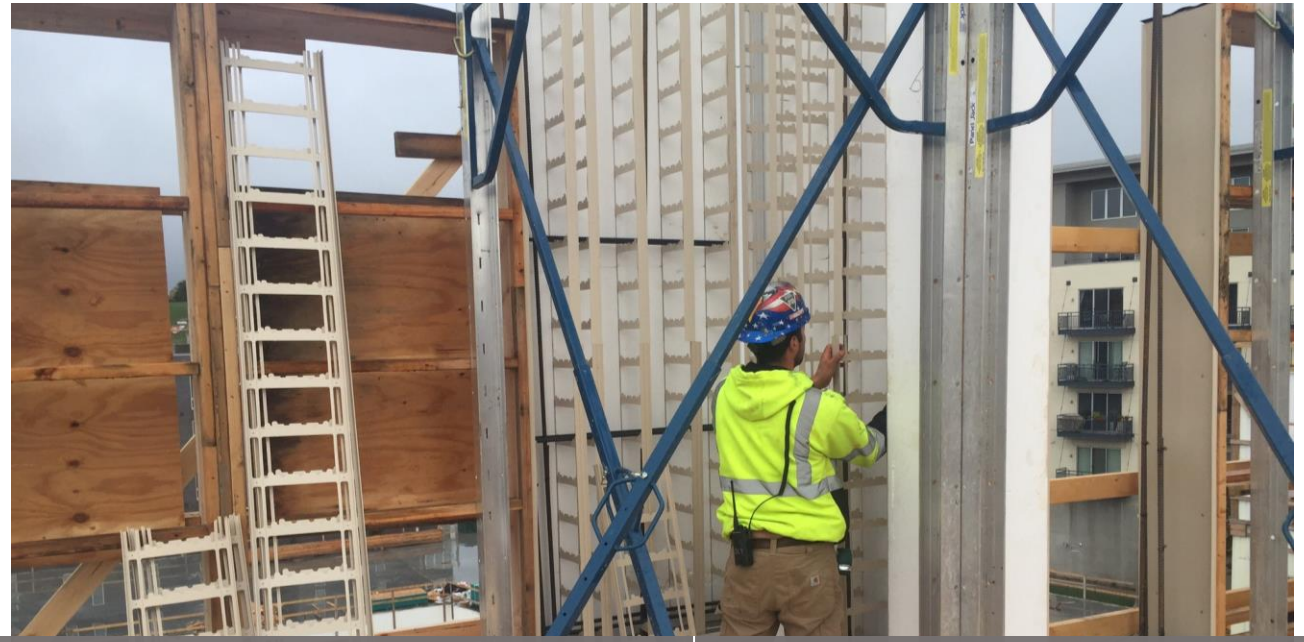
BEDFORD

DEVELOPMENT

Developing with Insulated Concrete Forms

What are Insulated Concrete Forms?



Developing With ICF

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THE KENDAL GROUP LTD.

Home costs $120 to heat

By Cynthia Dennis
of The Journal Staff

Ken Miller says the best thing about his 2,600-square-foot, solar envelope-style home at 3275 Manor Dr., New Berlin, is its livability.

But with fuel bills totaling just $120 from last October through this April, an argument could be made that economy is really the house's greatest asset.

Miller, 27, whose house is open to the public from 1 to 4:30 p.m. Saturdays and Sundays, is the president of Ken Miller Homes Inc., Greenfield. He began construction on this envelope house, his first, last summer. He now has several others under construction in the area, as do some other builders, he said.

Miller started in the construction business building conventional homes four years ago. Now he builds only envelope homes.

Saving energy is one of the home's biggest points. Of the $120 that Miller spent from October to April, $95 went for gas and $25 for wood consumed by the wood-burning stove in the living room. The home has a conventional gas, forced-air furnace.

Miller, his wife and young daughter didn't shiver to get those impressive fuel costs. Interior temperatures ranged between 68 and 72 in winter, he said.

...in a house

...ributed both livability ...o the envelope design, ...ally amounts to a house ... house. The inner home ...om the outer by a one- ...on the north wall and ... foot solarium on the ...he two are connected ...ed airspace below the ...pace in the basement. ...ix-inch east and west ...entional. ...e between the inner ...ses plays a big role in ...cooling the home, as ...tory vertical wall of ... the solarium on the ...he home. The wall col- ...heat, some of which is ...olarium's concrete and ...he floor is dark color ...nish for greater heat ... solarium warms, nat- ... draws it up a 14-foot ... and across a 3-foot ...nto an airspace bor- ...nd below by 6-inch ...avels through this air- ... to cool. By the time ...s the home's north ... enough to begin fall- ...e wall airspace into ...The natural push and ... heated by the win- ...process.

The basement holds much of the heat during the day and releases it at night.

The solarium's roof has overhangs positioned to block the sun in summer, when heat isn't needed. The room, which can serve as an enclosed patio, captures the sun's rays so effectively that daytime room temperatures sometimes reached 95 degrees last January, which was the winter's sunniest month, Miller said. During the summer, an attic exhaust fan pulls hot air from the solarium and replaces it with cooled air from the basement.

An air tube through the ground outside the basement brings fresh air in as the warm air is being exhausted.

Two open-slatted areas on the solarium's first floor, constructed of 2-by-6s spaced ⅜ inch apart, allow air to circulate from the basement. A second-story balcony off the master bedroom also is open-slatted to allow for air flow.

Buffer zone created

Miller said the envelope concept's basic principle was to make the inner house believe the external temperature is different than it actually is outside. The airspace, with its continuous circulation, acts as a buffer zone between the two.

Annual heating costs of $120 and a bright solarium to enjoy during Wisconsin's harsh winter months may sound too good to be true. But envelope houses are not without their critics and skeptics.

Miller conceded that fact and discussed a point sometimes raised about envelope houses — the possibility of increased fire hazards in them. Critics have questioned whether a fire, once started, might travel more quickly because of the continuous air movement.

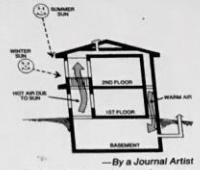
Miller said envelope houses are equipped, by Wisconsin state fire code requirements, with two smoke detectors. The houses he constructs are also equipped with additional fire-prevention features, Miller said, though he declined to divulge them for competitive reasons.

"These houses, in my opinion, are safer than a normal house because of all the things we do," said Miller.

Skepticism — both about the envelope design and how well it functions in Wisconsin's severe weather — has caused the concept to infiltrate state home design very slowly, Miller said.

Miller's home design, including the floor plan, is one he designed, patterning it after the first envelope houses built in California. Unlike the California models, which had underground crawl spaces, Miller added a basement, which he felt Milwaukeeans preferred.

Curiosity and disbelief have probably been the envelope home's greatest drawing card, Miller said. An average of 400 people per weekend have been visiting his home since its construction. Some come from other states.



—By a Journal Artist

This sketch shows how an envelope-style home works. Air warmed on the south side of the home rises through the top of the house where it cools slightly and then is drawn down into the basement, where the heat is stored.

Many visitors have been skeptics, Miller said. Some want to know why the home does not have any typical solar characteristics, like collector panels on the roof.

"People have always thought you could have a solar home but it had to look weird," Miller said. He said that was another attraction of the envelope concept — its conventional appearance. Miller said Wisconsin weather was highly suitable for envelope construction. An envelope house can be built in any style and any size, he said.

Envelope houses can be constructed of a variety of building materials but Miller said he favored wood because he considered its insulation characteristics the best.

Windows placed carefully

Windows can be placed on north, east or west walls, but must have double panes on the north. Miller's home has no windows on the north wall.

To make the house draft-free, all entries to the home have double doors with airlock entries. Both doors and windows have been caulked tightly.

The model home in which Miller lives costs $79,900, or $30.50 per square foot, to construct, excluding lot and decoration. Of that, Miller estimated about $12,000 was solar-equipment costs, with the biggest expense the solarium. Other solar requirements included extra insulation, the air tube and the extra spaces needed to circulate the air.

Miller received a total of $5,600 in federal and state energy rebates for his solar construction. Because of the rebates, Miller estimated the payback period on the solar equipment at 6 to 8 years.

Although Miller's home has one wood-burning stove, envelope houses can accommodate more than that, probably reducing fuel costs further. Miller does not recommend installing traditional fireplaces, because they're too fuel inefficient, he said.

Miller, who has a degree in architectural engineering, told how he became interested in the envelope concept. "I figured the time was right with people becoming more aware daily of fuel cost effectiveness," he said. However, he was reluctant to tout the house highly until he tested it himself through a full winter.

Now, $120 later, he said, "I wanted to be sure it worked. It does."

—Journal Photos by William Meyer

The exterior of Ken Miller's envelope-style home in New Berlin (below) has a traditional appearance. The home's solarium has a brick floor, which holds solar heat collected by the windows above it. A balcony off the master bedroom is partially open to allow for air circulation.

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Kendal Lofts – Waukesha, Wisconsin – 42 Units


730
637

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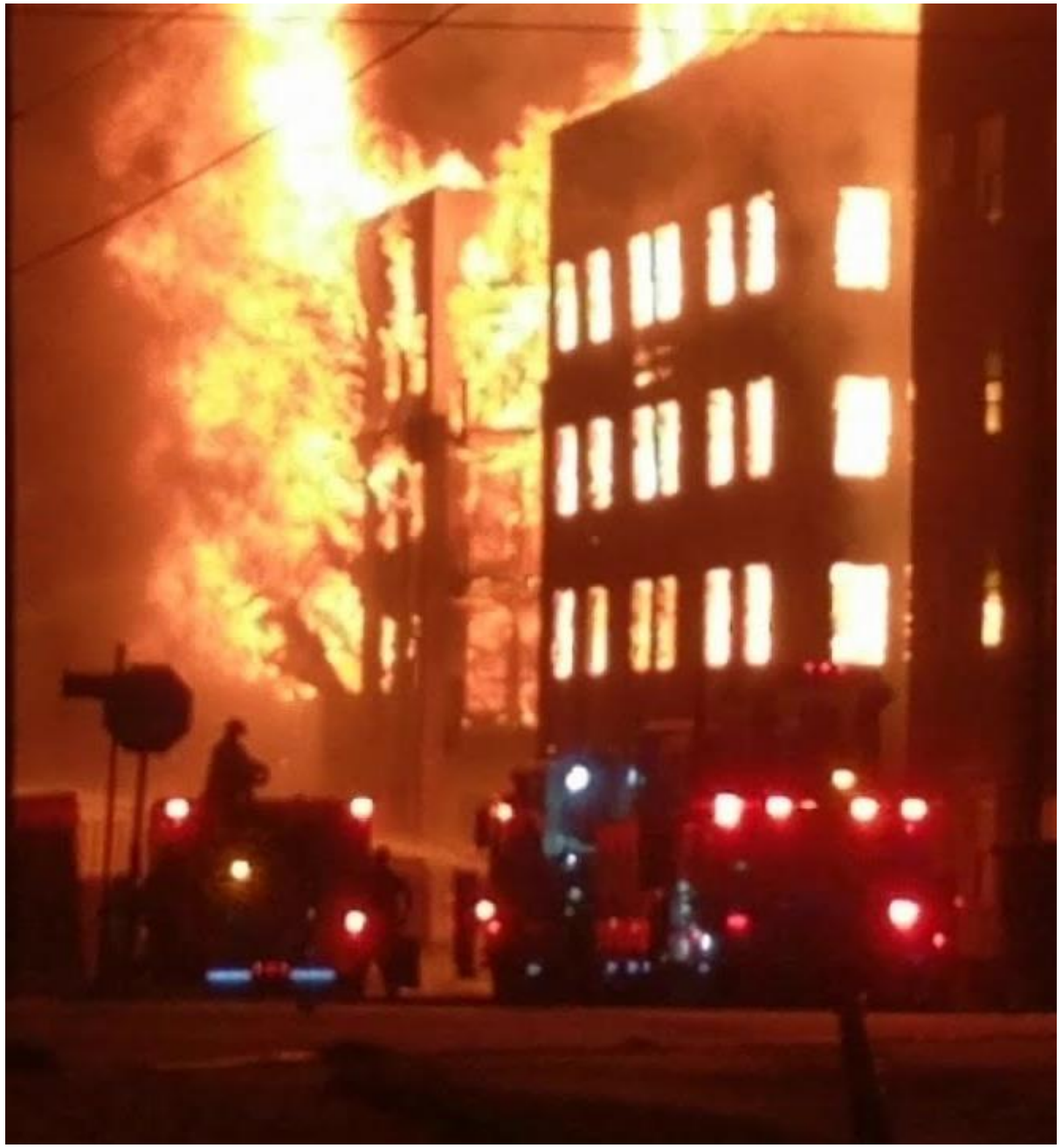

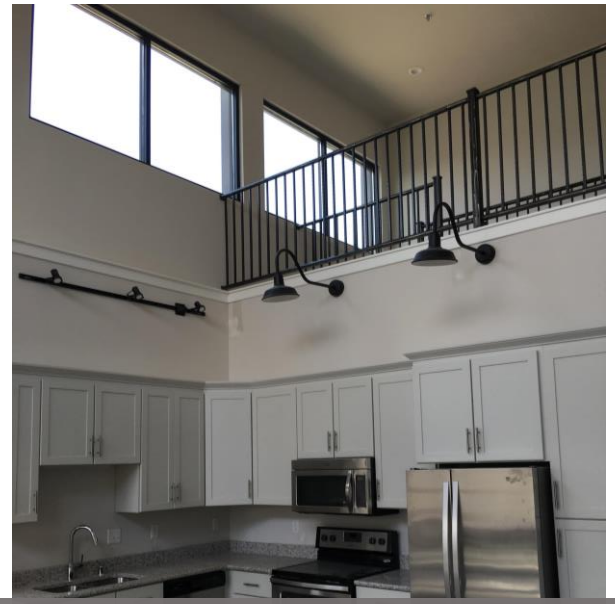

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Manseau Flats - Ashwaubenon, Wisconsin – 78 Units

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Admiral's Wharf – Milwaukee, Wisconsin – 133 Units

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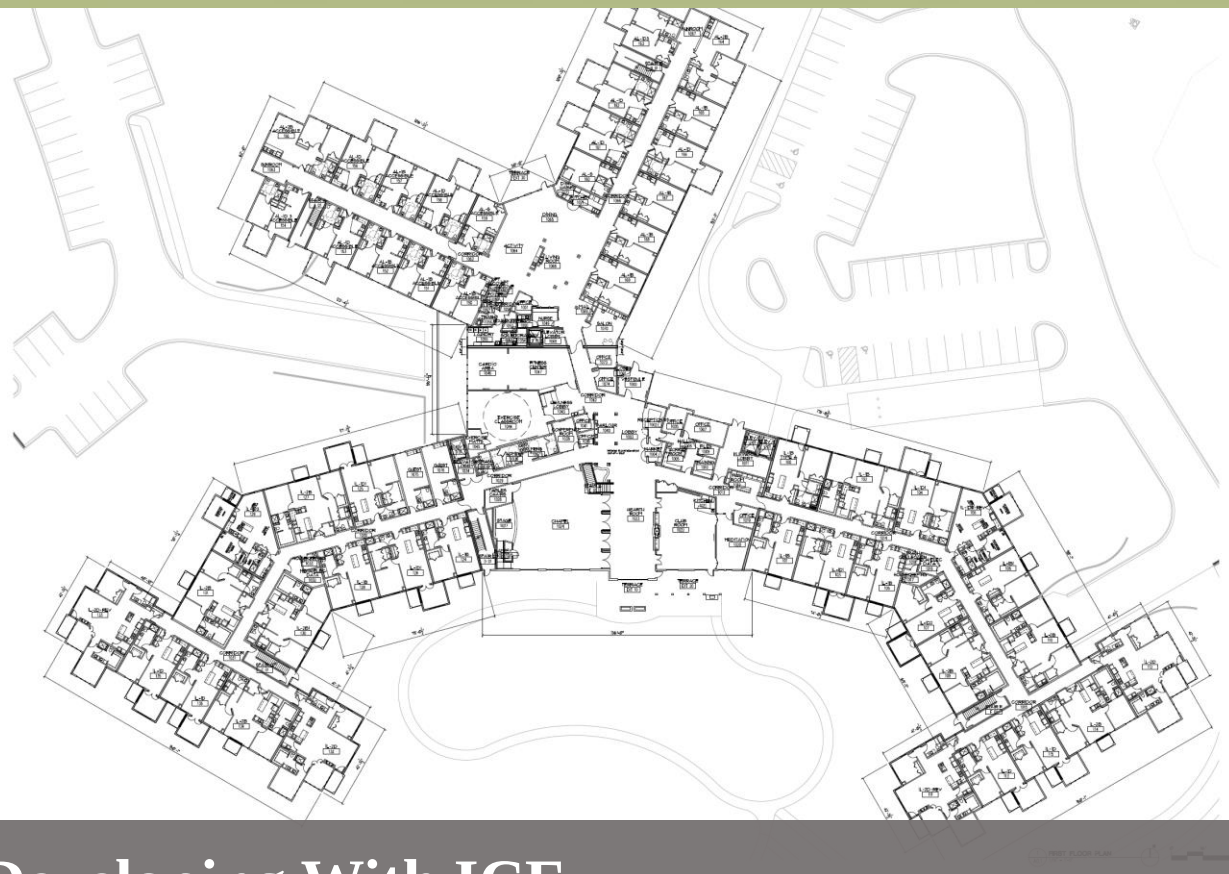


Cost Comparison?

ICF

vs.

Wood Frame

Oconomowoc, Wisconsin

Total Square Foot of Wood Frame Construction = 176,444

Cost of Wood Framing including Exterior Insulation = $4,320,000 or $24.48 SqFt

Cost of Wood Framing MINUS Exterior Walls = $3,400,000 or $19.27 SqFt
Cost of Insulated Concrete Form Exterior Walls = $950,000 or $5.38 SqFt

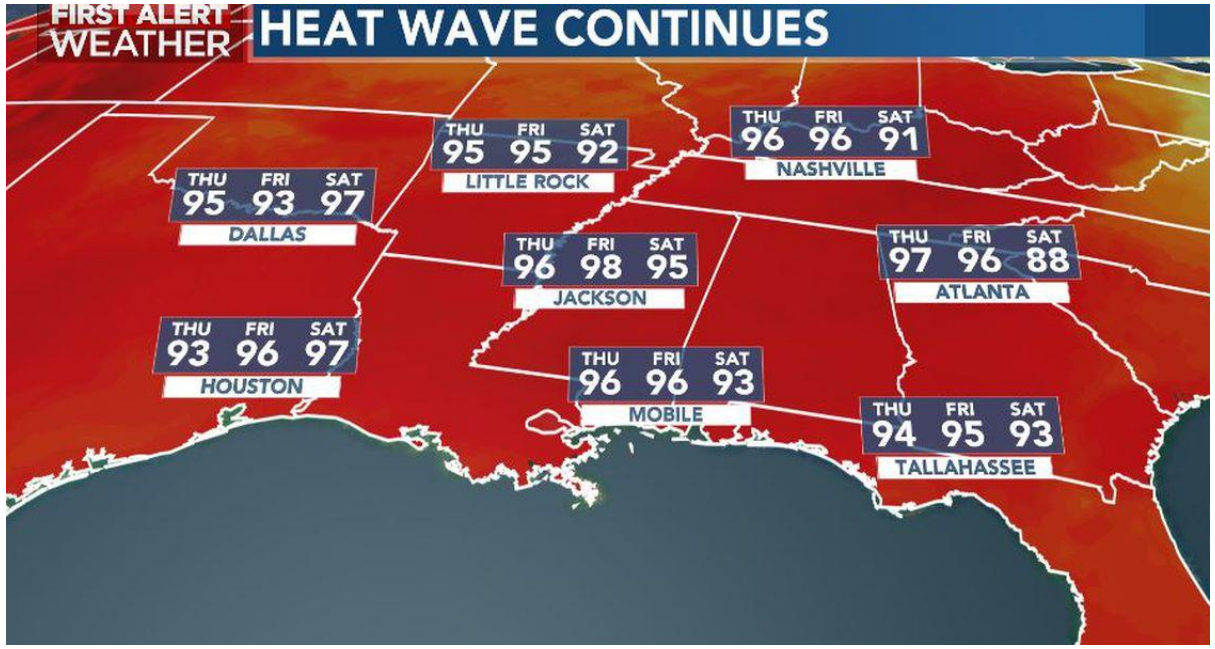
Wood Frame Total: $4,320,000

ICF + Wood Frame Interior Total: $4,350,000

PROs of ICF during Construction:

1. **Ability to pour Stair Towers and Elevator Shafts concurrent with structure, also making both more sound proof**
2. **Eliminate exterior vapor barrier**
3. **Continuous R-22 or greater insulation with added bonus of concrete thermal mass**
4. **Can pour in winter conditions**
5. **Structural integrity of wall for various possibilities – hanging balconies, masonry tower or trash chute tie offs, skip hoist tie offs, etc.**
6. **Improves sound transfer through exterior wall**


WONDERS
VITALY
MARCH 7


FIRST ALERT WEATHER
HEAT WAVE CONTINUES
THU FRI SAT
95 95 92
LITTLE ROCK
THU FRI SAT
96 96 91
NASHVILLE
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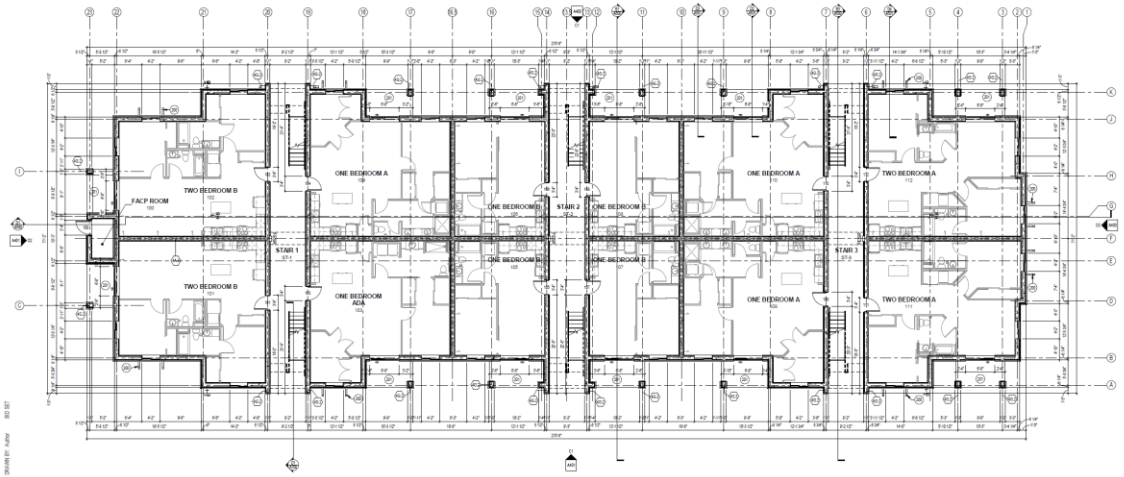


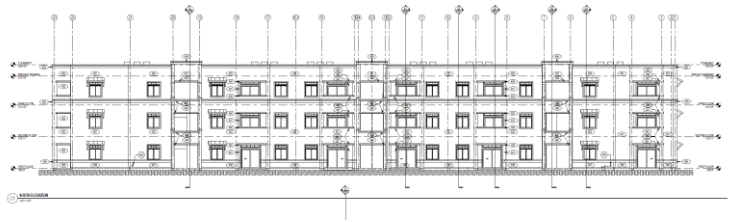
Cost Comparison?

ICF

vs.

Wood/Steel Stud

Sarasota, Florida



Total Square Footage = 71,769

Wood Frame @ $24.00 SqFt = $1,722,456

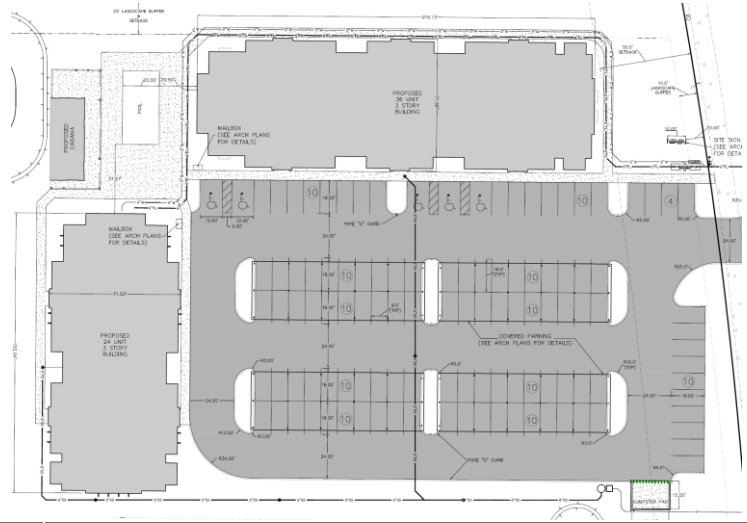
All Concrete/Steel Stud:

- ICF = $920,000
- Precast Concrete w/ Stairs & Topping = $680,000
- Steel Stud Interior Walls = $175,000

Total ICF/Steel Stud = $1,775,000

PROs of ICF in Florida:

1. Disaster Resistant
2. Mold Resistant
3. Termite Proof
4. Energy Efficient




Jennifer
HomeTeam

Ownership

1. **Retention**
   - Comfort, Safety, Efficiency
   - Approx. 30-40% annual turn over of units with wood frame, ICF 15-25%

Math: 100 units, turn over/ re-rental costs of $500/unit

Wood Frame: $15,000-$20,000
ICF: $7,500-$12,500
$7,500 increase to NOI or $136k of value at 5.5%CAP

2. **Reserves/Deferred Maintenance**
   - With ICF we are able to reduce our reserves by 30%.

Math: 100 units, $250/unit per year
Wood Frame: $25,000
ICF: $17,500
$7,500 increase to NOI or $136k of value at 5.5%CAP

Ownership

3. **Energy Efficiency**
   - Conservatively speaking 50% savings in heating and cooling

     Math: 100 units, Average heating and cooling common areas = $2,500 month

     Wood Frame: $30,000
     ICF: $15,000
     $15,000 increase to NOI or $272k of value at 5.5%CAP

4. **Insurance**
   - Possible savings of 10-15% off annual insurance premiums

     Math: 100 units, $400/unit per year
     Wood Frame: $40,000
     ICF: $34,000-$36,000

     $4,000 to $6,000 increase to NOI or $72-$109k of value at 5.5%CAP

Ownership

+$34,000 to NOI

OR

+$618,000 to Value at 5.5%CAP

Additional: If owner is responsible for utilities….

Math: 100 units, $100 average monthly heating/cooling costs

Wood Frame: $120,000/year
ICF: $60,000/year
$60,000 addition to NOI or $1,090,000 in Value at 5.5%CAP

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