Envelope Testing
Aniston Federal Courthouse

Scope of Work

Submittal Review: We shall review the contractor's submittals for the purpose of familiarization with the BE systems to be tested.

Fluid Applied Air Barrier: Air Leakage Testing (ASTM E1186-17. Adhesion Testing (ASTM D 4541-17). Air-barrier Dry Film Testing (ASTM D6162-13)

Precast Architectural Concrete Panels: Adhesion Testing (ASTM D 4541-17; ASTM D7234)

Glazed Aluminum Curtain Wall: Curtain Wall Assembly (ASTM E783-02(2018); ASTM E1105-15; AAMA 501.2-15; ASTM C794-18

Exterior Stone Cladding: Wall drainage test of the masonry drainage cavity, flashing, and weep system (ASTM C1715/C1715M-15); Test sealant joints between masonry units for water leakage (ASTM E1105-15); Perform (ASTM C794-18)

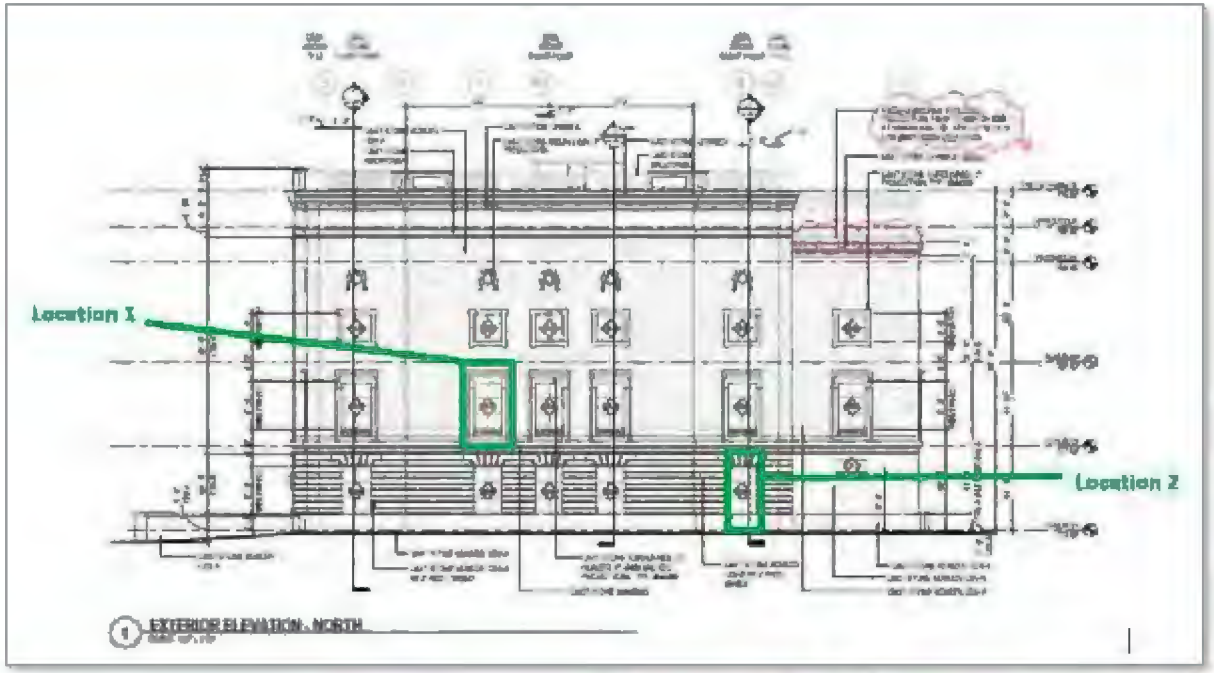
Membrane Roof System: Perform ASTM D7877-14; Perform AAMA 501.2-15. Perform ASTM C1153 - 10(2015)

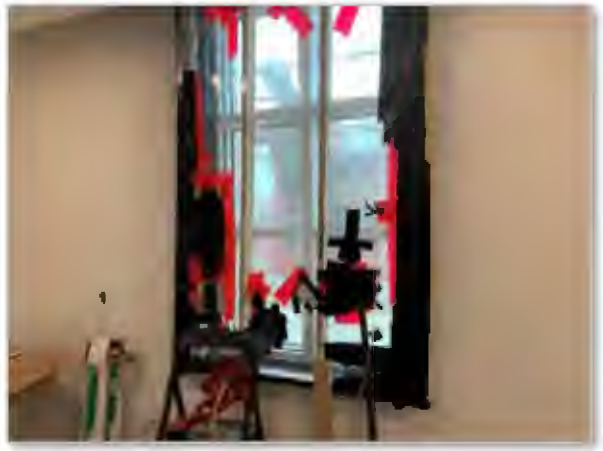
Exterior Joint Sealant: Perform ASTM C1521 - 19(2020)

Air Barrier System Adhesion & Durability: ASTM D4138 - 07a(2017)

Enclosure Airtightness: Perform ASTM E1827 - 11(2017); ASTM C1060-11a(2015)

Envelope Testing
Aniston Federal Courthouse





Scope of Work

Submittal Review: We shall review the contractor's submittals for the purpose of familiarization with the BE systems to be tested.

Fluid Applied Air Barrier: Air Leakage Testing (ASTM E1186-17. Adhesion Testing (ASTM D 4541-17). Air-barrier Dry Film Testing (ASTM D6162-13)

Precast Architectural Concrete Panels: Adhesion Testing (ASTM D 4541-17; ASTM D7234)

Glazed Aluminum Curtain Wall: Curtain Wall Assembly (ASTM E783-02(2018); ASTM E1105-15; AAMA 501.2-15; ASTM C794-18

Exterior Stone Cladding: Wall drainage test of the masonry drainage cavity, flashing, and weep system (ASTM C1715/C1715M-15); Test sealant joints between masonry units for water leakage (ASTM E1105-15); Perform (ASTM C794-18)

Membrane Roof System: Perform ASTM D7877-14; Perform AAMA 501.2-15. Perform ASTM C1153 - 10(2015)

Exterior Joint Sealant: Perform ASTM C1521 - 19(2020)

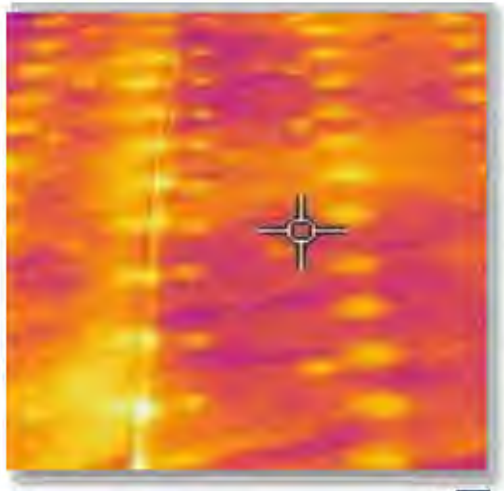
Air Barrier System Adhesion & Durability: ASTM D4138 - 07a(2017)

Enclosure Airtightness: Perform ASTM E1827 - 11(2017); ASTM C1060-11a(2015)

Roof Performance Testing

Infrared

A non-invasive process for identifying areas where moisture may have infiltrated the roofing assembly. Thermal imaging infrared surveys can often identify moisture in the roof system before it becomes a major problem.



Leak Detection

Multiple methods can be used to determine the presence of moisture in roof insulation. This can include electrical leak detection (based on the electrical capacitance of the installed membrane) or nuclear gauge detection (measures the density of the installed materials).

Bell Chamber Testing

Adhesion

A non-invasive process for identifying areas where moisture may have infiltrated the roofing assembly. Thermal imaging infrared surveys can often identify moisture in the roof system before it becomes a major problem.

Electrical Capacitance

Envelope Performance Testing

Air Barriers

Performed to test the unintended movement of air into and out of a building enclosure. Testing your air barrier systems allows you to measure the diffusion of air caused by wind, stack and mechanical equipment pressures. Follows the ASTM E-1105 and/or ASTM E-331 test methods.

Water Testing

Performed on building envelope assemblies with known water control problems to accurately identify suspect construction components and details. Rapid and accurate setup allows immediate understanding of water penetration points in a controlled test setting.

Blower Door Testing

ADHESION PULL TEST

SPRAY RACK TESTING

IECC 2015 Mandatory Provisions

- **C402.5 Building Envelope – Air Leakage**
- C403.2 Mechanical Systems - Heating and cooling loads, Equipment sizing, HVAC equipment performance requirements
- C404 Service water heating equipment performance requirements
- C405.2 Lighting controls
- C405.3 Exit signs
- C405.4 Interior lighting power requirements
- C405.5 Exterior lighting power requirements
- C405.6 Electrical energy consumption [relating to metering for individual dwelling units]
- C405.7 Electrical transformers
- C405.8 Electrical motors

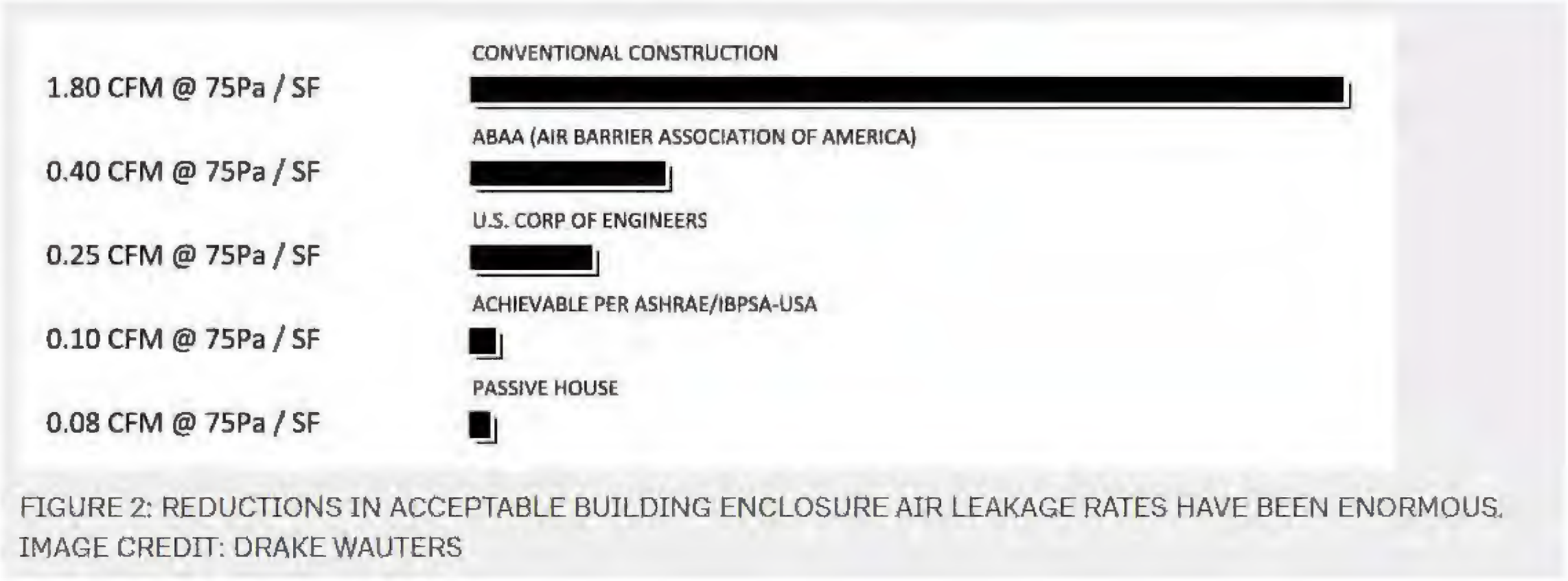


FIGURE 2: REDUCTIONS IN ACCEPTABLE BUILDING ENCLOSURE AIR LEAKAGE RATES HAVE BEEN ENORMOUS. IMAGE CREDIT: DRAKE WAUTERS

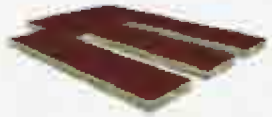
Source: By Drake A. Wauters AIA , https://network.aia.org/blogs/drake-wauters/2017/05/17/air-barrier-durability

OAK RIDGE National Laboratory Energy Savings and Moisture Transport Calculator

Home | Infiltration | Account

Infiltration Calculator Results

Building Type	Primary School
Location	Tampa FL USA
Floor Area	50000 ft²
Energy Price	Electricity 0.11$ /kWh, Natural Gas 11.03$ /1000 ft³



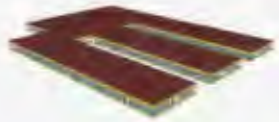
Leakage Rate		Equivalent Leakage Area	
Base Case	Retrofitted Building	Base Case	Retrofitted Building
1.02 CFM/ft² at 75 Pa	0.39 CFM/ft² at 75 Pa	1.90 ft²	0.72 ft²

Description	Base Case	Retrofitted Building
Total Moisture transfer	100,391 gal/year	33,303 gal/year
Moisture transfer per envelope area	0.99 gal/ft²/year	0.33 gal/ft²/year
Moisture transfer per effective leakage area (ELA)	23.09 gal/in²/year	20.04 gal/in²/year

Source: https://airleakage-calc.ornl.gov/#/infiltrationcalculation

Infiltration Calculator Results

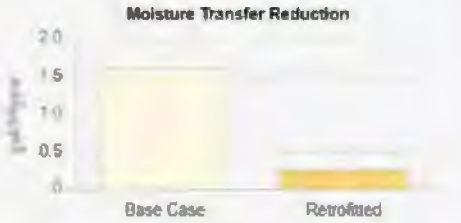
Building Type	Primary School
Location	Charlotte NC USA
Floor Area	50000 ft²
Energy Price	Electricity 0.09$ /kWh. Natural Gas 9 12$ /1000 ft³



Leakage Rate		Equivalent Leakage Area	
Base Case	Retrofitted Building	Base Case	Retrofitted Building
1.80 CFM/ft² at 75 Pa	0.39 CFM/ft² at 75 Pa	3.35 ft²	0.72 ft²

Predicted Annual Savings	Electricity	Natural Gas
Energy	18,265 kWh	339,213 ft³
Cost	$ 1,643.84	$ 3,093.62
Total Cost Savings	$ 4,737.47	

Moisture Transfer through the Wall Assembly due to Air Leakage		
Description	Base Case	Retrofitted Building
Total Moisture transfer	163,231 gal/year	26,814 gal/year
Moisture transfer per envelope area	1.62 gal/ft²/year	0.27 gal/ft²/year
Moisture transfer per effective leakage area (ELA)	21.27 gal/in²/year	16.13 gal/in²/year



Source: https://airleakage-calc.ornl.gov/#/infiltrationcalculation