



LEED Reference Guide **For Precast Concrete Products** **RETAINING WALLS**



NPCA

Precast ... The Concrete Solution

RETAINING WALLS



Precast concrete manufacturers located throughout North America produce a wide range of engineered earth retaining systems designed to provide a straight forward and cost-effective solution for your next project. Issues with wall height, right-of-way, seismic activity, drainage, quality control and aesthetics can all be overcome by specifying the use of a precast concrete earth retaining system.

There are numerous proprietary systems available which include precast concrete mechanically stabilized earth (MSE) face panels and large precast modular blocks (PMB). Precast concrete cantilever walls, crib walls and post-and-panel systems are also readily available from many local precast concrete manufacturers. Products includes: commercial retaining walls, residential retaining walls, sea walls, mechanically stabilized earth (MSE) panels, modular block systems, segmental retaining wall (SRW) products and other retaining walls

Advantages of Precast Concrete Retaining Walls..... 3

LEED New Construction

- SS 5.1 – Site Stewardship: Protect or Restore Habitat 4
- MR 4 – Recycled Content 5
- MR 5 – Regional Materials 6

LEED Homes

- SS 4.2 – Surface Water Management 7
- MR 2.2 – Environmentally Preferable Products..... 8
- MR 3.2 – Construction Waste Reduction 9

National Precast Concrete Association
1320 City Center Dr. Suite 200, Carmel, IN 46032
(800) 366-7731 | www.precast.org

This publication is designed to provide accurate and authoritative information in regard to the subject matter covered; however, National Precast Concrete Association acts as a mediator without approving, disapproving or guaranteeing the validity or accuracy of any data, claim or opinion appearing herein. Information is provided and disseminated with the understanding that the National Precast Concrete Association is not engaged in rendering engineering, legal or any other professional services. If engineering, legal or other professional assistance is required, the services of a competent professional should be obtained. The National Precast Concrete Association does not assume and hereby disclaims liability to any person for any loss or damage caused by errors or omissions in the material contained herein, regardless of whether such errors result from negligence, accident or any other cause whatsoever.

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

RETAINING WALLS

Rough and Tough

The strength of precast concrete gradually increases over time. Other materials can deteriorate, experience creep and stress relaxation, lose strength, deflect over time and may not be able to withstand vehicular impacts. The load-carrying capacity of precast concrete is derived from its own structural qualities and does not rely on the strength or quality of the surrounding backfill materials. Studies have shown that precast concrete products can provide a service life in excess of 100 years. In severe conditions, additional design options are available to extend the life of concrete products.

We're Talking Quality Here

Because precast concrete products typically are made in a controlled plant environment, they exhibit high quality and uniformity. Problems affecting quality typically found on a job site- temperature, curing conditions, poor craftsmanship and material quality are nearly eliminated in a plant environment.

Installation Is Easy

Setting precast concrete structures into place is easier because they do not require special rigging (such as fabric slings) to avoid structural damage. Other materials such as fiberglass can suffer structural damage during compaction. In contrast, precast concrete is less susceptible to vibratory damage while the surrounding soil is backfilled. Consequently, backfilling operations can usually proceed much faster around precast concrete structures.

Ready for Anything

While no material is completely immune to chemical attack, the mix designs used to produce precast concrete can be adjusted to help withstand anticipated corrosive agents. Materials such as steel and other materials quickly deteriorate in the presence of corrosive agents, some in the presence of water alone. To better protect reinforcement from corrosion, the precast concrete strength should be designed to 4,000 psi or more.

Engineering

Precast concrete walls are generally supported by engineering specific to both the particular wall system and to the project site conditions. This is not always



the case with walls built from natural stone materials (i.e., boulders).

Durability

Precast concrete walls are usually made from wet-cast, air entrained concrete that is very durable. Resistance to the adverse effects of repeated freeze-thaw cycles and road salts can be significant. Check with the producer to verify the mix design used (including the strength of the concrete) and to verify that the producer has a Quality Assurance program in place.

Aesthetics

Many of the precast concrete wall systems are made with an architectural finish that replicates natural stone. In addition, precast concrete walls can be stained with a number of commercially available stain products to further enhance and customize the look.

Looks Good in "Green"

Besides water, concrete is the most used material on earth. It is nontoxic and environmentally safe. Precast concrete is additionally beneficial because it is made from natural materials. Precast concrete products are used throughout the world as part of retaining wall systems of nearly every modern city. Precast concrete is the choice material for products used in retaining wall systems. Precast structures are modular, can fit any design situation, are produced in a quality-controlled environment and are ready to install immediately upon arrival at the job site. Precast retaining wall components are easily produced to be durable during storage and transportation, easy to install, less vulnerable than competing products to damage during backfill, and are environmentally safe during operation.

RETAINING WALLS



RETAINING WALLS LEED New Construction

SS 5.1 Sustainable Sites

Site Development – Protect or Restore Habitat

Credit Requirement

Max. Points: 1

Site Development – Protect or Restore Habitat

Case 1: Greenfield Sites

Limit all site disturbance to the following parameters:

- 40 feet beyond the building
- 10 feet beyond surface parking and utilities less than 12 inches in diameter
- 15 feet beyond primary roadway curbs and main utility branch trenches
- 25 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, stormwater detention facilities and playing fields) that require additional staging areas to limit compaction in the constructed area.

Case 2: Previously Developed Areas

Restore or protect a minimum of 50% of the site (excluding the building footprint) or 20% of the total site area (including building footprint area), whichever is greater, with native or adapted vegetation.

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

Precast Contribution

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.

RETAINING WALLS



RETAINING WALLS
LEED New Construction

MR 4
Materials and Resources

Recycled Content

Credit Requirement

Max. Points: 2

Recycled Content

Requirements

Use materials with recycled content such that the sum of postconsumer recycled content plus 1/2 the preconsumer content constitutes at least 10% or 20% (based on cost) of the total value of the materials in the project. The minimum percentage materials recycled for each point threshold is:

Recycled Content	Points
10%	1
20%	2

The recycled content value of a material assembly is determined by weight. The recycled fraction of the assembly is then multiplied by the cost of the assembly to determine the recycled content value.

Mechanical, electrical and plumbing components and specialty items such as elevators cannot be included in this calculation. Include only materials permanently installed in the project. Furniture may be included if it is included consistently in MR Credit 3: Materials Reuse through MR Credit 7: Certified Wood.

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.

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.

RETAINING WALLS



RETAINING WALLS LEED Homes
MR 5 Materials and Resources
Regional Materials

Credit Requirement

Max. Points: 2

Precast Contribution

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.

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.

RETAINING WALLS



Credit Requirement

Max. Points: 1

Surface Water Management – Permanent Erosion Controls

Design and install one of the following permanent erosion control measures.

- a) If portions of the lot are located on a steep slope, reduce long-term runoff effects through use of terracing and retaining walls. Or,
- b) Plant one tree, four 5-gallon shrubs, or 50 square feet of native groundcover per 500 square feet of disturbed lot area (including area under roof).

RETAINING WALLS LEED Homes

SS 4.2 Sustainable Sites

Surface Water
Management - Permanent
Erosion Controls

Precast Contribution

Precast retaining walls can help reduce steep slope water runoff which helps control soil erosion.

Precast retaining walls can create inviting seating spaces, create landscaped gardens, or even increase useable site area.

Sustainable sites can use precast retaining walls to decrease the amount of site grading required.

RETAINING WALLS



RETAINING WALLS

LEED Homes

MR 2.2

Materials and Resources

Environmentally
Preferable Products

Credit Requirement

Max. Points: 8

Environmentally Preferable Products

(0.5 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.

RETAINING WALLS



Credit Requirement

Max. Points: 3

Waste Management – Construction Waste Reduction

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 Management 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.

AMOUNT TO LANDFILLS AND INCINERATORS

Reduced Construction Waste		Increased Waste Diversion		Points
Lbs./Ft. ²	Cubic Yds./1,000 Ft. ²	% Waste	% Diverted	
4.0	25.5	100.0%	0%	0.0
3.5	22.3	88%	13%	0.0
3.0	19.1	75%	25%	0.5
2.5	15.9	63%	38%	1.0
2.0	12.8	50%	50%	1.5
1.5	9.6	38%	63%	2.0
1.0	6.4	25%	75%	2.5
0.5	3.2	13%	88%	3.0

RETAINING WALLS

LEED Homes

MR 3

Materials and Resources

Waste Management – Construction Waste Reduction

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 clean-up time, and less time spent sorting recyclables. These savings can contribute to a quicker, cheaper project and a more efficient construction schedule.