Asphalt Pavements and LEED® Certification

Leadership in Energy and Environmental Design (LEED®)

Developed by the U.S. Green Building Council, the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.[1]

Earning LEED® Certification

To earn certification a building project must meet certain prerequisites and performance benchmarks ("credits") within each category. Projects are awarded Certified, Silver, Gold, or Platinum certification depending on the number of credits they achieve.[1]

How Asphalt Pavements Contribute to Attaining LEED® Credits

Asphalt pavements contribute to LEED credits in a variety of ways. Asphalt pavements are 100% recyclable. They are used and reused with each cycle of road paving. As such, credits associated with recycling and waste management are attainable. Pervious asphalt mixtures have been used in Ohio for over a generation. Research in the 1970s by the Franklin Institute launched porous (pervious) asphalt pavements, a strategy that both reduces quantity and improves quality of storm water runoff. Credits can be attained for porous pavement use under categories for storm water management (both quantity and quality), and heat island reduction. In recent times, coating materials have been introduced to the industry. These allow designers to express their creativity and ingenuity while at the same time improving pavement reflectance and capturing credit for heat island reduction. From conventional, to porous, to pattern-stamped, asphalt pavements provide flexibility and options to architects and engineers designing sustainable pavements.

Tables have been developed to show for the different LEED programs the potential credits attainable by using asphalt pavements. Each table provides the rating category, credit description, available points, and a discussion of the applicability/contribution that asphalt pavements have in attaining credits. This information has been provided for the following LEED programs:

- **LEED®-NC Green Building Rating System For New Construction & Major Renovations Version 2.2**
- **LEED®-EB Green Building Rating System For Existing Buildings Upgrades, Operations and Maintenance Version 2**
- **LEED® for Schools For New Construction and Major Renovations April 2007 Version**
- **LEED For Neighborhood Development PILOT VERSION Updated June 2007**
- **LEED For Homes Program Version 1.11a January 2007**
- **LEED For Retail – New Construction and Major Renovations Pilot Version 2 April 2007**

[1] U.S. Green Buildings Council, www.usgbc.org

LEED®-NC Green Building Rating System For New Construction & Major Renovations Version 2.2			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Sustainable Sites			
SS Credit 6.1	Stormwater Design: Quantity Control	1	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed promotes quantity control utilizing highly pervious mixtures (approx. 6,000 ft/day). Potentially, site discharge and flow and can be reduced below predevelopment conditions through conveyance of roof drainage, and other stormwater flows, to the pavement recharge bed. Design Guide: http://store.hotmix.org/index.php?productID=179 Specification (base mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Specification (surface): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
SS Credit 6.2	Stormwater Design: Quality Control	1	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed promotes stormwater quality control through infiltration utilizing highly pervious mixtures (approx. 6,000 ft/day). Data indicates infiltration BMPs have the highest pollutant removal efficiency for total phosphorus, soluble phosphorous, nitrate, zinc, and TSS, when compared to wetlands, wet ponds, filtering, swales, and dry ponds. Presentation – Porous Asphalt Pavement: http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
SS Credit 7.1	Heat Island Effect: Non-Roof	1	There are two ways in which asphalt pavement may be used to attain this credit. (1) Porous asphalt pavement (i.e. pervious paving) applied to at least 50% of the parking lot area. (2) Reducing heat island effect using asphalt pavements is achievable by coating the pavement surface to raise the Solar Reflectance Index (SRI). This approach allows the designer to capture the economy of using asphalt pavement while also expressing creativity and ingenuity. Coatings of virtually any color are available to treat asphalt pavement. This allows the designer to raise the SRI and integrate features such as color designated pavement areas. Multiple colors can be used to identify walkways, bikeways, emergency parking, handicap areas, or other. Another treatment that raises albedo is "sealing and chipping" using limestone or other light colored aggregate. Sealing and chipping is low cost and provides an agrarian look. Lastly, a simple slurry application of portland cement following paving, while the asphalt surface is still hot, fills and coats the surface to raise SRI. Coating Colors for LEED Credit: http://www.integratedpaving.com/leed/
Materials & Resources			
MR Credit 2.1	Construction Waste Management: Divert 50% From Disposal	1	Asphalt pavements are 100% recyclable. Where construction/major renovation of the site requires removal of asphalt pavement the entire quantity of asphalt pavement can be redirected to the manufacturing process for recycling into new asphalt pavement.
MR Credit 2.2	Construction Waste Management: Divert 75% From Disposal	1	See discussion for MR Credit 2.1

LEED-**NC** (continued)			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Materials & Resources (continued)			
MR Credit 4.1	Recycled Content: 10% (post-consumer + ½ pre-consumer)	1	Reduction in virgin materials is accomplished by incorporating recycled asphalt pavement. Project features utilizing asphalt paving materials and referencing the Colorado Department of Transportation (CDOT) Construction & Material Specifications are permitted to contain the following percentages of recycled asphalt pavement: Surface course mixes – 15%, Intermediate course mixes – 25%. CDOT Specification: http://www.dot.state.co.us/DesignSupport/Construction/Recently%20Issued%20Specs/2007-11-15/401rap.doc
MR Credit 4.2	Recycled Content: 20% (post-consumer + ½ pre-consumer)	1 Point in addition to MR Credit 4.1	See discussion for MR Credit 4.1
MR Credit 5.1	Regional Materials: 10% Extracted, Processed & Manufactured Regionally	1	Asphalt pavements utilize indigenous resources and reduce environmental impacts resulting from transportation. Asphalt pavements must be placed hot; therefore these mixtures must be produced locally, typically with local aggregate. Vehicles hauling asphalt mix are equipped to reduce heat loss in transport.
MR Credit 5.2	Regional Materials: 20% Extracted, Processed & Manufactured Regionally	1 Point in addition to MR Credit 5.1	See discussion for MR Credit 5.1

LEED®-EB Green Building Rating System For Existing Buildings Upgrades, Operations and Maintenance Version 2			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Sustainable Sites			
SS Credit 5.1 & 5.2	Stormwater Management: Rate and Quantity Reduction	1-2	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed reduces stormwater flow rate and quantity leaving the site. Potentially, site discharge and flow and can be reduced below predevelopment conditions through conveyance of roof drainage, and other stormwater flows, to the pavement recharge bed. Pollutant reduction of natural water flows is attained through infiltration. Data indicates infiltration BMPs have the highest pollutant removal efficiency for total phosphorus, soluble phosphorous, nitrate, zinc, and TSS, when compared to wetlands, wet ponds, filtering, swales, and dry ponds. Presentation – Porous Asphalt Pavement: http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Design Guide: http://store.hotmix.org/index.php?productID=179 Specification (porous base mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Specification (porous surface mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
SS Credit 6.1	Heat Island Effect: Non-Roof	1	There are two ways in which asphalt pavement may be used to attain this credit. (1) Porous asphalt pavement (i.e. pervious paving) applied to at least 50% of the parking lot area. (2) Reducing heat island effect using asphalt pavements is achievable by coating the pavement surface to raise the Solar Reflectance Index (SRI). This approach allows the designer to capture the economy of using asphalt pavement while also expressing creativity and ingenuity. Coatings of virtually any color are available to treat asphalt pavement. This allows the designer to raise the SRI and integrate features such as color designated pavement areas. Multiple colors can be used to identify walkways, bikeways, emergency parking, handicap areas, or other. Another treatment that raises albedo is "sealing and chipping" using limestone or other light colored aggregate. Sealing and chipping is low cost and provides an agrarian look. Lastly, a simple slurry application of portland cement following paving, while the asphalt surface is still hot, fills and coats the surface to raise SRI. Coating Colors for LEED Credit: http://www.integratedpaving.com/leed/
Materials & Resources			
MR Credit 1.1 &1.2	Construction, Demolition and Renovation Waste Management	1 - 2	Asphalt pavements are 100% recyclable. Where construction/major renovation of the site requires removal of asphalt pavement the entire quantity of asphalt pavement can be redirected to the manufacturing process for recycling into new asphalt pavement.

LEED®-**EB** (continued)			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Materials & Resources (continued)			
MR Credit 2.1 – 2.5	Optimize Use of Alternative Materials	1 – 5	There are two ways in which asphalt pavement may be used to attain this credit. (1) LEED permits credit for building materials used on site where the material contains at least 10% post-consumer or 20% post-industrial material. Recycled asphalt pavement is such a material and project features utilizing asphalt paving materials, and referencing the Colorado Department of Transportation Construction & Material Specifications, are permitted to contain the following percentages: Surface course mixes – 15%, Intermediate course mixes – 25%, Base course mixes. CDOT Specification: http://www.dot.state.co.us/DesignSupport/Construction/Recently%20Issued%20Specs/2007-11-15/401rap.doc (2) LEED permits credit if 50% of the material used are extracted and processed within 500 miles of the project. Asphalt pavements must be placed hot; therefore these mixtures must be produced locally, typically with local aggregate.

LEED® for Schools For New Construction and Major Renovations March 2008 Version			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Sustainable Sites			
SS Credit 6.1	Stormwater Design: Quantity Control	1	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed promotes quantity control utilizing highly pervious mixtures (approx. 6,000 ft/day). Potentially, site discharge and flow and can be reduced below predevelopment conditions through conveyance of roof drainage, and other stormwater flows, to the pavement recharge bed. Design Guide: http://store.hotmix.org/index.php?productID=179 Specification (base mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Specification (surface): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
SS Credit 6.2	Stormwater Design: Quality Control	1	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed promotes stormwater quality control through infiltration utilizing highly pervious mixtures (approx. 6,000 ft/day). Data indicates infiltration BMPs have the highest pollutant removal efficiency for total phosphorus, soluble phosphorous, nitrate, zinc, and TSS, when compared to wetlands, wet ponds, filtering, swales, and dry ponds. Presentation – Porous Asphalt Pavement: http://www.flexiblepavements.org/documents/PorousPavementfporevisions.pdf
SS Credit 7.1	Heat Island Effect: Non-Roof	1	There are two ways in which asphalt pavement may be used to attain this credit. (1) Porous asphalt pavement (i.e. pervious paving) applied to at least 50% of the site hardscape. (2) Reducing heat island effect using asphalt pavements is achievable by coating the pavement surface to raise the Solar Reflectance Index (SRI). This approach allows the designer to capture the economy of using asphalt pavement while also expressing creativity and ingenuity. Coatings of virtually any color are available to treat asphalt pavement. This allows the designer to raise the SRI and integrate features such as color designated pavement areas. Multiple colors can be used to identify walkways, bikeways, emergency parking, handicap areas, or other. Another treatment that raises albedo is "sealing and chipping" using limestone or other light colored aggregate. Sealing and chipping is low cost and provides an agrarian look. Lastly, a simple slurry application of portland cement following paving, while the asphalt surface is still hot, fills and coats the surface to raise SRI. Coating Colors for LEED Credit: http://www.integratedpaving.com/leed/
Materials & Resources			
MR Credit 2	Construction Waste Management: Divert From Disposal	1 - 2	Asphalt pavements are 100% recyclable. Where construction/major renovation of the site requires removal of asphalt pavement the entire quantity of asphalt pavement can be redirected to the manufacturing process for recycling into new asphalt pavement.

LEED® for Schools (continued)			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Materials & Resources (continued)			
MR Credit 4	Recycled Content: (post-consumer + ½ pre-consumer)	1 – 2	Reduction in virgin materials is accomplished by incorporating recycled asphalt pavement. Project features utilizing asphalt paving materials and referencing the Ohio Department of Transportation Construction & Material Specifications are permitted to contain the following percentages of recycled asphalt pavement: Surface course mixes – 20%, Intermediate course mixes – 25%. CDOT Specification: http://www.dot.state.co.us/DesignSupport/Construction/Recently%20Issued%20Specs/2007-11-15/401rap.doc
MR Credit 5	Regional Materials: Extracted, Processed & Manufactured Regionally	1 – 2	Asphalt pavements utilize indigenous resources and reduce environmental impacts resulting from transportation. Asphalt pavements must be placed hot; therefore these mixtures must be produced locally, typically with local aggregate.

LEED For Neighborhood Development PILOT VERSION March 2008			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Green Construction & Technology			
GCT Credit 9	Stormwater Management	1 – 5	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed reduces stormwater flow rate and quantity leaving the site. Potentially, site discharge and flow and can be reduced below predevelopment conditions through conveyance of roof drainage, and other stormwater flows, to the pavement recharge bed. Pollutant reduction of natural water flows is attained through infiltration. Data indicates infiltration BMPs have the highest pollutant removal efficiency for total phosphorus, soluble phosphorous, nitrate, zinc, and TSS, when compared to wetlands, wet ponds, filtering, swales, and dry ponds. Presentation – Porous Asphalt Pavement: http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Design Guide: http://store.hotmix.org/index.php?productID=179 Specification (porous base mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Specification (porous surface mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
GCT Credit 10	Heat Island Reduction: Option 1 – Non-Roof	1	There are two ways in which asphalt pavement may be used to attain this credit. (1) Porous asphalt pavement (i.e. pervious paving) applied to at least 50% of the site hardscape. (2) Reducing heat island effect using asphalt pavements is achievable by coating the pavement surface to raise the Solar Reflectance Index (SRI). This approach allows the designer to capture the economy of using asphalt pavement while also expressing creativity and ingenuity. Coatings of virtually any color are available to treat asphalt pavement. This allows the designer to raise the SRI and integrate features such as color designated pavement areas. Multiple colors can be used to identify walkways, bikeways, emergency parking, handicap areas, or other. Another treatment that raises albedo is "sealing and chipping" using limestone or other light colored aggregate. Sealing and chipping is low cost and provides an agrarian look. Lastly, a simple slurry application of portland cement following paving, while the asphalt surface is still hot, fills and coats the surface to raise SRI. Coating Colors for LEED Credit: http://www.integratedpaving.com/leed/

LEED For Neighborhood Development (continued)			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Green Construction & Technology (continued)			
GCT Credit 17	Recycled Content in Infrastructure	1	Reduction in virgin materials is accomplished by incorporating recycled asphalt pavement. Project features utilizing asphalt paving materials and referencing the Ohio Department of Transportation Construction & Material Specifications are permitted to contain the following percentages of recycled asphalt pavement: Surface course mixes – 15%, Intermediate course mixes – 25%. CDOT Specification: http://www.dot.state.co.us/DesignSupport/Construction/Recently%20Issued%20Specs/2007-11-15/401rap.doc Ground Tire Rubber (GTR) can be added either as an asphalt cement modifier or a constituent of the aggregate structure.
GCT Credit 18	Construction Waste Management	1	Asphalt pavements are 100% recyclable. Where construction/major renovation of the site requires removal of asphalt pavement the entire quantity of asphalt pavement can be redirected to the manufacturing process for recycling into new asphalt pavement.

LEED For Homes Program Version 1.11a March 2008 Version			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Sustainable Sites			
SS 3.	Shading of Hardscapes	1	Requirements for this credit allow the use of pavement surfaces having reflectance of at least 0.3 over 50% of the site's non-roof impervious surface. Attaining this credit with asphalt pavements is achievable by coating the pavement surface to raise the Solar Reflectance Index (SRI). This approach allows the designer to capture the economy of using asphalt pavement while also expressing creativity and ingenuity. Coatings of virtually any color are available to treat asphalt pavement. This allows the designer to raise the SRI and integrate features such as color designated pavement areas. Another treatment that raises albedo is "sealing and chipping" using limestone or other light colored aggregate. Sealing and chipping is low cost and provides an agrarian look. Lastly, a simple slurry application of portland cement following paving, while the asphalt surface is still hot, fills and coats the surface to raise SRI. Coating Colors for LEED Credit: http://www.integratedpaving.com/leed/
SS 4.	Surface Water Management	6 max.	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed reduces stormwater flow rate and quantity leaving the site. Potentially, site discharge and flow and can be reduced below predevelopment conditions through conveyance of roof drainage, and other stormwater flows, to the pavement recharge bed. Design Guide: http://store.hotmix.org/index.php?productID=179 Specification (porous base mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Specification (porous surface mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
Materials & Resources			
MR 2.	Environmentally Preferable Products	8 max.	Credit can be obtained for using products that are extracted, processed and manufactured within 500 miles of the home. Asphalt pavements utilize indigenous resources and reduce environmental impacts resulting from transportation. Asphalt pavements must be placed hot; therefore these mixtures must be produced locally, typically with local aggregate.

LEED For Retail – New Construction and Major Renovations Pilot Version 2 March 2008 Version			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Sustainable Sites			
SS Credit 6.1	Stormwater Design: Quantity Control	1	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed promotes quantity control utilizing highly pervious mixtures (approx. 6,000 ft/day). Potentially, site discharge and flow and can be reduced below predevelopment conditions through conveyance of roof drainage, and other stormwater flows, to the pavement recharge bed. Design Guide: http://store.hotmix.org/index.php?productID=179 Specification (porous base mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc Specification (porous surface mix): http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
SS Credit 6.2	Stormwater Design: Quality Control	1	Porous asphalt pavement (i.e. pervious paving) constructed on a recharge bed promotes stormwater quality control through infiltration utilizing highly pervious mixtures (approx. 6,000 ft/day). Data indicates infiltration BMPs have the highest pollutant removal efficiency for total phosphorus, soluble phosphorous, nitrate, zinc, and TSS, when compared to wetlands, wet ponds, filtering, swales, and dry ponds. Presentation – Porous Asphalt Pavement: http://www.co-asphalt.com/documents/POROUS_HMA_PAVEMENTS.doc
SS Credit 7.1	Heat Island Effect: Non-Roof (25% of site hardscape)	1	There are two ways in which asphalt pavement may be used to attain this credit. **(1)** Porous asphalt pavement (i.e. pervious paving) applied to at least **25%** of the site hardscape. **(2)** Reducing heat island effect using asphalt pavements is achievable by coating the pavement surface to raise the Solar Reflectance Index (SRI). This approach allows the designer to capture the economy of using asphalt pavement while also expressing creativity and ingenuity. Coatings of virtually any color are available to treat asphalt pavement. This allows the designer to raise the SRI and integrate features such as color designated pavement areas. Multiple colors can be used to identify walkways, bikeways, emergency parking, handicap areas, or other. Another treatment that raises albedo is "sealing and chipping" using limestone or other light colored aggregate. Sealing and chipping is low cost and provides an agrarian look. Lastly, a simple slurry application of portland cement following paving, while the asphalt surface is still hot, fills and coats the surface to raise SRI. Coating Colors for LEED Credit: http://www.integratedpaving.com/leed/
SS Credit 7.2	Heat Island Effect: Non-Roof (50% of site hardscape)	1	There are two ways in which asphalt pavement may be used to attain this credit. **(1)** Porous asphalt pavement (i.e. pervious paving) applied to at least **50%** of the site hardscape. **(2)** See discussion for MR Credit 7.1
SS Credit 7.3	Heat Island Effect: Non-Roof (75% of site hardscape)	1	There are two ways in which asphalt pavement may be used to attain this credit. **(1)** Porous asphalt pavement (i.e. pervious paving) applied to at least **75%** of the site hardscape. **(2)** See discussion for MR Credit 7.1

LEED For Retail (continued)			
Rating Category	Credit Description	Points	Discussion of Asphalt Pavement Applicability/Contribution to Rating Category
Materials & Resources			
MR Credit 2.1	Construction Waste Management: Divert 50% From Disposal	1	Asphalt pavements are 100% recyclable. Where construction/major renovation of the site requires removal of asphalt pavement the entire quantity of asphalt pavement can be redirected to the manufacturing process for recycling into new asphalt pavement.
MR Credit 2.2	Construction Waste Management: Divert 75% From Disposal	1 Point in addition to MR Credit 2.1	See discussion for MR Credit 2.1
MR Credit 4.1	Recycled Content: 10% (post-consumer + ½ pre-consumer)	1	Reduction in virgin materials is accomplished by incorporating recycled asphalt pavement. Project features utilizing asphalt paving materials and referencing the Colorado Department of Transportation Construction & Material Specifications are permitted to contain the following percentages of recycled asphalt pavement: Surface course mixes – 15%, Intermediate course mixes – 25%, CDOT Specification: http://www.dot.state.co.us/DesignSupport/Construction/Recently%20Issued%20Specs/2007-11-15/401rap.doc
MR Credit 4.2	Recycled Content: 20% (post-consumer + ½ pre-consumer)	1 Point in addition to MR Credit 4.1	See discussion for MR Credit 4.1
MR Credit 5.1	Regional Materials: 10% Extracted, Processed & Manufactured Regionally	1	Asphalt pavements utilize indigenous resources and reduce environmental impacts resulting from transportation. Asphalt pavements must be placed hot; therefore these mixtures must be produced locally, typically with local aggregate. Vehicles hauling asphalt mix are equipped to reduce heat loss in transport.
MR Credit 5.2	Regional Materials: 20% Extracted, Processed & Manufactured Regionally	1 Point in addition to MR Credit 5.1	See discussion for MR Credit 5.1