Architectural Practice Community of Interest

Mission Statement:

• Promote Architectural Practice within SAME.
  – Advocacy Through Local APCOI POCs and Service Liaisons
  – Quality Technical Sessions at JETC
  – Face to Face APCOI Meetings at JETC and SBC
• Broaden SAME’s exposure in the architectural community to attract more architects in SAME.
  – Advocacy Through Local APCOI POCs and Service Liaisons
  – APCOI IQJ and Quarterly Calls/Webinars
• Networking and mentoring.
  – JETC/Regional Conferences/GM Meetings
• Celebrate excellence in public architecture.
  – 2020 SAME APCOI Design Awards Program
Progress Review/Discussions:

- APC Leadership Reports
  - AIA Collaboration – Ed Gauvreau (LTC Hugh Darville)
  - Continuing Education – Jose Matute
  - Communications – Laura Lavelle (Jim Oschwald)
    - APCQJ publication
    - Webinar Announcements
  - Design Awards Program – JJ Tang/Paula Loomis
  - SAME National Representative – Belle Febbraro
- Succession Planning
  - All positions – Please advise of interest.
- Urbahn Medal recipient – Captain Dan Cook
- JETC Technical Sessions – 5 moderators needed
- Others?
Service Branch Liaisons:

- Advising the committee on initiatives benefiting service branch architects.
- Encouraging and supporting interactions among industry and service branches.
- Encouraging participation from all service branches in SAME architectural activities.

- Army Liaison: TBD (Kenny Simmons?), USACE HQ
- Navy Liaison: CAPT Dan Cook, NAVFAC SW, Daniel.w.cook1@navy.mil
- Air Force Liaison: TBD, Air Force Civil Engineer Center
**Daphne Gurri is the architectural liaison coordinator**

Encouraging quality architectural programs in major SAME posts.

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<th>Location</th>
<th>First Name</th>
<th>Last Name</th>
<th>Company</th>
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<td>Leising, Luke</td>
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Architectural Practice Committee webpage:
http://www.same.org/apc
Questions?

Webinar
“High Performance Building Envelope”
By
Steve Tratt
CANAM Building Envelope Specialists, Inc.
Welcome to Architectural Practice Committee Meeting

High Performance Building Envelope
HOUSEKEEPING

• Mute your phones
• Submit a written question at any time during the event via the “CHAT”
• During the presentation, all participants will be in a listen-only mode
• This webinar will be recorded
Steven Tratt, National Sales Manager, Canam Building Envelope Specialists

- Before the pandemic I have traveled at least once a week nationally or abroad
- Frequently visit Florida during my down time
BUILDING AIR LEAKAGE AND EFFECTS ON THE BUILDING ENVELOPE

Tremco Roofing and Building Maintenance

J157
Presenter Name Steven Tratt
Date April 2020
This presentation is for architects and other design professionals interested in increasing their knowledge of the application and use of air barriers in the building envelope of commercial and multi-family residential buildings. Researchers, architects, and code writers have shown that attention to specific details in both new and retrofitted envelopes result in better performing buildings with better comfort and long durability as well as lower energy consumption.
BUILDING AIR LEAKAGE AND EFFECTS ON THE BUILDING ENVELOPE

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with AIA CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.

Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.
Learning Objectives:
At the end of the program, participants will be able to:

- Understand the definition of a High Performance Building and the importance of Air and Moisture Management to Occupants
- Understand the connection of the Building Envelope and the impact it has for the facilities Durability, Sustainability, Energy Efficiency, Occupancy Comfort/ Health and IAQ
- Understand the application differences of Air Barrier product types for new construction / major façade retrofit vs. remediation of existing buildings, (when the building owner is not considering re-skinning the façade).
- To understand what causes Building Air Leakage in the existing asset and how to remediate.

After the conclusion of this presentation there will be Examples / Results and time for Open discussion.
Definition of the High Performance Building

The term "high performance building" means a building that integrates and optimizes all major high-performance building attributes, including energy efficiency, durability, life-cycle performance, and occupant productivity.*

4 Elements of a High Performance Building
- Heat Flow
- Air Flow and Pressure
- Moisture
- Air Quality

*High Performance Building Council
a council of the National Institute of Building Sciences
Air Barrier Continuity - Identifying breaches:

The Basics of Air leakage

- Continuity is the most important characteristic of the air barrier system prevents.....

  Infiltration / Exfiltration which is

  • Diffusion Flow
  • Orifice Flow
  • Channel Flow

- Allows the proper control of air movement into and out of building enclosures

- All six sides of a building enclosure must be continuous within themselves and in conjunction with each other
Air Leakage & Moisture

Test simulating a Ottawa, Canada winter comparing an intact air barrier vs. a ¾” hole in the air barrier

Transport via DIFFUSION over 1m²

1/3 Litre
(10 oz)

Coated board with a liquid applied air barrier. Exposed coated side to Pressure and Moisture.

Transport via AIR LEAKAGE Through 4 cm²

30 Litres
(~ 8 Gallons)

Conducted same test with a ¾” hole in the board

100 times more moisture diffused through the board!
3 items in the conditioned building influenced by air leakage:

**Heat – Air – Moisture (HAM)**

Building Science translates that impact to:

- **Heat** = Energy Efficiency ♦ Equipment Sustainability
- **Air** = Comfort ♦ Productivity ♦ *IAQ Health
- **Moisture** = Building Durability ♦ *IEQ Health

* The terms *indoor environmental quality (IEQ)* and *indoor air quality (IAQ)* are often confused. The basic difference between the two is that **IEQ** refers to the environment that exists inside a building such as *the concentration of CO₂ gases, the thermal conditions, moisture and dampness* (Kumar 2002). Whereas **IAQ** is strictly, “a function of the interaction of contaminant sources and the effectiveness of ventilation utilized to dilute and remove air contaminants” (Bearg 2008).
Building Air Leakage Consequences
The Air and Moisture Connection

- HVAC Sizing
- Wind Effect/Weather
- Occupant Comfort
- Indoor Air Quality
- IAQ / IEQ
- Durability
- Energy Efficiency

= Productivity
= Sustainability
= Savings
Influences- the Building Science has been there; Now becoming relevant!

Codes Standards and Recommendations

Factors that continue to push the construction industry to higher performance and more energy efficient buildings

- ASHRAE 90.1- 2010, 2013
- IECC 2012
- IBC
- USACE
- ABAA
- NABA
- National Institute of Building Sciences
- Specialty Niche Organizations, (e.g. Joint Commission)
Base Diagnostic Tools:
For the forensic field assessor- identifying the source

- Smoke Pencil or similar tool to provide show of air flow
- Trained Assessor with camera & intake form
- Flir E50 BX IR camera
- Velocicalc 9565 IAQ Probe 980 for: Temp- RH, CO2 – Pressure
- Mold and BIO snaps
Advanced Diagnostic Tools:

Optional cost, additional set-up- measured leakage

**Diagnostic Tools**
Testing the airtightness of a home using a special fan called a blower door can help to ensure that air sealing work is effective. Often, energy efficiency incentive programs, such as the DOE/ EPA ENERGY STAR Program, require a blower door test (usually performed in less than an hour) to confirm the tightness of the house.

- Blower Door
- Standard Pressurization Kit and gauges used by Building Science Engineer Partner
- Multi-fan or larger
Air Barrier Continuity:

Failure of air barrier systems

- Breaches in the air barrier and it’s connections / continuity will make buildings:
  - Less healthy
  - Unsafe
  - Less durable
  - Uncomfortable
  - Energy inefficient
Air Barrier Continuity:

Failure of air barrier systems

• Leads to:
  • Uncontrolled and uncontrollable air leakage..
    • Infiltration / Exfiltration

• Caused by:
  • Stack effect
  • Wind effect
  • Mechanical effect
Importance of Continuity  Intro to IAQ/ IEQ:
According to the Environmental Protection Agency

– North Americans spend 80-90% of their time indoors, so IAQ is very important, for health and productivity reasons
– Sick Building Syndrome (SBS) involves health and comfort effects linked to time spent in a building
– Building Related Illness (BRI) involves symptoms of diagnosable illness attributed directly to airborne building contaminants (Asthma, aggravated allergies, etc.)
Occupant Control:

Temperature is the #1 complaint of office building occupants:

**Thermal Comfort Involves:**
- Humidity
- Air Speed
- Temperature
- Clothing
- Activity

**Thermal Comfort Issues:**
- Too hot, Too cold
- Too wet, Too dry

Thermal Environmental Conditions for Human Occupancy
The byproduct / financial benefit of air sealing:

Is a cost justifiable process, not sole driver

– Energy Efficiency that will save you MONEY!
  • More efficient ventilation in the HVAC system
  • More efficient use of pumps and fans within the system
  • Better performance of the system could mean longer operation life of the equipment

– 3 recommendations for all buildings (in order)
  • Air Sealing – inexpensive, is a building maintenance issue that is often ignored, should be looked at as long-term investment
  • Insulate- ALWAYS done after air sealing to enhance the conditioned space
  • HVAC- upgrade / redesign- done in this order will maximizes system efficiency
Stack effect is a temperature-driven phenomenon, which is especially noticeable in cold weather, when warmer indoor air, which is more buoyant than the colder outdoor air, tends to rise in the building.
The Building Science of Air Barrier Continuity

Failure of air barrier systems

Wind Effect
The Building Science of Air Barrier Continuity
Failure of air barrier systems

Mechanical Effect (Negative)
The Building Science of Air Barrier Continuity

Failure of air barrier systems

Mechanical Effect (Positive)
How Do We Implement??

There is a process for Assessment
Air Barrier Continuity
Diagnosing the problems

• Building envelope assessment
• Depressurization testing
• Locating air leakage paths
Air Barrier Continuity
Diagnosing the problems

- Building envelope assessment
- Depressurization testing
- Locating air leakage paths
- **Infrared thermography**
Air Barrier Continuity

i. TOP
ii. BOTTOM
iii. VERTICAL SHAFTS
iv. OUTSIDE WALLS
v. COMPARTMENTALIZE
Air Barrier Continuity

i. TOP
Air Barrier Continuity

Seal top of building

• Attics
• Roof/wall intersections and plenum spaces
• Mechanical penthouse doors and walls
• HVAC equipment
• Other roof penetrations
Air Barrier Continuity

Seal top of building
Air Barrier Continuity

• **The plenum**
  – Air can be extracted through many different assemblies if air barrier systems are not in place.
Air Barrier Continuity

• The plenum
  – Air can be extracted through many different assemblies if air barrier systems are not in place

exterior sheathing
Air Barrier Continuity

• The plenum
  - Air can be extracted through many different assemblies if air barrier systems are not in place
Air Barrier Continuity

Seal top of building
Air Barrier Continuity

Seal top of building
Air Barrier Continuity

Seal top of building
Air Barrier Continuity

Seal top of building
Air Barrier Continuity

i. TOP

ii. BOTTOM
Air Barrier Continuity

Seal bottom of building

- Defined as: “the ground floor and anything below grade
- Typically a unique area of the building
- Soffits and ground floor access doors
- Underground parking access doors
- Exhaust and air intake vents
- Pipe, duct, cable and other service penetrations into core of building
- Sprinkler hangar penetrations, inspection hatches and other holes
- Seal core wall to floor slab
- Residential crawl spaces
Air Barrier Continuity
Air Barrier Continuity

Seal the bottom of the building
Air Barrier Continuity

Seal bottom of building
Air Barrier Continuity

i. TOP

ii. BOTTOM

iii. VERTICAL SHAFTS
Air Barrier Continuity

Seal vertical shafts

• Stairwell fire doors
• Fire hose cabinets
• Plumbing, electrical, cable and other penetrations within service rooms
• Elevator rooms- cable holes, door controller cable holes, bus bar openings
Air Barrier Continuity

Seal vertical shafts

• Garbage chute perimeter and access hatches
• Hallway pressurization grille perimeters
• Smoke shaft access doors
• Elevator shaft smoke control grilles
• Service shafts
Air Barrier Continuity

Seal vertical shafts
Air Barrier Continuity

Seal vertical shafts
Air Barrier Continuity

Seal vertical shafts
Air Barrier Continuity

Seal vertical shafts
Air Barrier Continuity

i. TOP
ii. BOTTOM
iii. VERTICAL SHAFTS
iv. OUTSIDE WALLS
Air Barrier Continuity
Seal outside walls and openings

• Weather-strip windows, doors, including balcony/patio doors and seal window trim
• Exhaust fans and ducting
• All service penetrations
• Baseboard heaters
• Electrical receptacles
• Baseboards
Air Barrier Continuity

Seal outside walls and openings
Air Barrier Continuity

Seal outside walls and openings
Air Barrier Continuity

Seal outside walls and openings
Air Barrier Continuity

- TOP
- BOTTOM
- VERTICAL SHAFTS
- OUTSIDE WALLS
- COMPARTMENTALIZE
Air Barrier Continuity

Compartmentalize

• Garages
• Vented mechanical rooms
• Garbage compactor room
• Emergency generator room
• High voltage rooms
• Shipping docks
• Elevator rooms
• Workshops
Air Barrier Continuity

Compartmentalize
Air Barrier Continuity

Compartmentalize
Air Barrier Continuity
Fixing and preventing air leakage paths

- Conduct building assessment
- Determine location and severity of air leakage pathways
- Identify internal pathways
- Develop scope of work to create air barrier continuity
Air Barrier Continuity

Materials used

2-component polyurethane foam insulating air seal kits

Must meet requirement of ULC Standard S711.1
Air Barrier Continuity

Materials used

Caulking - Silicones

- Tremco Dymonic
- DAP Silicone Doors and Windows
Air Barrier Continuity

Materials used

Door and window weather-stripping seals
Air Barrier Continuity

Materials used

Air seal/fire stop systems
**Financial Results That Matter**

<table>
<thead>
<tr>
<th>CANAM METRICS (2018)</th>
<th>Building SF</th>
<th>Average Annual Energy Savings</th>
<th>Average Costs to Implement BE Corrective Measures</th>
<th>Typical Payback</th>
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<tbody>
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<td></td>
<td>50,000</td>
<td>$3,350</td>
<td>$15,000 - $25,000</td>
<td>3 – 10 years</td>
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<td>100,000</td>
<td>$6,700</td>
<td>$30,000 - $50,000</td>
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<tr>
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<td>200,000</td>
<td>$13,400</td>
<td>$60,000 - $100,000</td>
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This translates to:

- $0.067/SF of Average Annual Energy Savings
- $0.30 - $0.50/SF Average Cost to Implement BE Corrective Measures
Now the building is tight... Now what?

- Evaluate if rebalancing is necessary
  - Where areas cold while others too hot?
  - Was there an attempt to correct through HVAC
  - Understand how to manage the building RH

- Evaluate if the ventilation system is clean
  - Check coils to see if packed with dust /dirt
  - Check duct work to verify clean

- Evaluate other issues to determine correction of:
  - Pests, fecal matter and parts
  - Moisture infiltration building durability issues
  - IAQ issue continues, odors, dust levels remain the same, WHY?
Air Barrier Continuity

Improving health, safety, durability, comfort and energy efficiency in healthcare, commercial, institutional and multi-family buildings is as easy as ABC
Homer Louisiana Hospital Air Sealing Project: History of Mold Problems, High Humidity and Condensation, Negative Air Pressure, High Bills
Case Study

Lots Of Little Leaks: Windows and Doors
Case Study

And when they looked at all of the Roof Vents....
Case Study
Case Study

Overhanging Soffit Roof/Wall Joint Leakage Site Seen From Inside Unconditioned Soffit

3.16.2005
Case Study

Overhanging Soffit Roof/Wall Joint
Leakage Site Seen From Inside
Conditioned Space
Case Study

Metal soffit panel seams, sealed with foam sealant
Case Study

Results: Controlled Humidity, Twice Expected Savings on Utility Bills, 3 year payback on $52,000 job
Other Project Profiles • Healthcare & Higher Ed

Balancing the Mechanical System With Air Sealing Provides More Even Temperatures Throughout Edward Hospital Buildings

Air sealing measures resolve stack effect pressure issues.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
<th>Results</th>
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</thead>
<tbody>
<tr>
<td>Essex Hospital had noticed pressure on their HVAC system, resulting in uneven temperatures throughout the building. The HVAC system was not operating efficiently, leading to high energy costs.</td>
<td>Canam recommended installing air sealing around ducts and mechanical systems to improve airflow and reduce pressure fluctuations.</td>
<td>Air sealing measures resolved the pressure issue, improving HVAC system efficiency and reducing energy costs.</td>
</tr>
</tbody>
</table>

Canam installed air seals around ducts, reducing pressure fluctuations and improving airflow. The HVAC system operates more efficiently, resulting in cost savings and improved indoor air quality.

Air sealing improved the mechanical system's performance, providing more even temperatures throughout the building. Essex Hospital experienced cost savings and improved indoor air quality.

The project exemplifies the benefits of air sealing in healthcare settings, demonstrating how Canam solutions can enhance building performance and occupant comfort.

Customer confirms air sealing measures increase occupant comfort and IAQ

The project for Arkansas' hospitals involved installing air sealing to improve indoor air quality and reduce energy consumption. Canam provided custom solutions to achieve these goals.

Customer satisfied with the improved IAQ and energy savings, reporting a 10% decrease in energy costs since the installation of air seals. The hospital staff and patients have noticed a significant improvement in comfort levels, with fewer complaints of drafts and drafts.

Canam's air sealing solutions proved to be cost-effective, providing long-term benefits for the hospital and its occupants.

The project was a success, demonstrating Canam's commitment to delivering high-quality solutions that enhance indoor air quality and occupant comfort.

For more information on how Canam can help you with your indoor air quality and energy consumption, visit canambuildingenvelope.com.
Thank You!

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Questions??

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Upcoming Events

**2020 JETC**

*May 27 – 29, Washington, DC*

**VIRTUAL**

**Facilities Management Workshop**

*July 29-31, San Antonio, TX*

**2020 Small Business Conference**

*November 4-6, Dallas TX*
JETC 2020 Architectural & Engineering Sessions

• Design and Construction for Successful Accreditation of a Secure Facility
  – Wednesday May 27th @12:30 pm – 1:30 pm EST

• Human-Robot Collaboration in Construction Sites
  – Wednesday May 27th @ 2:30 pm – 3:30 pm EST

• Solving Cost Challenges Through Mission centric, Function-driven Design
  – Wednesday May 27th @ 4:00 pm – 5:00 pm EST

• Insight into DoD Critical Systems Testing & Integrated Commissioning Processes
  – Wednesday May 28th @ 2:30 pm – 3:30 pm EST