

BUILDINGENERGY BOSTON

Seeking Perfection In Air-Sealing

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Presenters:

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Ross MacPherson (New England Air Barrier)





- Everyone is somewhere between those 2 extremes

How do you get perfection...

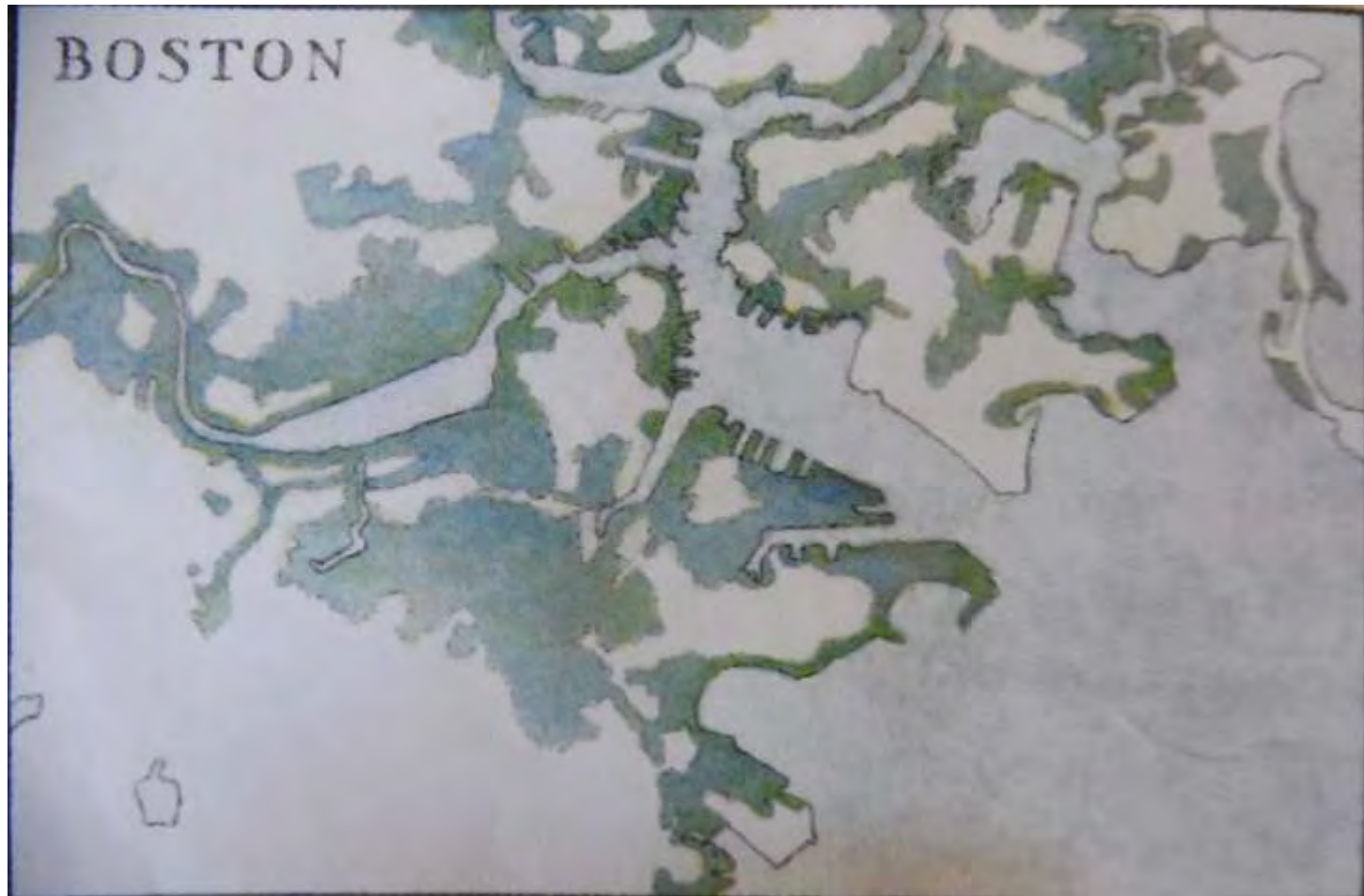
...from the people who do the work?

- 1. Tell them you seek perfection

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- 2. Tell them it will be checked so feedback available

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- 2. Tell them it will be checked so feedback available
- 3. Tell them why perfection is important

6 Feet



- 1. Tell them you seek perfection
- 2. Tell them it will be checked so feedback available
- 3. Tell them why perfection is important
- 4. Check their work

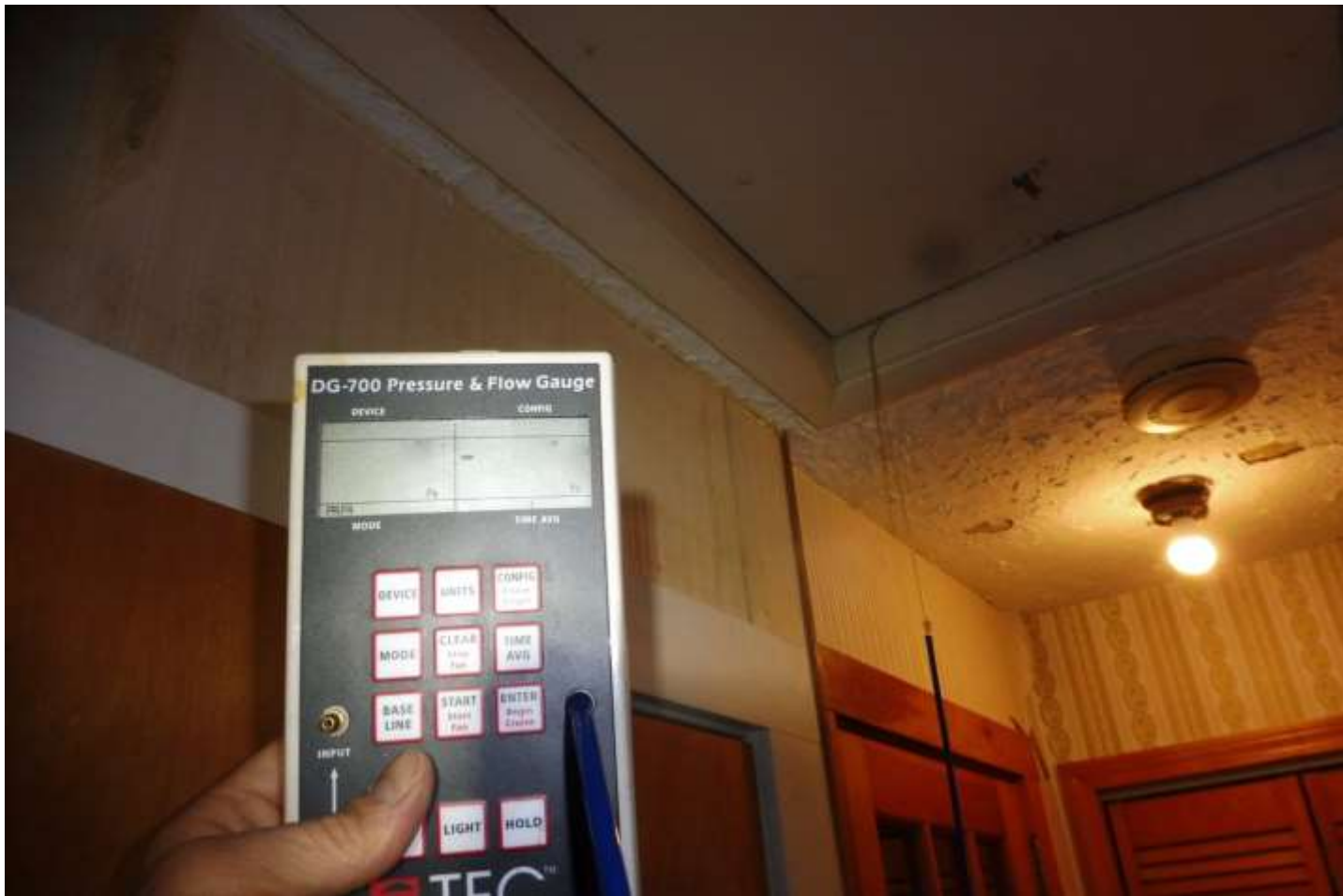
Checking Big Foam



Checking with Tracer Smoke



Zonal Pressure Diagnostics



Checking Cellulose Densepack



Another Way...?

...to get to air-sealing perfection?

Ross?

Is there?

Utilizing Atomized Air-Sealing

BuildingEnergy Boston

Ross MacPherson



What is Atomized Air-Sealing?

Sealant + Compressed Air +
Pressure

Best uses

- New Construction
- Gut Renovations
- Multi-Family Compartmentalization
- Program Air-Sealing Requirements

Challenges

- Adjoining lived-in units
- Finished spaces
- Underperforming build-quality
- Ventilation discussions

Sealant

- Acrylic Based
- Ultra-Low VOC
- Non-Flammable
- ILFI Red List Free
- SDI – 0
- Flame Spread – 0
- UL Listed as an air barrier for all L500, M500, P500, U300, V300, and W300 series assemblies

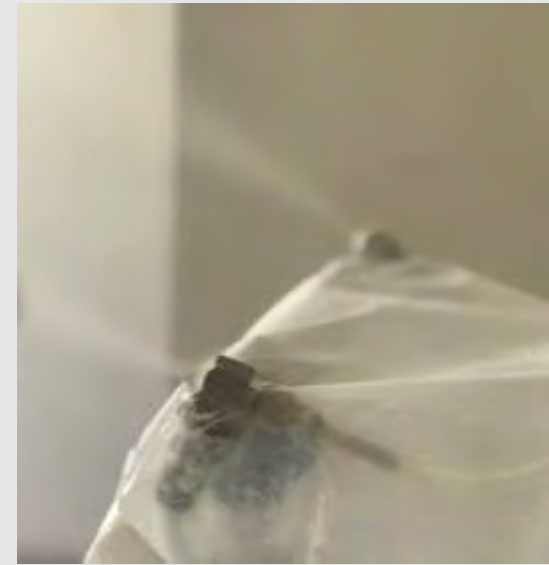




Preparation



- Windows
- HVAC
- Exhaust Fans
- Central Vacuum
- Attic Hatches
- Plumbing Lines
- Manual Air-Sealing



Is This A RESNET Test?

No. There are a few differences.

Seal

SmartSeal(3.0.1.10) CaseID 8035 Residential - [Smart Seal]

File Maintenance Help

NO LABACK FOUND NO DG/DB FOUND

System Home Envelope

Sealing Process

Sealing Time (Minutes)	CFM Leakage @ 50 Pa
5	3000
10	2500
15	2000
20	1800
25	1600
30	1500
31	1800
35	1400
40	1300
45	1200
48	1500
50	1100
55	1000
60	1000

Envelope Leakage (Square Inches) Inlet Temp (°F) Heaters
Envelope Leakage (CFM @ 50Pa) Compressed Air (PSI)
Envelope Leakage (ACH50) Inlet Humidity (%) Envelope Temp (°F)
Fan Flow (CFM) Envelope Humidity (%)
Envelope Pressure (Pa)
Fan Flow Sensor Pressure (Pa)

Fan
Ring Setting Channels
Fan Speed

Sealing Elapsed
Sealant/Water Pump
Fluid Pumped gallons
Pump RPM CCM/Channel
CCM Total

← Previous (F8) Seal Next (F9) →

Interior Conditions



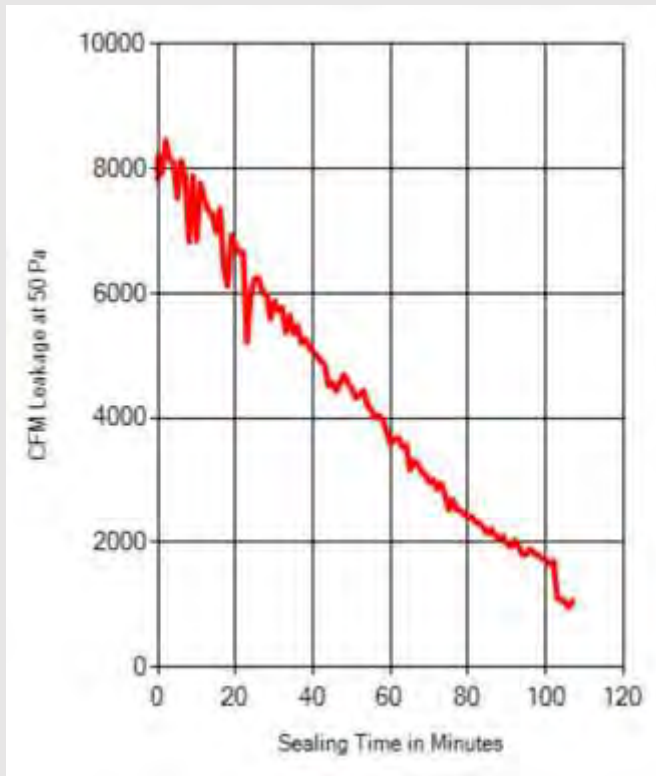
Results



Post Seal

- No Off-Gassing
- Slightly Tacky Floor
- Simulated 50 year Durability
- Cured in 24 – 72 Hrs
- Testing with Retrotec Fans

Uxbridge New Home



- Pre-Insulation
- Start **7,823** CFM
- Finish **1,073** CFM
- Under 2 Hours

Mt. Pleasant School

11 Units



potential

- Built in 1905
- R0 Exterior Walls – Exposed Brick
- Replaced Windows
- Ducted Heat Pumps
- Electric Resistance H2O Tanks
- Atomized Air-Sealing – reduced average air leakage by 54%

MassSave R&A Rebate \$73,000

Send Me Your Questions



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800-916-5895

neairbarrier.com

Typical Air Barrier



Contractor Spectrum



Case Study Starting Number: 4,000 CFMs (-50)



- Cathedral ceiling
- Propa-vents with ridge vent
- 3 inches of recycled extruded polystyrene (R-15)
- 1 inch of Foam-it-Green 2 part foam (R-7)
- 5 ½ inch rafters (R-5.5)
- 2 Sky Lights (R-2?)

Skylights Suck...

...the heat out of a house.

You can get good skylights...

...but how much?

Thermal Weak Spots Suck...

...the heat out of a house

Rafter Issues

- R-5.5 on 10% of thermal boundary because of rafters...
- R-22 on the rest (not including sky lights)
- R-2 on Sky lights

- All other things being equal: heat loss on sky lights per square foot is 11 times worse than the rest (not including rafters)
- 4 times as much heat loss through rafters than in between the rafters
- (Jason will give wall void example)

Cheap ways...

...of bumping up the thermal weak spots with foam board

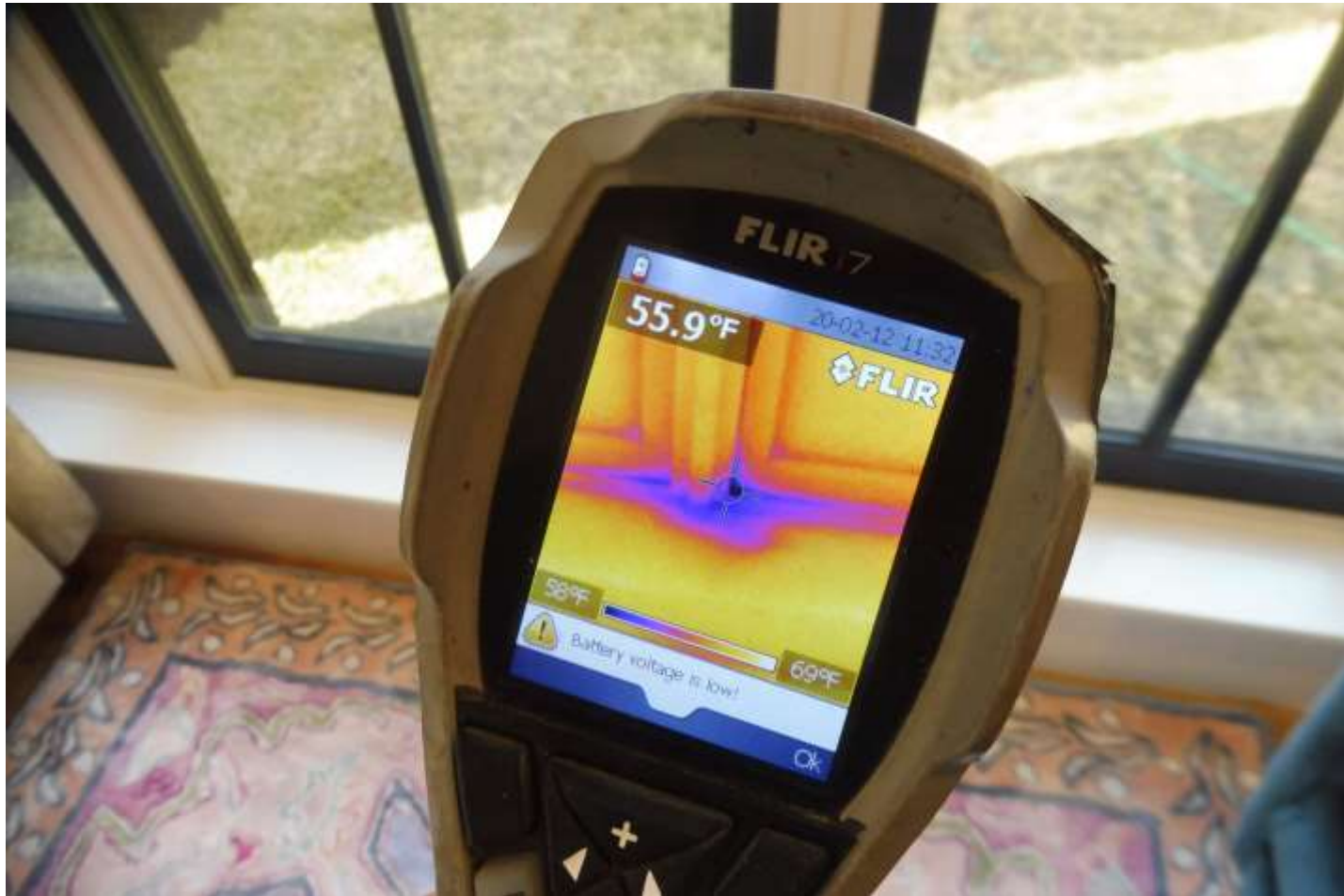


6 Mil Plastic Air barrier?





Do Windows Matter?



After closing up ridge vent and...

...blindly* foaming with 2 part spray foam...

* No blower door

...blower door number down to...

- 1882 cfms (-50)

Blower door guided air-sealing

- video

After blower-door-guided air-sealing:

- 758 CFMs (-50)

Beverly Craig sends me an email:

- Aero-barrier.
- Passiv Haus air-sealing standard reachable using this new technique
- I offer my entire bill as an incentive to try this new technique

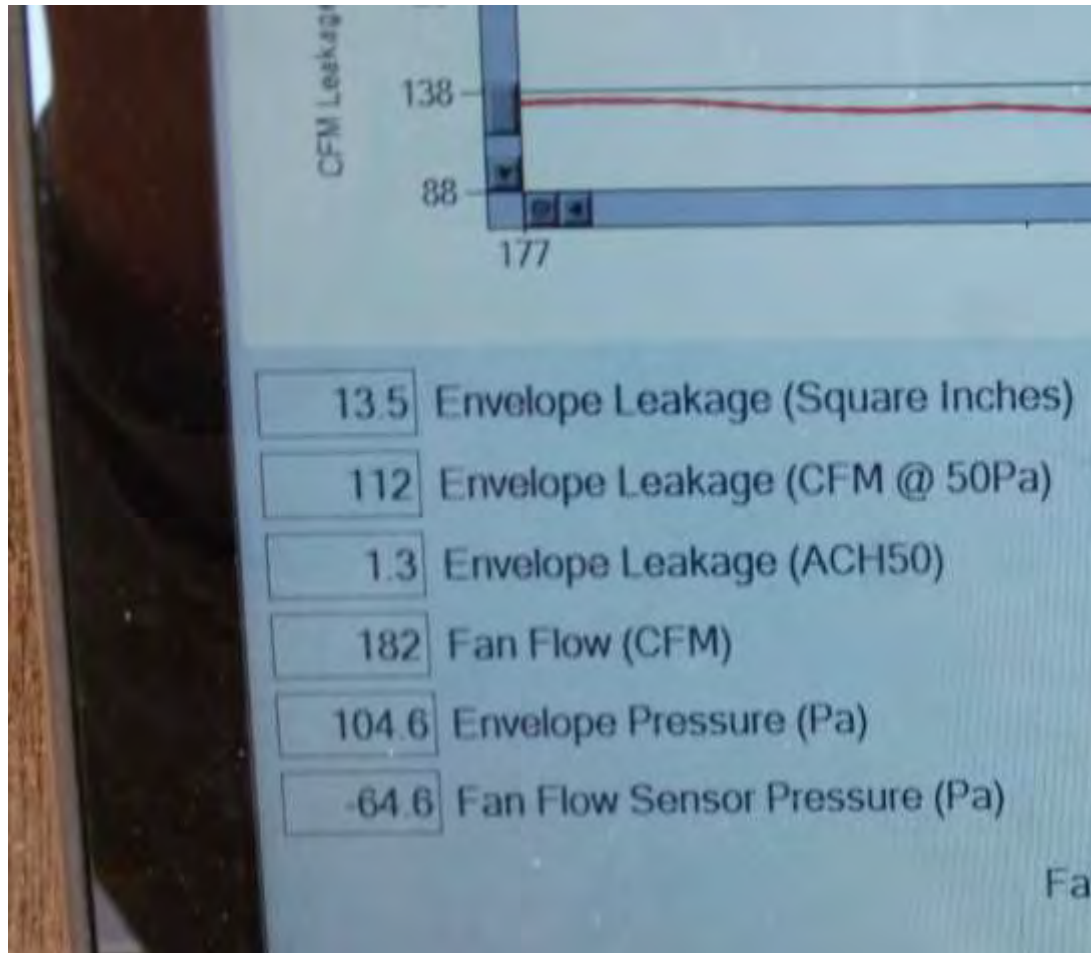
Money Vs. This Future?



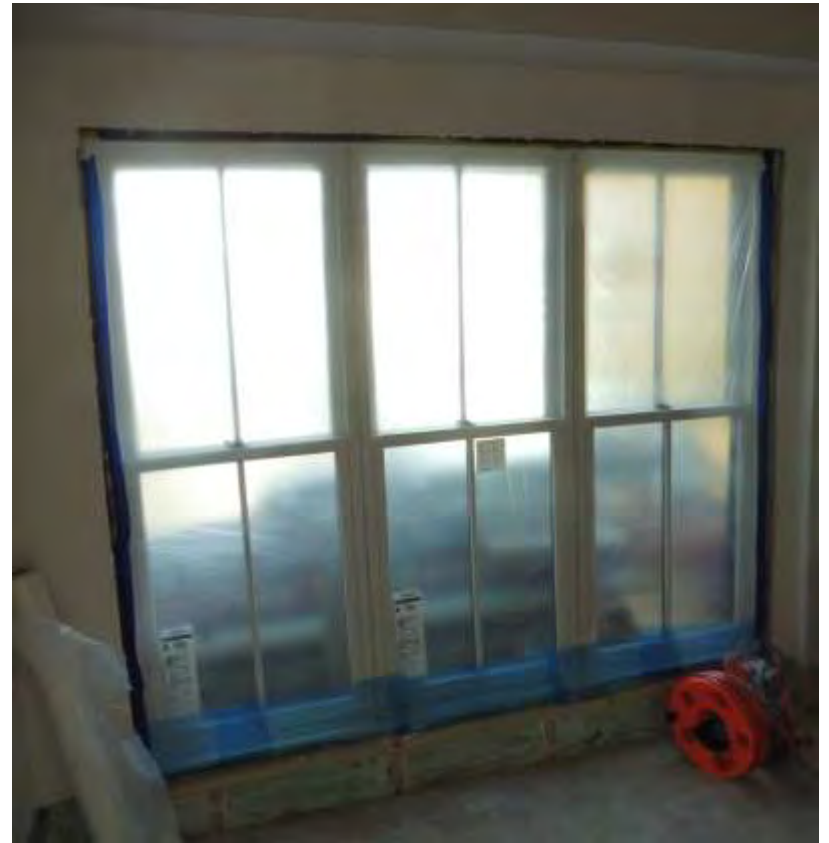
Sticky Feet



182 CFMs



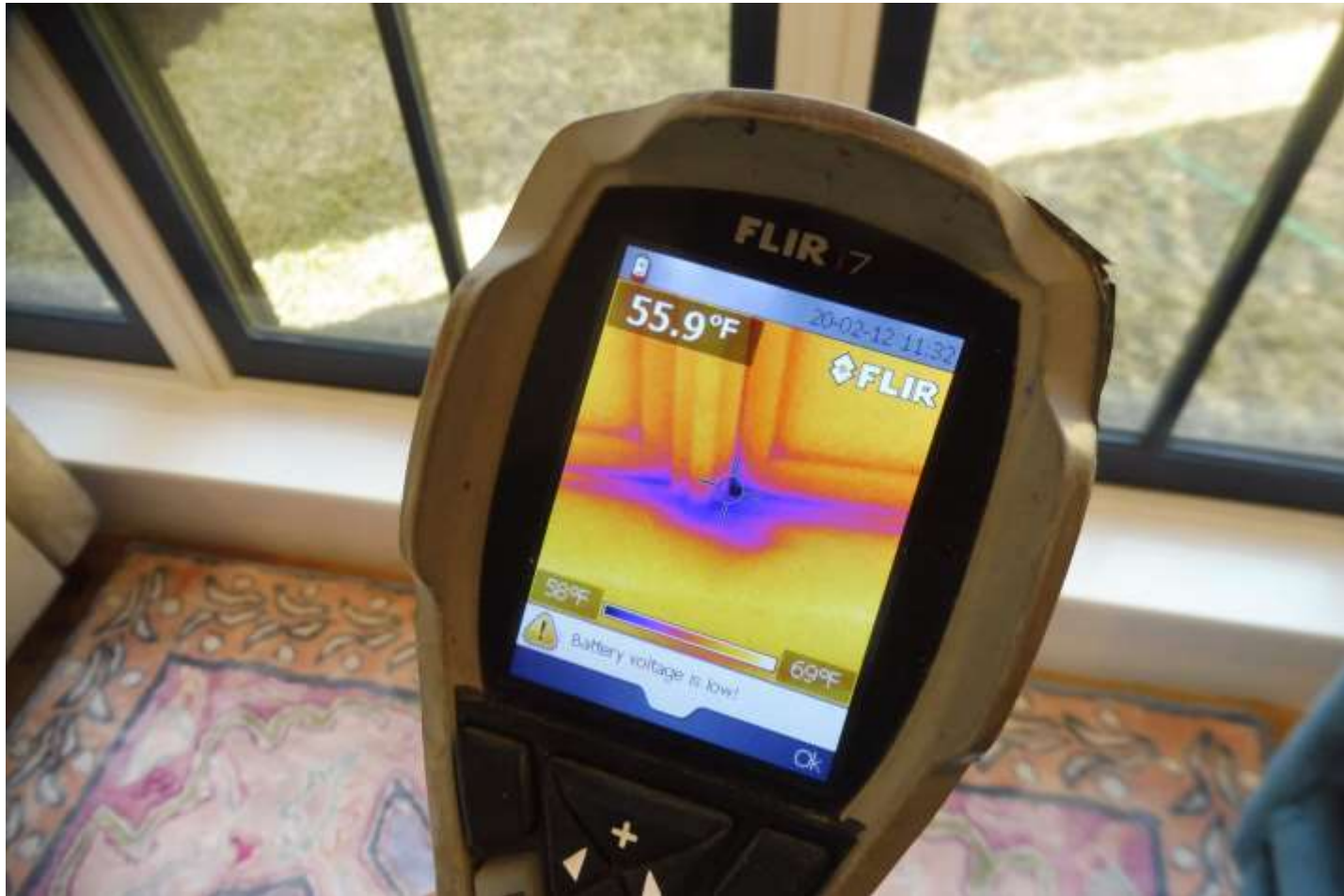
After Removing Plastic and...



Replacing Door



Average Windows and...



6 Mil Plastic Air Barrier at the Bottom





DG-700 Pressure & Flow Gauge

DEVICE

CONFIG

80.3

- 50.0

ADJ
Pa

350

CRUISE

TARGET

FR FL @50

MODE

TIME AVG

DEVICE

UNITS

CONFIG
Cruise
Target

MODE

CLEAR
Stop
Err

TIME
AVG

Help me get more workers!!!

