ARXX ICF

SCHOOLS

that outperform.

ex·cel·lence

noun |ˈek-s(ə-)lən(t)s|

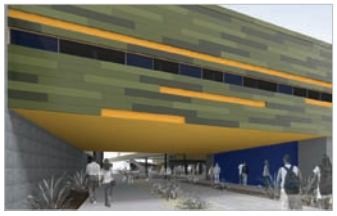
What schools built with ARXX ICFs demonstrate:

1 Big savings on heating and cooling costs,

2 Energy efficiency, and

3 No mold, no mildew and better air quality.

4 **Redefining building.**



LEED®

green

energy efficient

environmentally conscious

COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS CHPS MEMBER

ARXX™ ICF

Redefining building.

Schools that outperform.

Building a high performance school can have impact from the classroom to the boardroom and within the community. The benefits include more efficient use of financial and environmental resources, higher test scores for students, increased average daily attendance, lower operating and maintenance costs, improved teacher satisfaction and retention, decreased liability costs and reduced environmental impacts.

An enlightened learning environment is tailored to the needs of the students and community it serves and can protect children's health while teaching them how to protect their environment.

ARXX ICFs provide an energy-efficient building system that is the foundation of a high performance school.

Some of the characteristics of a high performance school include:

- High energy efficiency – significantly lower heating and cooling costs.
- Better indoor air quality – prohibits the growth of mold and mildew.
- Cost effective to build and maintain.
- Safe and secure – can withstand hurricane and tornado force winds and be designed for the highest seismic zones.
- Flexible space planning – superior sound suppression.
- Sustainable and educational – makes significant contribution to LEED points.
- Discerning design – reinforced concrete design provides flexible design possibilities.

THE BENEFITS OF BUILDING HIGH PERFORMANCE SCHOOLS WITH ARXX ICFS

ENERGY EFFICIENCY - REDUCED OPERATING COSTS

ARXX ICFs can significantly lower the operating costs to heat and cool schools by providing a wall system that is highly energy efficient. **These savings can be significant and used to supplement other budgets**, such as special education, computers, books, and salaries.

The energy effectiveness of an ARXX ICF wall is due to three important factors: continuous interior and exterior thermal envelope, reduced air infiltration and thermal mass moderation. ARXX ICF walls moderate indoor temperature swings and reduce the amount of heating and cooling needed. **Schools built with ARXX ICFs are specifically designed using life cycle cost methods to minimize the long-term costs of ownership.**

Independent scientific studies demonstrate that test scores of students are 15% to 26% higher in classrooms with daylighting.

The energy efficiency of the exterior envelope of an ARXX ICF wall assembly reduces the required HVAC system, resulting in lower capital costs and a subsequent reduction in heating and cooling costs. The smaller HVAC units optimize the amount of air exchanges per hour that are required to be heated or cooled.

IMPROVED INDOOR AIR QUALITY

A school built with ARXX ICFs provides superior indoor air quality by controlling sources of contaminants and preventing moisture accumulation. Prohibiting the growth of mold and mildew results in lower maintenance costs and eliminates the need for remediation attributable to mold and mildew resulting from water damage or infiltration.

Pollutants can be kept out of the classroom, stale air and mold growth eliminated - the elements that reduce the potential sources of health problems and inhibit the spread of airborne infections. This can result in fewer sick days for both students and teachers, especially those with asthma or other respiratory problems.

REDUCED ENVIRONMENTAL IMPACTS - INCREASED LEED CONTRIBUTIONS

High performance school buildings are consciously designed to respond to and positively impact the environment and use environmental features to enhance the education experience for students and teachers.

The energy-efficiency of ARXX ICFs in combination with other sustainable building technologies and practices, reduces the school's environmental footprint and is designed to stay that way throughout the entire life cycle of the building.

What are ICFs? *Insulating concrete forms (ICFs) create cast-in-place, reinforced concrete walls that are more than just highly energy efficient.*

ARXX ICFs can make significant contribution to LEED® points, an important designation that delineates the performance of the school in terms of leading standards of environmental design and performance.

A SAFE AND SECURE SCHOOL

An added value of building with ARXX ICFs is the structural superiority provided by the wall system. **The design of ARXX cast-in-place reinforced concrete walls allow the concrete to cure 25% stronger.** This superior strength provides safety from serious weather events and ARXX walls can withstand hurricane and tornado force winds as well as being engineered for the highest seismic zones or to provide a safe room to FEMA standards.

The wall assembly has a four-hour fire resistance rating and readily meets the most stringent building code requirements for flame spread and smoke development indices meaning that ARXX wall assemblies meet non-combustible construction standards.

SUPERIOR SOUND SUPPRESSION

The high STC ratings provided by ARXX walls allow multiple uses and more efficient designs with fewer restrictions on space due to the sound attenuation qualities. A gymnasium can be designed next to a classroom without concern of noise disruption. This can facilitate multiple uses of space and better access for students and teachers.

DESIGN FREEDOM

The physical properties of an ARXX ICF wall provides high shear strength from reinforced concrete walls allowing for larger openings and penetrations. **The larger openings allow the designers to take full advantage of passive daylight** when designing schools, without compromising energy efficiency or structural integrity.

The design and layout of a school is essential to the overall energy efficiency and operating costs. Building with ARXX ICFs can provide the design freedom to accomplish a cost-efficient build with an architecturally stimulating design that is highly energy-efficient.

Case studies - proving the value proposition in real time.

Clearview Elementary School

Elementary School (43,600 sq. ft.)
LEED Gold certification
First public school in Pennsylvania to receive LEED certification.
2003 NESEA Green Building Awards first prize: Places of Learning.

Clearview Elementary was designed to educate students in a healthy environment, while exemplifying the benefits of reducing the carbon footprint. This school was designed to be sustainable and conserve energy. Building with ARXX ICF has multiple advantages by providing a thermal envelope contributing to a mere 4.5° F indoor temperature reduction throughout the 14 hour night set-back during the winter months when the outdoor temperatures dropped from 40° F to 22° F.

The steady thermal environment provided by ARXX ICF walls facilitated the use of under-floor plenums for ventilation, a technique that improves indoor air quality. Other key energy saving factors were geothermal heating as well as the use of site orientation for passive solar and day lighting. It all adds up to an energy-efficient school with $18,000 in annual energy savings.

Los Paseos Elementary School

Elementary School / Multi-purpose Building (12,000 sq.ft.)
First public school in California to receive LEED certification.
Received a Savings by Design Award.

The Los Paseos Elementary School was a State of California, Division of State Architect project. Housing a combination of elementary school, community center and office space, the design challenge was significant and effective management was a priority.

Due to the multi-purpose use of this building, there was a need for a wall system that could support the steel roof structure which spanned the full width of the building. With the ARXX ICF code approval and testing information, the project met the stringent State of California Division of State Architect Approvals. Through this process, the building achieved substantial savings over Title 24 (the energy code benchmark for the state) with energy savings of over 26% per year. Acoustical management was also critical for this project. The interior ARXX ICF walls allow the speakers in the auditorium to project into the audience without resounding echoes, leaving the surrounding offices and classrooms undisturbed.

San Luis Obispo County Education Building

Community College (8,000 sq. ft.)
LEED Silver certification

Energy efficiency and the ability to meet the engineering requirements for building on an earthquake fault in the State of California, were the main reasons ARXX Prime was chosen for this project. The 22 foot high walls were placed without cold joints to help address the engineers concern about the location of the building in the highest seismic zone. This south-western design of the building included a stucco finish that contributed to the quick finish of the building. This was the first State of California - Division of State Architects ICF project in the State of California.

Ironwood Hall

Community College (71,000 sq. ft.)
LEED Silver certification

This community college in the southeastern suburbs of Phoenix represents a breakthrough for the use of ICFs in the construction of an educational institution in the western United States. The building achieves several engineering feats previously thought unworkable, such as cantilevering the second story ICF walls almost ten feet beyond the ground floor. LEED Silver certification is pending.

To learn more about how we can help you with your school project go to arxx.com or call 800.293.3210

ARXX ICFs Contribution to LEED Credits

LEED NC 2009 • LEED Core and Shell • LEED for Schools

ARXX ICFs contribute significantly to LEED points.

Based on the data shown on the LEED Credit Summary table, building with ARXX ICFs can contribute significantly to the LEED points for your project. Actual LEED point contribution will be project specific, and should be determined by a LEED Accredited Professional for each project seeking LEED accreditation.

LEED Section	LEED Credit	LEED Points	Relevant benefits of ARXX ICFs
Sustainable Sites	SSc5.1 - Site Development: Protect or Restore Habitat	1	Enabler - On a greenfield site this credit can be achieved by limiting site disturbance around the building perimeter (plus roads, trenches and other constructed features). ARXX ICF wall systems are typically braced from the interior. Accordingly, they allow minimal excavation area, enabling reduced site disturbance around the building perimeter.
	SSc7.2 - Heat Island Effect, Roof	1	Indirectly Enhanced - ARXX wall systems are capable of withstanding higher structural loads and could support the added load of a green roof. A green roof can reduce heat island effect and bring more natural spaces into an urban location.
Energy and Atmosphere	EAp2 - Minimum Energy Performance	Prereq 2	Contributor - The credits for energy performance relate to energy use of whole building. Use of ARXX wall systems can directly contribute to energy reduction.
	EAc1 - Optimize Energy Performance	Up to 19	Contributor - The credits for energy performance relate to energy use of whole building. Use of ARXX wall systems can directly contribute to energy reduction by providing superior air tightness, insulating value and thermal mass benefits.
Material sand Resources	MRc2 - Construction Waste Management	Up to 2	Enabler - The credits for ensuring debris from construction is recycled or redirected back to the manufacturing process. The nature of ARXX wall systems is such that very little waste is produced during construction, and what is produced can typically be fully recycled. ARXX can be a zero waste system.
	MRc 4 - Recycled Content	Up to 2	Enabler - ARXX ICFs contain between 25% to 50% recycled content material. Rebar typically has greater than 90% recycled content. Additional benefits are achieved by use of concrete products that substitute part of the Portland cement content with supplementary cementing materials (SCMs) such as fly ash, slag and silica fume.
	MRc5 - Regional Materials	Up to 2	Contributor - 80% of a material must be locally manufactured (within 500 mile radius) to qualify under this credit. ARXX currently has 11 manufacturing facilities throughout North America; concrete itself is locally manufactured.
	MRc8 - Durable Building (Canada only)	1	Enabler.
Indoor Environment Quality	EQc3.2 - Construction IAQ Management Plan: Before Occupancy	1	Enabler - ARXX ICFs do not deteriorate indoor air quality. They are insignificant contributors to VOCs, particulates, formaldehyde, carbon monoxide and 4-PC. Accordingly, they can help lead to a pass of the air testing required for this credit.
	IEQp3, IEQc9 - Acoustical Performance (LEED for Schools)	1	Contributor - ARXX ICFs have superior acoustic properties, providing sound attenuation rates at or over the minimum requirement levels of STC 50.
	IEQc10 - Mold Prevention (LEED for Schools)	1	Enabler - ARXX ICFs are mold, mildew and rot resistant unlike building materials such as wood and cellulose based alternatives. ARXX ICFs can therefore contribute to the required IAQ management plan related to mold.
Innovation and Design	IDc1 - Innovation in Design	Up to 5	Contributor to the LEED reward points for exemplary performance when projects achieve an additional level of performance on other LEED credits. The use of ARXX ICFs can contribute or enable many LEED credits in this category. Primary examples of how ARXX ICFs can contribute include: • Acoustic performance: innovative strategy to provide acoustical privacy. • Air leakage: not readily measured in most energy simulation tools. Benefits include energy use reduction. Reduced risk of mold and improved occupant comfort. • Thermal mass: not readily measured in most energy simulation tools. Can also contribute to occupant comfort. • Security and durability: high mass concrete will provide superior resistance to excessive loads possible during extreme weather events or explosions. • Recycled content: contribute to achieving exemplary performance. • Regional materials: contribute to achieving exemplary performance. • Waste reduction: contribute to achieving exemplary performance.
Regional Priority	Regional Priority	Up to 4	Regional priority credits are identified by the USGBC from the existing set of LEED credits noted above. They represent additional credits that are deemed more important for the specific region in which the project is located. As they are drawn from the current set of LEED credits, ARXX ICFs can contribute to regional priority credits.