Significance: Project addresses a common job type in NYC: renovation with occupants in place. This makes it key to the city's carbon reduction goals.
Presentation Outline

• Design and construction overview (David)
• Air sealing (Jason)
• Financing and PV system design/install (McGowan)
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Design & Construction Overview

• Design brief
• Analysis
• Steam System Repair
• Construction
Townhouse, occupied for duration of work.

Owner duplex above, renter at garden level, unfinished basement.
Owner desires
• New windows
• More even heating
• Better AC
• Fight climate change
• Capital improvement to building
Enclosure

- Walls – 2- and 3-wythe brick with interior plaster over wood lath over stud frame. Exterior stucco in satisfactory condition.
- Roof – 2” loose mineral wool between ceiling framing. Fairly new roof with some pocketing.
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- Roof – 2” loose mineral wool between ceiling framing. Fairly new roof with some pocketing.
- Floor – uninsulated frame floor to basement; much of basement ceiling removed for service runs

Analysis
Windows

• Broken springs
• Inability to close/open
• Sashes prone to fall in to interior
• Convective bypass in weight pockets

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Analysis
Skylight
• Typical intentionally vented construction
• Thick debris collecting on stained glass below
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Analysis
Roof Hatch
- Typical type
- Insulated but heavily thermally bridged
Air leakage
- Blower door and smoke puffer for diagnosis
- Biggest leaks found in attic and cellar (outdoors to cellar and cellar to house).
- Service shaft open to cellar shown at right
Air leakage
- Biggest leaks in attic and cellar
- Service shafts open to cellar

Analysis
Air leakage
  • Biggest leaks in attic and cellar
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Analysis
Air leakage
• Biggest leaks in attic and cellar
• Service shafts open to cellar
• Curtain to seal dryer exhaust from cellar

Analysis
Air leakage
• Biggest leaks in attic and cellar
• Service shafts open to cellar
• Curtain to seal dryer exhaust from cellar
• Steam pipe penetrations in floor and ceiling
• Voids in plaster hidden from view
• Gaps under baseboards
• Gaps at entry doors
Ducts (Kitchen & Bath)

- Termination showed no particular flow with all fans on
- Hypothesized that risers terminate in interstitial space

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• Hypothesized that risers terminate in interstitial space
• Poor kitchen hood to duct connection
• Durability issues with duct tape, many seams not sealed at all
Ducts (Dryer)
- Crumpled flex
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- 6 or more adjustable elbows, most at 90º
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- Pinched bullnose
- 6 or more adjustable elbows, mostly at 90°
- Duct tape seals, on transverse joints only
- Booster fan disconnected
- Exhaust termination not blocked from cellar
Odors
- Out of use washer, dry trap in drain
- Missing cap on house trap