

Garland Canada Inc.

Infrared Thermographic Roof Inspection



Municipality of South Huron – Recreation Centre
94 Victoria Street East
Exeter, Ontario
N0M 1S1



Inspection Date: **May 9, 2022**
Verification Date: **May 13, 2022**
Representative: **Mr. Nick Fedorow**



Introduction to Infrared Thermography

The purpose of the infrared roof inspection is to locate areas of subsurface moisture content in your buildings flat roofing system. This is the basic principle on how it works:

During the day the sun heats up the roofs surface and insulation. At night the roof cools down and areas of any wet roofing insulation that may be present, retain the heat (which was absorbed during the day) longer than the surrounding dry areas. It is this difference in the time it takes to cool itself that allows the infrared inspection to image and define areas of wet roofing.

The inspection is done in the following three phases:

- (1) The roof history, design and composition must be known or tested prior to the inspection.
- (2) The roof is inspected using an infrared imaging camera at night during proper weather conditions, i.e.:
 - (a) Roof must be dry, low or no wind, and temperature differential must be significant enough to create a thermal difference between the wet and dry roof.
 - (b) At this time suspected areas due to thermal abnormalities are outlined on the roof surface with marking paint.
- (3) Physical verification is done the following day, or shortly thereafter.
 - (a) This will involve doing core samples and electronic moisture sensitive probes to examine the top pour, felts, insulation, vapour barrier and the deck at both problem and non-problem areas.

For documentation, thermograms are taken of the thermally suspect areas, and this is grouped with corresponding real time pictures. The reports will contain certain comments and photos of the roof cores. Additional comments may be made on overall roof maintenance. What you will receive by doing this type of inspection is a formal report that documents your roofs verified areas of moisture, complete with pictures, comments, and a detailed roofing diagram.

To summarize, the infrared camera detects heat, and wet roofing is hotter than dry roofing during its cooling cycle. The inspection crew finds, then verifies areas of moisture damage utilizing thermographic technology. It should be noted that the inspection is complicated by adverse weather conditions, variations in the roof system mass, uneven areas of solar load on a roof and the thermal variations than are inherent to the multitude of roofing designs. In light of all the complexities of this inspection technique, **GARLAND CANADA** uses both a high-quality infrared imaging system and skilled certified thermographers to inspect your roof and provide your report.



Inspection Summary

Environmental Conditions

Ambient Temperature	17 °C
Wind Speed	21 km/h
Air Pressure	102.2 kPa
Relative Humidity	34 %



Equipment Specifications

Thermal Imager	Flir T660
Emissivity	0.95
Moisture Meter	Delmhorst BD-10
Roof Repair Adhesive	Garla-Flex



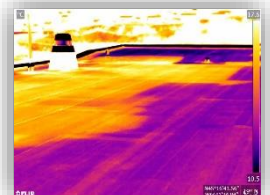
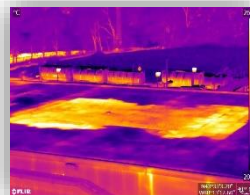
Core, Probe & Anomaly Data

Total Anomalies	0
Total Probes	4
Total Cores	2
Total V-Cuts	0



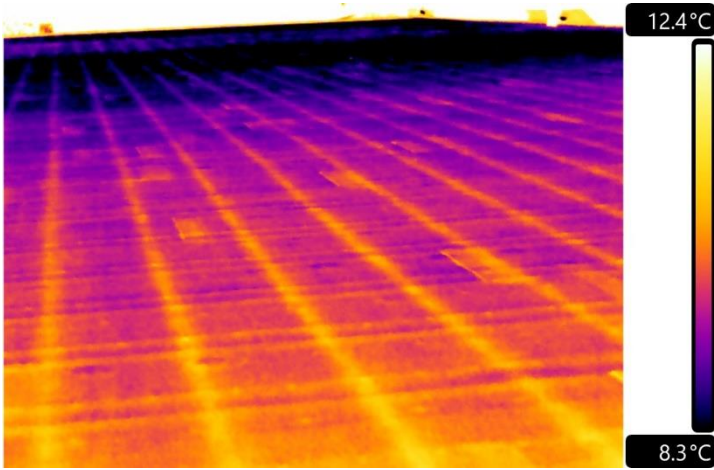
Scan Data

Scan Date	May 9, 2022
Verification Date	May 13, 2022
Total Roof Area Scanned	44,574 Sqft
Total Deficient Roof Area	0 Sqft
Total Deficient Area Percentage	0.00%





Vantage Point #1



Observations

Thermogram looking at typical roof area on Roof Section 1.0.

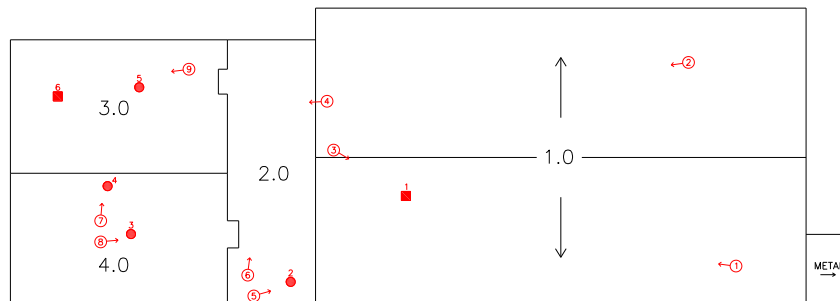
No suspect anomalies detected on this roof area.

Roof edge shown in background of images.



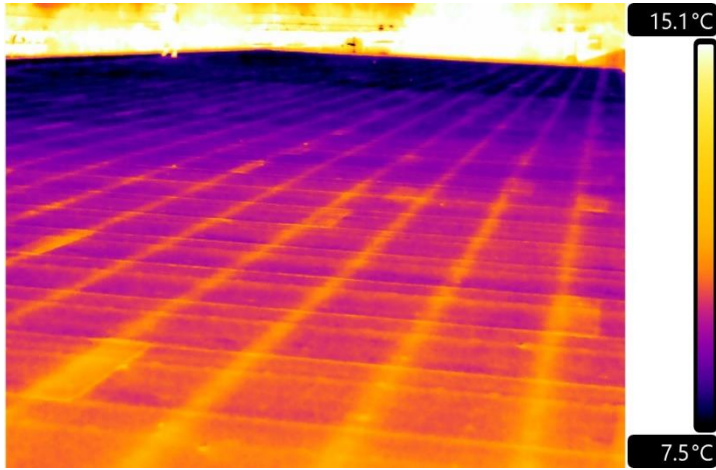
Anomaly Area...

0 sqft





Vantage Point #2



Observations

Alternate view Thermogram looking at typical roof area on Roof Section 1.0.

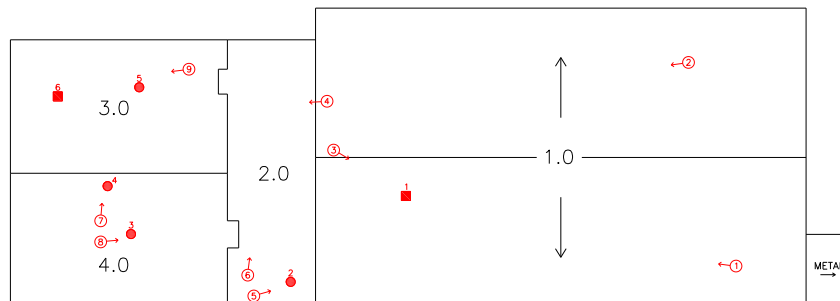
No suspect anomalies detected on this roof area.

Thermal bridging of structural components shown as light coloured lines.



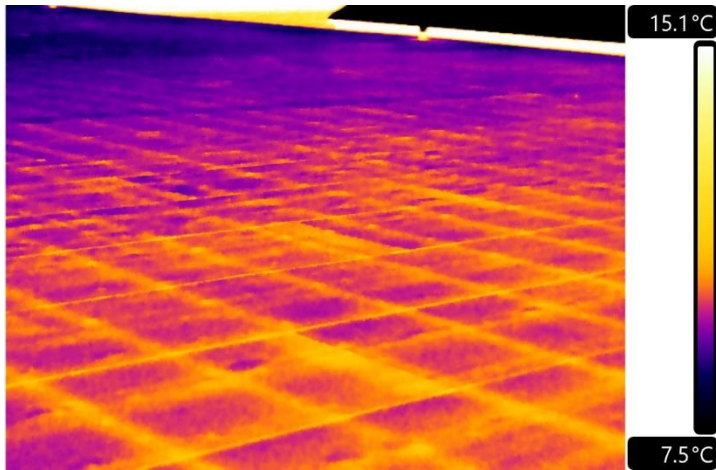
Anomaly Area...

0 sqft





Vantage Point #3



Observations

Thermogram looking at typical roof area on Roof Section 1.0.

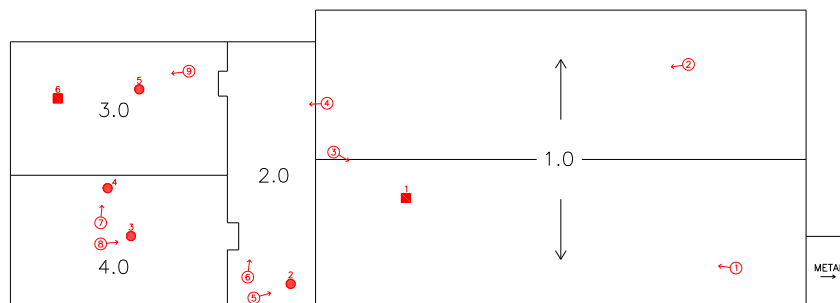
Verified Core #1 – Dry.

Higher thermal loss noted at this area of roof.



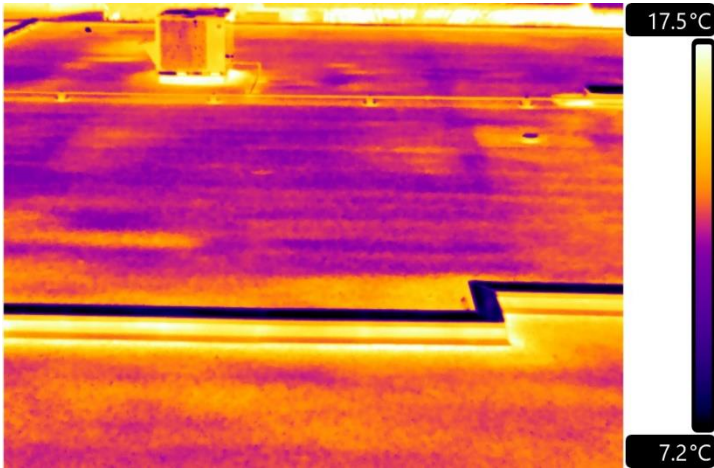
Anomaly Area...

0 sqft





Vantage Point #4



Observations

Thermogram looking down from Roof Section 1.0 at typical roof areas on Roof Sections 2.0 & 3.0.

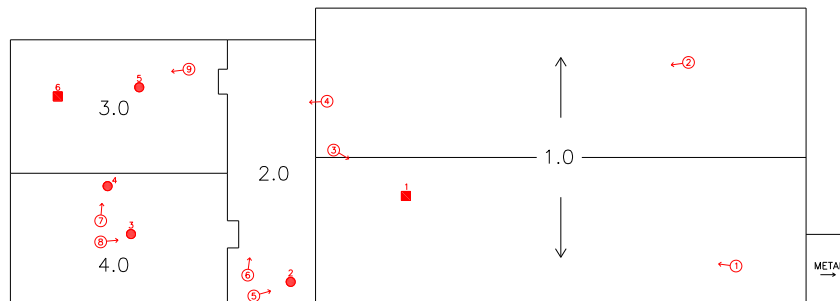
Verified Core #6 – Dry.

Various mechanical units shown in background of images.



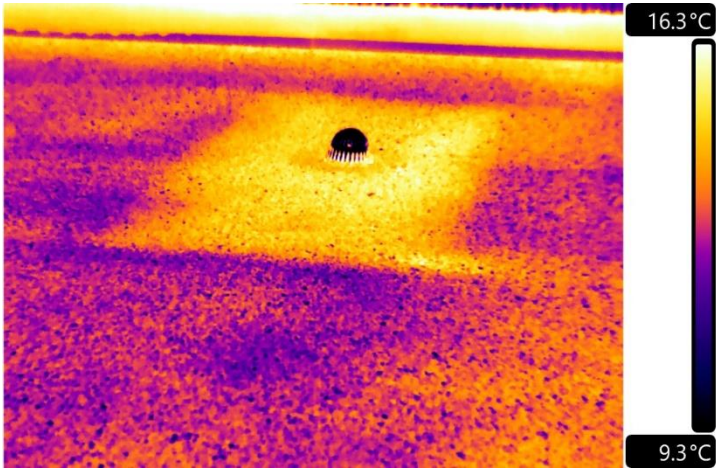
Anomaly Area...

0 sqft





Vantage Point #5



Observations

Thermogram looking at suspect anomaly
on Roof Section 2.0.

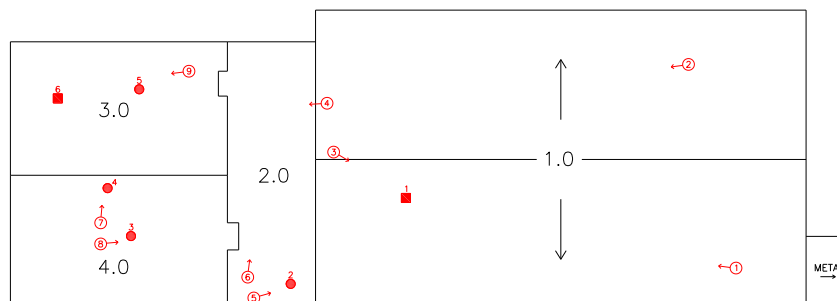
Verified Probe #2 – Dry.

Drain pan thermal characteristics noted at this location.



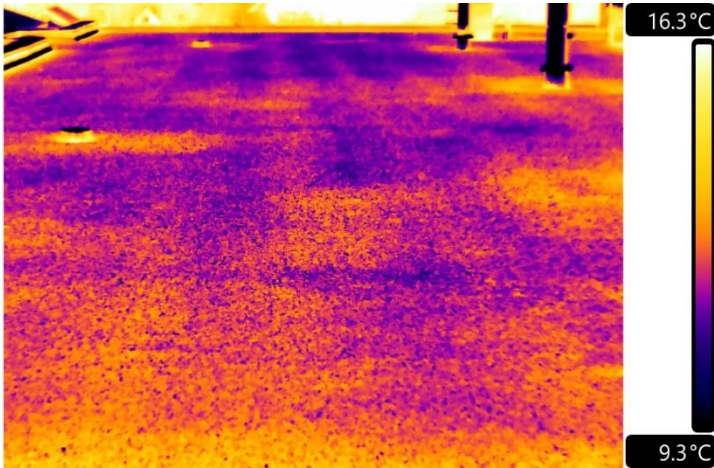
Anomaly Area...

0 sqft





Vantage Point #6



Observations

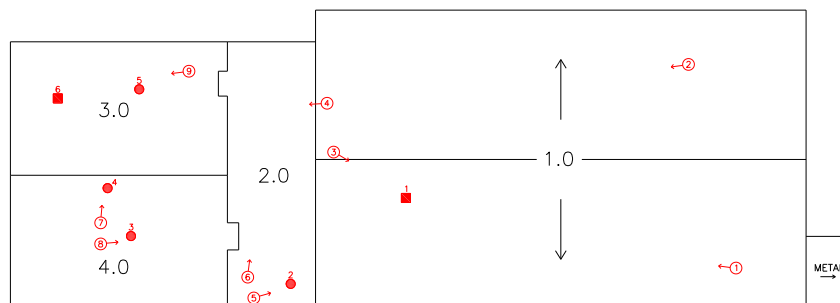
Thermogram looking at typical roof area on Roof Section 2.0.

Roof drain & roof edge shown in background of images.



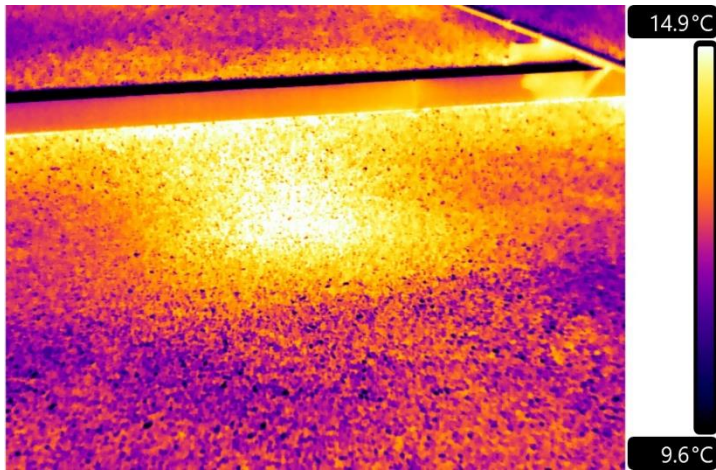
Anomaly Area...

0 sqft





Vantage Point #7



Observations

Thermogram looking at suspect anomaly on Roof Section 4.0.

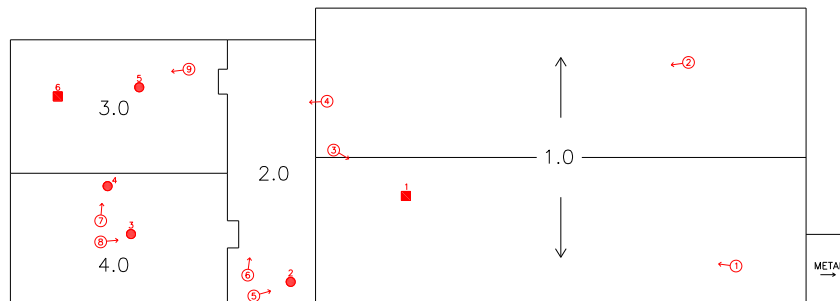
Verified Probe #4 – Dry.

Higher thermal retention caused by excess ballast (gravel) noted at this area.



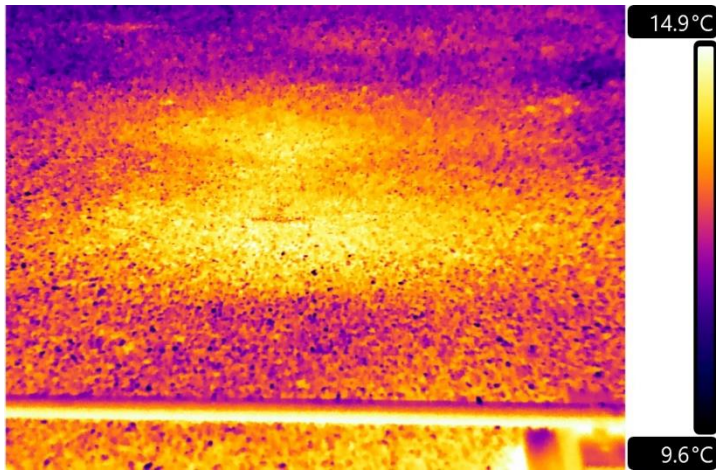
Anomaly Area...

0 sqft





Vantage Point #8



Observations

Thermogram looking at suspect anomaly on Roof Section 4.0.

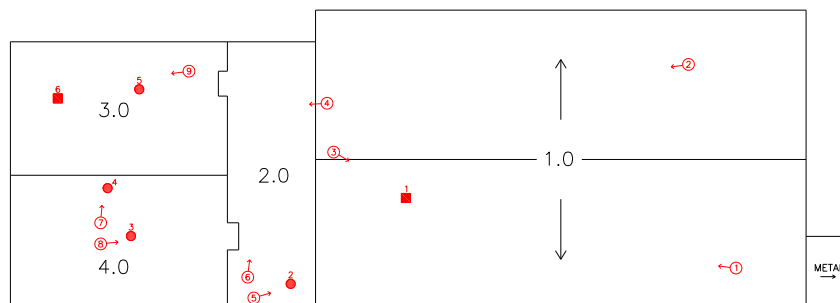
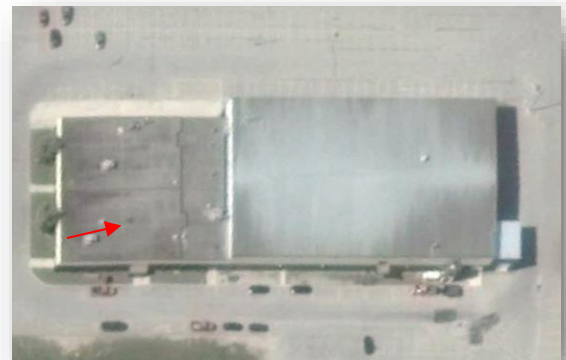
Verified Probe #3 – Dry.

Gas line shown at foreground of images.



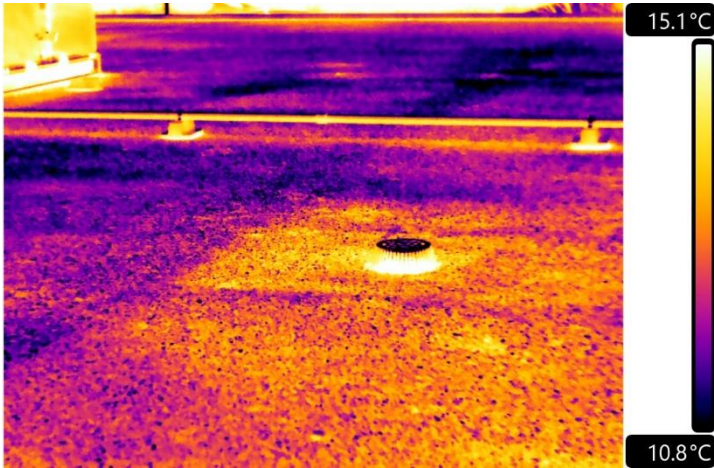
Anomaly Area...

0 sqft





Vantage Point #9



Observations

Thermogram looking at suspect anomaly on Roof Section 3.0.

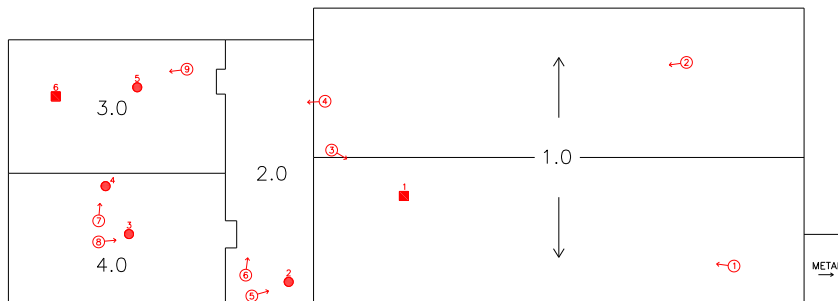
Verified Probe #5 – Dry.

Higher thermal retention caused by excess ballast (gravel) and thicker top pour noted at this area.



Anomaly Area...

0 sqft



Core Cut #1



Core Assembly - Roof Section 1.0

Layer Type	Description	Condition	Thickness
Surfacing	Granular	-	-
Membrane	Modified Bitumen	Fair	-
Felts	2 Ply	Dry	-
Insulation	None	-	-
Vapor Barrier	None	-	-
Deck	Wood	Good	-

Core Cut #6



Core Assembly - Roof Section 3.0

Layer Type	Description	Condition	Thickness
Surfacing	3/8" Gravel	-	-
Membrane	Built Up Roof - Asphalt & Gravel	Fair	-
Felts	4 Ply	Dry	-
Insulation	Fiberboard	Dry	1/2"
Insulation	Polyisocyanurate	Dry	2"
Vapor Barrier	Kraft Paper	-	-
Deck	Metal	Good	-



Probe Readings – Image & Data



Probe #3 Roof Section 4.0

Moisture Probe Reading: Dry Insulation



Probe #4 Roof Section 4.0

Moisture Probe Reading: Dry Insulation



Probe Readings – Image & Data



Probe #5 Roof Section 3.0

Moisture Probe Reading: Dry Insulation



Probe Verification Data

Probe Data

[illegible]



Roof Section	Size – Sq.ft.	Anomaly – Sq.ft.	Percentage
1.0	28,644	0	0.00%
2.0	4,586	0	0.00%
3.0	5,620	0	0.00%
4.0	5,724	0	0.00%
Total	44,574	0	0.00%