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**Opinion Letter on How SLENDERWALL® Can Qualify for Points in LEED-NC
CTLGroup Project No. 314033**

Dear Mr. Smith:

With your authorization on December 19, 2007, CTLGroup has written this letter which describes how the sustainable qualities of Smith-Midland's SLENDERWALL® can be used to earn points in version 2.2 of LEED for New Construction and Major Renovations (LEED-NC v2.2).

BACKGROUND

SLENDERWALL is an architectural precast concrete and steel stud building panel. It consists of two inches of concrete with galvanized welded-wire-fabric reinforcing steel, a ½-inch thermal break air space, and an insulated¹ 6-inch deep galvanized (or stainless) steel stud frame. The joints between panels are sealed with two layers of caulk sandwiching a drain strip². The drain strip is a secondary drainage system that also allows leak-detection inspection of potential failure of the caulk. The exterior face of the panel is the finished face. Finishes are available in a variety of colors and textures, including precast brick, granite, limestone, and sandstone.

The opinions in this letter are based on the information on www.slenderwall.com³ and from an e-mail received from you January 23, 2008.

Leadership in Energy and Environmental Design (LEED). The LEED green building rating system was created by the United States Green Building Council (USGBC) to help architects and engineers improve the quality of buildings and the environment. LEED is a family of rating systems that are based on principles of energy conservation and environmental protection, and it strikes a balance between established practices and emerging technologies. Its goal is to encourage a market transformation towards sustainable design.

¹ Insulation can be installed at the factory or on-site.

² Drainage system or caulking installed by caulking contractor.

³ Last visited February 1, 2008.

In LEED, points are awarded for environmentally friendly actions taken during design, construction, and use phases. The LEED rating system has five main categories. Each category consists of a number of credits, which are further divided into points. Points can also be earned for innovation and exceptional environmental performance in areas not specifically addressed in LEED. In LEED-NC, a building requires at least 26 points for certification. Silver, gold, and platinum levels are also available. If designed and built according to accepted principles of energy conservation and environmental protection, SLENDERWALL can help a building earn up to 14 points.

Credit category	Total points available	Potential points with SLENDERWALL	LEED-NC certification levels	Points required
Sustainable Sites	14	...	Certified	26 - 32
Water Efficiency	5	...	Silver	33 - 38
Energy & Atmosphere	17	up to 4	Gold	39 - 51
Materials & Resources	13	up to 6	Platinum	52 - 69
Indoor Environmental Quality	15	...		
Innovation & Design Process	5	up to 4		
Total	69	up to 14		

LEED and Concrete. Information on how ordinary portland cement concrete can help earn LEED points is available in *An Engineer's Guide to: Building Green with Concrete*⁴.

LEED AND SLENDERWALL

The following sections describe how SLENDERWALL can help earn LEED points. The section headings correspond to LEED credit categories and credit numbers. When applying for a LEED certification, points must be documented according to LEED procedures. The LEED website, www.leedbuilding.org, contains a downloadable letter template that simplifies the documentation requirements.

Optimize Energy Performance, Energy and Atmosphere Credit 1 (EAc1). This credit is awarded if energy cost savings can be shown compared to a baseline building that meets the requirements of *ANSI/ASHRAE/IESNA Standard 90.1-2004 Energy Standard for Buildings Except Low-Rise Residential Buildings*. The method of determining energy cost savings must meet the requirements of Appendix G, "Building Performance Rating Method," of *ASHRAE 90.1*. Whole-building energy simulations using a computer program such as DOE-2 or EnergyPlus must be performed to determine energy savings. Such programs can show the energy saving benefits of insulated concrete building systems because they can model thermal mass and they simulate energy use on an hourly basis. Furthermore, when SLENDERWALL is used, such programs are necessary to simulate the complex interaction between thermal mass and energy use. Generally a concrete wall needs to be at least 3 inches thick to be considered a mass wall; however, SLENDERWALL provides energy savings due to its combination of thermal mass, air tightness, and thermal breaks. A continuous air barrier is provided by the concrete, with negligible air infiltration, and the two layers of caulk between the panels. Thermal bridges are minimized by the combination of a ½-inch air space between the studs and concrete and the

⁴ *An Engineer's Guide to: Building Green with Concrete*, IS312, Portland Cement Association, <http://www.cement.org/bookstore/profile.asp?store=&pagenum=1&pos=0&catID=&id=4496>.

epoxy coated stainless-steel anchors. The combination of concrete, insulation, thermal breaks, and an air barrier is energy efficient and contributes to energy savings. The number of points awarded will depend on the building, climate, fuel costs, and minimum requirements of *ASHRAE 90.1*. Up to 10 points are awarded for energy cost savings of 10.5% to 42% for new buildings and 3.5% to 35% for existing buildings. As of June 2007, all new LEED-NC projects must also attain at least 2 EAc1 points: 14% energy cost savings for new buildings or 7% energy cost savings for existing buildings. Studies show that using concrete walls that are insulated to exceed minimum code requirements by a modest amount (about the same as minimum requirements for frame walls) can contribute to earning 1 to 4 points, depending on the building type, orientation, and climate⁵.

Construction Waste Management, Materials and Resources Credit 2 (MRc2). The intent of this credit is to divert construction debris from disposal in landfills. Since SLENDERWALL panels are prefabricated at the plant and assembled on-site with precast steel and precast concrete, there is virtually no on-site waste associated with building the walls. Thus the total amount of construction debris generated on-site will be less, making it easier to meet the objectives of a construction waste management plan. This credit is worth 1 point for diverting 50% of site generated waste from disposal in landfills, and 2 points for diverting 75%.

Recycled Content, Materials and Resources Credit 4 (MRc4). This credit rewards the use of materials with recycled content. One point is awarded if the sum of the post-consumer recycled content plus one-half of the pre-consumer recycled content constitutes at least 10% of the total cost of the materials in the project. The value of the recycled content of a material is the weight of the recycled content in the item divided by the weight of all materials in that item, and then multiplied by the total cost of the item. The recycled content of the heavy-gauge studs is 78.7% (combination post- and pre-consumer) and the recycled content of reinforcing steel is 69% post-consumer and 20% pre-consumer. This credit is worth 1 point for the quantities quoted above and 2 points if the quantities are doubled to 20%.

Regional Materials, Materials and Resources Credit 5 (MRc5). This credit supports the use of indigenous (local) resources and reduced transportation distances. The requirement states: "Use building materials or products that have been extracted, harvested or recovered, as well as manufactured, within 800 km (500 miles) of the project site for a minimum of 10% (based on cost) of the total materials value." Concrete in SLENDERWALL qualifies because the source of the raw materials (cement and aggregate) is within 100 miles of the plant. The source of the reinforcing steel is within 500 miles of the plant. Only the steel studs are more than 500 miles from the plant. The three plants are in Midland, Virginia; Alma (Quebec), Canada; and Monterrey (Nuevo León), Mexico. This credit is worth 1 point for the quantities quoted above and 2 points for double the percentage to 20%.

⁵ Marceau, M.L., M.G. VanGeem, and I.M. Alsamsam, "Modeling Energy Performance of Concrete Buildings for LEED-NC v2.2 Energy and Atmosphere Credit 1", *Proceedings - Thermal Performance of the Exterior Envelope of Buildings X*, Clearwater Beach, Florida, December 2007.

Innovation and Design Process (IDc1.1 to IDc1.3). In addition to the points discussed above, four points are available as Innovation and Design Process (ID) credits. These points can be applied for if an innovative green design strategy is used that does not fit into the point structure of the five LEED categories or if it goes significantly beyond a credit requirement and demonstrates exceptional environmental performance.

Potential ID Credit 1.1—Life Cycle CO₂ Reduction. The concrete panel of the SLENDERWALL system is only 2 inches thick and thus uses less portland cement than typical concrete systems. Since manufacturing portland cement produces carbon dioxide (CO₂) emissions, the USGBC has issued a *Credit Interpretation Ruling (CIR)* that allows an ID credit for concrete mixes that are specifically designed to use 40% less portland cement than standard mixes. However, this CIR applies to site-cast concrete where concrete makes up a significant portion of the project and does not specifically address thinner members. To qualify for a similar credit ruling, the project team would have to demonstrate that the life cycle CO₂ emissions embodied in a building with SLENDERWALL is significantly less than a similar building using a typical precast system. Further, a SLENDERWALL system with the architectural precast brick finish would also contain significantly less embodied CO₂ than a concrete wall system with clay brick veneer.

Potential ID Credit 1.2—Durability. The USGBC has indicated that the durability credit allowed in *LEED Canada-NC v1.0*, which is not explicitly a credit in *LEED-NC v2.2*, can be used as an ID credit. The SLENDERWALL system is a durable system because it consists of concrete, which is inherently durable, and a sealing system (two layers of caulk with a secondary drainage strip) that is designed for easy inspection and quick location of leaks.

Potential ID Credit 1.3—Resource-Efficient Cladding System. The SLENDERWALL system is lighter than conventional precast systems and the exterior finish is the panel itself, and thus requires no additional cladding material such as brick or stone veneer. A CIR has awarded an ID credit for the innovative nature of a resource-efficient structural systems (that uses 35% less material than several other systems). In the case of SLENDERWALL, a project team would have to provide calculations that show the weight and material use of the SLENDERWALL system on a particular building project is significantly less than typical systems if they were to be used on the same project.

Innovation and Design Process (IDc2). One point is also provided if a principal participant of the project team is a LEED Accredited Professional. The concrete industry has LEED-experienced professionals available to help maximize the points for concrete construction.

A LEED-NC Project Checklist for SLENDERWALL is provided at the end of this letter.

BENEFITS OF LEED CERTIFICATION

Although LEED is a voluntary program, obtaining a LEED certification projects a positive environmental image. Using green building practices can result in significant energy and cost savings over the life of the structure. Other advantages include better indoor air quality and plenty of daylight. Studies have shown that people working in green office buildings are more productive and absent fewer days. These benefits contribute directly to a company's profits because salaries—which are about ten times higher than rent, utilities, and maintenance combined—are the largest expense for most companies occupying office space. Further,

students in green buildings have higher test scores, and retail sales are higher in buildings with natural light.

Support for green buildings is increasing every year. Many cities and states either provide tax credits or grants for green buildings, or require green building certification for public buildings. The U.S. government is adopting green building programs similar to LEED through the General Services Administration, the U.S. Army, the Department of State, the Department of Energy, and the Environmental Protection Agency. Eight states including California, New York, Oregon, and Washington have adopted its use for public buildings. Many agencies are requiring LEED silver certification as a minimum. Thirteen countries have expressed interest in LEED including China and India. The details vary and the list is growing, so contact local jurisdictions or the USGBC for more information.

The use of SLENDERWALL and the LEED Green Building Rating System for New Construction and Major Renovation, version 2.2, promote sustainable buildings for the conservation of energy and resources and the protection of the environment.

Please let us know if you have any questions or comments, or need any additional information.

Sincerely,



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PROJECT CHECKLIST FOR SLENDERWALL

		Points
Energy and Atmosphere		
Credit 1	Optimize Energy Performance	1 to 4
Materials and Resources		
Credit 2	Construction Waste Management	1 to 2
Credit 4	Recycled Content	1 to 2
Credit 5	Regional Materials	1 to 2
Innovation and Design Process		
Credit 1.1	Life Cycle CO ₂ Reduction	1
Credit 1.2	Durability	1
Credit 1.3	Resource-Efficient Cladding System	1
Credit 2	LEED Accredited Professional	1
Total		up to 14