Passive House III
The Construction Process

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Presentation Team

Raymond Rebilas, AIA, Kitchen & Associates

Harry Moody, Pennrose Properties, Inc.

Adam Blackburn, CPHC, Innova Services Corporation

Tim Sherman, CH&E Construction
Mid-Rise Passive House Construction
- Lessons Learned in the Field
Mid-Rise Passive House Construction
- Lessons Learned in the Field

• Can be built with conventional methods, slightly modified.
• Rater/Verifier needs to be part of the design process
• The average subcontractor can build to Passive House standards
• Rater/Verifier has to be present - a lot
• Have plan B ready to go
• Don’t rely on subcontractors and maintenance staff to make Passive House work - operationally it should be at least as simple to maintain as conventional construction.
Mid-Rise Passive House Construction - Lessons Learned in the Field

- Rater/Verifier should be part of the design process:
  - Make sure their fee includes design review at the 50% and 90% stages
  - Think about how you’re going to run tests - where are you going to put the blower doors? How many will you need?
  - Where are the holes in the building? Figure what you’re going to need to inspect
  - If you’re certifying under PHIUS, ENERGY STAR certification is a pre-requisite for low-rise buildings. Rater will need to perform additional testing for HERS ratings and certification.
Mid-Rise Passive House Construction - Lessons Learned in the Field

- Can be built with traditional methods, slightly modified.
  - Same goop, just more of it
  - ZIP-type sheathing or liquid-applied drainage plane absolve a myriad of sins
  - So does spray foam (shhhhh!)
  - Conventional foundations and footings
  - Conventional framing - can be panels
Can be built with traditional methods, slightly modified.
- Conventional insulation
- Conventional finishes
- Gas hot water heating
Mid-Rise Passive House Construction - Lessons Learned in the Field

- Set up subs for success:
  - Design details must be clear and cover all transitions (where walls turn, where walls meet the roof, window-to-siding, below-grade to above-grade)
  - Make sure GC understands requirement for greater attention to detail when pricing
  - Provide training in the field
  - Use conventional approaches to framing, air sealing and insulating - easier with large buildings
  - De-mystify Passive House: “it’s like ENERGY STAR, just more.”
  - Make the sub part of the success story: “You, Ms. Mechanical Sub, are part of a groundbreaking movement, ‘Passive House makes a big difference in energy bills for those on limited incomes”
  - Union jurisdictionality
Mid-Rise Passive House Construction
- Lessons Learned in the Field

- Rater/Verifier needs to stay on top of what’s happening during construction:
  - They should make sure their fee includes:
    - Bi-weekly visits to the job site starting the day footings are poured
    - Follow-up visits to inspect repairs or to re-test
  - Review all RFI - virtually every design change can impact PH performance
  - Take responsibility for the success of the project: don’t just throw up red flags, be ready to suggest solutions
  - Know your tools
Mid-Rise Passive House Construction
- Lessons Learned in the Field

- We did do some less than conventional things...
  - Doghouses (well, we do these on conventional buildings, too)
  - Heavy duty service door weatherstrip
Mid-Rise Passive House Construction - Lessons Learned in the Field

- We did do some less than conventional things...
  - Clothes dryer plena
  - Ridiculous amount of insulation in garage ceiling (R-100?) (intent was not R-value, but alignment of air and thermal control layers)
Mid-Rise Passive House Construction - Lessons Learned in the Field

- Assume something will go wrong.
  - Just like any other project, except that most designers and contractors freak out because it’s PASSIVE HOUSE
  - Be a hero - have plan B ready. Plan C, too, just in case.
  - KISS theorem
  - “It’s never one thing” (J. Allegretti): if you encounter a problem during testing, you may be looking at two or more causes
Mid-Rise Passive House Construction - Lessons Learned in the Field

• To a building manager or maintenance superintendent, running a PH building should be no different than any other.
  • Don’t design a building that requires a PhD to build or operate
  • Potential for a high turnover rate among maintenance staff means institutional knowledge is not passed on.
  • Low operating cost is a threshold requirement for developers and managers of affordable house. Not just the utility bills, but staff time and service calls cost money and disrupt lives.
  • “Hey Mr. Developer, how do you want to meter this thing?” This is a threshold question that is dependent on programming and will drive the PH design process.
Initial feedback from Sacred Heart and Wynne Theater maintenance staff:

- "It’s fine."
- More frequent ventilation system filter changes (at Sacred Heart, (4) central ERVs; at Wynne Theater, ERVs in each unit). Otherwise, no issues with ERV systems.
- Summertime cooling good, no humidity issues - “we like the humidity control”
- No complaints about inward-swing windows (these are senior buildings, remember)
- Buildings have some start-up issues, but they’re the same as any other building: closet shelf screw punctured a water line; a contractor accidentally shut off a hot water supply valve, etc... Issues so far are unrelated to Passive House.
- Too early to tell on energy costs - summer energy cost and consumption data is available but needs to be parsed to generate apples-to-apples comparison to conventional buildings
Viking J
Lots of Foam is Needed
Foam Continues Around Base of Elevator
Concrete Pour
Three Layers of 2” XPS
Air Barrier Applied and Reinforcing - Fiber Mesh?
The Importance of Running Pumps
Underwriting...

- General rule of thumb:
  - 7.5 to 8.5% increase in costs
  - 35k to 50k in additional soft costs (fees, consultants, etc.)
Scheduling...

- Be very diligent with scheduling

- Confirm that each development team member has incorporated extra time into his/her schedule

- All team members should agree on a timeframe/schedule from the start

- More work associated with construction, long lead items due to manufacturing overseas, etc.
Attention to Detail...

- Be sure to schedule many pre-development design meetings (as necessary)

- Missing even a small detail can be costly
Team Involvement...

- Be sure to include the following on your development team (from the beginning):
  - Architect
  - Passive House Consultant
  - Builder
  - Subs (if possible)
  - Energy Raters
  - Owner’s Rep
  - Maintenance
  - Management
Thank you!

Raymond Rebilas, AIA
rrrebilas@kitchenandassociates.com

Harry Moody
hmoody@pennrose.com

Adam Blackburn, CPHC
ablackburn@innovaservices.com

Tim Sherman
tsherman@cheinc.com