With today's green building revolution, architects, engineers, developers, and builders are looking for creative and effective solutions for sustainable development. Concrete offers a solution. The inherent environmental benefits of concrete are numerous. Along with superior stability, durability and design flexibility, concrete is made from natural and recycled materials. Concrete also conserves resources by reducing maintenance and the need for reconstruction with its resistance to fire, water and weather, and because of its thermal mass, concrete saves energy year-round by reducing temperature swings. These features make concrete an excellent choice in helping to meet sustainable design goals. Concrete also offers the lowest carbon footprint of any other construction material making it a champion in the green building arena.

From pervious concrete parking lots to concrete homes and buildings to recycled materials, concrete offers a clear advantage for architects, engineers, developers, and builders looking for green design solutions.

Pervious Concrete Reduces Stormwater Runoff

An innovative and effective application for stormwater management

Pervious concrete is an innovative and effective application for stormwater management. Not only is the use of pervious concrete recognized by the U.S. EPA as a best practice for stormwater management, but it also provides economic benefits such as reducing the need for expensive stormwater drainage and wet pond retention systems.

With little or no sand, pervious concrete has a 15 to 25 percent void content, which allows water from precipitation and other sources to pass through quickly, thereby reducing the runoff of pollutants from a site into rivers and streams and recharging groundwater levels.

The use of pervious concrete in building site design can aid in the process of qualifying for the Leadership in Energy and Environmental Design (LEED®) program developed by the U.S. Green Building Council (USGBC). LEED points are not gained directly by the use of a product, but by meeting a specific sustainability goal of the rating program. Pervious concrete in design helps with reaching stormwater management goals and can contribute to the following LEED categories: Sustainable Sites, Water Efficiency, Materials and Resources, and Innovative Design.

Cold weather and the use of pervious concrete is no longer cause for concern due to freeze-thaw studies and anecdotal evidence. A well-designed and properly placed pervious system will sustain extreme temperature fluctuations. In addition, concrete pavement may clear more quickly because of its pervious surface, reducing the need for snow plowing. Also, the melted snow can drain more quickly rather than ponding and refreezing.

Environmental benefits of using pervious concrete:

- Prevents stormwater run-off from entering and polluting rivers, streams, lakes, and storm sewers
- Recharges the groundwater to maintain aquifer levels
- Reduces the heat island effect because of the voids so it won't absorb and store heat and then radiate it back into the environment, increasing levels of air conditioning demand, air pollution, and greenhouse gas emissions

Recycled Materials in Concrete

Fly ash, slag and silica fume used as a partial replacement in concrete reduces greenhouse emissions and landfill use

Industrial byproducts such as fly ash, slag and silica fume can be used as partial replacements for portland cement in concrete manufacturing. These products are called supplementary cementitious materials (SCM's). Using these byproducts does not contribute to the energy and CO_2 impacts that cement has on the environment and, in addition, does not use valuable landfill space when discarded.

Fly ash is a byproduct of coal-burning power plants and is commonly used at replacement levels for cement of up to 25%. Slag, a by-product of the steel industry, is used at replacement levels of up to 60%; and silica fume, a by-product from processing quartz into silicon metals in an electric furnace, up to 5% to 7%. Proper testing of the concrete will ensure that the use of these byproducts meet the required concrete properties of the project. These products are used in Tilcon's ternary blend under our new Eccocon mixes.

Also, old concrete that results from demolished buildings, pavements, bridges and foundations can be recycled to be crushed and reused in new concrete for most applications. Ideal uses include fills and bases, landscaping features, foundations, and some other concrete structures.

Environmental benefits of using recycled materials in concrete:

- Reduces the amount of energy used by the cement manufacturing industry while reducing carbon dioxide and water vapor emissions
- Lessens pressure on landfills
- Gain points towards LEED certification

Concrete Walls Save Energy

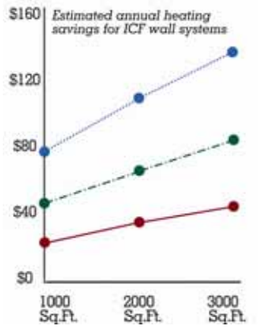
Concrete walls offer comfort, sturdiness, durability, resistance to natural disasters, quietness, and energy efficiency

When considering structures such as homes, office buildings, hotels, theatres, schools, apartments, and warehouses, concrete wall systems such as Insulated Concrete Forms (ICF's) or "Sandwich Walls" offer unmatched comfort, sturdiness, durability, resistance to natural disasters, quietness, and energy efficiency over other building materials. ICF's have seen a 30% or more annual growth in the U.S. making it the fastest growing building system.

Insulated Concrete Forms and Sandwich Walls are two methods of construction, which are increasingly being used in commercial as well as residential construction. These methods create a concrete wall with desirable properties: air tightness, strength, sound attenuation, insulation, and thermal mass offering advantages over wood or steel frame building. The high R-value combined with thermal mass means concrete walls exceed most energy code requirements.

Environmental benefits of using concrete walls:

- Labor and financing savings because of faster construction
- Less injuries and lower insurance costs due to the low weight of ICF components
- Reduced heating and cooling costs with thermal mass that moderates temperature fluctuation
- Lower equipment costs with up to 40% less HVAC capacity and adding to EPA's Energy Star criteria
- Gain of substantial amount of points toward LEED certification (up to 17 of the 26 points needed to become certified)
- Savings in maintenance, reconstruction and insurance costs because of concretes resistance to fire, hurricanes and tornados
- Healthier work environment without the potential for mold



Estimated annual heating savings for ICF wall systems

In addition, concrete can take on any shape as easily as wood and steel and, in most cases, you would not be able to differentiate between a wood structure and a concrete structure.

Concrete and LEED® Certification

The use of concrete offers LEED points toward certification

The use of concrete can assist in the process of obtaining LEED certification. Leadership in Energy and Environmental Design (LEED) is a point rating system developed by the United States Green Building Council (USGBC) to evaluate the environmental performance of a building and encourage market transformation towards sustainable design. Points are earned towards credits for a building project that meets high green building and performance measures.

The LEED rating system has five main categories of human and environmental health and each category is divided into credits. The categories and associated credits are: Sustainable Sites (14 credits), Water Efficiency (5 credits), Energy and Atmosphere (17 credits), Materials and Resources (13 credits), and Indoor Environmental Quality (15 credits). For a building to become certified requires a minimum of 26 points earned. Three other certification levels are available, which are Silver requiring 33-38 points, Gold, 39-51 points, and Platinum, 52-69 points. The potential available points that can be earned from the use of concrete in building range from 19 to 28.

Although LEED is a voluntary program, certification of a structure offers important benefits for a builder and its owner with the primary one of projecting a positive environmental image to the community. Other benefits include:

- Energy and cost savings over the lifetime of the structure
- Better indoor air quality and plenty of daylight. This results in healthier living and working environments for increased productivity and days worked and job retention
- Conservation of natural resources
- Diversion of waste from landfills

For more information on the LEED program and certification requirements, visit the USGBC website at www.usgbc.org.

How Tilcon Can Help

Tilcon's **EccoCon** is a new line of commercial and residential concrete mixes designed to "Build for a Better World." These mixes were created with the best interest of our environment in mind, contributing to a sustainable world.

Here is how Tilcon can help in green building design:

- **EccoCon**, a line of environmentally-friendly commercial and residential concrete mixes, can help you meet your sustainable design goals.
- Assist you in specifying the use of concrete in your sustainable design project plans
- Guide you in the completion of LEED forms for gaining points toward certification for the use of concrete in your project

Tilcon has assisted with the following green building projects:

- Ahepa Apartments, Norwich, CT (Nutmeg Companies)
- CT Science Center, Hartford, CT (Whiting -Turner and RJB)
- Mason's Island ICF Home (M.H. Lyons)
- Quaker Hill School, Waterford, CT (McCarthy Concrete)
- Whole Foods, Glastonbury, CT (CM&B)
- Westminster School, Simsbury, CT (Bartlett Brainard Eacott)

Please call our sales department with questions or guidance in your sustainable building project at **1-888-TILCONN or *Sales Direct* at 860-612-3161.**

Why Build with Concrete?

The benefits of using concrete as a solution for sustainable design

- Concrete reduces the environmental impact of transporting construction material because it's produced locally from abundant natural resources. This results in lower fuel use, energy consumption and emissions from transportation and handling.
- Concrete reduces embodied CO_2 emissions and landfill use because "supplementary cementitious materials" (SCM's) such as slag, a by-product of the steel industry and fly ash, a by-product of coal-burning power plants, can be used to partially replace portland cement.
- Pervious concrete allows stormwater to percolate through to the soil reducing the runoff from a site preventing pollution of rivers and streams and recharging groundwater levels.
- Concrete walls save energy by combining insulation and thermal mass, which lowers heating and cooling costs.
- Concrete's light color reflects more light at night reducing the need to turn more lights on and saving on lighting infrastructure costs. Also, concrete's lighter color creates cooler communities because of less heat absorption.
- Concrete can be reclaimed if not used at the jobsite allowing for the ability to recycle and reuse stone and sand, along with fresh water savings and processed wash water management control.
- Recycled concrete aggregate can be substituted for conventional aggregate used in new concrete or as fill or base materials for roads, sidewalks and concrete slabs.
- Concrete is strong, durable and low maintenance withstanding extreme weather conditions such as hurricanes, tornadoes and explosions, which conserves resources by reducing maintenance and the need for reconstruction.
- Concrete helps achieve LEED Certification. Leadership in Energy and Environmental Design (LEED) was established by the U.S. Green Building Council to help evaluate the environmental performance of a structure and encourage a sustainable design market.

TILCON

Build for a Better World

Tilcon Connecticut Inc.

Crushed Stone | Hot Mix Asphalt | Ready Mix Concrete
Heavy & Highway Construction | Paving

P.O. Box 1357
New Britain, CT 06050
Corporate Office: (860) 224-6005
Sales Direct: (860) 612-3161
Concrete Dispatch: (888) Tilconn *or* (860) 225-7801
www.tilconct.com
Concrete Plant Locations:
East Granby | Enfield | Groton | Hartford
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Concrete Solutions for Green Building

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