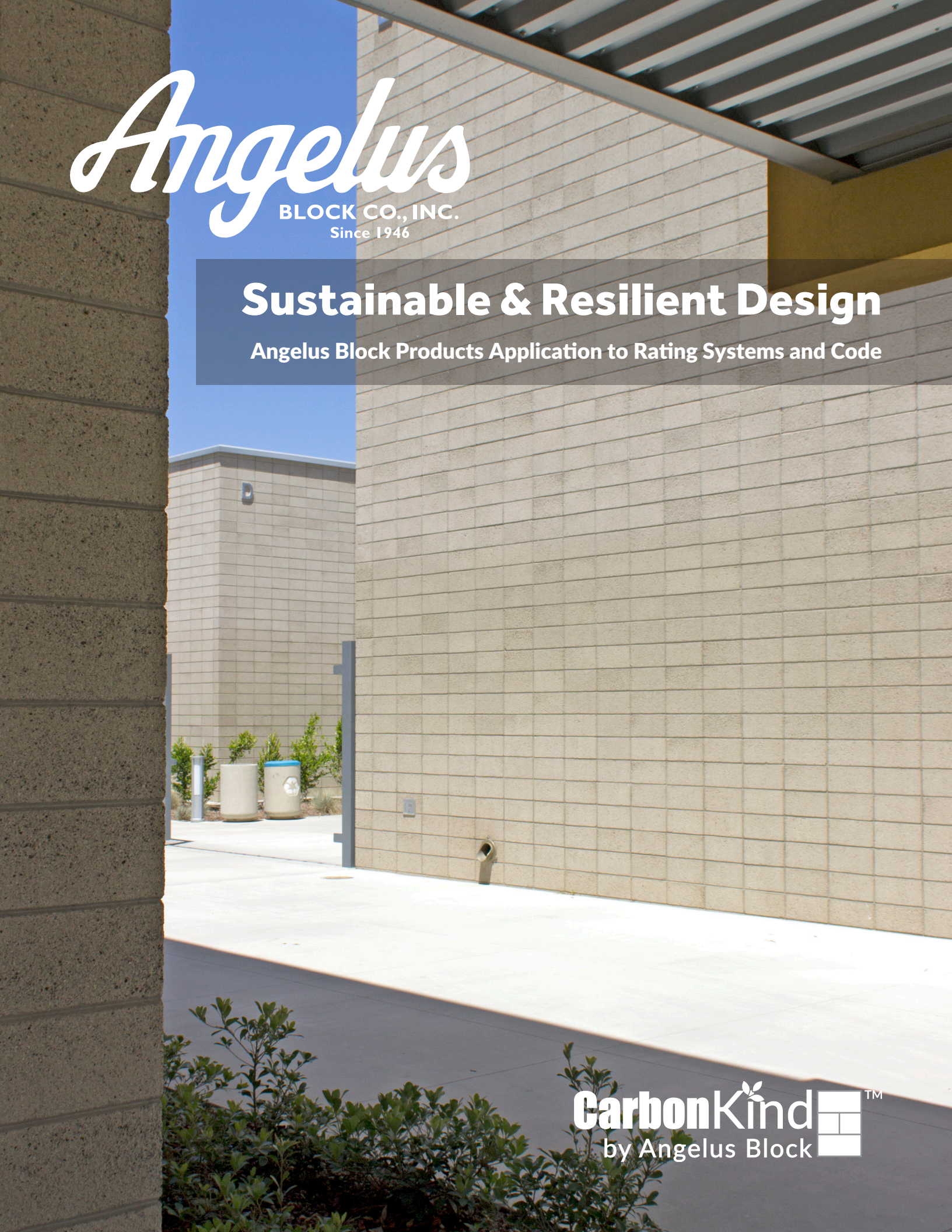
Angelus
BLOCK CO., INC.
Since 1946

Sustainable & Resilient Design

Angelus Block Products Application to Rating Systems and Code



CarbonKind™
by Angelus Block

Sustainability & Resilience Rating Systems and Code

An overview of products and systems related to credits and strategies.

California Building Standards Commission:	
2019 California Green Building Standards Code	**CalGreen**
Collaborative for High Performance Schools®:	
CHPS Criteria™ 2014 v1.02 with 2016 California Title 24 updates	**CalGreen**
Green Building Initiative™:	
Green Globes® for New Construction 2019 Technical Reference Manual v1.0	**CalGreen**
U.S. Green Building Council:	
LEED® v4 Building Design & Construction	**BDCv4**
LEED® v4.1 Building Design & Construction	**BDCv4.1**
LEED® v4 Neighborhood Development	**NDv4**
SITES™ v2 For Sustainable Land Design and Development	**SITES**

Most green standards and rating systems categorize credits and strategies within commonly used divisions. Our product lines contribute specifically to or generally support the cited criteria.

The systems in which these products are installed typically provide functions and benefits in multiple ways, thereby maximizing the effective use of materials.

CarbonKind™ by Angelus Block

Concrete masonry units (CMU) produced by Angelus Block and referenced in the following credits and strategies are CarbonKind low impact products. CarbonKind CMU have demonstrated, substantial reductions in CO_2e compared to Carbon Leadership Forum's 2021 Material Baselines. Learn more at AngelusBlock.com.

Integrative Process

Integrative Process Intent / Goal: Support high-performance, cost-effective outcomes through early analysis of interrelationships among systems.		
CalGreen		Requires pre-design modeling and analysis of energy-related systems to inform an optimized design and encourages taking advantage of efficiencies. The building envelope is among the systems to be explored. The thermal mass and heat capacity of concrete masonry has been shown to benefit energy design, and in most cases significantly contribute to reduction in HVAC requirements. The California Energy Code recognizes and accounts for concrete masonry as a heavy mass wall. **In most Southern California climate zones, insulation is NOT required for concrete masonry walls 8-inches and greater in width.** See Optimize Energy Performance. Further efficiencies may be gained when considering concrete masonry as a multi-function system with structural, acoustic, fire-resistant, energy, and design finish properties. See Multi-Function Assemblies.
CHPS	II 1.0 Prereq.: 1 pt.; II 1.1: 1 pt.	
GGlobes		
BDCv4	Integrative process: 1 pt.	
BDCv4.1	Integrative process: 1 pt.	
NDv4		
SITES		
Products / Systems	•Concrete unit masonry	

Location and Site

Development Density / Infill Sites
Intent / Goal: Channel development to urban areas with existing infrastructure.

CalGreen	A5.103.1	While the specific criteria for many rating systems pertain to urban density and surrounding services, the goal is explicit to existing infrastructure and at the very least implicit to infill sites. Certain product systems inherently provide value in support of this goal by their performance properties or flexibility in design and construction. Concrete masonry walls intrinsically provide fire and separation walls. In our region, walls are typically solid-grouted; therefore, a common 8-inch thick concrete masonry wall meets a 4-hour resistance rating just as it is. Stud-based systems must add significant layers for fire resistance. Unitized materials such as these are ideal for sites with limited access and working space.
CHPS	SS 6.1: 2 pts.	
GGlobes	2.1.1.1: 14 pts.	
BDCv4	LT Sensitive land protection Op 1: 1 pt. LT Surrounding density and diverse uses: up to 5 pts.	
BDCv4.1	LT Sensitive Land Protection Op 1: 1 pt. LT Surrounding density and diverse uses: up to 5 pts.	
NDv4	SLL Smart, Preferred Locations: up to 10 pts.	
SITES	SC 1.6: 4 pts.	
Products / Systems	•Concrete unit masonry •Proto-II™ post tension masonry site walls	

Brownfield Sites
Intent / Goal: Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land.

CALGreen	A5.103.2.1	Sites to be rehabilitated can be subject to severe settlement issues. Interlocking concrete pavements (ICP) are excellent at maintaining usability when underlying soils settle, move, or expand. Repairs can be made with original stones reinstalled, reducing cost and material consumption. PICP can be designed in a no-exfiltration option to capture runoff and prevent direct drainage into underlying soils, thereby lessening potential water-borne migration of site contaminants. Its detaining and filtering of runoff can mitigate stress on existing storm drain infrastructure. Proto-II™ Post Tensioned Masonry has designs for expansive soils, suitable for rehabilitated sites where post-development settlement is anticipated.
CHPS		
GGlobes	2.1.2.1: 14 pts.	
BDCv4	LT High priority site: up to 3 pts.	
BDCv4.1	LT High Priority Site and Equitable Development, Op 1, Path 1: 1 or 2 pts.	
NDv4	SLL Brownfield remediation: up to 2 pts	
SITES	SC Redevelop degraded sites, Case 2: 6 pts.	
Products / Systems	•Permeable interlocking concrete pavements •Proto-II™ post tension masonry site walls	

Walkable Streets
Intent / Goal: Provide appealing and comfortable pedestrian street environments in order to promote pedestrian activity. Promote public health through increased physical activity.

CALGreen		ICP and PICP naturally invoke reduced speeds, demarcating zones by texture, color, and pattern. Excellent for creating woonerfs or home zones (an area, usually residential, where motorists and other users share the street without boundaries such as lanes and curbs). Woonerfs are included in equivalent provisions for walking. ICP and PICP excel at creating a sense of place and defining a focal-point, intimately detailed and purposed for foot traffic, inviting common areas and gathering places.
CHPS		
GGlobes		
BDCv4	Innovation Catalog: Walkable project site: 1 pt.	
BDCv4.1	Innovation Catalog: Walkable Project Site: 1 pt.	
NDv4	NPD Walkable streets: Prereq.; up to 9 pts.	
SITES		
Products / Systems	•Interlocking concrete pavements •Permeable interlocking concrete pavements	

Protect Habitat
Intent / Goal: Limit all site disturbance by delineating construction buffer zones.

CALGreen	
CHPS	
GGlobes	2.3.2.1: 5 pts.
BDCv4	SS Site development – protect or restore habitat: up to 2 pts. (Guidance Step 3)
BDCv4.1	
NDv4	GIB Minimized site disturbance: 1 pt.
SITES	
Products / Systems	•Concrete unit masonry •Interlocking concrete pavements •Permeable interlocking concrete pavements •Decorative landscape walls •Proto-II™ post tension masonry

Green Globes: 40 ft from building; 5 ft from parking lots, roadways, sidewalks, and utility right of ways, unless intended to improve natural integrity.

LEED ND: 40 ft. from building; 10 ft. from walkways, patios, parking; 15 ft. from street curbs and main utility trenches; 25 ft. from constructed areas with permeable surfaces.

Concrete masonry, Proto-II™ Wall Systems, pavers, and decorative landscape walls are unitized materials that do not require large equipment for placement, nor large staging areas.

Proto-II™ utilizes optimized footings that displace much less soil than conventional masonry fence and retaining walls.

Segmental decorative landscape walls respect the natural contours of the site, and do not require large footings and the associated soil displacement.

Pavers are immediately usable after installation and may be utilized for their own self-contained staging area as work progresses.

Heat Island Reduction
Intent / Goal: Reduce heat islands.

CalGreen	A5.106.11.1
CHPS	SS 10.1: 2 pts.
GGlobes	2.3.4.2: up to 2 pts.
BDCv4	SS Heat island reduction: up to 2 pts..
BDCv4.1	SS Heat Island Reduction: up to 2 pts.
NDv4	GIB Heat island reduction: 1 pt.
SITES	SD-S+V Reduce urban heat island effects: 4 pts.
Products / Systems	•Interlocking concrete pavements •Permeable interlocking concrete pavements

Pavements with higher SRI or SR values reflect sunlight, absorb and emit less heat than standard pavements, especially compared to asphalt.

Angelus Pavers can provide a wide selection of design options with the following colors meeting the SRI of 29, and initial SR of 33%:

	SRI	SR*	Applicable to:
Angelus Paver Gray	37	33	All
Angelus Paver Cream	36	33	All
Angelus Paver Red	37	31	CalGreen, CHPS, GG
Angelus Paver Sand (S.O.)	-	37	All
Angelus Paver Terra Cotta	32	-	CHPS, GG, BDCv3, NDv3
Angelus Paver Adobe (S.O.)	36	-	CHPS, GG, BDCv3, NDv3
Angelus Paver Buff (S.O.)	35	-	CHPS, GG, BDCv3, NDv3

*Initial SR %

Green Globes includes permeable surfaces such as PICP in the calculations.

Green Globes also includes opaque wall surfaces (east, west, south). Concrete masonry without pigments is deemed to comply.

Stormwater Design / Rainwater Management
Intent / Goal: Reduce runoff volume and improve water quality, replicating natural hydrology of the site.

CalGreen	A5.106.2; A5.106.3	Rainwater management in LEED v4 combines quantity control and quality control which were separate in previous LEED versions. Using green infrastructure and low-impact development approaches, the goal is to replicate natural site hydrology in the design of site elements. PICP are well recognized as a proven strategy that manages rainwater where it falls, allowing it to infiltrate the underlying soils, and controlling any runoff beyond the capacity of the soil. *Quantity control:* The pervious surface and base structures of PICP create typical water storage capacity 30% to 40% of the total volume of the base and sub-base. This water is allowed to infiltrate into the soil usually within 24 to 72 hours. Water that does not infiltrate can be filtered through the base before draining through perforated pipes in the sub-base. The ICPI manual on permeable pavement notes that the long-term conservative pavement surface infiltration rate is approximately 3 in./hour (210 l/sec/ha). This rate will easily accommodate 2-year, 24-hour rainfall intensities given sufficient base storage and soil infiltration. Permeable interlocking concrete pavements can reduce runoff to zero for the most frequent storms. PICP can maximize the percentage of pervious surface area by combining parking with runoff detention and by utilizing grid pavements for auxiliary parking and fire access lanes. *Quality control*: PICP act as a buffer between developed areas and the surrounding natural environment. PICP filter out significant portions of contaminants – including oil drippings – as well as cooling the temperature of the runoff, mitigating potential damage to sensitive flora and fauna. Since PICP reduce runoff through infiltration, it has the ability to reduce TSS (total suspended solids) and TP (total phosphates). Several studies have demonstrated 80% reduction of TSS and at least 40% TP reduction. These studies compared reductions in pollutants from PICP to that from impervious pavements. The ability of PICP to reduce these pollutants is typically greater than these percentages according to references in the Interlocking Concrete Pavement Institute's manual, Permeable Interlocking Concrete Pavements (Fifth Edition) – Selection, Design, Construction, Maintenance. The ICPI manual references studies on permeable pavements with reductions in TSS and TP as high as 95%. For more information visit **www.angeluspavingstones.com**.
CHPS	SS 5.1: 2 pts.	
GGlobes	2.4.1.1.1: 3pts., 2.4.1.1.2: 1 pt., 2.4.1.1.3: 1 pt., 2.1.1.1.4: 1 pt., 2.4.1.1.5: 1 pt	
BDCv4	SS Rainwater management: up to 3 pts.	
BDCv4.1	SS Rainwater Management: up to 3 pts.	
NDv4	GIB Rainwater Management: up to 4 pts.	
SITES	SD-W Manage precipitation on site: Req, 3.3 4-6 pts.	
Products / Systems	•Permeable interlocking concrete pavements	

Energy

Optimize Energy Performance
Intent / Goal: To reduce the environmental and economic harms of excessive energy use by achieving a minimum level of energy efficiency for the building and its systems.

CalGreen	5.201.1
CHPS	EE 1.0 Prereq.: 8 pts.; EE 1.1: up to 40 pts.
GGlobes	3.1.1.1: up to 180 pts.
BDCv4	EA Minimum energy performance: Prereq.; Optimize energy performance, Op 1: up to 18 pts. (Healthcare 20 pts., Schools 16 pts.)
BDCv4.1	EA Minimum Energy Performance: Prereq.; Optimize Energy Performance, Op 1: up to 18 pts. (Healthcare 20 pts., Schools 16 pts.)
NDv4	GIB Minimum building energy perf.: Prereq.; GIB Optimize building energy per.: up to 2 pts.
SITES	
Products / Systems	•Concrete unit masonry

Concrete masonry can harvest site energy using passive solar designs and decrease the size of HVAC systems. It has high thermal mass and specific heat, providing very effective thermal storage. The result is a beneficial lag between peak heating and cooling loads and outside temperature peaks, thereby delaying needed heating or cooling and lowering associated energy demand.

Interior walls act as heat-sinks to moderate indoor temperature swings, further reducing heating/cooling loads. Whole-building analysis programs capable of projecting a building's energy use and cost based on an hour-by-hour simulation can accurately model concrete masonry's thermal mass and predict associated savings.

Concrete masonry's thermal mass is a resilient feature and a potential for thermal storage walls.

The California Energy Code recognizes the value of heavy mass walls (with concrete masonry units (CMU) in its definition); **for most metro areas in Southern California, no insulation is required**.

Please see California Energy Code References, a quick reference guide available from your Angelus Block representative or AngelusBlock.com.

Materials and Resources

Building Life-Cycle Impact Reduction / Building Reuse
Intent / Goal: To encourage adaptive reuse and optimize the environmental performance of products and materials.

CalGreen	A5.105.1.1
CHPS	MW 8.1: 1-2 pts.
GGlobes	5.5.11: up to 12 pts.
BDCv4	MR Building life-cycle impact reduction: up to 5 pts.
BDCv4.1	MR Building LIfe-Cycle Impact Reduction: up to 5 pts.
NDv4	GIB Recycled and Reused Infrastructure: 1 pt. GIB Building reuse: 1 pt.
SITES	SD-MS 5.2 Maintain on-site structures and paving: 2-4 pts.
Products / Systems	•Concrete unit masonry

Concrete masonry is exceptionally durable and its life-cycle considerably longer than many other building envelope systems. This allows the opportunity to refurbish the building for other uses while maintaining the concrete masonry shell.

At the end of its service life, concrete masonry can be completely recycled.

NDv4 and SITES: ICP and PICP are high-strength concrete units high in durability and can be lifted and reset to accommodate revised site plans.

Environmental Product Declarations
Intent / Goal: To reward project teams for selecting products with verified improved environmental life-cycle impacts.

CalGreen	
CHPS	MW 7.1: 2 pts.
GGlobes	5.2.1.1: up to 19 pts.
BDCv4	MR BPDO – EPDs: up to 2 pts.
BDCv4.1	MR BPDO – EPDs: up to 2 pts. MRpc132 Procurement of Low Carbon Construction Materials: up to 2 pts.
NDv4	
SITES	SD-MS 5.9 Support sustainability in materials manufacturing: 1-5 pts.
Products / Systems	•Concrete unit masonry

Angelus Block was the first producer to publish a Type III EPD based on the first Product Category Rules specific to concrete masonry units in North America and again is first to publish EPDs to the latest PCR for Part B: Concrete Masonry and Segmental Concrete Paving Product EPD Requirements, November 2020.

The new Type III EPDs are available by product mix and manufacturing location. Essential EPDs are available at AngelusBlock.com, and more are available upon request or from our EPD operator, ASTM.

CarbonKind™ CMU by Angelus Block significantly lowers CO2e well below the Carbon Leadership Forum's (CLF) 2021 Material Baselines (v2) for concrete masonry units. Medium Weight (MW) CMU are the predominant product type used in buildings. The average CO2e impacts in Angelus EPDs for MW show reductions of 43% and 61% for CLF Typical and Baseline values.

Carbon Kind™ by Angelus Block

With data now available from CLF, comparisons to baselines are possible. A new LEED v4.1 Pilot Credit, Procurement of Low Carbon Construction Materials (MRpc132), provides means to account for and define reductions in the embodied carbon of materials, and ultimately the building. Angelus CarbonKind cmu significantly contribute to the intent of this pilot credit.

All typically used structural and architectural cmu are covered, specific to manufacturing location.

Recycled Content
Intent / Goal: To avoid the environmental consequences of extracting and processing virgin materials by using recycled and reclaimed materials.

CalGreen	A5.405.4 (except structural frame)
CHPS	MW 3.1: 2 pts.
GGlobes	5.4.1.1: up to 10 pts.
BDCv4	MR BPDO – Sourcing of raw materials Op 2: up to 2 pts.
BDCv4.1	MR BPDO – Sourcing of Raw Materials Op 2: up to 2 pts.
NDv4	GIB Recycled and reused infrastructure: 1 pt.
SITES	SD-MS 5.5 Use recycled content materials: 3-4 pts.
Products / Systems	•Concrete unit masonry •Interlocking concrete pavements •Permeable interlocking concrete pavements •Decoractive landscape walls •Proto-II™ post tension masonry site walls

Angelus Block offers from select locations CMU, pavers, and landscape units with postconsumer / preconsumer recycled content blends (crushed reclaimed and waste product as aggregate replacement). Many stock items contain recycled material. The result is a corresponding reduction in consumption of virgin aggregates.

Masonry grout is approximately 50% or more of the volume of solid grouted concrete masonry, and has substantially greater potential for sustainability benefit than recycled content in CMU alone. Fly ash, or fly ash combined with ground granulated blast furnace slag (GGBFS), may be used as a partial Portland cement replacement, and as a practical means of introducing significant recycled content into the masonry wall without adversely affecting aesthetic control of exposed masonry units. Studies undertaken by numerous industry organizations have shown:

- Grouts with up to 30% by weight of Portland cement replaced with Class F fly ash can be treated as conventional masonry grout.
- Grouts with 40% to 50% by weight of Portland cement replaced with Class F fly ash are viable; compressive strength should be tested at 42 days, and should not have a significant effect on the overall project schedule.
- Grouts with 50% to 80% by weight of Portland cement replaced by fly ash (25%) and GGBFS (varying %) are also viable.
- These grouts have other benefits, such as increased workability.

Availability and specific mix designs will vary by local grout suppliers, who should be consulted for specifications. Please contact the Concrete Masonry Association of California and Nevada (CMACN), www.cmacn.org, or your Angelus Block representative for more information.

Health Product Declarations
Intent / Goal: To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances.

CalGreen	
CHPS	II 10.1: 4pts.; MW 10.1: 1pt.
GGlobes	
BDCv4	MR BPDO – Material ingredients: 1pt.
BDCv4.1	MR BPDO – Material Ingredients: 1pt.
NDv4	
SITES	
Products / Systems	•Concrete unit masonry

Angelus Block was the first producer to publish HPDs to the HPD Open Standard 2.0. Current versions are 2.2.

The set of six HPDs are reported to 100 ppm and encompass all typically specified cmu products, grouped by ASTM C90 density categories.

Angelus CMU do not contain intentionally added BM-1 substances.

Copies, as well as updated guide specifications incorporating sustainable attributes, are available from your Angelus Block representative or at **AngelusBlock.com**.

Regional Materials
Intent / Goal: To reduce impacts from transportation.

CalGreen	A5.405.1	CALGreen and LEED v3 recognize a 500-mile radius. All Angelus produced items are manufactured and sourced well within 500 miles of our market area. LEED v4 eliminated Regional Materials as a standalone credit, instead incorporating it as a contribution multiplier in the BPDO credits. However, the radius has been reduced to 100 miles, and more significantly, current wording and interpretation does not allow for any partial accounting – 100% of raw material sourcing and production must occur within 100 miles of the project. Applicability of Angelus products will depend on much more than the obvious project and supplying plant location. Other factors such as product density (weight) classifications and pigmenting will determine its qualification. For LEED v4, determination will be made on a project and product-specific basis. By far, the bulk of materials used in the manufacture of Angelus products are local to our market area and within the state, thus contributing to local economies.
CHPS		
GGlobes		
BDCv4	Project and product specific	
BDCv4.1	Project and product specific	
NDv4		
SITES	SD-MS 5.6 Use regional materials: 3-5 pts. SD-HH+W 6.11 Support local economy: 3 pts.	
Products / Systems	•Concrete unit masonry •Interlocking concrete pavements •Permeable interlocking concrete pavements •Decorative landscape walls •Proto-II™ post tension masonry site walls	

Resource Conservation
Intent / Goal: To design for efficient use of materials.

CalGreen		Modular building products are material-efficient, conveniently stored, and reduce potential waste. Unused materials may be returned to the supplier for reuse or recycling, reducing waste impacts for the project.
CHPS		
GGlobes	3.5.6.1.1: 2 pts.	
BDCv4		
BDCv4.1		
NDv4		
SITES		
Products / Systems	•Concrete unit masonry •Interlocking concrete pavements •Permeable interlocking concrete pavements •Decorative landscape walls •Proto-II™ post tension masonry site walls	

Multi-Functional Assemblies
Intent / Goal: To minimize the use of raw materials.

CalGreen		Concrete masonry walls inherently perform many functions without any added materials or trades: • Structural element • Finished surface • Design material • Fire rated up to 4 hours, solid-grouted 8-in and wider • Noise control Permeable interlocking pavements also provide multiple functions: • Durable surface for vehicles or pedestrians • Finished surface • Design material • Runoff control and filtering • Temporary storage for rainwater to allow for infiltration
CHPS		
GGlobes	3.5.6.2: 1 pt.	
BDCv4		
BDCv4.1		
NDv4		
SITES		
Products / Systems	•Concrete unit masonry •Permeable interlocking concrete pavements	

Construction Waste Management
Intent / Goal: To reduce construction and demolition waste disposed of in landfills by recovering, reusing, and recycling materials. Prevent the generation of waste materials.

CalGreen	4.408.1, 5.408.1; A5.408.3.1	Concrete masonry units, pavers, and segmental retaining units are completely recyclable when crushed and used as aggregates for base material or in other concrete products. These credits are attainable for either demolished installations, or the waste and scraps from new construction. Undamaged, unused new product delivered to the job site may be diverted to and used in other projects. CMU and paver products are stored and shipped on reusable pallets that may be returned to the manufacturer. At approximately 45 - 50 lbs. each and potentially hundreds involved on a typical project, that's thousands of pounds to include in diversion calculations. LEED 4.1 gives point preference to waste prevention above waste diversion. Unitized materials inherently prevent excessive material use.
CHPS	MW 2.0 Prereq.: 2 pts.; MW 2.1: 2 pts.	
GGlobes	5.6.1.3: up to 8 pts., 5.6.1.4: up to 4 pts.	
BDCv4	MR Construction and demolition waste management: Prereq.; up to 2 pts.	
BDCv4.1	MR Construction and Demolition Waste Management: Prereq.; up to 2 pts	
NDv4	GIB Solid Waste Management: 1 pt.	
SITES	C Divert construction and demolition materials from disposal: 3-4 pts.	
Products / Systems	•Concrete unit masonry •Interlocking concrete pavements •Permeable interlocking concrete pavements •Decorative landscape walls •Proto-II™ post tension masonry	

Enhanced Durability
Intent / Goal: Choose materials proven to be characterized by durability.

CalGreen	A5.406	Proven longevity with minimal deterioration, reduced maintenance, and recyclability at end of service life: concrete masonry, interlocking concrete pavements, permeable interlocking concrete pavements, decorative landscape walls, and Proto-II™ certainly apply to all of the criteria. Concrete is prized as an extremely durable material, and in the form of concrete masonry units, pavers, and landscape units provides long-lasting structures and pavements requiring little to no maintenance, with less impact than poured concrete. While concrete masonry walls are not "flexible" in the sense of reconfiguring to a new layout, they are one of the most resilient and disaster-resistant structural systems possible. Their performance would be the reason a building could be refitted or repurposed beyond original intent or post-disaster. ICP and PICP are not only inherently durable, but they can be removed and reinstalled to revised site plans.
CHPS		
GGlobes		
BDCv4		
BDCv4.1		
NDv4		
SITES		
Products / Systems	•Concrete unit masonry •Interlocking concrete pavements •Permeable interlocking concrete pavements •Decorative landscape walls •Proto-II™ post tension masonry	

Indoor Environmental Quality

Acoustic Performance
Intent / Goal: Provide building occupants with an indoor environment conducive to learning and healing.

CalGreen	5.507.4; A5.507.5
CHPS	EQ 14.0 Prereq.: 5 pts; EQ 14.1: 4 pts.
GGlobes	6.5.1.2: up to 2 pts.
BDCv4	IEQ Acoustic performance.: Prereq, (Schools) 1 pt. (2 pts. Healthcare)
BDCv4.1	IEQ Acoustic Performance.: Prereq, (Schools) 1 pt. (2 pts. Healthcare)
NDv4	
SITES	
Products / Systems	•Concrete unit masonry

Concrete masonry walls can be used to isolate noise, block sound transmission and absorb noise. They are successfully used as party walls, hotel separation walls, and highway sound walls.

Sound Transmission Class (STC) measures the sound-blocking capability of an assembly.

Typical STC ratings of solid grouted Medium Weight CMU

Thickness	STC
6-inch	50
8-inch	55
10-inch	60
12-inch	63

Low-Emitting Materials
Intent / Goal: To reduce concentrations of chemical contaminants that can damage air quality, human health, productivity, and the environment.

CalGreen	
CHPS	EQ 7.0 Prereq.: 2 pts.; EQ 7.1: 6 pts.
GGlobes	6.2.1.3.4: 1 pt.,
BDCv4	IEQ Low-emitting materials: up to 3 pts.
BDCv4.1	IEQ Low-Emitting Materials: up to 3 pts.
NDv4	
SITES	
Products / Systems	•Concrete unit masonry

Under LEED v4 Emission and Content Requirements, and Green Globes VOC for wall systems, concrete and concrete masonry are specifically listed among products that are inherently nonemitting, and therefore are considered fully compliant without testing, if it does not include integral organic-based surface coatings or sealers.

Thermal Comfort Design
Intent / Goal: To promote occupants' productivity, comfort, and well-being by providing quality thermal comfort.

CalGreen	
CHPS	EQ 9.0 Prereq.: 4 pts.
GGlobes	6.4.2.1: 9 pts.
BDCv4	IEQ Thermal comfort Op 1: 1 pt.
BDCv4.1	IEQ Thermal Comfort Op 1: 1 pt.
NDv4	
SITES	
Products / Systems	•Concrete unit masonry

With thermal mass and high specific heat, concrete masonry walls remain warm or cool long after heat or air-conditioning has shut off. This can effectively: reduce heating and cooling loads; improve occupant comfort by moderating indoor temperature swings; and shift peak heating and cooling loads to off-peak hours.

The high heat capacity of concrete masonry can play a role in designing Thermal Storage Walls to contribute to passive thermal in emergencies.

Innovation

Innovation in Design
Intent / Goal: To encourage projects to achieve exceptional or innovative performance.

CalGreen	
CHPS	II 10.1: 4 pts.
GGlobes	
BDCv4	IN Innovation: up to 5 pts.
BDCv4.1	IN Innovation: up to 5 pts.
NDv4	IN Innovation: up to 5 pts.
SITES	C 10.1 Innovation or exemplary performance
Products / Systems	•Varies with strategy

Many of the strategies discussed have the potential to earn additional LEED Exemplary Performance points where certain criteria are exceeded. Applicability of the credit may be specific to certain LEED rating systems or to particular options or paths within a given credit. Credits with Exemplary Performance options include:

Exemplary Performance:	**BDCv4**	**NDV4**	**CHPS**
Sites			
High-Priority Site	X		
Protect or Restore Habitat	X		
Rainwater Management	X	X	
Heat-Island Reduction	X	X	
Energy & Atmosphere			
Optimize Energy Performance	X	X	X
Materials & Resources			
Building and Material Reuse	X	X	
Environmental Product Declarations	X		
Recycled Content	X	X	
Health Product Declaration	X		X
Construction Waste Management	X		X
Indoor Environmental Quality			
Low-Emitting Materials	X		

Opportunities to achieve additional points under LEED Innovation in Design IDc1 exist with Pilot Credits and the Innovation Catalog. Refer to USGBC for applicability and details of each:

Possible Innovation in Design Credits for LEED v4 and v4.1	**Pilot Credits**	**Innovation Catalog**
Enhanced acoustical performance – exterior noise control (EQpc57)	X	
Assessment and Planning for Resilience (IPpc98)	X	
Design for Enhanced Resilience (IPpc99)	X	
Integrative Analysis of Building Materials (MRpc103)	X	
Procurement of Low Carbon Construction Materials (MRpc132)	X	
Innovation: Walkable Project Site		X

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