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 & testing process above grade
  – 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 & testing process roof insulation
  - Equipment on roof
    - Curbs
    - Brackets
    - Small dividing walls
  - Bulkheads/unconditioned mechanical rooms – roof insulation needed in these areas before main roof
Redline Plan & Section

Vapor barrier switches from inside to outside at this corner.
Drill Into Details

Air and vapor barrier must be addressed at this location.

Insulation void in concrete block. Area must be insulated.
Identify Sequencing & Timing of Inspections
SWA’s Scopes

• Include prelim QA/QC checklist development
  – Dependent on construction type
• Final blower door test plan
Develop Contractor Checklists
Automated Inspection Checklists

- Large projects with multiple dwellings
- Repetitive Tasks - duct & unit by unit leakage testing
- Insulation inspections
<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>2nd Floor Slab Edge Insulation:</strong> Refer to architectural details 20 A-356.</td>
<td>![Diagram of 2nd Floor Slab Edge Insulation]</td>
</tr>
<tr>
<td></td>
<td>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).</td>
<td>![Diagram of 2nd Floor Slab Edge Insulation]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>![Diagram of floor plan showing highlighted area]</td>
</tr>
<tr>
<td></td>
<td>This conditions exits at the area highlighted on the plan to the right.</td>
<td>![Diagram of floor plan showing highlighted area]</td>
</tr>
</tbody>
</table>
Progress

- Panel installation started in March
- Finished top floor end of August
- Drywalled up to 13th 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 4th, 5th and 6th floors
- Window & Door Leakage
- Façade Leakage
- Compartmentalization
Guarded Testing

Red line indicates area that needs to be sealed off. Barrier needs to be taped to ceiling, walls and floors for the entire length as well as overlapping seams.
Temporary Air Barrier
Blower Doors on 3 Floors
Façade Leakage
Measurements: Quantitative

[Image of a window with tape measurement]


Steven Winter Associates, Inc.
NEW YORK, NY | WASHINGTON, DC | NORWALK, CT

CALL US 866.676.1972 | SWINTER.COM
Façade Leakage Measurements: Qualitative
Wall Insulation Inspections

• ICF doesn’t require as many inspections for insulation
1st Window Mockup
2nd Window Mockup
Duct Sealing on ERVs
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
Blower Door Test Conditions

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

- Mechanical dampers closed, but NOT sealed
- Temporary BD test port in wall
- 1 Mini-Fan:DG700 A to outside B to BD
# Blower Door Test Conditions

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

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

larena@swinter.com
Come by Our Booth

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

Thank you!