


INSULATING CONCRETE FORMS

An Introduction

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Insulating Concrete Forms Manufacturers Association

The Insulating Concrete Forms Manufacturers Association (ICFMA) is the North American non-profit trade association for the Insulated Concrete Form industry and was founded in 2014 by a dedicated group of manufacturers with the interest of improving the quality and acceptance of Insulated Concrete Form construction.

Mission:
The mission of the ICFMA is to promote and enhance the social, environmental and economic value of insulating concrete forms in the North American marketplace.

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Insulating Concrete Forms Manufacturers Association

ICFMA Members













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Today's Learning Objectives

1. Introduce Insulating Concrete Forms (ICF)
2. Benefits of ICF Construction
3. How ICFs are Installed
4. Applications for ICF

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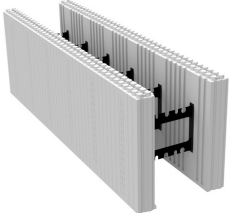
Objective #1 Introduction to Insulated Concrete Forms (ICF)

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What are Insulated Concrete Forms?

- Interlocking Expanded Polystyrene (EPS) foam block.
- Used as a concrete forming system to create structural, solid mass walls that are insulated on both sides.
- Sized for 4", 6", 8", 10", 12" concrete cores.
- Reinforced with steel rebar and filled with concrete.

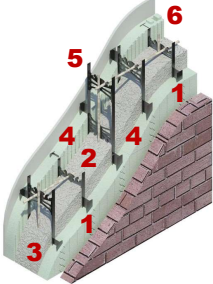


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ICF Walls Complete Many Tasks at the Same Time

1. Stay in Place Forming System w/ Rebar Ties
2. Structurally Reinforced Concrete Wall
3. Continuous Air Barrier
4. Continuous Insulation – exterior and interior
5. Continuous Vapor Retarder
6. Embedded Furring Strips
7. Low Sound Transmission (STC 54)
8. 3-4 Hour Fire Rating



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ICF Codes and Standards





ICC Acceptance Criteria:
 AC12 - Foam Plastic Insulation
 AC15 – Concrete Floor, Roof and Wall Systems
 AC353 – Stay-in-place Foam Plastic Insulating Concrete Forms for Solid Walls

ICF Building Code Product Evaluation
 Third Party Laboratory Testing



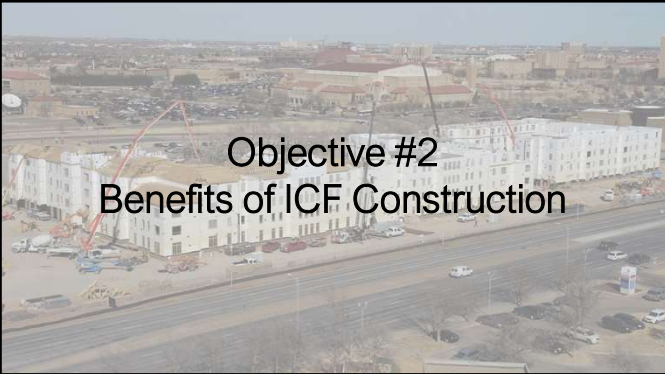

ASTM Standards:



ASTM E2634 – Standard Specification Flat Wall Insulating Concrete Forms

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Objective #2 Benefits of ICF Construction

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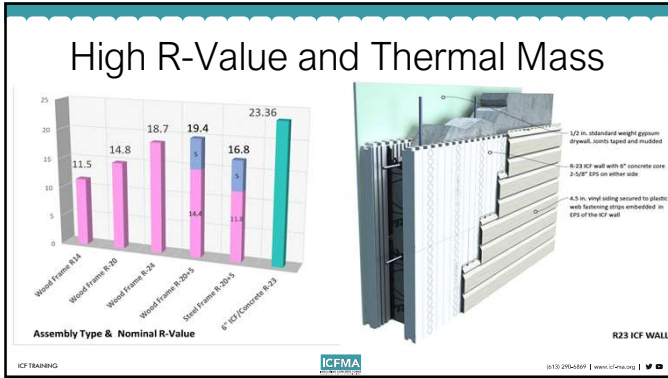
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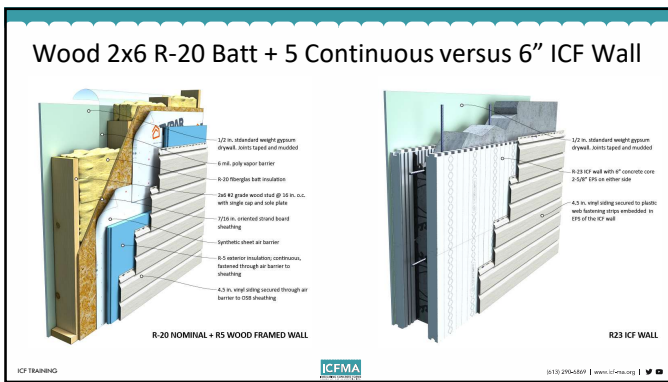
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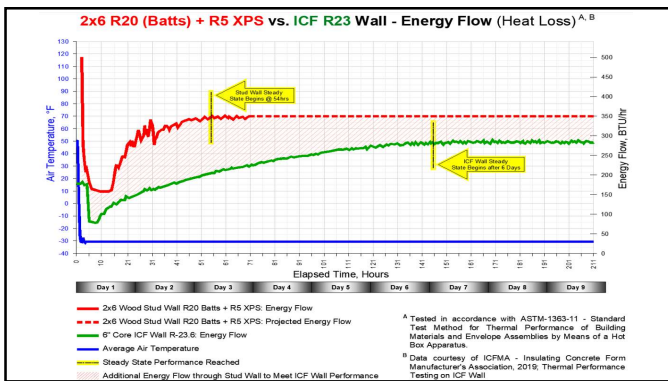
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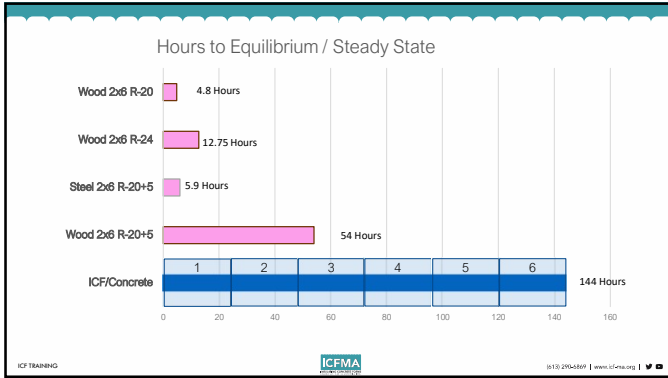
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ICF Installation Overview - Laying Out The Wall

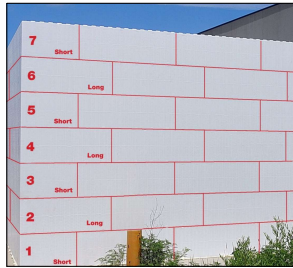
- Start ICF's from corners and work toward center of wall.
- Stack two courses of block, then level, plum and square the walls.
- Secure to Footing with spray foam adhesive every 18"-24"

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ICF Installation Overview – Running Bond

The first two rows define the coursing layout for the remainder of the wall.

- Alternating corner blocks on each course provides the offset
- All even courses line up
- All odd courses line up



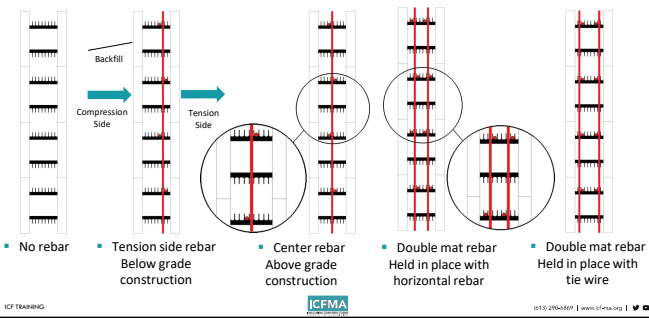
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ICF Installation Overview - Rebar



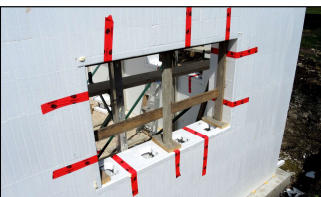
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ICF Installation Overview – Openings



EPS Buck

- Follow manufacturers installation procedures



Wood Buck

- May require pressure treated lumber
- Strap so block and buck cannot move

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ICF Installation Overview - Alignment, Bracing and Scaffolding

- There are many brands and styles of bracing that work with ICF's
- Follow the manufacturers installation process

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ICF Installation Overview - Wall Penetrations and Hangers

Before Pouring Concrete Ensure:

- Place Sleeves for any needed penetration through wall. HVAC, Electric, Plumbing, Network, ect...
- Place Hangers, embedment or other systems that may attach directly to the concrete wall.
- Locate to avoid reinforcement bars

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ICF Installation Overview - Concrete Pour and Consolidation

- ICF construction requires consolidation

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ICF Building Types

ICFs are compatible for all building types:

- Residential
- Multi-Story
- Commercial
- Institutional
- Hospitality
- Churches
- Theaters
- Industrial
- Agricultural
- Safe rooms (FEMA)

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MULTI FAMILY

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HOSPITALITY - HOTEL / MOTEL



Hilton Garden Inn




Hampton Inn & Suites

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INSTITUTIONAL

- Schools, Colleges, Universities
- Libraries, Gymnasiums, Pools
- Dormitories
- Community Centers



AUSTIN ELEMENTARY SCHOOL



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MEDICAL FACILITIES

- Hospitals
- Clinics
- Home for the Elderly
- Veterinary Clinics
- Research laboratories



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BUILDINGS OF WORSHIP



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COMMERCIAL

- Retail small and big box stores
- Offices, Banks, Warehouses
- Theaters
- Restaurants




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INDUSTRIAL / AGRICULTURAL

- Produce and Food Storage
- Animal Barns
- Concrete Plants
- Manufacturing Plants





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PRECAST CONCRETE 101

WWW.PCI.ORG

PRESENTED: JANUARY 20, 2021



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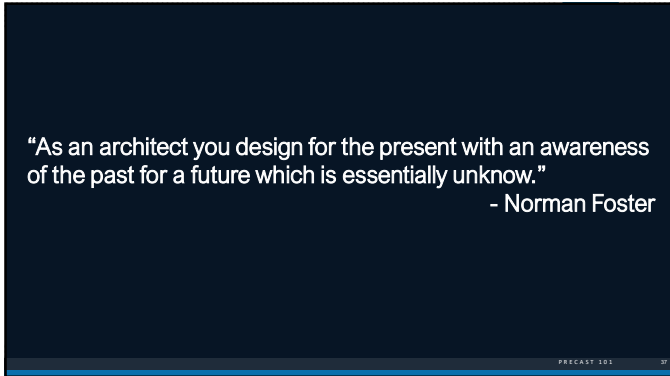


LEARNING OBJECTIVES

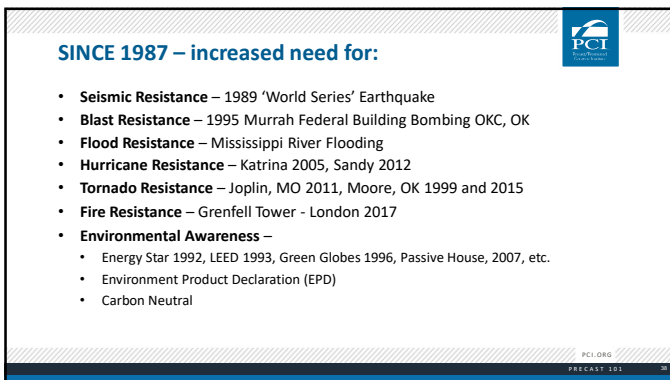
- Learn to identify the different precast concrete components, applications and systems
- Learn how precast concrete is manufactured
- Learn how precast concrete contributes to design versatility, energy efficiency, and long-term building performance

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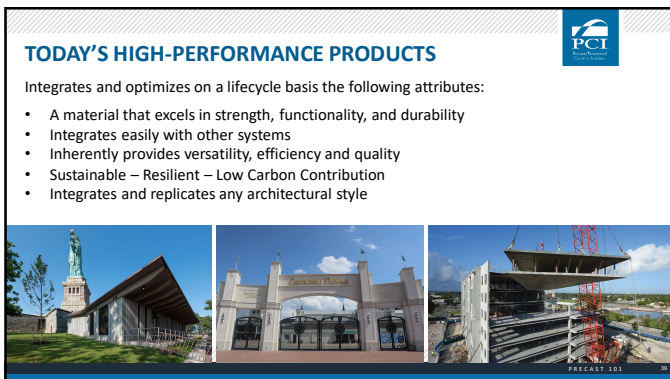
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Precast Concrete Units

Architectural Precast – All precast units employed as elements of a structure's architectural design

Structural Precast – All precast units incorporated as part of the supporting structure, including those with architectural color and/or finish

Bridge/Transportation Precast – All precast units incorporated into bridge structures, including those with architectural color and/or finish

Pavement Precast – All precast concrete units used as roadway or pedestrian access

Utility Precast – All precast units used in underground applications



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Architectural Units

- Wall Panels
- Spandrel Panels
- Columns Covers
- Window Panels
- Special Shaped Units



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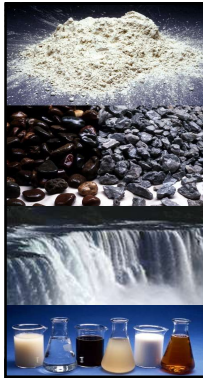
Structural Units

- Wall Panels
- Columns
- Beams
- Floor Systems
- Stairs



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WHAT IS CONCRETE?


Concrete – A composite material that consists essentially of a binding medium within which are embedded particles or fragments of aggregate. (ASTM)

Concrete constituents:

- Cement
- Water
- Aggregates
- Admixtures
- Air
- Color pigments (optional)

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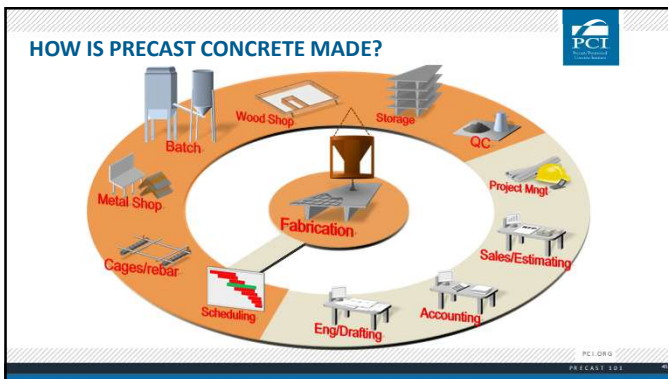
WHAT IS PRECAST CONCRETE?

Concrete components that are cast into a specific shape at a location other than its in-service position.

- Manufacturing plant that follows a strict safety and quality control processes
- Controlled environment
- Year-round production

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HOW IS PRECAST CONCRETE MADE?

Diagram illustrating the precast concrete production process:

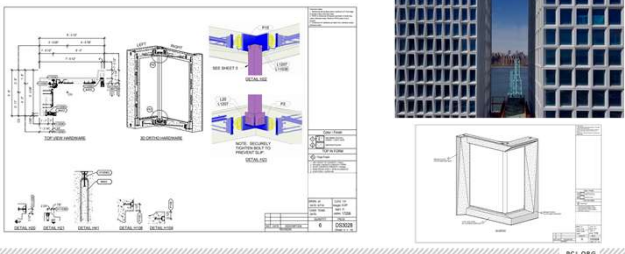
- Batch
- Wood Shop
- Storage
- QC
- Project Mngt
- Sales/Estimating
- Accounting
- Eng/Drafting
- Scheduling
- Cages/rebar
- Metal Shop
- Fabrication

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HOW IS PRECAST CONCRETE MADE?

Each piece is custom designed for your project



The slide features technical drawings on the left showing various precast concrete components like 'TOP JOINT ANCHORAGE', 'REINFORCING BARS', and 'WALL REINFORCEMENT FOR PRECAST CLIP'. On the right, there is a photograph of a modern building facade with a grid of precast concrete panels, and a smaller technical drawing of a panel joint. The PCI logo is in the top right corner, and 'PRECAST 101' is at the bottom right.

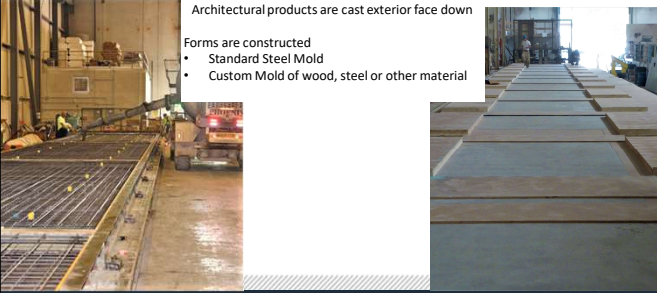
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HOW IS PRECAST CONCRETE MADE?

Architectural products are cast exterior face down

Forms are constructed

- Standard Steel Mold
- Custom Mold of wood, steel or other material



The slide shows two photographs of a precast concrete manufacturing plant. The left photo shows a long, narrow formwork structure with rebar reinforcement. The right photo shows a long, straight concrete slab being cast in a form. The PCI logo is in the top right corner, and 'PRECAST 101' is at the bottom right.

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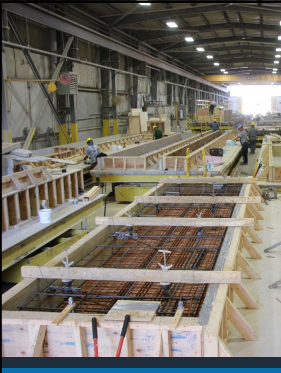
HOW IS PRECAST CONCRETE MADE?

Structural products have standard steel beds



The slide features two photographs. The left photo shows a large industrial facility with multiple long, parallel steel beds used for casting structural precast concrete. The right photo shows a close-up of a steel bed with rebar reinforcement. The PCI logo is in the top right corner, and 'PRECAST 101' is at the bottom right.

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HOW IS PRECAST CONCRETE MADE?

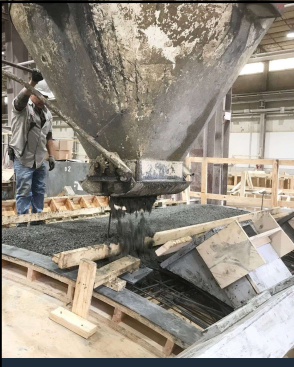
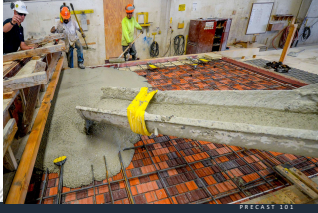
Architectural beds require more flexibility

Cast in items installed

- Thin brick, stone, terra cotta
- Reinforcement
 - Conventional Reinforcing (rebar and mesh)
 - Prestress Reinforcement
 - Post-Tension Reinforcement
- Block outs for openings
- Electrical conduit

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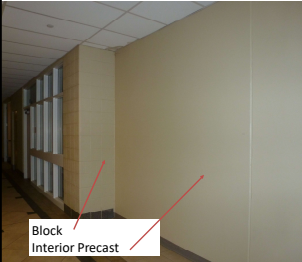

HOW IS PRECAST CONCRETE MADE?

Concrete is mixed – tested and placed in molds

- Face mix – exposed to view
- Back mix – less expensive for unexposed areas

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HOW IS PRECAST CONCRETE MADE?


Back (upside) of unit is finished

- Wood float, broom finish, steel trowel
- USDA approved treatment

Block
Interior Precast

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HOW IS PRECAST CONCRETE MADE?

Components cure overnight

- Reach minimum compression strengths
- QC personnel break cylinders

Components removed from the forms

- Moved to storage
- Moved to finishing area



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Precast/Prestressed Concrete Institute

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HOW IS PRECAST CONCRETE MADE?

Finish application is performed

- Power wash
- Acid Etch
- Sandblast
- Polished
- Other



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Precast/Prestressed Concrete Institute

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HOW IS PRECAST CONCRETE MADE?

Product is loaded on trucks and shipped to the site



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Precast/Prestressed Concrete Institute

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HOW IS PRECAST CONCRETE MADE?

Product is installed directly onto the building from the trucks



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PCI Quality Control Measures

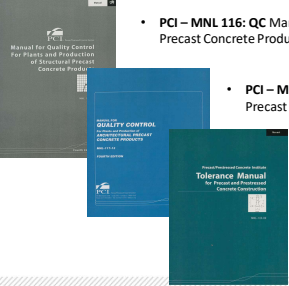


- PCI plants follow a detailed process
- 2 unannounced audits per year
- Measure every aspect of
 - Concrete raw materials
 - Concrete strengths
 - Form construction
 - Reinforcement and insert placement
 - Finished product size, shape and appearance

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Body of Knowledge





- PCI – MNL 116: QC Manual for **Structural** Precast Concrete Products
- PCI – MNL – 117: QC Manual for **Architectural** Precast Concrete Products
- PCI – MNL – 135: Manual on **Tolerances** for Precast and Prestressed Concrete Construction

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PRECAST COMPONENTS

- Columns and beams
- Double tees
- Hollow-core slabs
- Wall panels
- Spandrels
- Glass Fiber Reinforced Concrete
- Specialty components (stairwells, piers, etc.)
- Bridge components



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COMPONENTS & SYSTEMS
Columns and Beams



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COMPONENTS & SYSTEMS
Double Tee Floor/Roof System



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COMPONENTS & SYSTEMS

Specialty



Patricia and Phillip Frost Museum of Science, Miami, FL

Gate Precast Co. PCI.ORG PRECAST 101

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COMPONENTS & SYSTEMS

Glass Fiber Reinforced Concrete - (GFRC) Panels
'Thinner Wall Panel Systems'



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COMPONENTS & SYSTEMS

Bridge Beams, Abutments and other Components







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TOTAL PRECAST SYSTEMS




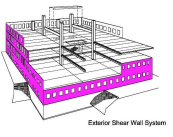
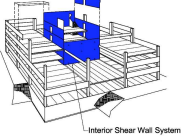
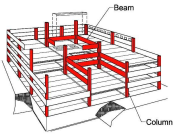
- Rigid Frame System
- Exterior Shear Wall System
- Interior Wall System
- Load Bearing Exterior Walls



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COMPONENTS & SYSTEMS

- Rigid Frame System
- Interior Shear Wall System
- Exterior Shear Wall System



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COMPONENTS & SYSTEMS

Rigid Frame System



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ARCHITECTURAL FACADES

- Load Bearing or Non-Load Bearing
- Unlimited Colors/Textures
- Custom Shapes
- Multiple Texture Options
- Embed Masonry Products
- Incapsulate Insulation

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HOW PRECAST BUILDS
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DESIGN FLEXIBILITY

Solution for every architectural style



Color Form Texture

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PRECAST/CONCRETE

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DESIGN FLEXIBILITY

Add or embed common exterior finish materials:

- Brick veneer
- Stone veneer
- Terracotta
- Ceramic tiles

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SUSTAINABILITY

Insulated Wall Panels

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PRECAST BENEFITS

- Design Flexibility
- Controlled Production
- PCI-Certified Quality
- Safety & Security
- Sustainability
- Layout Flexibility
- Low Maintenance
- Acoustical Control
- Mold Resistance
- Controlled Environments
- Expansion Capabilities
- Economy

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CONTROLLED PRODUCTION

Casting components under factory-controlled conditions benefit the project in many ways:

- Production regardless of weather conditions
- More control over final appearance
- Precaster as team member
- Elimination of several trades and materials

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PCI CERTIFIED QUALITY

The advantages of PCI certification:

- Prequalified bidders
- Quality production processes
- Trained QC inspectors
- Referenced to Body of Knowledge
- Reliability



Ross Bryan Association
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PCI CERTIFIED QUALITY

Many organizations and government agencies either mandate or recommend PCI plant certification:

- Federal Aviation Administration
- Bureau of Reclamation, U.S. Dept. of the Interior
- Federal Bureau of Prisons
- Federal Highway Administration
- U.S. Army Corps of Engineers
- U.S. Veteran Affairs
- U.S. Department of the Navy
- General Services Administration
- 30+ State Departments of Transportation
- AIA Masterspec





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PRECAST APPLICATIONS

- Commercial
- Entertainment
- Institutional
- Residential
- Industrial
- Transportation



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ALL-PRECAST CONCRETE STRUCTURES



University of Michigan Wall Street Parking



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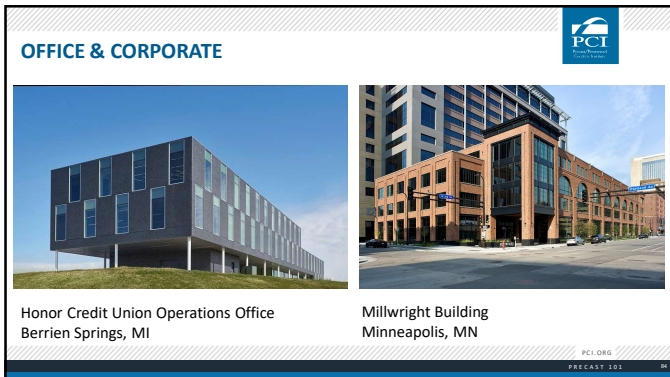
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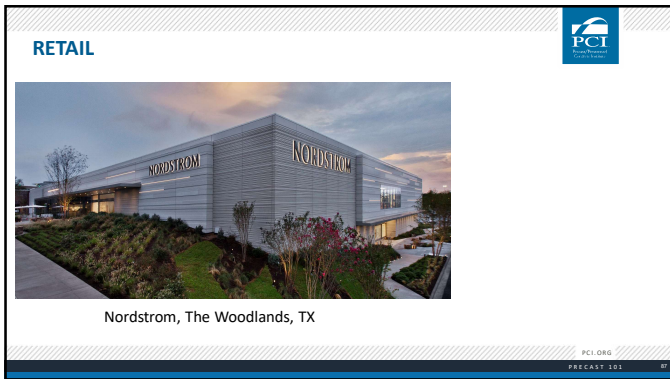
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RETAIL



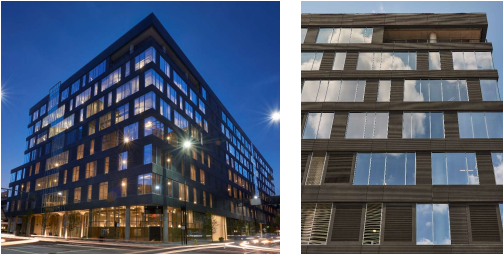
Gabbert's – HOM Furniture
Bloomington, MN




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MIXED USE




5th & Race Street,
Cincinnati, OH




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MIXED USE




The Capp Iowa 46
Minneapolis, MN



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STADIUMS



New Meadows Stadium, East Rutherford, NJ

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ARENAS



Toronto Pan AM Sports Centre, Toronto, Canada

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PERFORMING ARTS CENTER






Kauffman Center For the Performing Arts, Kansas City, MO

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EDUCATION K-12





DC West Elementary School
Valley, NE

St. Mary's Catholic Church and School
Joplin, MO

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EDUCATION UNIVERSITIES





UCSF Mission Hall Global Health Sciences
Building, San Francisco, CA

St. Joseph University,
Philadelphia, PA

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EDUCATION UNIVERSITIES






Pioneer Hall – University of Minnesota
Minneapolis, MN

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GOVERNMENT BUILDINGS





Advanced Learning Library
Wichita, KS

FDNY Firehouse Rescue #2
Brooklyn, NY

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GOVERNMENT BUILDINGS

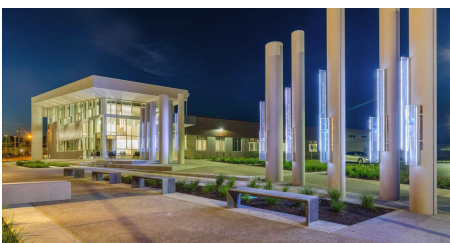



Minnesota Senate Building
St. Paul, MN

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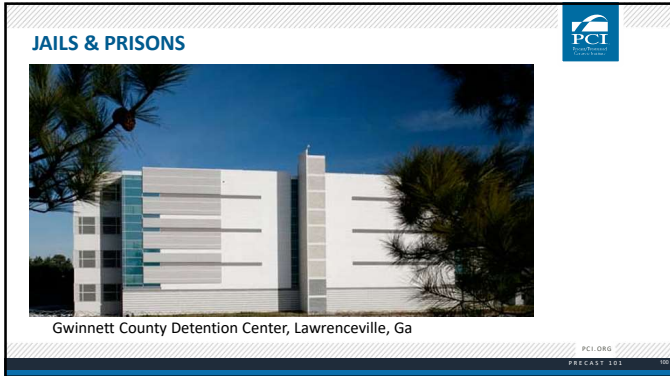
POLICE/MUNICIPAL BUILDINGS



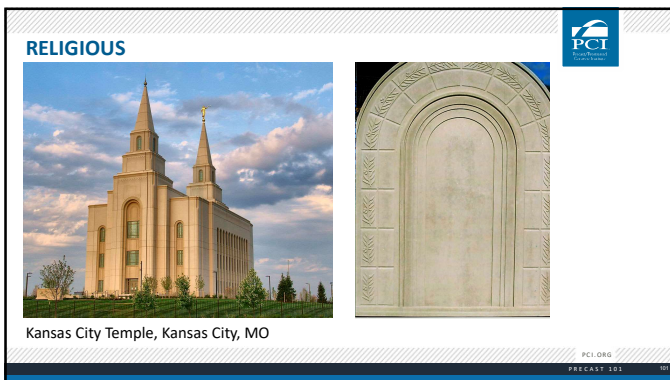
District 3 Police Headquarters, Cincinnati, OH

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100




101




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HEALTHCARE & HOSPITALS



Avera on Louise Health Campus
Sioux Falls, SD



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WAREHOUSE & DISTRIBUTION



Macy's Parade Warehouse
Moonachie, NJ


Dollar General Distribution
Center, Bessemer, AL




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BRIDGES




West Seventh Street Bridge, Fort Worth, TX



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BRIDGES



U.S. Hwy 12 Bridge
Over Baraboo River
Baraboo, WI

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CONCLUSION

- Early precast involvement
- Overcome design challenges
- Summary


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EARLY PRECASTER INVOLVEMENT

The precaster can provide:

- Technical advice
- Engineering support
- Aesthetic guidance
- Economical solutions and product suggestions



LIPSCOMB ACADEMY

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OVERCOMES DESIGN CHALLENGES

- Speed construction
 - provide faster return on investment
 - reduce interest on construction loans
 - Meet occupancy needs
- Minimize operating costs for the life of the building
- Minimize congestion and safety concerns on the site
- Minimize floor-to-floor height to meet zoning codes
- Devise aesthetic details to reflect architect's vision
- Increase energy efficiency
- Offer superior fire resistance
- Meet the area's seismic requirements

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SUMMARY

Unlimited uses:

- Total Precast Structures
- Architectural Facades
- Transportation
- Pavement
- Utility

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Questions

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Thank You

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