LEED Certification

Polished & Processed Concrete

U.S. GREEN BUILDING COUNCIL MEMBER

CONCRETE Processing and Polishing Technical INSTITUTE

SUSTAINABLE ADVANTAGES OF

POLISHED CONCRETE FLOOR SURFACES

when polished using methods of the

CONCRETE Processing and Polishing Technical INSTITUTE

WITH EMPHASIS ON PROJECTS REGISTERED UNDER
THE U.S. GREEN BUILDING COUNCIL'S LEED RATING SYSTEM®

LEED NC (VERSION 2.2) • NEW CONSTRUCTION AND MAJOR RENOVATION

LEED EB • EXISTING BUILDINGS- Operations & Maintenance

LEED CI • COMMERCIAL INTERIORS

LEED CS • CORE and SHELL CONSTRUCTION

LEED FOR SCHOOLS

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CREDITS

This report was developed and written by Green Tree Partners of Leesburg, Florida, under the direction of Jaime Hayden-Pisczek, LEED-AP. It represents the most up-to-date information available at the time of release. It is important for the reader to understand that the USGBC registers projects under its various LEED Programs and credit points are accumulated toward accreditation of various levels of LEED Certification. These points typically represent a collaborative effort among the building team, the project's LEED-AP and various contractors, manufacturers and distributors. Individual products or processes are seldom used alone to achieve points. More likely, products and processes are combined as part of a system or as a collective group and points are earned accordingly.

Information cited in this report was derived from the following sources:

Portland Cement Association
U.S. Green Building Council
- **The LEED for New Construction Version 2.2 Reference Guide**
- **The LEED for Existing Buildings Version 2.0 Reference Guide**
- **The LEED for Commercial Interiors Version 2.0 Reference Guide**

American Society of Heating, Refrigeration and Air Conditioning Engineers
ASHRAE Handbook of Fundamentals
Green Building Initiative
National Institute for Occupational Safety and Health
U.S Department of Labor
Occupational Safety & Health Administration
U.S. Environmental Protection Agency

INTRODUCTION

In general non-technical terms, sustainability is defined as the ability to support or to keep a process going for a significant, yet undefined period of time. In the construction industry, the concept takes on tighter parameters. Sustainability in this context has come to be synonymous with "environmentally friendly" and "green." Engineers and architects define sustainability to mean having no net negative impact on the environment while providing a long life cycle of performance. It also embraces qualities such as energy savings, material reuse and minimal maintenance.

In an effort to reduce the energy consumption across the country, more and more builders are embracing the concept of sustainable development—the ability to build the facilities and structures we need today without depleting resources for the future. Sustainability seeks to balance the economic, social and environmental impacts, recognizing that population growth will continue as will the need for more commercial structures.

This report will explore the sustainable benefits of polishing a concrete floor using the methods taught by the Institute for use in a variety of aesthetical and functional applications as opposed to covering the concrete with carpeting, hardwood, VCT or other traditional floor covering material.

By its basic nature, the Institute polishing process is sustainable for a number of reasons. The process eliminates the need for a second floor covering material, which offers a significantly shorter life cycle than the concrete substrate. VCT has a significant maintenance cycle that requires stripping and refinishing with the use of caustic chemicals, carpeting is traditionally replaced on a frequent cycle, depending on traffic and wear, coatings such as epoxies not only wear but have the potential to delaminate and although a wood surface typically lasts longer, it requires a higher degree of maintenance and frequent refinishing. Statistically, no floor covering materials comes close to outlasting its concrete foundation.

Application methods for polishing concrete vary among contractors. Although most chemicals used by the various contractors are considered environmentally friendly, there is a significant environmental difference in wet versus dry grinding processes. This report will document these differences.

This report will also address several of the more popular green building initiatives, specifically the U.S. Green Building Council's LEED Rating System and the international Green Globes program. We will offer specific details on the role a polished concrete floor can play in the various categories and credits that are available in a LEED project.

BENEFITS OF CONCRETE

In order to develop a thorough understanding of the advantages of polished concrete, it is important to first explore the sustainability and other related benefits of concrete.

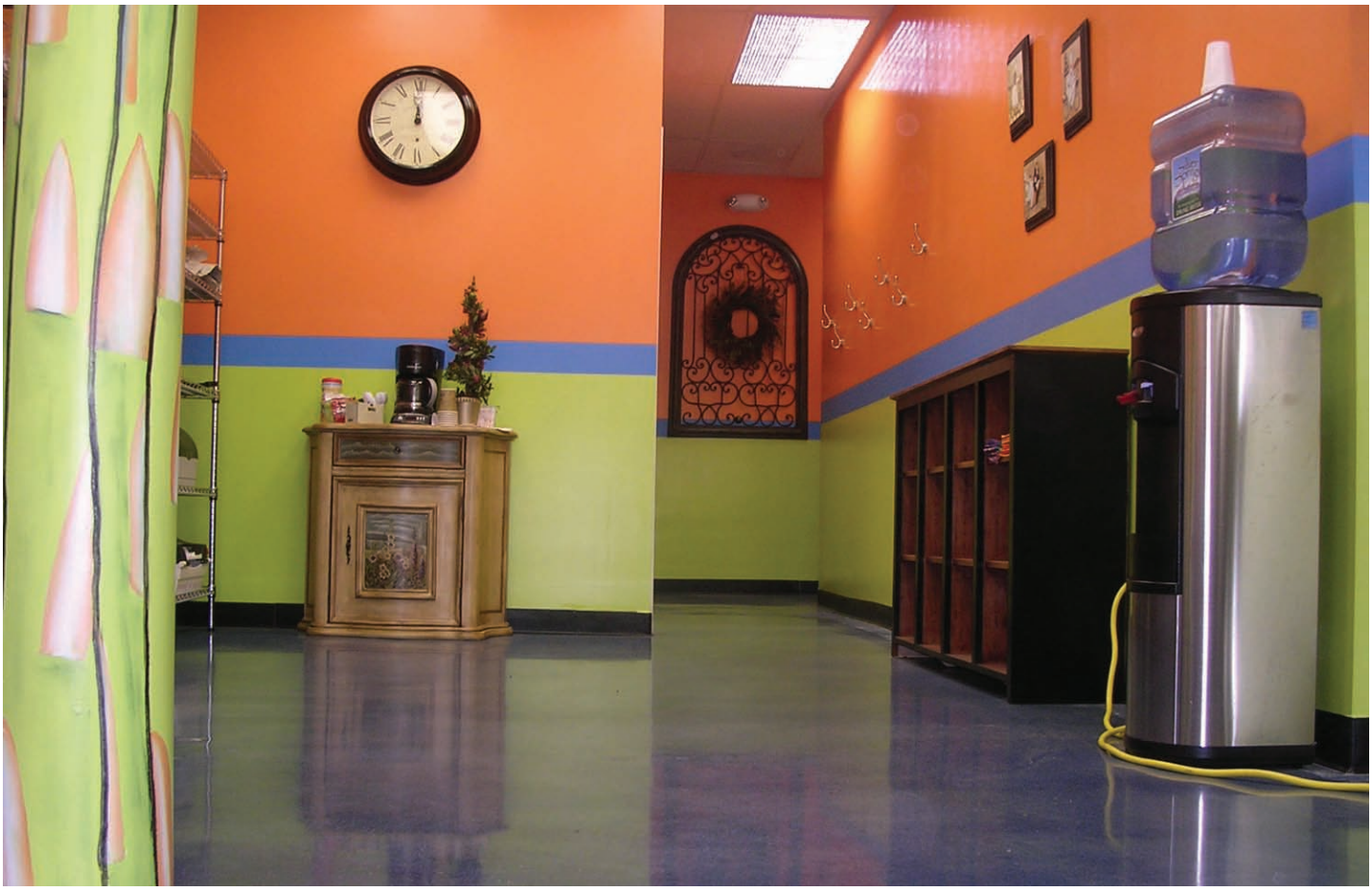
As a sustainable building material, there is nothing better than concrete. Its ingredients are abundant, and their extraction and production cause little irreparable damage to the environment. Concrete is readily recyclable and can consume recycled waste products like ground glass, fly ash, polystyrene and even recycled tires. Concrete creates a structure that is nearly airtight, that insulates well against temperature changes, and that is rock solid in resisting environmental forces of wind or fire. It also helps solve a significant "green" issue because concrete resists the growth of mold and mildew.

More and more architects, engineers and building owners are choosing concrete for its durability, recycled ingredients, and energy efficiency. These sustainable qualities are not found in other building materials like steel or wood. Concrete will not rust, rot, or burn; and it requires less energy and resources over time to repair or replace. As the most widely used building material in the world, concrete structures have withstood the test of time for more than 2,000 years.

When a concrete structure has served its purpose, it can be recycled as aggregate in new concrete paving, backfill, or as road base. Even the reinforcing steel in concrete (which often is made from recycled materials) can be recycled and reused. It can be a viable solution for any type of environmentally responsible design.

Another significant advantage offered by a concrete floor foundation is its embodied thermal mass. Thermal mass is a property that enables building materials to absorb, store, and later release significant amounts of heat. Buildings constructed of concrete and masonry has a unique energy-saving advantage because of their inherent thermal mass. These materials absorb energy slowly and hold it for much longer periods of time than do less dense materials. This delays and reduces heat transfer through a thermal mass building component, which creates several distinct advantages.

There are fewer spikes in the heating and cooling requirements, since mass slows the response time and moderates indoor temperature fluctuations. A massive building uses less energy than a similar low mass



building due to the reduced heat transfer through the massive elements. Thermal mass can also cause a shift in energy demand to off-peak time periods when utility rates are lower.

In some climates, thermal mass buildings have better thermal performance than low mass buildings, regardless of the level of insulation in the low mass building. Research conducted by the Portland Cement Association reveals that the most energy is saved when significant reversals in heat flow occur within a wall during the day. So, mass has the greatest benefit in climates with large daily temperature fluctuations above and below the balance point of the building (55 to 65°F). For these conditions, the mass can be cooled by natural ventilation during the night, and then be allowed to absorb heat or "float" during the warmer day. When outdoor temperatures are at their peak, the inside of the building remains cool, because the heat has not yet penetrated the mass.

Values of heat capacity, thermal resistance, and thermal transmittance for concrete and masonry are presented in Appendix A of ASHRAE Standard 90.1-2004. Thermal conductivities are presented in the ASHRAE Handbook of Fundamentals.

ASHRAE has also developed methodology for assigning an R-value to concrete, thus adding the concept in insulation value to thermal resistance. The formula is expressed in a per-unit-thickness basis with several variables, including the composition of the concrete. But a general rule of thumb is an R-value of 0.54 for a 6-inch thick concrete surface.

THE CONCEPT OF CONCRETE POLISHING

The technology used in concrete polishing is approximately 10 years old. It began as a matter of function in warehouses to create a coating free permanent, low maintenance flooring solution to eliminate dusting, increase lighting and reduce ware on equipment. Overtime concrete polishing was marketed as a decorative application that maintained it functional benefits that was enhanced by advancements in concrete staining, coloring, engraving and saw cutting. The Institute was part of a pioneering effort in positioning polished concrete as a sustainable alternative within the framework of high performance building concepts.

Concrete Processing: is the act of changing an existing concrete surface by means of a mechanical process that involves cutting and/or refining the surface to a desired finish. Polished concrete is one of many end results in what is the processing of the concrete surface by mechanical refinement through the use of multiple abrasives measured in grits.

The process of polishing concrete consists of three consecutive categories: grinding, honing and polishing. Each category is then broken down into multiple steps, consisting of consecutively finer grit abrasives. During this process a densifier or hardener is applied that is absorbed into the concrete creating a chemical reaction that makes the concrete more dense and hard.

Polished Concrete: is the processing of the concrete surface through means of a mechanical process that uses an abrasive medium where each step is refined to its purest possible form on a microscopic level from one progressively finer abrasive to the next until the desired level of 'polish' is achieved.

The result is a beautiful, durable and efficient surface which eliminates the need for carpets or tile that requires expensive replacement, maintenance and use of harsh cleaning chemicals. The natural concrete floor can be customized and provides long-lasting beauty and ease of maintenance with environmental benefits.

The sustainability aspects of the process involve low-impact installation, healthier interior environment, added light reflectance and a significant reduction in maintenance cost when compared to carpet, VCT, wood, stone, ceramic tile or linoleum maintenance. The true value of a polished concrete floor is measured by its durability, beauty and long term cost savings in maintenance.

Architects and specifiers can categorize concrete polishing technology under sections 03 35 00 (Concrete Finishing) and 03 01 30 (Maintenance of Cast-in-place Concrete) in the Construction Specifications Institute (CSI) MasterFormat listings.

THE ENVIRONMENTAL EFFECTS OF THE CONCRETE POLISHING PROCESS

In several previous areas, this report has documented the various sustainable benefits offered by the Institute concrete polishing process (reuse, thermal mass, light reflectance, mold control, etc.). It is equally important to address the environmental impact of the grinding process itself, especially within the framework of Interior Air (Environmental) Quality.

There are two basic styles of facilitating the concrete polishing process. One style employs a dry grinding process throughout the entire operation. The Institute endorse a combination wet/dry or completely wet process as a better and healthier alternative.

The issue with the dry concrete polishing process involves silica laden particulate created and released into the air. This is particularly an issue during the initial processing steps when the most material is removed. Vacuum systems do capture a portion of this particulate but not 100% of it. The result is significant amounts of accumulated particulate left on the floor. The particulate is then released into the air as a result of foot traffic, vacuum hoses and electrical cords dragged across the surface and the use of squeegees to push the particulate into piles that are then shoveled and/or vacuumed for disposal. If equipment skirting is not strictly maintained even more particulate is left on the floor. Although a contractor's employees may wear respiratory protection the concern is with others who are also working or occupying the work area. Silica dust, which has been classified by the EPA as a known human carcinogen. Estimates from National Institute for Occupational Safety and Health claim that more than 250 workers in the USA die annually from silicosis and that hundreds more become disabled from this and related diseases, such as bronchitis. In December of 2004, New Jersey Acting Governor Richard Codey signed a law that banned the dry cutting and dry grinding of masonry materials on construction worksites across the state. The law requires the use of wet grinding methods to dampen dust and prevent exposures to silica. This is the same reason stone fabrication shops primarily utilize a wet process when processing stone.

Photo courtesy of
Advanced Diamond Tools Canada

The U.S. Occupational Safety and Health Administration (OSHA) currently has a permissible exposure limit (PEL) for crystalline silica. The following equation is used to determine the PEL limit: PEL = 250 mppcf/% of silica = 5. Over 30 percent of OSHA-collected silica samples from 1982 through 1991 exceeded the current PEL limit.

The wet/dry process, as advocated by the Institute, uses water slurry to keep dust below acceptable levels during the initial grinding and honing steps.

Vacuums are used for polishing steps where silica dust can be 100% captured from the polishing process.

Once the surface is smoothed and surface irregularities are removed the processes then switches to a dry honing and polishing process for the final steps. Because the final steps involve final cosmetic polishing, very little material is removed and the dust level can be controlled by the more commonly available vacuum equipment filtration systems.

The slurry waste resulting from the wet portion of the process must be collected and then either disposed of in accordance with EPA regulations or dried and later recycled.

LIFE CYCLE ANALYSIS (LCA)

In terms of the much broader **Life Cycle Analysis (LCA)** view of this process, the advantages of concrete polishing significantly outweigh the single disadvantage. Consider that a floor conducive to the concrete polishing process will last well in excess of 10 years. According to industry averages, that means that a similarly carpeted floor will be replaced at least 4 times and that a similar hardwood floor will be replaced one and completely sanded and refinished two more times. By LCA standards, the landfill impact; the embodied energy involved in manufacturing, transporting and installing the carpeting or wood; the higher maintenance costs; and the impact of refinishing the wood are significantly more impactful than dealing with the one-time slurry/dust issue of the polishing process. And by utilizing the recommended wet/dry method, the dust issue itself becomes minimal.

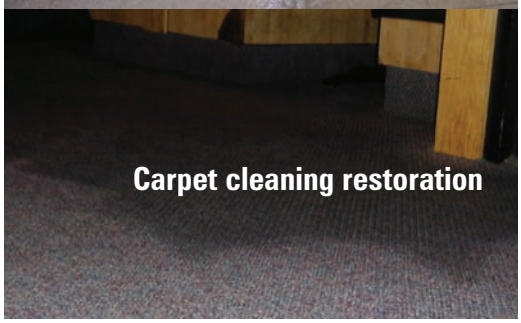
Institute concrete polishing is the mechanical refinement of the concrete surface to its purest form with diamond abrasives. The result is a beautiful, durable and efficient surface which eliminates the need for carpets or tile that requires expensive replacement, maintenance and use of harsh cleaning chemicals. The natural concrete floor provides long-lasting beauty and ease of maintenance with environmental benefits.

VCT tile restoration

Worn acid stain

Painted concrete

Stripping / finishing VCT tile



Carpet cleaning restoration

UNDERSTANDING THE LEED RATING SYSTEM

It has been previously cited, that there are several functioning sustainability initiatives which warrant serious consideration. Foremost among these is the U.S. Green Building Council and its LEED Rating System.

Back in 1993, a group of visionaries from various segments of the architectural community came together to discuss the need for a series of formal, environmentally friendly initiatives that embraced concepts like energy performance, recycling and conservation. Their efforts led to the formation of the U.S. Green Building Council and the Leadership in Energy and Environmental Design (LEED) standards.

LEED, is a voluntary consensus-based standard for developing sustainable and efficient buildings. Utilizing state-of-the-art standards, LEED provides a framework for assessing building performance and meeting sustainability goals through a system of prerequisites and credits, awarded in six different categories:

SS	Sustainable Sites
WE	Water Efficiency
EA	Energy & Atmosphere
MR	Materials & Resources
IEQ	Indoor Environmental Quality
ID	Innovation & Design Process

As mentioned at the beginning of this report, it is important to understand that LEED rates projects, not products. LEED credits are earned when a product or a series of products are combined to achieve a specific end result (lower energy use, collective recycled content, etc.). The total number of available credits various in each of the above categories. In addition to available credits, each of the above categories also contains one or more prerequisites which MUST be met in order for the project to achieve LEED certification. Examples of these prerequisites include minimum energy performance standards, the collection of recyclables and requirements for smoking within the building.

Currently, the USGBC administers seven different LEED programs. The list, and a brief summary of each, is as follows:

LEED for New Construction and Major Renovations

This is the original LEED version and it is designed primarily for new commercial office buildings that are four or more stories tall. It can also be applied to major renovation projects involving existing buildings. As a major rule of thumb, a major renovation includes the elements of major HVAC replacement, significant building envelop modifications and major interior rehabilitation.

LEED for Existing Buildings – Operations & Maintenance

Recently revised and expanded, LEED-EB deals with the sustainability issues in operating and maintaining existing buildings. Unlike most other LEED Versions, this one involves facility alterations and additions as well as operational issues and procedures for utilizing existing HVAC, lighting and other systems.

LEED for Commercial Interiors

This LEED version deals specifically with the build-out of tenant spaces in government as well as private sector commercial buildings. In general terms, this initiative covers the areas of responsibility that a tenant of leased space normally has control of, such as interior floor and wall covering, maintenance and lighting.

LEED for Core and Shell Construction

This is the opposite of the Commercial Interior version, structured specifically for the developer. It addresses the details of the building envelope in general, including the HVAC system, roof system and other components that are traditionally handled by the landlord in a tenant-landlord relationship.

LEED for Homes

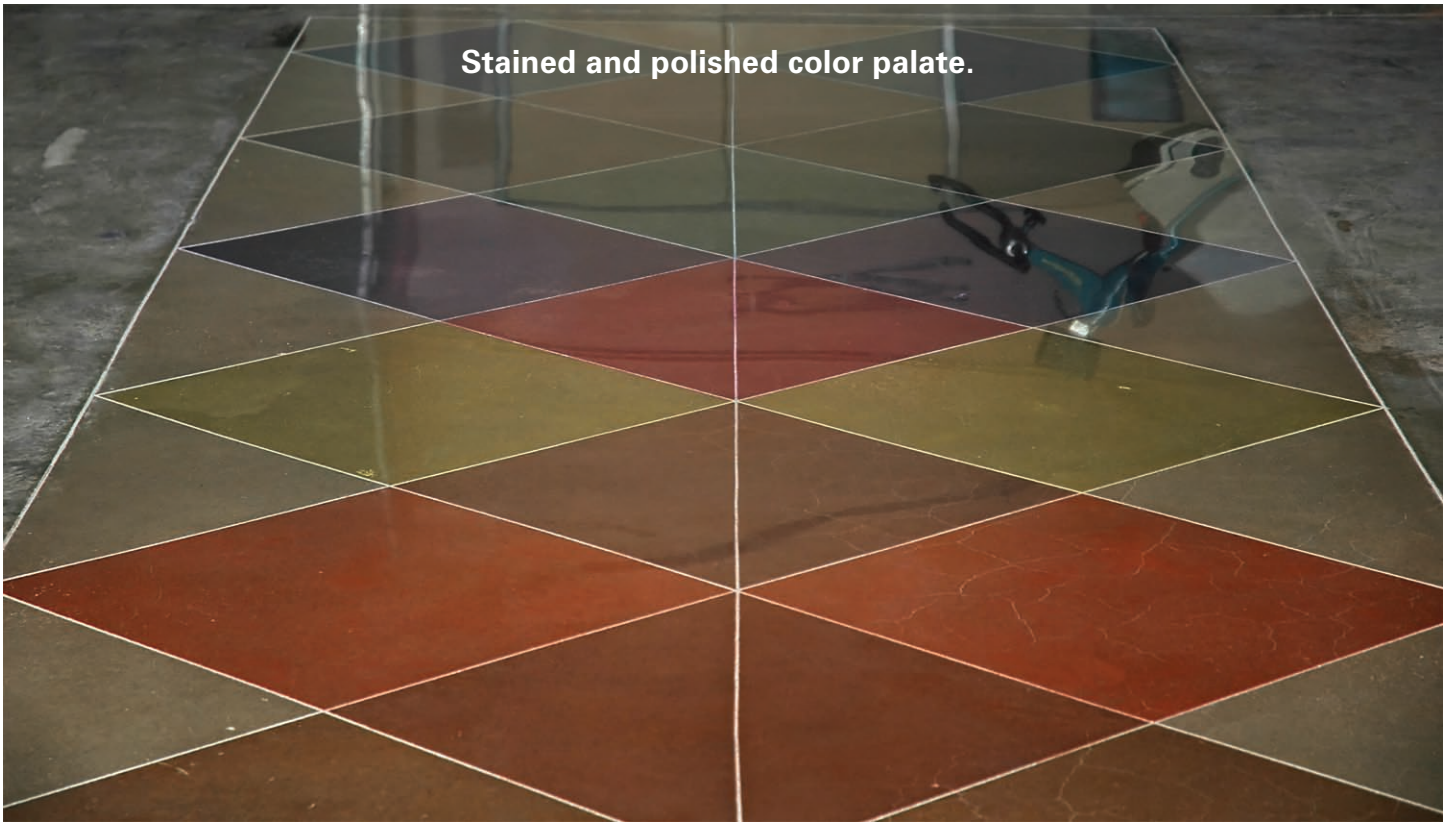
As the name implies, this is the residential version of LEED. It deals with both single-family and multi-family structures as well as multi-unit developments. Functions just like LEED-NC only on a residential basis.

LEED for Schools

This version covers the construction and major renovations of K thru 12 educational facilities. It addresses the unique qualities of school spaces and children's health issues.

Additional LEED programs are also currently in development to address Retail Businesses, Healthcare, Community Development and other categories.

Each LEED program requires a different number of points for certification, and in each cases certification is issued on four levels – Basic, Silver, Gold and Platinum.



Stained and polished color palate.

LEED CREDITS ACHIEVABLE WITH POLISHED CONCRETE

The following is a summary of the five LEED program specifically relevant to the wet/dry or wet polished concrete process taught at the Institute. Also noted is a reference summary of the credits needed for project certification:

LEED NC (VERSION 2.2) – NEW CONSTRUCTION AND MAJOR RENOVATION

69 Possible Points
26 Points needed for certification

LEED EB -- EXISTING BUILDINGS-Operations & Maintenance

85 Possible Points
32 Points needed for certification

LEED CI – COMMERCIAL INTERIORS

57 Possible Points
21 Points needed for certification

LEED CS – CORE & SHELL CONSTRUCTION

61 Possible Points
23 Points needed for certification

LEED FOR SCHOOLS

79 Possible Points
29 Points needed for certifications

The methodology used in this report is to review potential LEED credits in the categorical order presented in the various document versions. Because of the characteristics of the concrete polishing process as specifically taught at the Institute, we will be dealing with only the five LEED Rating System versions detailed previously. Even though there have been documented use of the concrete polishing process being used in residential applications, this report will deal only with commercial applications of the process.

LEED CATEGORY: ENERGY & ATMOSPHERE

OPTIMIZE ENERGY PERFORMANCE

LEED-NC CREDIT
EA 1 **1 - 10 POINTS**

LEED-EB CREDIT
EA 1 **1 - 10 POINTS**

LEED-CI CREDIT
EA c1.3 **1 – 2 POINTS**

LEED-CS CREDIT
EA 1 **1 – 8 POINTS**

LEED – SCHOOLS
EA 1 **1 – 10 POINTS**
(2 Mandatory)

The intent of these credits is to achieve increasing levels of energy performance above the prerequisite baseline standards in order to reduce the environmental and economic impacts associated with excessive energy use.

The baseline performance standard used for this calculation is ASHRAE/IESNA Standard 90.1-2004. In New Construction, Core & Shell and Schools, an increase of 10.5% over the baseline earns 1 point with a total of 10 points possible when the increase reaches 42%. In Existing Buildings, an increase over baseline of 3.5% earns one point, with maximum points possible with a 35% increase over the standard. Two points are mandatory under the Schools version.

Numerous studies have documented how the heat retentive qualities of concrete offer an insulation value that can potential reduce energy consumption. Further research conducted by the Department of Materials Science and Engineering at the University of Illinois Urbana-Champaign indicates that lightweight concrete offer improved insulation properties over conventional concrete.

Although it is clear that the concrete polishing process does not improve or detract from the thermal mass of the concrete floor, this credit must be identified in this context because the aesthetic beauty of concrete polishing can in fact aid in the decision to select concrete as the primary floor substrate.

Polished Concrete can contribute additional credits as a result of:

- Increased light reflectivity over other flooring materials increases the efficiency of installed lighting, reducing energy demands.
- Reduced energy needs for maintenance equipment and lighting for after-hours janitorial services.

LEED CATEGORY: MATERIALS & RESOURCES

BUILDING REUSE

LEED-NC CREDITS

MR 1.1	1 POINT
MR 1.2	1 POINT

LEED-CS CREDITS

MR 1.1	1 POINT
MR 1.2	1 POINT
MR 1.3	1 POINT

LEED – SCHOOLS

MR 1.1	1 POINT
MR 1.2	1 POINT

These credits involve the use of the buildings existing structural components. One point is awarded for maintaining at least 75% (based on surface area) of existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing). A second point is added if the collective total reaches 95%. In the case of Core & Shell, a total of three points are available for maintaining 25%, 50% and 75% of the existing structure.

These are significant credits when it comes to concrete polishing because the process is specifically designed to rehabilitate and enhance existing concrete floors. An architect may choose to salvage the existing floor slab by removing the existing floor covering and polishing the old floor surface as part of a strategy to earn these specific points.

RECYCLED CONTENT

LEED-NC CREDITS

MR 4.1	1 POINT
MR 4.2	1 POINT

LEED-CI CREDITS

MRc 4.1	1 POINT
MRc 4.2	1 POINT

LEED-CS CREDITS

MR 4.1	1 POINT
MR 4.2	1 POINT

LEED – SCHOOLS

MR 4	1-2 POINTS

The intent of these credits is to encourage the demand for building products that incorporate recycled content materials,

thereby reducing impacts resulting from extraction and processing of virgin materials.

The USGBC places twice the emphasis for achieving these credits on post-consumer recycled material (full value, based on cost) over pre-consumer recycled material (half value, based on cost) as defined by ISO 14021. The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of the assembly to determine the recycled content value. One credit point is awarded for 10% recycled content and a second point is available if the amount reaches 20% or more.

As with the energy optimization credits detailed earlier, these potential credits are earned by the concrete and not by the polishing process. A typical strategy to secure credits in this category involve the use of concrete that contains ground glass (post-consumer), fly ash (pre-consumer) or other inert recycled material. Concrete that includes such materials can be polished and the added recycled material could add a unique decorative effect to the finished floor.

The intent of these credits is to increase demand for building materials or products that have been extracted, harvested, recovered or manufactured within a 500-mile radius of the project site thereby supporting the use of indigenous resources and also reducing the environmental impacts resulting from transportation.

This calculation is based on cost of materials. One point is awarded if a total of 10% of the materials come from regional sources, and two points are awarded if 20% or more regional materials are purchased.

If the concrete polishing contractor purchases or formulates the compounds used in the concrete polishing process within 500 miles of the work site LEED credit would be available in this category.

REGIONAL MATERIALS

LEED-NC CREDITS

MR 5.1	**1 POINT**
MR 5.2	**1 POINT**

LEED-CI CREDITS

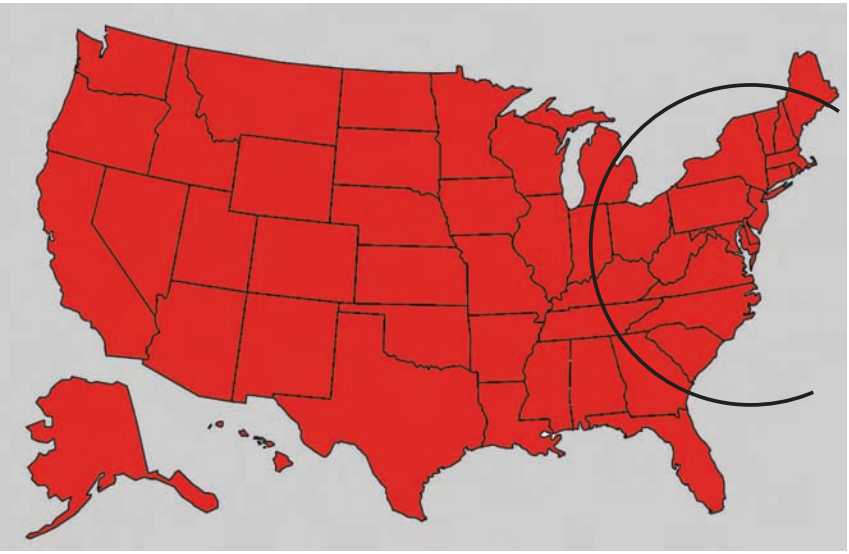
MR c5.1	**1 POINT**
MR c5.2	**1 POINT**

LEED-CS CREDITS

MR 5.1	**1 POINT**
MR 5.2	**1 POINT**

LEED – SCHOOLS

MR 5	**1-2 POINTS**



LEED CATEGORY: INDOOR ENVIRONMENTAL QUALITY

CONSTRUCTION IEQ MANAGEMENT PLAN – DURING CONSTRUCTION

LEED-NC CREDIT
EQ 3.1 **1 POINT**

LEED-EB CREDIT
EQ 3 **1 POINT**

LEED-CI CREDIT
EQ 3.1 **1 POINT**

LEED-CS CREDIT
EQ 3 **1 POINT**

LEED – SCHOOLS
EQ 3.1 **1 POINT**

The intent of this credit is to reduce indoor air quality problems resulting from the construction/renovation process in order to help sustain the comfort and well-being of construction workers and building occupants. The general strategy here is to maintain a clean and safe environment inside the new building during the construction process.

The concrete polishing process taught at the Institute, employs a combination wet/dry grinding, honing and polishing process designed to control the release of dangerous silica dust and maintain OSHA standards. This use of this process and the documented reduction in silica dust during the floor polishing process can help a project earn this credit point.

LOW EMITTING MATERIALS – ADHESIVES & SEALANTS

LEED-NC CREDIT
EQ 4.1 **1 POINT**

LEED-CI CREDIT
EQ 4.1 **1 POINT**

LEED-CS CREDIT
EQ 4.1 **1 POINT**

LEED – SCHOOLS
EQ 4 **1 POINT**

The intent of this credit is to reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants. VOC (Volatile Organic Compound) limits have been set for various categories of adhesives and sealer compounds in accordance with industry standards set by the South Coast Air Quality Management District (SCAQMD) Rule #1168.

The solvent-free chemical compounds that are used as part of the CPTInstitute concrete polishing process meet or exceed these standards and can therefore assist a project in achieving this credit.

MOLD PREVENTION

LEED – SCHOOLS
EQ 10 **1 POINT**

As described in its name, the intent of this credit is to reduce the potential presence of mold in schools through preventive design and construction measures. This is a difficult credit to achieve, as it also requires the project to first have earned the EQ 3.1 Credit, which is listed earlier in this report, as well as EQ Credits 7.1 and 7.2 for compliance and verification of thermal comfort.

The concrete polishing process eliminates the use of a floor covering material, like carpeting, which can be a notorious breeding ground for mold and mildew. The polished

concrete surface can be easily maintained with disinfectant cleaners to prevent any traces of mold formation. Use of the Institute concrete polishing process can work in combination with other appropriate mold abatement strategies to help earn this credit.

LEED CATEGORY: INNOVATION AND DESIGN PROCESS

Each of the LEED versions sets aside between 1 and 4 points to allow for the innovative use or application of product(s) or systems not otherwise addressed in the formal LEED credit structure. Cited examples include substantially exceeding a LEED-NC performance credit, such as energy performance or water efficiency. The strategy is to apply ideas or measures that demonstrate a comprehensive approach and quantifiable environment and/or health benefits.

The innovative nature of concrete polishing lends itself to submissions in this category. The process yields a mirror-like finish which reflects both natural and artificial light, thus contributing to less required lighting and lower energy costs. Unlike carpeting, which can trap bacteria deep within its fibers and also foster mold growth, the bright, clean concrete polished finish requires minimal maintenance and helps improve the overall interior environmental quality of the building. Examples such as these can be properly documented with measurable performance, and can be submitted for Innovation points.

GREEN GLOBES AND OTHER SUSTAINABILITY INITIATIVES

Although the most popular, LEED is not the only sustainability initiative in use. At last count, there were more than a dozen similar programs, some specific to a particular state or region and others specific to a certain industry. Any attempted list would become incomplete in a matter of weeks.

However, one program that warrants recognition is Green Globes. This concept is offered in the form of a revolutionary green management tool that includes assessment protocol, a rating system and guide for integrating environmentally friendly design into commercial buildings. Once complete, it also facilitates recognition of the project through third-party verification. It's an interactive, flexible and affordable approach to environmental design.

Developed in Canada in partnership with BOMA, Green Globes was introduced into the United States in 2004. It is supported and endorsed by interests from such sectors as financial services, retail, wholesalers, various manufacturers and other building material providers. Unlike LEED, which deals with the "here and now," Green Globes takes a more life cycle view of products and projects, beginning with the extraction of raw materials and ending with the installation of the finished product or system.

The Green Globes Rating System (v.1) encompasses seven categories:

1. **Project Management – Policies and Practices**
2. **Site**
3. **Energy**
4. **Water**
5. **Resources, Building Materials and Solid Waste**
6. **Emissions and Effluents**
7. **Indoor Environment**

Like LEED, the program rates projects, not products, and awards one, two, three or four green globes to a registered project upon third-party verification.

CPTInstitute CONCRETE POLISHING AND GREEN GLOBES

Under the current version of Green Globes, the Institute concrete polishing process, as taught at the Concrete Polishing and Processing Technical Institute, can help earn points in three Green Globes categories – Energy, Resources; Building Materials and Solid Waste; and Indoor Environment.

ENERGY

360 Total Points Available

ENERGY CONSUMPTION

Up to 100 Available Points

Like the LEED Energy Optimization credits, this category awards between 10 and 100 points for achieving different levels of EPA Target Finder energy savings. The use of a concrete floor process, with its documented thermal mass characteristics would assist in this area.

The availability of concrete polishing as a design option can assist in the decision to select concrete as the material of choice for the floor.

ENERGY DEMAND MINIMIZATION

Up to 135 Available Points

This credit also involves the thermal mass of the concrete and can earn points utilizing the same strategy as explained above. These

points also factor in daylighting, which can be enhanced through the use of the concrete polishing process.

RESOURCES, BUILDING MATERIALS & SOLID WASTE

100 Total Points Available

MATERIALS WITH LOW ENVIRONMENTAL IMPACT

Up to 40 points

This credit offers 10 points specifically for "Foundation and Floor Assembly Materials." The criteria for this credit is environmentally preferable products and materials with the lowest life cycle environmental burden and embodied energy.

Data available through the Portland Cement Association verifies both the low embodied energy and the low life cycle burden of concrete. The use of the polishing process only enhances the value and sustainability of the floor system.

MINIMIZED CONSUMPTION & DEPLETION OF MATERIAL RESOURCES

Up to 30 Available Points

The objective of this category is to conserve resources and minimize the energy and environmental impact of extracting and processing non-renewable materials. Specifically, 10 points can be earned if the concrete contains post-consumer recycled material, like ground glass. Use of a concrete polishing process can create unique design options as the glass will add unique effects to the floor appearance.

RE-USE OF EXISTING STRUCTURE

Up to 10 Available Points

The use of the building's existing floor is specifically cited as criteria in earning these points. Use of the CPTInstitute Concrete Polishing process on an existing floor offers specific sustainable advantages in addition to many aesthetic design possibilities.

INDOOR ENVIRONMENT

200 Total Points Available

EFFECTIVE VENTILATION SYSTEM

Up to 60 Available Points

This is a broad category, designed to encompass the performance and effectiveness of the building's HVAC system. However, the category does offer 23 points for use of a Construction/Renovation Indoor Air Quality Management Plan. According to these criteria, the Institute concrete polishing wet/dry installation process can contribute to this credit because of its positive control of airborne silica dust during the early (wet) stages of the grinding process.

SOURCE CONTROL OF INDOOR POLLUTANTS

Up to 45 Available Points

This category includes 2 points for the use of third-party environmentally certified low-VOC emitting sealants. The chemical compounds used in the CPTInstitute concrete polishing process meet industry standards set by the South Coast Air Quality Management District (SCAQMD) Rule #1168.

FINAL CONCLUSIONS

Sustainable or "green" construction products and procedures are here to stay. The LEED Rating System will evolve and expand, Green Globes will do likewise. New initiatives will be born, others will be abandoned. By the fundamentals will always be constant:

Energy Performance
Environmental Responsibility through Life Cycle Analysis
Healthier workplace conditions

The thermal mass and insulation qualities of concrete enhance the overall energy performance of a building. This means more consistent and more comfortable inside temperatures for the building occupants. The embodied energy of the mass keeps temperatures cooler during periods of summer heat and warmer during the winter cold spells.

The CPTInstitute concrete polishing process yields a finished surface that will significantly outlast an equivalent carpeted, VCT, wood, stone, ceramic tile, linoleum, or coated concrete such as epoxies surface with less required maintenance. The energy required to install the process is less than that required to install a hardwood or ceramic surface and there is absolutely no landfill impact when the life cycle ends.

What you see is what you get! The concrete polishing process leaves no moist dark areas for mold to grow, as occurs with carpeting. There is no grout to absorb odors or harmful bacteria. And there are no cracks or joints, as with a hardwood surface, to trap dirt and grease. Institute concrete polishing yields a clean, healthy surface that reflects light and requires minimal maintenance.

Products and systems that can deliver as effectively as the Institute concrete polishing process will always have a place in our green future. The documentation put forth in this report verifies that the Institute concrete polishing process offers benefits in all three key areas of sustainable construction, in addition to creating a floor finish that rivals the finest granite and marble surfaces.

For more information, please visit this Web site:
www.polishinginstitute.org