LEED Reference Guide
For Precast Concrete Products
WALL PANELS AND VENEERS
It just makes sense. Precast concrete offers the aesthetics, affordability, and speed of installation owners and architects want in a building material for their construction project. But precast concrete wall panels don’t stop there. They offer design flexibility, time savings and improved profitability too.

Nearly everywhere you look, new office buildings, hospitals, schools, parking garages, shopping centers and apartments are taking shape as cities continue to expand. These and other structures look fantastic clad in precast concrete wall panels, which offer a limitless variety of shapes, styles, and colors. Precast concrete wall veneer is usually lightweight and easy to install, with products ranging from thin brick veneer to cladding inspired by limestone, travertine, and other stone products. Precast concrete veneer can be produced locally and manufactured in a nearly unlimited array of shapes, colors, textures, and accessories. Precast concrete floor veneer can replicate tile, pavers, custom patterns, wood, slate, and other materials.

Advantages of Precast Concrete Wall Panels and Veneers

LEED Homes
- SS 1.2 – Site Stewardship: Minimize Disturbed Area of Site
- SS 5 – Site Stewardship: Nontoxic Pest Control
- SS 1.2 – Energy & Atmosphere: Optimize Energy Performance
- EA 2 – Energy & Atmosphere: Insulation
- EA 3 – Energy & Atmosphere: Air Infiltration
- MR 1.4 & 1.5 – Material Efficient Framing
- MR 2.2 – Environmentally Preferable Products
- MR 3.2 – Waste Management

LEED New Construction
- SS 5.1 – Site Development – Protect Or Restore Habitat
- MR 4 – Recycled Content
- MR 5 – Regional Materials

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The Credit Requirements listed in this document are contained within the Leadership in Energy and Environmental Design Green Building Rating System developed by the United States Green Building Council. For more information on the LEED Green Building Rating System, please visit www.usgbc.org.

For additional information about using precast concrete within the LEED system, please visit www.precast.org
Here to stay
Precast concrete will continue to gain strength over time, whereas other materials can deteriorate and lose strength when exposed to UV or harsh environments. Precast concrete’s high strength and density can withstand the abuses of weather and other unforeseen forces, unlike some alternative wall construction materials. In addition, exterior cladding panels can easily be designed to handle structural building loads, thereby reducing the need for other structural components. This will save substantially on a project’s cost and completion time.

I’ve got your back
Precast concrete provides excellent protection against impacts from explosions, vehicles and projectiles. Also, it has passed tornado/hurricane impact testing, giving owners an added level of safety assurance in areas prone to severe weather.

Ready to go when you are
Precast concrete panels have a distinct advantage over other materials such as brick, concrete masonry, cast-in-place concrete and EIFS. Because precast panels are manufactured well in advance of installation, they are ready for transportation to the job site at a moment’s notice. Most panels include embedded connection hardware so they can be erected onto a steel frame quickly with a limited installation crew. Projects designed with precast concrete can save weeks or months over other materials. Precast concrete also saves considerable time over production of tilt-up panels and traditional cast-in-place floor slabs.

I’m talking quality here
Because precast concrete products typically are produced in a controlled plant environment, they exhibit high quality and uniformity. Problems affecting quality typically found on a job site – temperature, humidity, poor craftsmanship and material quality – are nearly eliminated in a plant environment. Precast concrete wall panels produced in a quality-controlled environment and installed with high-quality sealants offer a superior solution to watertightness requirements.

Nasty Weather? No problem
Precast concrete increases efficiency because weather will not delay production. In addition, weather conditions at the job site do not significantly affect the installation of precast wall panels, allowing the project to progress on schedule.

Variety? Oh yes
Precast concrete panels can be produced in virtually any color and a wide variety of finishes to achieve the desired appearance. Finishes commonly available are: smooth-as-cast, textured formliner, exposed aggregate, acid etch, brick and sand blast. Each is distinctly different and provides architects and owners a broad choice in the appearance of their structures.

I look good in “green"
Precast concrete is nontoxic, environmentally safe and made from allnatural materials, making it an ideal material for use in urban environments and around vegetation.

Check the bottom line
Precast concrete wall panels offer lower long-term costs when compared with other materials. Additionally, because significantly less installation time is required, overall project cost savings can be realized. Precast wall panels can be manufactured in a broad range of sizes, colors and textures; are durable during transportation, installation and use; can easily be installed by a small crew; are structurally sound; are environmentally safe; and are less vulnerable than other materials to damage from weather, vandalism or impact.
Site Stewardship: Minimize Disturbed Area of the Site

Minimize disturbance to the site by meeting the following:

Where the site is developed:
- Develop a tree or plant preservation plan with “no-disturbance” zones clearly delineated on drawings and on the lot.
- Leave undisturbed at least 40% of the buildable lot area, not including area under the roof. Only softscapes can be counted toward this credit; projects cannot receive credit for preserving preexisting hardscapes, such as driveways.

Where the site is previously developed:
- Develop a tree or plant preservation plan with “no-disturbance” zones clearly delineated on drawings and on the lot, and rehabilitate the lot by undoing any previous soil compaction, remove existing invasive plants, and meeting the requirements of SS 2.2
- Build on a site with a lot area of less than 1/7 acre, or with housing density for the project that is equal to or greater than 7 units per acre. For multifamily buildings, the average lot size shall be calculated as the total lot size divided by the number of units.

Precast concrete products are plant cast and delivered to the site ready to set, so they reduce the staging area required, which can reduce the overall site disturbance.

The impact on the construction site is also reduced because there is no additional formwork, which often requires more construction area for above-ground products and larger excavation areas for underground products. Less impact on the site includes reduced construction waste, less noise pollution, a shorter construction schedule and fewer laborers needed on-site.

Note: Any “No disturbance” zones must also be protected from parked construction vehicles and building material storage. Soils compacted by vehicles or stored materials can cause major difficulties in establishing any new landscaping.
Credit Requirement Max. Points: 2

Pest Control Alternatives (1/2 point each, maximum 2 points) Implement one or more of the measures below. All physical actions must be noted on construction plans:

- Keep all wood (i.e. siding, trim, structure) at least 12 inches above soil (code usually requires 8 inches)
- Seal all external cracks, joints, penetrations, edges, and entry points with caulking. Where openings cannot be caulked or sealed, install rodent-and corrosion-proof screens. Protect exposed foundation insulation with moisture-resistant, pest proof cover fiber cement board, galvanized insect screen.
- Include no wood-to-concrete connections or separate any exterior wood-to-concrete connections with metal or plastic fasteners or dividers.
- Install landscaping such that all parts of mature plants will be at least 24 inches from the home
- In areas marked “moderate to heavy” through “very heavy” on the termite infestation probability map, implement one or more of the following measures (1/2 point each):
  1. Treat all cellulosic material with a borate product to a minimum of 3 feet above the foundation.
  2. Install sand or diatomaceous earth barrier.
  3. Install a steel mesh barrier or termite control system.
  4. Use noncellulosic (i.e., not wood or straw) wall structure.
  5. Use solid concrete foundation walls or masonry wall with top course of solid block bond beam or concrete-filled block.

Precast Contribution

Precast concrete is resistant to all insect attacks and qualifies as pest proof.

Precast concrete foundations are the perfect choice to ensure that no wood gets within 12 inches of grade, which eliminates the need for additional alternative termite resistance measures.
**Credit Requirement**

**Max. Points: 34**

**Optimize Energy Performance**

Exceed the performance of ENERGY STAR for Homes. The equations are available in the LEED Homes guidebook. A third party inspection is a prerequisite.

**Precast Contribution**

Precast concrete products are plant cast and delivered to the site ready to set, thereby reducing the staging area required and limiting the overall site disturbance.

The impact on the construction site is also reduced because there is no additional required formwork, which often requires more construction area for above-ground products and larger excavation areas for underground products. Less impact on the site includes reduced construction waste, less noise pollution, a shorter construction schedule and fewer laborers needed on-site.
Credit Requirement

Max. Points: 2

**Insulation**

**2.2 Enhanced Insulation**

a) Install installation that exceeds the R-value requirements listed in Chapter 4 of the 2004 International Energy Conservation Code by at least 5%. Alternative wall and insulation systems, such as structural insulated panels (SIPs) and insulated concrete forms (ICFs), must demonstrate a comparable R-value, but thermal mass or infiltration effects cannot be included in the R-value calculation.

b) Install insulation to meet the Grade 1 specifications set by the National Home Energy Rating Standards. Installation must be verified by an energy rater or Green Rater conducting a pre-drywall thermal bypass inspection. See the LEED Guide for additional information, prerequisite and charts.

**Precast Contribution**

Precast concrete wall panels and foundations can prove to be an excellent choice for R-value when used along with insulation as a means to minimize heat transfer and thermal bridging.

In many cases, if additional insulation is desired, it can be added to the precast wall panel system between the studs.
Credit Requirement

**Max. Points: 3**

**Insulation**

**3.1 Prerequisite – Reduced Envelope Leakage.** Meet the air leakage requirements as shown in the table. The air leakage rate must be tested and verified by an energy rater.

**3.2 Greatly Reduced Envelope Leakage** (2 points). Meet the air leakage requirements shown in the table. The air leakage rate must be tested and verified by an energy rater.

**3.3 Minimal Envelope Leakage** (3 points). Meet the air leakage requirements shown in the table. The air leakage rate must be tested and verified by an energy rater.

A project receiving credit for EA1 is not eligible for this credit and vice versa.

### Air Leakage Requirements

**Performance Requirements (in ACH50)**

<table>
<thead>
<tr>
<th>LEED Criteria</th>
<th>IECC Climate Zones 1-2</th>
<th>IECC Climate Zones 3-4</th>
<th>IECC Climate Zones 5-7</th>
<th>IECC Climate Zones 8</th>
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</thead>
<tbody>
<tr>
<td>EA 3.1: Reduced Envelope Leakage (mandatory)</td>
<td>7.0</td>
<td>6.0</td>
<td>5.0</td>
<td>4.0</td>
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<tr>
<td>EA 3.2: Greatly Reduced Envelope Leakage (optional)</td>
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<tr>
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<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**Precast Contribution**

Air pressure changes due to drafts from air leakage can wreak havoc on HVAC building performance.

Precast concrete can improve water and air tightness by reducing the amount of joints and penetrations in a structure.

Because of this simple principle, mechanical systems become more efficient and effective with a precast concrete building envelope.
Credit Requirement  Max. Points: 4

Material-Efficient Framing – Off-Site Fabrication

Use either of the following alternatives to on-site framing:

a) Panelized construction. Wall, roof, and floor components are delivered to the job site pre-formed

b) Modular, prefabricated construction. All principal building sections are delivered to the job site as prefabricated modules.

For the complete credit, prerequisite and additional information, please visit www.usgbc.org to download the free LEED Homes Guide.

Precast Contribution

Precast architectural wall panels and foundations are panelized and created at the plant which helps create less on-site framing waste.

In some cases, precast components can include the wall, roof and floor as one complete unit – ready to set and install – saving installation time.

In addition, precast construction reduces air leakage through fewer joints and significantly decreases on-site construction waste.
WALL PANELS AND VENEERS

Credit Requirement

Environmentally Preferable Products

(.5 point each, maximum 8 points)

Use building component materials that meet one or more of the criteria below:

- Environmentally preferable products. 0.5 points for using a foundation with 30% fly ash/slag. An additional .5 point for exemplary performance of 50% flyash/slag, and/or
- Low Emissions (not applicable for concrete), and/or
- Local Production. 0.5 points for using a foundation that was extracted, processed, and manufactured within 500 miles of the project site.

Precast Contribution

Precast concrete products may contain supplementary cementitious materials such as fly ash and blast furnace slag, which will add to the project’s recycled content goals. Because concrete uses plentiful and natural raw materials, concrete components can be extracted, harvested and manufactured within 500 miles of the project site. Using locally obtained raw materials helps reduce the environmental impact of carbon emissions.

The NPCA LEED calculator helps members respond with the proper documentation required for this credit. Simply input the Zip Code/Postal Code and weight for each component to generate a pdf file that can be e-mailed directly to the LEED AP, contractor or architect.
Credit Requirement

Max. Points: 3

Waste Management

3.1 Construction Waste Management Planning (Prerequisite)
Investigate and document local options for diversion, then document the diversion rate for construction waste. See LEED Homes Guide for the full prerequisite.

3.2 Construction Waste Reduction
Reduce or divert waste generated from new construction activities from landfills and incinerators to a level below the industry norm. Use either of the two options:

a) Reduced Construction Waste. Generate 2.5 pounds or less of net waste (not including waste diverted reclamation or recycling) per square foot of conditioned floor area. Use the table to determine the score.

b) Increased Waste Diversion. Divert 25% or more of the total materials taken off the construction site from landfills and incinerators. Use the table to determine the score. Calculate the percentage using either weight or volume.

Precast Contribution

This credit allows for 2.5 pounds of construction waste per square foot of floor space. Precast concrete can contribute toward this credit because it is plant produced, which creates little to zero on-site construction waste.

Less on-site waste means less transportation of waste, less cleanup time, and less time spent sorting recyclables. These savings can contribute to a quicker, cheaper project and a more efficient construction schedule.
Precast concrete products are cast and cured in the plant and delivered to the site ready to set so they reduce the staging area required, which can reduce the overall site disturbance.

The impact on the construction site is also reduced because there is no additional formwork, which often requires more construction area for above-ground products and larger excavation areas for underground products.

Less impact on sites can reduce construction waste, shorten the construction schedule and require fewer laborers on-site.
Precast concrete products may contain supplementary cementitious materials (SCM) such as fly ash and blast furnace slag which will add to the project’s recycled content goals. Precast products may also contain rebar and welded wire mesh which is often made from recycled steel. Other less frequently used recycled content components include various fiber reinforcements, glass aggregates, silica fume, and recycled crushed concrete.

The NPCA LEED calculator helps members respond with the proper documentation required for this credit. Simply input the Zip Code/Postal Code and weight for each component to generate a pdf file that can be e-mailed directly to the LEED AP, contractor or architect.

Note: Care must be taken when using SCMs because each individual SCM batch can vary in color, which could affect panel color matching.
Credit Requirement

Regional Materials

Use materials or products that have been extracted, harvested, and manufactured within 500 miles of the project site.

The calculation is based on the overall materials cost. Materials costs include all expenses to deliver the material to the project site. Materials costs should account for all taxes and transportation costs incurred by the contractor but exclude any cost for labor and equipment once the material has been delivered to the site.

Regional Materials of 10% = 1 point
Regional Materials of 20% = 2 points

See the NPCA LEED Calculator at www.precast.org/leed for help with this credit.

See the LEED Canada guide for information on Canada’s credit requirements.

Precast Contribution

Because concrete uses plentiful and natural raw materials, concrete components can be extracted, harvested and manufactured within 500 miles of the project site. Using locally obtained raw materials helps reduce transportation distances which reduces the environmental impact of carbon emissions.

If shipping is done by rail or water, LEED Canada allows up to 2,400 km (1,500 miles) from both the manufacturing site to the project site and the location where building materials are extracted, harvested, recovered and processed to the manufacturing site.

The NPCA LEED Calculator helps provide the proper documentation required for this credit. Simply input the Zip code where each raw material originates and the weight of each material to generate a printable file that can be e-mailed to the LEED AP, contractor or architect.