

**399 BATHURST STREET
TORONTO, ON**

FCAP-TW ROOF CONDITION ASSESSMENT

FINAL REPORT

Prepared For:
University Health Network
399 Bathurst Street
Toronto, ON M5T 2S8

Prepared By:
Engineering Link Incorporated
207 Adelaide St. E., Suite 200
Toronto ON M5A 1M8
Project No.: 17-0017

October 20, 2017



EXECUTIVE SUMMARY

Engineering Link Inc. was retained by the University Health Network (UHN) to carry out a condition assessment of the roofs on the various buildings of the Toronto Western Hospital complex. The Krembil and Power Plant roofs are not included in the scope of this review.

The purpose of the assessment was to identify the current condition of the existing roof assemblies, identify any necessary repairs to maintain the roofs in a state of good repair, and to develop a budget estimate for the repair work for inclusion in the updated 10-year capital plan. The following is a summary of estimated costs per year in 2017 dollars, not including engineering fees or taxes.

Year	Estimated Cost
2017	\$ 607,500.00
2018	\$ 50,000.00
2019	\$ 455,000.00
2020	\$ -
2021	\$ 205,000.00
2022	\$ 10,000.00
2023	\$ 100,000.00
2024	\$ -
2025	\$ -
2026	\$ -



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1. INTRODUCTION

1.1 Scope of Service

Engineering Link Inc. was retained by University Health Network to perform a comprehensive condition assessment of the roofs of the various buildings forming the Toronto Western Hospital (TWH) complex located at 399 Bathurst Street in Toronto, Ontario. The purpose of the assessment is to develop a 10 year capital expenditure plan for the maintenance of the roofing.

All roof areas in the Krembil, Power Plant, a couple of canopies, as well as a review of the skylight are not included in the scope of work.

1.2 Limitations

The work reflects Engineering Link's best judgment in light of the information reviewed by them at the time of preparation. This is not a certification of compliance with past or present regulations. No portion of this report may be used as a separate entity; it is written to be read in its entirety.

No party other than the Client shall rely on Engineering Link's work without the express written consent of Engineering Link. Any use which a third party makes of this work, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Decisions made or actions taken as a result of our work shall be the responsibility of the parties directly involved in the decisions or actions. Any third party User of this report specifically denies any right to any claims, whether in contract, tort and/or any other cause of action in law, against Engineering Link (including Sub-Consultants, their officers, agents and employees).

2. BACKGROUND

2.1 Facility Description

The Toronto Western Hospital (TWH) is comprised of several buildings constructed at various dates from the 1905 through the 2010s, and is located on the corner of Bathurst and Dundas Street.

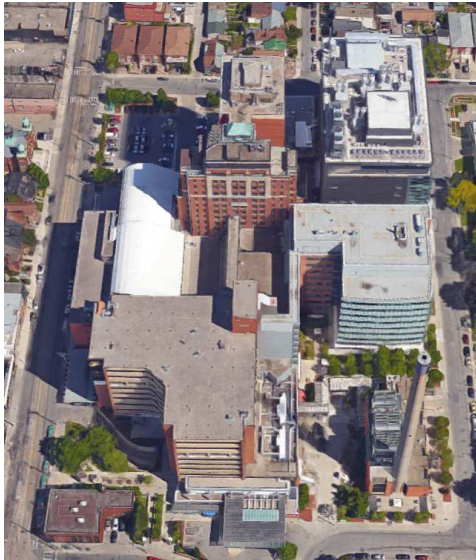


Figure 1 – View of TWH along Dundas Street.

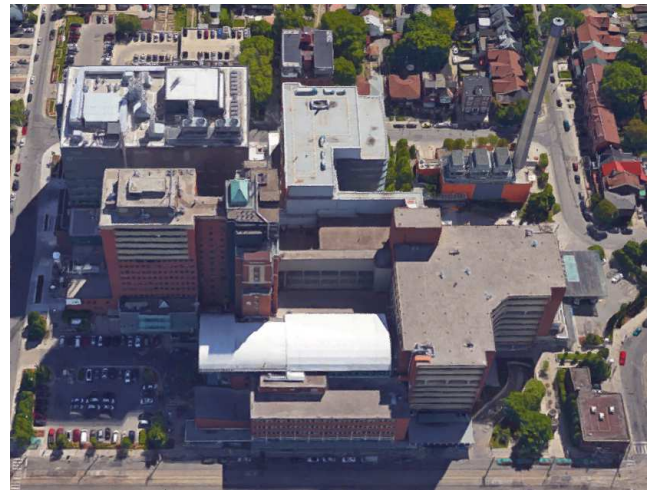
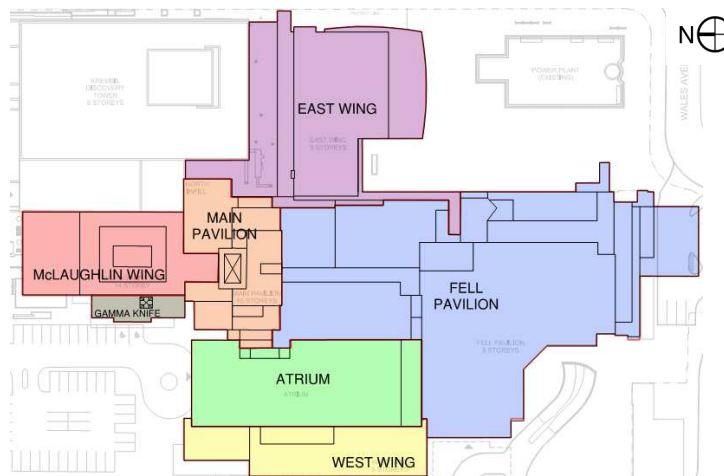


Figure 2 – View of TWH along Bathurst Street.

2.2 Roof Identification

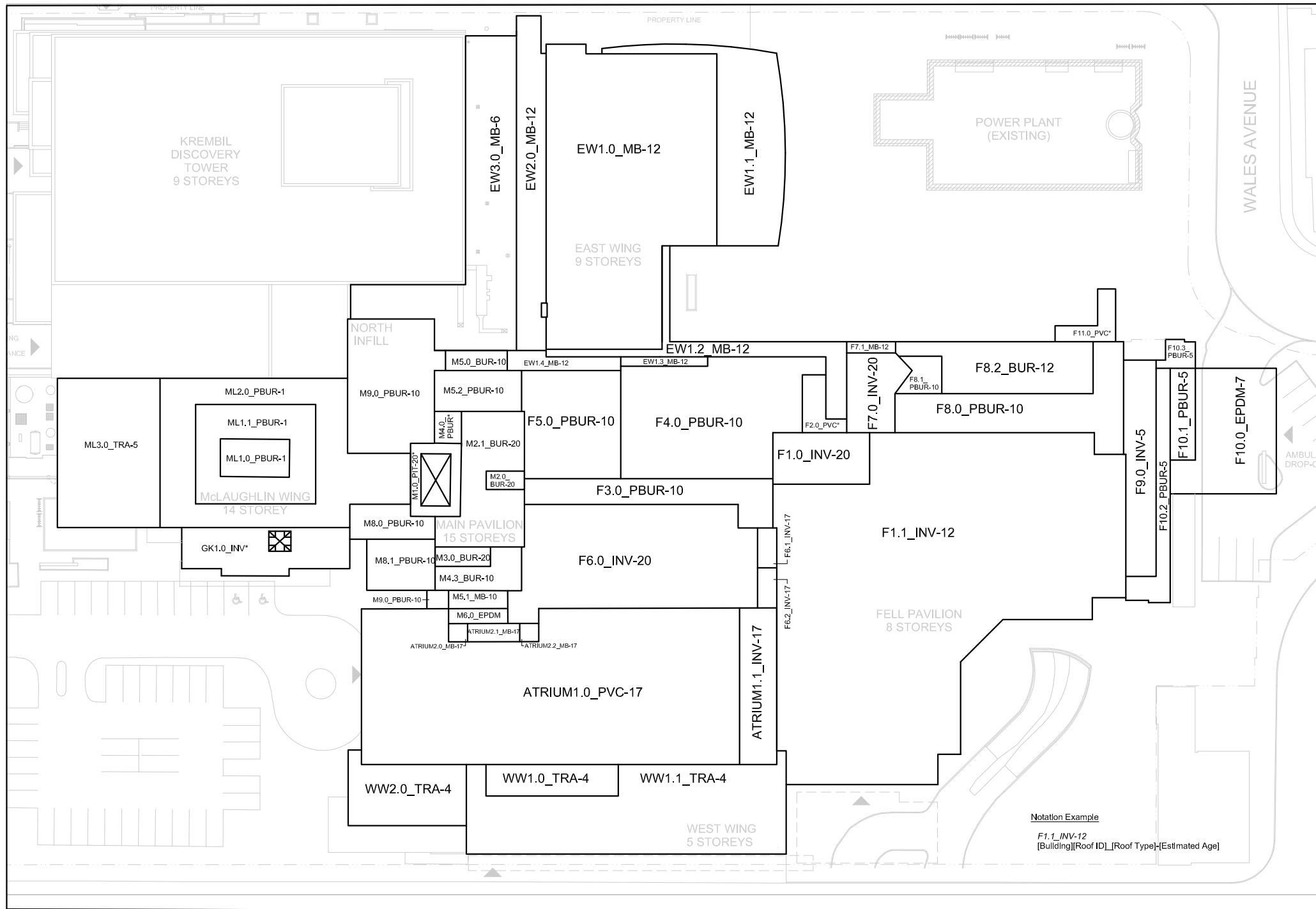
Included in study were seven facilities, and fifty-three (53) discrete roof areas were noted totalling to approximately 150,000 sq ft roof area. The following figure and table outlines the building names and its corresponding roof.



Building Name	Number of Roofs
East Wing	7
McLaughlin Wing	4
Gamma Knife	1
Main Pavilion	13
Atrium	5
West Wing	3
Fell Pavilion	20
TOTAL	53

Figure 3 – Various Building Names and Roofs.

A detailed roof plan is located in the following page.





2.3 Recent Performance History

At the time of this report, several of the roof areas were reportedly to have experienced and are experiencing active water leaks as shown in the figure below.



Figure 4 – Past and active roof water leaks as indicated by TWH (shaded yellow).

3. INVESTIGATIVE PROGRAM

The following is a summary of the investigative program developed to perform the roof condition assessment.

3.1 Document Review

Although no drawings were available for our review, we contacted Dean Chandler Roofing and Tremco Roofing, since both have history for some of the roof areas.

It should be noted Tremco Roofing has their own roof identification system, which does not indicate whether it is a Tremco roof.

3.2 Field Investigation

The site observations were performed on March 10, 2017. Weather conditions at the time were partly cloudy and between -4 and -7 degrees Celsius.

Our field investigation included a visual review of the roof, parapet and associated flashings, adjacent walls, and strategic exploratory openings to confirm the as-built construction and condition of the constituent components. Thirteen (13) openings were carried out at locations where there was no documentation available regarding the roof system composition (Refer to Figure 5). Details of the openings have been reported in the appendix. We did not perform exploratory openings on any of the roofs that are covered under warranty.



Figure 5: Exploratory opening locations (shown in red).

Dean-Chandler Roofing provided access, performed and repaired the test openings. All areas disrupted during the investigation were repaired and/or reinstated prior to our departure from site.



4. ROOF CAPITAL PLAN SUMMARY

4.1 General

Approximately eleven different types of roofs were identified for the facility, the following table is a breakdown of the various roof types and their corresponding roof area.

Table 4-1: Roof Types and Area

Roof Type	Number of Roofs	Approximate Roof Area (sq ft)
Conventional Configuration (Exposed membrane)		
▪ Ballasted EPDM	1	200
▪ 4-Ply Asphalt BUR	4	6,800
▪ Asphalt BUR (Assumed)	1	1,150
▪ Proprietary BUR	18	34,700
▪ 2-Ply Modified bitumen	12	27,900
▪ EPDM fully adhered	1	4,000
▪ PVC	3	16,500
Inverted Configuration (Insulation over the membrane)		
▪ 2 Ply Modified bitumen	5	9,600
▪ EPDM	1	1,750
▪ TRA/LRM (Tremco)	6	44,400
Other		
▪ Pitch Roof (covered by Modified Bitumen)	1	600
TOTAL	53	147,600

In terms of square footage, the facility is comprised of 60% conventional roof system, and 40% inverted roof assembly system. Tremco's proprietary Burmastic BUR and TRA/LRM roof systems covers a total of 54% of the roof area.

4.1.1. Roof Composition Details

Referring to the table in the previous section, the typical roof composition for each of these roof type is summarized below.

Conventional Roof (Exposed membrane on the top)

- a. Ballasted EPDM: For one roof Main 6.0, the cut test revealed the following composition:
 - Gravel
 - Loose laid EPDM Membrane
 - 3" Insulation loose laid
 - 2-ply felt and asphalt bitumen



- b. Built-Up Roof (Asphalt 4-Ply): Approximately 4 roofs were identified with the following composition:
- Gravel
 - Asphalt BUR, 4 ply organic felts/fiberglass felts membrane
 - 1.5"-3" insulation
 - 0.5" fiberboard (for one roof)
 - Kraft paper vapour barrier
- c. Built-Up Roof (Proprietary): Tremco provide the following roof system composition. However, since the roofs have been specified by numerous consultants over several years there are likely variances from roof to another.
- Gravel
 - 3 Plies of BURmastic Composite Ply HT w/ BURmatic interply adhesive w/ BURmastic Flood coat
 - TRA Flashings in BURmatic SF w/ BURmesh seam stripping in Polyroof LV
 - 0.5" coverboard in Fas n' Free Adhesive
 - 1.5" ISO in Fas n' Free Adhesive
 - Kraft Paper vapour barrier or BURmastic Composite Ply HT in BURmastic SF vapour barrier
- d. 2-Ply Modified Bitumen: The composition could not be verified at the time of our site visit.
- e. PVC: Three roofs were identified. However, the composition could not be verified due to unsafe access at the time.

Inverted Roof (Protected membrane on the deck)

- a. 2-Ply Modified bitumen or EPDM Membrane: The following system composition:
- Gravel
 - Filter fabric
 - 3" Insulation
 - 2-Ply Modified bitumen or EPDM (depending on the roof area)
 - Fiberboard (if on steel deck)
- b. TRA/LRM: Tremco provided the following system composition.
- River stone ballast
 - Protection sheet
 - Extruded polystyrene insulation
 - BURmesh seam stripping in Tremlar V or Polyroof LV
 - TRA in Tremlar H (field membrane)
 - TRA in Tremlar V (flashing membrane)



4.1.2. Infrared Thermography

As part of the second phase of this scope of work, an infrared thermography survey was completed for all conventional roofs to identify areas of moisture infiltration in the roof assembly. This was completed as an proactive roof maintenance approach to show where and/if any water penetration has occurred; thus, limiting loss and decreasing potential for leaks.

The infrared thermographic scans of the roofs were performed using an infrared camera to detect thermal anomalies in the form of thermal conduction (i.e. wet insulation) during the evening of August 17, 2017. Weather conditions at the time were 20°C and clear.

The findings of the IR scan will assist in determining whether restoring the roof or replacing the roofs is more cost effective. A total of twelve areas of suspected moisture infiltration were noted during the infrared scan, report details can be found in Appendix B.

4.1.3. Warranty

Twenty-three (23) roofs out of fifty-three (53) roofs reviewed, that is 43% of the roofs, are currently under full labour and material warranty of either 15 or 20 years. The time remaining varies at 2, 4, 12, 14 and 18 years. Detailed information on each roof can be found in the Appendix A.

Based on Tremco's documentation the following roofs are under warranty. However, during our walkthrough with the Tremco's representative, in their opinion, these are not Tremco roofs.

- Fell 9.0 (Tremco Database Ref: 50)
- Fell 10.0 (Tremco Database Ref: 54)
- Main 5.1 (Tremco Database Ref: 15)

We recommend TWH to review available warranty documentation, and sort through the details with Tremco to determine which roofs are under warranty. We based this study on Tremco's documentation to identify which roofs are under warranty.

4.1.4. Roof Condition Summary

In general, based on our visual review, infrared scans and the reported performance history, a majority of the roofs in our opinion are in serviceable condition with the following exceptions:

- A few roofs in the Main Pavilion and Atrium are nearing the end of their expected service life, and in our opinion should be restored or replaced within the short-term.
- Degranulation, ridging, and ponding were noted on the East Wing roofs which does not appear to be under any warranty. It is recommended that these roofs be restored within the mid-term.
- Based on the estimated age, a few other roofs adjacent to the atrium will be nearing the end of their service life and should be replaced within the long-term.
- Based on the infrared scans, three roofs (EW1.1, EW1.2, and EW2.0) were moved forward from Year 3 for immediate repair in Year 1. Roof M2.0 was also identified in the infrared scan; however, it was already recommended for full replacement as part of Year 1.



- Based on the infrared scans, some Tremco Roofs under warranty (ML2.0, F3.0, F4.0, F5.0, and F8.0) may require repair. Tremco completed a site verification of the infrared findings, and recommends repair for Roofs Fell 4.0, McLaughlin Wing 2.0. Tremco also recommends more investigation on Fell 4.0 and Fell 5.0 (Tremco report found in Appendix C).

During our investigation, we performed an exploratory opening on the Main Pavilion Roof 4.0 (Tremco Database Ref: 6). The opening revealed wet coverboard insulation and appeared to be Tremco's roof products. This roof was not in Tremco's warranty database. We recommend UHN review available documentation from past work to locate information regarding warranties.

Refer to Appendix A for a detailed summary for each roof area.

Other observations were noted throughout the roofs that are not currently under warranty that should be addressed as part of a first year maintenance program; the scope of work would generally include:

- Cleaning drains;
- Re-securing loose counter flashing;
- Replacing deteriorated sleepers;
- Replacement of deteriorated sealant around penetrations;
- Pitch pan top-up;
- Removal of various construction debris, and
- Removal of vegetative growth.

The roofs that are under warranty should be reviewed annually as part of the warranty program.

4.2 Recommendation Summary and Cost Estimate

The following table summarizes our opinion of the roof condition and recommended strategy to either repair or replace the roofing and the associated timing and cost, which have not been adjusted for inflation.

Our estimate of repair costs associated with our recommendations is based on the roofs reviewed and in the areas where exploratory openings were conducted. A reduction in the cost of construction would be realized by grouping several roof replacement projects into one contract since the mobilization/demobilization component will be reduced and economies of scale realized. The project costs can only be ascertained with the preparation of the bid documents for a defined scope of work and competitive bidding to reflect market conditions. Our budget cost estimate includes a 10% contingency for unforeseen conditions.

Note the cost estimates are presented in 2017 dollars, and does not include engineering fees or taxes. In developing the cost estimate, we have assumed that a cold-applied low odour roof system would be installed where replacement is required. The costs represent our best estimate.



Table 5.4: Cost Summary Table

Roof		REF (Tremo/DC)	Membrane Type/Composition	Recommendation	Short Term Repairs					Long Term Repairs				
					2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1	Atrium 1.0	61	PVC - Conventional	Membrane Restoration	\$ 350,000.00									
2	Atrium 1.1	37	Inverted 2 Ply Mod-bit	System Replacement					\$ 20,000.00					
3	Atrium 2.0	38	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration	\$ 5,000.00									
4	Atrium 2.1	39	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration	\$ 5,000.00									
5	Atrium 2.2	40	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration	\$ 5,000.00									
6	East Wing 1.0	DC	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration			\$ 250,000.00							
7	East Wing 1.1	DC	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration	\$ 78,000.00									
8	East Wing 1.2	DC	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration	\$ 38,000.00									
9	East Wing 1.3	--	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration			\$ 5,000.00							
10	East Wing 1.4	--	2 Ply Mod-bit (thermofusible) - Conventional	Install flashing; Membrane Restoration			\$ 10,000.00							
11	East Wing 2.0	DC	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration	\$ 61,000.00									
12	East Wing 3.0	DC	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration			\$ 120,000.00							
13	Fell 01.0	2	Inverted EPDM	Remove vegetation, Replace w INV TRA			\$ 20,000.00							
14	Fell 01.1	1	Inverted TRA	-			\$ -							
15	Fell 02.0	--	PVC - Conventional	System Replacement			\$ 15,000.00							
16	Fell 03.0	30	Proprietary BUR	-										
17	Fell 04.0	29	Proprietary BUR	-										
18	Fell 05.0	28	Proprietary BUR	-										
19	Fell 06.0	34	Inverted 2 Ply Mod-bit	System Replacement					\$ 90,000.00					
20	Fell 06.1	35	Inverted 2 Ply Mod-bit	System Replacement					\$ 5,000.00					
21	Fell 06.2	36	Inverted 2 Ply Mod-bit	System Replacement					\$ 5,000.00					
22	Fell 07.0	62	Inverted?	System Replacement			\$ 30,000.00							
23	Fell 07.1	--	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration			\$ 5,000.00							
24	Fell 08.0	33	Proprietary BUR	-										
25	Fell 08.1	--	Proprietary BUR	-										
26	Fell 08.2	31	Asphalt 4 Ply BUR	System Replacement						\$ 90,000.00				
27	Fell 09.0	50	Proprietary BUR	-										
28	Fell 10.0	54	EPDM fully adhered											
29	Fell 10.1	51	Proprietary BUR	-										
30	Fell 10.2	52	Proprietary BUR	-										
31	Fell 11.0	--	PVC - Conventional	System Replacement					\$ 15,000.00					
32	Gamma 1.0	49	Inverted 2 Ply Mod-bit	Remove vegetation										
33	Main 1.0	7	Pitch Roof	System Replacement	\$ 15,000.00									
34	Main 2.0	9	Asphalt 4 Ply BUR	System Replacement	\$ 10,000.00									
35	Main 2.1	8	Asphalt 4 Ply BUR	System Replacement	\$ 10,500.00									
36	Main 3.0	10	Asphalt 4 Ply BUR	System Replacement	\$ 5,000.00									
37	Main 4.0	6	Proprietary BUR	Tremco to investigate										
38	Main 5.0	4	Proprietary BUR											
39	Main 5.1	15	2 Ply Mod-bit (thermofusible) - Conventional	Membrane Restoration					\$ 20,000.00					
40	Main 5.2	5	Inverted TRA	-										
41	Main 5.3	14	Proprietary BUR	-										
42	Main 6.0	55	Ballasted EPDM	System Replacement					\$ 30,000.00					
43	Main 7.0	21	Proprietary BUR	-										
44	Main 8.0	45	Proprietary BUR	Tremco to investigate										
45	Main 8.1	46	Proprietary BUR	-										
46	Main 9.0	47	Proprietary BUR	-										
47	McLaughlin 1.0	13	Proprietary BUR	-										
48	McLaughlin 1.1	12	Proprietary BUR	-										
49	McLaughlin 2.0	11	Proprietary BUR	-										
50	McLaughlin 3.0	27	Inverted TRA	-										
51	West Wing 1.0	43	Inverted TRA	-										
52	West Wing 1.1	42	Inverted TRA	-										
53	West Wing 2.0	44	Inverted TRA	-										
A	Item A: General Maintenance				\$ 20,000.00									
B	Item B: IR Scan to be completed in Year 1				\$ 5,000.00									
B2	Item B2: IR scan to be completed after warranty									\$ 10,000.00				
C	ITEM C: Non-Tremco Roof Repair Maintenance (assumes 5% of scanned roofs require repairs)					\$ 50,000.00					\$ 10,000.00			
D	ITEM D: Roof Assessment								\$ 20,000.00					
TOTAL					\$ 607,500.00	\$ 50,000.00	\$ 455,000.00	\$ -	\$ 205,000.00	\$ 10,000.00	\$ 100,000.00	\$ -	\$ -	\$ -

A summary roof plan depicting the roofs and the recommended replacement timing is found in Figure 6.

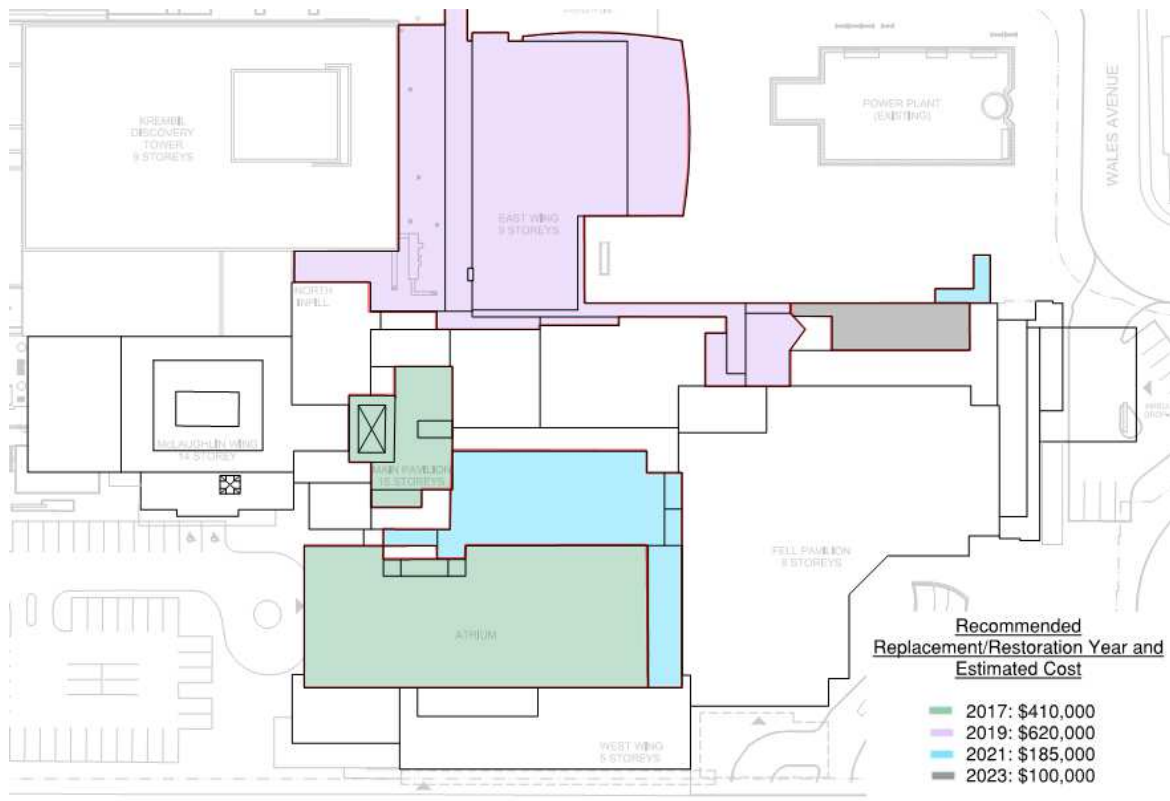


Figure 6: Recommended Repair Year and Estimated Cost

We understand that the roofs Gamma 1.0 (Tremco Database Ref: 49) and Fell 8.2 (Tremco Database Ref: 31) are experiencing water leakage. It is assumed this leakage will be repaired in the near future. However, it is recommended to complete an IR scan to determine if moisture exist within the assembly. Depending on the outcome, this roof may be restored or replaced in 2017 rather than 2023.

4.3 Recommended Roof Repair/Replacement System Description

The recommendations for the replacement system are based on removing the existing assemblies in their entirety to the roof deck and installing a new insulated assembly on the existing roof deck. We have not made any allowances for special protection on the interior. We do not recommend the use of a hot applied membrane due to odours and risk of fire. The roof membrane systems selected are based on appropriateness for the roof conditions and take into consideration the current assembly configuration (i.e. conventional or inverted).



The following is the general approach taken for the development of the roof work cost estimates outlined in the cost table:

- 2-ply Modified Bitumen: In order to extend the roof's (All of East Wing, Atrium 2.0-2.2, and Main 5.1) life, we recommend the restoring the membrane using an odourless, chemically cured, fully reinforced polyurethane membrane system. Some manufacturer's offer a 20 year warranty; however as a prerequisite requires an IR scan and some minor analysis of the existing substrate to ensure that roof is a viable restoration candidate.
- Asphalt 4 Ply BUR: We recommend at the end of the service life to complete a full replacement of the roofs (Fell 8.2, Main 2.0, Main 2.1 and Main 3.0) with a new conventional roof assembly similar to the current proprietary BUR system in place on the facility
- PVC: For Atrium 1.0, we recommend the restoring the membrane using an odourless, chemically cured, fully reinforced polyurethane membrane system in Year 1. While for the Fell 2.0 and Fell 11.0 roofs over the staircase, a full replacement should be considered.
- General Roof Maintenance (non Tremco roofs): We recommend including an allowance to address general maintenance such fix seams in PVC, clean drains, remove debris, reattach metal counter flashing, expansion joint flashing cover, top up pitch pans, and clean drains free of debris as part of the ongoing maintenance program
- Ongoing Roof Repairs (non Tremco roofs): Following the IR scans results, localized roof repairs may be required on an as needed basis in order to maintain the roofs.
- Roof Assessment: We recommend completing a roof assessment in Year 5 as an update.

Report Prepared by:

A handwritten signature in blue ink, appearing to read 'CCSuen'.

Per: Ching Chi Suen, MBS
B: 416 599 5465 x 163
E: chingchi.suen@englink.ca

A handwritten signature in blue ink, appearing to read 'Paul Pasqualini'.

Paul Pasqualini, MASc, P.Eng.
Partner
B: 416-599-5465 x 112
E: paul.pasqualini@englink.ca



399 Bathurst Street, Toronto, ON

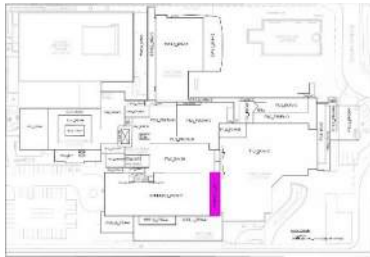
April 7, 2017

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Appendix A

Roof Detail Summary

A.2 Atrium Roof 1.1 (Tremco Database Ref: 37)



System Information

Age: 17 years

Estimated Remaining Service Life: 5 years

Main Field Construction*:

- Gravel
- Filter fabric
- 3" XPS
- 2 MB
- fiberboard
- 1/2" dense glass

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on cut test opening



East view



Flashing joint open



Exploratory opening



Exploratory opening

Conditions/Observations

- Main Field:
- Broken glass noted, and unsafe wooden stair access.
- Perimeter Finishing:
- Mostly in serviceable condition except an open flashing joint noted.
- Projection Details:
- Presumed serviceable condition.
- Ponding/Drainage:
- No drainage provided.
- Adjacent Walls:
- Unknown

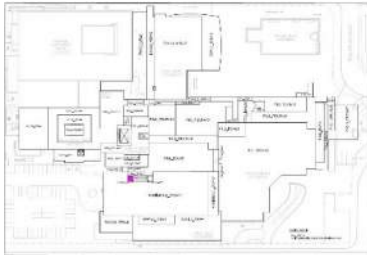
Recommendations

- Replacement Roof
- Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration					\$20,000					

A.3 Atrium Roof 2.0 (Tremco Database Ref: 38)



System Information

Age: 17 year

Estimated Remaining Service Life: 1 year

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible)
 - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Unsafe access

*Based on visual review

Conditions/Observations

- | | |
|----------------------|--|
| Main Field: | ▪ Degranulation around the drain. |
| Perimeter Finishing: | ▪ Presumed serviceable condition. |
| Projection Details: | ▪ Presumed serviceable condition. |
| Ponding/Drainage: | ▪ Presumed serviceable condition. |
| Adjacent Walls: | ▪ Metal wall appears to be in serviceable condition. |

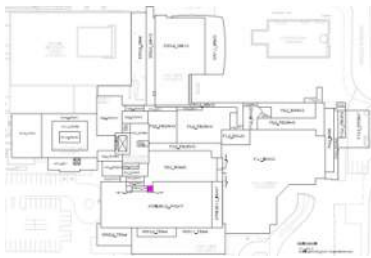
Recommendations

- Replacement Roof Considerations:
- Difficult access

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

A.5 Atrium Roof 2.2 (Tremco Database Ref: 40)



System Information

Age: 17 year

Estimated Remaining Service Life: 1 year

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible)
 - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Exterior fixed ladder

*Based on visual review



South view

Conditions/Observations

- | | |
|----------------------|---|
| Main Field: | ▪ In general, degranulation noted. |
| Perimeter Finishing: | ▪ Presumed serviceable condition. |
| Projection Details: | ▪ Not applicable. |
| Ponding/Drainage: | ▪ Drainage clear. |
| Adjacent Walls: | ▪ Staining noted in the corner of the metal wall. |

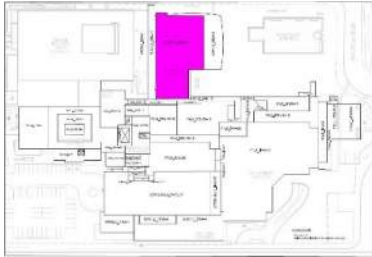
Recommendations

- Replacement Roof
- Considerations:
- Difficult access
 -

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

A.6 East Wing Roof 1.0 (Tremco Database Ref: Not applicable)



System Information

Age: 12 years

Estimated Remaining Service Life: 3 years

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible) - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



Piles of granulation



Conditions/Observations

- Main Field:
- In general, degranulation was noted.
- Perimeter Finishing:
- Presumed serviceable condition.
- Projection Details:
- Metal flashing exhibit some surface corrosion.
- Ponding/Drainage:
- A few ponding noted.
- Adjacent Walls:
- Not applicable.

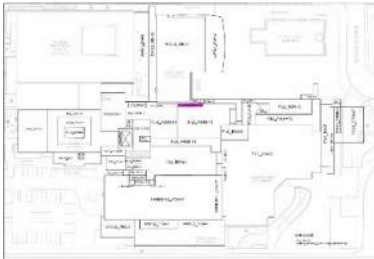
Recommendations

- Replacement Roof
- Significant detail work around penetrations
- Considerations:
-

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration			\$250,000							

A.9 East Wing Roof 1.3 (Tremco Database Ref: Not applicable)



System Information

Age: 12 years

Estimated Remaining Service Life: 3 years

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible) - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review



View

Conditions/Observations

- Main Field:
 - Presumed serviceable condition.
- Perimeter Finishing:
 - Presumed serviceable condition.
- Projection Details:
 - Not applicable.
- Ponding/Drainage:
 - No drainage provided.
- Adjacent Walls:
 - Flashing detached. Refer to East Wing 1.2.

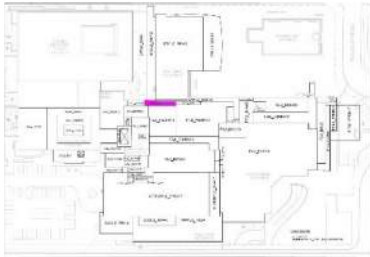
Recommendations

- Replacement Roof
 - Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration			\$5,000							

A.10 East Wing Roof 1.4 (Tremco Database Ref: Not applicable)



System Information

Age: 12 years

Estimated Remaining Service Life: 3 years

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible) - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review



North view



North view



Side alligating

Conditions/Observations

- Main Field:
 - In general, side alligating.
- Perimeter Finishing:
 - Presumed serviceable condition.
- Projection Details:
 - Presumed serviceable condition.
- Ponding/Drainage:
 - Presumed serviceable condition.
- Adjacent Walls:
 - Brick masonry in repairs

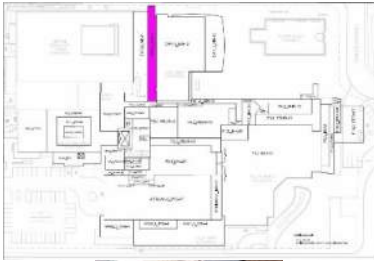
Recommendations

- Replacement Roof
 - Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration			\$10,000							

A.11 East Wing Roof 2.0 (Tremco Database Ref: Not applicable)



System Information

Age: 12 years

Estimated Remaining Service Life: 3 years

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible) - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review

Conditions/Observations

Main Field: ▪ Presumed serviceable condition.

Perimeter Finishing: ■ Presumed serviceable condition.

Projection Details: ■ Presumed serviceable condition.

Ponding/Drainage: ▪ Presumed serviceable condition.

Adjacent Walls: ▪ Presumed serviceable condition.

Recommendations

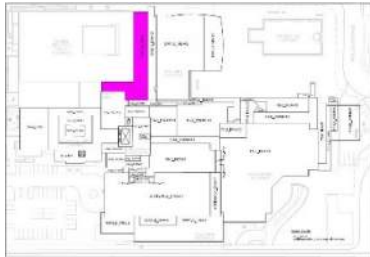
Replacement Roof ■ None.

Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

A.12 East Wing Roof 1.2 (Tremco Database Ref: DC)



System Information

Age: 11 years

Estimated Remaining Service Life: 3 years

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible) - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



Degranelation



Ponding

Conditions/Observations

- Main Field:
- In general, ponding and degranulation was noted.
- Perimeter Finishing:
- Presumed serviceable condition.
- Projection Details:
- Presumed serviceable condition.
- Ponding/Drainage:
- Ponding noted.
- Adjacent Walls:
- Brick masonry in repairs at the time.

Recommendations

- Replacement Roof
- None.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration			\$120,000							

- Interior hatch

*Based on cut test opening



Cut test

Main Field:	<ul style="list-style-type: none"> Two trees were noted near the edge of the south and north end of the roof. Roots were noted within the insulation in the exploratory opening.
Perimeter Finishing:	<ul style="list-style-type: none"> Minor discolouration; however, still in serviceable condition.
Projection Details:	<ul style="list-style-type: none"> Not applicable.
Ponding/Drainage:	<ul style="list-style-type: none"> Serviceable condition.
Adjacent Walls:	<ul style="list-style-type: none"> Not applicable.

Replacement Roof Considerations:	<ul style="list-style-type: none"> ▪ Difficult access ▪ Removal of trees ▪ Consider distributing the gravel onto Fell Roof 1.1 during roof replacement.
----------------------------------	--

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

A.14 Fell Pavilion Roof 1.1 (Tremco Database Ref: 1)



System Information

Age: 13 years

Estimated Remaining Service Life: 7 year

Main Field Construction*:

- River stone ballast
- Protection sheet
- EPS insulation
- TRA membrane
- Deck

Warranty: 15 (2 years remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door access

*Based on Tremco's documentation



General view



West roof view



South roof view



View of adjacent wall

Conditions/Observations

- Main Field: ▪ Serviceable condition.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Brick masonry wall appears to be in serviceable condition.

Recommendations

- Replacement Roof Considerations: ▪ Consider distributing the gravel onto other roofs during roof replacement.

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

A.15 Fell Pavilion Roof 2.0 (Tremco Database Ref: NA)



System Information

Age: 31 years

Estimated Remaining Service Life: 1 year

Main Field Construction:

- Unknown

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- No access



General NE view



General east view

Conditions/Observations

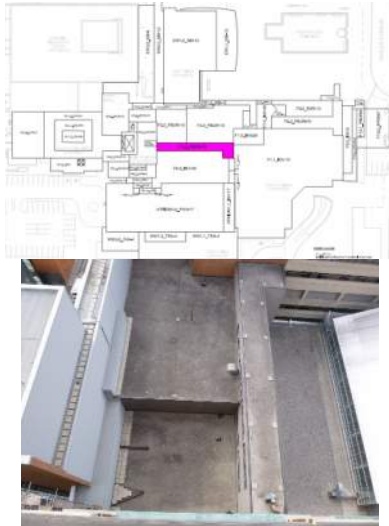
- | | |
|----------------------|--|
| Main Field: | ▪ The sloped area appears to be clean, while the flat roof lower region has a layer of dirt accumulated. |
| Perimeter Finishing: | ▪ Serviceable condition. |
| Projection Details: | ▪ Serviceable condition. |
| Ponding/Drainage: | ▪ Drain grate cap missing. |
| Adjacent Walls: | ▪ Brick masonry parapet appears to be in serviceable condition. |

Recommendations

- Replacement Roof Considerations:
- Difficult access
 - Lighting cables require removal prior to roof work

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

**A.16 Fell Pavilion Roof 3.0 (Tremco Database Ref: 30)****System Information**

Age: 11 years

Estimated Remaining Service Life: 9 years

Main Field Construction*:

Warranty: 15 (4 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Unsafe window access

*Based on Tremco's documentation

Conditions/Observations

- Main Field: ▪ Presumed serviceable condition.
- Perimeter Finishing: ▪ Presumed serviceable condition.
- Projection Details: ▪ Presumed serviceable condition.
- Ponding/Drainage: ▪ Presumed serviceable condition.
- Adjacent Walls: ▪ Presumed serviceable condition.

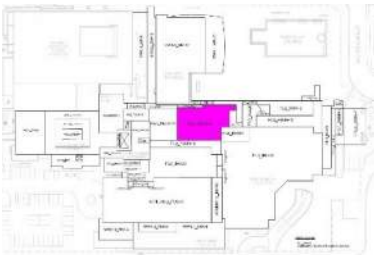
Recommendations

- Replacement Roof ▪ Very difficult access.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration					No direct cost anticipated					

A.17 Fell Pavilion Roof 4.0 (Tremco Database Ref: 29)



System Information

Age: 10 years

Estimated Remaining Service Life: 10 years

Main Field Construction*:

Warranty: 15 (4 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Exterior fixed ladder

* Based on Tremco's documentation



Overall view



North roof view



South roof view



View of adjacent wall

Conditions/Observations

- Main Field: ▪ Serviceable condition.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Detached flashing noted.

Recommendations

- Replacement Roof ▪ Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration						No direct cost anticipated				

A.18 Fell Pavilion Roof 5.0 (Tremco Database Ref: 28)



System Information

Age: 10 years

Estimated Remaining Service Life: 1 years

Main Field Construction*:

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- *Exterior fixed ladder

*Based on Tremco's documentation



North roof view



East roof view


View of counter flashing at
wall


South roof view

Conditions/Observations

Main Field:

- Serviceable condition.

Perimeter Finishing:

- Serviceable condition.

Projection Details:

- Serviceable condition.

Ponding/Drainage:

- No drainage provided.

Adjacent Walls:

- Brick masonry exhibiting several cracks and efflorescent. At the time of assessment, repair work on the wall was being completed.

Recommendations

Replacement Roof

- Difficult access

Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated



Age: 17 years
Estimated Remaining Service Life: 3 years

- Gravel
- Filter fabric
- 3" XPS
- 2 MB
- Concrete deck

Warranty: NA

Warranty Provider: NA

- None reported

- Metal flashing

- Exterior fixed ladder

*Based on cut test opening



View of adjacent wall



North roof view

- | | |
|----------------------|--------------------------------|
| Main Field: | ▪ In general, moss were noted. |
| Perimeter Finishing: | ▪ Serviceable condition. |
| Projection Details: | ▪ Serviceable condition. |
| Ponding/Drainage: | ▪ Serviceable condition. |
| Adjacent Walls: | ▪ Serviceable condition. |

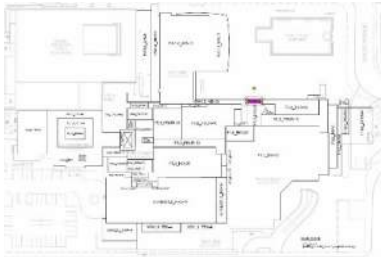
- Replacement Roof Considerations:
- Ladder unsafe.

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

[illegible]

[illegible]

**A.23 Fell Pavilion Roof 7.1 (Tremco Database Ref: Not applicable)****System Information**

Age: 12 years

Estimated Remaining Service Life: 8

Main Field Construction*:

- 2 Ply Mod-bit (thermofusible)
- Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review

Conditions/Observations

- Main Field: ▪ Debris and degranulation noted.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Serviceable condition.

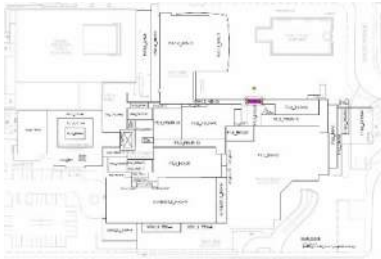
Recommendations

- Replacement Roof ▪ Difficult access.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration			\$5,000							

A.24 Fell Pavilion Roof 7.1 (Tremco Database Ref: Not applicable)



System Information

Age: 12 years

Estimated Remaining Service Life: 8 years

Main Field Construction*:

- Conventional 2 ply mod bit

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Exterior fixed ladder

*Based on visual review



View of adjacent wall



North roof view

Conditions/Observations

- Main Field: ▪ In general, moss were noted.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Serviceable condition.

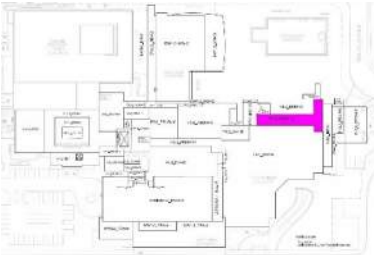
Recommendations

- Replacement Roof ▪ Ladder unsafe.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration			\$5,000							

A.25 Fell Pavilion Roof 8.0 (Tremco Database Ref: 33)



System Information

Age: 10 years

Estimated Remaining Service Life: 10 years

Main Field Construction*:

Warranty: 15 (4 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



South roof view



Sealant debonded



Overall wall view

Conditions/Observations

- Main Field:
- Appears to be in serviceable condition.
- Perimeter Finishing:
- Modified bitumen flashing noted.
- Projection Details:
- Not applicable.
- Ponding/Drainage:
- Serviceable condition.
- Adjacent Walls:
- Deteriorated sealant and cracking in the precast panel noted.

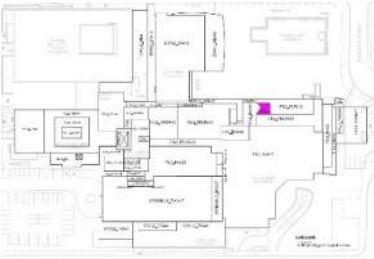
Recommendations

- Replacement Roof
- Difficult access
- Considerations:
- Removal of trees
 - Consider distributing the gravel onto Fell Roof 1.1 during roof replacement.

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

**A.26 Fell Pavilion Roof 8.1 (Tremco Database Ref: Not applicable)****System Information**

Age: 10 years

Estimated Remaining Service Life: 10 years

Main Field Construction*:

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review

Conditions/Observations

- Main Field: ▪ Debris noted and patch repair noted.
- Perimeter Finishing: ▪ Minor flashing bent.
- Projection Details: ▪ Not applicable.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Not applicable.

Recommendations

- Replacement Roof ▪ Penetration details.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration						No direct cost anticipated				

- Door

Flashina lifted

[illegible]

**A.28 Fell Pavilion Roof 9.0 (Tremco Database Ref: 50)****System Information**

Age: 6 years

Estimated Remaining Service Life: 14 years

Main Field Construction*:

Warranty: 20 (14 years remaining)

Warranty Provider: Tremco

- Gravel
- 4" insulation
- Fleece back epdm mopped on fiberboard
- 2" fiberboard
- 1/2" densedeck
- Steel deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on cut test opening

Conditions/Observations

- Main Field:
 - Serviceable condition.
- Perimeter Finishing:
 - Minor discolouration; however, still in serviceable condition.
- Projection Details:
 - Serviceable condition.
- Ponding/Drainage:
 - Serviceable condition.
- Adjacent Walls:
 - Sealant deterioration.

Recommendations

- Replacement Roof Considerations:
 - None.

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

*Based on visual review



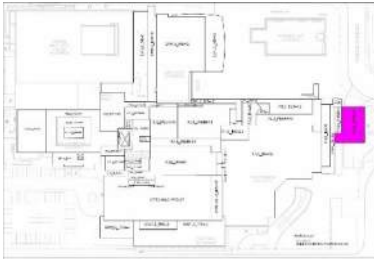
Exploratory opening

Adjacent Walls: ▪ Serviceable condition.

Considerations:

[illegible]

A.30 Fell Pavilion Roof 10.0 (Tremco Database Ref: 54)



System Information

Age: 8 years

Estimated Remaining Service Life: 12 years

Main Field Construction*:

- EPDM Fully Adhered

Warranty: 20 (14 remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review



View

Conditions/Observations

- Main Field:
- Canopy in serviceable condition.
- Perimeter Finishing:
- Presumed serviceable condition.
- Projection Details:
- Not applicable.
- Ponding/Drainage:
- Not applicable.
- Adjacent Walls:
- Not applicable.

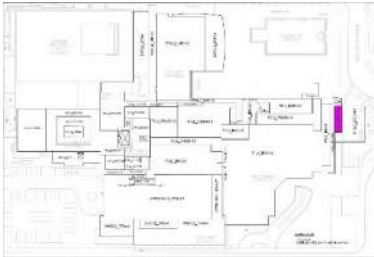
Recommendations

- Replacement Roof
- None.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

**A.31 Fell Pavilion Roof 10.1 (Tremco Database Ref: 52)****System Information**

Age: 6 years

Estimated Remaining Service Life: 14 years

Main Field Construction*:

Warranty: 20 (14 remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review

Conditions/Observations

- Main Field: ▪ Two trees were noted near the edge of the south and north end of the roof. Roots were noted within the insulation in the exploratory opening.
- Perimeter Finishing: ▪ Minor discolouration; however, still in serviceable condition.
- Projection Details: ▪ Not applicable.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Not applicable.

Recommendations

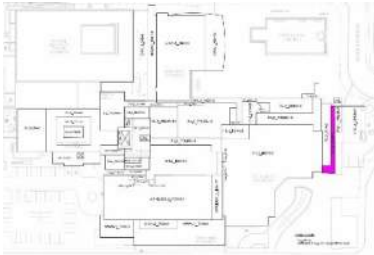
- Replacement Roof ▪ Difficult access
- Considerations: ▪ Removal of trees
- Consider distributing the gravel onto Fell Roof 1.1 during roof replacement.

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

A.32 Fell Pavilion Roof 10.2 (Tremco Database Ref: 52)



System Information

Age: 6 years

Estimated Remaining Service Life: 14 years

Main Field Construction*:

Warranty: 20 (14 remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

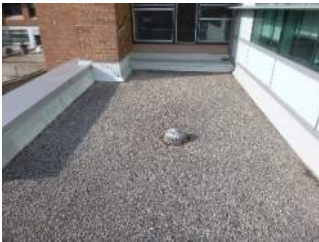
Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review



North roof view



East view



West view

Conditions/Observations

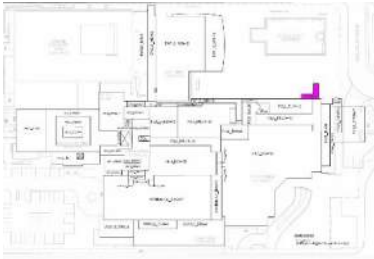
- Main Field:
 - Serviceable condition.
- Perimeter Finishing:
 - Serviceable condition.
- Projection Details:
 - Serviceable condition.
- Ponding/Drainage:
 - Serviceable condition.
- Adjacent Walls:
 - Serviceable condition.

Recommendations

- Replacement Roof
 - None.
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement						No direct cost anticipated				
Roof Restoration										

**A.33 Fell Pavilion Roof 11.0 (Tremco Database Ref: 33.1)****System Information**

Age: 17 years

Estimated Remaining Service Life: 3 years

Main Field Construction*:

- PVC - Conventional

Warranty: NA

Warranty Provider: NA

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review

Conditions/Observations

- Main Field:
 - Presumed serviceable condition.
- Perimeter Finishing:
 - Presumed serviceable condition.
- Projection Details:
 - Presumed serviceable condition.
- Ponding/Drainage:
 - Presumed serviceable condition.
- Adjacent Walls:
 - Presumed serviceable condition.

Recommendations

- Replacement Roof
 - Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration					\$15,000					

*Based on cut test



Main Field:	▪ Vegetative growth.
Perimeter Finishing:	▪ Serviceable condition.
Projection Details:	▪ Serviceable condition.
Ponding/Drainage:	▪ Serviceable condition.
Adjacent Walls:	▪ Serviceable condition with a dent in the brick masonry.

Replacement Roof Considerations:

- Depending on repair outcome from current reported water leakage. Costing to be determined.

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

[illegible]

[illegible]

[illegible]



Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration						No direct cost anticipated				



A.38 Main Pavilion Roof 5.0 (Tremco Ref: 4)



System Information

Age: 10 years

Estimated Remaining Service Life: 1 year

Main Field Construction*:

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- *Requires ladder

*Based on Tremco's documentation

Conditions/Observations

Main Field: ▪ Serviceable condition.

Perimeter Finishing: ▪ Serviceable condition.

Projection Details: ▪ Serviceable condition.

Ponding/Drainage: ▪ No drainage provided.

Adjacent Walls: ▪ Brick masonry exhibiting several cracks and efflorescent. At the time of assessment, repair work on the wall was being completed.

Recommendations

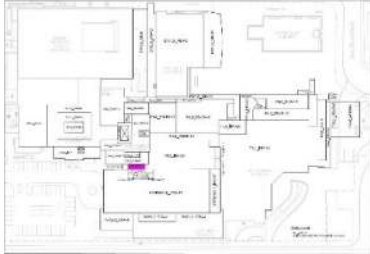
Replacement Roof ▪ Difficult access

Considerations:

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

**A.39 Main Pavilion Roof 5.1 (Tremco Ref: 15)****System Information**

Age: 10 years

Estimated Remaining Service Life: 5 years

Main Field Construction*:

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

- 2 Ply Mod-bit (thermofusible)
- Conventional

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires ladder

*Based on visual review

Conditions/Observations

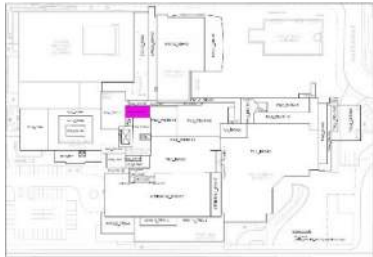
- Main Field: ▪ Presumed serviceable condition.
- Perimeter Finishing: ▪ Presumed serviceable condition.
- Projection Details: ▪ Presumed serviceable condition.
- Ponding/Drainage: ▪ Presumed serviceable condition.
- Adjacent Walls: ▪ Not applicable.

Recommendations

- Replacement Roof ▪ Difficult access.
- Considerations: ▪ Possible Tremco roof – to be determined.

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration					\$20,000					

**A.40 Main Pavilion Roof 5.2 (Tremco Ref: 5)****System Information**

Age: 10 years

Estimated Remaining Service Life: NA

Main Field Construction*:

- Inverted TRA

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review

Conditions/Observations

- Main Field:
 - In general, bare gravel spots and debris were noted.
- Perimeter Finishing:
 - Serviceable condition.
- Projection Details:
 - Serviceable condition.
- Ponding/Drainage:
 - Serviceable condition.
- Adjacent Walls:
 - Was in the process of being repaired.

Recommendations

- Replacement Roof
 - Difficult access.
- Considerations:

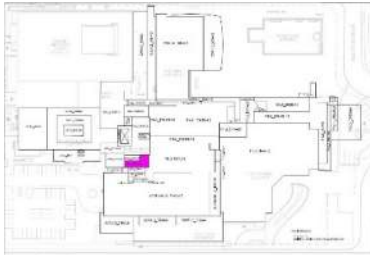
Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated



A.41 Main Pavilion Roof 5.3 (Tremco Ref: 14)



System Information

Age: 10 years

Estimated Remaining Service Life: NA

Main Field Construction*:

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review

Conditions/Observations

- Main Field: ▪ Debris noted throughout roof.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Presumed serviceable condition.

Recommendations

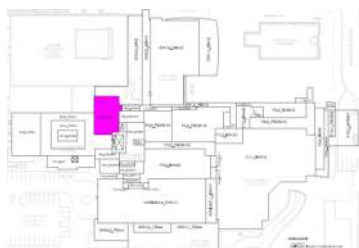
- Replacement Roof ▪ None
- Considerations:

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration						No direct cost anticipated				

[illegible]

A.43 Main Pavilion Roof 7.0 (Tremco Ref: 21)



System Information

Age: 10 years

Estimated Remaining Service Life: 10 year

Main Field Construction*:

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

Water Leaks:

- Reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



Overall view



Overall view



Penetrations



Debris

Conditions/Observations

- Main Field:
- Debris and bird carcasses noted.
- Perimeter Finishing:
- Serviceable condition.
- Projection Details:
- Metal flashing exhibit some surface corrosion.
 - Sealant and/or pitch pockets exhibit some deterioration.
- Ponding/Drainage:
- Serviceable condition.
- Adjacent Walls:
- Serviceable condition.

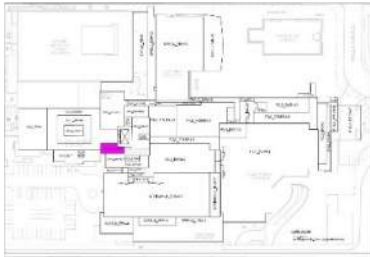
Recommendations

- Replacement Roof
- Difficult access and several penetration details.
- Considerations:

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration						No direct cost anticipated				

A.44 Main Pavilion Roof 8.0 (Tremco Ref: 45)



System Information

Age: 10 years

Estimated Remaining Service Life: 10 year

Main Field Construction*:

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- Reported

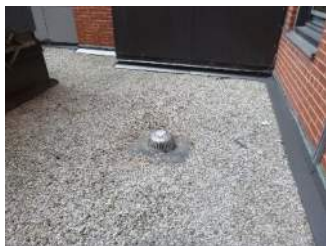
Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



View of Drain

Conditions/Observations

- Main Field: ▪ Debris noted.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Metal flashing exhibit some surface corrosion.
 ▪ Sealant and/or pitch pockets exhibit some deterioration.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Serviceable condition.

Recommendations

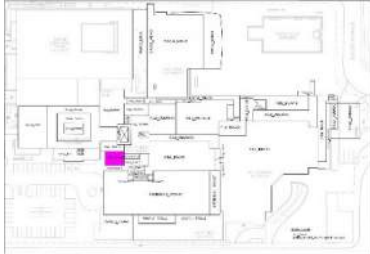
- Replacement Roof ▪ Difficult access
- Considerations:

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

A.45 Main Pavilion Roof 8.1 (Tremco Ref: 46)



System Information

Age: 10 years

Estimated Remaining Service Life: 10

Main Field Construction*:

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

Water Leaks:

- Reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



View



View



View



View

Conditions/Observations

- Main Field: ▪ Debris noted.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Metal flashing exhibit some surface corrosion.
- Sealant and/or pitch pockets exhibit some deterioration.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Serviceable condition.

Recommendations

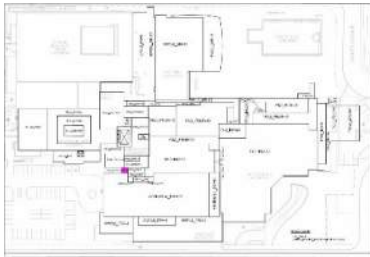
- Replacement Roof ▪ Difficult access
- Considerations: ▪ Significant detail work around penetrations

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

A.46 Main Pavilion Roof 9.0 (Tremco Ref: 47)



System Information

Age: 10 years

Estimated Remaining Service Life: 10

Main Field Construction*:

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Warranty: 15 (5 years remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Requires lift

* Based on visual review

Conditions/Observations

- Main Field:
 - Presumed serviceable condition.
- Perimeter Finishing:
 - Presumed serviceable condition.
- Projection Details:
 - Presumed serviceable condition.
- Ponding/Drainage:
 - Presumed serviceable condition.
- Adjacent Walls:
 - Presumed serviceable condition.

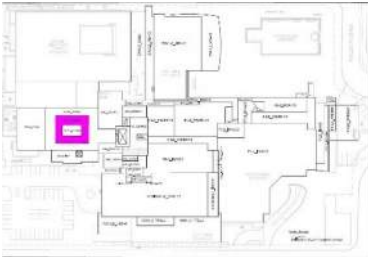
Recommendations

- Replacement Roof Considerations:
 - Difficult access.

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

**A.47 MacLaughlin Roof 1.1 (Tremco Ref: 12)****System Information**

Age: 1 year

Estimated Remaining Service Life: 19

Main Field Construction*:

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Warranty: 20 (19 years remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Side hatchdoor

*Based on visual review

Conditions/Observations

- Main Field: ▪ Serviceable Condition.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable Condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Unknown.

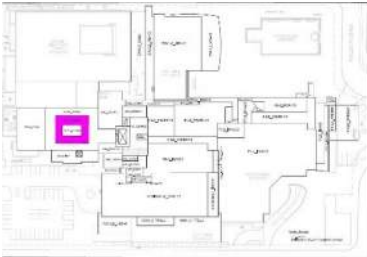
Recommendations

- Replacement Roof ▪ Difficult access
- Considerations:

Proposed Budget (2017 \$): does not include taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

**A.48 MacLaughlin Roof 1.1 (Tremco Ref: 12)****System Information**

Age: 1 year

Estimated Remaining Service Life: 19

Main Field Construction*:

Warranty: 20 (19 years remaining)

Warranty Provider: Tremco

- Gravel
- 3 ply BURmastic
- ½" coverboard
- 1½" iso insulation
- Kraft paper or BURmastic Composite Ply HT vapour barrier
- Deck

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Side hatchdoor

*Based on visual review

Conditions/Observations

- Main Field: ▪ Serviceable Condition.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable Condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Unknown.

Recommendations

- Replacement Roof ▪ Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated

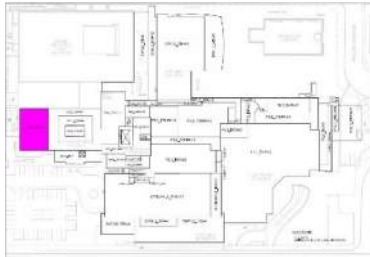


*Based on cut test opening

Walkway

[illegible]

A.50 MacLaughlin Roof 3.0 (Tremco Ref: 27)



System Information

Age: 5 years

Estimated Remaining Service Life: NA

Main Field Construction*:

- Inverted TRA

Warranty: 20 (15 years

remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review



View of building



Penetration



NE view



Wall inner corner

Conditions/Observatio

- Main Field: Serviceable condition.
- Perimeter Finishing: Serviceable condition.
- Projection Details: Serviceable condition.
- Ponding/Drainage: Serviceable condition.
- Adjacent Walls: Unknown

Recommendations

- Replacement Roof: Difficult access
- Considerations:

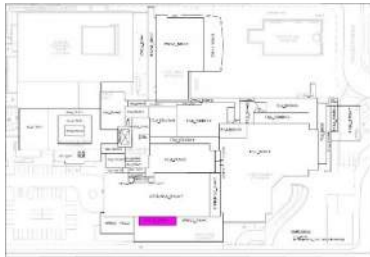
Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	
Roof Replacement										
Roof Restoration										

No direct cost anticipated



A.51 West Wing Roof 1.0 (Tremco Ref: 43)



System Information

Age: 4 years

Estimated Remaining Service Life: NA

Main Field Construction*:

- Inverted TRA

Warranty: 20 years (16 years remaining)

Warranty Provider: Tremco

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Exterior fixed ladder

*Based on visual review

Conditions/Observations

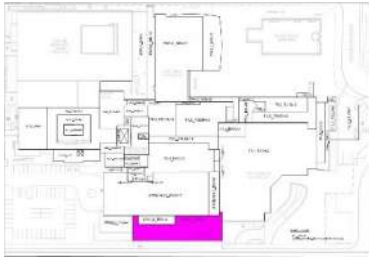
- Main Field: ▪ Serviceable condition.
- Perimeter Finishing: ▪ Serviceable condition.
- Projection Details: ▪ Serviceable condition.
- Ponding/Drainage: ▪ Serviceable condition.
- Adjacent Walls: ▪ Serviceable condition.

Recommendations

- Replacement Roof ▪ Difficult access
- Considerations: ▪ Significant detail work around penetrations

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement						No direct cost anticipated				
Roof Restoration										

**A.52 West Wing Roof 1.1 (Tremco Ref: 42)****System Information**

Age: 4 years

Estimated Remaining Service Life: NA

Main Field Construction*:

Warranty: 20 years (16 years

remaining)

Warranty Provider: Tremco

- 2 Ply Mod-bit (thermofusible) - Conventional

Water Leaks:

- None reported

Flashing Construction:

- Metal flashing

Access:

- Door

*Based on visual review

Conditions/Observations

- Main Field:
 - Serviceable condition.
- Perimeter Finishing:
 - Serviceable condition.
- Projection Details:
 - Serviceable condition.
- Ponding/Drainage:
 - Serviceable condition.
- Adjacent Walls:
 - Serviceable condition.

Recommendations

- Replacement Roof
 - Difficult access
- Considerations:

Proposed Budget (2017 \$): does not includes taxes, contingency, and consulting fees. Refer to main body for complete capital plan for overall facility costs associated with infrared thermography and general maintenance.

Recommendation	Timing (Years)									
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Roof Replacement										
Roof Restoration										

No direct cost anticipated



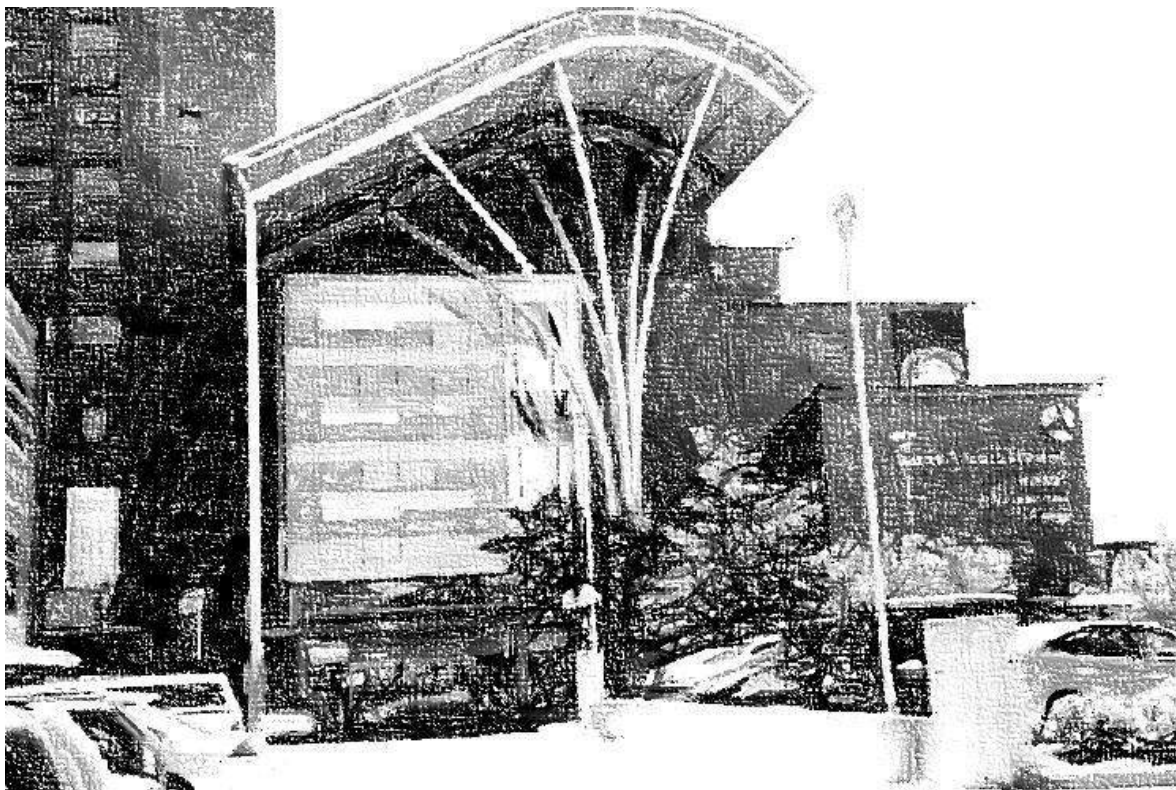
399 Bathurst Street, Toronto, ON

October 20, 2017

17-0017

Appendix B

Infrared Thermography Report



Roof Membrane Evaluation

399 Bathurst Street, Toronto

August 16, 2017

Greg Labbé BSc., CEA, CET, HRAI#5807, Level II

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Overview

On the evening of August 16, 2017, select roofs of Toronto Western Hospital at 399 Bathurst Street were evaluated non-destructively using infrared thermography in general accordance with procedures outlined in ASTM C1153 *Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging*.

Summary of Suspected Breaches

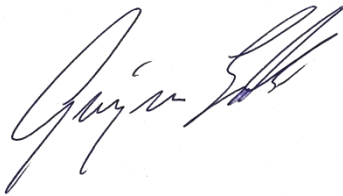
Suspect Breach Location	Notes
1, 3, 4,	BUR Spot proximal to roof edge
6, 7, 8	Adjacent to wall
5, 10,	Penetration at or near anchor or drain
9, 10	BUR Spot in field
11, 12	BUR large area
2	BUR Rectangular, large area

Conclusions:

Overall the findings point to a few non-systemic areas where the integrity of the roof membrane appears to be breached. Roofs that were inaccessible were scanned from above, but we highly recommend direct closer observation. We recommend further core sampling of identified areas to confirm the presence of water and that subsequent repairs be made as soon as possible.

Regards,

Prepared by:

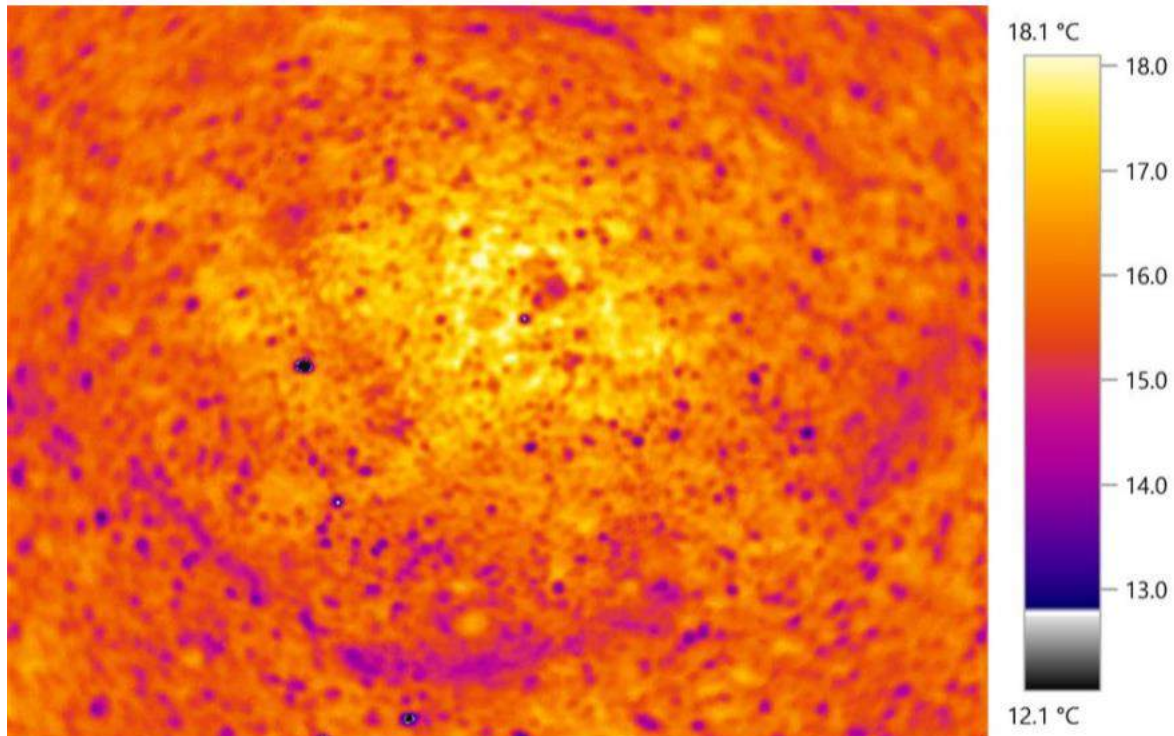


Greg Labbé BSc., CET, CEA
Level II Thermographer, HRAI#5807
Director, BlueGreen Consulting Group Inc.
greg@bluegreengroup.ca

Appendix A – Suspected Breaches in the Roof Membrane

The test method used was in general accordance with ASTM C1153 - 10(2015) *Standard Practice for Location of Wet Insulation in Roofing Systems Using Infrared Imaging*. An infrared scan of all applicable building roof sections began at 9PM after sunset (8:20PM) and ended by 1AM. All accessible suspect breaches were outline with orange spray paint on the surface of the roof and sequentially numbered with the exception of two areas that were on inaccessible roofs.

Location 1: M2.0, Dimensions: 3'x3' = 9ft²

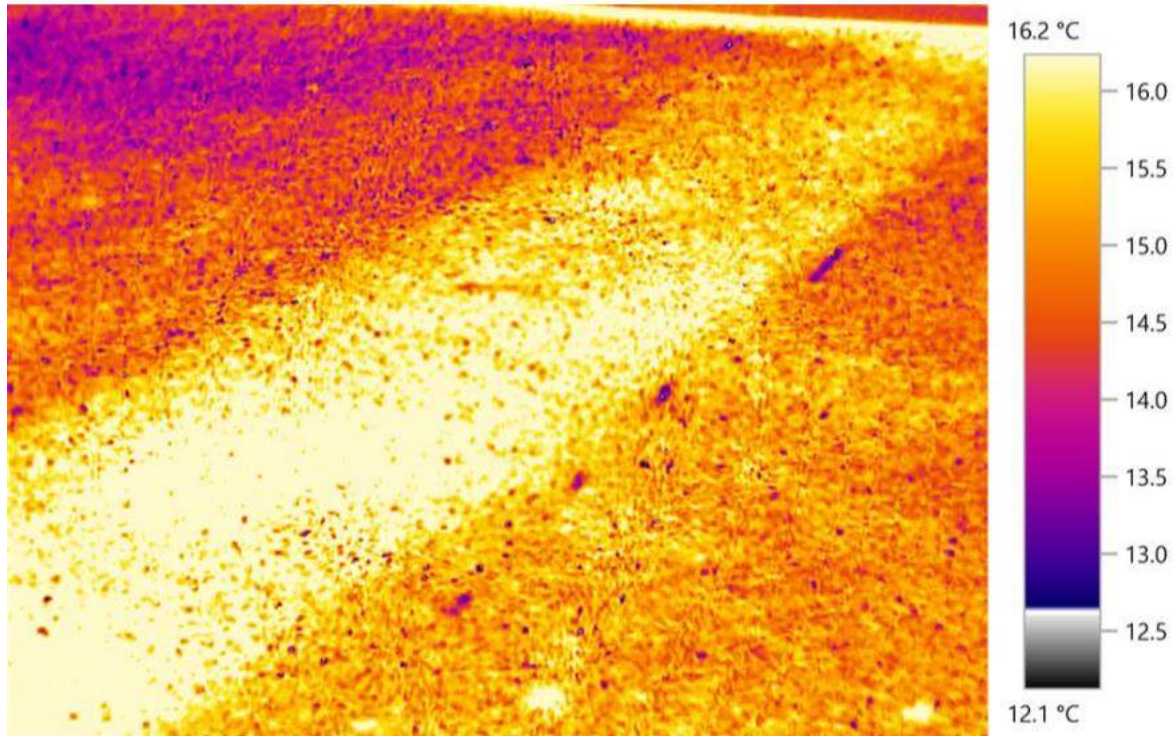


Notes: The elevated surface temperature may indicate presence of water under the BUR. Possibility of false positive due to thicker ballasting.

Visible light Image:

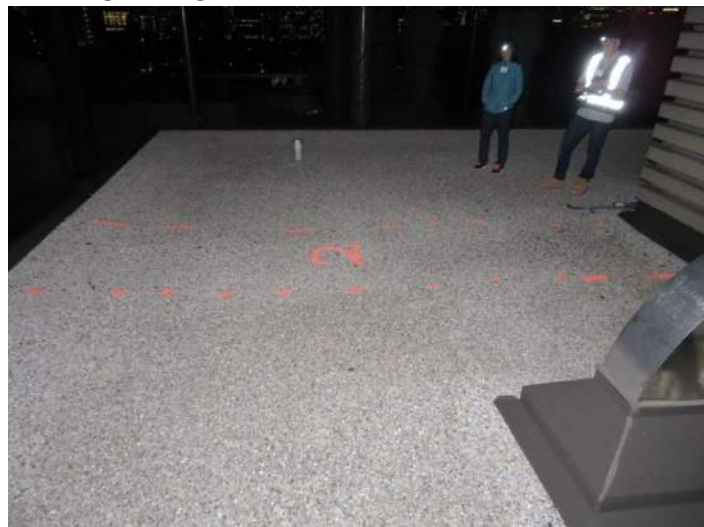


Location 2: M1.2, Dimensions: 4'x18' = 72ft²

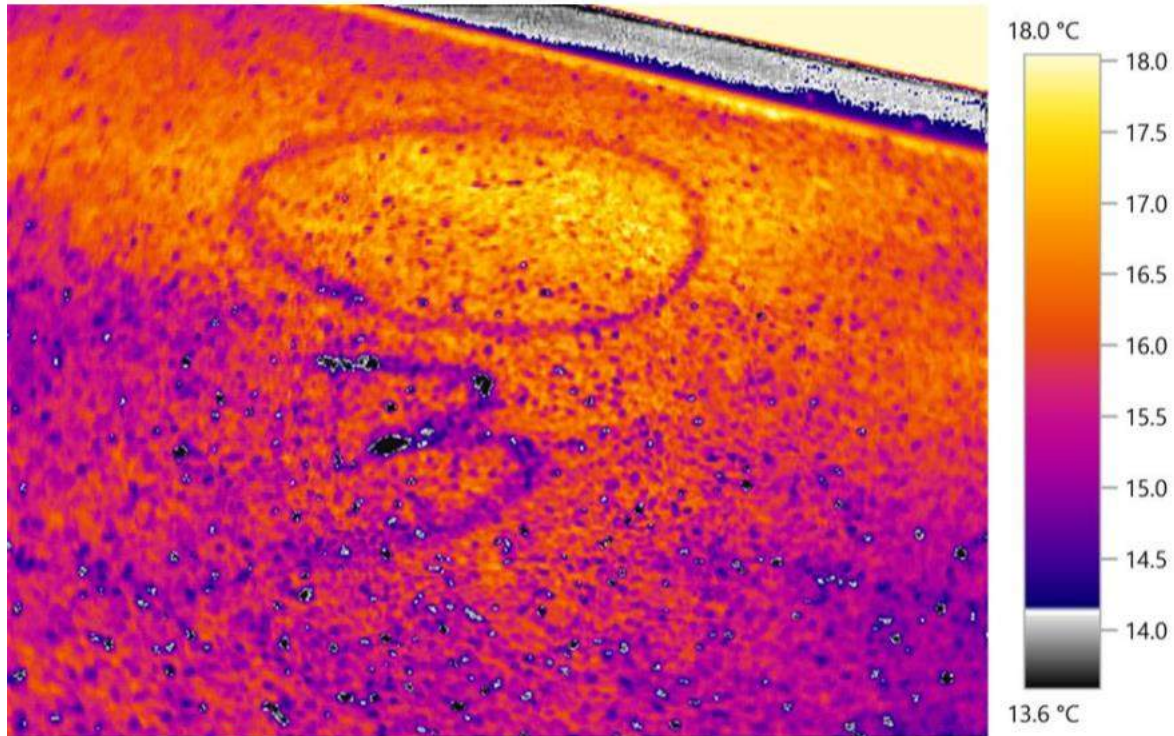


Notes: The elevated surface temperature may indicate presence of water under the BUR.

Visible light Image:



Location 3: M1.2.0, Dimensions: 2'x3' = 6ft²

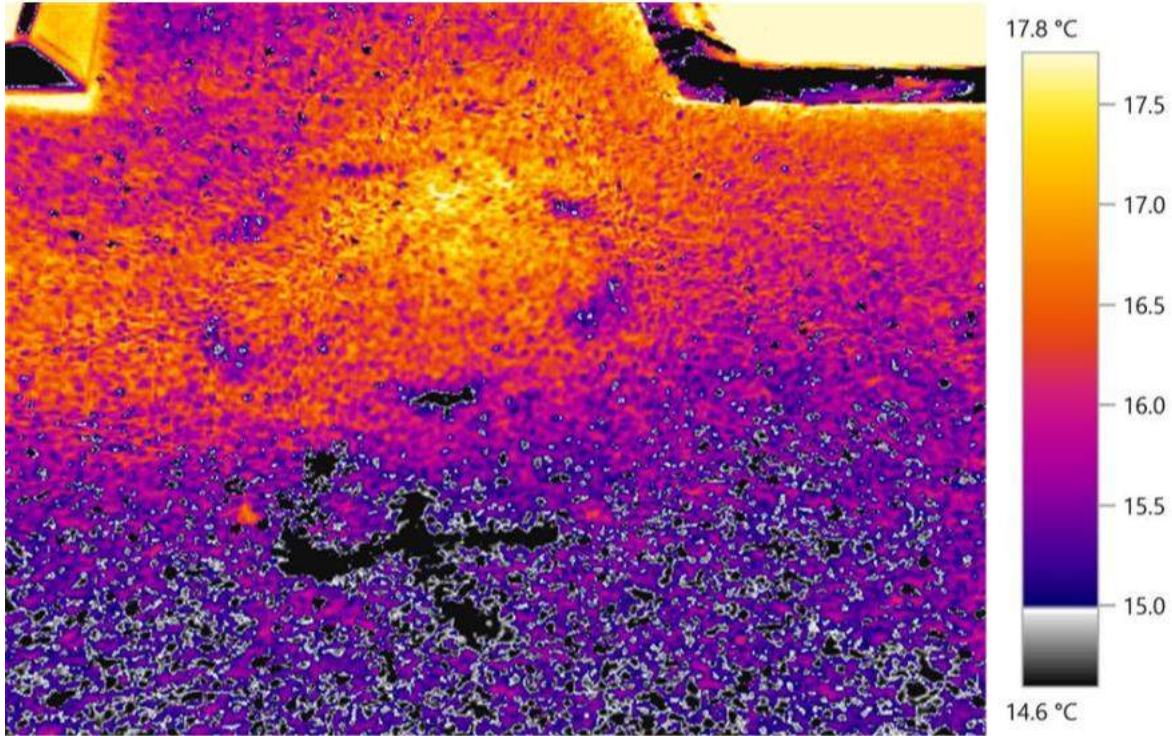


Notes: The elevated surface temperature may indicate presence of water under the BUR.

Visible light Image:



Location 4: M1.2.0, Dimensions: 2'x2' = 4ft²

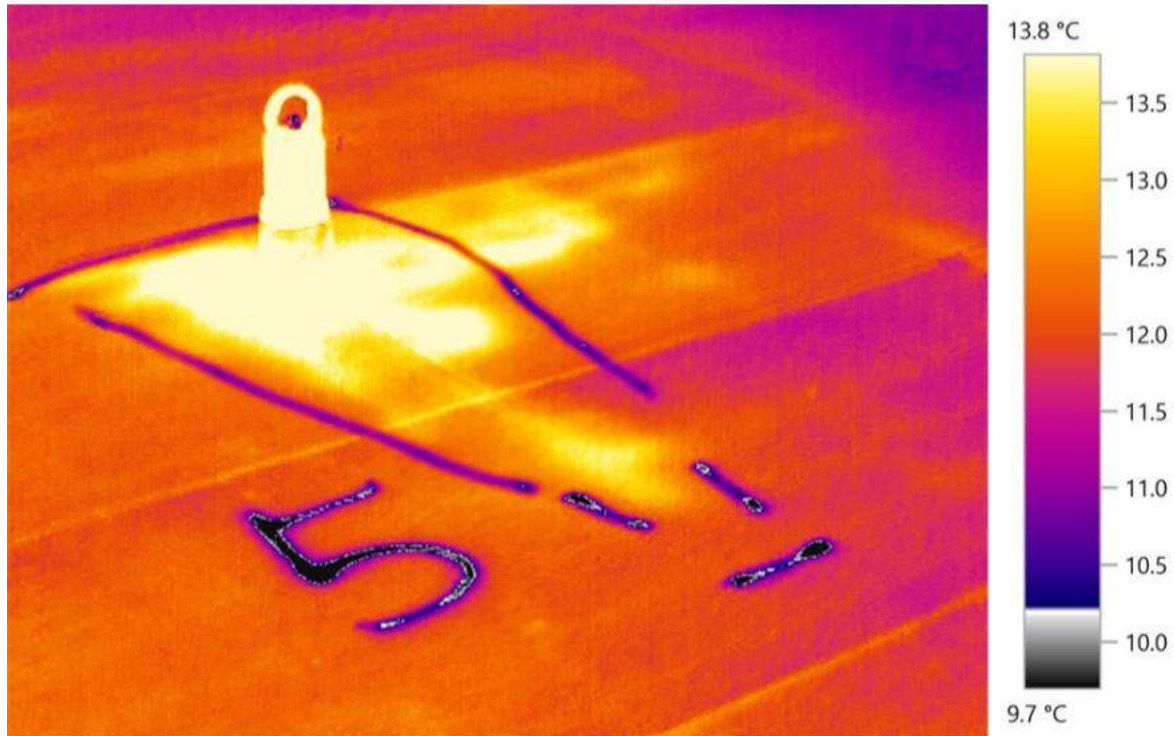


Notes: The elevated surface temperature may indicate presence of water under the BUR.

Visible light Image:



Location 5: EW1.1, Dimensions: 1.5'x6' = 9ft²

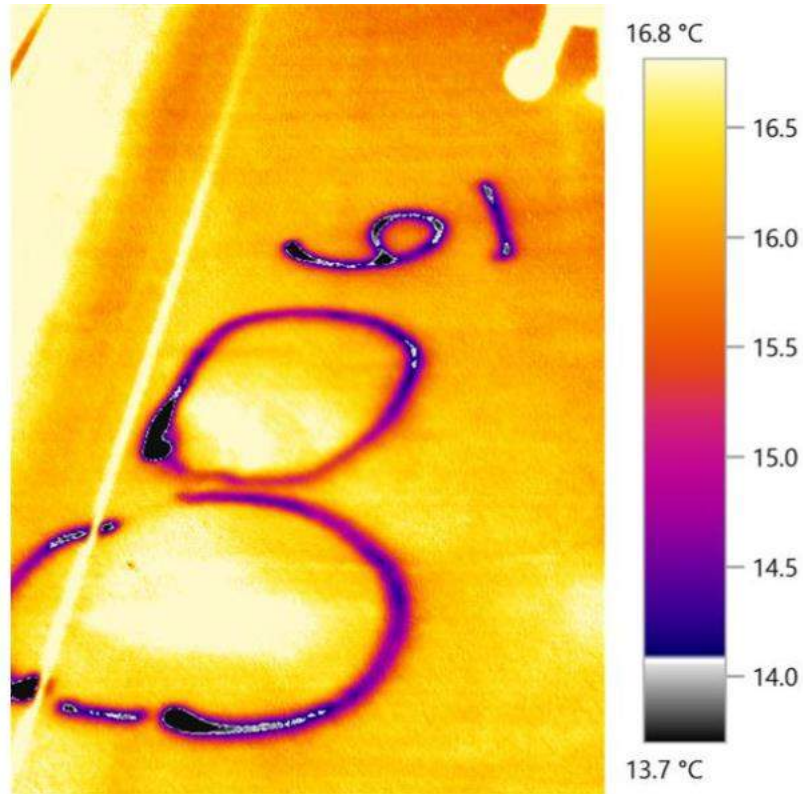


Notes: The elevated surface temperature may indicate presence of water under membrane. Signs of picture framing.

Visible light Image:



Locations 6 – EW1.2, Dimensions: 2'x3' = 6ft²



Notes: The elevated surface temperature may indicate presence of water under air blister/delamination bubbles.

Visible light Image:



Location 7: EW2.0, Dimensions: 4'x3' = 12ft²

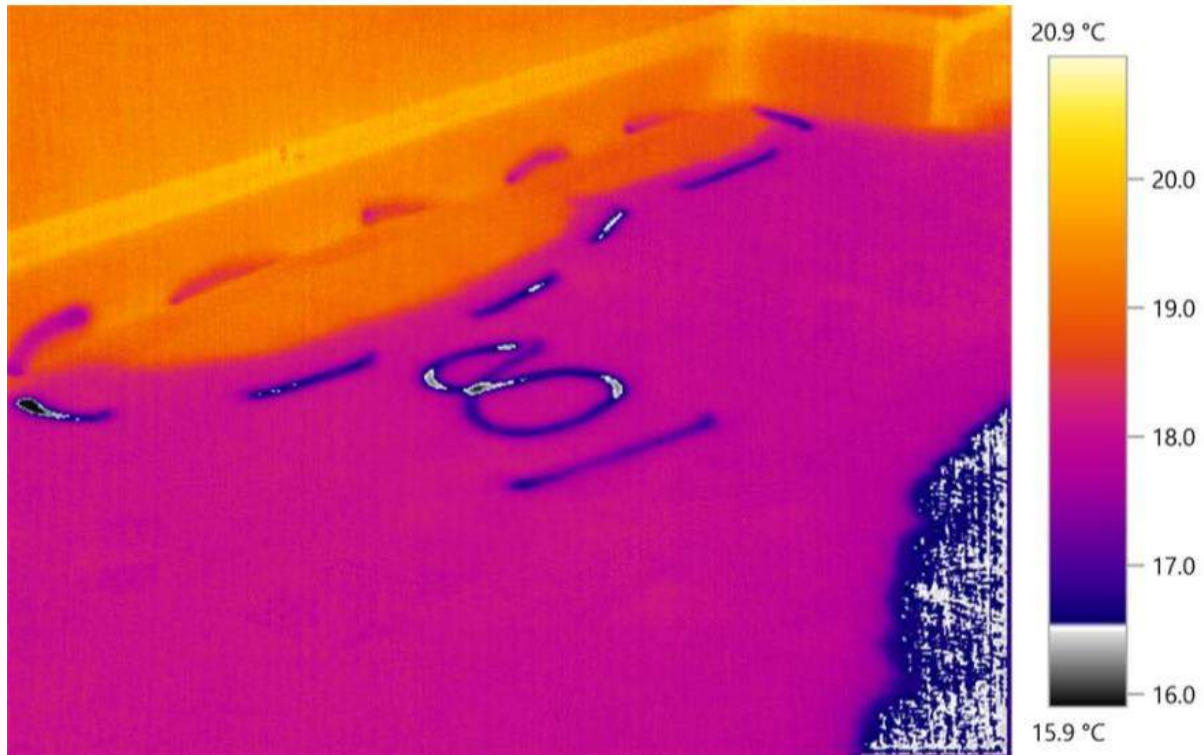


Notes: The elevated surface temperature around the drain may indicate presence of water under the membrane. A deep crescent was observed in the centre of the circle.

Visible light Image:



Location 8: EW2.0, Dimensions: 7'x1' = 7ft²

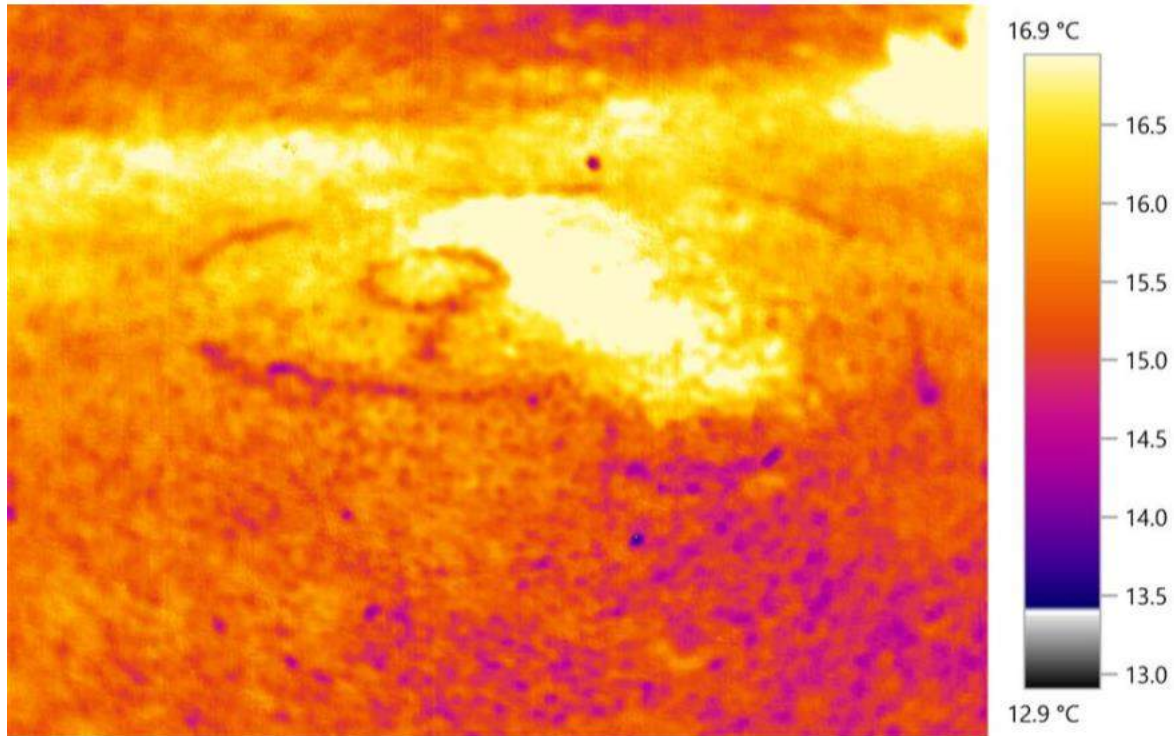


Notes: The elevated surface temperature may indicate presence of water under the bubbling/delaminated membrane.

Visible light Image:



Location 9: F08, Dimensions: 4'x4' = 16ft²

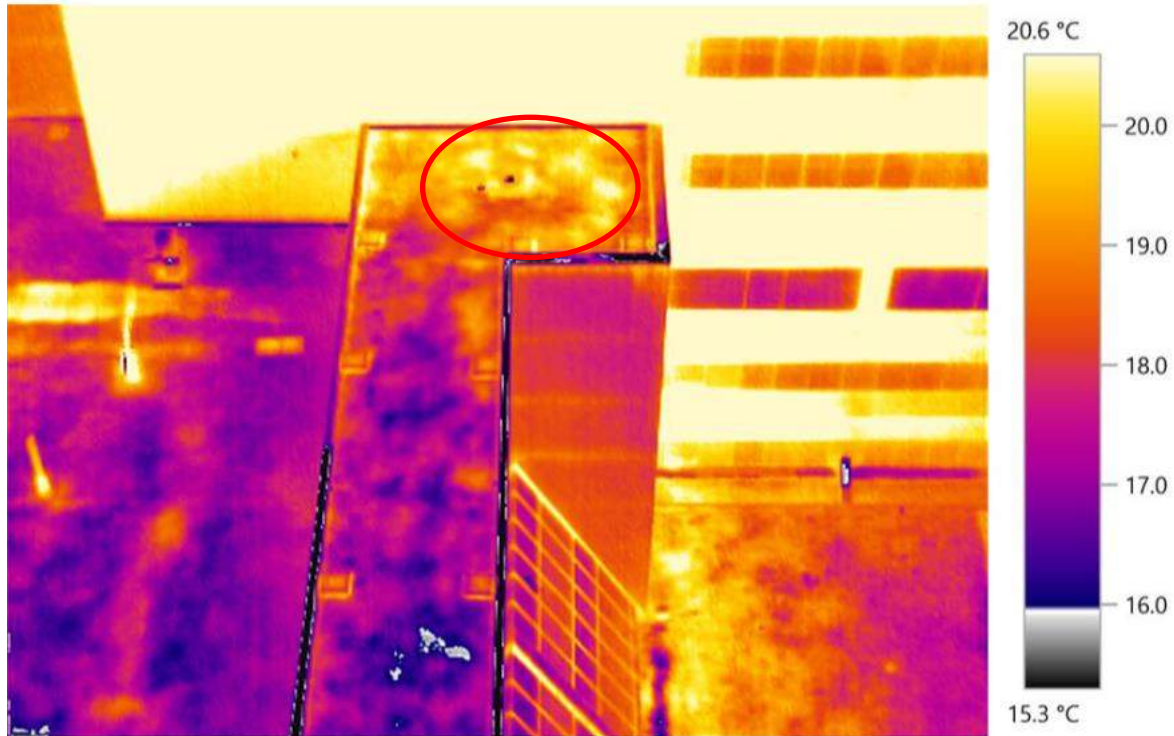


Notes: The elevated surface temperature may indicate presence of water under the BUR.

Visible light Image:

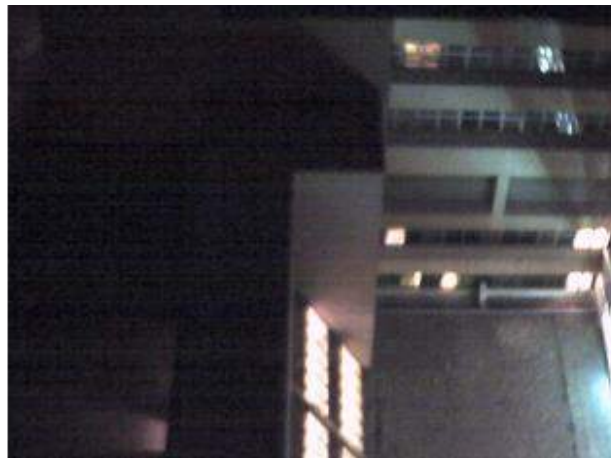


Location 10: F3, Dimensions: max 3'x3' = 9ft²

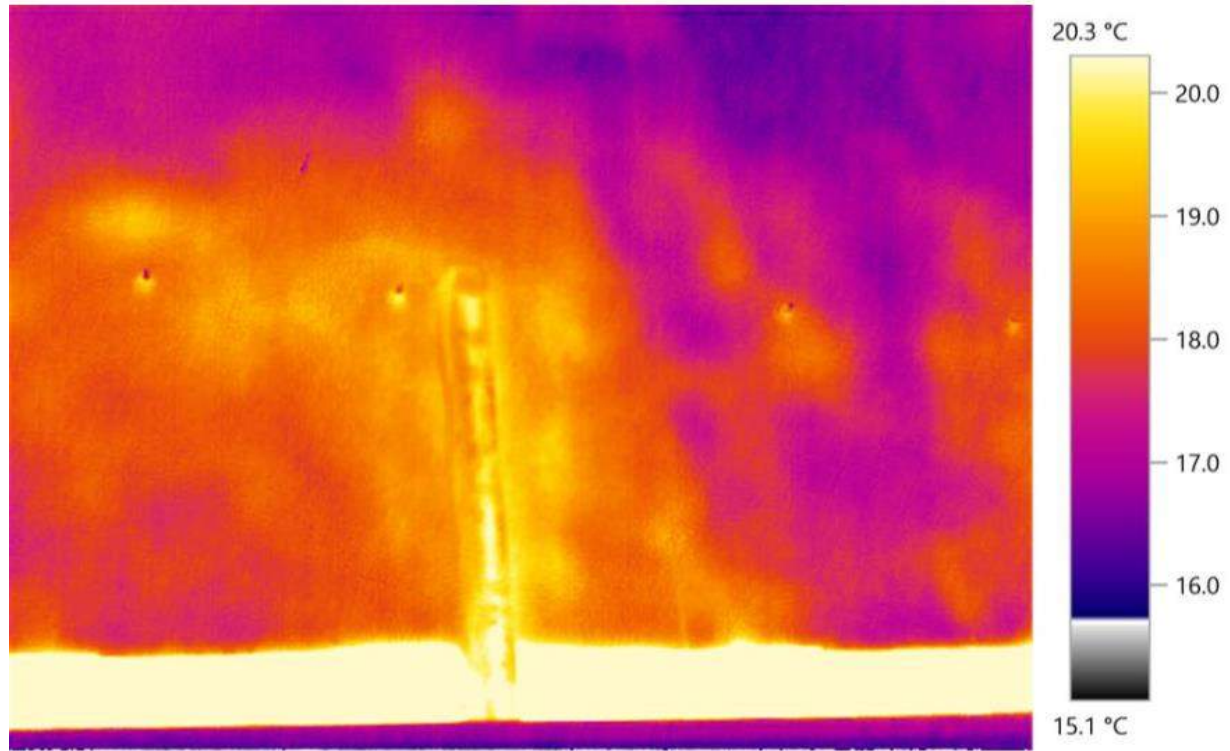


Notes: The elevated surface temperature may indicate presence of water under the membrane in a radial pattern centered on the vent/drain. We were unable to access this roof and suggest further testing.

Visible light Image:



Location 11: F5.0, Dimensions: 12'x12' = 144ft²

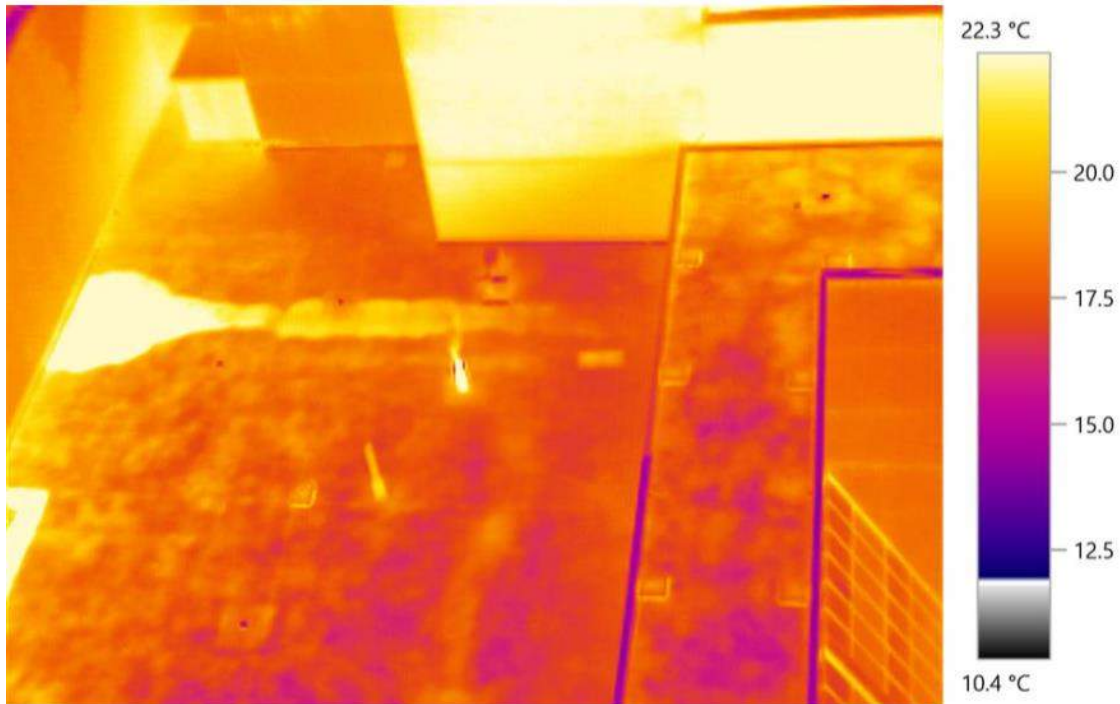


Notes: We were unable to access this roof and suggest further testing. The elevated surface temperature may indicate presence of water under the membrane. This roof may not have experienced enough solar gain to radiate as much, but worth further investigation.

Visible light Image:

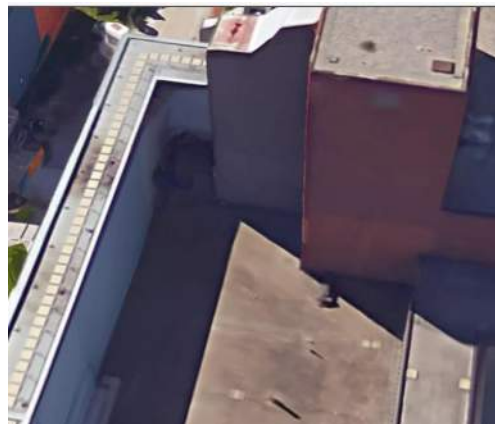


Location 12: F4.0, Dimensions: 3'x12' = 36ft²

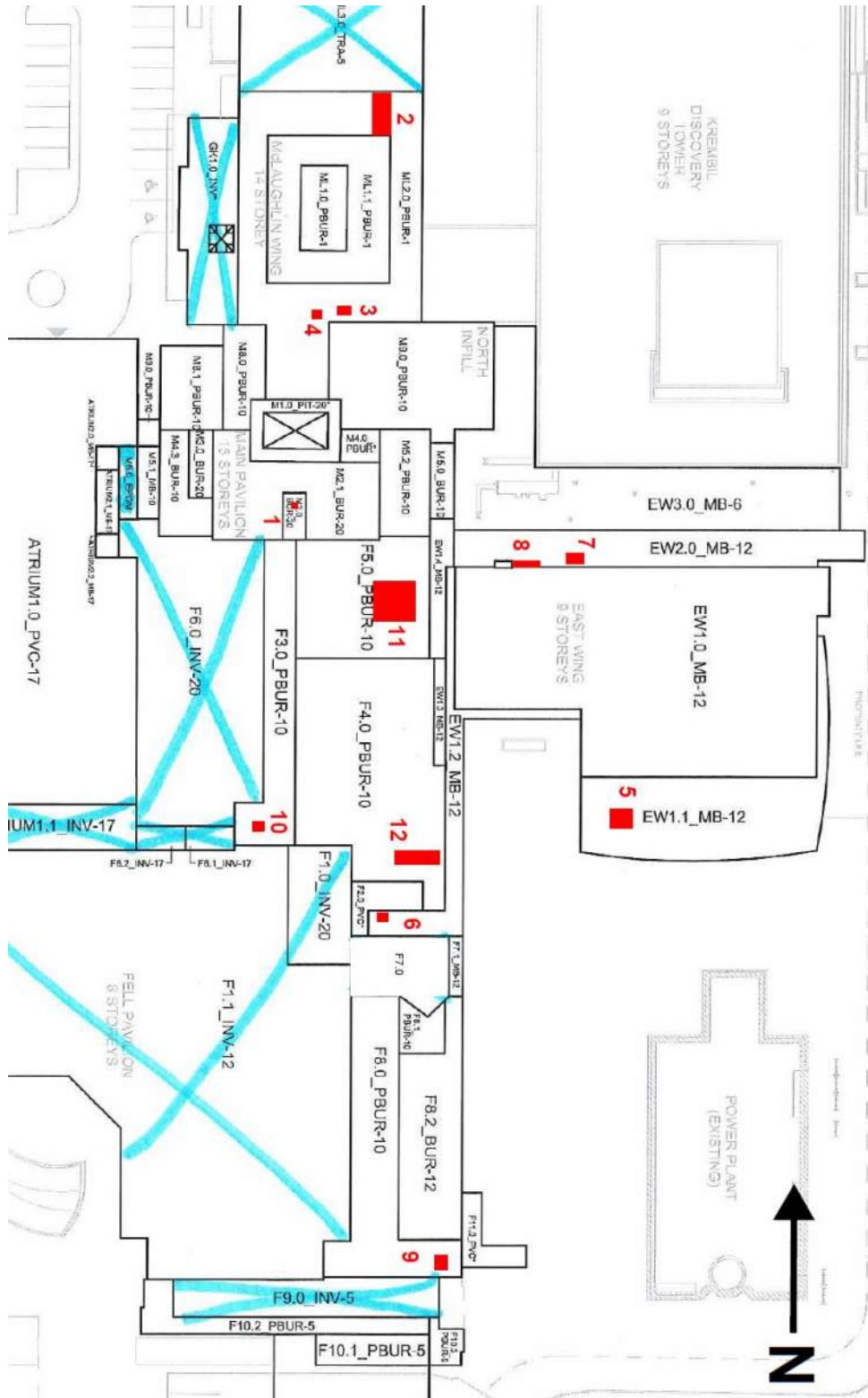


Notes: We were unable to access this roof and suggest further testing. The elevated surface temperature may indicate presence of water under the membrane. This roof may not have experienced enough solar gain to radiate as much, but worth further investigation.

Visible light Image:

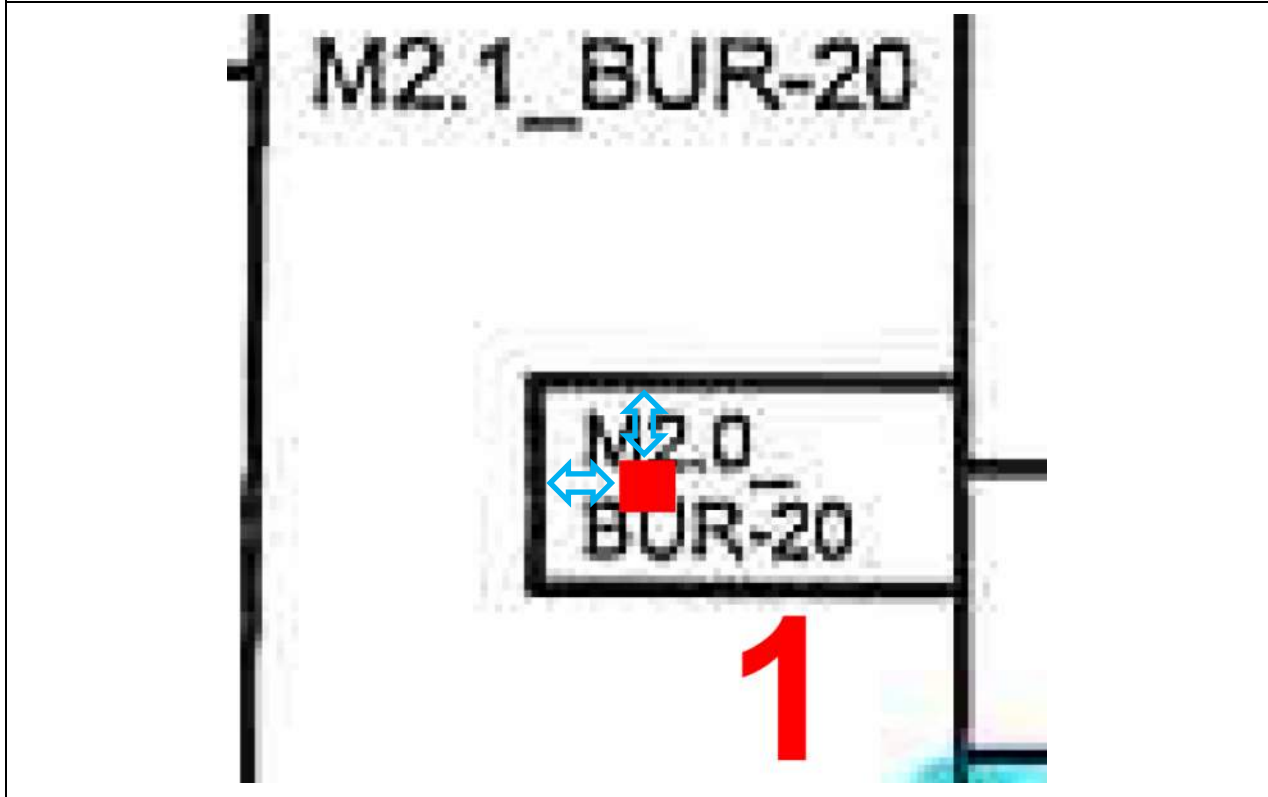


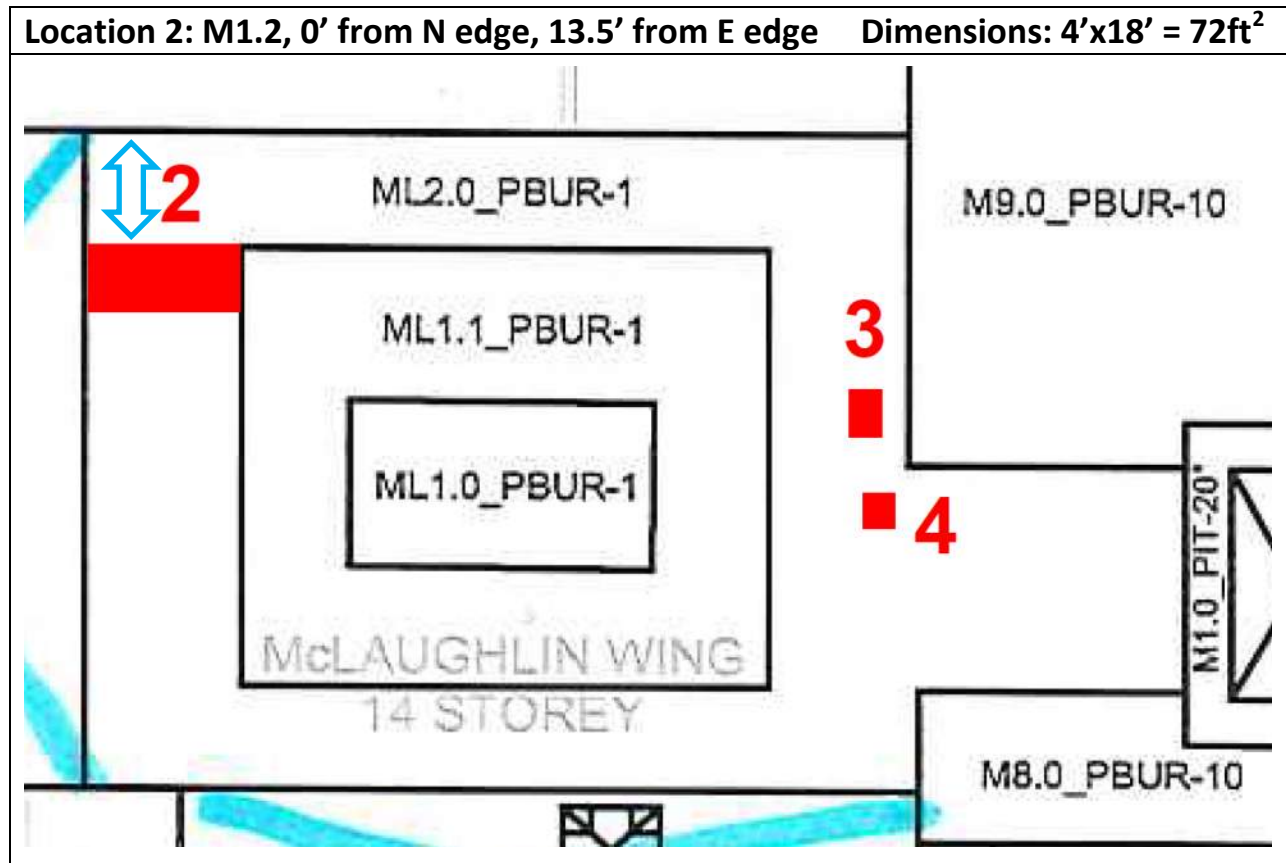
Appendix B – Breach Map



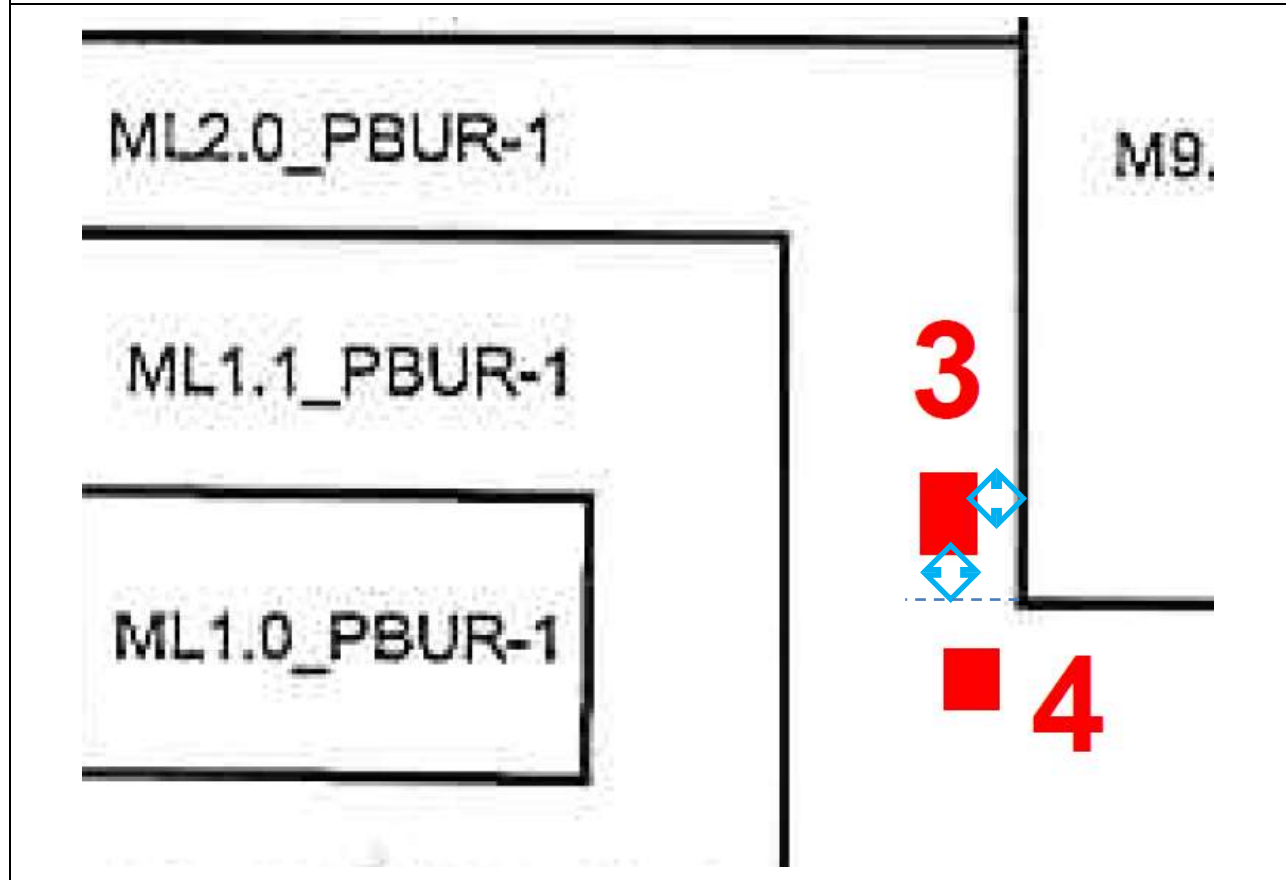
Location 1: M2.0, 5' from N edge, 5' from E edge
9ft²

Dimensions: 3'x3' =

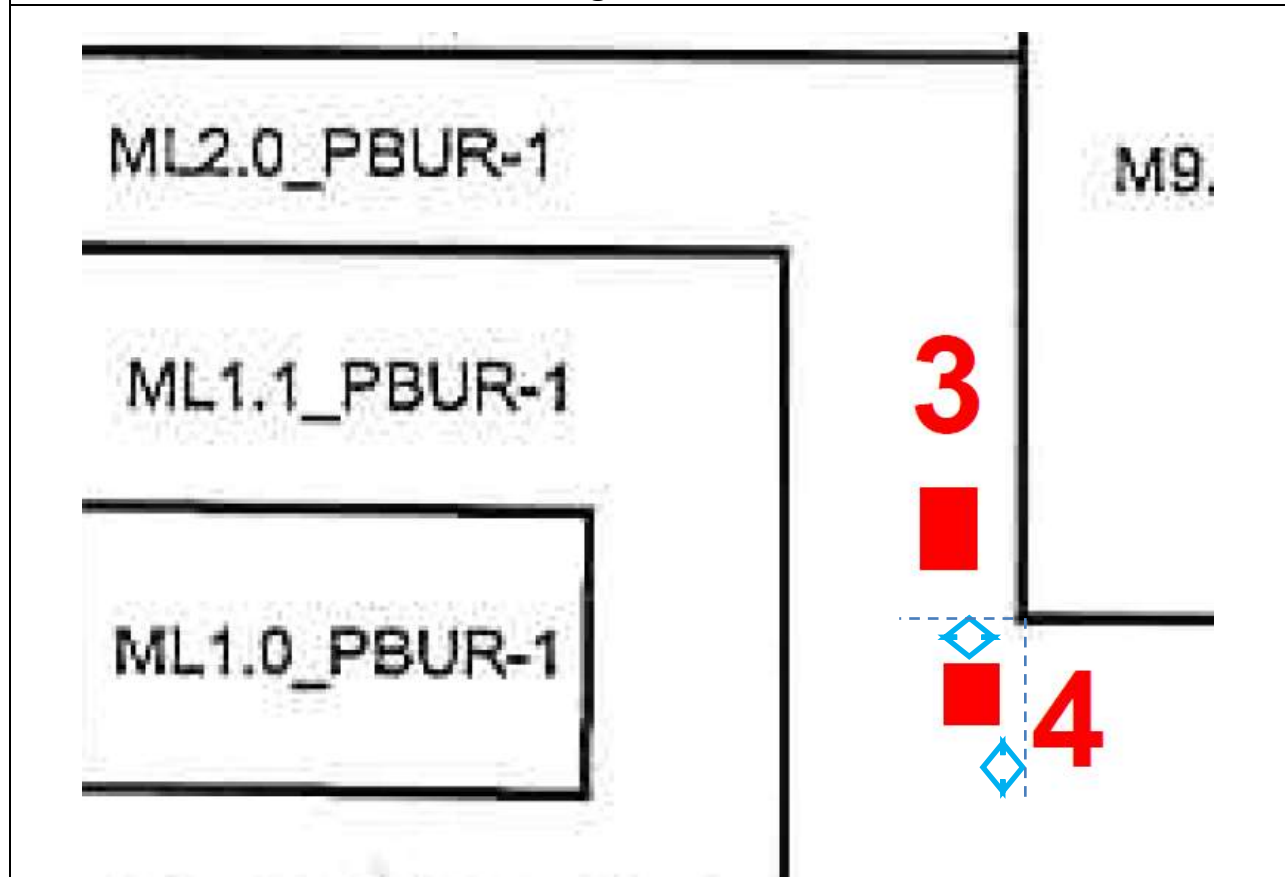




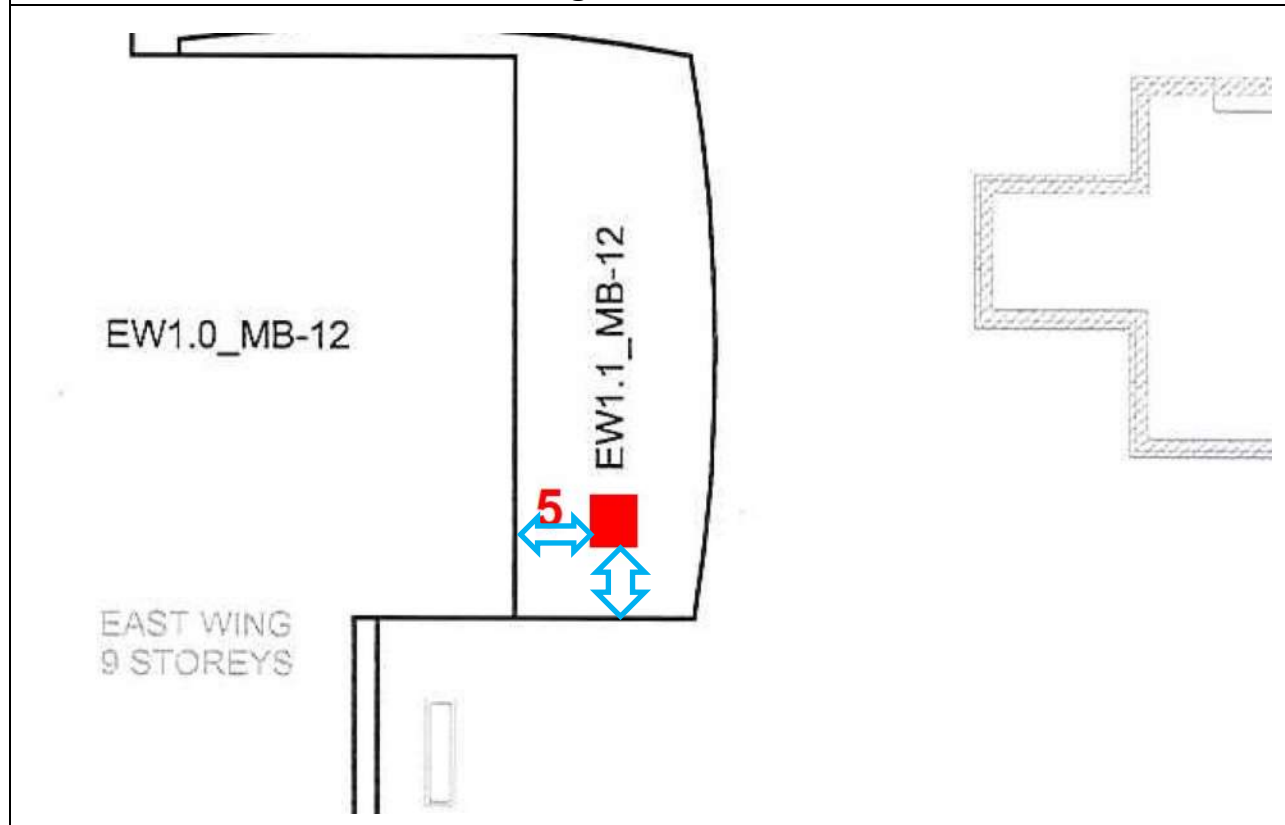
Location 3: M1.2.0, 1' from S edge, 4.5' from inside edge, Dimensions: 2'x3' = 6ft²



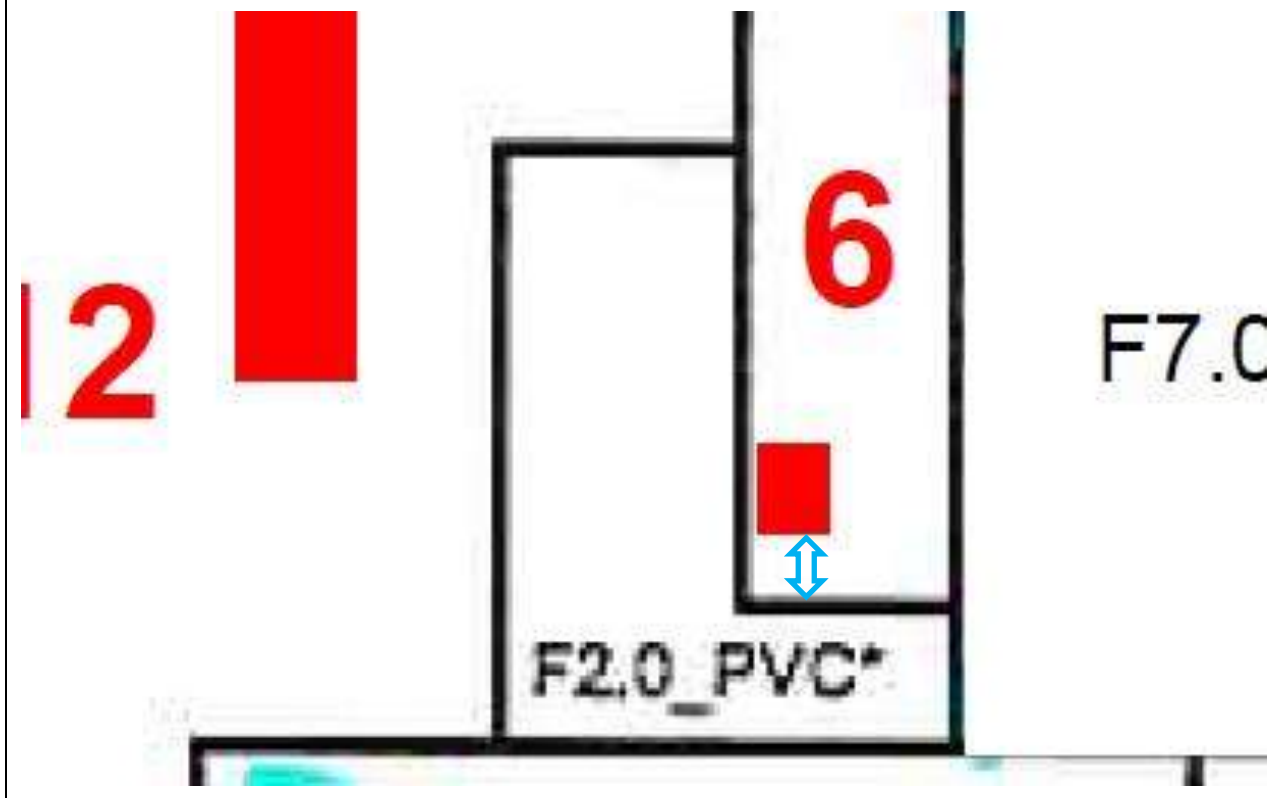
Location 4: M1.2.0, 1' from inside edge, Dimensions: 2'x2' = 4ft²



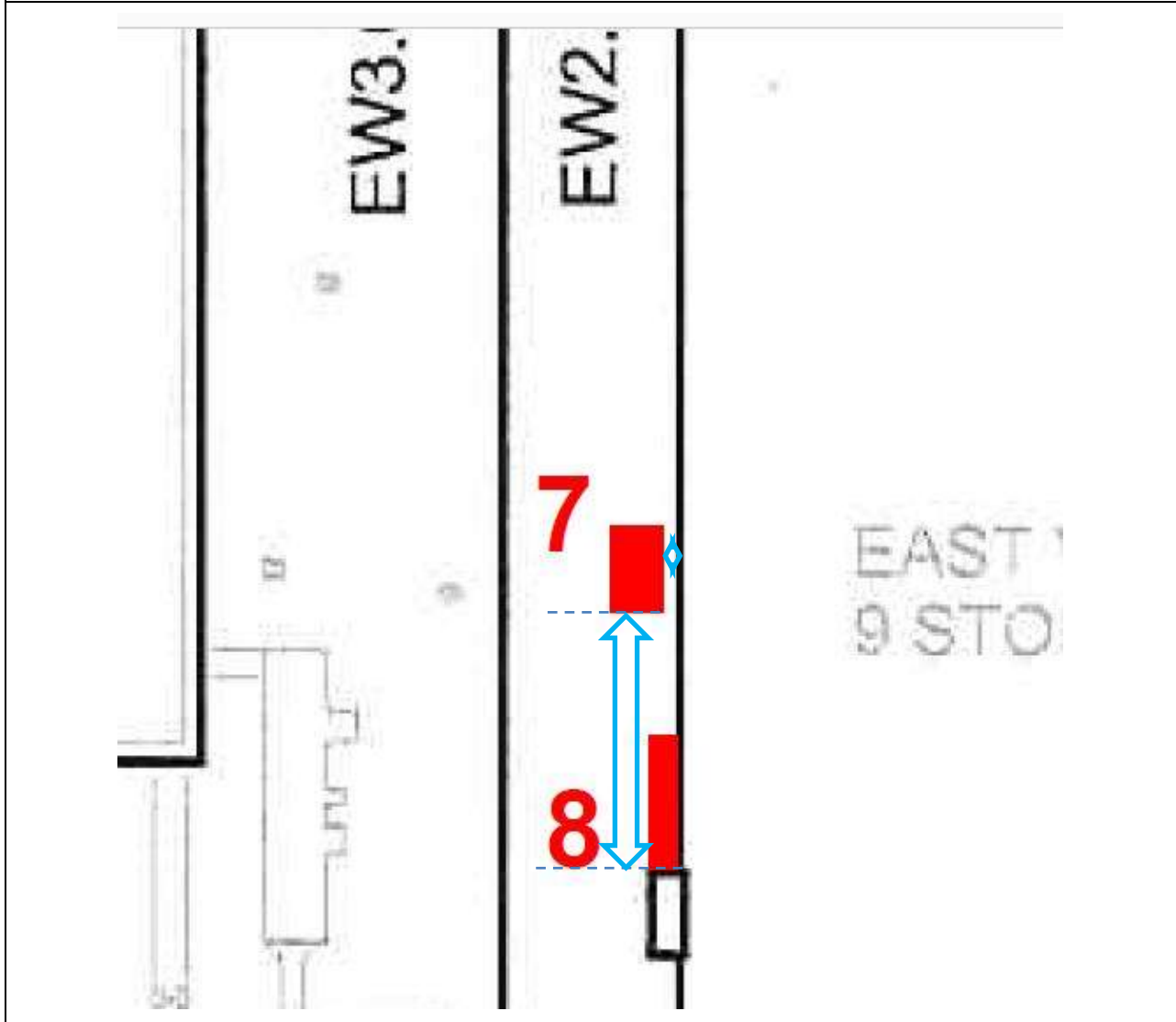
Location 5: EW1.1, 15.5' from W edge, 5' from N wall Dimensions: 1.5'x6' = 9ft²



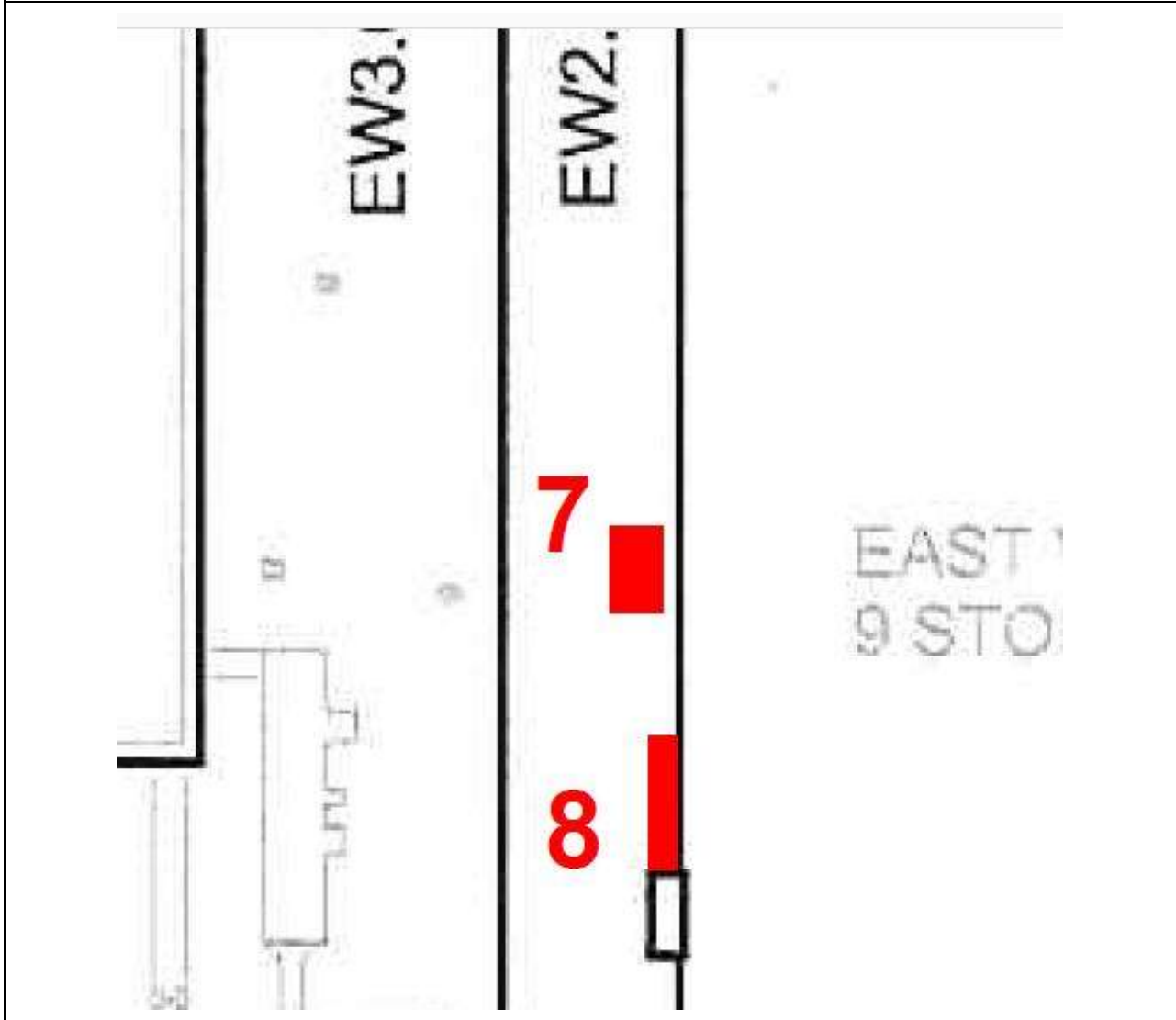
Locations 6 – EW1.2, 1' from N wall, 6.5' from W edge Dimensions: 2'x3' = 6ft²



Location 7: EW2.0, 0.5' from S wall, 20.5' from bay window bump out
Dimensions: 4'x3' = 12ft²

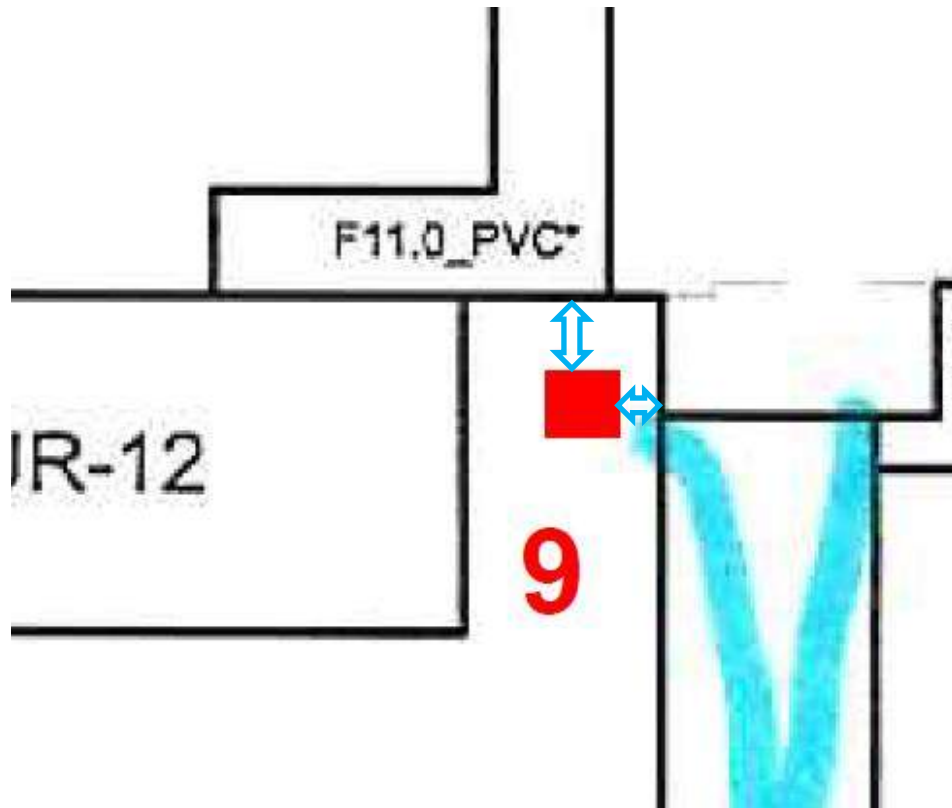


Location 8: EW2.0 on south wall at bay window bump-out Dimensions: 7'x1' = 7ft²



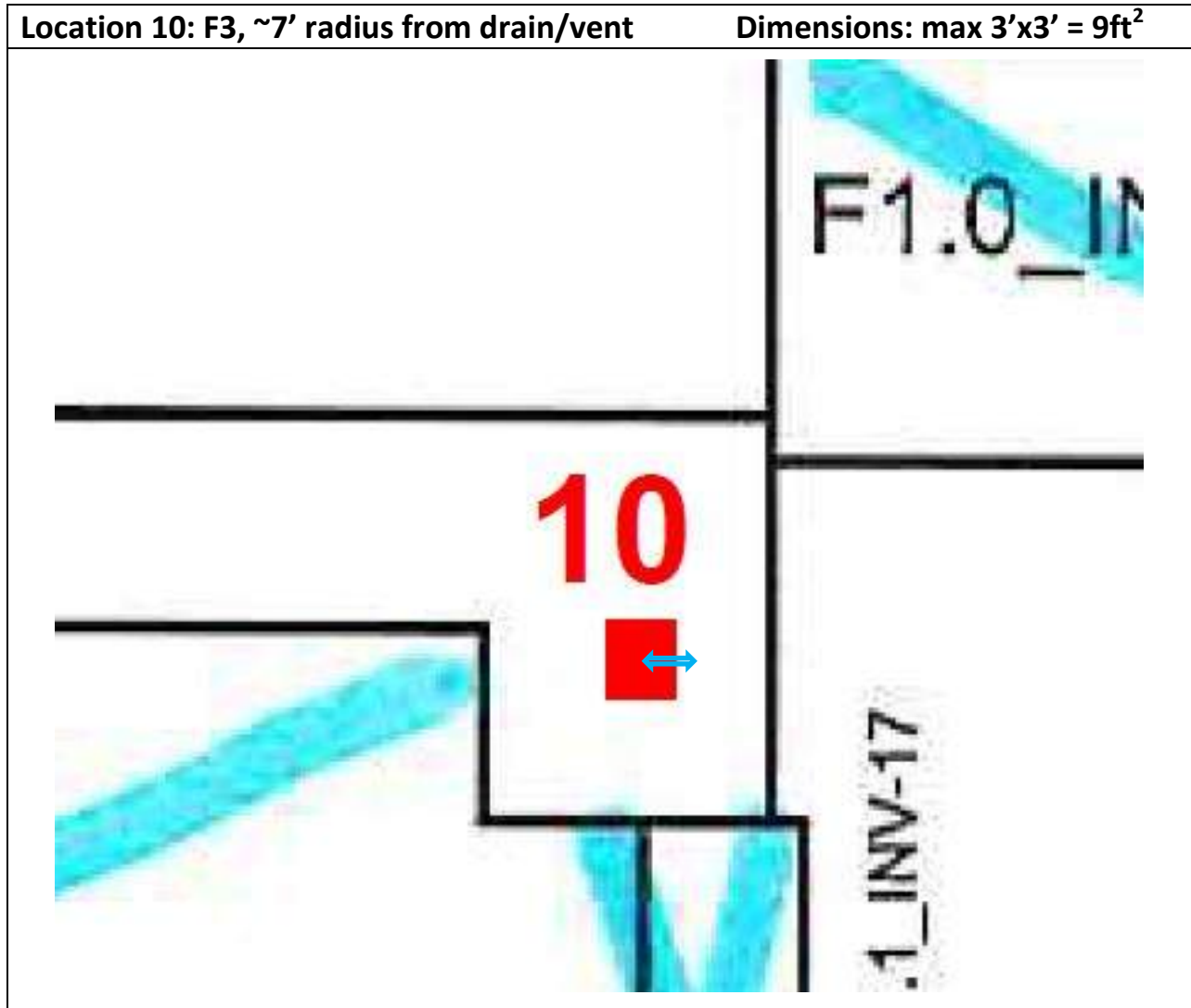
Location 9: F08, 9' from S edge, 10' from E edge

Dimensions: 4'x4' = 16ft²



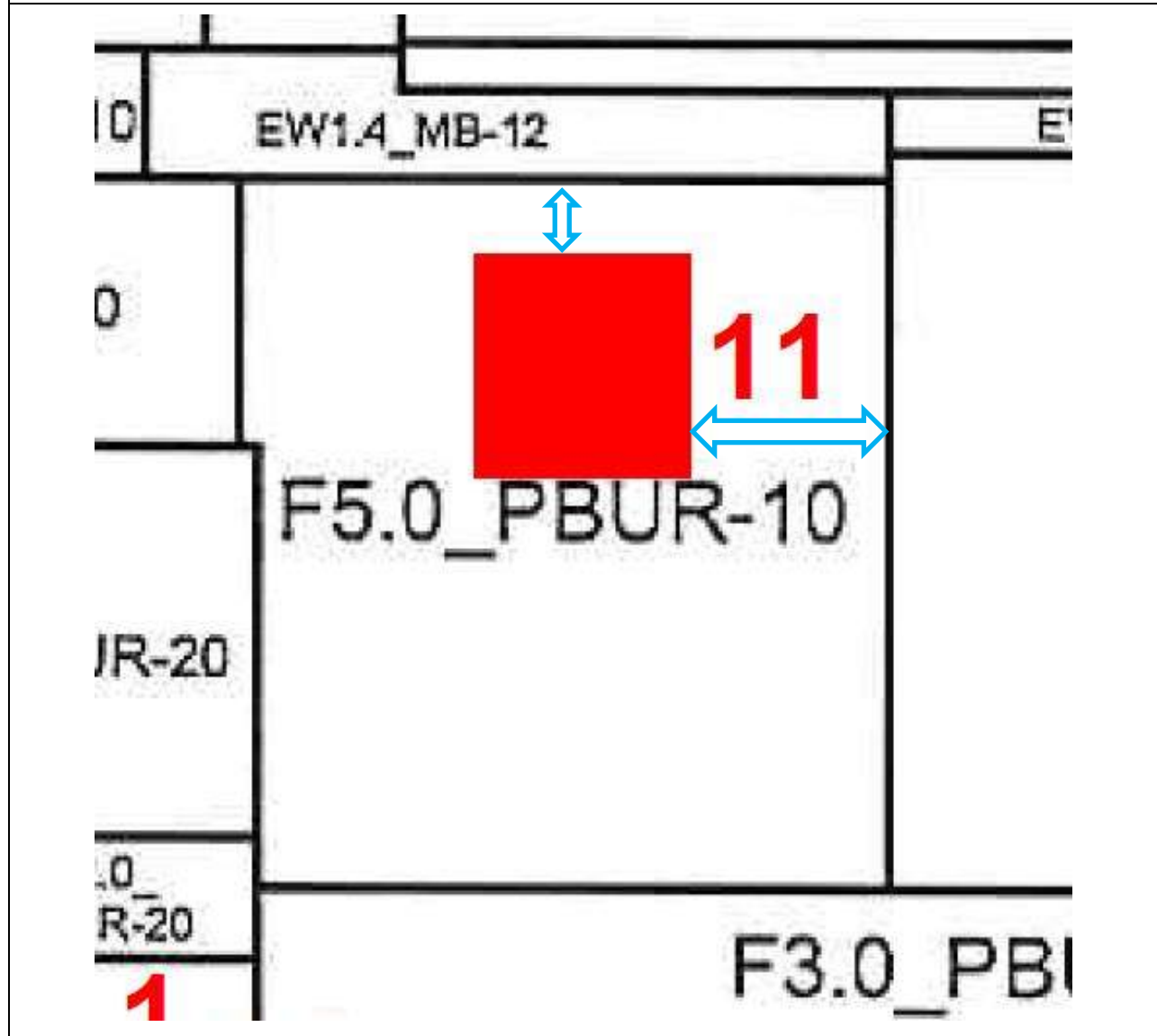
Location 10: F3, ~7' radius from drain/vent

Dimensions: max 3'x3' = 9ft²

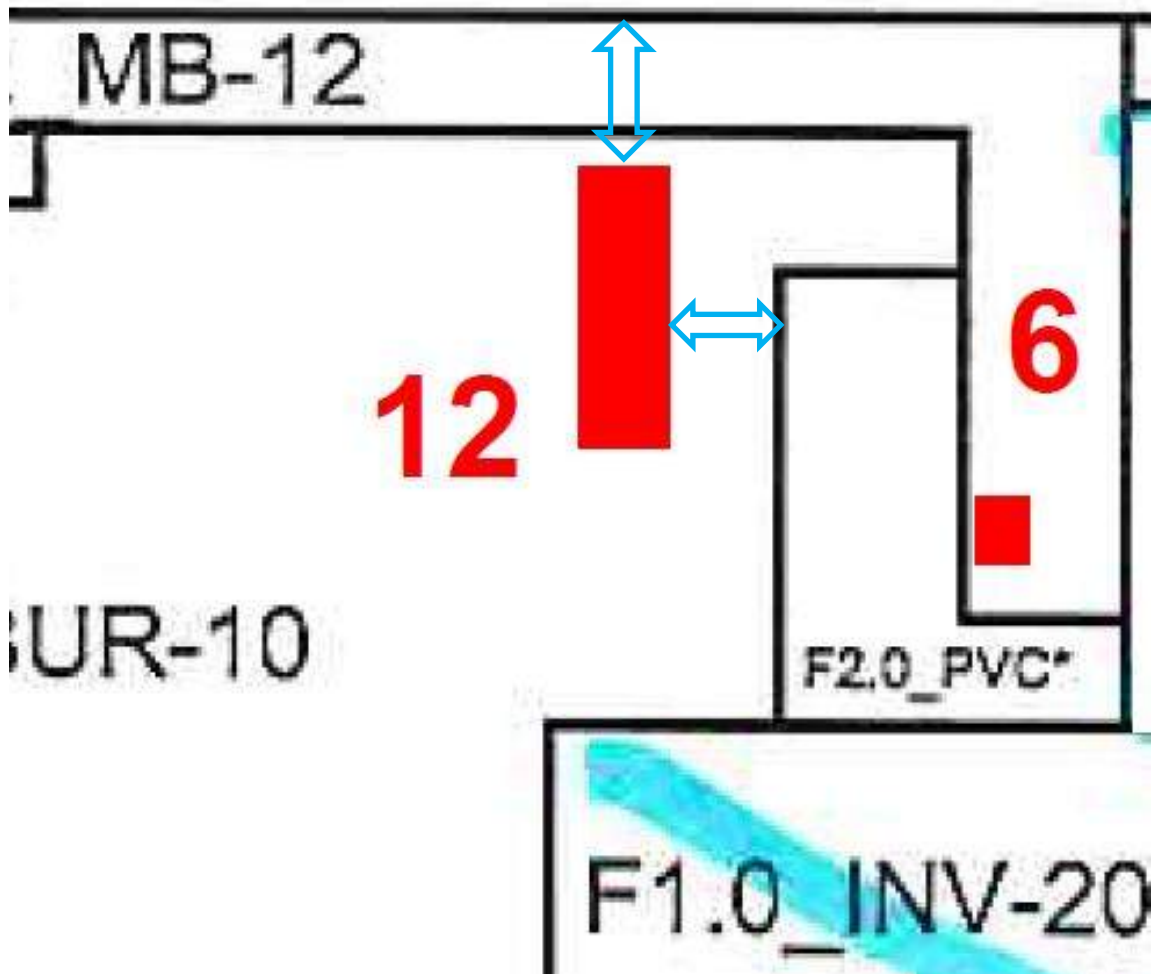


Location 11: F5.0, 6' from east wall, ~12' from south wall

Dimensions: 12'x12' = 144ft²



Location 12: F4.0, ~12' from east wall, ~6' from south wall Dimensions: 3'x12' = 36ft²



Appendix C – Instrumentation

Infrared camera – was blackbody tested November 16, 2016 and found to be within the 2% allowed.

Testo 882	SN 02203834
Lens 33° x 25°	SN20277586
Last calibrated	29.09.2011
IFOV	1.7mRad
NETD	<60mK @ 30°C

Appendix D – Survey Conditions & Limitations

Date of Survey: Aug 16-17, 2017

Time Survey performed: Starting at 9:00 – 01:30.

Weather: Clear skies.

Outside Temperature: 19.6°C.

Relative Humidity: 82%

Previous Weather (last 12 hours): No rain in the past 12 hours. Rained 24+ hours prior to scan.

Ground Condition: Dry with the exception of a few locations with standing water.

Wind: 9km/h N

Standard atmospheric Pressure: 100.89 kPa

Limitations:

- The work reflects our best judgement in light of the information reviewed by our team at the time of preparation. Unless otherwise agreed in writing by BlueGreen Consulting Group Inc (BGG), it shall not be used to express or imply warranty as to the fitness of the property for a particular purpose.
- No party other than the Client shall rely on the BGG's work without the express written consent of BGG. Any third party user of this report specifically denies any right to any claims, whether in contract, tort and/or any other cause of action in law, against the Consultant.
- Only the specific information identified has been reviewed. The Consultant is not obligated to identify mistakes or insufficiencies in the information obtained from the various sources or to verify the accuracy of the information. Conditions existing but not recorded were not apparent given the level of study undertaken.
- BGG is not responsible for any action or situation that may result from any interpretation of this report.
- Note that infrared surface temperatures are an approximation of what the actual temperature might be given the steep angles, reflective surfaces and variability in emissivity.



399 Bathurst Street, Toronto, ON

October 20, 2017

17-0017

Appendix C

Tremco's Verification Roof Report

O N L I N E I N F O R M A T I O N

Toronto Western Hospital Main Building

Toronto, ON

Roofs Inspected: 11, 12 and 13

17 October 2017

Roof Inspection Report



Toronto Western Hospital
Main Building

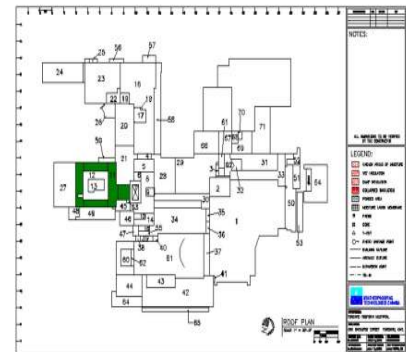
Toronto, ON

Toronto, ON



GENERAL INFORMATION

Roof Name 11
Notes Built Up Roof System
Service Activity Type Thermocore
Service Activity Date 07/09/17
Year of Installation 1984 (Estimate)
Roof Leaks No
Roof Size 5,717 sq. ft.
531.32 sq. meters
Roof Rating Good

**ROOF COMPOSITION**

BURMastic

OVERALL CONDITION

Good

VISIBLE ROOF DEFECTS

Minor tarboils
Blister around suspected wet area #2
Soft and spongy around suspected wet area #2

RECOMMENDATIONS

Suspected wet area #2 is wet as per the original scan and should be cut out and replaced.

Suspected wet areas 3 & 4 were false positives on the original scan and require no further action.

SCAN HISTORY

This area was scanned in summer 2017 - a 4' x 18' area of wet insulation was identified



Suspected wet area #3 as per the BlueGreen Consulting scan - slight increase in moisture content but not enough to suggest wet insulation. The false positive from the original scan likely resulted from the heavy coverage of gravel in that specific area.



Suspected wet area #4 as per the BlueGreen Consulting scan - slight increase in moisture content but not enough to suggest wet insulation. The false positive from the original scan likely resulted from the heavy coverage of gravel in that specific area.



Baseline number on a non destructive probe on roof #11 - this roof contains suspected wet areas 2-4. It reads 30



Suspected wet area #3 - Non destructive moisture probe reads 31 compared to 30 on a dry area. This is a negligible increase in sub surface moisture content.



Suspected wet area #4 - Non destructive moisture probe reads 35 compared to 30 on a dry area. This is a negligible increase in sub surface moisture content.



Baseline reading on the Trammex Dec scanner - reads 20



Suspected Wet Area #2 - Trammex reading on suspected area is 100. The original scan on this area is accurate. It has around 72 Sq. Ft. of wet.



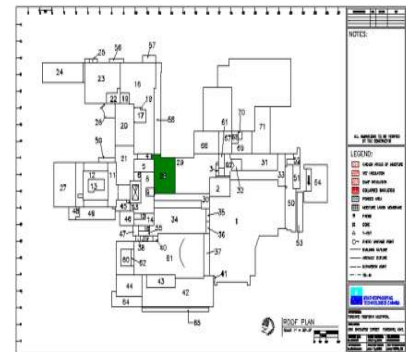
Suspected Wet Area #2 - non destructive moisture probe read 51 vs. baseline of 23. This area is wet.



Topped up pitch pans with fresh mastic

GENERAL INFORMATION

Roof Name	28
Notes	3 Ply BURmastic
Service Activity Type	Thermocore
Service Activity Date	07/09/17
Year of Installation	2006
Warranty	Effective Date: May 31, 2006 Expiration Date: May 29, 2021 Information: 15 Year Tremco Warranty
Installing Contractor	Dean Chandler Roofing Ltd.
Roof Leaks	No
Roof Size	3,479 sq. ft. 323.33 sq. meters
Roof Type	BUR Gravel Surface
Roof Rating	Good

**ROOF COMPOSITION**

BURMastic
MB Alterations on area dividers

OVERALL CONDITION

Good

VISIBLE ROOF DEFECTS

Areas of suspected wet were identified in a preliminary scan from BlueGreen Consulting (anomaly #11 in the report), but due to extensive surface moisture, we could not verify these results aside from a non destructive probe on the area divider which identified it as an area of suspected wet.

The area dividers on this roof were also covered in a modified bitumen membrane that was not part of the original Tremco roof. As these were not a Tremco approved alteration the warranty on this roof was voided. The moisture probe also identified moisture within these areas of modified bitumen membrane.

RECOMMENDATIONS

Anomaly #11 could not be verified on either attempt as the roof is almost consistently wet on account of its position.

Although the warranty on this roof is void on account of the non-approved alterations, we will return when the roof is dry to verify the scan results to prevent the spread of any potential wet insulation. We also recommend replacing the modified bitumen flashing membrane on the area dividers as they contain moisture and are no longer watertight.

SCAN HISTORY

Scanned in summer 2017



A general view - we were not able to verify the Thermography from BlueGreen Consulting Group as the roof was too wet and not conducive to scanning.



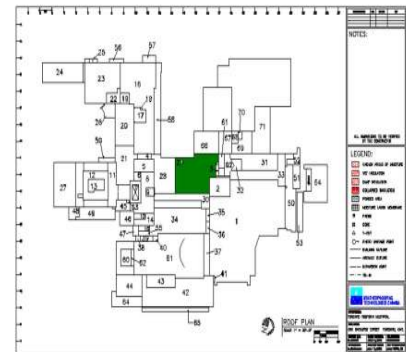
A reading of 54 on the area divider indicating that there is sub surface moisture. It also felt wet to the touch. This membrane was not part of the original Tremco roof and was altered after the fact, voiding the warranty.



The roof was still too wet to scan when we returned in October

GENERAL INFORMATION

Roof Name 29
Notes 3 Ply BURmastic
Service Activity Type Thermocore
Service Activity Date 13/10/17
Year of Installation 2006
Warranty Effective Date: May 31, 2006
Expiration Date: May 29, 2021
Information: 15 Year Tremco Warranty
Installing Contractor Dean Chandler Roofing Ltd.
Roof Leaks No
Roof Size 6,810 sq. ft.
632.90 sq. meters
Roof Type BUR Gravel Surface
Roof Rating Good

**ROOF COMPOSITION**

BURmastic w/ TRA flashing

OVERALL CONDITION

This roof is in good condition.

VISIBLE ROOF DEFECTS

Anomaly #12 in the BlueGreen report - approx. 36 sq. ft. of wet insulation - verified

No visible defects aside otherwise

RECOMMENDATIONS

Investigate the adjacent upper roof/wall connection to eliminate that as the source of the moisture entry into this roof area.

Remove the area of wet roofing and replace to match existing.

SCAN HISTORY

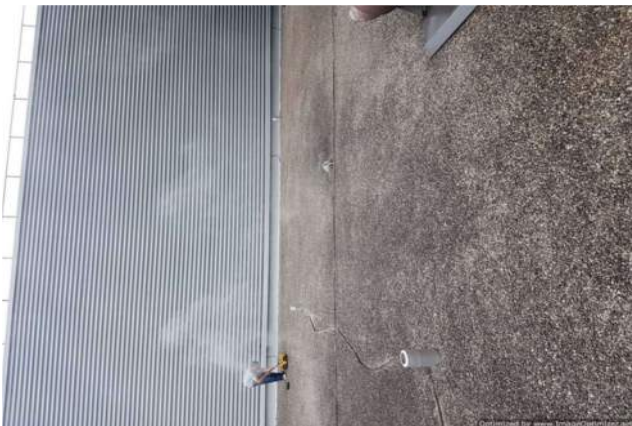
Scanned in summer 2017 - 3' x 12' area of wet insulation was identified



A general view - this roof was not accessed during the original scan, so the thermograms were taken from an adjacent roof.



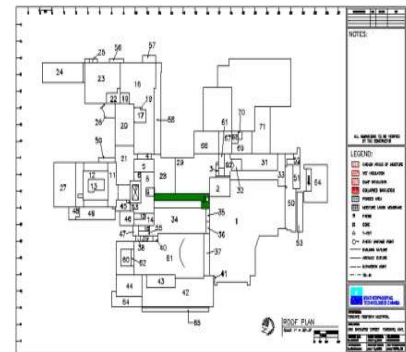
Anomaly #12 - The Tramex Dec scanner verifying that anomaly #12 in the BlueGreen report is accurate and this area of roof (approx. 36 sq. ft) is wet.



Due to the age of the warranted Tremco roof and the lack of penetration near the area of wet insulation we would like to investigate the roof/wall connection at the top of this wall to verify that it isn't the source of the moisture entry.

GENERAL INFORMATION

Roof Name 30
Notes 3 Ply BURmastic
Service Activity Type Thermocore
Service Activity Date 13/10/17
Year of Installation 2006
Warranty Effective Date: May 31, 2006
Expiration Date: May 21, 2021
Information: 15 Year Tremco Warranty
Installing Contractor Dean Chandler Roofing Ltd.
Roof Leaks No
Roof Size 1,200 sq. ft.
111.52 sq. meters
Roof Type BUR Gravel Surface
Roof Rating Good

**ROOF COMPOSITION**

BURmastic

OVERALL CONDITION

This roof is in good condition.

VISIBLE ROOF DEFECTS

N/A - anomaly #10 in the BlueGreen report was a false positive.

RECOMMENDATIONS

Continue to monitor and maintain

SCAN HISTORY

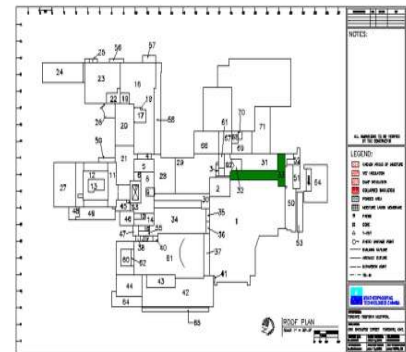
This roof was scanned in summer 2017 - no wet insulation was identified



Anomaly #10 - The Tramex Dec scanner verified that anomaly #10 in the BlueGreen report was not wet insulation. The anomaly was most likely caused by a heavier build up of aggregate on the roofs surface.

GENERAL INFORMATION

Roof Name 33
Notes 3 Ply BURmastic
Service Activity Type Thermocore
Service Activity Date 13/10/17
Year of Installation 2006
Warranty Effective Date: May 31, 2006
Expiration Date: May 29, 2021
Information: 15 Year Tremco Warranty
Installing Contractor Dean Chandler Roofing Ltd.
Roof Leaks No
Roof Size 3,070 sq. ft.
285.32 sq. meters
Roof Type BUR Gravel Surface
Roof Rating Good

**ROOF COMPOSITION**

BURmastic

OVERALL CONDITION

This roof is in good condition.

VISIBLE ROOF DEFECTS

Organic debris

RECOMMENDATIONS

Anomaly #9 in the BlueGreen report was a false positive, likely caused by a heavier than normal distribution of aggregate surfacing.

Continue to maintain

SCAN HISTORY

This roof was scanned in summer 2017 - no areas of wet were identified



Anomaly # 9 - the Tramex confirmed that this was a false positive likely caused by a heavy distribution of aggregate on the roofs surface