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Sample School District
Air Leakage Inspection Report





Building:	School District Buildings
Customer:	Customer School District Customer Name customer@schooldistrict.com 000-000-0000
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Submittal Date:	May, 2017

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TREMCO
Roofing & Building Maintenance Division

WEATHERPROOFING TECHNOLOGIES CANADA

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PROJECT DESCRIPTION

WEATHERPROOFING TECHNOLOGIES, INC., TOGETHER WITH ITS AFFILIATES, TREMCO INCORPORATED AND CANAM BUILDING ENVELOPE SPECIALISTS (TOGETHER, "WTI") IS PLEASED TO PRESENT THIS AIR LEAKAGE INSPECTION AND RECOMMENDATIONS REPORT TO SCHOOL DISTRICT.

On April 11, 2017, 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 1 Certified Thermographer to evaluate energy loss and moisture issues for the following building located in City, State:

- School Building

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 to assess the project's potential economic benefit were also undertaken.

INSPECTION FINDINGS

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

Our inspection of the School District's 1 building, totaling 83,921 square feet, revealed gaps, cracks and holes in the building envelope. When converted to their square feet equivalency, these holes total:

- School Building
  27.24 sf

RECOMMENDATIONS

Building envelope air sealing, weather-stripping, and interior compartmentalization is recommended to eliminate the infiltration and exfiltration of air to reduce energy loss while improving occupant safety and comfort.

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RECOMMENDATIONS

The scope of work for the School District's, includes weather-stripping and sealing the following building components, which have failed to varying degrees.
(See Appendix A for photos and details)

- Exterior Doors
- Windows
- Mechanical Room
- Roof Top Exhausts
- Roof/Wall Intersections
- Vent Grills
- Roof Hatches/Doors
- Soffits

Canam's turnkey air barrier solution includes material specification, material procurement and installation services. Also included is on-site project management to ensure quality control. The cost to implement Canam's air barrier solution is reflected in the following table. Potential savings from utility, federal, state and local incentive programs will be investigated upon project execution.

BUILDING NAME	SQ. FT. LEAKAGE AREA	PRICE*
School Building	27.24	$ 75,648
TOTAL:	**27.24**	**$ 75,648**

**Price does not include taxes that may apply.*

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ENERGY SAVINGS AND PAYBACK

Canam's analyses confirmed there is an opportunity for the School District to reduce their energy consumption by reducing or eliminating building envelope air leaks.

Calculated by a Certified Energy Manager (CEM), our analysis of the School District's buildings and utility rates, determined that the reduction of energy consumption from the Canam solution can produce significant savings. Based upon your current cost of energy within your climate zone and current energy usage rates, we estimate that air sealing measures as defined in this report will result in an annual energy savings of **$15,739** the equivalent of **$0.19** per square foot. These air sealing measures will reduce the amount of energy needed to heat and cool the facility at typical historical levels and will lower your Energy Utilization Index (EUI)* by **3.77** kBtu per square foot.

**EUI converts both gas and electric consumption into Btu's, enabling the comparison of a building's energy intensity.*

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FINANCIAL IMPACT

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

TOTAL PROJECT: SCHOOL DISTRICT	
Total Investment Requirement	$ 75,648
Annual Savings*	$ 15,739
Internal Rate of Return	20%
Net Present Value (NPV**)	$ 120,497
Payback Years	4.8

**Annual Savings are estimated based upon factors such as current energy usage patterns and building usage and occupancy.*
*** NPV compares the value of a dollar today to the value of that same dollar in the future, taking inflation and returns into account.*

This offer remains valid for 120 days after submittal date.

Please see the Appendix for the cash flow statements.

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SCHOOL BUILDING

GENERAL CONDITIONS

The School Building is approximately 84,000 square feet, consisting of a few additions added over the years. The square footage includes the Gym which is not attached to the main building, and not conditioned.

The general structure of the building seems to be in good shape, with the exception of the roof. The building envelope can be easily addressed to ensure that the air barrier is connected The scope of work developed for the building encompasses mostly surface sealing measures, i.e., weather-stripping doors, windows, roof/wall intersection, soffits and compartmentalizing vented rooms.

CRITICAL AIR LEAKAGE

The building envelope inspection of the school was to evaluate the current condition of the air barrier. This was a visual inspection, as well as testing measures taken that utilized the Air Leakage Detector to determine the pathways of air leakage.

The inspection started at the roof, where there are many roof exhausts that require the curb-to-duct to be sealed, as well as several old mechanical curbs that have been capped but not sealed.

The interior inspection determined that the exterior unconditioned air is migrating into the interior conditioned space through many pathways. The roof/wall intersection is not sealed and shows signs of outside air migrating into the building. There are over 15 old vents that are opened to the Cafetorium above the drop ceiling. These vents are allowing warm moist air to enter into the building. Combined with the unsealed roof/wall intersection, there is a considerable amount of moisture entering into the school. This accounts for the issues with the suspended ceiling tiles that bow and require replacement every year.

The sliding window systems appear to be tight with no further action required, however, the casement style windows, which are the majority in the school, have dropped and has caused a small gap at the top of each window. These windows can be retrofitted easily in a cost-effective method without being replaced at this time.

Most of the doors into the school has a soffit/overhang at each of the entries. All these soffits are open to the space above the drop ceiling, which is another area for air infiltration and exfiltration.

There are 3 driving forces that move air across the pressure boundaries of a building. Stack Effect airflow is the result of pressure differences between the interior and exterior air columns, generally due to temperature differences in the columns of air. Wind Effect is airflow into and out of a building due to pressure differences from wind conditions. Mechanical Effect airflow is due to either deliberate or inadvertent pressure imbalances created by the HVAC systems.

The potential for unintentional airflow exists in all buildings due to the presence of these three physical effects. The airflow itself is made possible by the flaws in the building envelope-gaps, cracks and holes

The goal is to reduce the infiltration/exfiltration of air into the space caused from both mechanical pressures on the building, as well as stack pressures. Buildings' air conditioned, stack pressures can reverse by pulling warm moist air in from the top of the building and then the heavy cooled air dropping down and out through gaps, cracks and holes, i.e., windows, doors, etc.

SCHOOL BUILDING (CONT'D)

INDOOR AIR QUALITY

Normally with pressurized buildings, concerns about indoor air quality are minimized. However, with so many holes opened to the conditioned space, this is very hard to reduce the likelihood of outside pollutants, insects and pollens from entering the building.

CONCLUSION

Sealing the leakage points in the buildings will not only save energy dollars, but will also improve occupant comfort. In addition, the HVAC equipment will work more efficiently. When the mechanical system has to fight various building pressures such as wind, and stack, it must work harder to maintain the space at the desired temperature and air quality levels.

Please note that the Mechanical System needs attention to correct the issues found in this assessment.

THE RECOMMENDED SCOPE OF WORK FOR EACH BUILDING IS BASED ON THE PROBLEM AREAS AND/OR ENERGY RELATED MEASURES IDENTIFIED DURING THE ASSESSMENT. A TURNKEY SOLUTION PROVIDED BY CANAM INCLUDES THE SUPPLY AND INSTALLATION OF RELATED AIR SEALING PRODUCTS SUCH AS WEATHER-STRIPPING, SEALANTS AND INSULATION. THESE MAY INCLUDE ITEMS FROM THE LIST BELOW.

- Roof Exhausts
- Interior Doors
- Interior Shafts
- Chase ways
- Roof Hatches/Doors
- Stairwell Doors
- Mechanical Room
- Shafts (floor-to-floor)
- Soffits
- Overhead Doors
- Windows
- Skylights
- Exterior Doors
- Roll Up Doors
- Electrical Receptacles
- Roof/Wall Intersections

SCHOOL BUILDING

Component	Existing Condition	Recommendation
Roof Top Exhausts	Visually good	Seal curb-to-duct
Roof Hatches/Doors	Poor, seals are worn	Install higher-end seals
Roof/Wall Intersection	Signs of air infiltration/exfiltration, dirt lines and cobwebs	Seal roof/wall with a closed-cell polyurethane foam
Mechanical Room	Ok, but needs to be compartmentalized	Install new weather-stripping on entry door
Soffits (Door Entrance)	Poor, open to exterior allowing migrating air into and out of the school	Close off with insulation board and foam sealant
Windows - Operable	Fair condition, windows have dropped exposing a small crack at all window tops	Weather-strip tops of windows only to bridge the gap
Windows- Top of Mullions Above Drop Ceiling	Mullions are open at tops above drop ceiling, air is infiltrating around the seams of the windows and up through the mullions	Seal tops of mullions with 2-part closed-cell polyurethane foam
Old Vent Grills (Cafetorium)	Poor, grill vents are allowing air migration into and out of the school	Block off and seal with an insulation board and foam sealant
Exterior Doors	Poor, worn or missing weather-seals	Install high-end, longer lasting weather-stripping

NOTE: *Although CANAM will make every effort to air seal all areas listed in our Assessment Report, please be advised there may be locations with limited or prohibited access. In rare instances where accessibility or safety issues arise, they will be identified during the implementation stage of the contract. Additional costs will be incurred for work completed that has been identified as not reasonably accessible. Areas that cannot be completed due to access and/or safety concerns, and are identified in the Close-Out Manual as being inaccessible, will be reduced and contract costs will be adjusted accordingly.*

Customer acknowledges that once the CANAM recommendations have been agreed upon, they are responsible for full payment of the job. If the Customer or Building Owner should reduce the project's scope after contract is signed, it is understood that the contract cost will still apply.

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SCHOOL BUILDING

A. School Building.

B. Mechanical Curb - Capped: The mechanical curb has been capped, however, the perimeter requires sealing to prevent migration of air infiltration/exfiltration.

A.

B.

C.

D.

C. Roof Exhausts: There are many roof exhausts on the school and they all require the curb-to-duct to be sealed. The gap around the curb-to-duct is allowing air leakage.

D. Roof/Wall Front Entrance: The air leakage detector is showing that inside conditioned air is migrating out of the school. Cobwebs and dirt are an indication that air leakage is occurring.

E. Roof/Wall Intersection: This is another detail of the roof/wall intersection. The smoke is escaping, which is also bringing the conditioned air along with it.

F. Typical Window System: This style of window system is representative of the majority type of window system in the school.

E.

F.

G.

H.

G. The windows have dropped slightly allowing a small gap at the tops of these systems. New weather-seals installed at the tops will rectify the issue of air leakage.

H. Double-Hung Windows: This type of window appears to be in good condition, as was noted when tested with the air leakage detector.

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I. Another photo showing the double-hung window being tested with the air leakage detector.

J. Window Mullions Above Drop Ceiling: The mullions are opening which is allowing air to migrate into and out of the school.

I.

J.

K.

L.

K. Cafetorium - Above Drop Ceiling (exterior view): There are many old vents above the drop ceiling that need to be blocked off and sealed. The vents are allowing the migration of moist air into the school as well as the conditioned air to escape.

L. Cafetorium - Above Drop Ceiling (interior view): The vents are open to the interior, approximately 30 vents in total. 15 on each side of this area.

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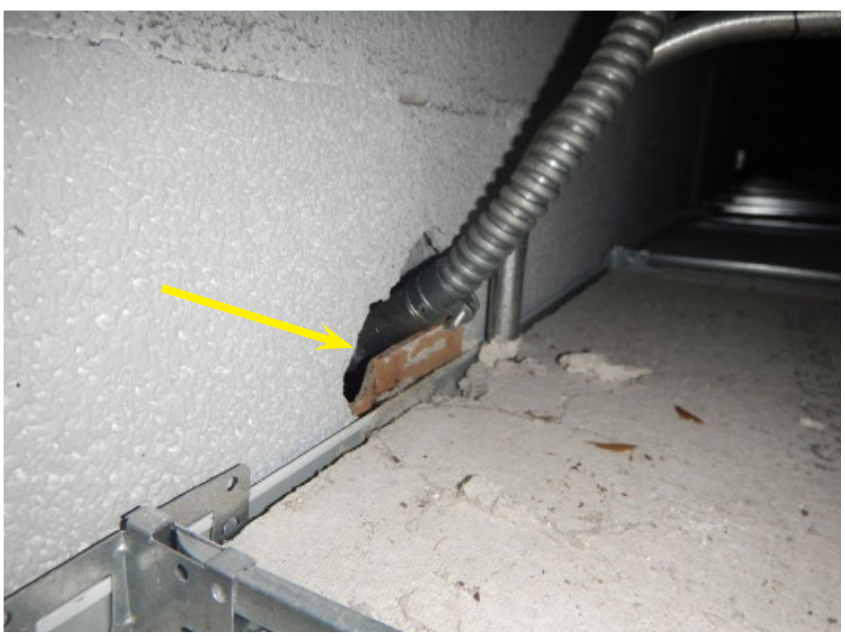
M. Conduit Penetration to Exterior: The air leakage detector is showing that the inside conditioned air is escaping around this hole.

N. Photo shows another conduit penetration, a source of air leakage, that needs to be sealed.

M.



N.

O.

P.

O. Front Entrance Doors: The air leakage detector shows that their is air leakage between the door as well as at the tops of these doors, which is leaking the inside air to the outside.

P. Photo shows the door being tested with the air leakage detector. The building is under negative pressure and is pulling in the outside, unconditioned air.

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Q. The dirt lines around the frame are more evidence of air infiltration/exfiltration into and out of the building.

R. Exit Door (Double): This is the typical type of door system found in the school. The door bottom sweeps have worn as noted by the daylight under the door.

Q.

R.

S.

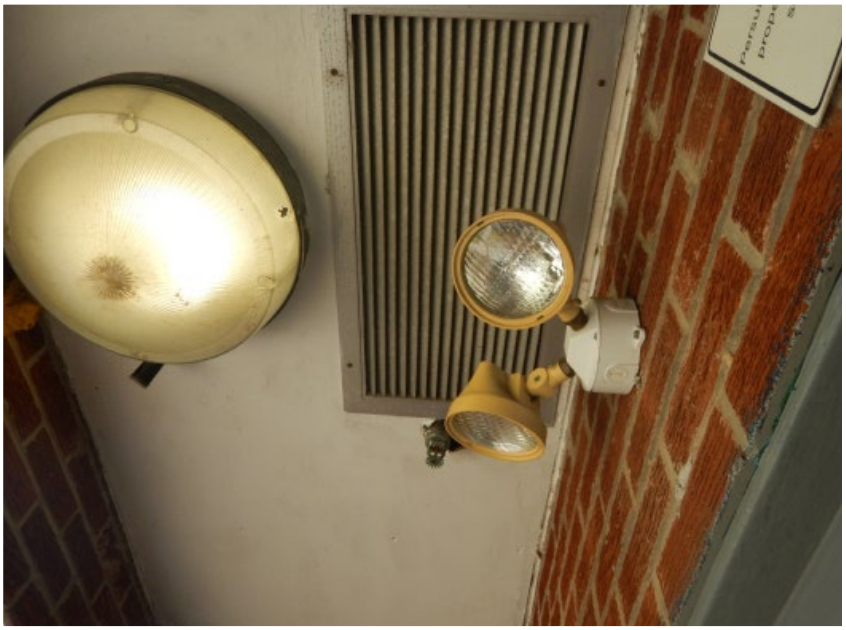
T.

S. Testing the double door bottom with the air leakage detector indicated that outside moist, unconditioned air is entering into the school at this detail.

T. Air is escaping at the top side of this entry door.

U. Soffit Overhang at Door Entrances (exterior view): The soffits at the door entries all appear to be open to the conditioned space above the drop ceilings.

V. Soffit Overhang at Door Entrances (interior view): From inside you can look into the soffit that is on the exterior, as well as there is a large vent connecting both in to outside. This can bring in a lot of moisture which will cause issues like ceiling tiles bowing.



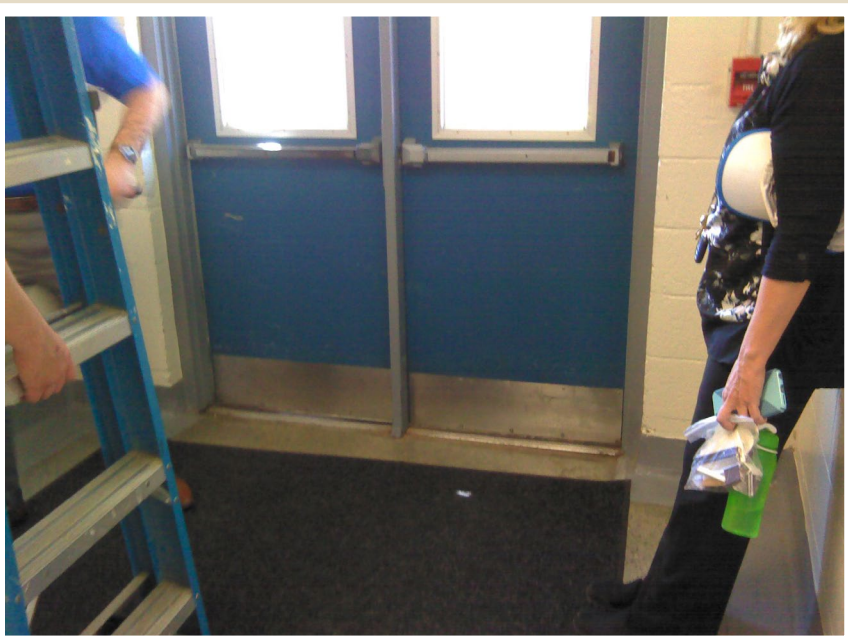
U.

V.

THERMOGRAPHY REPORT

IR-A. IR of Entry Door: Thermal difference around the perimeter of this door confirms air leakage.

IR-A.



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SUMMARY FINANCIAL OVERVIEW

Please see energy calculation summary on the following pages.