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Asphalt – Paving the Way to LEED Certification

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Developers seeking LEED certification can achieve numerous credits by incorporating asphalt pavements into their building projects. Under LEED's various rating systems, asphalt pavements can contribute to credits in the Sustainable Sites, Materials and Resources, and Innovation in Design categories. In particular, such pavements can help manage stormwater, reduce heat island effect, divert materials from landfills, and utilize recycled and/or regionally produced materials. Projects can potentially earn additional credits by using asphalt with high recycled content or warm-mix asphalt. The following discussion highlights the applicable credit areas where asphalt pavement is conducive to LEED certification.

1. Sustainable Sites (SS)

This credit category "discourages development on previously undeveloped land; minimizes a building's impact on ecosystems and waterways; encourages regionally appropriate landscaping; rewards smart transportation choices; controls stormwater runoff; and reduces erosion, light pollution, heat island effect, and construction-related pollution."[1] As explained below, asphalt pavements can help projects earn credits in this category by reducing stormwater runoff, improving stormwater quality, and reducing heat island effect.

(a) Managing Stormwater

SS Credit 6.1, Stormwater Design – Quantity Control, is intended "to limit disruption of natural hydrology by reducing impervious cover, increasing on-site infiltration, reducing or elimination pollution stormwater, and eliminating contaminants."[2] Where sites have existing imperviousness of 50% or less, a project earns one point through implementation of a stormwater management plan that either (1) prevents the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the 1-and 2-year 24-hour design storms; or (2) protects receiving stormwater channels from excessive erosion through stream channel protection and quantity control strategies. Where sites have existing imperviousness of greater than 50%, a project earns one point through implementation of

[1] USGBC, *What LEED Measures*, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1989 (hereinafter, "*What LEED Measures*").
[2] LEED REFERENCE GUIDE FOR GREEN BUILDING AND CONSTRUCTION 91 (2009) (hereinafter, "REFERENCE GUIDE").

a stormwater design plan resulting in a 25% decrease in the volume of stormwater runoff from the 2-year 24-hour design storm.

SS Credit 6.2, Stormwater Design – Quality Control, is intended "to limit disruption and pollution of natural water flows by managing stormwater runoff."[3] Accordingly, projects can achieve one point for implementation of a stormwater plan that, through the use of acceptable best management practices (BMPs), (1) decreases impervious cover; (2) promotes infiltration; and (3) removes 80% of Total Suspended Solids (TSS) for 90% of average annual rainfall.

Incorporating porous asphalt can assist a project in obtaining both of these credits. With respect to Credit 6.1, porous pavements can reduce site discharge and flow below predevelopment conditions by conveying roof drainage and other stormwater flows to the pavement recharge bed.[4] Additionally, studies have shown that infiltration BMPs (such as porous pavements) have the highest pollutant removal efficiency for total phosphorus, soluble phosphorus, nitrate, zinc, and TSS.[5] Porous pavements are therefore beneficial for achieving Credit 6.2.

(b) Reducing Heat Island Effect

New technologies applied to asphalt pavements can also assist in the achievement of SS Credit 7.1, Heat Island Effect – Nonroof. The heat island effect – caused by, *inter alia*, displaced vegetation, nonreflective surfaces, and waste heat from vehicles and factories[6] – results in increased ambient air temperatures in urban areas. This phenomenon increases cooling loads during summer months and also depletes native plant and animal populations. This credit is therefore intended to "reduce heat island effect to minimize impacts on microclimates and human and wildlife habitats."[7]

As such, a project earns one point by using any of the following strategies for 50% of the site's hardscape (including pavements): (1) providing shade from the existing tree canopy or within 5 years of landscape installation; (2) providing shade from solar-paneled structures producing energy to offset some nonrenewable resource use; (3) providing shade from architectural devices or structures with a solar reflectance index (SRI) of at least 29; (4) paving with materials with an SRI value of at least 29; or (5) using an open-grid pavement system (which is at least 50% pervious). In the alternative, the project can place a minimum of 50% of the site's parking spaces under cover, with

[3] *Id*. at 101.
[4] Minnesota Asphalt Pavement Association, *Hot Mix Asphalts and LEED Certification Guideline*, http://www.asphaltisbest.com/PDFs/LEED%20-%20HMA%20contribution%20to%20points%2009-04-07.pdf (hereinafter, "*Hot Mix Asphalts*").
[5] *Id*.; Wisconsin Asphalt Pavement Association, *HMA Pavements and LEED* 28, http://www.wispave.org/downloads/HMA_and_LEED.pdf (comparing infiltration BMPs to wetlands, wet ponds, filtering, swales, and dry ponds) (hereinafter, "*HMA Pavements*")
[6] REFERENCE GUIDE, *supra* note 2, at 109; *HMA Pavements*, *supra* note 5, at 32.
[7] REFERENCE GUIDE, *supra* note 2, at 109.

the cover having an SRI of at least 29, constituting a vegetative green roof, or consisting of solar panels producing energy to offset some nonrenewable resource use.

While new asphalt generally has an SRI of zero,[8] synthetic colored coatings can be applied to the pavement to increase the SRI and achieve SS Credit 7.1. The USGBC, recognizing the importance of both porous and high-SRI pavements for green building projects, agreed in 2008 to fund a "Porous Pavement Study" in conjunction with East Carolina University and Barnhill Contracting Company.[9] The study will focus, in part, on the impact of color modification agents on porosity. The study began in late 2008 and will continue through the third quarter of 2010.[10]

2. Materials and Resources

This credit category emphasizes "the selection of sustainably grown, harvested, produced, and transported products and materials."[11] It thus "promotes the reduction of waste as well as reuse and recycling, and it takes into account the reduction of waste at a product's source."[12] Asphalt pavements contribute to credit achievement in this category because they are readily recyclable and predominately contain local aggregates.

(a) Reducing Waste and Reusing Materials

MR Credit 2, Construction Waste Management, is intended "to divert construction and demolition debris from disposal in landfills and incineration facilities [and to] redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites."[13] As such, a project may earn one to two points, respectively, by recycling or salvaging 50% or 75% of nonhazardous construction and demolition debris.

In the United States, asphalt pavement is the most recycled material;[14] hot-mix asphalt from any type of pavement (streets, parking lots, runways, etc.) can be recycled.[15] Any existing hot-mix asphalt on the project site can therefore be broken up and recycled (instead of taken to a landfill) in order to obtain a point for this credit. In addition, shingles, which are high in asphalt content, can be torn off existing roofs and processed for use in future asphalt mixes.

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[8] *Id*. at 112.
[9] Architectural Stone & Landscape Design, *Porous Paving Gets USGBC Grant* (Nov. 21, 2008), http://www.as-ld.com/index.php?option=com_content&view=article&id=59:pourous-paving-gets-usgbc-grant&catid=11:latest
[10] *Improvement of Porous Pavement System for on-site Stormwater Management*, http://www.usgbc.org/ShowFile.aspx?DocumentID=5306
[11] *What LEED Measures*, *supra* note 1.
[12] *Id*.
[13] REFERENCE GUIDE, *supra* note 2, at 357.
[14] *HMA Pavements*, *supra* note 5, at 40; National Asphalt Paving Association, *Hot Mix Asphalt is the Best Buy*, http://www.flexiblepavements.org/documents/BB11.pdf (hereinafter "*Best Buy*")
[15] *Best Buy*, *supra* note 14.

MR Credit 3, Materials Reuse, is intended "to reuse building materials and products to reduce demand for virgin materials and reduce waste, thereby lessening impacts associated with the extraction and processing of virgin resources."[16] A project can therefore earn one point if 5% of all site material (by cost) is reused, and two points if 10% of all site material is reused. The use of salvaged paving materials (obtained off-site and then recycled) can make this credit readily achievable.

(b) Using Recycled and/or Regionally Produced Materials

MR Credit 4, Recycled Content, is intended to "increase demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials."[17] A project earns one point if its post-consumer waste plus ½ of pre-consumer content constitutes at least 10% (based on cost) of the total materials value. The project may earn two points if its post-consumer waste plus ½ of pre-consumer content constitutes at least 20% (based on cost) of the total materials value.

While this credit is based on materials value for the entire project, the use of recycled asphalt can contribute toward the project's total incorporation of recycled content. As noted above, asphalt pavement is particularly suited to assist in achieving this credit because it is the most recycled material in the United States.

The incorporation of asphalt pavements can also improve a project's chances of achieving Credit 5, Regional Materials. Its intent is "to increase demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation."[18] A project will earn one credit if all materials extracted, harvested, recovered, or manufactured within 500 miles of the project site constitute at least 10% of total materials value (based on cost). The project may earn two credits if those regional materials constitute at least 20% of the total materials value of the project.

Asphalt pavements are also uniquely situated to assist in achievement of this credit because they "utilize indigenous resources and reduce environmental impacts resulting from transportation."[19] By weight, 95 percent of an asphalt pavement is fine and course aggregates and with very few exceptions, local aggregate quarries (from well within 500 miles) will be utilized for paving projects.

3. Innovation in Design

Up to three Innovation in Design credits are available when a project achieves exemplary performance in existing LEED credits. MR Credits 4 and 5, respectively, allow exemplary performance credits for achieving a total recycled-content value of at least 30% or a total value of regionally harvested, extracted, and manufactured materials

[16] REFERENCE GUIDE, *supra* note 2, at 363.
[17] *Id*. at 369.
[18] *Id*. at 379.
[19] *Hot Mix Asphalts*, *supra* note 4.

of 30% or more. Recycled (or reclaimed) asphalt pavements (RAPs) and warm mix asphalt can likely contribute toward these goals and help projects garner additional points toward certification.

Like traditional asphalt mixes, warm mix asphalt is traditionally composed of local aggregate. In addition, warm mix asphalt requires a lower temperature for mixing and paving and therefore reduces fuel consumption.[20] The low heat associated with warm mix asphalt also encourages the incorporation of mixes with high RAP content; the lower temperatures help maintain the binder and thus increase compactibility and reduce cracking.[21]

In sum, green building projects can earn LEED points in the Sustainable Sites and Materials and Resources credit categories by incorporating asphalt pavements. Porous versions can assist with stormwater management, and the application of colored coatings can lead to additional points by reducing the heat island effect. These pavements are also easily recycled (and thus diverted from landfills) and are largely composed of regional and recycled materials. The high composition of recycled and regional materials in certain asphalts may also assist projects in collecting Innovation & Design credits.

[20] *See* www.warmmixasphalt.com

[21] Better Roads, *Highway Contractor – RAP Making New Fans Across the Country* (Feb. 1, 2010), http://www.betterroads.com/highway-contractor-rap-making-new-fans-across-the-country/; Brian M. Prowell and Graham C. Hurley, *Warm Mix Asphalt: Best Practices* 26, http://www.warmmixasphalt.com/submissions/73_20080324_WarmMixAsphaltBestPractices_NAPA2008.pdf