

Ready Mixed Concrete Industry LEED Reference Guide

Executive Summary

This document was underwritten by the RMC Research Foundation with financial support from the Portland Cement Association (PAC) and primary technical assistance from the National Ready Mixed Concrete Association (NRMCA). It was researched and written by Steven Winter Associates, Inc., 50 Washington Street, Norwalk, CT 06854 (www.swinter.com). Steven Winter Associates (SWA) is an independent research and consulting firm with a long-standing commitment to achieving energy-, cost-, and resource-efficient buildings. SWA works closely with project architects, building owners, developers, and other industry representatives to apply sustainable, “whole building” strategies in a wide variety of building types: commercial, residential, educational, and institutional. SWA possesses expertise in material selection, systems engineering and specification, environmental performance, affordability, reduced construction and operating costs, HVAC control strategies, durability and affordability. SWA expresses its thanks to the following people for their assistance in the preparation of this document: Edward R. Herbert III, NRMCA; David Shepherd, PCA; David Goss, American Coal Ash Association; Jan Prusinski, Slag Cement Association.

Abstract: Ready mixed concrete offers opportunities for designers, architects, engineers, and others in the building industry to maximize credits offered by the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) Program. This document will guide the reader in understanding the LEED program and areas where ready mixed concrete can be applied in a project to earn LEED points, enhancing its sustainability.

Keywords: Energy conservation, environmental factors, innovative design, LEED, ready mixed concrete, recycling, sustainability.

EXECUTIVE SUMMARY

Of all the green building design and construction evaluation programs in the U.S., the U.S. Green Building Council's LEED rating system (an acronym for "Leadership in Energy and Environmental Design") is the most widely adopted standard. Public and private companies, government agencies, trade groups, and other entities throughout the U.S. construction industry have adopted LEED as the standard for determining a building's degree of sustainability. Recognizing the importance to LEED, the RMC Research Foundation commissioned the development of a LEED Reference Document that could be used by architects, developers, clients, builders, manufacturers, suppliers, and others in the construction industry to determine how the use of ready mixed concrete can contribute to sustainable building.

The resulting document presents a detailed discussion of the LEED program, how LEED points are assigned, how material uses and construction methods must be documented, and what issues must be carefully considered in using ready mixed concrete to enhance a building's sustainability.

Potential LEED points gained through the use of ready mixed concrete are discussed in the following areas: stormwater management; landscape paving; minimizing energy use; optimizing energy performance; managing construction waste; recycled content; use of regional materials; use of certified wood; innovation in design; site-wide VOC reduction; and reduction in the use of portland cement. The document also covers plant waste water disposal; onsite wash water disposal; solid waste; and site protection. In each of these areas, the Reference Document presents information useful to the designer, the contractor, and the ready mixed concrete supplier in achieving LEED points. This information is supplemented by extensive lists of citations, references, and other resource documents, trade groups, and websites.

INTRODUCTION

Established in 1998, the LEED Green Building Rating System for New Construction (LEED-NC) is a voluntary, consensus-based national standard for designing and building high-performance, sustainable buildings. LEED (an acronym for "Leadership in Energy and Environmental Design") was developed by members of the U.S. Green Building Council

(USGBC) representing many segments of the building industry and environmental science. LEED's mission is to: define that which qualifies as a "green building" by establishing a common standard of measurement; promote integrated, whole-building design practices; recognize environmental leadership in the building industry; stimulate green competition; raise consumer awareness of green building benefits; and transform the building market. While the current number of registered LEED projects only accounts for about 5% of the United States Commercial and Institutional Building market, this number has grown from 12 registered LEED projects in 1999 to 1,262 by April 2004.

LEED Certification can be achieved at a Certified, Silver, Gold, or Platinum level based on how many of the 65 LEED-NC Credits are awarded after a project meets seven LEED Prerequisites. The LEED-NC Rating System divides these credits and prerequisites into six categories: Sustainable Sites, Water Efficiency, Energy & Atmosphere, Materials and Resources, Indoor Environmental Quality, and Innovation in Design. Prerequisites and Credits are based mostly on established governmental, trade group, or laboratory standards, such as the EPA's "Stormwater Management for Construction Activities," or the standards for energy efficiency and ventilation effectiveness of the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE). The number of points a project earns by satisfying the environmental performance criteria of the various LEED Credits determines the level at which a project can be certified.

While the LEED-NC Rating system was initially designed for commercial high-rise office buildings, the system can be used for a wide variety of projects. LEED-NC version 2.1, released in November 2002, includes requirements suitable for multifamily residential high-rise projects. Also, the USGBC modified and added to the LEED-NC Rating System to create two new LEED Rating Systems; LEED-CS for Core & Shell and LEED-CI for Commercial Interiors. LEED-CS and LEED-CI are currently in the pilot phase with approximately 98 projects registered between them. The USGBC is currently developing guidelines for residential and laboratory projects, and is making the final revision to the LEED-EB Rating System for Existing Buildings.

THE LEED CERTIFICATION PROCESS

LEED is a voluntary rating system. An environmentally conscious building owner or developer may choose to design and construct a building to minimize environmental impact using the LEED rating system as a guide. LEED certification quantifies the level of environmental performance for a building. Typically the owner's representative, who is usually an architect, is directed to design the building to meet a certain level of LEED certification. Some building owners have committed to having all of their projects LEED certified and others have committed to certifying only selected buildings. For example, several public agencies such as city governments or federal agencies have declared that all of their new buildings shall be LEED certified. Some private companies have built new headquarters using LEED certification.

A project formally begins the LEED Certification process by having it registered as a LEED project on the USGBC website (www.usgbc.org) by one of the project team members. This process requires completing an online form that asks for information on the project and the design team. Registering also requires a fee based on the total square footage of the project. The registration fee ranges from \$750 to \$3,000 depending on project size. The registration process entitles the project team access to member-only portions of the USGBC's website and two free Credit Interpretation Requests (CIR). CIRs are made to the USGBC online when a project deems that compliance with a credit's intent can be met without meeting the letter of a given Credit Requirement. The member's-only portion of the USGBC website includes access to all prior CIRs made by registered projects and subsequent USGBC responses or "Rulings."

Informally, most projects begin the LEED process by evaluating criteria of the various LEED Credits and targeting those most compatible with the project scope, budget, and environmental goals. Projects that start this process in the early stages of the design process are usually more successful because they can take advantage of synergies between LEED Credits and because they do not need to make design changes to meet LEED Criteria.

The process of documenting compliance with LEED Criteria can begin early in the design, but many of the credits related to construction activities and building materials require documentation that is not available until the final stages of Construction Administration, or even Substantial Completion. While the building commissioning (the process of making final

checks and adjustments to construction and building operations), may need to continue beyond substantial completion for seasonal or deferred testing, projects are usually able to assemble all the documentation needed to submit a LEED Application to the USGBC about the same time as substantial completion.

The LEED Application includes documentation or letters declaring compliance for all LEED Prerequisites and targeted LEED Credits. The USGBC website (www.usgbc.org) includes detailed information on the required format for the LEED Application. Once a project has submitted the two copies of the application to the USGBC, the USGBC forwards one copy to a contracted reviewer and the LEED third party review process begins. The USGBC will issue a formal review of the LEED Application within 30 days. This first formal preliminary review will detail which credits are accepted, which credits need additional documentation, and which credits are being audited. The preliminary review provides descriptions of the additional documentation materials required. The project team then has 30 days to provide the requested materials to the USGBC. The final Certification then occurs within 30 days from the date in which the USGBC receives the additional requested materials. At that time, a set of 10 LEED Certified, Silver, Gold, or Platinum Certificates are issued to the design team in recognition of the LEED Rating earned. The actual LEED Plaque is then ordered and is usually available within four to six weeks.

LEED encourages and rewards an integrated approach to design and construction that involves all team members in the project, including the design and construction team, owners, product suppliers and manufacturers, construction managers, cost estimators, specification writers, and others. LEED documentation is the responsibility of several team members, although it is typically coordinated by an Accredited LEED specialist, who also prepares CIRs, the final submittal, and the responses to the USGBC during the review period.

THE READY MIXED CONCRETE INDUSTRY LEED REFERENCE DOCUMENT

The document is organized into 11 sections that offer the best opportunities for achieving LEED Credits through the use of ready mixed concrete. The term “ready mixed concrete” and “concrete” are used interchangeably throughout this publication and meant to describe concrete that is delivered to the project site in the plastic state in concrete trucks. The 11

sections are organized under four categories: “Sustainable Sites,” “Energy and Atmosphere,” “Materials and Resources,” and “Innovation In Design.” These four categories are taken directly from the LEED-NC standard. A fifth section, “Incidental Ready Mixed Concrete Use in Other Credits,” offers guidance in how the material can enhance opportunities for gaining LEED Credits in other areas.

In each section, the discussion of the LEED-NC Credits relevant to ready mixed concrete is separated into those issues primarily affecting the project designers (in the section “Design Issues”) and those primarily affecting the concrete trade professionals (in the section “Trade Contractor and Manufacturer Issues”). However, each group needs to read both portions, as both groups are often responsible for completing documentation requirements. In general, “Design Issues” deals with issues that must be decided before the project begins construction, while “Trade Contractor and Manufacturer Issues” is concerned with actual construction and close-out.

A final section of the document addresses environmental considerations in using ready mixed concrete with reference to plant waste water disposal, onsite wash water disposal, solid waste, and site protection.