

# PH Verification for Large Buildings: What We've Learned So Far

Lois B. Arena, PE





# Overview

- Focus: Verification of Insulation and Air Barrier Continuity
- Issues that dictate QA/QC program
- Case Studies
  - Cornell
  - Beach Green North
  - 3365 Third Ave



# Verification for Large Projects

- Project Sequencing:  
Foundations
  - Abutting neighbor?
  - Staging of foundation?
  - Under slab
  - Stem walls



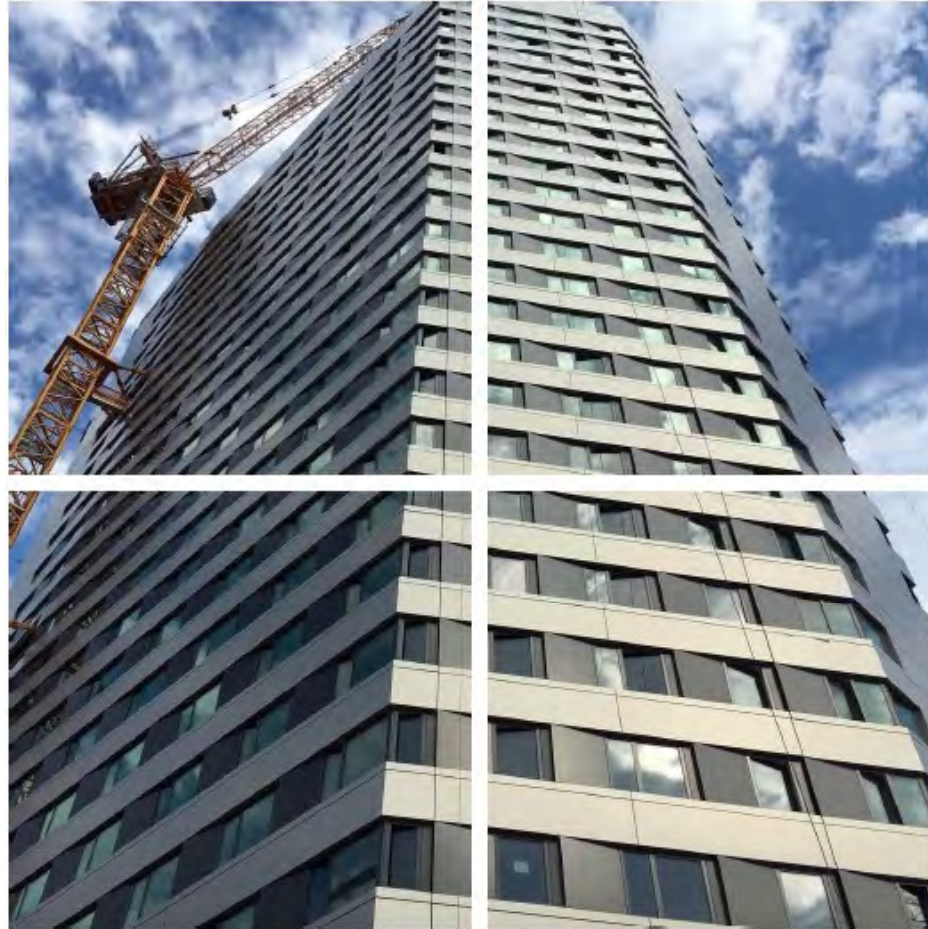
# Verification for Large Projects

- Inspection above grade & testing process
  - Wall construction
    - Brick & block
    - Panel
    - Metal Stud
  - Staging
    - Drywall starting on lower levels, still insulating at top
    - Opening like hoistways, elevator shafts, HVAC shafts



# Verification for Large Projects

- Inspection roof insulation
  - Equipment on roof
    - Curbs
    - Brackets
    - Small dividing walls
  - Bulkheads/unconditioned mechanical rooms – roof insulation needed in these areas before main roof

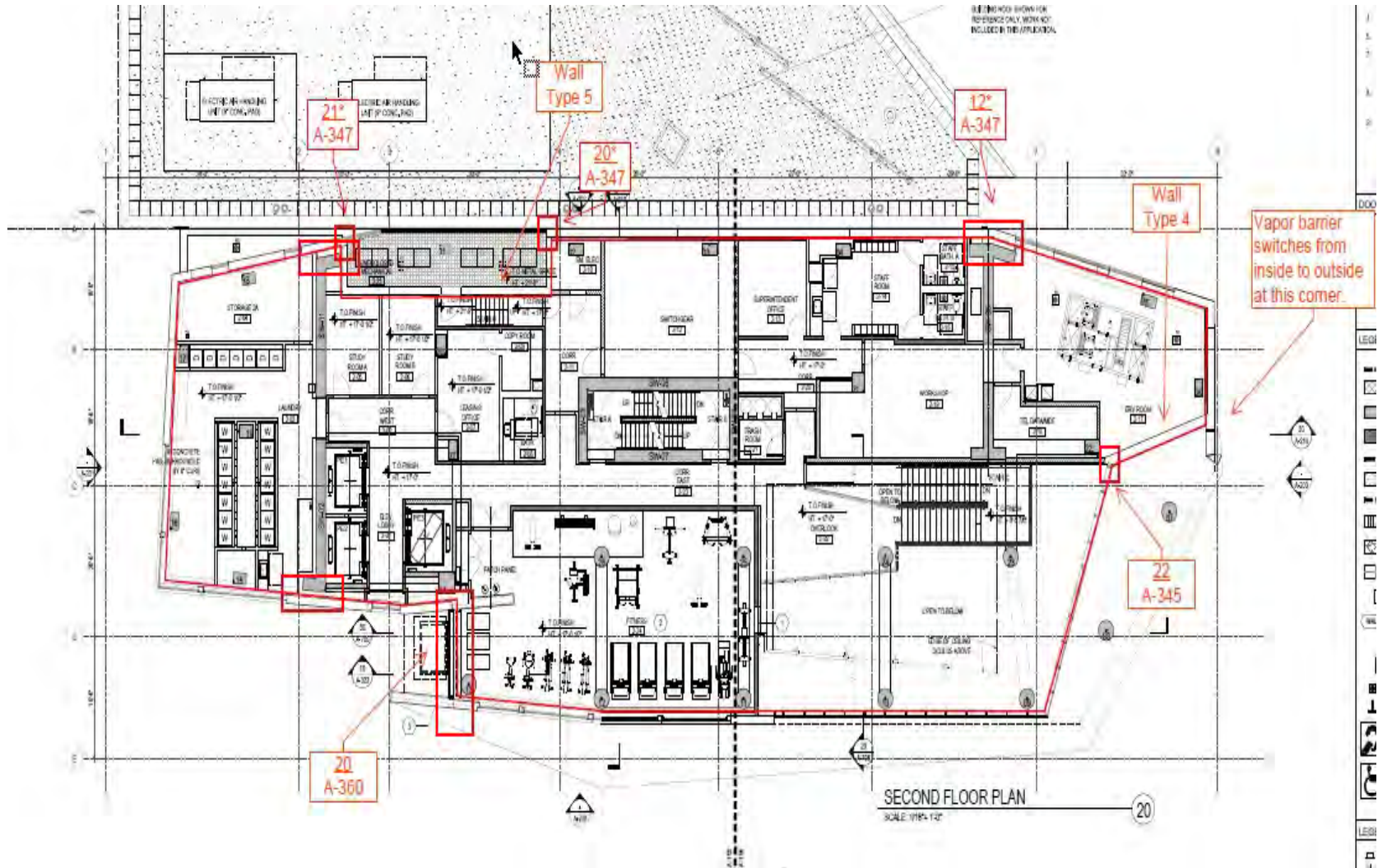


# CORNELL ROOSEVELT ISLAND, NY

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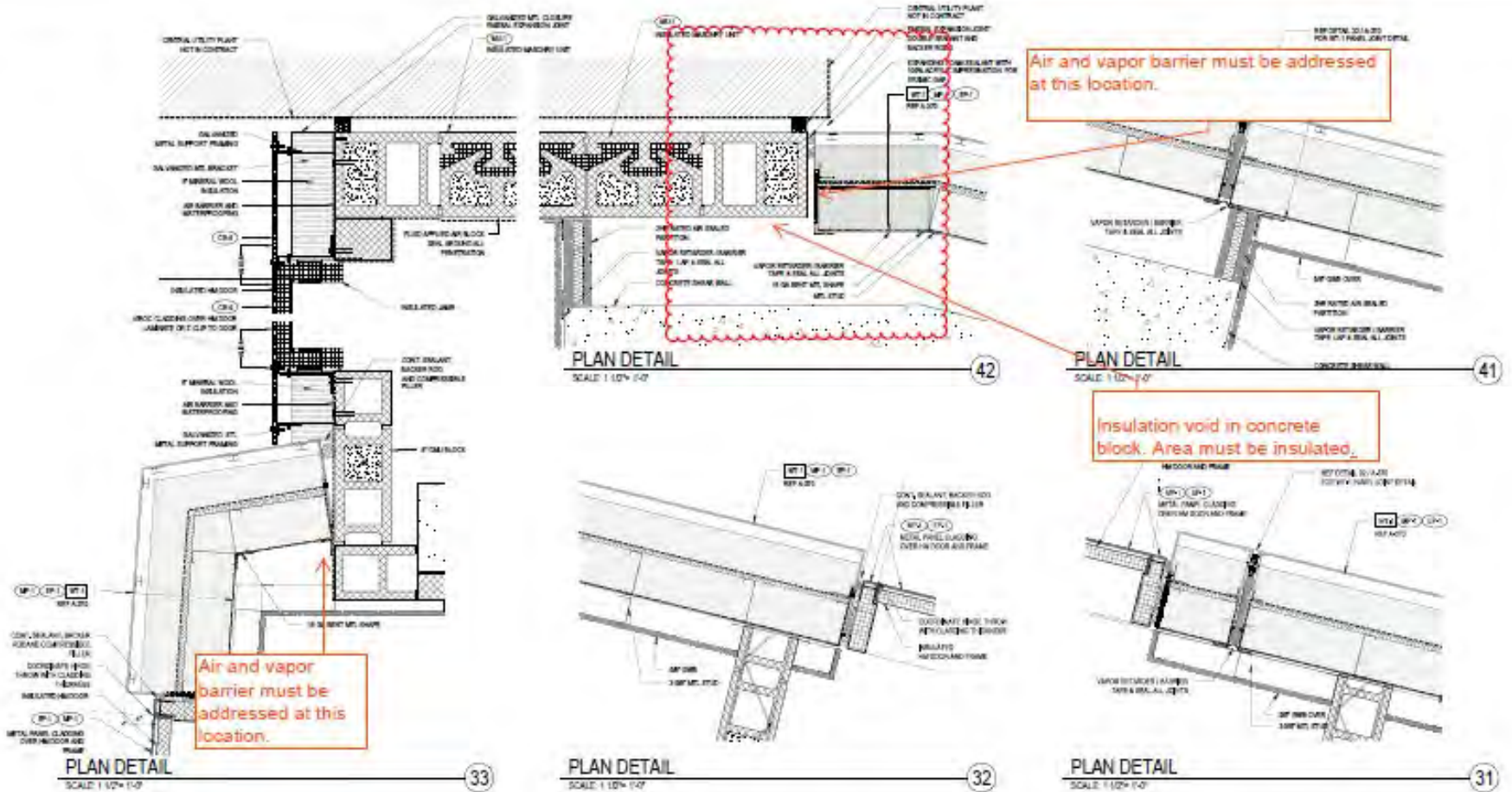
# Redline Plan & Section



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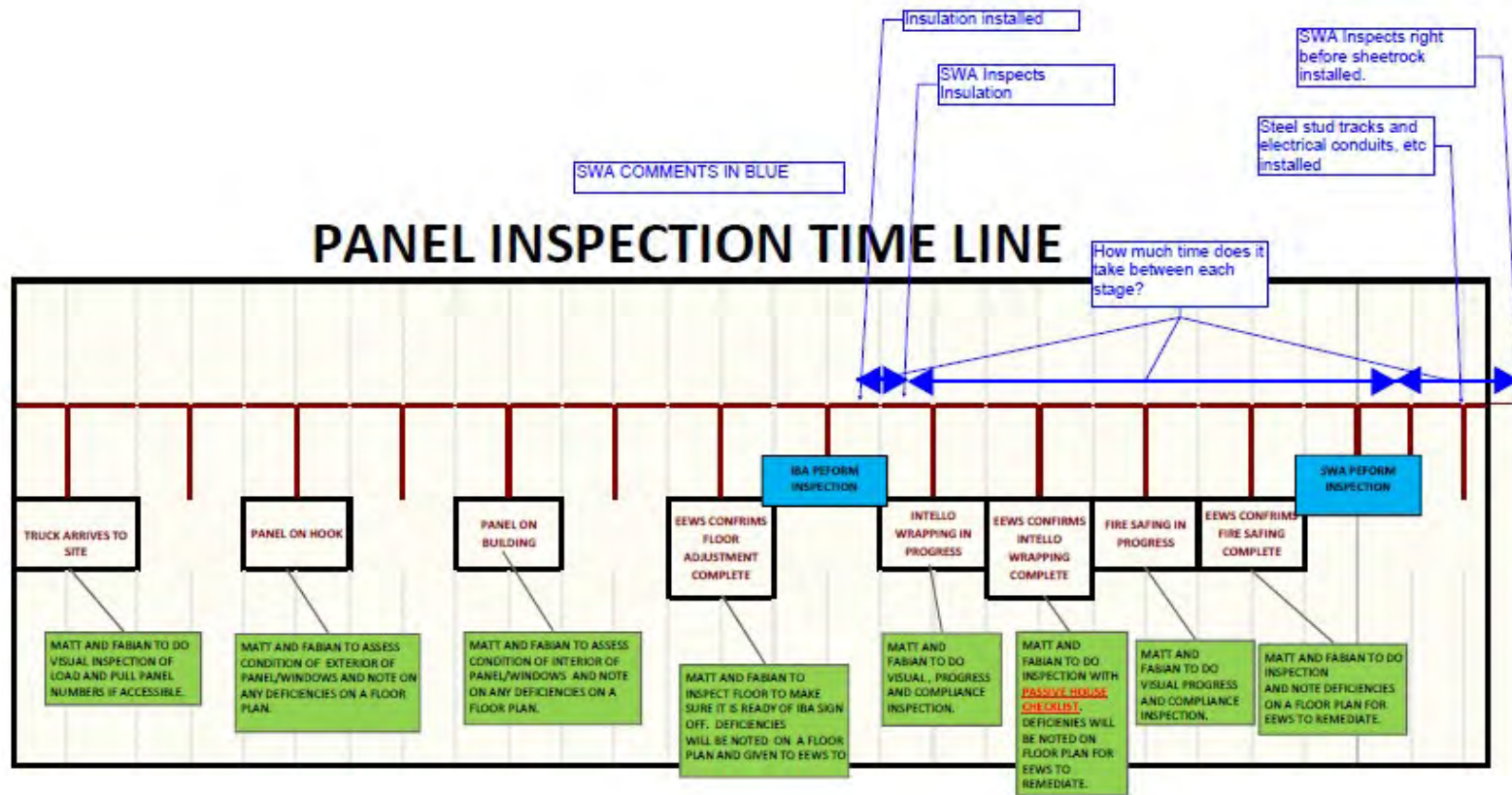
# Drill Into Details



100 2016



# Identify Sequencing & Timing of Inspections



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# SWA's Scopes

- Include prelim QA/QC checklist development
  - Dependent on construction type
- Final blower door test plan

# Develop Contractor Checklists



DATE: \_\_\_\_\_ WEATHER: \_\_\_\_\_  
 PANEL # \_\_\_\_\_ FLOOR: \_\_\_\_\_

**MONADNOCK**  
CONSTRUCTION, LLC.

**PASSIVE HOUSE PANEL WALL INSPECTION CHECKLIST**

**PANEL SUBSTRATE**

A. PANEL  
B. POURED CONCRETE  
C. CMU

**PANEL WALL INSPECTION**

**PANEL INSULATION**

	YES
Panel insulation installed without gaps?	<input type="checkbox"/>
Insulation installed at panel slab anchors?	<input type="checkbox"/>
Panel insulation dry?	<input type="checkbox"/>
Insulation installed at panel to panel transitions?	<input type="checkbox"/>

NOTE:

WITH INSULLO  
WITH INTELLO  
OR INSULLO FROM

\*Mark locations where insulation, panels or tape is missing or damaged

**CONFIRMATION OF INTELLO SURFACE PREPARATION**

	YES
Is surface dry per HWB checklist?	<input type="checkbox"/>
Is surface every free of voids and sharp protrusions per HWB checklist?	<input type="checkbox"/>
Is surface free from dust, dirt or other foreign matter per HWB checklist?	<input type="checkbox"/>
If substrate is concrete has it been allowed to cure?	<input type="checkbox"/>

**INTELLO INSTALLATION**

	YES
Is jointed side facing outside?	<input type="checkbox"/>
Is membrane free of rags or creases?	<input type="checkbox"/>
Is Intello to concrete surface adhered with Duroflex (adhesive) side tape?	<input type="checkbox"/>
Is Intello to metal stud surface adhered with Duplex (adhesive) side tape?	<input type="checkbox"/>
Is Intello to Intello seam adhered with Tensar Vena tape?	<input type="checkbox"/>
Has Intello and Tensar Vena tape and/or patch been installed?	<input type="checkbox"/>

**PANEL WALL WINDOW INSPECTION**

# SWA Checklists



## Automated Inspection Checklists

- Large projects w/ multiple dwellings
- Repetitive Tasks – duct & unit by unit leakage testing
- Insulation inspections

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Item #1


**Verification Item #1:**  
Insulation inspection on 24th floor

**Description of Verified Item #1:**  
SWA inspected the 24th floor insulation installation. Minor issues were found and immediately repaired by Eastern.

**Action Required:**  
None.

**Reinspection Required?**

Item 1 - Photo 1



Item 1 - Photo Caption 1  
24th floor insulation installation.



# Site Visit Reports

Item #	Description	Image
	<p><b>2<sup>nd</sup> Floor Slab Edge Insulation:</b> Refer to architectural details 20 A-356.</p> <p>Detail 20 shows 4" thick insulation at the slab edge between the CUP and the Residential Tower extending 2" above and below the slab (highlighted area in detail at right)..</p> <p>This conditions exits at the area highlighted on the plan to the right.</p>	



# Progress

- Panel installation started in March
- Finished top floor end of August
- Drywalled up to 13<sup>th</sup> floor
- Finishes being installed on lower levels
- Majority of effort spent inspecting insulation & air barrier – at least 1x per week since March

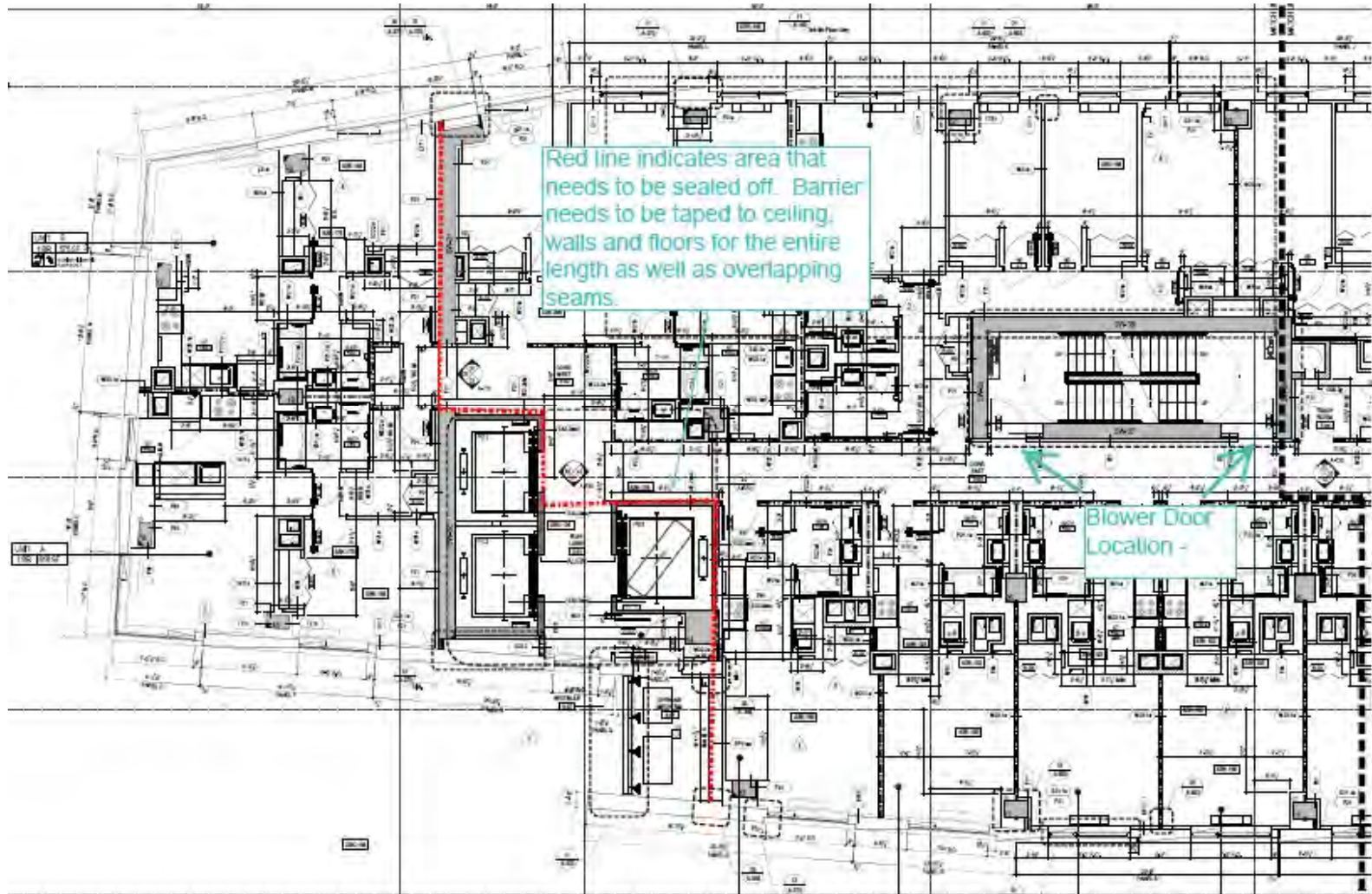


# Interim Testing

- Ductless mini-splits – no leakage testing required
- Original plan – no whole floor testing
- Revised plan – guarded testing on 4<sup>th</sup>, 5<sup>th</sup> and 6<sup>th</sup> floors
- Window & Door Leakage
- Façade Leakage
- compartmentalization



# Guarded Testing



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# Temporary Air Barrier



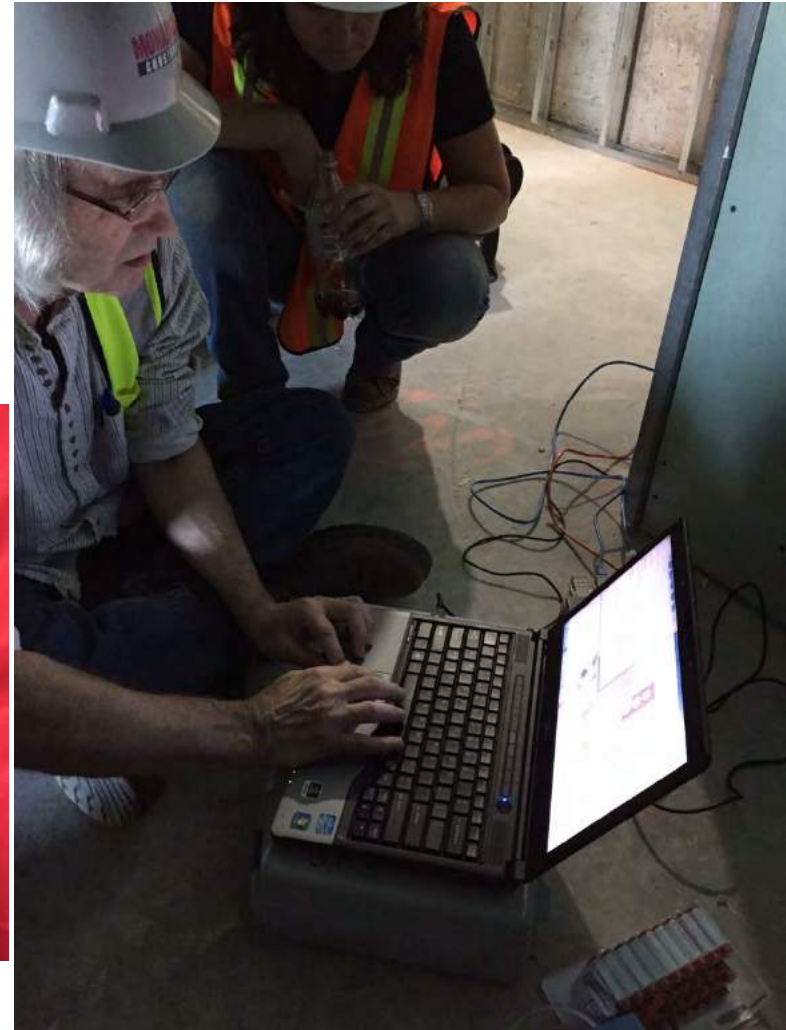
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# Blower Doors on 3 Floors

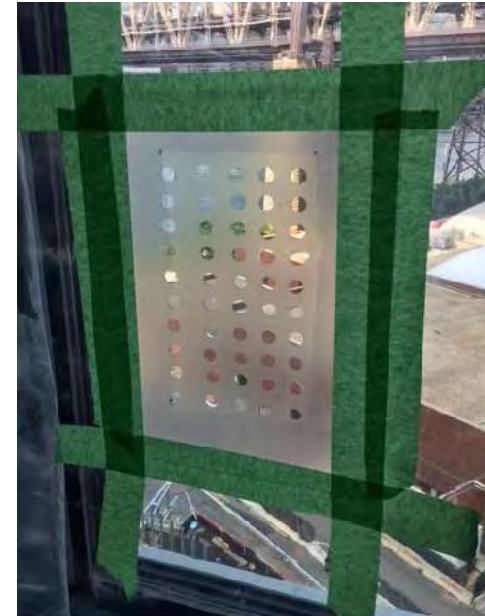


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# Façade Leakage Measurements: Quantitative



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# Façade Leakage Measurements: Qualitative



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# BEACH GREEN NORTH QUEENS, NY

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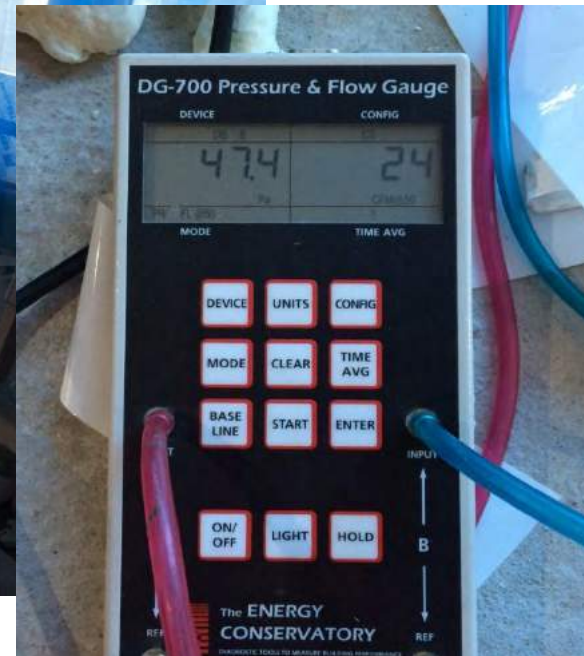


# Wall Insulation Inspections



- ICF doesn't require as many inspections for insulation

# 1<sup>st</sup> Window Mockup

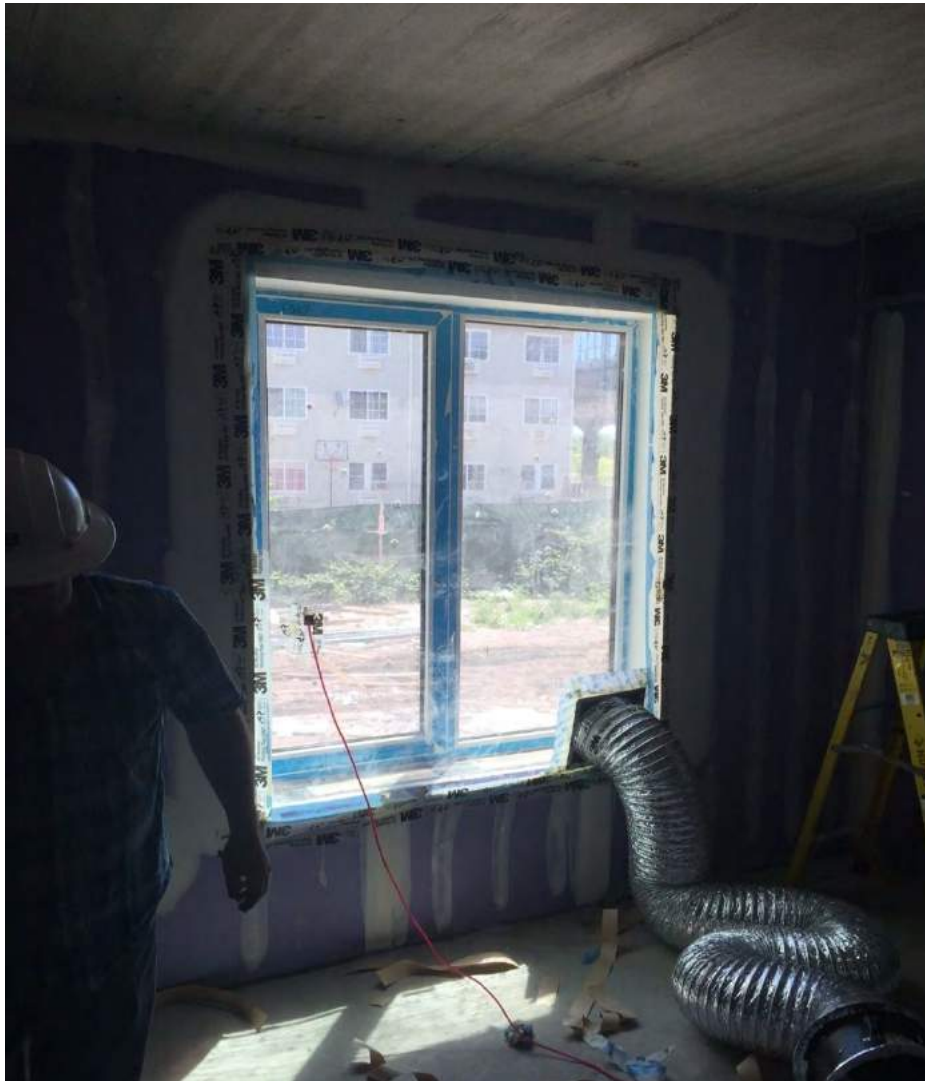


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# 2<sup>nd</sup> Window Mockup



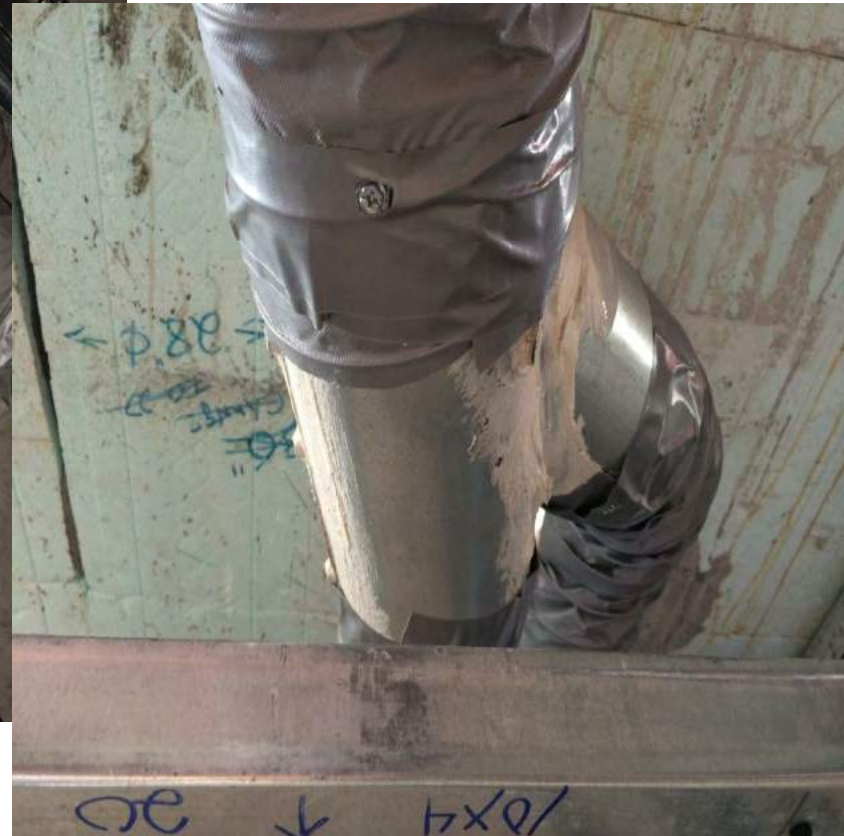
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# Duct Sealing on ERVs



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# Blower Door Test Plan



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## WHOLE BUILDING INFILTRATION TESTING PLAN TO DETERMINE COMPLIANCE WITH PHIUS+ AIRTIGHTNESS REQUIREMENTS AT BEACH GREEN NORTH, 41-19 ROCKAWAY BEACH BLVD., QUEENS, NY

MAY 6, 2016

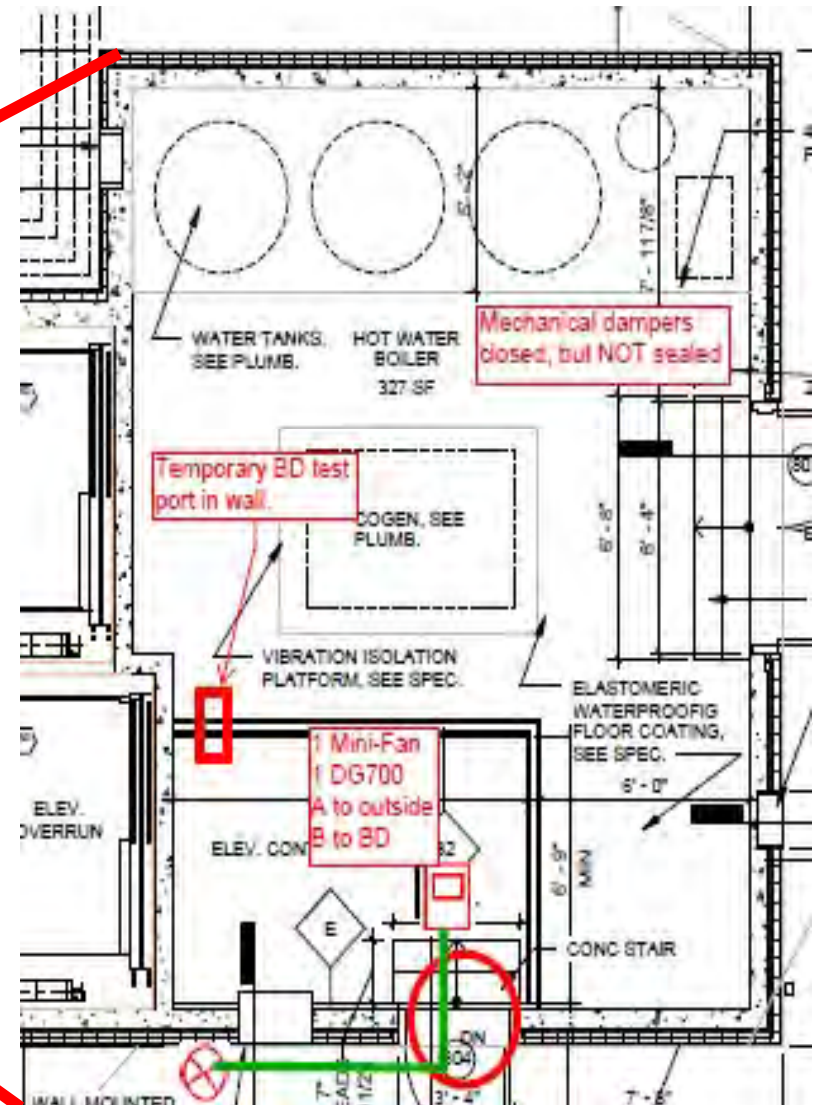
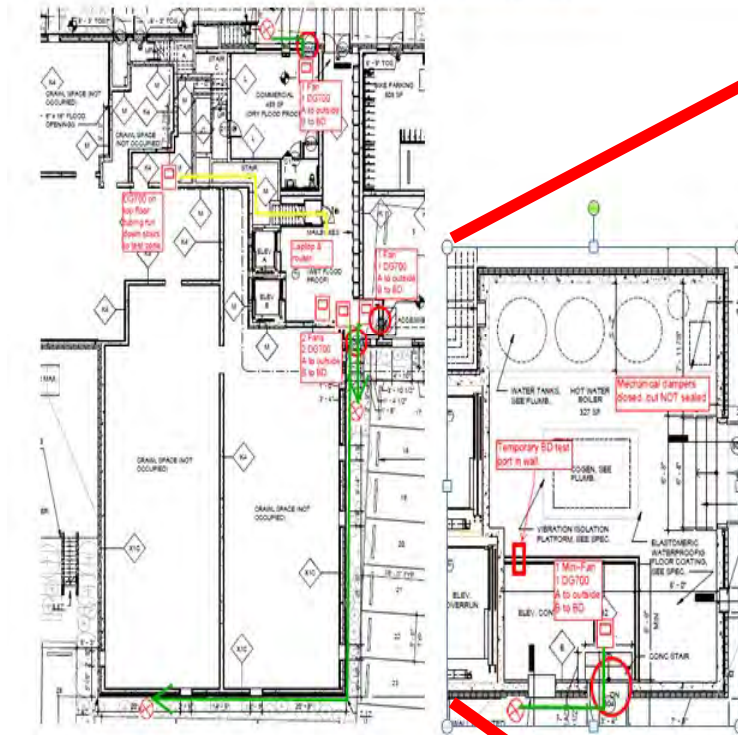


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# Blower Door Test Conditions



Figure 1 – location of test fans, indoor and outdoor pressure taps

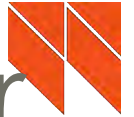


# Blower Door Test Conditions



Intentional Opening	Test Setting	Notes
Windows, doors, skylights and hatches in the building enclosure	Closed and latched	
Dryer doors	Closed and latched	
Doors, hatches and operable windows inside the <u>test enclosure</u>	Open	Use stairways A & B to connect all zones of the building
All motorized dampers	Fan off, damper closed but NOT sealed	Penthouse boiler room. Elevator hoistway
Fire dampers	Remain as found	
ERV's	Fan off, dampers closed. Ducts to outside sealed inside ERV cabinet.	Ventilation is continuous, so dampers closed and sealed
Heat / Cool system	Thermostat to 'off', supply and return ducts open & uncovered	
Combustion appliance flue gas vents	Appliance set to pilot or off Flue left in their as-found position	Penthouse boiler room
Plumbing traps	Sealed or filled with water	

# Individual ERV & Blower Door



- Need to seal off ERV for final test.
- Can't seal off vents from outside
- Will leave ducts to unit disconnected at first, then connect after testing.



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# Complicated Foundations

- Infill site
- Walls near neighbors being poured in stages
- Several foundation inspections needed



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Questions?

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- High Performance Building Guides available
  - Details for efficient façade attachments
  - Guidance on de-rate for penetrations
  - Product information

## Thank you!