PEDCO BUILDING AIR LEAKAGE AND EFFECTS ON THE ENVELOPE A CASE STUDY

Tremco Roofing and Building Maintenance

Steve Tratt
October, 2015

Tremco Incorporated is a Registered Provider with The American Institute of Architects Continuing Education Systems.

Learning Objectives:

At the end of the program, participants will be able to:

- Brief overview of the Building Science of Air Leakage
- Air Leakage Problem vs. Total Building Assessment
- Actual case studies of customer problems
- Tools and process to detect and Assess.

Importance of Building Air Leakage:

Building as a system… its all connected

Overview of the Building Science of Air Leakage

Definition of Building Air Leakage-

Any breach in the the Building Envelope that causes a lack of continuity between connections, which allows unintended infiltration / exfiltration to occur in a conditioned space.

Unintended air and moisture issues cause:

- *Occupant discomfort*
- *Indoor Air Quality problems*
- *Building asset degradation*
- *Pathways for Pests*
- *Added expense for utility waste*

An understanding of Building Air Leakage- the impact on the end user

Required or just common sense

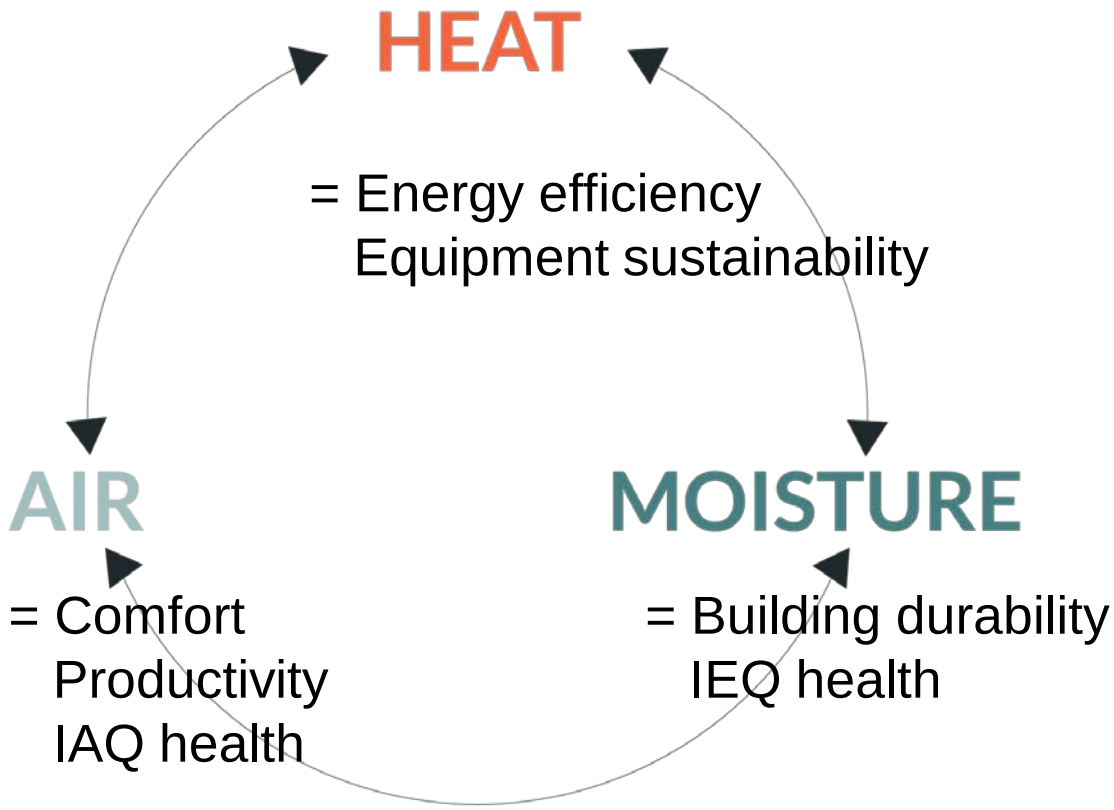
When to address in the Building Life Cycle

(cradle to gravel)

- New construction
  - its about the connection details
- Additions / Retrofits
  - If new addition is to utilize high performance building standard, how is the existing/remaining structure handled?
- Operations and Maintenance
  - age of building (new and old buildings leak about the same)
  - warmer climates appear to be not as tight
- Fixing a problem within the building impacting: comfort, performance, health, durability or efficiency

3 items in the conditioned building impacted by air leakage

Building science translates:



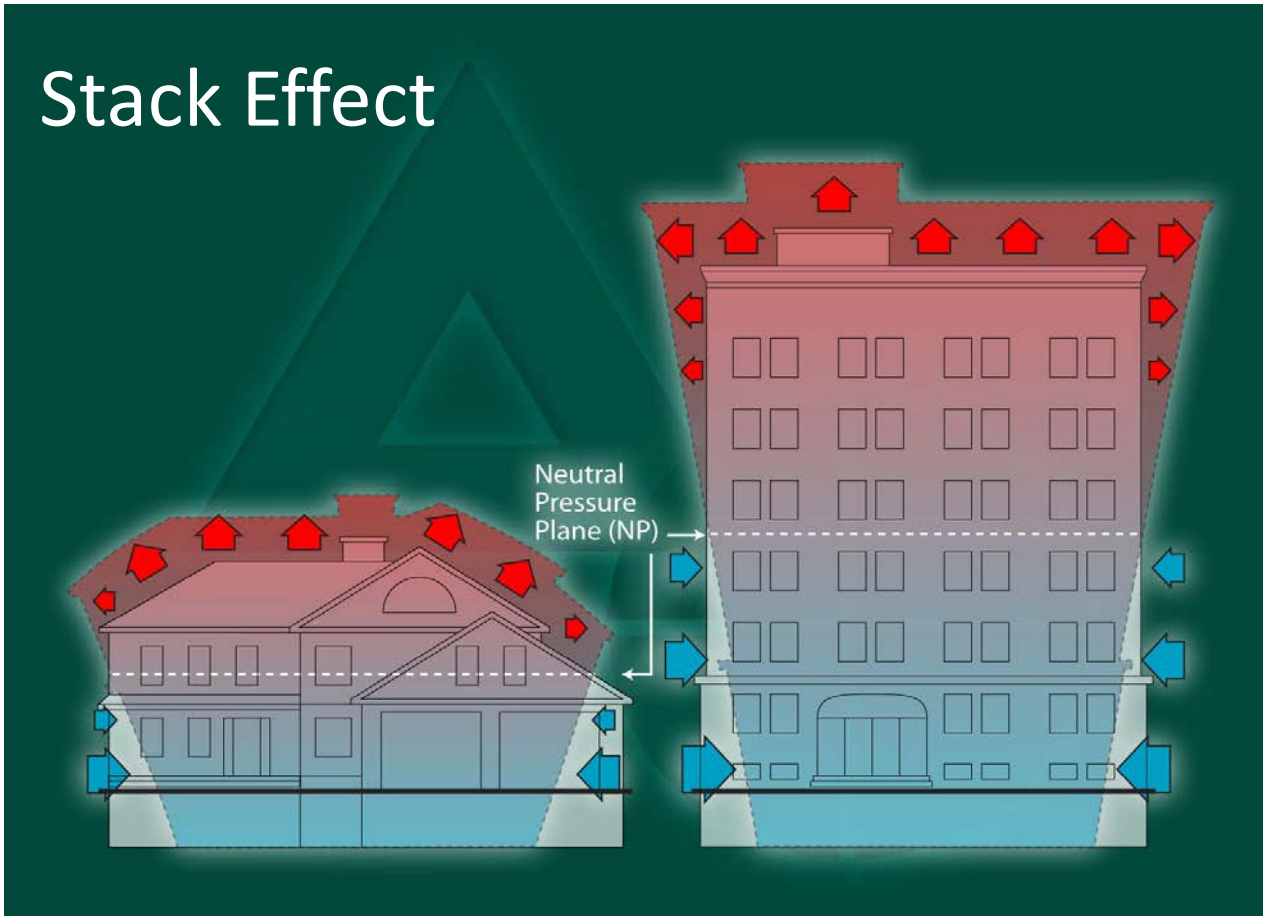
Air Barrier Continuity- *the process*

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

- Condition Evaluation / Testing
- Building Science effect of:
  - *Stack effect*
  - *Wind effect / weather data*
  - *Mechanical effect*
- Energy Engineering to calculate the inefficiency

The Building Science of Air Barrier Continuity

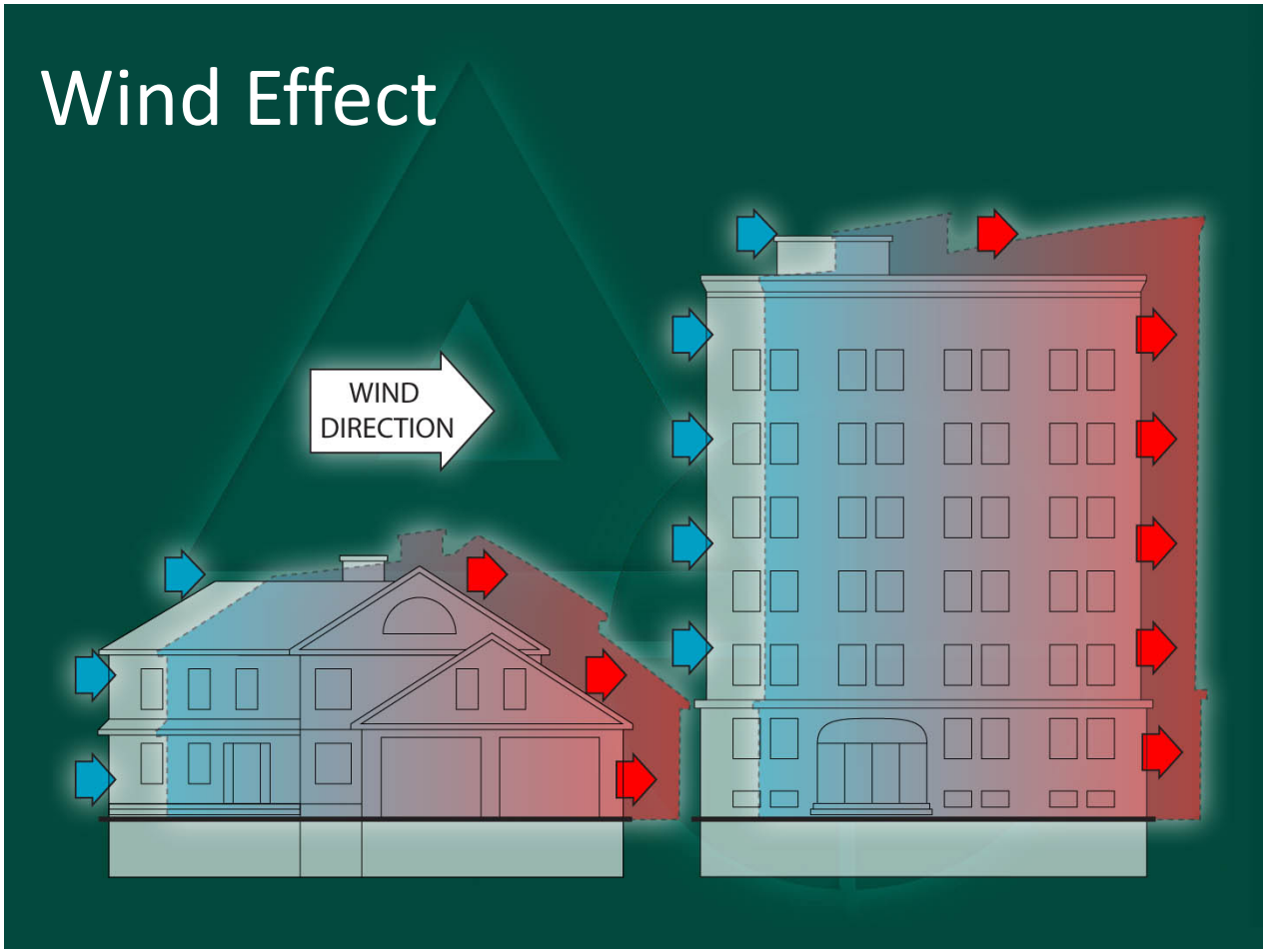
Failure of air barrier systems



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



The Building Science of Air Barrier Continuity

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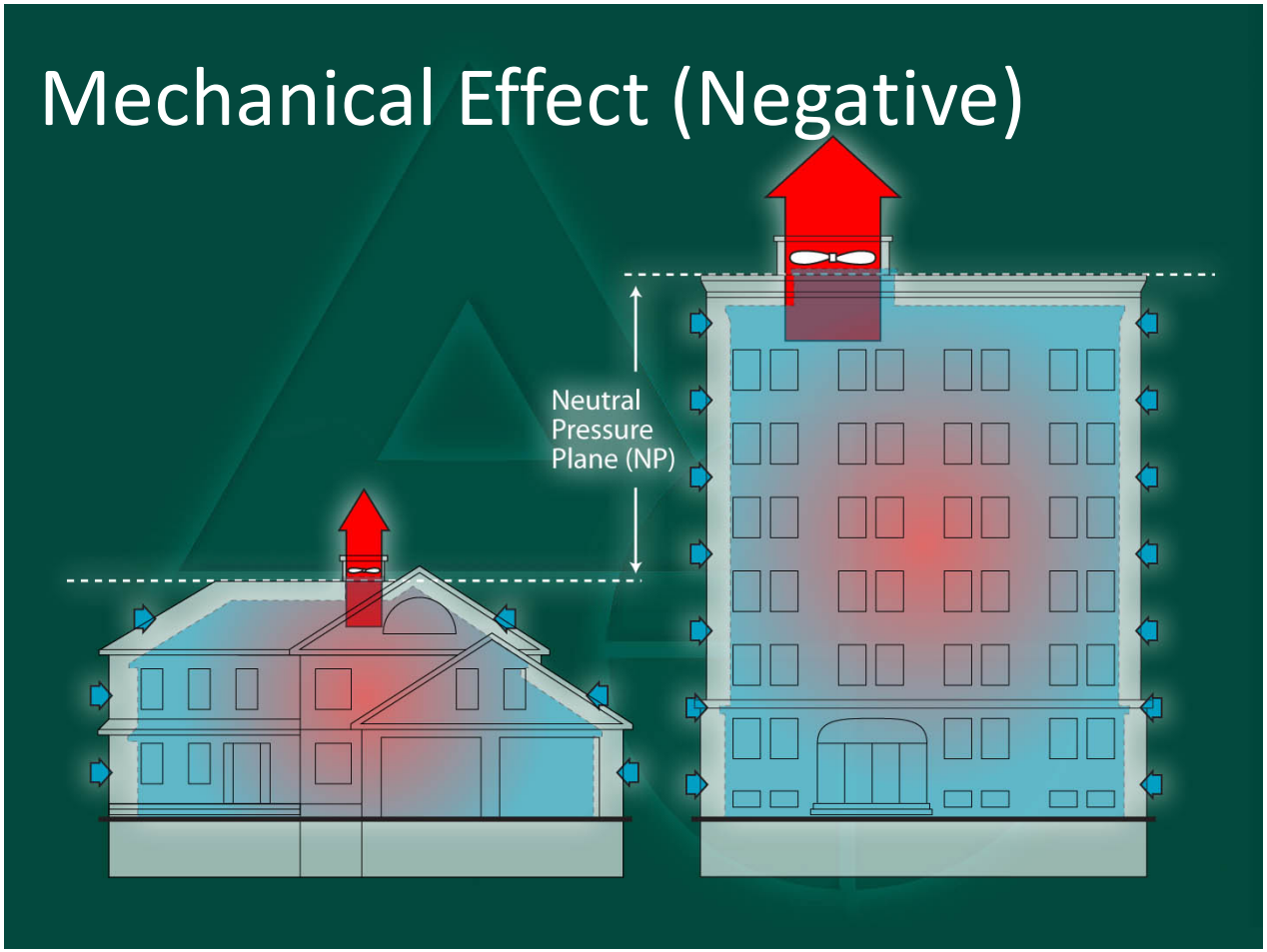
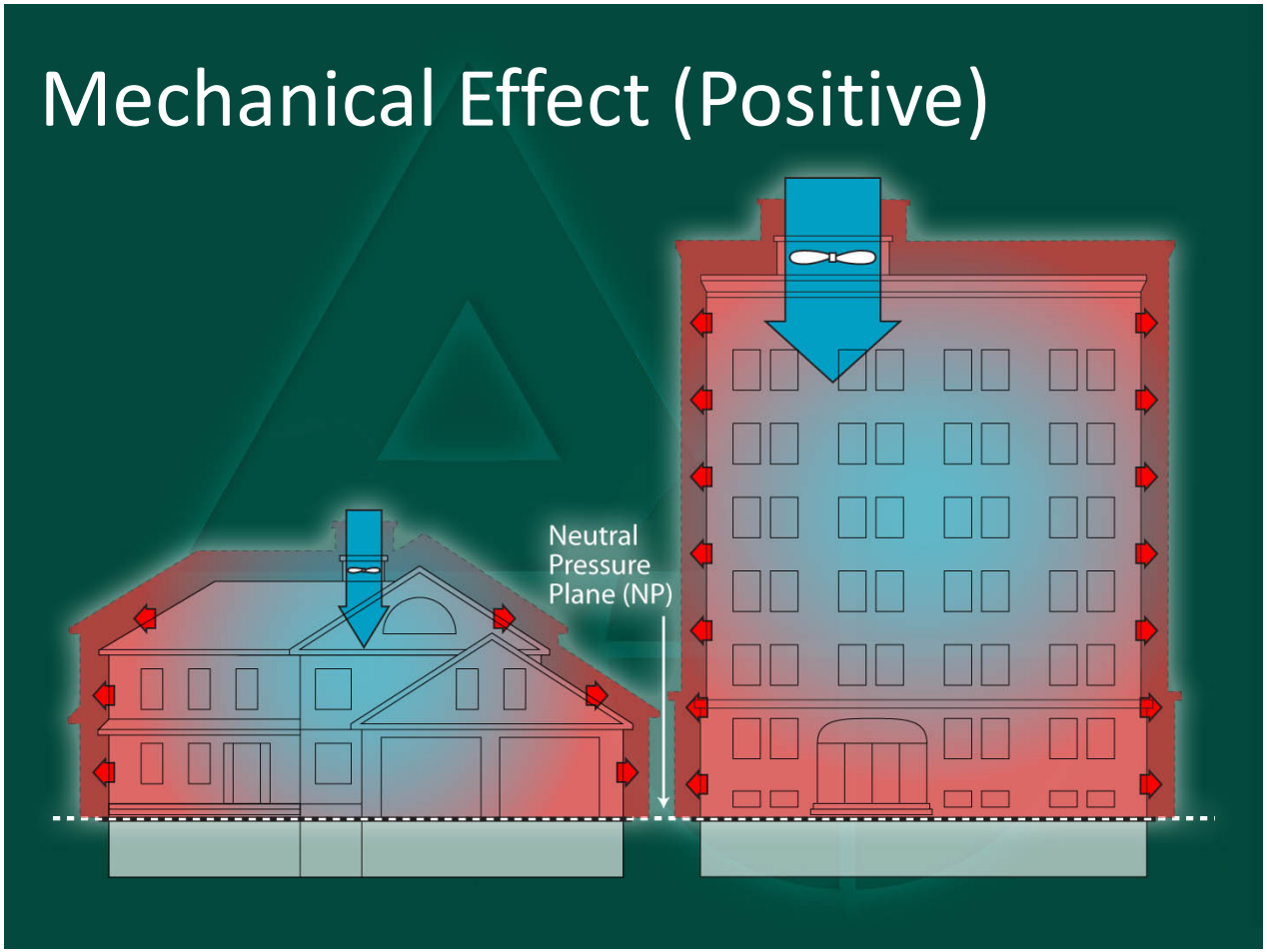


The Building Science of Air Barrier Continuity

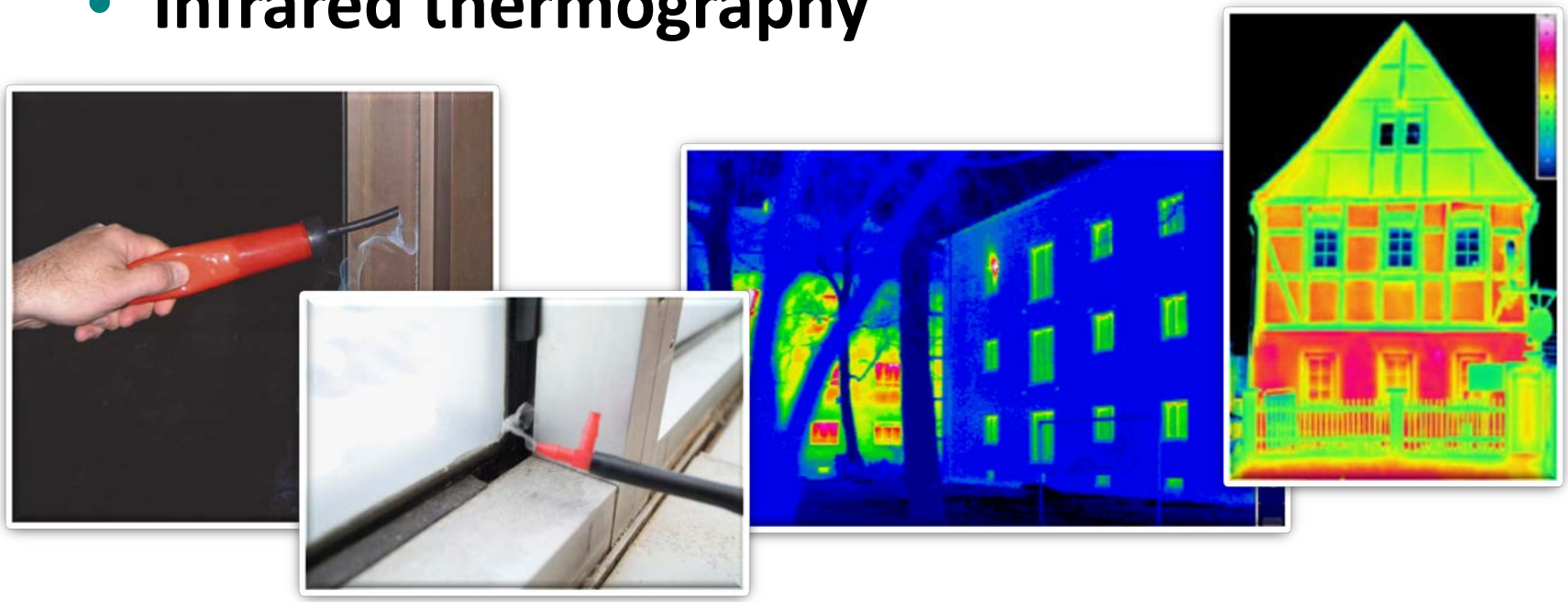
Failure of air barrier systems



Air Barrier Continuity

Diagnosing the problems

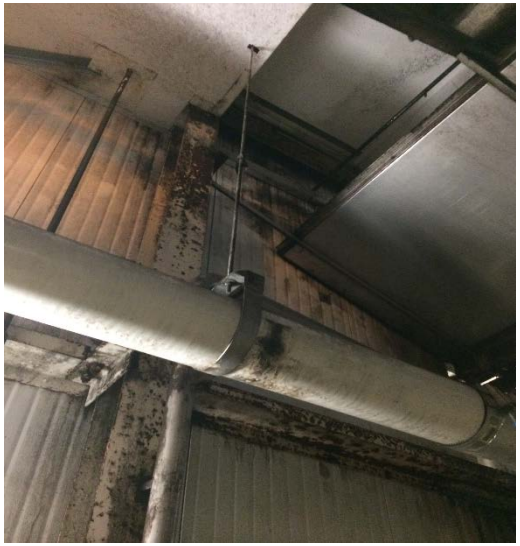
- Building envelope assessment
- Depressurization testing
- Locating air leakage paths
- **Infrared thermography**



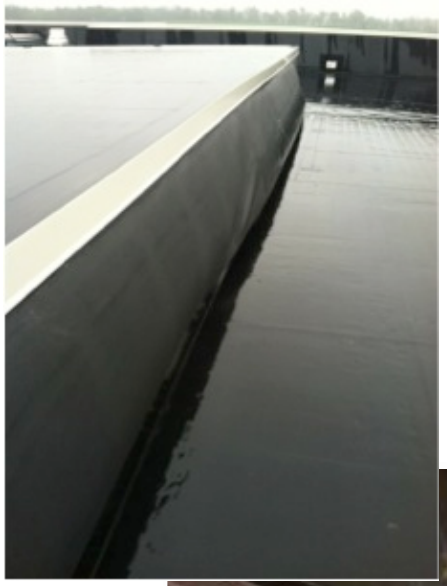
An understanding of Building Air Leakage- Look for the signals

If you have these there is a PROBLEM!

Cold storage issue in hot humid temperatures



Mold / Mildew
Conditioned space Metal building in humid climate



1 Problem in warmer climates .. Roof / Wall Connection

Mounting Problems: Managers Share Deferred Maintenance Experiences

By Dave Lubach, Associate Editor July 2015 - Facilities Management

The advancing age of roofs, HVAC systems and building envelopes and leaks in components and deteriorating parts, combined with a lack of funding to address the issues, are among the top reasons some institutional and commercial facilities are struggling with deferred maintenance.

Facility Maintenance Decisions and facilitiesnet.com asked maintenance and engineering managers to provide examples of some of the deferred maintenance issues in their facilities. Here are some of the best responses from more than 550 managers.

Leaky roofs, HVAC systems cause major problems

Managers responding to the survey say they are optimistic about overcoming deferred maintenance in their facilities over the next decade. But despite the positive attitude, many managers had shared experiences with deferred

Clean Cooling Towers Key to Reducing Risk of Legionella Outbreaks

By Dave Lubach August 2015 - HVAC

As the death toll and the number of people hospitalized with Legionnaires disease climbs in New York City, heath officials have traced the source of the legionella outbreak to cooling towers in South Bronx.

According to a *USA Today article*, the towers have been disinfected and are being monitored by health officials. The article also says that all affected sites must submit long-term plans on how to prevent the return of bacteria to the cooling towers.

Ray Field, the director of Goodway Liquid Solutions, has worked on legionella control and chemical remediation technologies during his career, and he offers maintenance and engineering managers some tips on keeping cooling towers bacteria-free.

"The unfortunate outbreak of Legionnaire's disease in New York City is enough to keep any facility manager awake at night," Field says. "Your cooling tower is one o

the most common sources for legionella bacteria. When algae and mold builds up in a dirty cooling tower, the tower's warm water creates the perfect environment for bacterial growth.

"However, there are steps you can take to help reduce the chances of legionella growth. Ongoing and regular maintenance of the cooling tower is the most vital part of managing legionella outbreaks.

"What does this preventative maintenance involve?

- **Inspect Towers Monthly.** Look for sediment, scale and slime, which can lead to buildup and help legionella grow and thrive.
- **Clean Tower Basin Surfaces.** Clean the basin when sediment is visible. Cooling tower vacuums make it easier to remove contaminants without shutting down or draining your system.
- **Treat Circulating Water.** Use a biodegradable descaler/antiscalant and dose biocides at recommended levels. Using a descaler in conjunction with biocides enhances biological control. A descaler will help remove tough scale allowing biocides to tackle legionella in the tower more effectively.
- **Drain and Clean.** At least once a year, take the time to drain your system and perform a thorough cleaning before turning it back on. If your system has been offline for a long period of time, be sure to disinfect.
- **Clean the Fill.** The tower fill is the perfect environment for bacterial growth, especially legionella. A cooling tower fill cleaner will remove lime scale and debris."

In addition to preventing Legionnaires' disease, caring for your cooling tower can also save money in energy and equipment costs. Putting together a maintenance plan and developing proper procedures is no longer optional. Take these steps now to minimize the risks of an outbreak occurring in your facility.

Base Diagnostic Tools:

For the forensic field assessor- identifying the source

Trained Assessor
with camera &
intake form

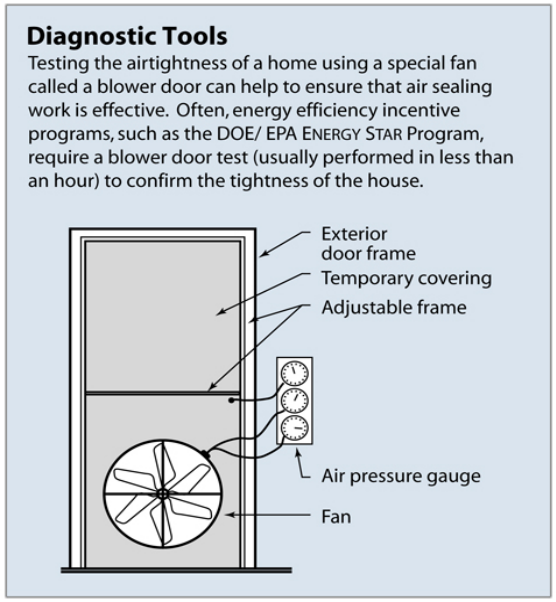
Smoke Pencil
or similar tool to
Provide show
of air flow

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



Blower Door

Standard Pressurization Kit and gauges used by Building Science Engineer Partner

Multi-fan or larger

Occupant Control:

Temperature is the #1 complaint of office building occupants:

Thermal Comfort Involves:

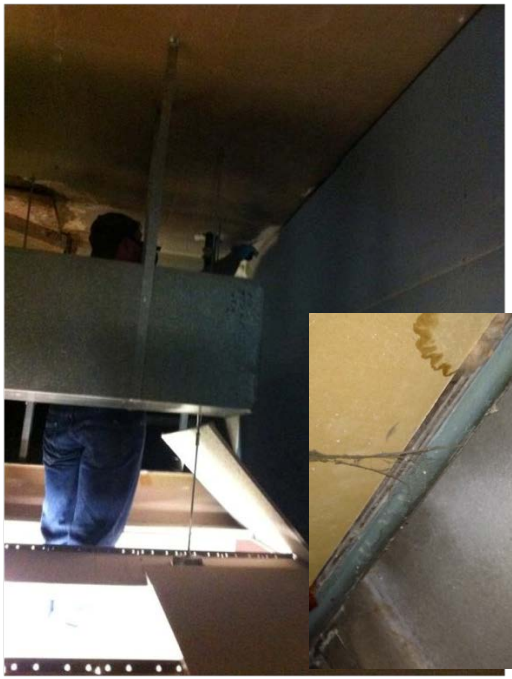
- Humidity
- Air Speed
- Temperature
- Clothing
- Activity

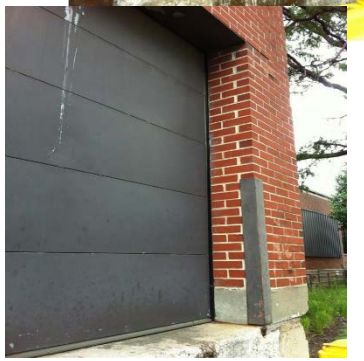
Thermal Comfort Issues:

- Too hot, Too cold
- Too wet, Too dry

ANSI/**ASHRAE** Standard **55-2010**.
Thermal Environmental Conditions for Human Occupancy

Knowing that continuity fails or was not done correctly …….30 years of experience knows where to look:





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Process / Results

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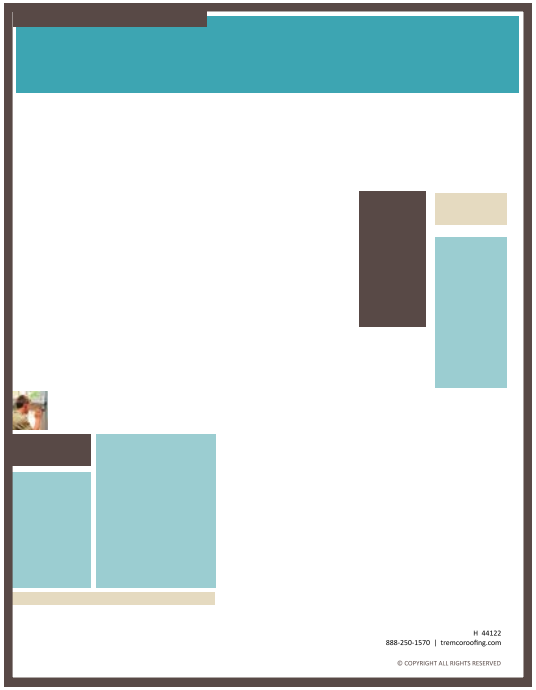
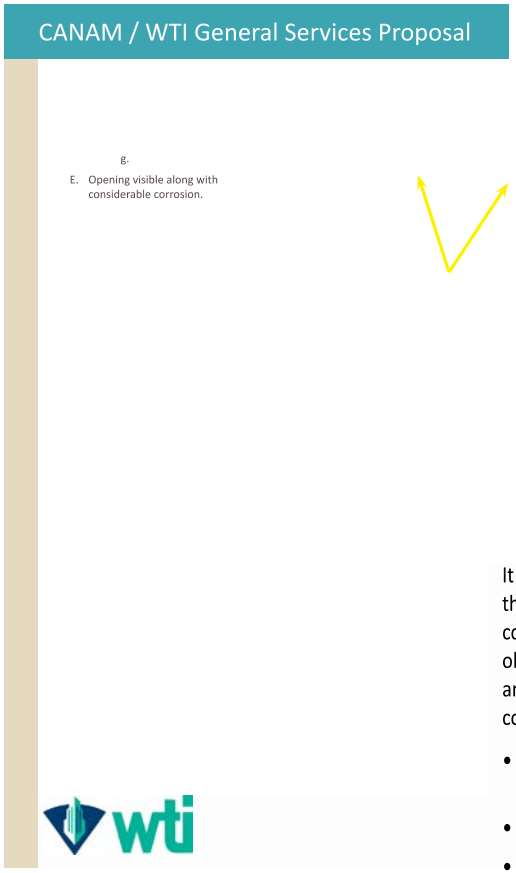
Problem Proposal for Air Leakage

Solving a problem, work scoped to alleviate a single problem





Problem Identified

Scope and Price Established

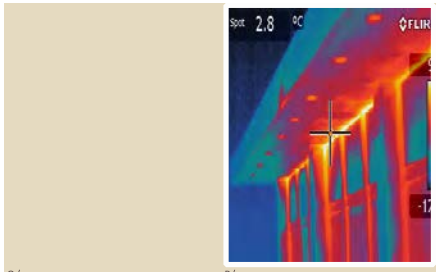
It is probable that the moisture diffusion is occurring in the barrier walls of the Tower and the excess condensation leaking from the conditioned space below is keeping the masonry constantly wet. When rain occurs, the block becomes over-saturated and the leaks become obvious. Additional testing could be done to measure the moisture penetration on the interior and exterior surface of the Tower with a rilem tube, however, a more direct corrective action could be as follows:

- Install a sealed air-tight door at the base of the Tower, in the store and in the storage area, to terminate the conditioned air entering the Tower shaft.
- Inspect all Coping Cornice joints and properly repair/replace defective sealants.
- Damp proof the Coping Stone Cornice and exterior brick.
- Investigate and determine if the Coping Stone Cornice should be coated with a waterproof coating rather than a damp proofer product, depending on the amount of moisture penetration currently occurring.

Strategy for Assessment and Correction

Whole Building Assessment

(Proposal Development Cost required)



- Evaluation of problem
  - Q &A with Customer / understanding building issues
    - Building size, Location /weather trends, Building Use
    - Understanding the HVAC system *(how do you heat & cool)*
    - *Customer to supply, utility bills, evacuation floor plans, by floor-(facility road map)*
  - Review / Analysis of actual utility bills, *(not complied spread sheet data)*
  - Site visit by Air Leakage Specialist / Building Scientist **Required**
  - Condition assessment collected during site visit
    - Smoke pencil / infrared- performance evaluation (Standard)
    - Pressurized Blower Door Performance Testing (Optional)
    - Inventory of Crackage (Hole Size)
    - Narrative generated and submitted to Energy Engineer for evaluation
  - Final Report generated with: Problem - High Level Scope - Cost to fix

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Assessment Report - Review

Site Evaluation / IAQ /Air Leakage Energy Loss / Budgeted Scope of Repair

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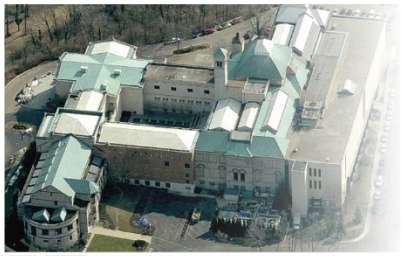
Cincinnati Art Museum
Air Leakage Inspection Report



Building: Cincinnati Art Museum:

Contact: Todd Smith
tdsmith@tremcoinc.com
513-708-6696

Submittal Date: January 13, 2014

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Roofing & Building Maintenance Division

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CANAM, AN AFFILIATE
OF THE ROOFING AND
LDING MAINTENANCE
DIVISION OF TREMCO
INCORPORATED, IS
PLEASED TO PRESENT
THIS AIR LEAKAGE
INSPECTION AND
RECOMMENDATIONS
REPORT TO GOVERNOR
MIFFLIN SCHOOL
DISTRICT.

SECTION 1 | EXECUTIVE

PROJECT DESCRIPTIO

On March 7 and 8, 2012, Canam conducted an on-site building envelope inspection which included a visual inspection, a smoke pencil air leakage test and interior and exterior infrared thermography by a Level 2 Certified Thermographer to confirm energy loss and moisture issues for the following buildings located in Shillington and Manton, PA:

- Brecknock Elementary School
- Cumru Elementary School
- Mifflin Park Elementary School
- Governor Mifflin Intermediate School
- Governor Mifflin Middle School
- Governor Mifflin High School
- Governor Mifflin Education Center

In addition to the on-site inspection, Canam reviewed building construction and building performance issues with facility management to understand current conditions and priority needs. An analysis of historical energy costs was also completed to determine how the condition of the building envelope currently affects energy consumption. Potential financial saving projections associated with air sealing determined the project's economic benefit.

INSPECTION FINDINGS

On-site testing and the analysis of historical energy consumption indicate there is an opportunity to improve Governor Mifflin School District's indoor air quality, occupant comfort and energy use by upgrading

existing air barrier systems

Our inspection of the 7 bu
641,357 square feet, revea
cracks and holes in the bu
When converted to their s
equivalency, these holes to

- Brecknock Elementary
  27.35 Sq. Ft.
- Cumru Elementary Sch
  27.44 Sq. Ft.
- Mifflin Park Elementar
  17.14 Sq. Ft.
- Governor Mifflin Inter
  17.52 Sq. Ft.
- Governor Mifflin Middl
  34.74 Sq. Ft.
- Governor Mifflin High S
  54.44 Sq. Ft.
- Governor Mifflin Educa
  15.69 Sq. Ft.

RECOMMENDATIONS

Building envelope air seali
weather-stripping, and Inta
compartmentalization is re
to eliminate the infiltration
exfiltration of air to reduce
while improving occupant
comfort.

cana

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SECTION 1 | EXECUTIVE SUMMARY

FINANCIAL IMPACT

The financial impact of Canam's recommended air barrier solution is reflected below:

TOTAL PROJECT: GOVERNOR MIFFLIN SCHOOL DISTRICT	
Total Investment Requirement	$ 277,453
Annual Savings	$ 83,429
Net Present Value (NPV*)	$ 767,676
Internal Rate of Return	30%
Payback Years	3.3

BRECKNOCK ELEMENTARY SCHOOL	
Total Investment Requirement	$ 32,446
Annual Savings	$ 12,110
Net Present Value (NPV*)	$ 119,096
Internal Rate of Return	37%
Payback Years	2.7

CUMRU ELEMENTARY SCHOOL	
Total Investment Requirement	$ 35,237
Annual Savings	$ 12,401
Net Present Value (NPV*)	$ 119,986
Internal Rate of Return	35%
Payback Years	2.8

*NPV compares the value of a dollar today to the value of that same dollar in the future, taking inflation and returns into account.

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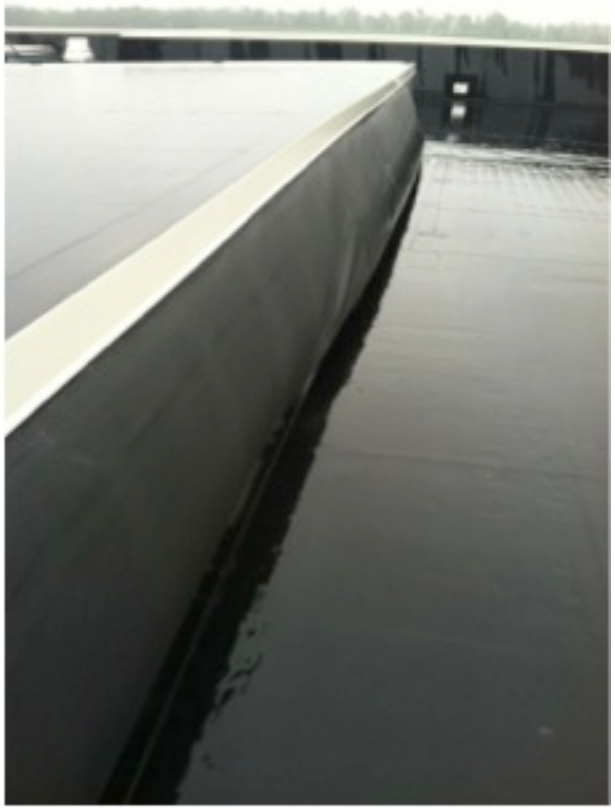
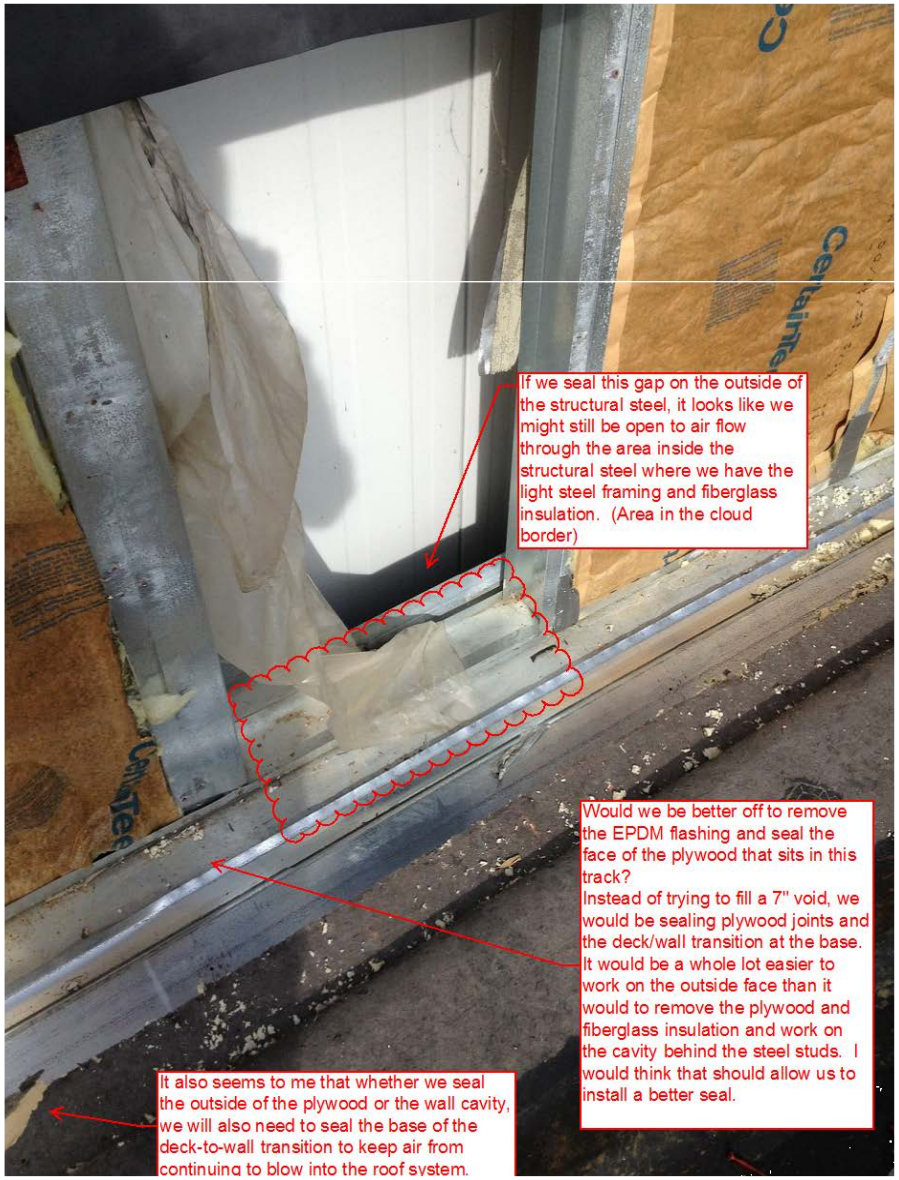
Case Study # 1

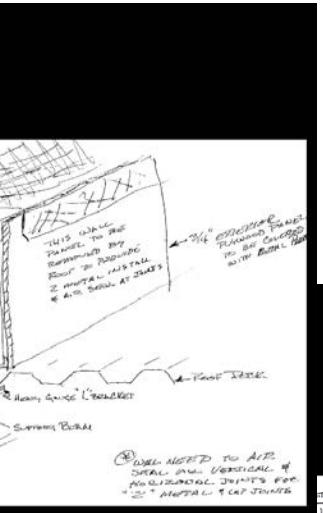
Issue: Manufacturing Company with pressure blowing roof into roof flashings causing failure

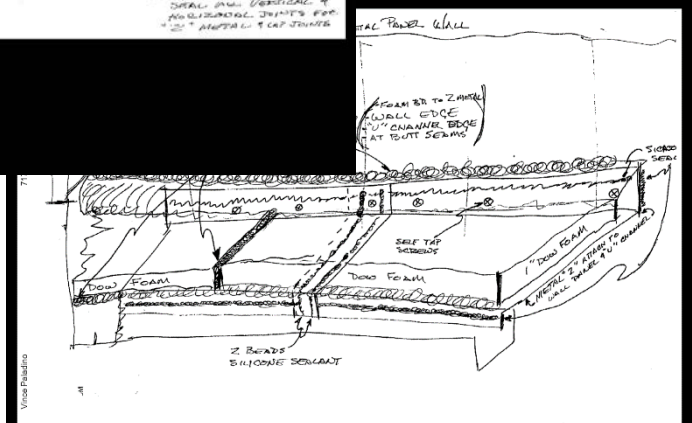


Case Study # 1



Construction: Exterior Insulated metal wal panel with Steel structural framing with no regard to conditioned & non conditioned space with significant Air leakage and pressure.





Case Study # 1

Results: Project coordinated with Roofing contractor to install metal wall panels and remediate air leakage at Roof Wall connection.

Case Study # 1

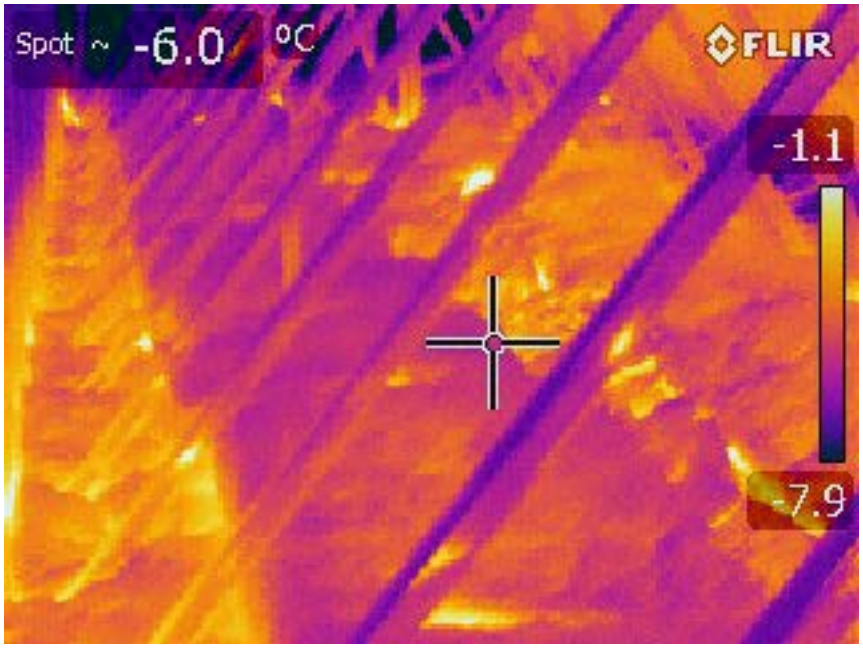
Results: Air leakage controlled, providing enhanced; durability, life cycle of roof wall, energy efficiency benefit and overall better appearance.

Case Study # 2

Issue: Medical Office Building, Comfort issues, Insects, High energy costs

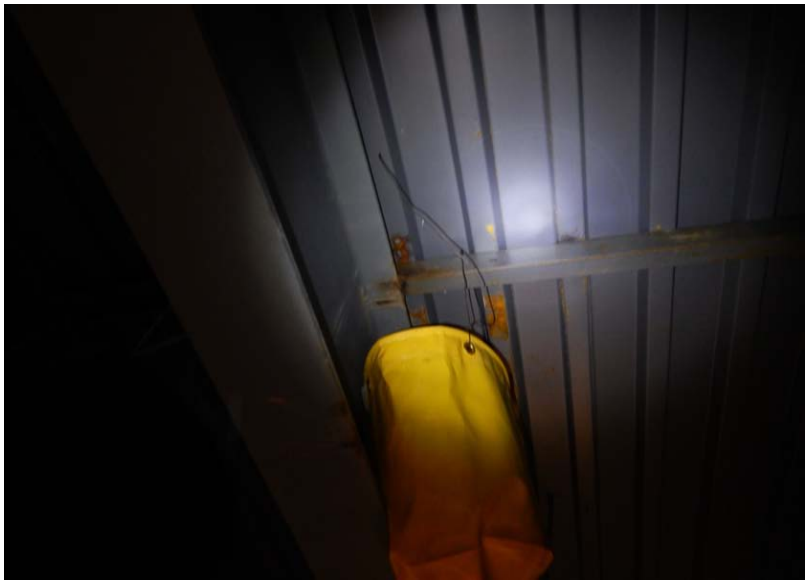
Case Study #2

Knee wall attic



Case Study #2

Knee wall attic, many holes in roof deck below attic space. Condensation issues



Case Study #2

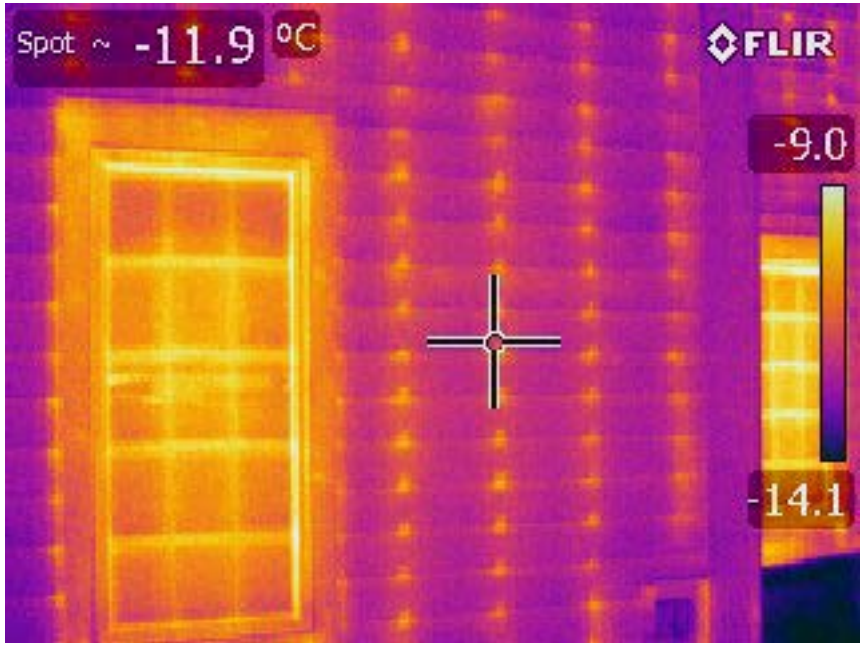
Roof to Wall Intersection- Good condition

Case Study #2

Window Trim- signs of insect migration

Case Study #2

Exterior Façade Issues-Thermal bridging



Medical Office Bldg Case Study #2

- **Results**
  - 24,000 sq ft
  - Cost to rectify $86,827
  - Hole size sealed 12 sq ft.

    - Annual Savings $ 8,247
    - Over $0.35/ sq ft/ year
    - Years Payback 10.5 years
    - No more insect migration
    - Increased occupant comfort

Case Study # 3


Homer Louisiana Hospital Air Sealing Project: History of Mold Problems, High Humidity and Condensation, Negative Air Pressure, High Bills
MAIN ENTRANCE

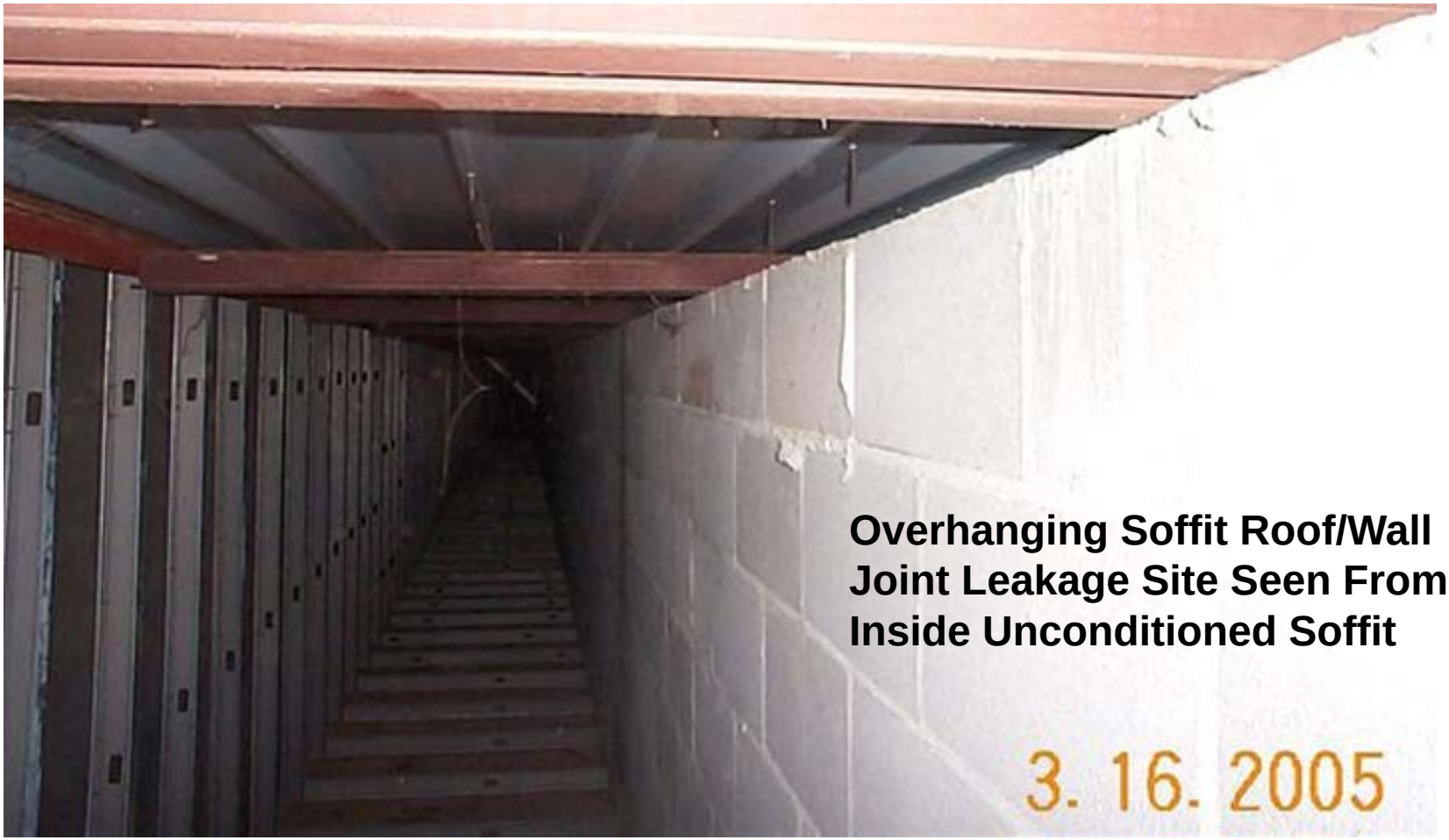
Case Study # 3

Case Study # 3

Case Study # 3

Case Study # 3

Case Study # 3



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

Case Study # 3

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

Case Study # 3

Case Study # 3

Case Study # 3

Case Study # 3


Results: Controlled Humidity, Twice Expected Savings
on Utility Bills, 2.8 year payback on $52,000 job
MAIN ENTRANCE

ASU, Case Study #4

- Knew they had issue with cold drafts and teacher student comfort
- Interest in energy efficiency improvement
  - Investment $ 19,187.56
  - Annual Savings $ 1,588.00
  - Net Present Value (NPV) $ 845.00
  - Internal Rate of Return (IRR) % 5
  - Years Payback 12.1
  - NO more comfort complaints

ASU Science & Mathematics Case Study # 4

Case Study # 4

– Roof Exhausts- open to ceiling below

Case Study # 4

– doors weren’t weather-stripped

Case Study # 4

– Soffits/Overhang was open to the conditioned space

Case Study #4

– Moisture being pulled into the building was bowing the ceiling tiles

Rule of Thumb..on average…

- Canam's Air Barrier Upgrades result in savings of **$0.05-0.11 / sq. ft. / year**
  - 1,000,000 sq. ft. x $0.10 = $100,000 / year in energy savings
    - $100,000 x 5 years = $500,000 in available capital (for roofing)

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Improving indoor air quality and occupant comfort enhances the learning environment.

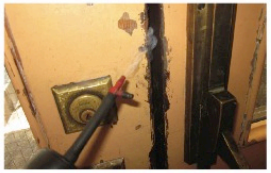
Air Sealing of School Delivers Measurable Improvements for Energy Savings

Testing confirms air sealing makes the grade with significant reduction in air leakage

Problem

Originally constructed in 1946, the 60,000 square foot elementary school located in Vancouver, British Columbia had a big building envelope problem. Students and staff complained of temperature swings and uncomfortable drafts throughout the original building, as well as the newer wing built in 1972.

The metal-framed windows and exterior doors were noticeably drafty and HVAC costs were higher than similar buildings in the district. Those higher HVAC bills were soon explained by an air barrier assessment, which determined the school was experiencing unwanted air infiltration and exfiltration equivalent to a 26.7-squarefoot hole in the building.



Solution

The cost to replace the doors, windows and other original building envelope components was not an economically viable option. Fortunately, Canam Building Envelope Specialists Inc., a subsidiary of Tremco Roofing and Building Maintenance, offered an economically attractive turnkey air sealing solution that included the identification and remediation of all sources of unwanted air infiltration. The remediation was projected to generate over $7,000 in annual energy savings and included:

- Weatherstripping of all doors and hatches
- Re-glazing of windows
- Sealing of roof-to-wall intersections, roof penetrations and attic ductwork and openings
- Compartmentalization of soffits

Results

Air sealing effectiveness was verified by an independent blower door evaluation conducted before and after the air sealing occurred. Energy auditors use blower door testing to pressurize buildings and locate sources of air leakage and energy loss. A blower door test consists of a calibrated fan installed in an exterior door opening. By pulling air out of the building, indoor air pressure is lowered, which allows higher outside air pressure to enter through cracks and openings.

Testing after the air sealing confirmed that air leakage was reduced by 14%, from a value of 21,880-CFM before air sealing to a post-sealing value of 18,230-CFM for even more energy savings than originally estimated. Indoor comfort and air quality are also significantly improved, at a fraction of the cost of replacing the school's original construction components.

5 Green Road // Beachwood, Ohio 44122 T 800-562-2728
Beth Nealson Drive // Toronto, Ontario M4H 1M6 T 800-668-9879
NAMBUILDINGENVELOPE.COM

Building Air Leakage Retrofit value:

- Improve Student / Teacher comfort
- Improve IAQ/IEQ
- Enhance learning environment
- Provide opportunity to learn from building improvement and connection to sustainable awareness
- Prevent pest intrusion
- Save utility $$$

Air Barrier Continuity

- Success stories

Charleston Area School- Charleston, SC

- Interest in Air Barrier continuity / energy efficiency improvement.
- 65,000sq/ft school pilot with proof of success to entire 145 building district
- $ 83,000 Canam project cost (3.9 year payback)
- Interested in working with Duke Energy for efficiency incentives, this pilot to prove principle.

Air Barrier Continuity

- Success stories

- South Florida County Hospital, Fort Lauderdale, FL.
- Interest in Air Barrier continuity / energy efficiency improvement, patient comfort and pest control (Bugs)
- 123,000sq/ft Healthcare facility with equivalent of 105 sq/ft hole in building
- $ 56,284 Canam project cost (2 year simple payback)
- Huge energy savings due to Humid climate and also sold to C suite because of patient comfort issues

Other Project Profiles

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Colquitt County Schools
Number of buildings: 63
Total square feet: 1.2 million
Problem Rectified: Occupant Comfort/ Energy Efficiency

Sealing Air Leaks Saves Energy and Improves Indoor Air Quality for Colquitt County Schools

Testing confirms air sealing makes the grade with significant reduction in air leakage

Problem

Located in Moultrie, Georgia, the Colquitt County School District's cooling costs were above average and indoor temperatures were uncontrollable when they contracted with leading facility management firm ABM Building Solutions to improve their energy efficiency. ABM inspected Norman Park, the first of 15 schools in the district, and immediately identified a gap above the ceiling tiles so large "that we could see outside", according to ABM's project development engineer Clint Knudson.

Recognizing that openings like this made air leakage a likely problem in the district's 60+ buildings, ABM contracted with Canam Building Envelope Specialists to conduct air barrier continuity inspections and testing across the district.

Solution

Canam inspected approximately one million square feet of buildings, documenting findings with digital images and infrared tests. Like the Norman Park School, many buildings had ridged roofs with vented soffits, and no air barrier between the vented attics and the air-conditioned classrooms. The results revealed the district's buildings air leakage paths are the equivalent of a 300 square foot hole responsible for unintended air leakage in and out of the building.

A scope of work was developed to provide a continuous air barrier solution for each building. In addition to sealing the space between the vented attics and the classroom ceilings, caulking windows and weather-stripping doors was recommended to control air leakages across the building envelope.

Results

Sealing Colquitt's air leaks means indoor air temperature can be better controlled for improved student and staff comfort, and the energy load for each building is reduced as conditioned air is no longer wasted. Annual savings of $117,954 has been projected by Canam, with a payback of 6.8 years for the district. According to ABM's Knudson, "The savings provided by Canam's air barrier solution will help fund the other energy conservation measures the district otherwise wouldn't be able to afford."

Exterior door has new quality weather-stripping.

Large openings at soffit caused considerable energy loss and comfort-related issues. This was typical in most of the buildings.

Soffit is blocked with insulated board and sealed with polyurethane foam.

TREMCO
Roofing & Building Maintenance Division

For more information on how Canam can help reduce your energy consumption and improve indoor air quality and comfort, contact us at 888-250-1570 or info@canambuildingenvelope.com.

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Reading, Pennsylvania School District

Governor Mifflin District Reduces Three School's Energy Use by 20%

Air Sealing Improves Occupant Comfort Too

Problem

Schools within the Governor Mifflin School District were often cold and uncomfortable, with drafts and temperature swings that could not be controlled by the HVAC system. And heating the buildings, located just outside Reading, Pennsylvania, was especially expensive in years when winters were colder and longer than usual, as was the case in the 2011–2012 school year.

Indoor air quality was also a concern as dirt, pollen and other pollutants infiltrated the buildings.

Solution

Building components inspected and tested by Canam revealed that gaps and cracks in the schools' building envelopes were allowing air to uncontrollably infiltrate and exfiltrate the building. An analysis of each component revealed that the roof-to-wall intersections were primary leak sources due to original construction.

When converted to square feet, The Cumru Elementary School, the Intermediate School and the High School air leaks totaled an equivalency of a 99 square foot hole.

The schools' historical energy consumption was also analyzed by Canam to determine potential cost savings associated with sealing air leaks. In the summer of 2012 Canam proceeded with an air sealing project.

Results

The schools' natural gas energy consumption was analyzed over a thirteen month period to confirm energy savings expected to result from the air sealing the three buildings. The analysis verified the following savings for each school:

Cumru Elementary:
28% energy reduction
$9.52 per student

The Intermediate School:
17% energy reduction
$10.70 per student

The High School:
15% energy reduction
$6.97 per student

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Other Project Profiles

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PROJECT SPECS:

LOCATION:	Naperville, Illinois
BUILDING SF:	366,000
# OF BUILDINGS:	1 - Main Building Connected to the Education Center
BUILDING AGE:	Built 1920, Many Additions and Renovations

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

Stack effect pressure issues resolved through air sealing measures.

Problem

Edward Hospital had relied on Tremco's assistance for the asset management of their roofs for many years. When Edward Hospital mentioned they were interested in saving money by making the building more energy efficient and durable, while also creating a more healthy, safe and comfortable environment, they allowed Tremco's service companies of WTI/CANAM to show them what could be done to achieve their desired results.

Canam inspected the Main Building and the Education Building, which is connected to the Main Building. The original building was built in 1920, with a brick facade, but has had many additions and renovations over the years. In addition to typical issues that affect a building of this age, such as failing weather-seals around doors and windows, Canam discovered extreme pressure differences throughout the building. Stack effect was very prevalent, bringing in outside cold air along with dirt, moisture, pollutants, etc.

Testing window shows air infiltration before caulk.

Solution

Canam inspected the Main Building and connected Education Building, totaling 366,000 sq. ft., using the air leakage detector and digital and infrared photos, identifying temperature differences through air leakage. Most of the issues identified were a result of typical air leakage areas such as windows, doors and roof exhausts. Canam concluded that the main cause of the strong stack effect was attributed to the gaps, cracks and holes throughout the buildings.

Air sealing measures that Canam recommended to Edward Hospital, to rectify the air leakage issues, were typical, and included replacing worn and missing weather-stripping to doors and windows and sealing roof exhausts and leaky roof/wall intersections.

Window complete shows no air movement.

Results

As a typical healthcare facility, Edward Hospital required difficult access and special project coordination so the patients would not be disturbed.

Air sealing and insulation measures conducted on Edward Hospital have reduced the air leakage issues, but more importantly have helped to eliminate the extreme pressure differences that were caused by stack effect. Canam projected annual savings for the Main Building to be approximately $13,351, with a payback of 3.2 years, and the Education Center to expect approximate annual savings of $8,237, with a payback of 4.8 years. The majority of these repairs have a duration life of 15-20 years. The simple payback actually provides an accumulated investment value for an additional 10-15 years, or a total savings from utility costs of $123,000-$224,297, over this period.

In addition, less than 6 months later, the client requested that Canam return and assess 4 additional buildings on the Edward Hospital campus.

Sealing perimeter of ducting at RTI

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PROJECT SPECS:

LOCATION:	Jonesboro, Arkansas
BUILDING SF:	20,000
# OF BUILDINGS:	1
BUILDING AGE:	Built 1936; Renovated 1986

Air Sealing Makes Noticable Difference in Occupant Comfort and IAQ for Arkansas State University

Customer confirms air sealing measures increase occupant comfort and IAQ

Problem

The project for ASU, Jonesboro, Arkansas, was sold primarily to resolve occupant comfort, Indoor Air Quality issues and for the customer to use as a pilot project for future air sealing work in other buildings.

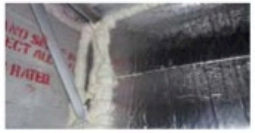
Canam inspected one building, The College of Science and Mathematics, and identified several problem areas. The largest issue proved to be the window systems that were installed a couple of decades ago. These were replacement windows which were inserted into the opening of the original windows, however, the replacement windows appeared to be 3" to 4" too short to the underside of the top frame. In addition, there was a gap above the replacement windows that were stuffed with fiberglass batting to bridge the window frame. This was not providing a good air barrier and the batt was also collecting dirt from the outside which was migrating into the building.

Smoke pencil testing identified that the window systems to the sills had a gap allowing air migration into the building. This caused a great deal of negative pressure.

Solution

Canam inspected one building, totaling approximately 20,000 sq. ft., documenting findings with smoke pencil testing and digital images. Our recommendations to rectify the problem areas in this building were based on a very common scope of work. The scope included typical measures such as door weather-stripping, sealing roof exhausts, etc., however, the main problem area required air sealing and insulating above the tops of the window systems with 2-part polyurethane closed-cell spray foam.

Other issues that were brought to the attention of ASU management and addressed were soffits that were open to the building that required frame and block and sealing the perimeter, sealing multiple pipe penetrations and addressing the mildew that was forming on the South side of the building above the suspended ceiling during the hot summer months when the outside humid air entered the building, causing condensation with the inside air conditioning.



Blocked and sealed soffits are no longer open to the outside.

Results

Air sealing and insulation measures conducted on ASU, will reduce the likeliness of moisture migration into the building, thus insuring the building durability. In addition, Canam projected annual savings of approximately $1,588, or $0.08 sq. ft., with a payback of 12.1 years.

More importantly, one year later, the customer has reported back that the comfort has increased. According to ASU's David Hakenewerth, Energy Conservation Engineer Facilities Management, " I believe the improvements at CSM have made a noticeable difference in the comfort level and IAQ. I have not done an audit of the utilities because the weather conditions the last 12 months have been so unusual."

Air sealing above drop ceiling now provides a proper air barrier resulting in eliminating dirt entering the building at this detail, and increased occupant comfort.

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Thank You