

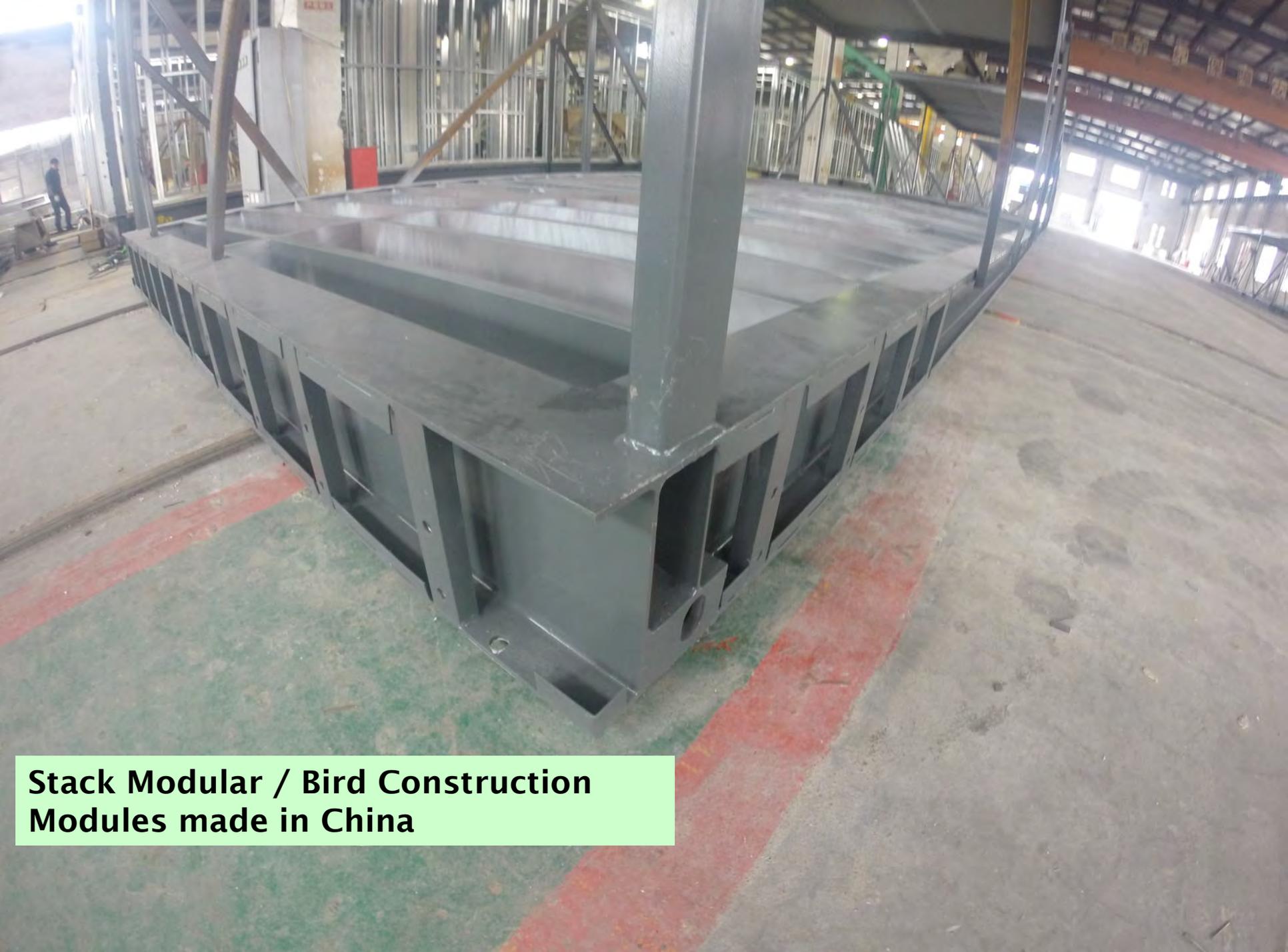
# Case Study

- Stack Modular / Bird Construction
- Iqaliut Hotel & Conference center
- Steel modular

# Iqaliut

- very far north
- HDD (3x Ottawa)





**Stack Modular / Bird Construction  
Modules made in China**



[www.stackmodular.com](http://www.stackmodular.com)



# Wrapped, ready for yard & trucking



# Ship offloading



# Toffino, BC... lifting



# Close in ASAP to protect finishes



Note housewrap, furring

Not watertight



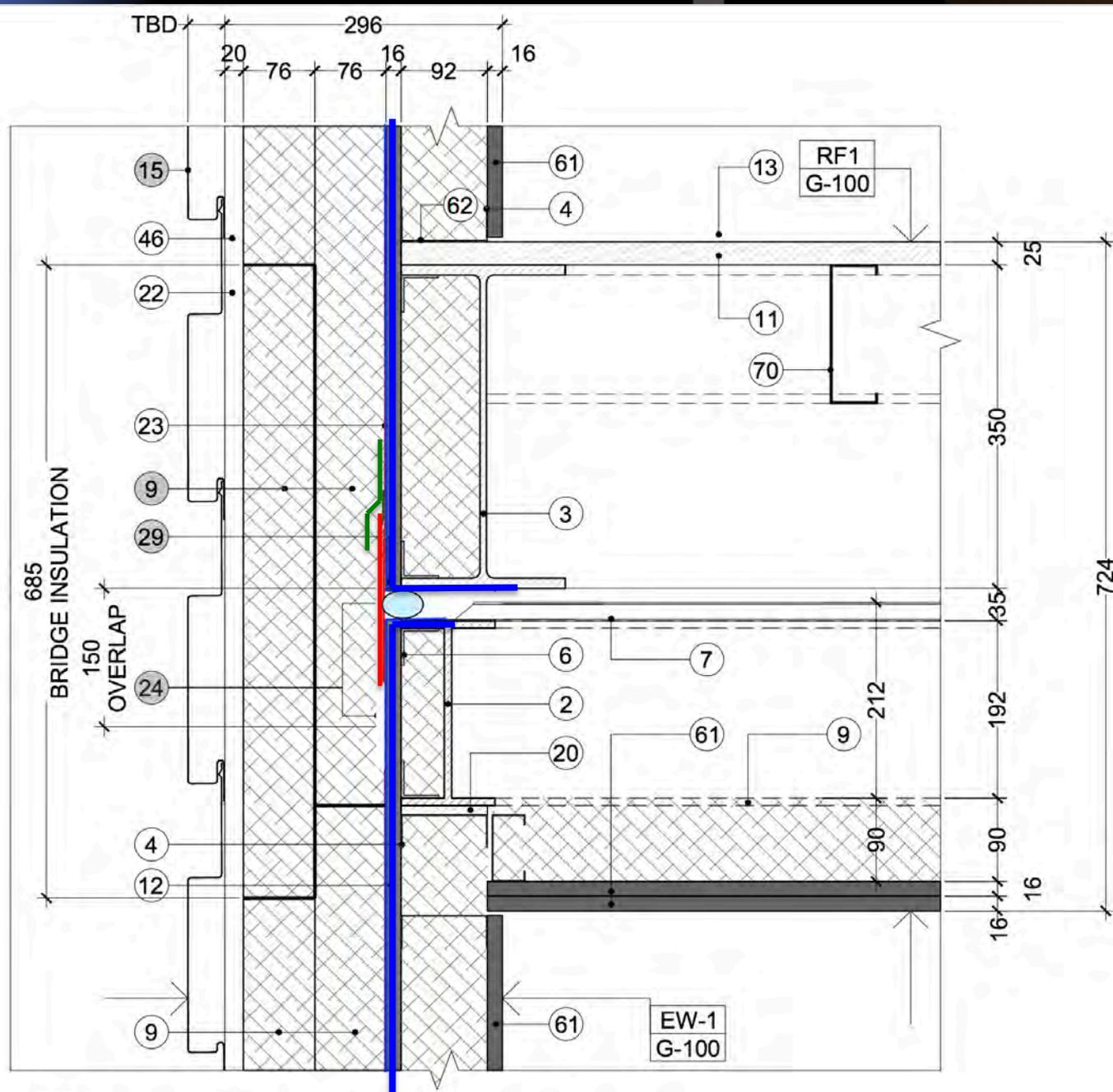
# STACK, stacked



# Your module has landed...now what



→ 6"  
exterior  
ci



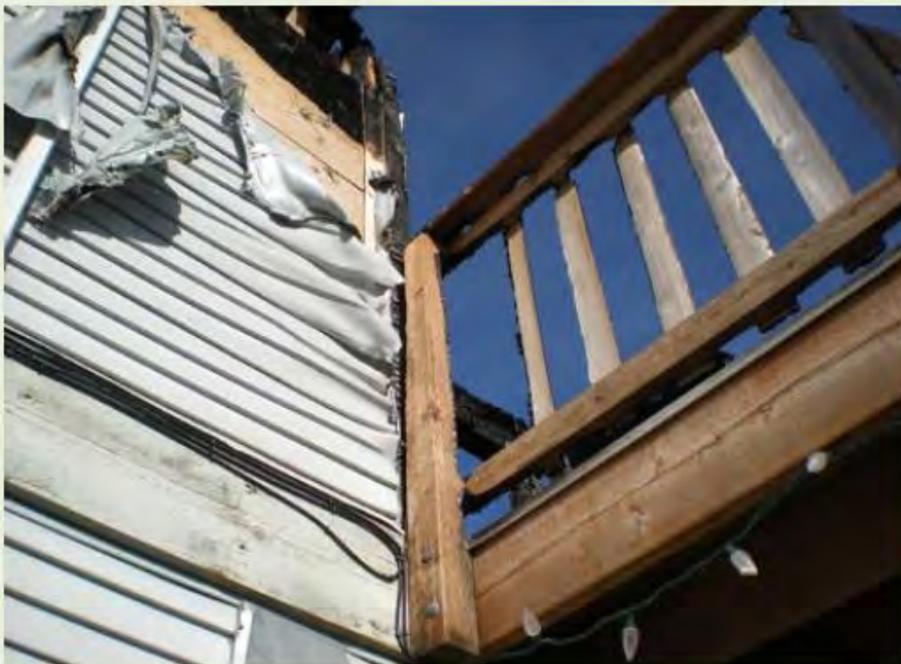
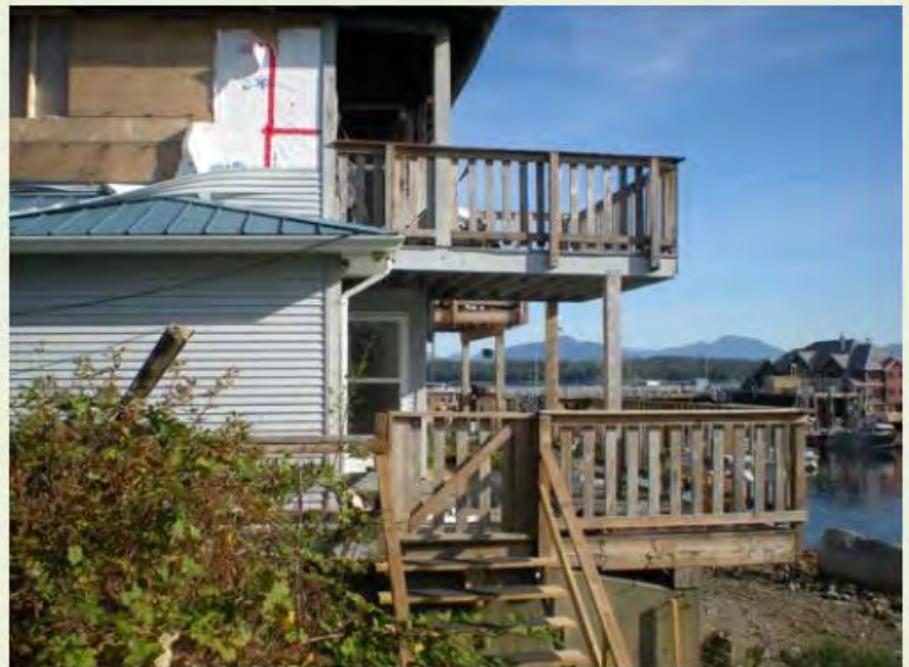
2 TYPICAL EXT. WALL, FLOOR-CEILING SECTION

# Case Study

- **Passive House residential housing, remote, very rainy climate**
- **Bella Bella British Columbia, CA**



#BellaBella



# Design for modular and Passive House



# Factory Assembly



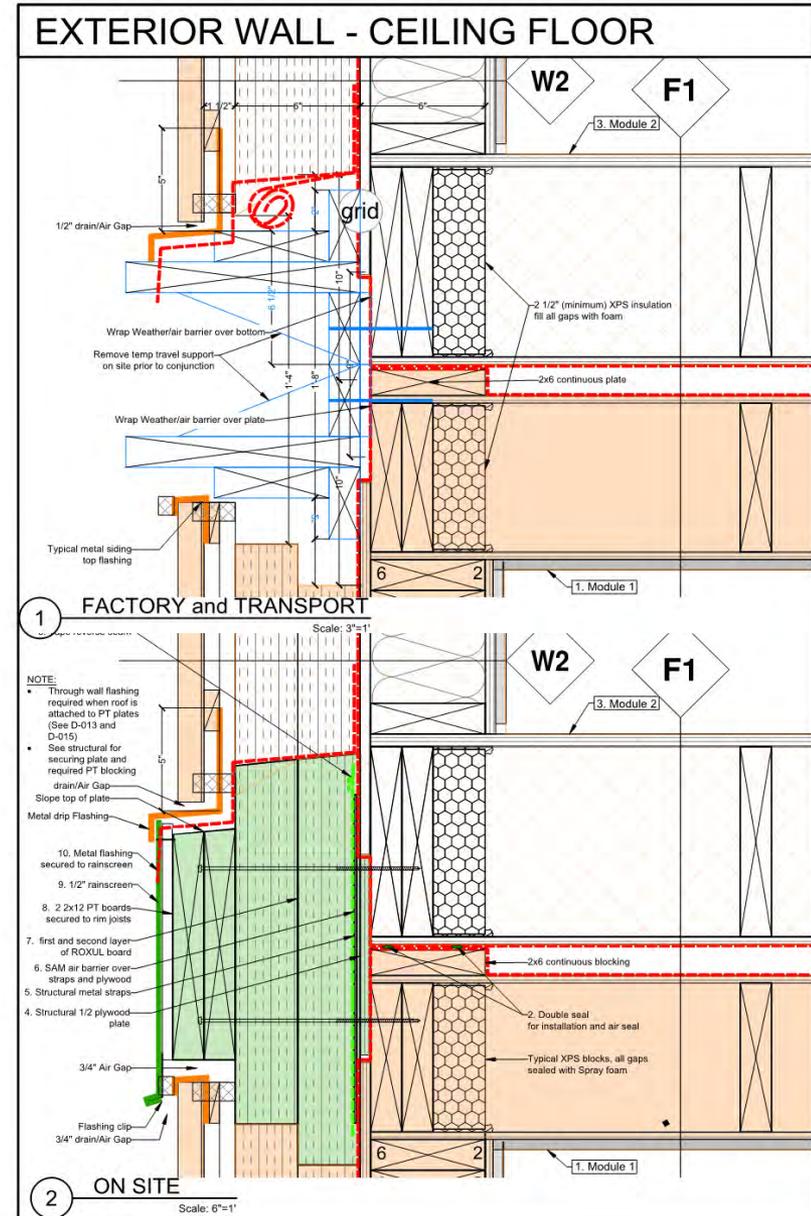
**Fully-adhered air-water barrier**



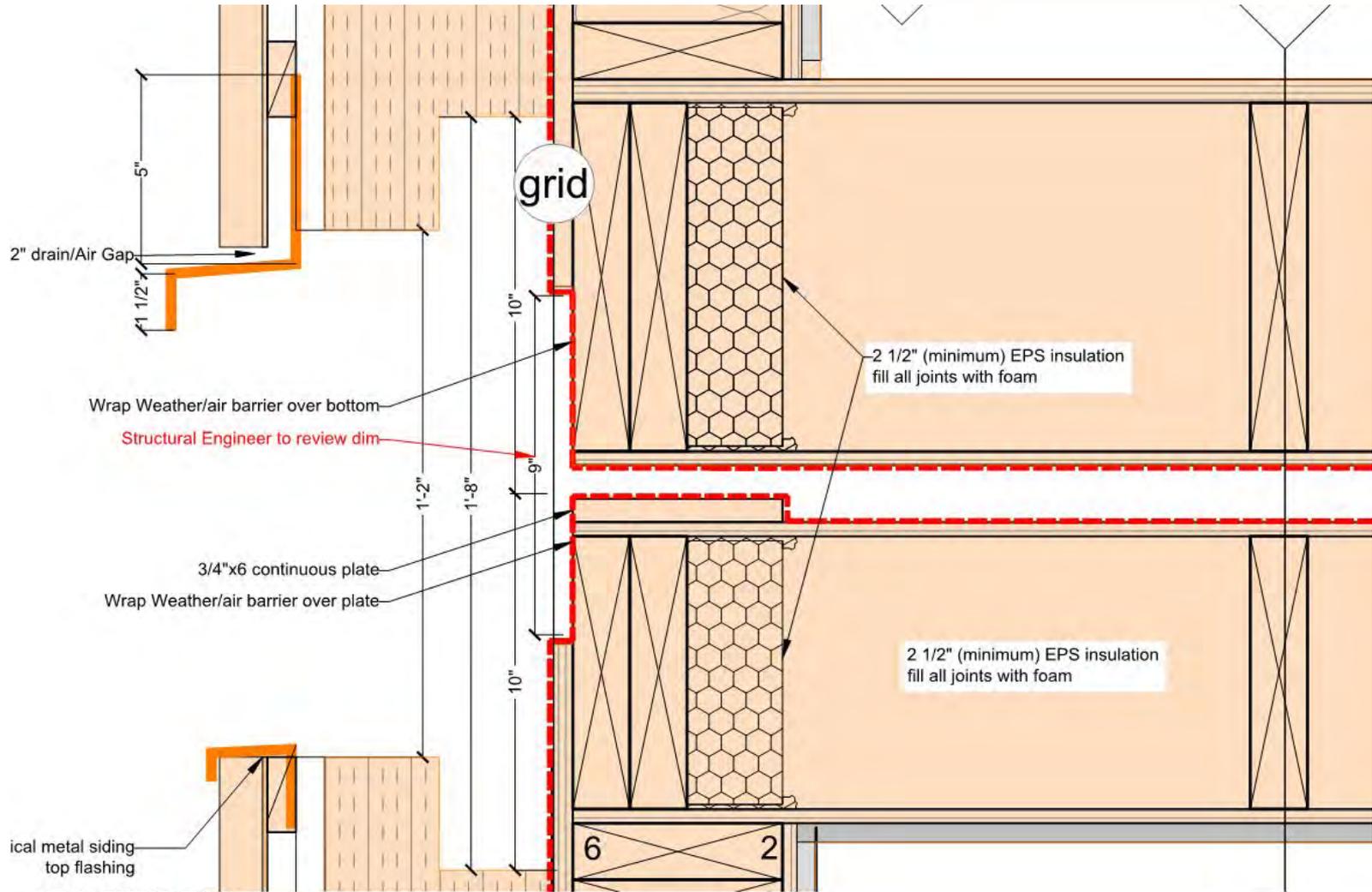
# Factory, Transport, and Field Details

Explicit design drawings for *each phase* with concern for water tightness & tolerances

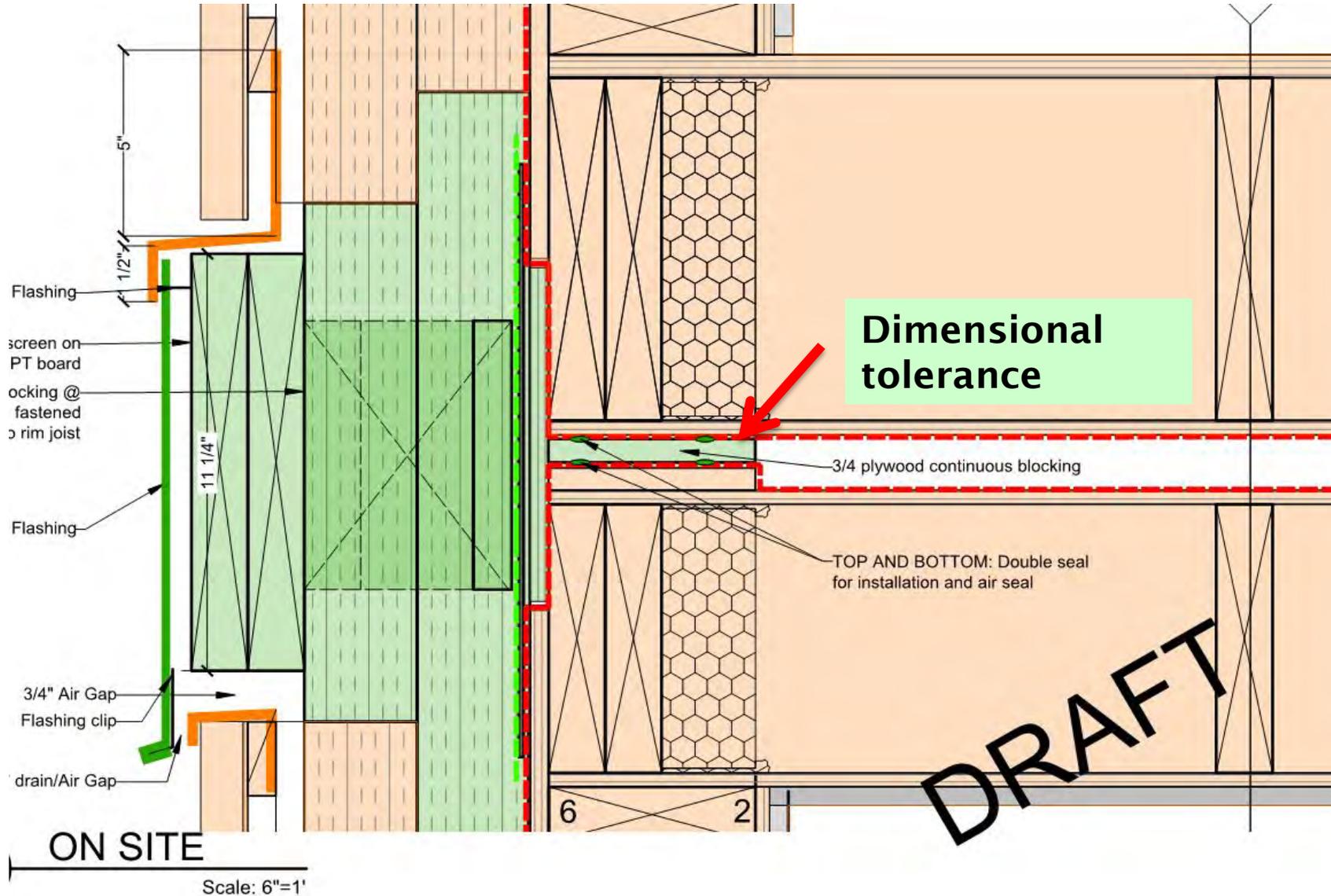
- Fabrication
- Transport
- Construction
- Service



# Joint Details!



# The Details!







EAGLE

EAGLE WEST

3

ite

cc

4826

co. co

# Sticking to wet stuff is hard



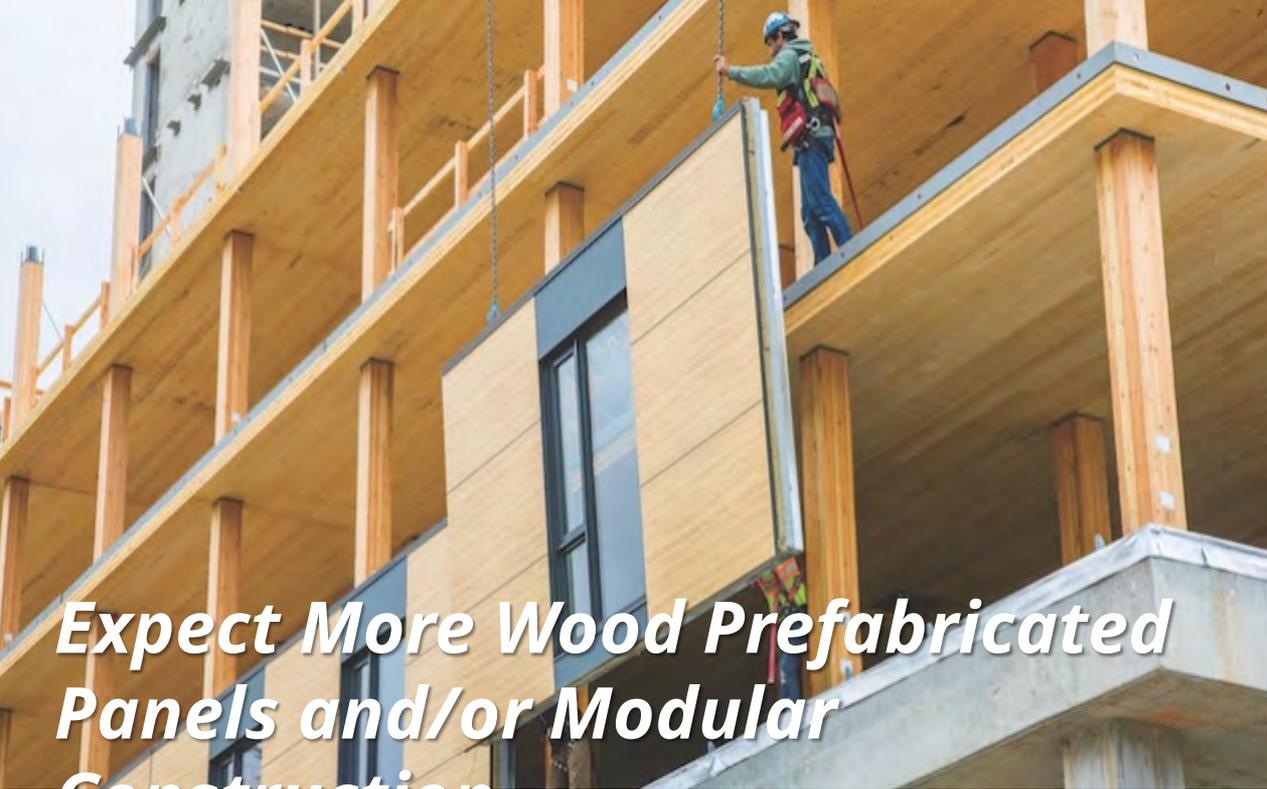


# Lessons

1. Modular Construction (& Passive House) is a team sport.
2. Everything depends on great connection details: **tolerances, sequences** and control **continuity** (have a contingency plan)
3. Factory production lines move fast.
4. Mock-ups, In-factory and field air/water tightness testing, (i.e. QA/QC) are essential.
5. Protection against rain during yard storage, transportation, construction

# Prefab

- Prefab is a century long trend... slow + steady
- Numerous practical challenges to get the benefits
- Likely will see more
  - panelized enclosures
  - Modular buildings
  - Full wet room / kitchen modules / HVAC



*Expect More Wood Prefabricated Panels and/or Modular Construction*



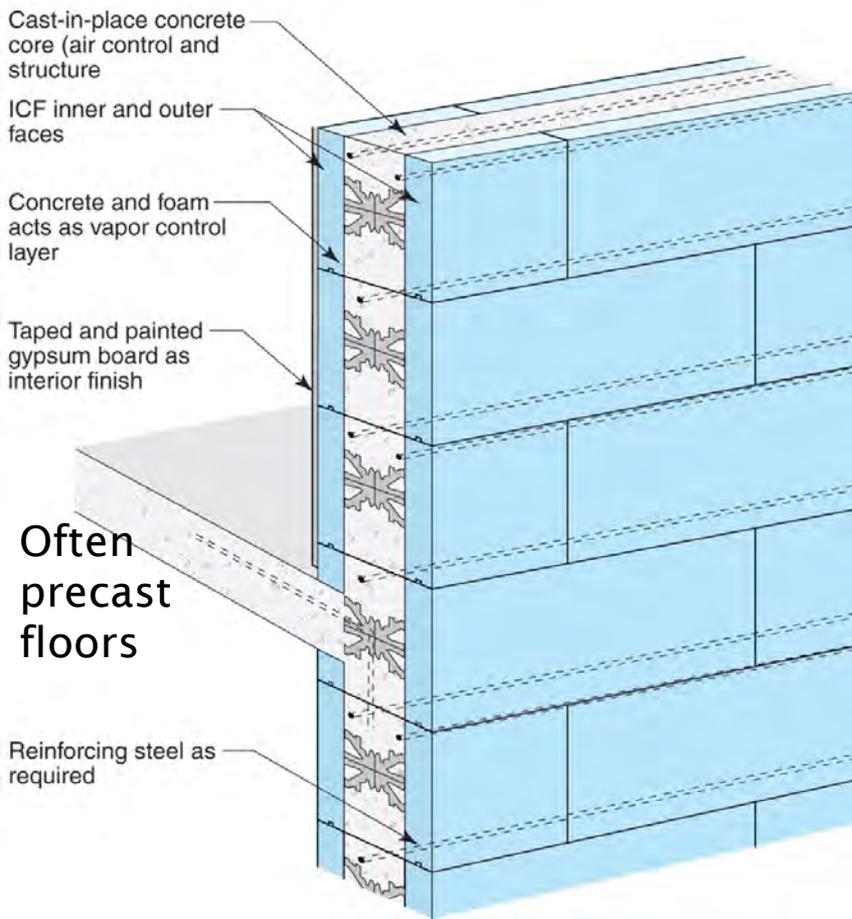
# The Future

- More demand for prefab
- More urban / remote modular
- More panelized systems of all types

# New Ideas: Panelized ICF

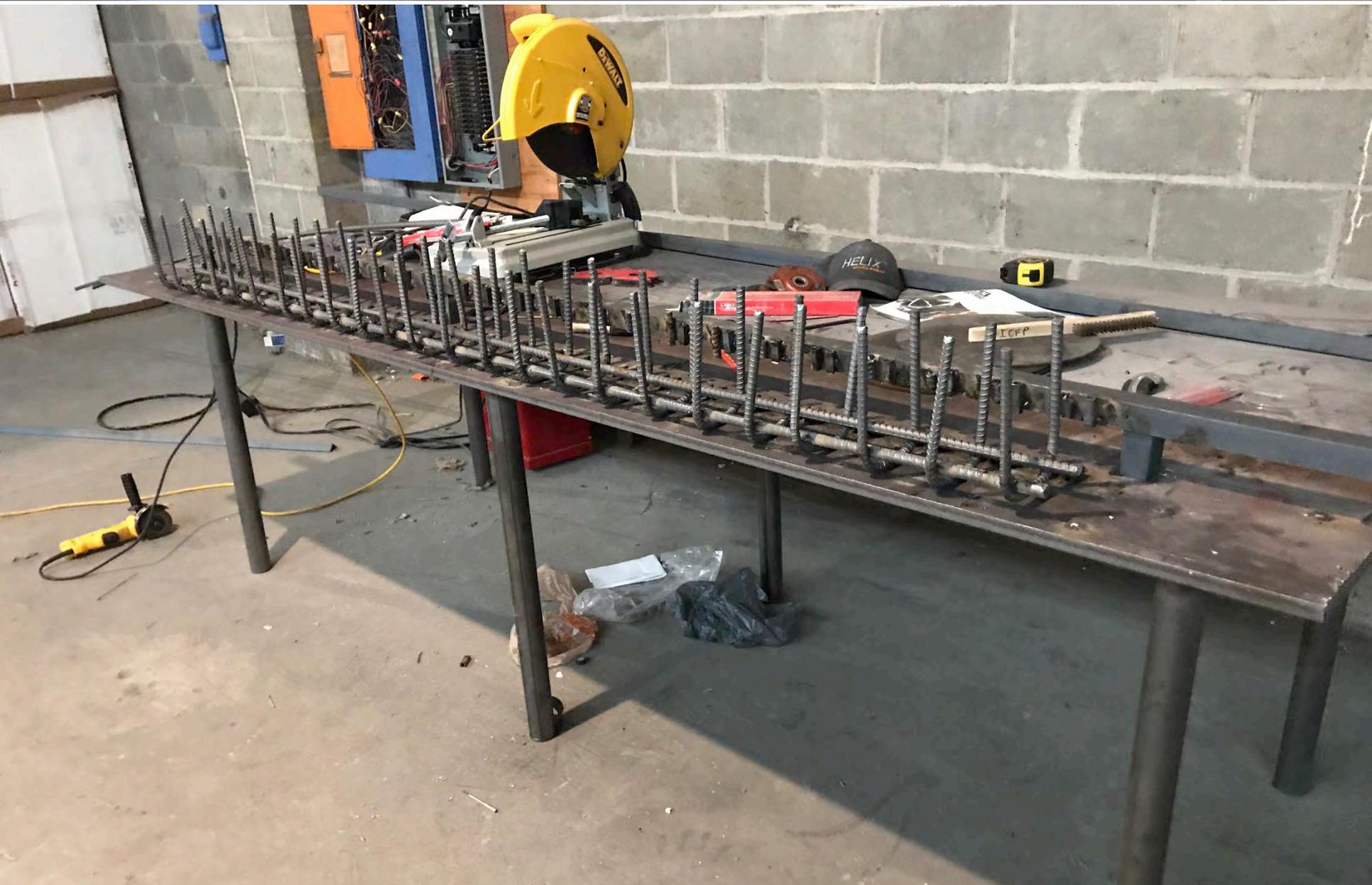
→ Prefab hollow Insulated Concrete Forms

→ See more at <http://icfpanels.com/>





# Rebar fabricated & factory installed



# Easy to transport (note truck!)





# Lightweight = small crane



Perhaps, one day, integrated exterior air-water barrier, cast-in place bucks, etc.

# Case Study

- Net Zero, modular, wood-frame infill housing
- Oakland CA
- Zeta Homes / DOE Building America

# Zeta Homes





# The lift



# Field vs Factory tolerance





610

IF FENCES  
(714) 633-9881

70  
Z  
List  
Water  
Waste

TOW AWAY

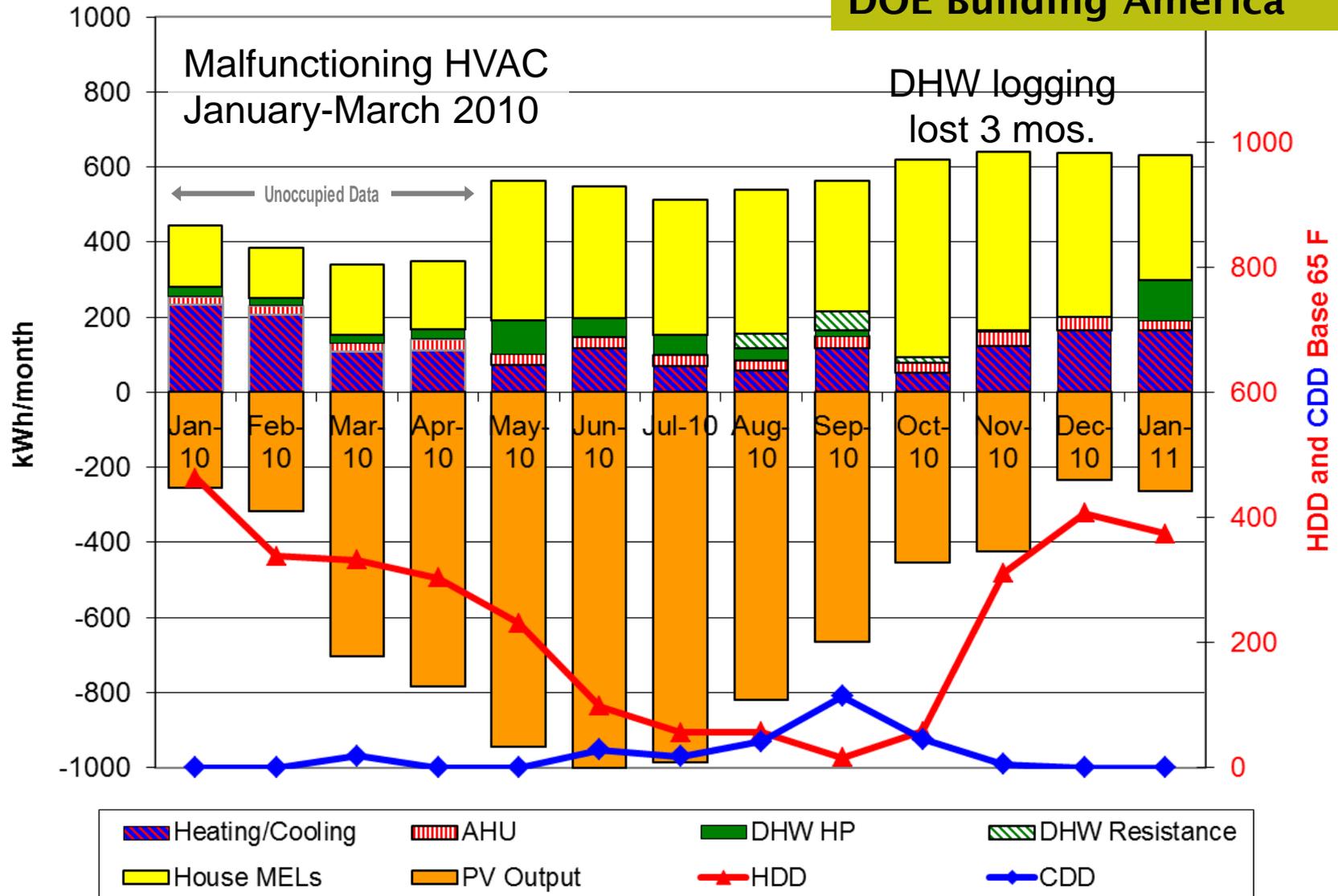
# Performance Monitoring

- Almost 2 years of monitoring with occupancy
- Performed at net positive level
- Some PV removed!



# Electrical Performance to Date

DOE Building America



13 months: 7844 kWh produced / 6770 kWh consumed

# Discussion + Questions

FOR FURTHER INFORMATION PLEASE VISIT

→ [www.rdh.com](http://www.rdh.com)

→ [www.buildingsciencelabs.com](http://www.buildingsciencelabs.com)

OR CONTACT US AT

→ [live@buildingsciencelabs.com](mailto:live@buildingsciencelabs.com)



→ [rdh.com](http://rdh.com) | [buildingsciencelabs.com](http://buildingsciencelabs.com)

# **RDH** Building Science

RDH Building Engineering Ltd. and Building Science Consulting Inc. are merging. Effective November 1, 2015, we will operate as one integrated firm. The merger brings two of the leading building science firms in North America together to provide a combination of cutting-edge research with leading design and implementation capabilities. The result is a unique offering for our clients—an ability to explore new and innovative ideas based on science and our practical knowledge of what can be built. We are excited about the possibilities as we launch the new firm.