stabilization with cement stabilization (1 point)**

**Criteria**

- Utilize cement stabilization to minimize the amount of soil excavation needed

**I-1d.iii Soil Stabilization with fly-ash (2 points)**

**Criteria**

- Utilize fly-ash to minimize the amount of soil excavation needed

**I-1d.iv Soil stabilization with mineral filler bag house fines (1 point)**

**Criteria**

- Using mineral filler bag house fines to minimize the amount of soil excavation needed.

**I-1e Hot-in-place Asphalt Recycling (1 point)**

**Criteria**

- Utilizing hot-in-place asphalt recycling for base to reduce the amount of hot or warm mix asphalt needed.

**I-1f SRI 29+ Asphalt Coatings (Seal Coating)**

**Criteria**

- the use of high albedo seal coating to make the pavement more reflective resulting less heat generation (reducing the heat island effect) and lighting demand

**I-1g Utilize stronger pavements**

**Criteria**

- Utilize stronger (higher strength or thicker) pavements resulting in longer Pavement Life Cycles

**Sources and Resources**

Geosynthetic Material Association (GMA) (www.ifai.com)
Plastic Pipe Association (www.plasticpipe.org
American Concrete Institute www.aci.org
Illinois Asphalt Pavement Association www.iapa.org