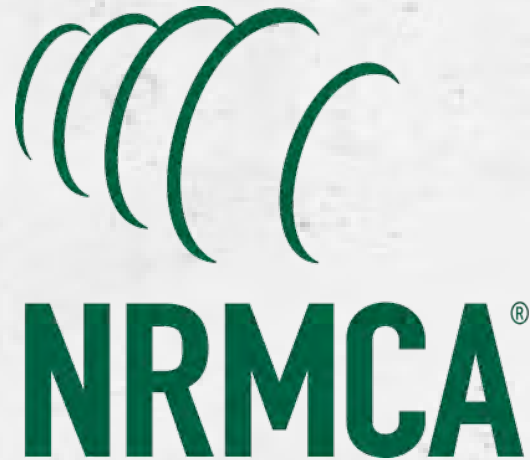


Making the Business Case for Concrete

Quadruple the Quantity of Concrete on Building Projects Using the Concrete Design Center



Patrick Matsche
Building Promotions, NRMCA



Empirical – Quantifiable Data



CONCRETE



DESIGN



CENTERED

4-7 stories | 200,000 ft²



8,000 yd³



2,000 yd³



- We lose 6,000 yd³ per project
- We lost 7.3 million yd³ in 2016*
- \$1 Billion in revenue

* Dodge Data & Analytics, 4-7 story buildings, excluding parking garages

reTHINK
WOOD

Renewable by nature.

\$33M

Pavilion

LICAN

WOOD

GREENBUILD

GREENBUILD

ALL (GREENBUILD)
CARPET LEADS TO
NEW CARPET



WoodWorks



AMERICAN WOOD COUNCIL

BUILD WITH STRENGTH

A COALITION OF THE NATIONAL READY MIXED CONCRETE ASSOCIATION

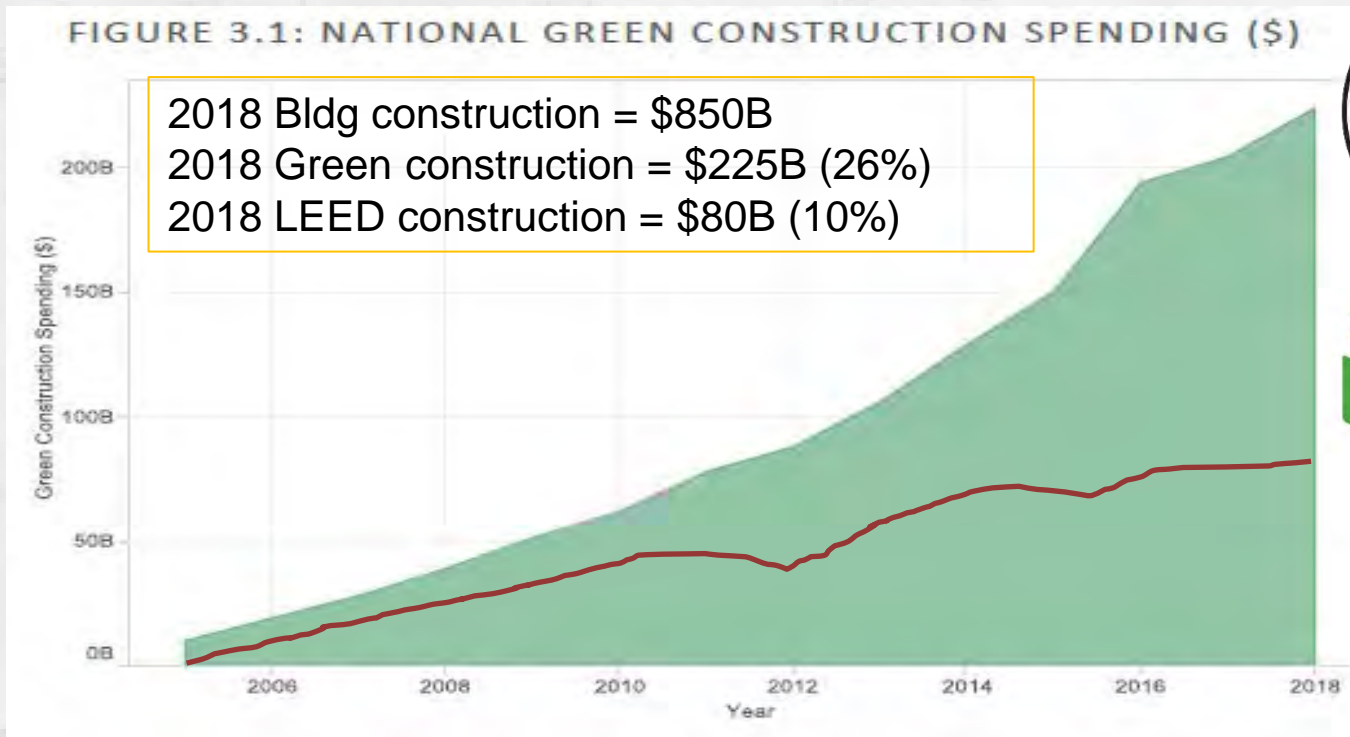
Concrete's Role in Sustainable Development

by James Bogdan

National Ready Mixed Concrete Association



Market Opportunity: Green Building



LIVING BUILDING CHALLENGE

Source: USGBC Green Building Economic Impact Study. Booz Allen Hamilton. Sept 2015.



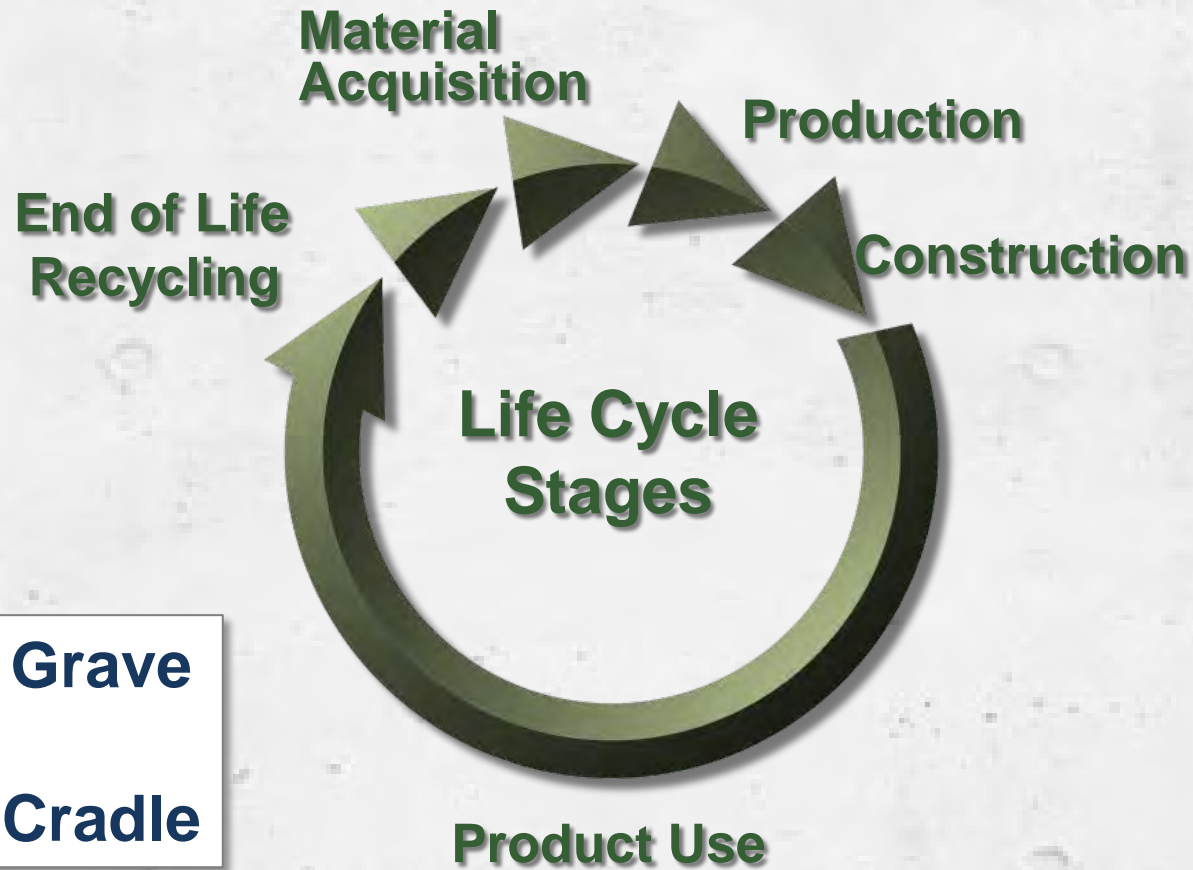


Attributes of Ready Mixed Concrete

- Local material
 - Abundant raw materials and production is local
- Minimal processing
 - Efficient operations
- Uses wastes (by-products) from other industries
 - Fly ash, slag
- Thermal mass
 - Reduces energy consumption during building operations
- Resilient / long service life
 - Low maintenance
- Recyclable



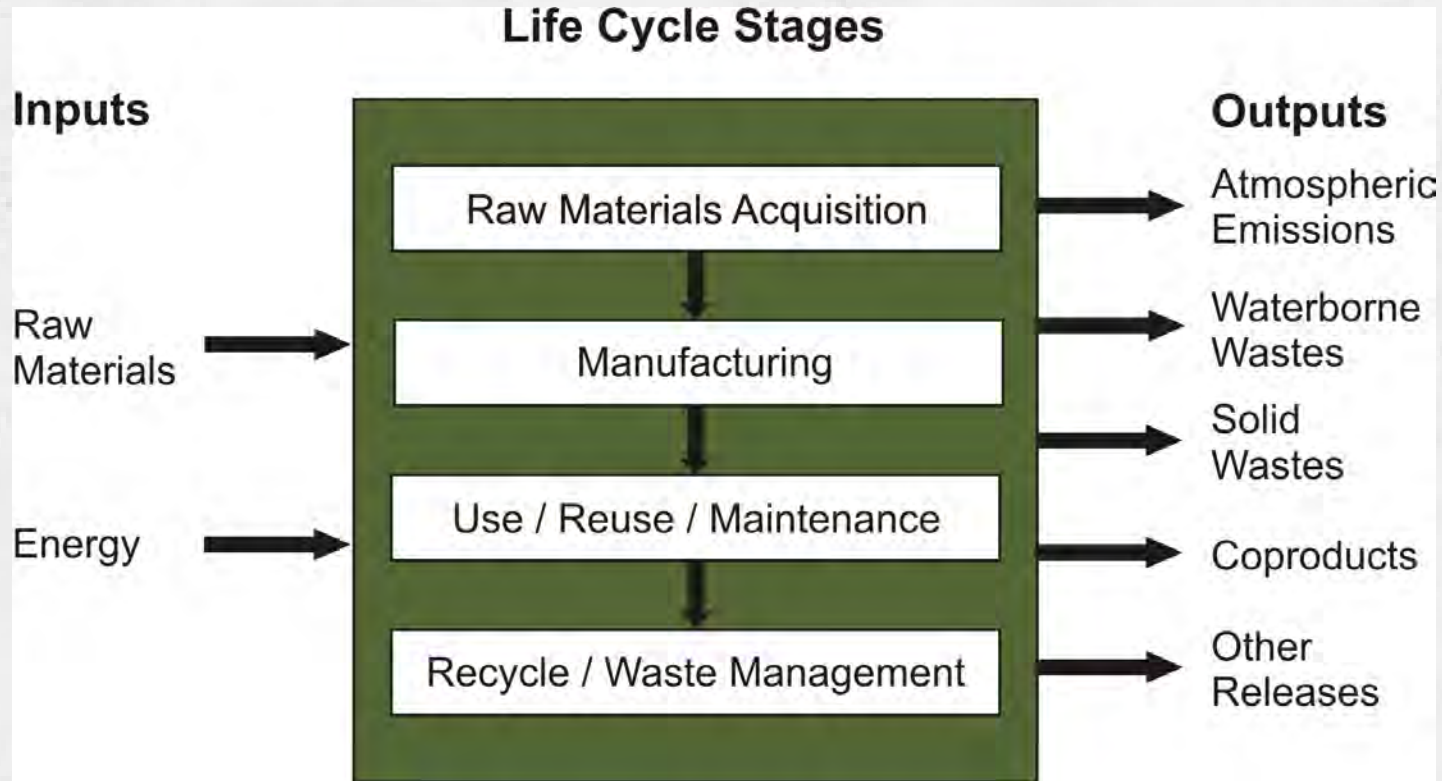
Life Cycle Perspective



**Cradle to Grave
TO
Cradle to Cradle**



Life Cycle Perspective



Source: EPA (2003)

Extraction: Logging

- Wood products
- Disruption per unit of building material is high
- Renewal takes generations
- Stream damage common

Source: Natural Resources Canada



Impact Index

Resource Impact Index		
Concrete	Aggregate Quarrying	1.00
	Limestone Quarrying	1.50
Steel	Iron Ore Mining	2.25
Wood	Boreal Timber Harvesting	2.50
	Coastal Timber Harvesting	3.25

Source: Natural Resources Canada



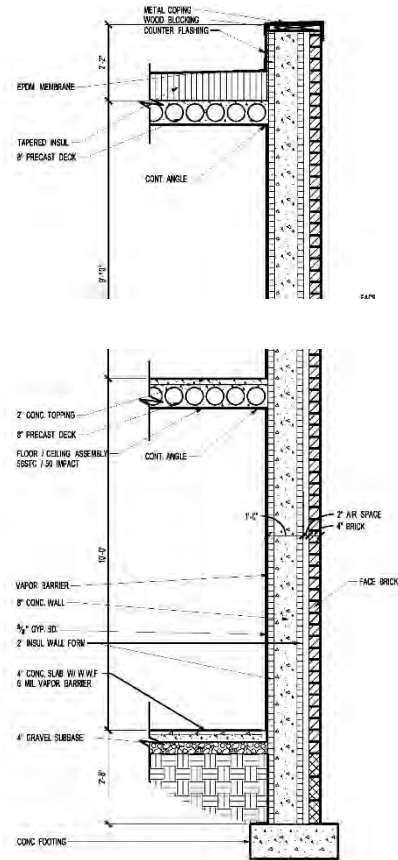
Summary: Concrete Life-Cycle Benefits

Concrete Feature	Sustainable Design Benefit
Most materials harvested and manufactured locally	Minimizes transportation energy
Most ingredients require little processing	Minimizes energy of production
Incorporates recycled industrial byproducts	Reduces the energy required for manufacturing & landfilling of industrial wastes
Absorbs CO ₂ throughout its lifetime through carbonation	Reduces carbon footprint
Building systems combine insulation and thermal mass	Homes and buildings more energy efficient
Long service life	Minimizes reconstruction, repair and maintenance
Recyclable	Existing infrastructure exist to place spent product as a raw material into another product

Concrete Design Center

Architectural Design | Structural Design | Cost Analysis

Energy Analysis | LEED Optimization



Infrared images courtesy of Logix



Why Should NRMCA Promote ICFs?

Cost Estimate of 100,000 Square Foot Apartment Building – National Average

A comprehensive cost estimate was conducted for a typical four story, 100,000 square foot apartment building using National Average costing data from RS Means. The building consists of 92 apartments, 60 one bedroom apartment and 32 two bedroom apartments (see figure 1). The cost estimate was conducted for both combustible construction and non-combustible construction. Cost estimates were derived from RS Means, the most widely known and respected cost estimating data available.

The combustible construction consists of wood frame construction for all the walls, floors and roof of the building (see figure 2). The non-combustible construction consists of Insulating Concrete Walls (ICF) construction for the exterior, corridor, demising and fire walls and precast hollow core plank for the floors and roof framing (see figure 3). The following are the results of the cost estimate:

Combustible: **\$14,817,449**

Non-combustible: **\$14,818,983**



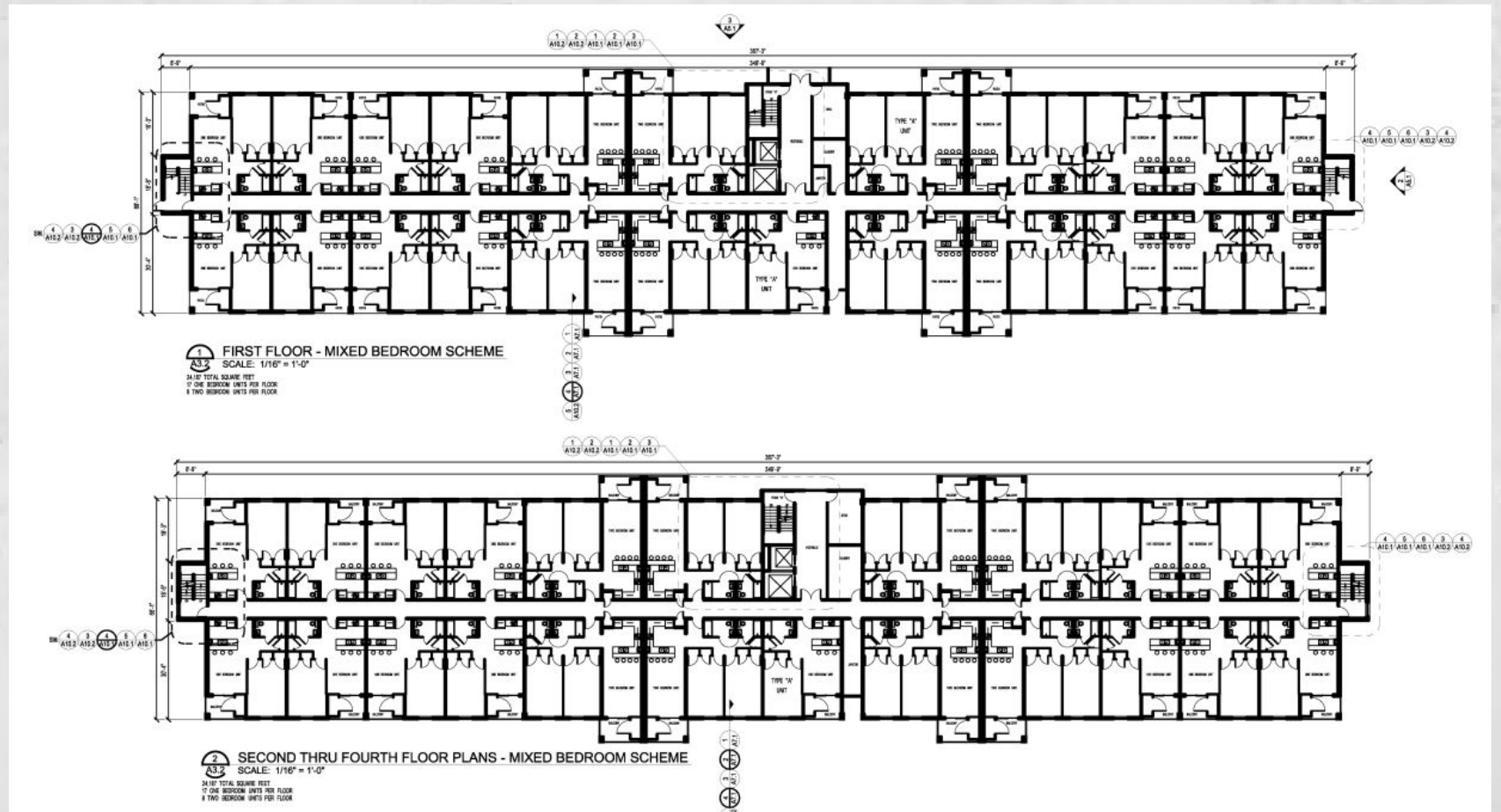
1 FRONT ELEVATION - TWO BEDROOM SCHEME
AS.1 SCALE: 1/16" = 1'-0"



ICFs – Very Competitive on First Cost

4 story Multi-family reference building, \$10-\$15 million cost of construction

Towson, MD	0%
Pittsburgh	2%
Austin, TX	1%
Kansas City	-1%
Albany	3%
Athens, GA	3%
Phoenix, AZ	-1%
Melville, NY	1%
Sacramento, CA	1%



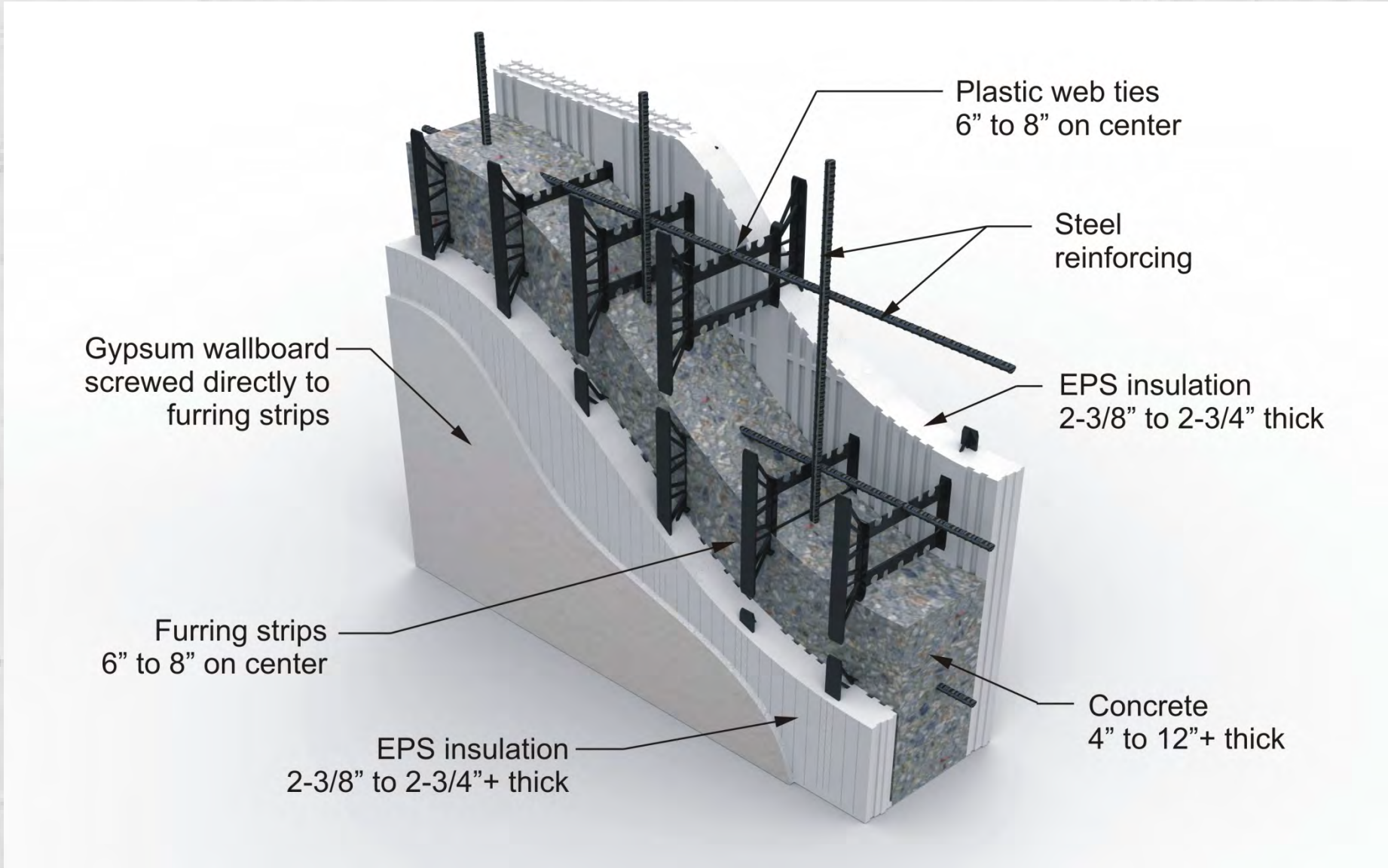


ICFs Increase Revenues for Owner

	Individual Metered		Master Metered	
	Wood	Concrete	Wood	Concrete
Revenues				
Gross Po				0000
Losses t				4600
Collecti				7000
Losses t				5000
Other Re				0000
Total Rev				8400
Operating				
Salaries &				8000
Insurance				8600
Taxes				8000
Utilities	35000	28000	104000	83200
Management Fees	39000	29000	59000	59000
Administration	28000	28000	38000	38000
Marketing	19000	19000	18000	18000
Contract Services	38000	38000	52000	52000
Repair and Maintenance	52000	52000	81000	81000
Total Operating Expenses	545000	526800	714000	680800
Net Operating Income	884000	925600	1016000	1072600

**Individual metered wood to
master metered concrete:
INCREASE in
Net Operating Income
of \$188,600 every year**

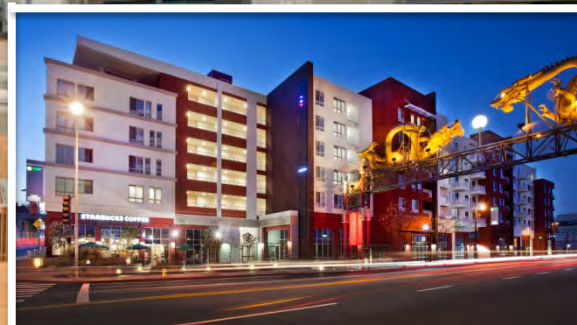
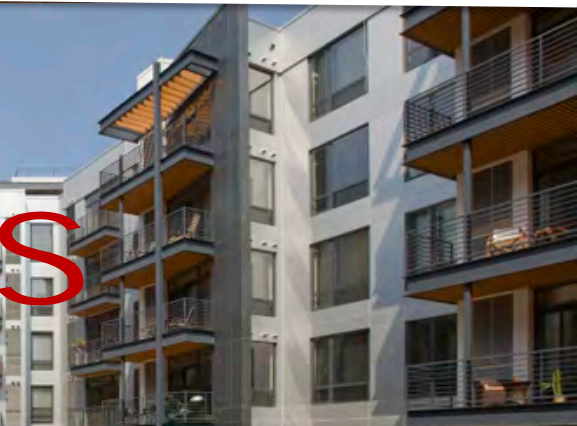
ICFs: Strong – Efficient – Easy to Use



ICFs are Ideal for Low to Mid-Rise Building



Apartments
Dormitories
Senior Residences
Hotels / Motels





ICFs Make Buildings Safer...

- Walls (Fire Ratings)
 - 2 hrs for 4" wall
 - 3 hrs for 6" wall
 - 4 hrs for 8" wall
- Floors (Fire Ratings)
 - 2 to 3 hrs
 - Depends on system



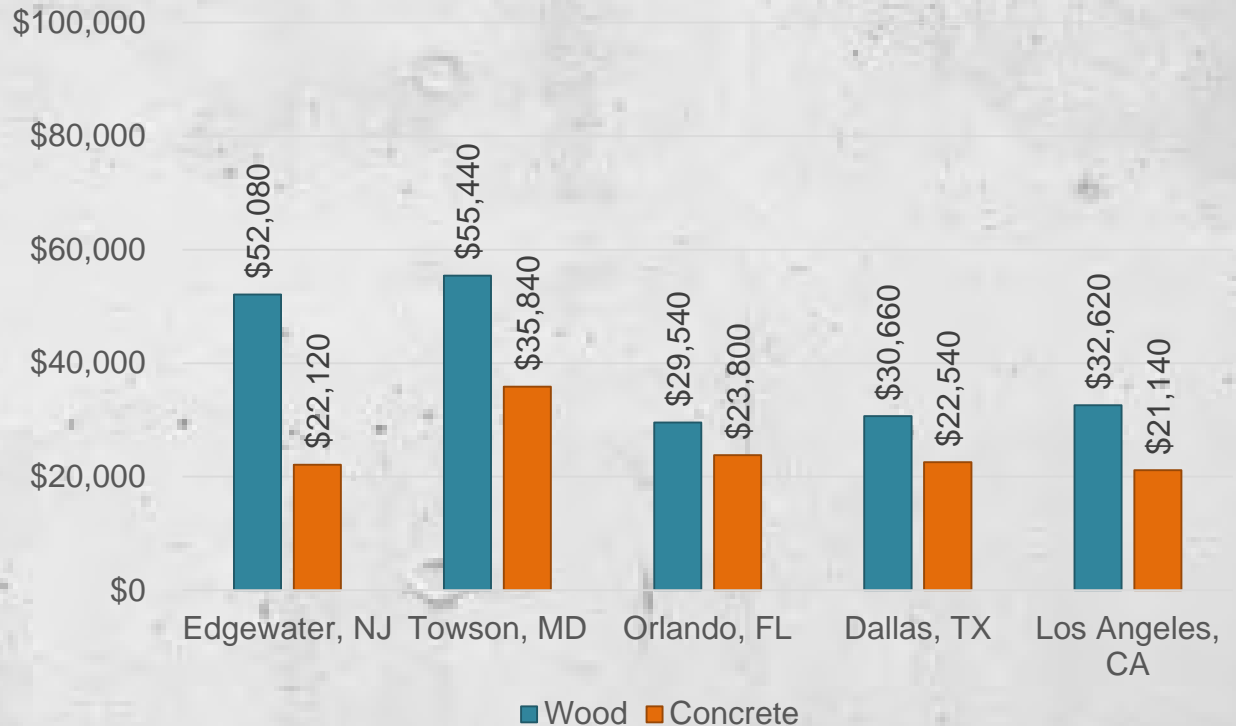


Reduce Insurance Costs

**Total Builder's Risk Insurance Premium
for Reference Building**
15 month construction period
\$14 million construction replacement cost



**Annual Property Insurance Premium
for Reference Building**
\$14 million construction replacement cost





Feb 2017
Maplewood, NJ



Jan 2017
Lynnwood, WA



Jan 2017
Laurens, NY



Jan 2017
Kane, PA



Dec 2016
Cambridge, MA



Oct 2016
Oakland, CA



Oct 2016
Gilbert, AZ



Aug 2016
Northampton, MA



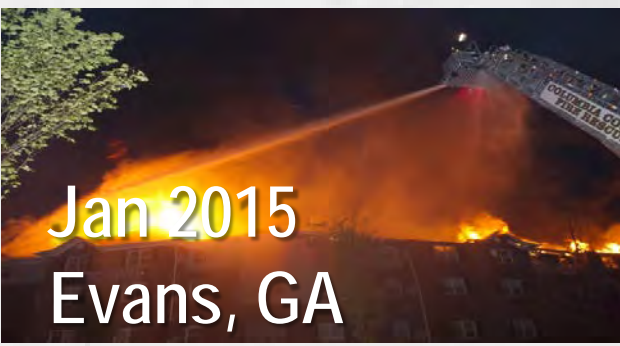
Feb 2016
Norfolk, VA



Apr 2015
Baltimore, MD



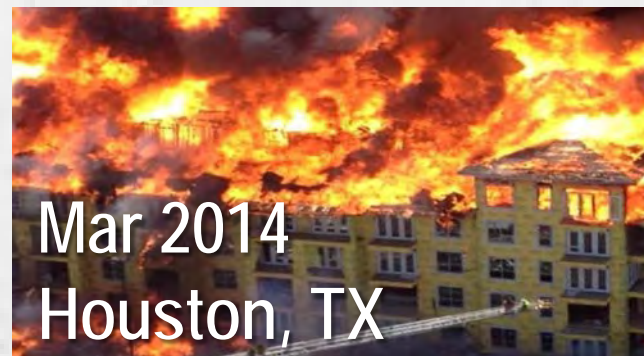
Jan 2015
Edgewater, NJ



Jan 2015
Evans, GA



Apr 2014
Rockville, MD



Mar 2014
Houston, TX



Mar 2014
Odenton, MD



Mar 2017
Raleigh, NC

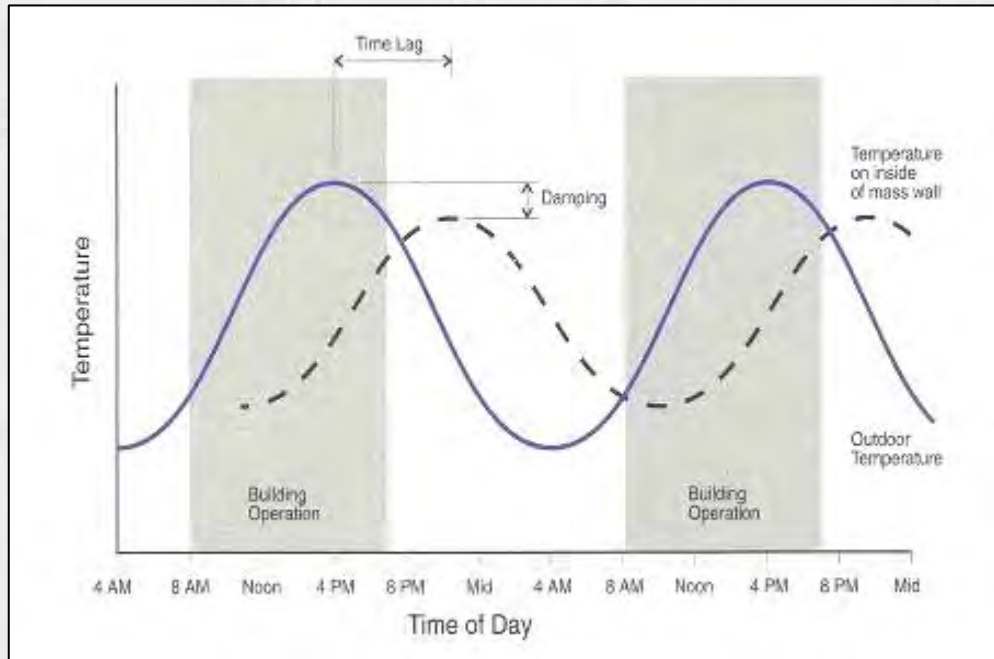


Green Building Programs





Concrete Thermal Mass



- Thermal Mass
- Increase thermal lag
 - Off peak demand
 - Lower energy costs
- Lower peak energy
 - Smaller, more efficient HVAC equipment
- Reduce temperature swings
 - Less heating and cooling energy required



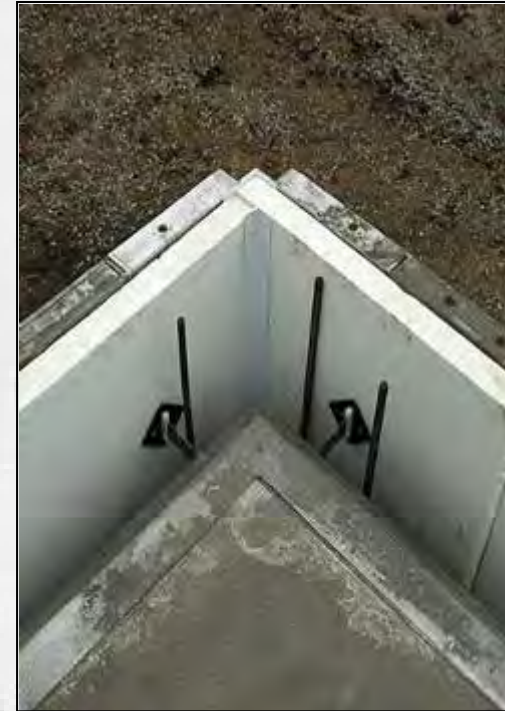
Concrete Thermal Mass



**Tilt-up
Concrete
Walls**



**Insulating
Concrete
Forms**



**Removable
Form
Systems**

Value – Energy Efficiency



Multifamily Resource Center

“The best performing building in a multifamily new construction four stories or greater that SWA has ever worked on in that category.” – Steven Winter Associates, Inc. (SWA)

INTRODUCTION

Beach Green Dunes will be designed to meet stringent energy standards set by Passive House Institute US (PHIUS), the New York State Energy Research and Development Authority (NYSERDA), and more. The development will also include resilient features to weather the heavy storm conditions in Far Rockaway, Queens, New York.





Concrete and Sound



Intent: To provide workspaces and classrooms that promote occupants' well-being, productivity, and communications through effective acoustic design.

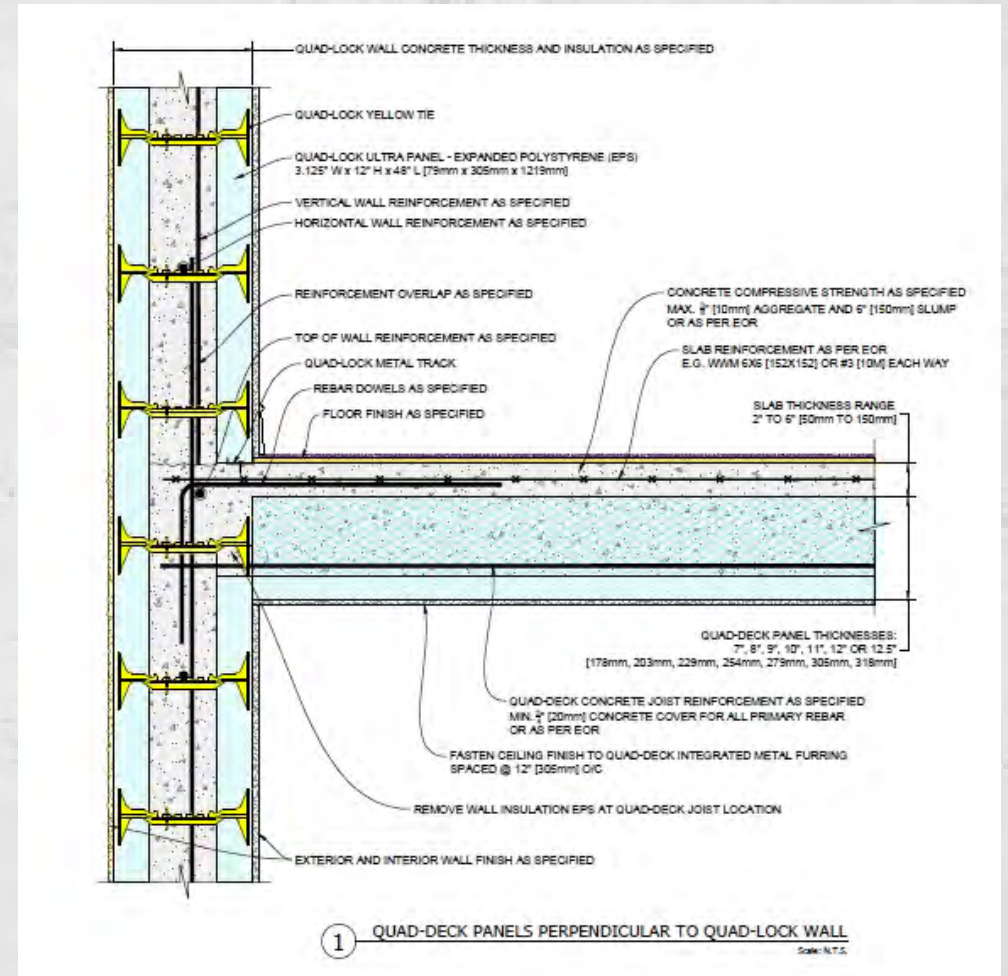
Table 1. Maximum composite sound transmission class ratings for adjacent spaces

Adjacency combinations		STC _c
Residence (within a multifamily residence), hotel or motel room	Residence, hotel or motel room	55
Residence, hotel or motel room	Common hallway, stairway	50
Residence, hotel or motel room	Retail	60
Retail	Retail	50
Standard office	Standard office	45
Executive office	Executive office	50
Conference room	Conference room	50
Office, conference room	Hallway, stairway	50
Mechanical equipment room	Occupied area	60



Quiet = Happy Tenants Save You Money

- Walls
 - STC: 55-70
- Floor
 - STC: 50+
 - IIC: 50+



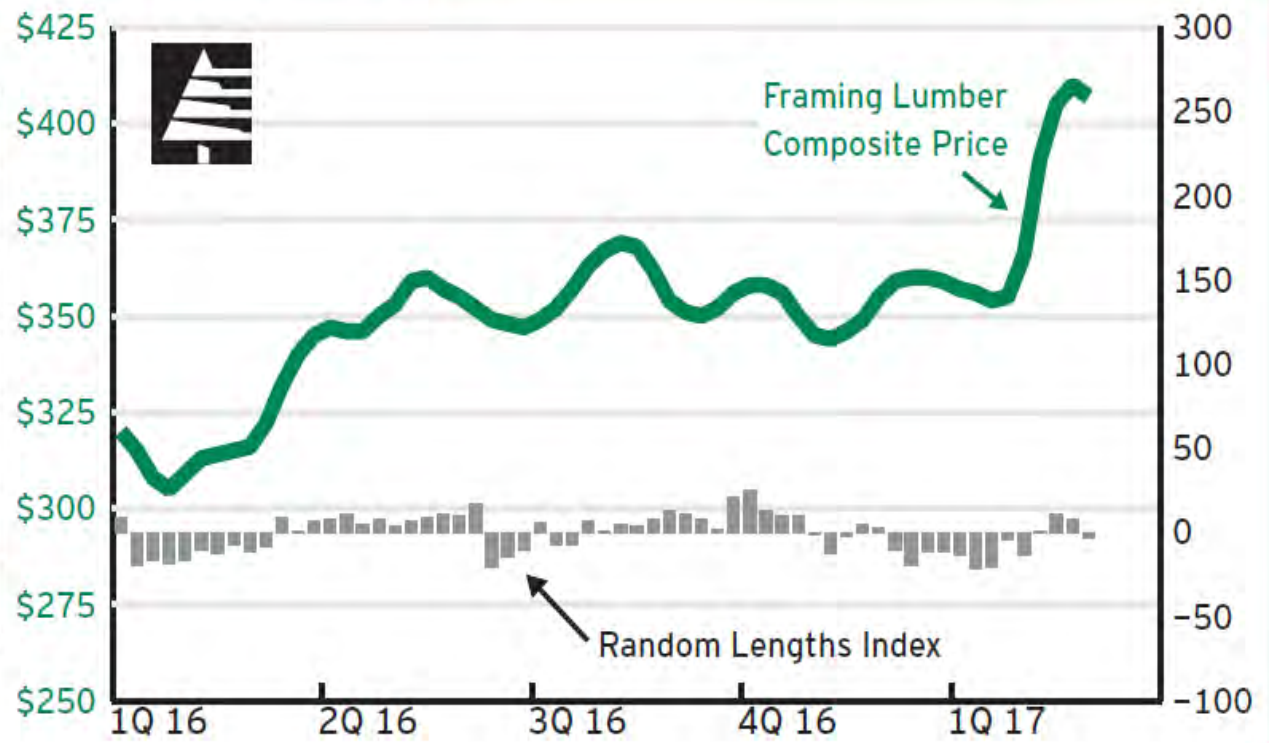


Wood Prices Keep Going Up...

Lumber Market Indicators

	This Week	Last Week	Year Ago
Framing Lumber Composite Price	\$407	\$410	\$316
2x4 #2&Btr KD Western S-P-F	369	385	276
2x4 Std&Btr Grn Douglas Fir (Portland)	370	370	322
2x4 #2 KD SYP (Westside)	490	488	367
2x4-8' PET KD Western S-P-F	332	348	215
1x12 #3 KD Ponderosa Pine	510	500	345
Random Lengths Index*	-2.9	+8.3	-11.0

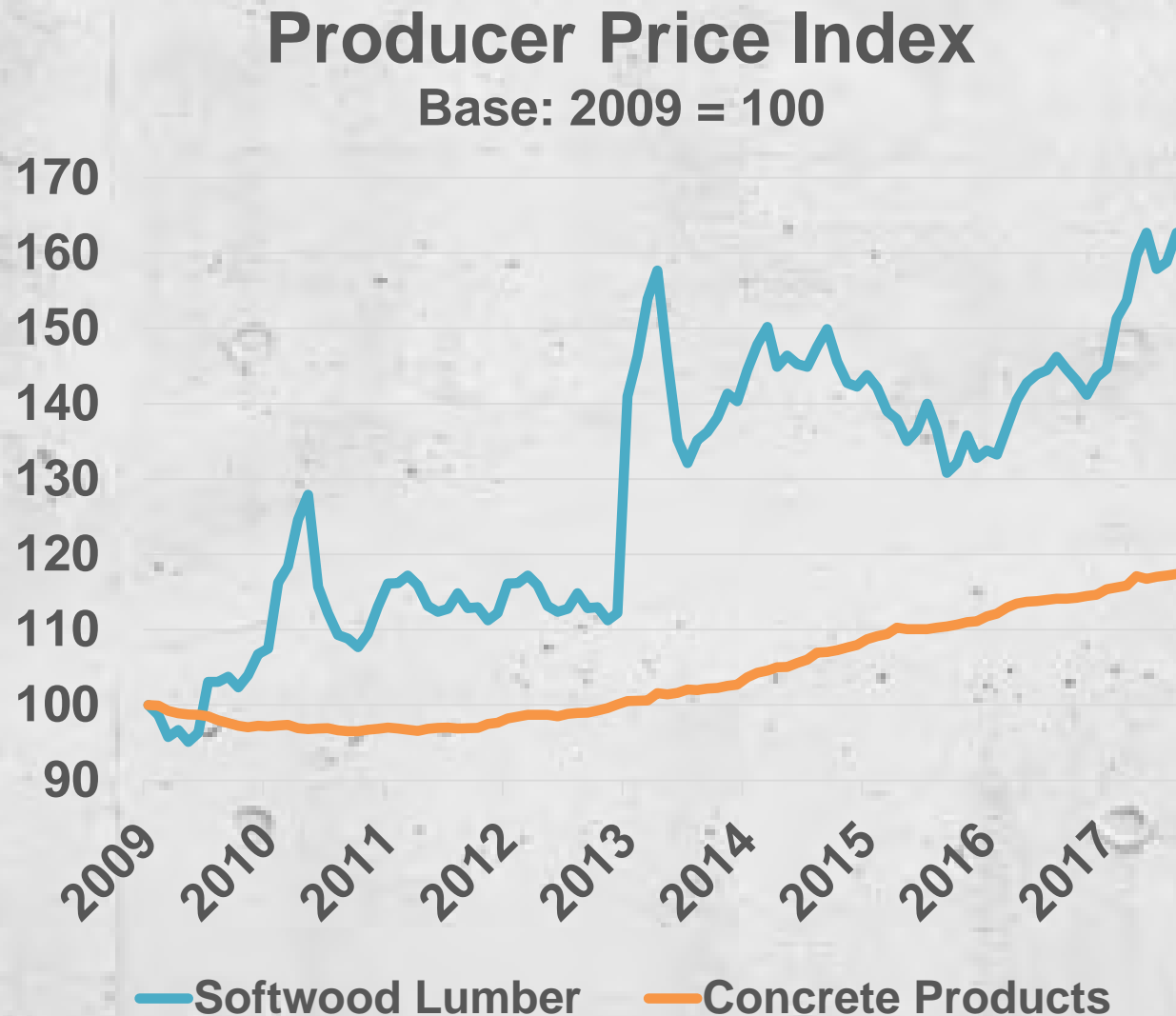
*The index is a numerical representation of market activity, based on a ratio of western sawmill order files to inventories. In computing the index, the data are compared with similar data averaged over the past five years.



- Framing lumber composite price is up this week \$41 from week ending February 3rd and up \$91 year to date.



Wood Prices Keep Going Up...





...and the labor market gets tighter

DJIA ▼ 21812.09 -0.40%

Nasdaq ▼ 6278.41 -0.30%

U.S. 10 Yr ▲ 13/32 Yield 2.167%

Crude Oil ▲ 48.38 1.15%

Euro ▲ 1.1818 0.48%

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BUSINESS
For Some Craft
Brewers, Sales Are
Tapping Out



U.S. NEWS
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Motorists Pay for
Tappan Zee Bridge's ...



MARKETS
The Price Isn't
Right for Home
Builders



MARKETS | HEARD ON THE STREET

Wood and Workers Squeeze Housing Market

Tightening labor market in construction, high lumber prices hit profit margins



By *Justin Lahart*

May 9, 2017 1:11 p.m. ET



...Even When the Unthinkable Happens



2013



March 12, 2014

- Natural Gas Explosion Next Door
- 2 Buildings Collapse
- 8 People Killed
- 70 People Injured
- 100 Families Displaced



2015



...there's still more trouble with wood

“I strongly recommend that we slow down and figure out how to build structures that will last, and spend less time on how to build them more cheaply and more quickly. Until then, I (along with other experts and **construction litigation attorneys**) will enjoy the abundance of work provided by investigating damages associated with typical wood construction practices.”

“In summary, mid-rise wood framed buildings may be allowed by the code; however, if we don't start changing our construction practices to deal with the challenges, **we are asking for trouble.**”

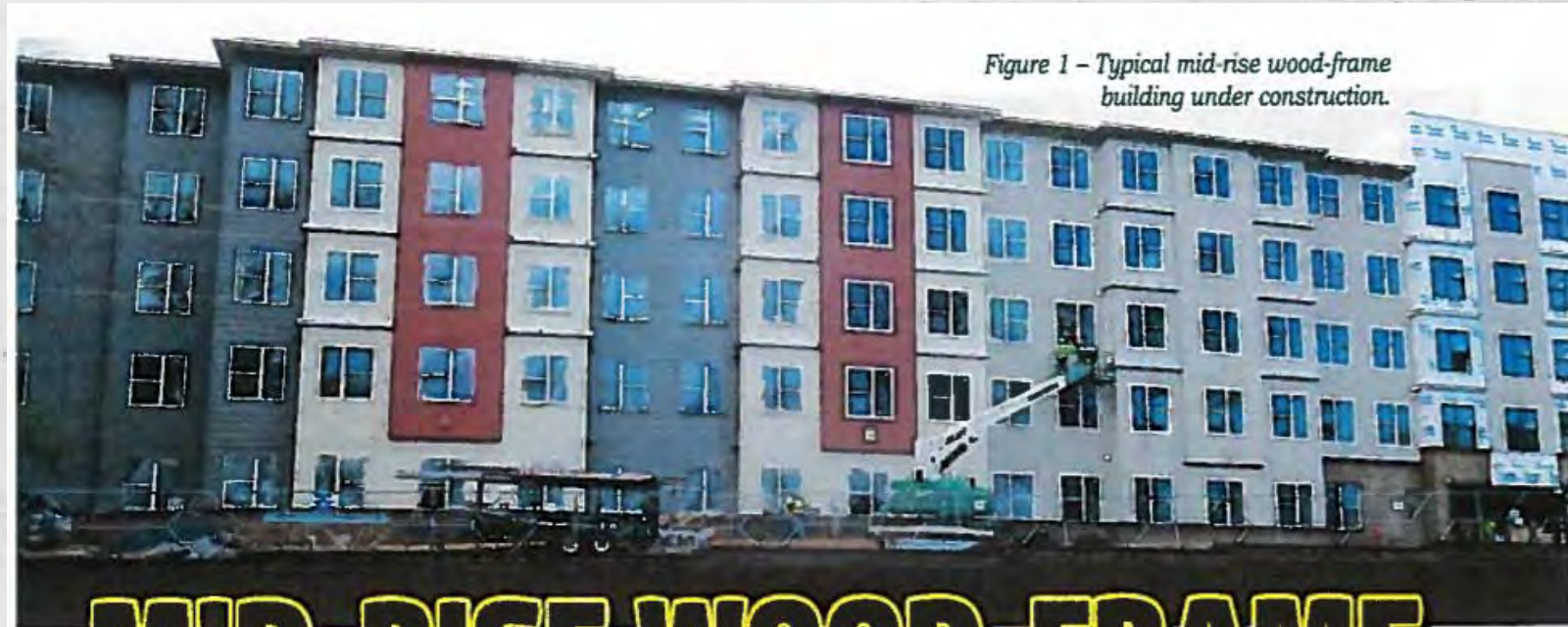


Figure 1 – Typical mid-rise wood-frame building under construction.

MID-RISE WOOD-FRAME CONSTRUCTION:

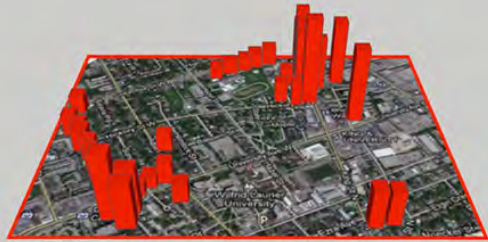
A Good Idea, or Are We Asking for Trouble?

By Derek A. Hodgin, RBEC, PE, CCEA

A version of this article was presented to the Forest Products Society International Conference in June 2017.



ICFs have a track record of Success



**40 BUILDINGS IN LESS THAN
1 SQUARE MILE**





ICFs have a track record of Success

Lane Miles Standish Portland, OR

- \$8 Million
- 25,000 SF Apartments
- 5,000 SF Retail/Offices





ICFs have a track record of Success



Ricchi Condominium
San Antonio, TX

ICFs have a track record of Success

**Bellarmino
University
Dormitories
Louisville, KY**

**104,000 SF
project**

**Awarded this
project based
on speed of
construction**

**Started:
Jan 2007**

**Completed:
July 2007**





ICFs have a track record of Success



Drury Inn All Locations

**Hotel Owner
and Operator**

**Less
Expensive to
Operate and
More Durable**

**15 ICF Hotels
currently
under
construction**

**Operates 55
ICF Hotels**





We can save you money and time



CONCRETE

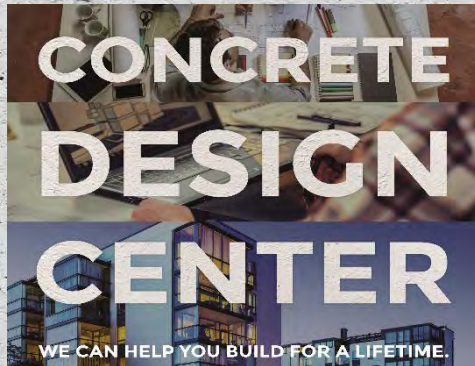


DESIGN



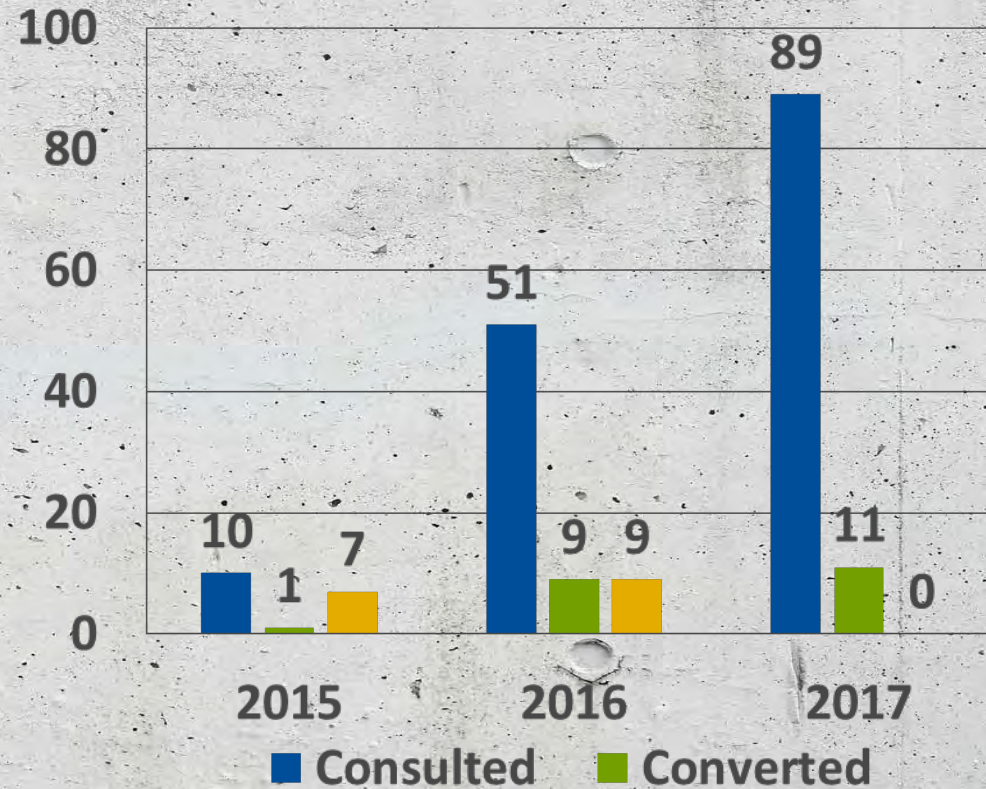
CENTERED

Direct Project Promotion – Convert projects to concrete through the Concrete Design Center

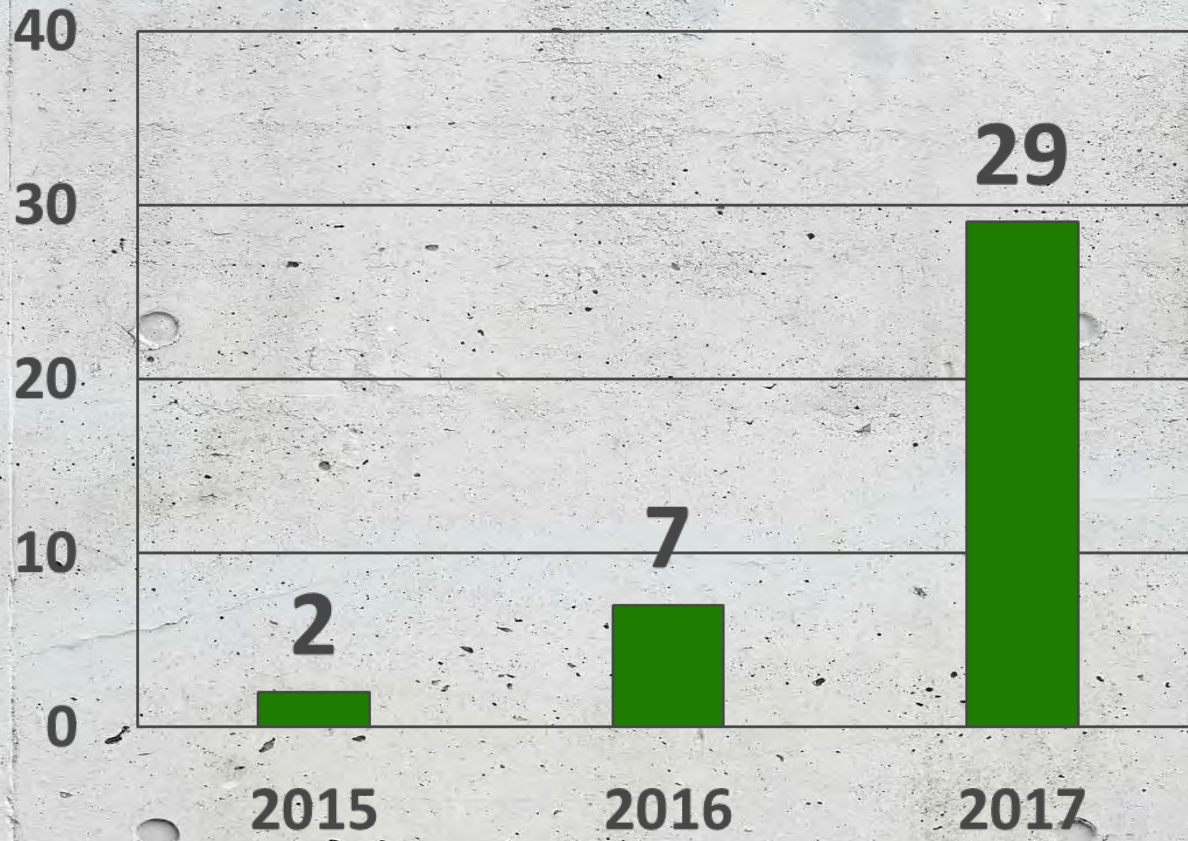


2030 Target
750
Converted

Project Promotion



Member and Partner Referrals



DESIGN CENTER

Free concrete project design and technical assistance is available through the National Ready Mixed Concrete Association's Design Center. The Design Center can assist you in choosing the right concrete solution for a wide variety of projects, from multi-family residential/mixed use to industrial and health care facilities. NRMCA's expert team of engineers and architects are available to help you select the most appropriate concrete system, including:

- Concrete frame and post-tension flat plate systems
- Voided slab systems
- Insulating concrete forming (ICF) systems
- Tilt-up concrete wall systems

FIRST NAME

LAST NAME

COMPANY

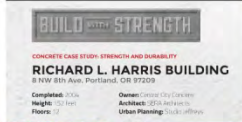
EMAIL

COLLATERAL CASE STUDIES

Real projects. Real proof.

Our case studies highlight concrete projects from across the U.S.--so you can get a first-hand look at the advantages of building with concrete.

STRENGTH




BUILD WITH STRENGTH

CONCRETE CASE STUDY: STRENGTH AND DURABILITY

RICHARD L. HARRIS BUILDING
8 NW 8th Ave., Portland, OR 97209

Completed: 2016
Height: 17 stories
Floors: 17

Owner: Central City Center
Architect: OFA Architects
Urban Planning: Urban Affairs



BUILT TO LAST. BUILT WITH CONCRETE.

Large floor-to-ceiling windows define the interior of the Harris Building and its users of the Richard L. Harris Building in Portland. Original clear concrete. The 12-story high precision, transitional housing for low-income and special-needs individuals also incorporates a highly efficient concrete frame with long-span, post-tensioned concrete slabs and a steel ring frame column layout.

01. Minimal column layout.
To create an open-plan office work, the architects used a minimal column layout, which creates a warm and inviting feel. Concrete's superior strength allows for long spans, thus eliminating the need for superimposed bracing walls.

02. External walls built for strength and durability.
External walls incorporate high-performance "lean concrete" construction with no rebar foundation to support the exterior face system. With the forward-slab system, it's superior to precast. But even if water does get in, the concrete structure is unaffected.

03. Highly efficient concrete frame.
The structural frame uses post-tensioned concrete. In the end, the entire concrete frame was without rebar casting.


AWARDS

Donald Turner Prize for Innovation and Leadership in Affordable Housing, 2017

ODS Quantum Housing Award, 2016

ODS Excellence in Concrete Residential Award, 2017

SAFETY




BUILD WITH STRENGTH

CONCRETE CASE STUDY: SAFETY

BUILDING A STORM-RESISTANT HOME
Pass Christian, Mississippi

Completed: Late summer in a neighborhood
Floors: 1



Concrete is resilient to the worst natural disasters.

Buildings were ready.

Following the risk of hurricanes in coastal Mississippi, the Suddings of their hometown better building groups by studying the regional emergency management agency's 50-mile flood zone case study. They identified where the flood zone their property was located. They also checked building codes and water damage forms provided by insurance carrier to determine how to best protect their home to survive even the most severe storm.

01. The only home left standing.
This building for its nearly 90 percent concrete frame is known to have the most intact project. The Suddings family was originally built to be a two-story house. They only other 90 percent concrete but instead of concrete for use in the neighborhood.

02. Built to withstand even the harshest winds.
The structure is a combination of precast concrete slabs with walls and reinforced concrete slabs and panels, allowing it to withstand winds between 90-120 mph. The walls are reinforced with steel reinforcement. The concrete frame was reinforced with steel reinforcement.


03. Protection from floods.
The building's long-term design from flood protection, the long-term performance of the concrete frame. Because the concrete frame was built with concrete, it can withstand the water surge. The frame without flood water of 20 feet.

04. Starting with a strong foundation.
The foundation concrete frame was built with concrete columns and beams of the first floor that can support the 1000 square foot concrete frame. Concrete reinforcement provides the precast concrete frame and concrete.

BUILDING ATTRIBUTES:

- Insulated Concrete Form (ICF) walls
- Post-tension concrete slab
- Concrete columns and beams
- Concrete roof
- Concrete floors

LONG TERM VALUE




BUILD WITH STRENGTH

CONCRETE CASE STUDY: VALUE

SECOND AND DELAWARE
Delaware St. & E. 2nd St., Kansas City, MO 64105

Completed: Scheduled to open for 2016
Claim to Fame: Largest Floor-to-Ceiling Concrete in the U.S.



BUILT FOR LASTING VALUE.

The Second and Delaware project for a true example of concrete's energy efficiency benefits in action. Second and Delaware is the nation's largest multi-family apartment project using precast concrete construction, a system means more energy efficient than the highest LEED building registered.

01. Innovative and contemporary design.
Local residents are proud of the building project for its design. Modern design will return 21st century use and energy efficiency.

02. Virtually sound-proof.
Concrete's inherent mass and rigidity, concrete's rigidity offers low-frequency sound insulation of structural noise and sound. Sound control is one of the most important components that affect the quality of life of a resident.


03. If these walls could talk.
The building's walls are made of precast concrete panels. This design will not only make the apartments quieter, but will reduce 50-60% energy use in heat and air conditioning.

04. Stands the test of time... and Mother Nature.
Concrete walls will withstand extreme weather and can be built to last. It will stand the test of time. The building will give residents more building for their money and maintenance can save for concrete than other types of construction.

BUILDING ATTRIBUTES:

- Only multi-family apartment project using Precast concrete in the United States
- Energy code compliance is expected to reduce all types of weather and last for 200 years
- Developer: Arad Development Group
- Architect: Direct Design
- Build to Green City Build team or prepared as the Smart Growth design

EASE OF USE




BUILD WITH STRENGTH

CONCRETE CASE STUDY: EASE OF USE

MOSLER LOFTS
2722 3rd Ave., Seattle, WA 98121

Completed: 2018
Floors: 7



SLEEK, SOPHISTICATED, AND BUILT STRONG.

From the most interesting and profitable residential high-rise to appear in Seattle since World War II, Mosler Lofts was designed not only for style but also with a purpose.

The contemporary design of the concrete project was well received by buyers as the development was 90 percent sold within the first six months of hitting the market.

01. Elimination of transfer beams.
Design transfer beams were eliminated at the first floor by allowing the concrete between the first and second floors to function as a transfer beam. The transfer cost in the case then can be an alternative to a concrete transfer beam. The concrete frame was reinforced with steel reinforcement.

02. Flexibility for residents.
Concrete slabs were used to create the main area of the building to provide for more open and flexible living spaces.

03. Material savings.
Concrete slabs, columns, and core walls were left exposed and reinforced with steel reinforcement. The concrete frame was reinforced with steel reinforcement.

BUILDING ATTRIBUTES:

- Concrete was exposed in residential units, saving the cost of interior finishes
- Post-tensioned slabs reduced floor-to-floor heights, saving the cost of interior finishes
- Wall area was minimized in the project through the use of precast open floor slabs, providing residents with more open and flexible living spaces.

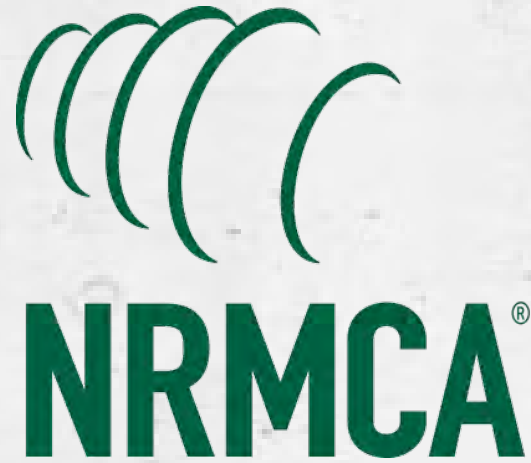
AWARDS:

- First Built Green and LEED Silver Certified condominium in Seattle
- Won the "Best in the West" award for Best Project of the Year, Best Sustainable Concrete, and Best Attached Project - High Rise at Pacific Coast Builders Conference, 2016

MRC2: Company EPD



Who Do You Know?



A COALITION OF THE NATIONAL READY MIXED CONCRETE ASSOCIATION