

Garland Canada Inc.

Roof Asset Management Program

R A M P.



City of  
**Prince  
Albert**

City of Prince Albert - Municipal Services Centre Roof Inspection

Prepared By  
Brett Foote

Prepared For  
Don Cheeseman

June 10, 2022

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# Facility Summary

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

## Facility Data

<b>Address 1</b>	11 38 St E
<b>City</b>	Prince Albert
<b>Province</b>	Saskatchewan
<b>Postal</b>	S6W1A5
<b>Type of Facility</b>	Municipal
<b>Square Footage</b>	31,408
<b>Contact Person</b>	Don Cheeseman

## Asset Information

<b>Name</b>	<b>Date Installed</b>	<b>Square Footage</b>	<b>Roof Access</b>
Lower Section(Middle)	-	7,743	Attached Ladder
Upper Section(East)	-	17,548	Attached Ladder
Upper Section(West)	-	6,118	Attached Ladder





since 1895

# ROOF MEASUREMENT REPORT

11 38 St E, Prince Albert, SK S6W1A5

## Report Contents



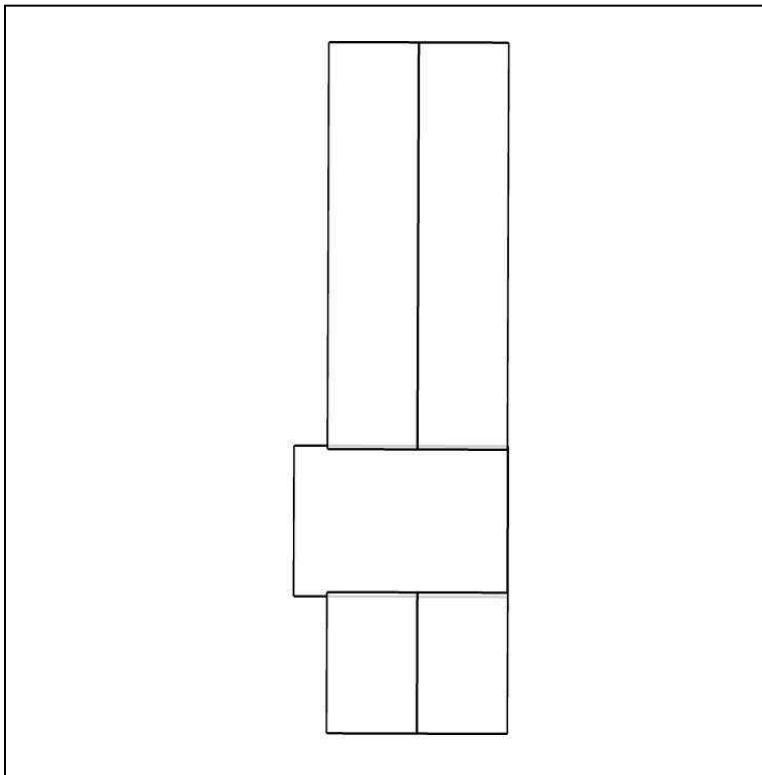
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## Report Details

Date:	05/28/2022
Report:	46333276

## Roof Details

Total Area:	31,408 sq ft
Total Roof Facets:	5
Predominant Pitch:	1/12
Number of Stories:	>1
Total Ridges/Hips:	269 ft
Total Valleys:	0 ft
Total Rakes:	0 ft
Total Eaves:	0 ft
Total Penetrations:	50
Total Penetrations Perimeter:	451 ft
Total Penetrations Area:	486 sq ft



In this 3D model, facets appear as semi-transparent to reveal overhangs.

## Contact Us

Contact: Brett Foote  
 Company: Garland Company Inc.  
 Address: 3800 East 91St  
 Cleveland OH 44105  
 Phone: 306-914-3514

Measurements provided by [www.eagleview.com](http://www.eagleview.com)



Certified Accurate

[www.eagleview.com/Guarantee.aspx](http://www.eagleview.com/Guarantee.aspx)

## REPORT IMAGES

The following aerial images show different angles of this structure for your reference.



**Top View**

## REPORT IMAGES



**North View**



**East View**

## REPORT IMAGES



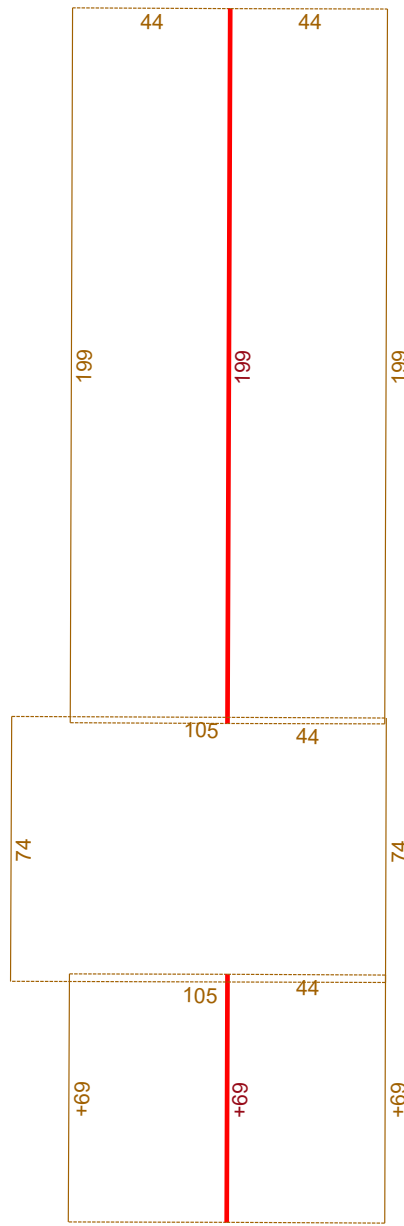
South View



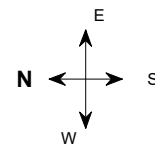
West View

## LENGTH DIAGRAM

Total Line Lengths:    **Ridges = 269 ft**                      **Valleys = 0 ft**                      **Flashing = 685 ft**                      **Eaves = 0 ft**  
    **Hips = 0 ft**                                      **Rakes = 0 ft**                                      **Step flashing = 564 ft**                      **Parapets = 0 ft**



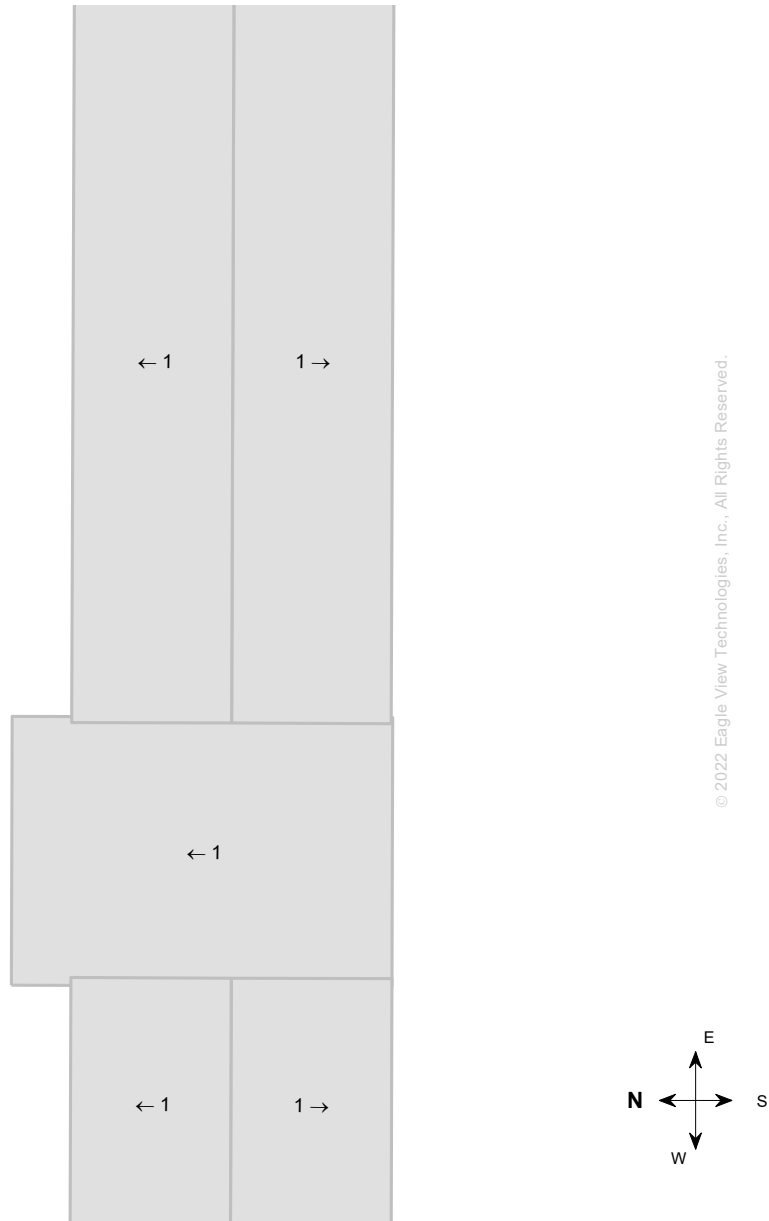
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*Note: This diagram contains segment lengths (rounded to the nearest whole number) over 5 feet. In some cases, segment labels have been removed for readability. Plus signs preface some numbers to avoid confusion when rotated (e.g. +6 and +9).*

## PITCH DIAGRAM

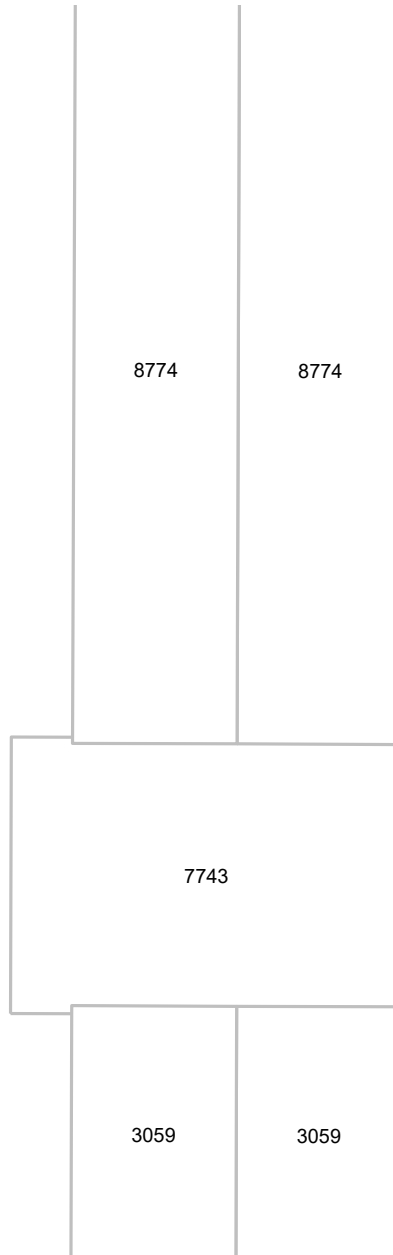
Pitch values are shown in inches per foot, and arrows indicate slope direction. The predominant pitch on this roof is 1/12.



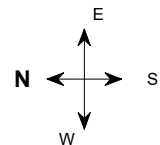
*Note: This diagram contains labeled pitches for facet areas larger than 20 square feet. In some cases, pitch labels have been removed for readability. Gray shading indicates flat, 1/12 or 2/12 pitches. If present, a value of "F" indicates a flat facet (no pitch).*

## AREA DIAGRAM

Total Area = 31,408 sq ft, with 5 facets.



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*Note: This diagram shows the square feet of each roof facet (rounded to the nearest foot). The total area in square feet, at the top of this page, is based on the non-rounded values of each roof facet (rounded to the nearest square foot after being totaled).*

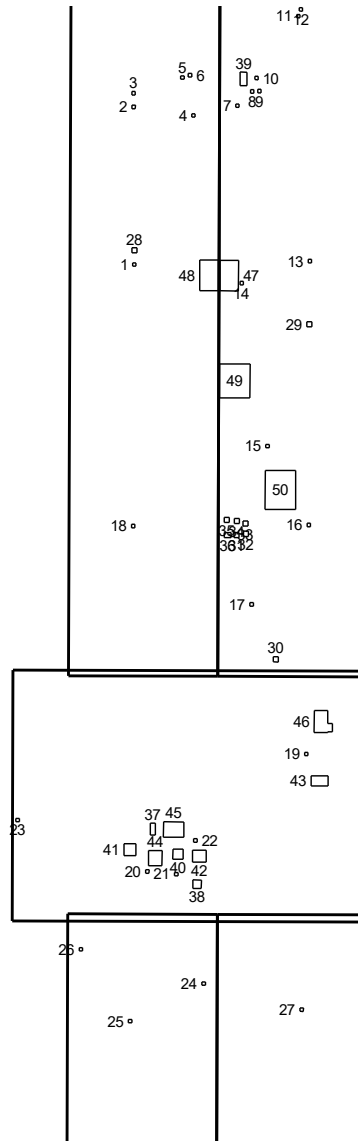
## PENETRATIONS

### Penetrations Notes Diagram

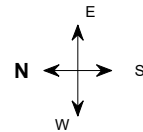
Penetrations are labeled from smallest to largest for easy reference.

Total Penetrations: 50  
 Total Penetrations Perimeter = 451 ft

Total Penetrations Area: 486 sq ft  
 Total Roof Area Less Penetrations = 30,922 sq ft



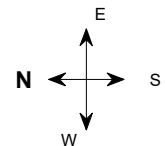
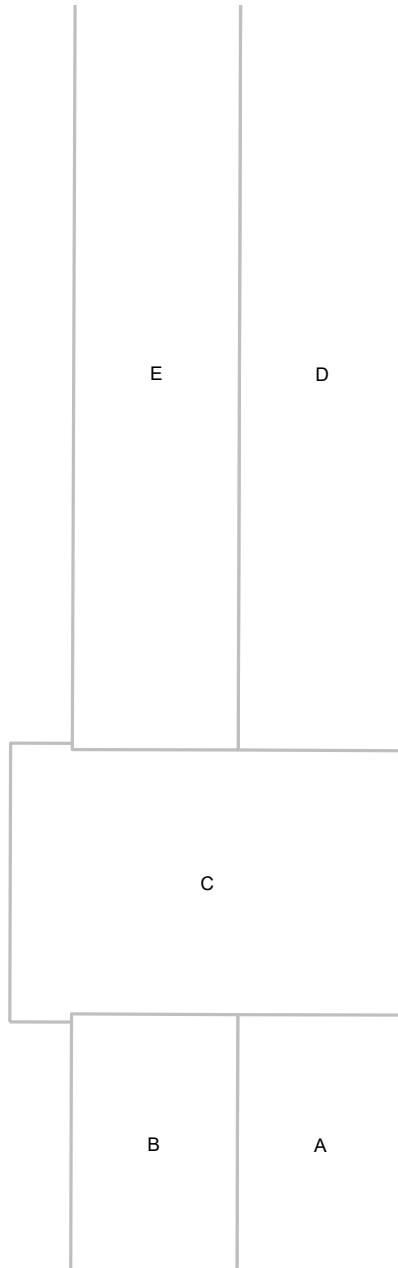
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*Note: Any measured penetration smaller than 3x3 feet may need field verification. Accuracy is not guaranteed. The total penetration area is not subtracted from the total roof area.*

## NOTES DIAGRAM

Roof facets are labeled from smallest to largest (A to Z) for easy reference.



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## Property Info



### Property Location

Longitude = -105.7525112

Latitude = 53.1780028

Online map of property:

[http://maps.google.com/maps?f=g&source=s\\_q&hl=en&geocode=&q=11+38+St+E,Prince+Albert,SK,S6W1A5](http://maps.google.com/maps?f=g&source=s_q&hl=en&geocode=&q=11+38+St+E,Prince+Albert,SK,S6W1A5)

### Property Info

Year Built:

Effective Year Built: \*

\*



### Notes

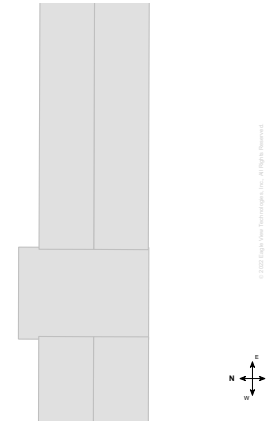
This was ordered as a commercial property. There were no changes to the structure in the past four years.

## REPORT SUMMARY

Below is a measurement summary using the values presented in this report.

### Lengths, Areas and Pitches

Ridge.....	269 ft (2 Ridges)
Hips.....	0 ft (0 Hips)
Valleys.....	0 ft (0 Valleys)
Rakes*.....	0 ft (0 Rakes)
Eaves/Starter**.....	0 ft (0 Eaves)
Drip Edge (Eaves + Rakes).....	0 ft (0 Lengths)
Parapet Walls.....	0 ft (0 Lengths)
Flashing.....	685 ft (6 Lengths)
Step Flashing.....	564 ft (10 Lengths)
Total Area.....	31,408 sq ft
Total Penetrations Area.....	486 sq ft
Total Roof Area Less Penetrations.....	30,922 sq ft
Total Penetrations Perimeter.....	451 ft
Predominant Pitch.....	1/12



Total Roof Facets = 5

\*Rakes are defined as roof edges that are sloped (not level).

\*\* Eaves are defined as roof edges that are not sloped and level.

### Areas per Pitch

<b>Roof Pitches</b>	1/12
<b>Area (sq ft)</b>	31407.3
<b>% of Squares</b>	100%

The table above lists each pitch on this roof and the total area and percent (both rounded) of the roof with that pitch.

### Waste Calculation Table

Waste %	0%	10%	12%	15%	17%	20%	22%
<b>Area (sq ft)</b>	31,408	34548.8	35177.0	36119.2	36747.4	37689.6	38317.8
<b>Squares</b>	314.1	345.5	351.8	361.2	367.5	376.9	383.2

This table shows the total roof area and squares (rounded up to the nearest decimal) based upon different waste percentages. The waste factor is subject to the complexity of the roof, individual roofing techniques and your experience. Please consider this when calculating appropriate waste percentages. Note that only roof area is included in these waste calculations. Additional materials needed for ridge, hip, valley, and starter lengths are not included.



# ROOF MEASUREMENT REPORT

<b>Penetration Table</b>	1-27	28-35	36	37	38	39	40	41	42	43
Area (sq ft)	1	2.3	3	5.3	6.3	8	9	12.2	14	15
Perimeter (ft)	4	6	7	10	10	12	12	14	15	16
	44	45	46	47-48	49	50				
Area (sq ft)	18	27	29.5	49.5	90	103.5				
Perimeter (ft)	17	21	23.8	29	38	41				

*Any measured penetration smaller than 3x3 feet may need field verification. Accuracy is not guaranteed. The total penetration area is not subtracted from the total roof area.*



5/27/2022

Re: CLEAR Program Test Results  
Project: RD-414-417

Dear Brett,

Thank you for sending your roof core samples for testing through the CLEAR program. We have completed comprehensive testing of your sample and the results are included with this package. Your test results may include the analysis of the items requested, such as:

- Tensile Strength
- Inter-ply/Surface Bitumen Softening Point/Penetration
- Ply/Bitumen and Scrim Type
- Number of Plies
- Bitumen Weight/Application Rate
- Flexural Strength

Now that you have the results, as a reminder, some objectives of this program are to help you to answer questions like:

- Is the roof failing? Why?
- Expected remaining useful life, approximately?
- Does this sample indicate that this roof needs replaced? Or is this a possible restoration candidate?
- Were there application errors during installation?

*If you are looking to restore the roof* and these results show this to be a potential candidate, but you need to truly determine if this is a good option for the client, the next steps are:

- Reference the Restoration warranty System Overview document on the Garland HQ.
- Full visual inspection of the rest of the roof and if conditions are suitable
- A quality moisture survey (Infrared or Nuclear) to determine whether the roof is dry enough and what areas of the roof need to be replaced
  - Less than 30% moisture contained within the system is a good benchmark for a cost-effective option versus a replacement
  - A stamped engineering report is best, if possible
- Determine whether the flashings and penetration points need to be replaced, rather than only coated to make the desired restoration warranty period
- Consider which Garland restoration systems make sense. If you are unsure, reach out to the Product Management Team for assistance.

If you have questions about these test results, feel free to call Derek Scavuzzo at 216-430-3520.

Sincerely,  
The Garland Laboratory Team



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### Municipal Services Centre - East and West

<i>Property</i>	<i>Core Sample</i>	<i>Test Method</i>	<i>Notes</i>
<b>Core Size</b>	15.5" x 12"	ASTM D2829	N/A
<b>Core Weight</b>	2.35 lbs	ASTM D2829	N/A
<b>Surfacing Type</b>	Mineral	Visual	N/A
<b>Ply Type</b>	Fiberglass Felt Fiberglass Felt	ASTM D2829	N/A
<b>Number of Plies</b>	2	ASTM D2829	N/A
<b>Bitumen Type</b>	Asphalt	Solvent Test	N/A
<b>Softening Point</b>	255.5 °F	ASTM D3461	Out of range per type IV asphalt
<b>Pen</b>	4 dmm/5 sec	ASTM D5	Out of range per type IV asphalt
<b>Flexural Strength</b>	Pass	NBS	Above recommended 30 lb minimum
<b>Puncture</b>	108.4 lbs	NBS	Exceeded recommended 5 lb minimum
<b>Tensile Strength</b>	176.4 lbf	ASTM D2523	Fell below recommended 200 lbf minimum
<b>Elongation</b>	3.4%	ASTM D2523	Above recommended 2.5% minimum



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**Municipal Services Centre Conclusion**

The 25 year old core samples are from a 2 ply modified roof system with fiberglass felt interplies in an asphalt adhesive. After visual inspection, both cores from the system appear to be in similar condition, implying that both sections of the roof have aged at a similar rate. For this reason, testing values were reported from the East section core. The interplies were very easily delaminated by hand as shown in Figures 12 and 15. Some mineral loss is expressed by exposed asphalt spots on the surface of the core but overall the coverage is still fairly good. The softening point and pen tests show that the asphalt adhesive responsible for keeping the system intact has lost its oils over time, causing the system to become more brittle. The core tested below the recommended tensile strength, but elongation was well above the recommendation. The sample performed well when undergoing puncture testing, implying that the system can withstand foot traffic and most weather phenomena.

Please contact Garland’s Technical Team to discuss the best options for these roof systems. The above results are based solely on the core samples examined and may not be representative of the condition of the roof. No representations or warranties are hereby made as to the condition of the roof.

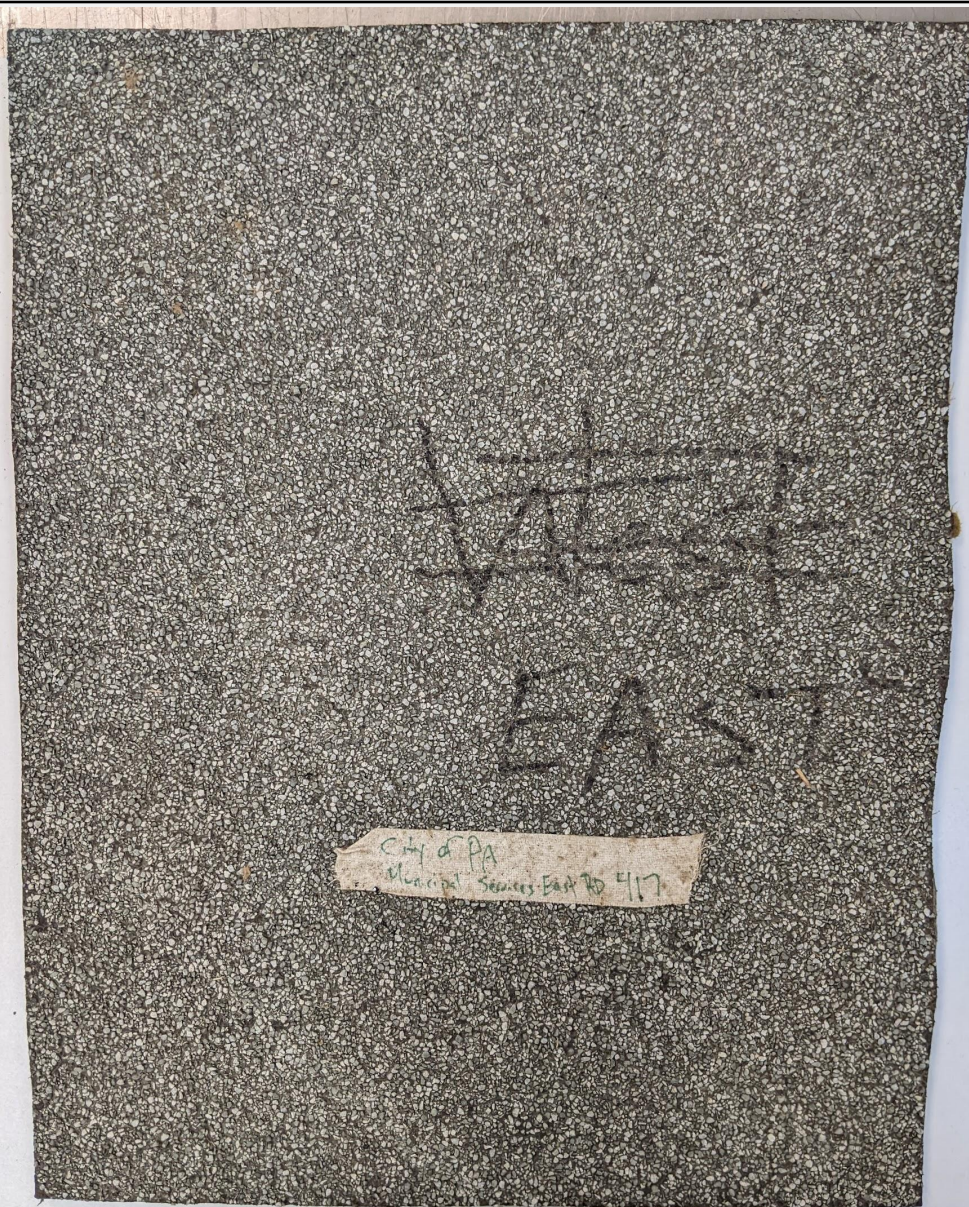


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**Figure 10:** Municipal Services Centre East top view.

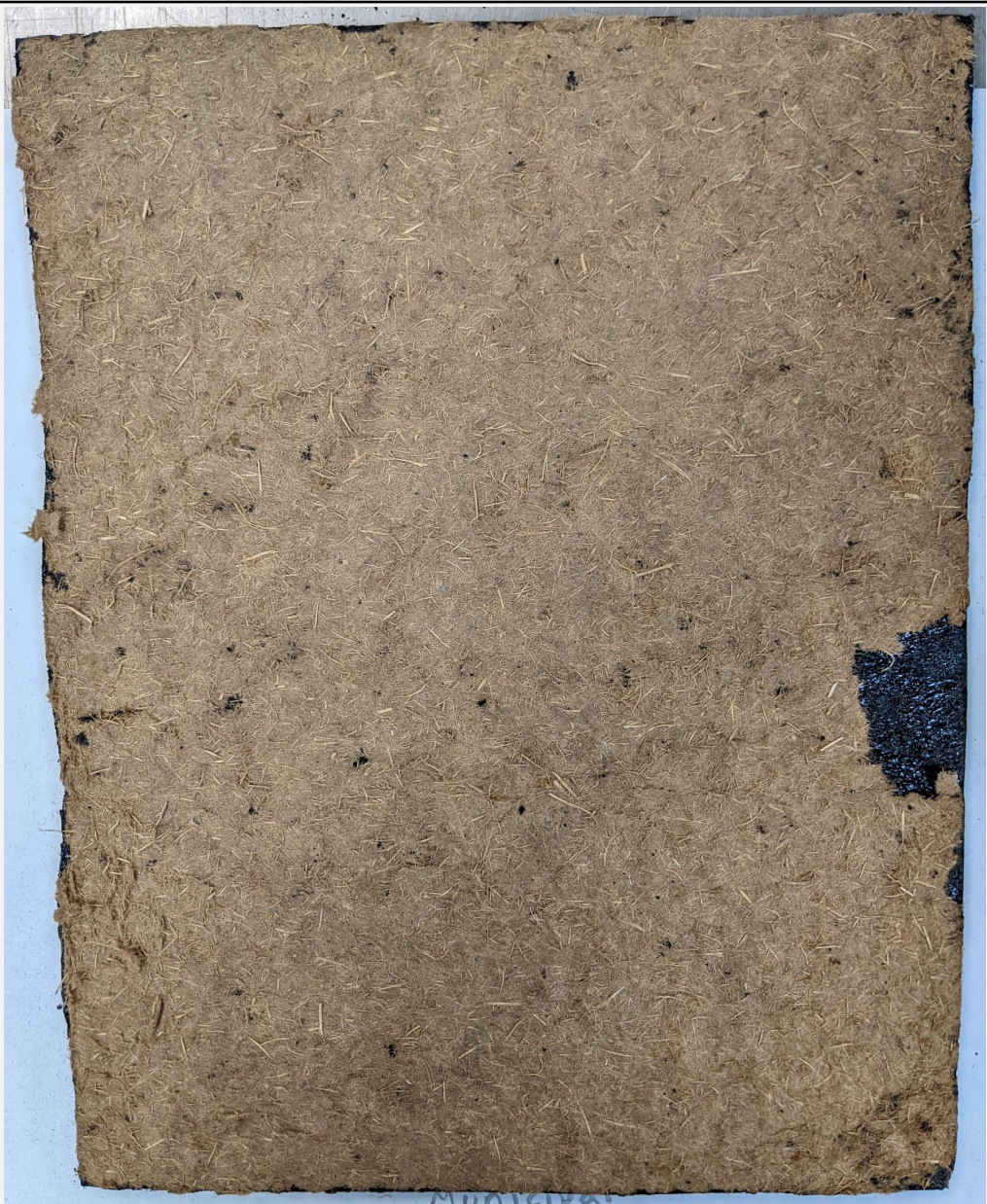


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**Figure 11:** Municipal Services Centre East bottom view.

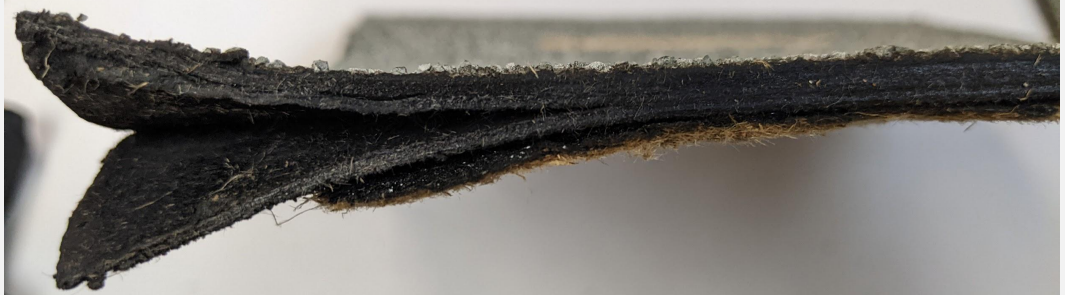


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**Figure 12:** Municipal Services Centre East side profile.

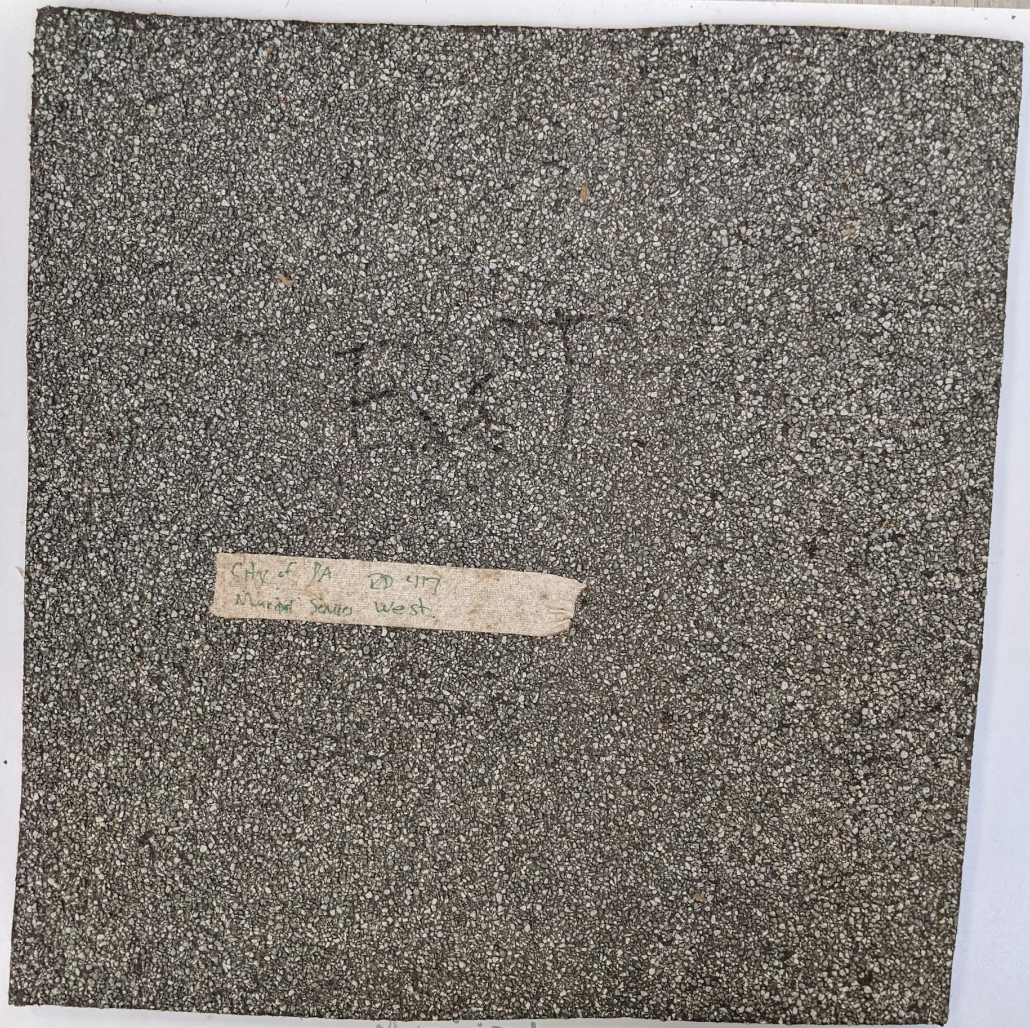


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**Figure 13:** Municipal Services Centre West top view.

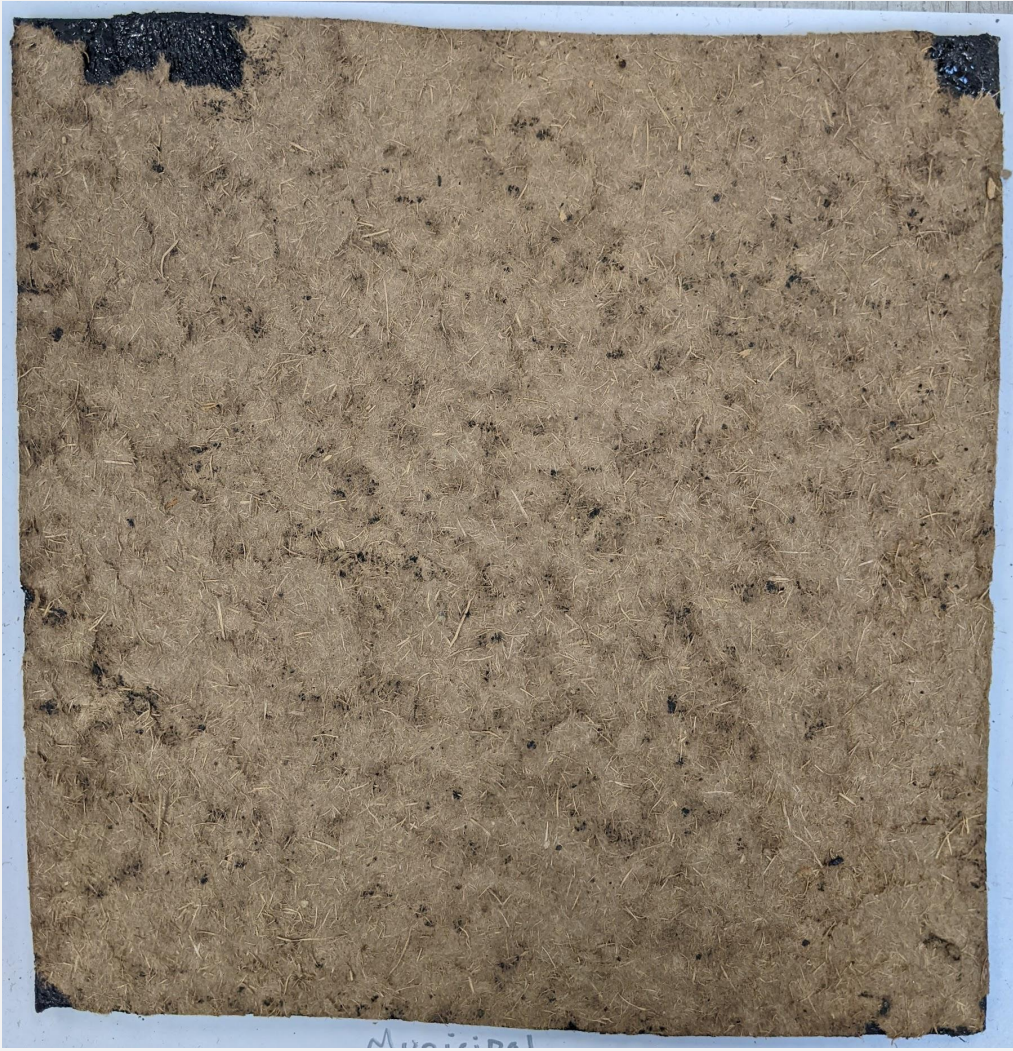


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**Figure 14:** Municipal Services Centre West bottom view.



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**Figure 15:** Municipal Services Centre West side profile.



**Figure 16:** Solvated samples - from bottom to top - Firehall, Alfred Jenkins, Police Station, Municipal Services Centre.

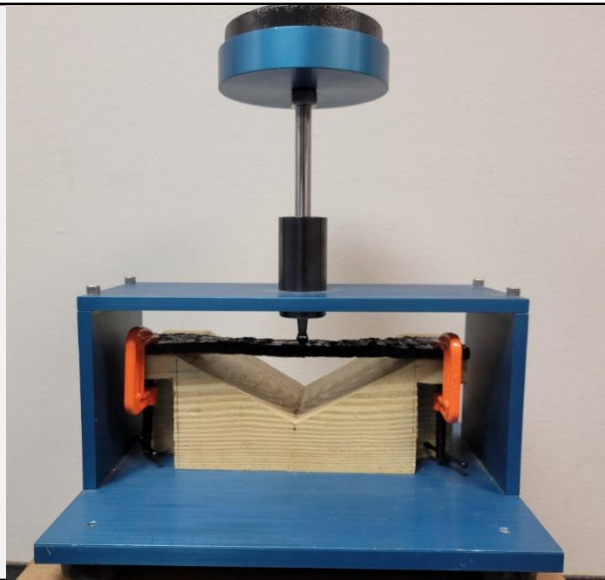


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**Figure 17:** Sample image of the flexural strength testing apparatus.



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# Construction Details

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Lower Section(Middle)

## Information

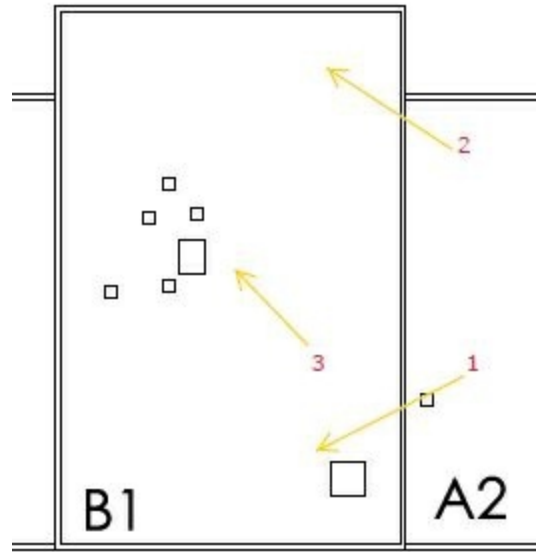
<b>Year Installed</b>	-	<b>Square Footage</b>	7,743
<b>Slope Dimension</b>	low slope	<b>Eave Height</b>	~20
<b>Roof Access</b>	Attached Ladder	<b>System Type</b>	Mineral Modified Bitumen

## Assembly

Roof #	Layer Type	Description	Attachment	R-Value	Thickness
1	Membrane	Mod Bit - 2 ply mineral surfaced	Torch applied	-	-

## Details

<b>Drain System</b>	Internal Roof Drains
---------------------	----------------------





# Inspection Report

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Report Date:** 05/16/2022

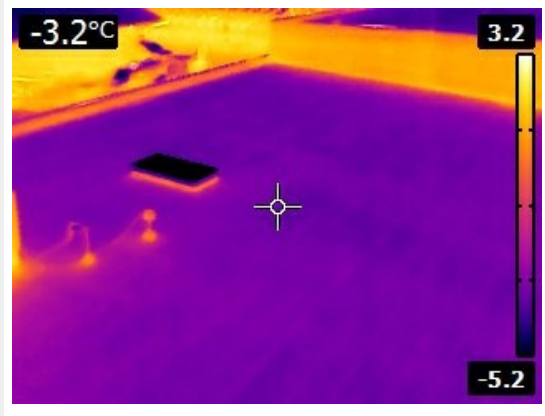
**Roof Section:** Lower Section(Middle)

## Inspection Information

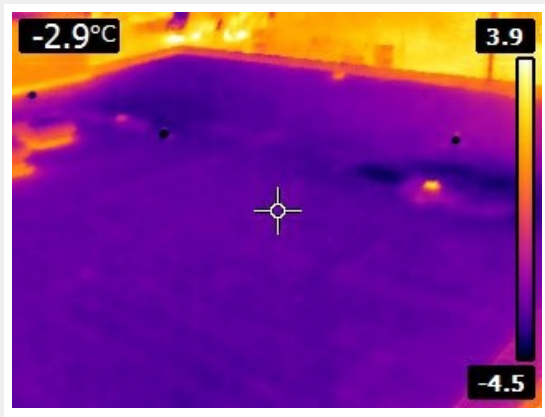
<b>Inspection Date</b>	05/16/2022	<b>Core Data</b>	No
<b>Inspection Type</b>	Infrared Scan	<b>Leakage</b>	No

## Overall

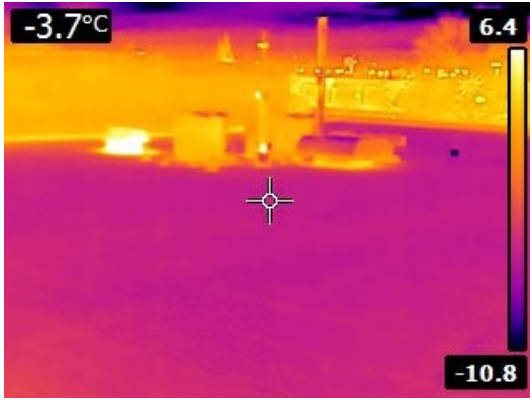
<b>Rating</b>	Fair
<b>Condition</b>	No thermal anomaly related to wet insulation was found on this section



*Photo 1*  
 General view of the lower section (B1) from section A2.  
 No thermal anomaly related to wet insulation was found on this section



*Photo 2*  
 General view of the lower section (B1) from section A2.  
 No thermal anomaly related to wet insulation was found on this section  
 An area of light water ponding was visible around the drain.



*Photo 3*

General view of the lower section (B1) from the roof surface.  
The thermal patterns on the roof surface were homogeneous.

No thermal anomaly related to wet insulation was found on this section



# Photo Report

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Lower Section(Middle)

**Report Date:** 05/27/2022

**Title:** Initial Inspection



*Photo 1*

**Lower Middle Section:**  
Modified Bitumen

**Overall Condition:** Good - Fair

**Scan:** 0% Wet

**CLEAR Analysis:** The 25 year old core samples are from a 2 ply modified roof system with fiberglass felt interplies in an asphalt adhesive. After visual inspection, both cores from the system appear to be in similar condition, implying that both sections of the roof have aged at a similar rate. For this reason, testing values were reported from the East section core. The interplies were very easily delaminated by hand as shown in Figures 12 and 15. Some mineral loss is expressed by exposed asphalt spots on the surface of the core but overall the coverage is still fairly good. The softening point and pen tests show that the asphalt adhesive responsible for keeping the system intact has lost its oils over time, causing the system to become more brittle. The core tested below the recommended tensile strength, but elongation was well

above the recommendation. The sample performed well when undergoing puncture testing, implying that the system can withstand foot traffic and most weather phenomena. Please contact Garland's Technical Team to discuss the best options for these roof systems. The above results are based solely on the core samples examined and may not be representative of the condition of the roof. No representations or warranties are hereby made as to the condition of the roof.



*Photo 2*

**Caulking Deterioration:** As caulking is exposed to UV rays and temperature fluctuations it loses its flexibility and develops cracks. Once this occurs splits develop allowing water to penetrate walls and buildings causing damage as well as leaks.



*Photo 3*

**Perimeter Flashing**

**Deterioration:** Most roof failures start at perimeter and penetration locations. Perimeter wall flashings can be damaged due to normal seasonal building movement and thermal shock. Additional damage can also be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the buildings interior.



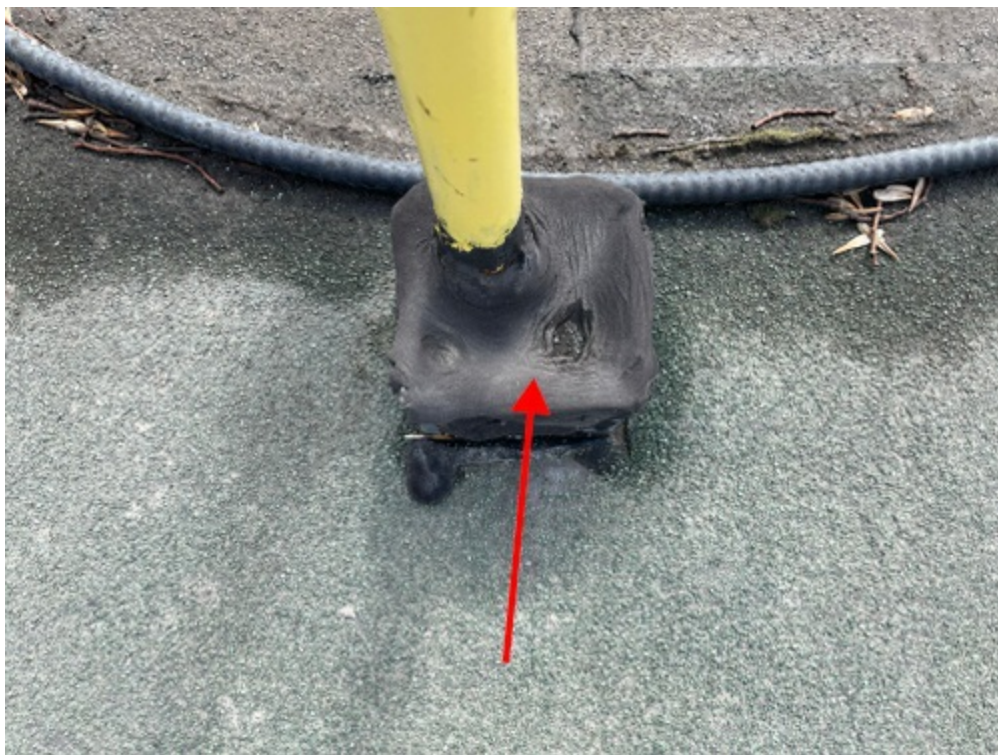
*Photo 4*

**Fish mouths:** Wrinkles or openings at the edge of the membrane caused by poor adhesion or installation. Fish mouths are a common cause of early failure on 2-ply torch down and single ply roof systems. These systems are prone to workmanship error due to two factors (1) the manual heating/welding of the adhesive, which is very unpredictable for constant heat, and (2) the roof system only consists of 1 to 2 plies, which translates in to a very thin layer of water protection.



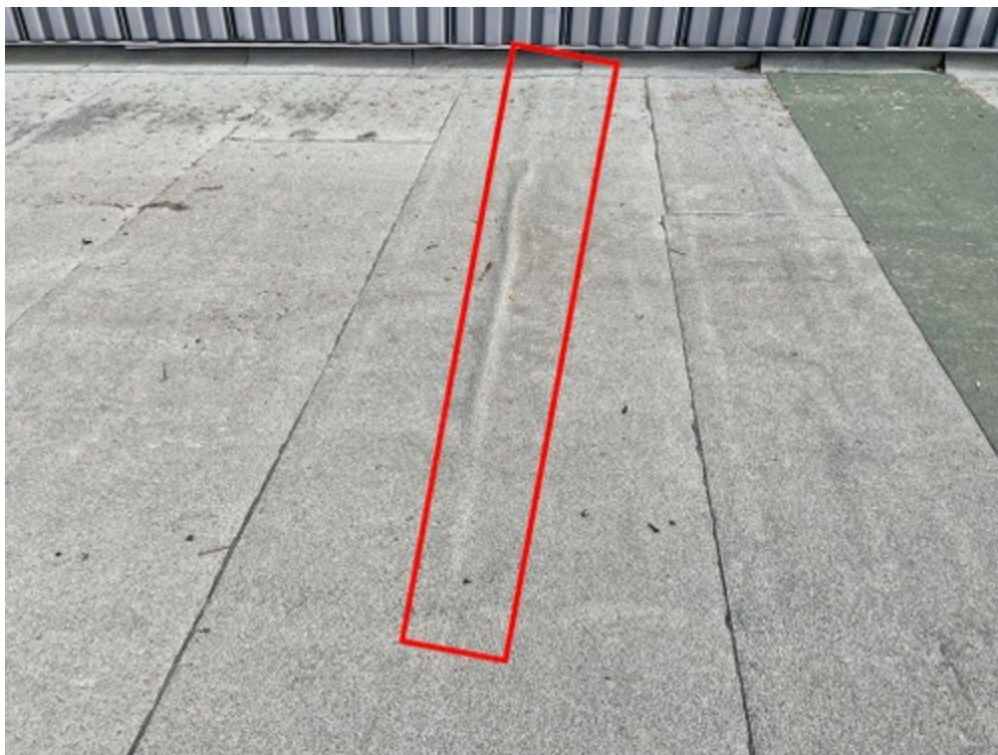
*Photo 5*

**Fish mouths:** Wrinkles or openings at the edge of the membrane caused by poor adhesion or installation. Fish mouths are a common cause of early failure on 2-ply torch down and single ply roof systems. These systems are prone to workmanship error due to two factors (1) the manual heating/welding of the adhesive, which is very unpredictable for constant heat, and (2) the roof system only consists of 1 to 2 plies, which translates in to a very thin layer of water protection.



*Photo 6*

**Pitch Pocket Deterioration:** Metal protrusions that penetrate the roof system to allow conduits to run from the rooftop into the building. Movement from the protrusion can break the waterproofing compound, creating cracks. Over time, the release of solvents from the compound can cause the material to shrink, leaving gaps along the edges of the pan and around structural support. Water can enter through a defective pitch pan and find its way into the interior of the building. Moisture can also penetrate into the roof system leading to premature failure.



*Photo 7*

**Ridges:** These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate. Ridges are formed by either thermal changes expanding and contracting the roofing felts or by gaps in the underlying insulation that allow vapor to migrate upwards through the roof system. Over a period of time ridges will grow and erode until they are stripped of their protective asphalt. These exposed ridges, through repeated weather cycling, will eventually crack and split to allow water into the roof system.



*Photo 8*

**Pitch Pocket Deterioration:** Metal protrusions that penetrate the roof system to allow conduits to run from the rooftop into the building. Movement from the protrusion can break the waterproofing compound, creating cracks. Over time, the release of solvents from the compound can cause the material to shrink, leaving gaps along the edges of the pan and around structural support. Water can enter through a defective pitch pan and find its way into the interior of the building. Moisture can also penetrate into the roof system leading to premature failure.



*Photo 9*

**Pitch Pocket Deterioration:** Metal protrusions that penetrate the roof system to allow conduits to run from the rooftop into the building. Movement from the protrusion can break the waterproofing compound, creating cracks. Over time, the release of solvents from the compound can cause the material to shrink, leaving gaps along the edges of the pan and around structural support. Water can enter through a defective pitch pan and find its way into the interior of the building. Moisture can also penetrate into the roof system leading to premature failure.



*Photo 10*

**Debris - Leafs and Pine Needles:** Pine needles and other leaves build up on the roof membrane causing plugged drains and scuppers thereby causing ponding water and structural weight loading. As the leaves and pine needles rot a "compost effect" occurs, this in effect causes soil to form on top of the roof membrane. This soil creates a perfect medium for plant and weed growth. When seeds take hold the roots will often penetrate through the membrane causing immediate leaks and damage internally.



*Photo 11*

**Debris - Leafs and Pine**

**Needles:** Pine needles and other leaves build up on the roof membrane causing plugged drains and scuppers thereby causing ponding water and structural weight loading. As the leaves and pine needles rot a "compost effect" occurs, this in effect causes soil to form on top of the roof membrane. This soil creates a perfect medium for plant and weed growth. When seeds take hold the roots will often penetrate through the membrane causing immediate leaks and damage internally.



*Photo 12*

**Penetration Waterproofing:**

Beginning to deteriorate around the perimeter allowing for potential moisture access.



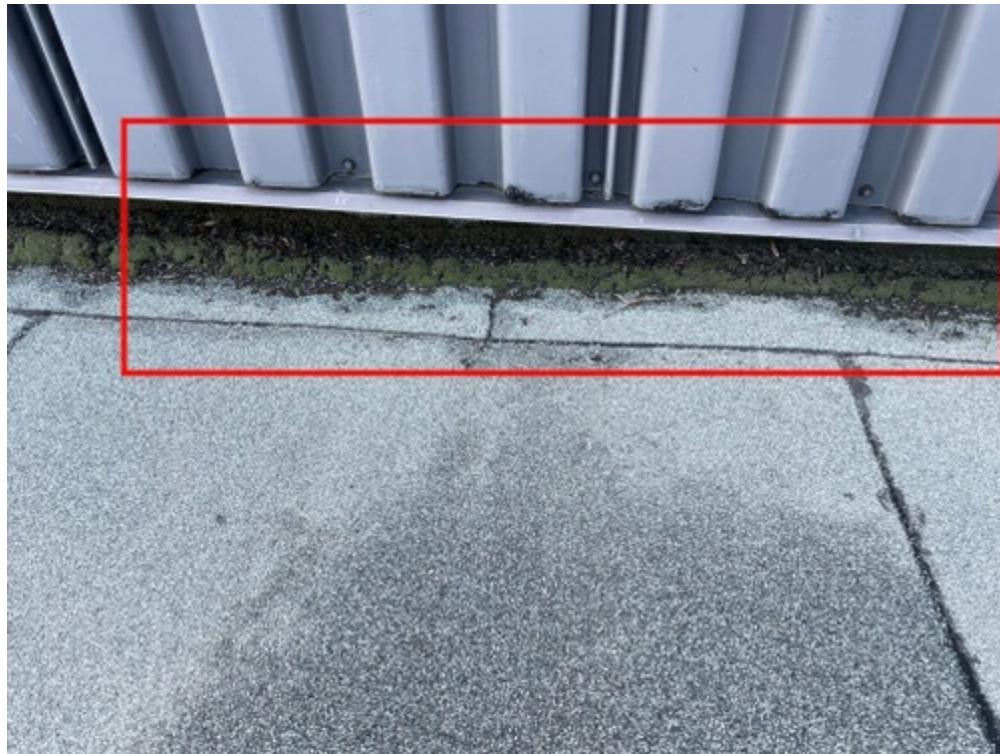
*Photo 13*

**Debris:** Left on field of roof deteriorating waterproofing membrane.



*Photo 14*

**Penetration Waterproofing:** Beginning to deteriorate around the perimeter allowing for potential moisture access.



*Photo 15*

**Vegetation Growth:**

Vegetation often occurs when dirt and debris collect on roof systems. Over time this creates a perfect medium for plant and weed growth. When seeds take hold the roots will often penetrate through the membrane causing immediate leaks and damage internally.



*Photo 16*

**Fish mouths:** Wrinkles or openings at the edge of the membrane caused by poor adhesion or installation. Fish mouths are a common cause of early failure on 2-ply torch down and single ply roof systems. These systems are prone to workmanship error due to two factors (1) the manual heating/welding of the adhesive, which is very unpredictable for constant heat, and (2) the roof system only consists of 1 to 2 plies, which translates in to a very thin layer of water protection.




# Solution Options

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Lower Section(Middle)

## Restore Options

<b>Solution Option:</b>	Restore 	<b>Action Year:</b>	2025
<b>Square Footage:</b>	7,743	<b>Expected Life (Years):</b>	20
<b>Budget Range:</b>	\$105,000.00 - \$120,000.00		

### Scope of Work: Full Restoration with 15 year watertight warranty

1. Power wash the entire surface including flashings
2. For the field of the roof and flashings, apply 1.5 gal./100 sq. ft. (24 wet mils) of base coat
3. Embed reinforcement fabric by brushing or rolling into place from the center out.
4. Next, top reinforcement with 1 gal./100 sq. ft. (16 wet mils) Allow to dry for 24-48
5. Finally, apply an additional 2 gal./100 sq. ft. (32 wet mils) to the entire roof by brush, roller or spray.




# Solution Options

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Lower Section(Middle)

## Maintenance Options

<b>Solution Option:</b>	Maintenance 	<b>Action Year:</b>	2022
<b>Square Footage:</b>	7,743	<b>Expected Life (Years):</b>	3
<b>Budget Range:</b>	\$3,500.00 - \$5,000.00		

### Scope of Work: Routine Maintenance

1. Repair all open fish mouths using high grade mastic reinforced with mesh
2. Re caulk all coping cap seams
3. Fill all pitch pockets using high grade mastic
4. Re seal around all penetrations using high grade mastic
5. Repair sagging curb flashings on units and around perimeter



# Construction Details

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(East)

## Information

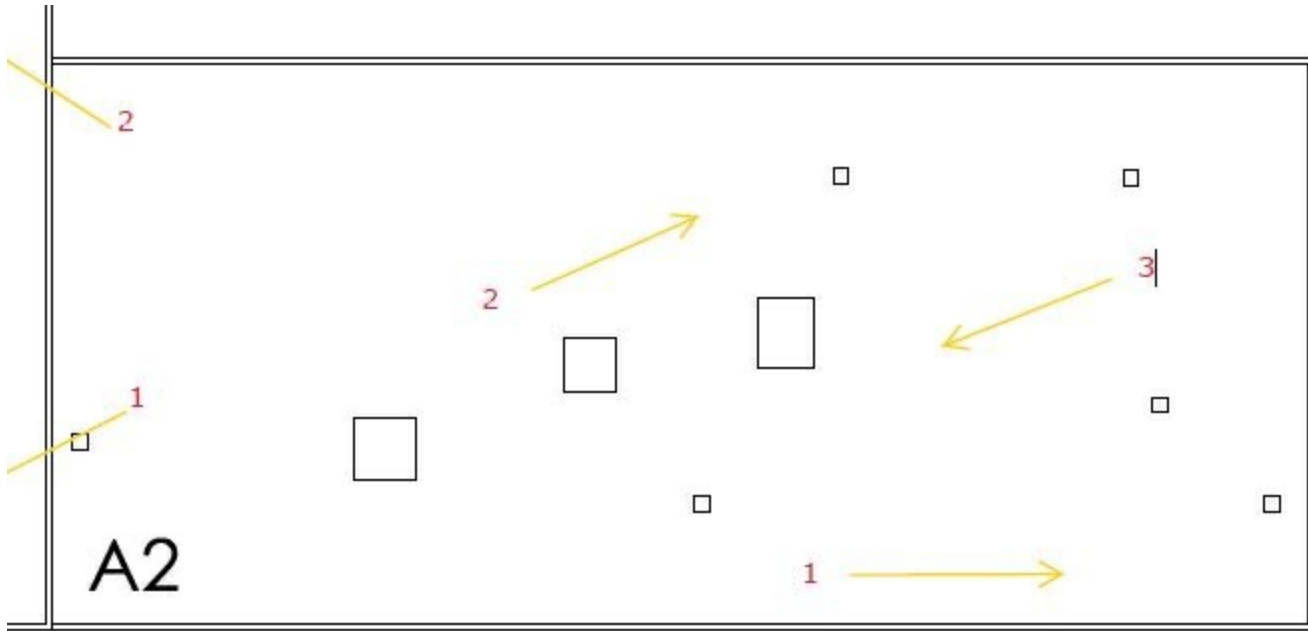
<b>Year Installed</b>	-	<b>Square Footage</b>	17,548
<b>Slope Dimension</b>	0	<b>Eave Height</b>	~25
<b>Roof Access</b>	Attached Ladder	<b>System Type</b>	Mineral Modified Bitumen

## Assembly

Roof #	Layer Type	Description	Attachment	R-Value	Thickness
1	Membrane	Mod Bit - 2 ply mineral surfaced	Torch applied	-	-

## Details

<b>Drain System</b>	Internal Roof Drains
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# Inspection Report

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Report Date:** 05/16/2022

**Roof Section:** Upper Section(East)

## Inspection Information

<b>Inspection Date</b>	05/16/2022	<b>Core Data</b>	No
<b>Inspection Type</b>	Infrared Scan	<b>Leakage</b>	No

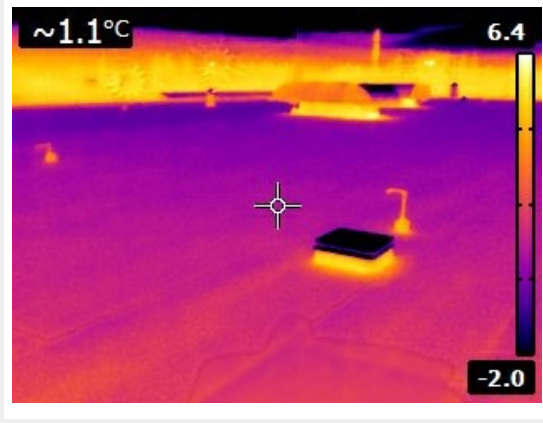
## Overall

<b>Rating</b>	Fair
<b>Condition</b>	No thermal anomaly related to wet insulation was found on this section



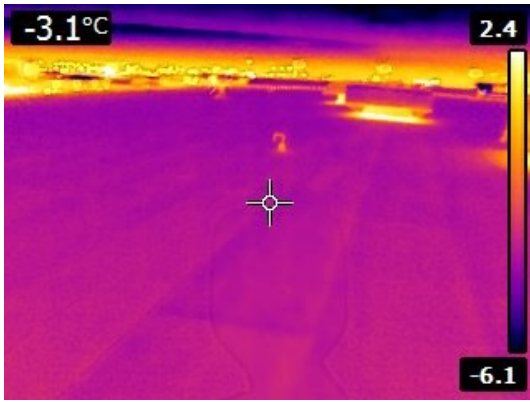
*Photo 1*

General view of section A2 (upper est) with the infrared camera.  
 No thermal anomaly related to wet insulation was found on this section.  
 Accumulation of granules were visible on the perimeters of the roof.



*Photo 2*

General view of section A2 (upper est) with the infrared camera.  
 No thermal anomaly related to wet insulation was found on this section.



*Photo 3*

General view of section A2 (upper est) with the infrared camera.

No thermal anomaly related to wet insulation was found on this section.

HVAC systems were working during our inspection.



# Photo Report

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(East)

**Report Date:** 05/27/2022

**Title:** Initial Inspection



*Photo 1*

**Lower Middle**

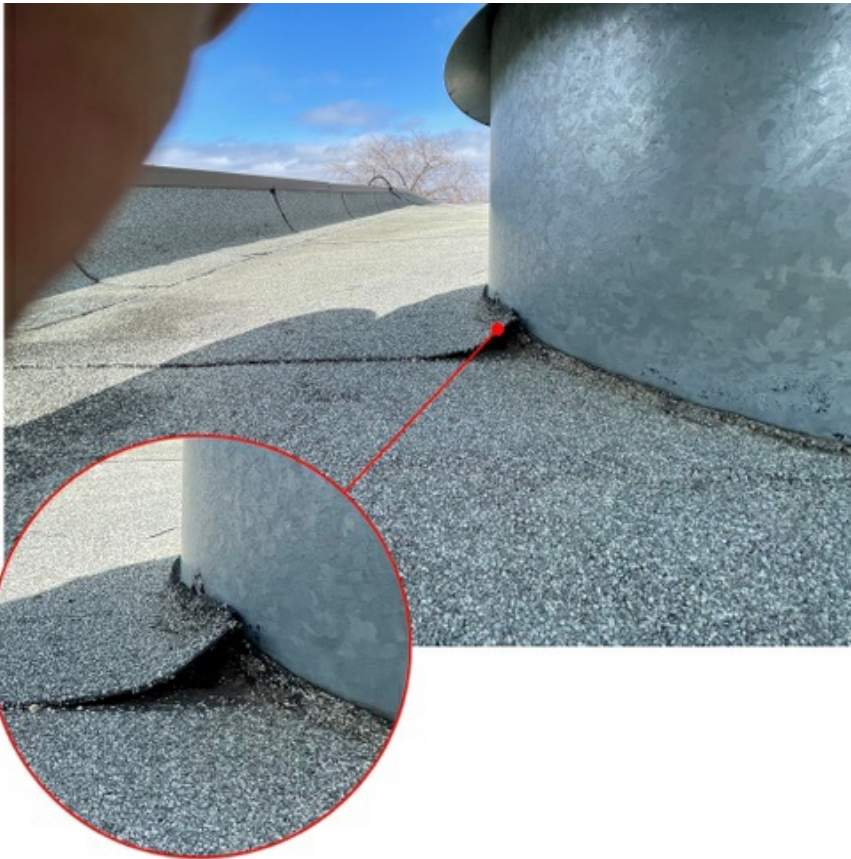
**Section:** Modified Bitumen

**Overall Condition:** Good - Fair

**Scan:** 0% Wet

**CLEAR Analysis:** The 25 year old core samples are from a 2 ply modified roof system with fiberglass felt interplies in an asphalt adhesive. After visual inspection, both cores from the system appear to be in similar condition, implying that both sections of the roof have aged at a similar rate. For this reason, testing values were reported from the East section core. The interplies were very easily delaminated by hand as shown in Figures 12 and 15. Some mineral loss is expressed by exposed asphalt spots on the surface of the core but overall the coverage is still fairly good. The softening point and pen tests show that the asphalt adhesive responsible for keeping the system intact has lost its oils over time, causing the system to become more brittle. The core tested below the recommended tensile strength, but elongation was well

above the recommendation. The sample performed well when undergoing puncture testing, implying that the system can withstand foot traffic and most weather phenomena. Please contact Garland's Technical Team to discuss the best options for these roof systems. The above results are based solely on the core samples examined and may not be representative of the condition of the roof. No representations or warranties are hereby made as to the condition of the roof.



*Photo 2*

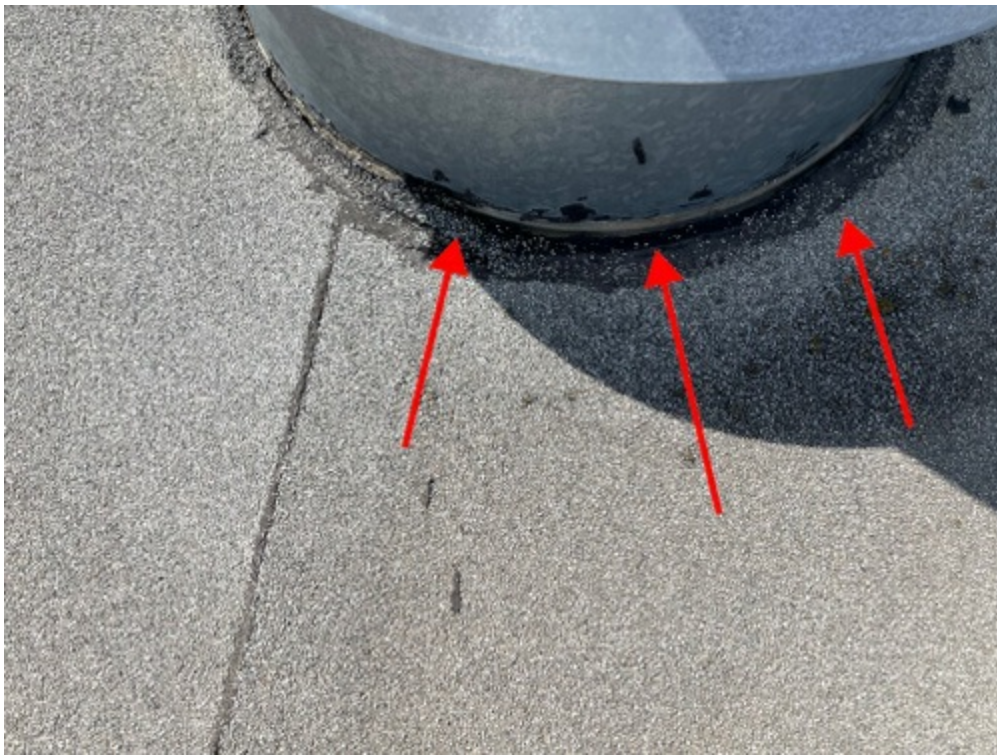
**Fish mouths:** Wrinkles or openings at the edge of the membrane caused by poor adhesion or installation. Fish mouths are a common cause of early failure on 2-ply torch down and single ply roof systems. These systems are prone to workmanship error due to two factors (1) the manual heating/welding of the adhesive, which is very unpredictable for constant heat, and (2) the roof system only consists of 1 to 2 plies, which translates in to a very thin layer of water protection.



*Photo 3*

**Penetration**

**Waterproofing:** Beginning to deteriorate around the perimeter allowing for potential moisture access.



*Photo 4*

**Penetration**

**Waterproofing:** Beginning to deteriorate around the perimeter allowing for potential moisture access.



*Photo 5*

**Ridges:** These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate. Ridges are formed by either thermal changes expanding and contracting the roofing felts or by gaps in the underlying insulation that allow vapor to migrate upwards through the roof system. Over a period of time ridges will grow and erode until they are stripped of their protective asphalt. These exposed ridges, through repeated weather cycling, will eventually crack and split to allow water into the roof system.



*Photo 6*

**Ridges:** These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate.

*Photo 7*

**Ponding:** Ponding water occurs when moisture collects in large pools on the surface of a roof system. These pools begin to form



due to the following: 1) roof drains are blocked or clogged with debris, 2) the insulation package has lost dimensional stability and has reduced in thickness, 3) poor slope to drain design via overbuilt crickets or tapered insulation system, 4) roof drains are built along side building support columns which maintain a consistent height under load while the balance of the roof system is applied over a live deck which tends to move and deflect under normal seasonal load. In all cases, roof depressions that collect and hold water will tend to grow in size as the added weight of the ponding water will continue to deflect the roof deck even further.

This condition can damage the roof in a number of ways. Additional structural loads create more movement of the roof assembly creating more tear stress and of course a potential for structural failure. UV intensity also increases under ponding conditions as the sun's rays are increased to the point where it accelerates deterioration in most all roof systems. In asphalt based assemblies the natural waterproofing oils in the asphalt will separate from the membrane if the system remains submerged under water for sustained periods. Single ply roof system rot and burn out when the ponding area is exposed to sunlight. The added weight can crush insulation increasing the ponding condition and creating a condition where the insulation becomes a useless thermal barrier. This condition then affects the

mechanical system and the cost of heating and cooling the building. In the winter ponding water will expand as it freezes. This expansion will weaken small imperfections in the roof system. Small cracks and tears will widen until they rupture to allow water into the building. And finally, a negatively deflected deck becomes a structural concern.



*Photo 8*

**Ponding:** Ponding water occurs when moisture collects in large pools on the surface of a roof system.



*Photo 9*

**Ponding:** Ponding water occurs when moisture collects in large pools on the surface of a roof system.



*Photo 10*

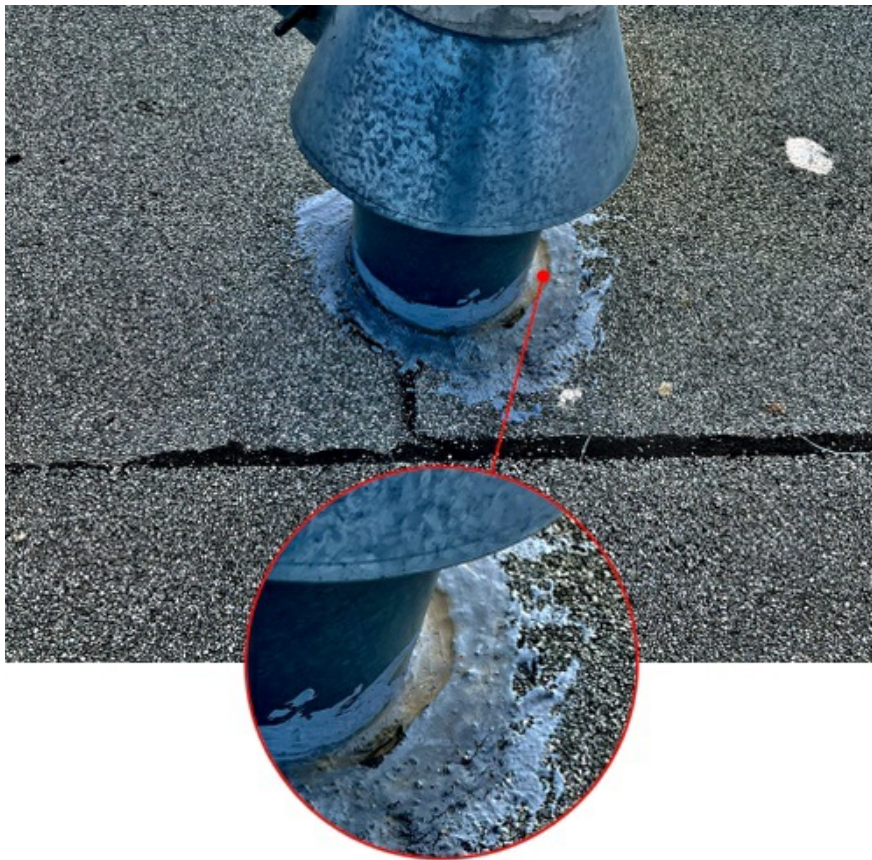
**Pitch Pocket Deterioration:** Metal protrusions that penetrate the roof system to allow conduits to run from the rooftop into the building. Movement from the protrusion can break the waterproofing compound, creating cracks. Over time, the release of solvents from the compound can cause the material to shrink, leaving gaps along the edges of the pan and around structural support. Water can enter through a defective pitch pan and find its way into the interior of the building. Moisture can also penetrate into the roof system leading to premature failure.



*Photo 11*

**Pitch Pocket**

**Deterioration:** Metal protrusions that penetrate the roof system to allow conduits to run from the rooftop into the building. Movement from the protrusion can break the waterproofing compound, creating cracks.



*Photo 12*

**Penetration Waterproofing:** Beginning to deteriorate around the perimeter allowing for potential moisture access.



*Photo 13*

**Ridges:** These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate.



*Photo 14*

**Ridges:** These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate.

*Photo 15*

**CLEAR Analysis:**  
Removal of membrane  
sample.



*Photo 16*

**CLEAR Analysis:** Repair  
of membrane cut.



*Photo 17*

**CLEAR Analysis:**  
Imbedded using granules from perimeter to reinforce mastic repair and protect from UV.






# Solution Options

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(East)

## Maintenance Options

<b>Solution Option:</b>	Maintenance 	<b>Action Year:</b>	2022
<b>Square Footage:</b>	17,548	<b>Expected Life (Years):</b>	3
<b>Budget Range:</b>	\$2,500.00 - \$5,000.00		

### Scope of Work: Routine Maintenance

1. Repair all open fish mouths using high grade mastic reinforced with mesh
2. Re caulk all coping cap seams
3. Fill all pitch pockets using high grade mastic
4. Re seal around all penetrations using high grade mastic
5. Repair sagging curb flashings on units and around perimeter




# Solution Options

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(East)

## Restore Options

<b>Solution Option:</b>	Restore 	<b>Action Year:</b>	2024
<b>Square Footage:</b>	17,548	<b>Expected Life (Years):</b>	20
<b>Budget Range:</b>	\$250,000.00 - \$350,000.00		

### Scope of Work: Full Restoration with 15 year watertight warranty

1. Power wash the entire surface including flashings
2. For the field of the roof and flashings, apply 1.5 gal./100 sq. ft. (24 wet mils) of base coat
3. Embed reinforcement fabric by brushing or rolling into place from the center out.
4. Next, top reinforcement with 1 gal./100 sq. ft. (16 wet mils) Allow to dry for 24-48
5. Finally, apply an additional 2 gal./100 sq. ft. (32 wet mils) to the entire roof by brush, roller or spray.



# Construction Details

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(West)

## Information

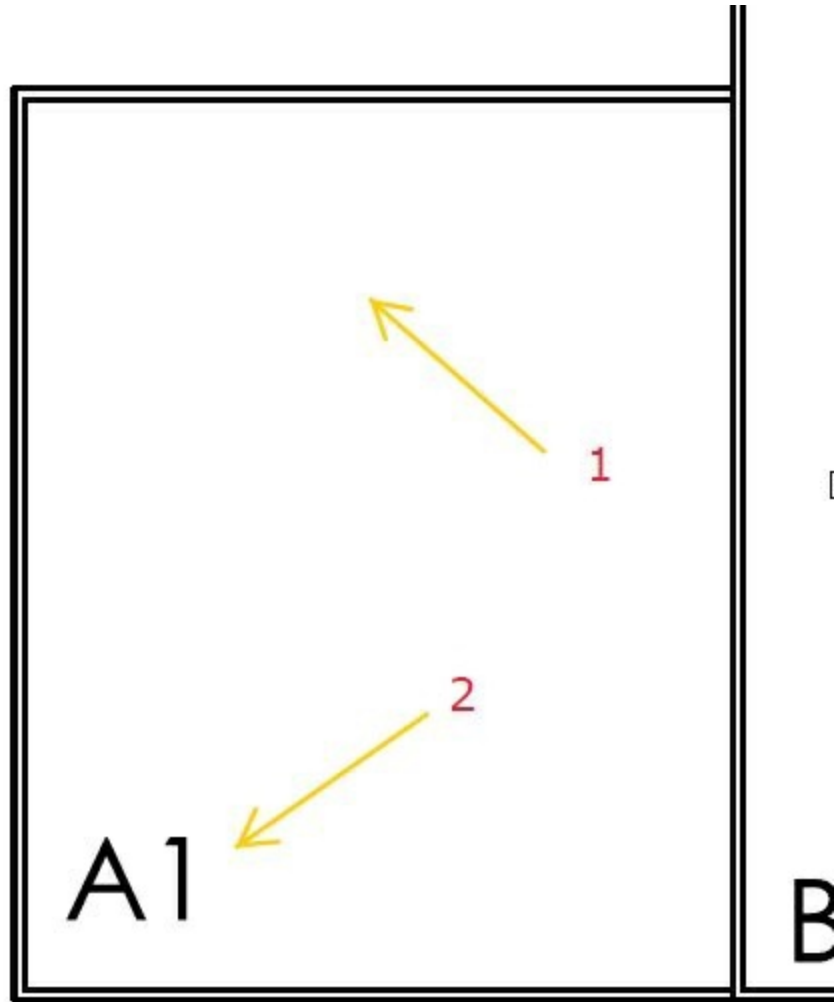
<b>Year Installed</b>	-	<b>Square Footage</b>	6,118
<b>Slope Dimension</b>	0	<b>Eave Height</b>	~25
<b>Roof Access</b>	Attached Ladder	<b>System Type</b>	Modified Bitumen

## Assembly

Roof #	Layer Type	Description	Attachment	R-Value	Thickness
1	Membrane	Mod Bit - 2 ply mineral surfaced	Torch applied	-	-

## Details

<b>Drain System</b>	Internal Roof Drains
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# Inspection Report

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Report Date:** 05/16/2022

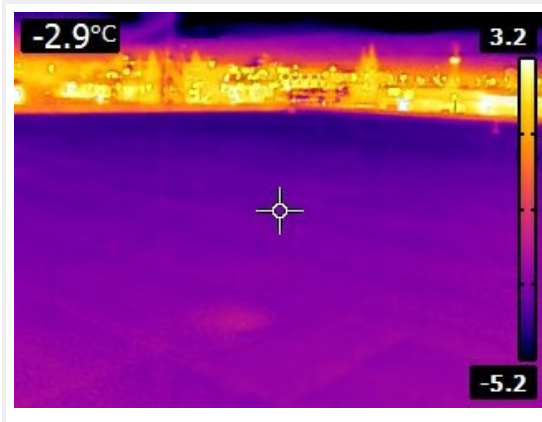
**Roof Section:** Upper Section(West)

## Inspection Information

<b>Inspection Date</b>	05/16/2022	<b>Core Data</b>	No
<b>Inspection Type</b>	Infrared Scan	<b>Leakage</b>	No

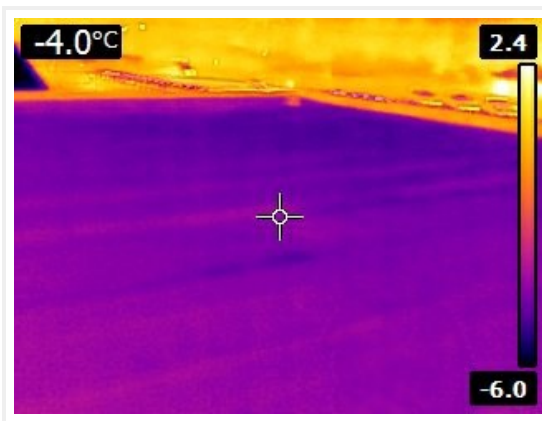
## Overall

<b>Rating</b>	Fair
<b>Condition</b>	No thermal anomaly related to wet insulation was found on this section



*Photo 1*

General view of section A1 (upper west)  
 No thermal anomaly related to wet insulation was found on this section.  
 The thermal patterns are homogeneous.



*Photo 2*

General view of section A1 (upper west)  
 No thermal anomaly related to wet insulation was found on this section.



# Photo Report

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(West)

**Report Date:** 05/27/2022

**Title:** Initial Inspection



*Photo 1*

**Lower Middle Section:** Modified Bitumen

**Overall Condition:** Good - Fair

**Scan:** 0% Wet

**CLEAR Analysis:** The 25 year old core samples are from a 2 ply modified roof system with fiberglass felt interplies in an asphalt adhesive. After visual inspection, both cores from the system appear to be in similar condition, implying that both sections of the roof have aged at a similar rate. For this reason, testing values were reported from the East section core. The interplies were very easily delaminated by hand as shown in Figures 12 and 15. Some mineral loss is expressed by exposed asphalt spots on the surface of the core but overall the coverage is still fairly good. The softening point and pen tests show that the asphalt adhesive responsible for keeping the system intact has lost its oils over time, causing the system to become more brittle. The core tested below the recommended tensile strength, but elongation was well above the recommendation. The sample performed well when undergoing puncture testing, implying that the system can withstand foot traffic and most weather phenomena. Please contact Garland's Technical Team to discuss the best options for these roof systems. The above results are based solely on the core samples examined and may not be representative of the condition of the roof. No representations or warranties are hereby made as to the condition of the roof.



*Photo 2*

**Drains:** Membrane replaced around drains.



*Photo 3*

**Ponding:** Ponding water occurs when moisture collects in large pools on the surface of a roof system. These pools begin to form due to the following: 1) roof drains are blocked or clogged with debris, 2) the insulation package has lost dimensional stability and has reduced in thickness, 3) poor slope to drain design via overbuilt crickets or tapered insulation system, 4) roof drains are built along side building support columns which maintain a consistent height under load while the balance of the roof system is applied over a live deck which tends to move and deflect under normal seasonal load. In all cases, roof depressions that collect and hold water will tend to grow in size as the added weight of the ponding water will continue to deflect the roof deck even further.

This condition can damage the roof in a number of ways. Additional structural loads create more movement of the roof assembly creating more tear stress and of course a potential for structural failure. UV intensity also increases under ponding conditions as the sun's rays are increased to the point where it accelerates deterioration in most all roof systems. In asphalt based assemblies the natural waterproofing oils in the asphalt will separate from the membrane if the system remains submerged under water for sustained periods. Single ply roof system rot and burn out when the ponding area is exposed to sunlight. The added weight can crush insulation increasing the ponding condition and creating a condition where the insulation becomes a useless thermal barrier. This condition then affects the mechanical system and the cost of heating and cooling the building. In the winter ponding water will expand as it freezes. This expansion will weaken small imperfections in the roof system. Small cracks and tears will widen until they rupture to allow water into the building. And finally, a negatively deflected deck becomes a structural concern.



*Photo 4*

**Ridges:** These show up on the surface of built up roofs as linear buckling felt lines protruding upward through the surface layers of asphalt and aggregate. Ridges are formed by either thermal changes expanding and contracting the roofing felts or by gaps in the underlying insulation that allow vapor to migrate upwards through the roof system. Over a period of time ridges will grow and erode until they are stripped of their protective asphalt. These exposed ridges, through repeated weather cycling, will eventually crack and split to allow water into the roof system.



*Photo 5*

**Ponding:** Ponding water occurs when moisture collects in large pools on the surface of a roof system.



*Photo 6*

**Perimeter Flashing Deterioration:** Most roof failures start at perimeter and penetration locations. Perimeter wall flashings can be damaged due to normal seasonal building movement and thermal shock. Additional damage can also be seen from UV degradation as well. At all of these deteriorated or failed points, moisture can gain direct access to the roof system insulation and the buildings interior.



*Photo 7*

**Mineral Roof Granule Deterioration:** It is very common for mineral finished roofs to experience bare felts as early as five years after installation. Manufacturing quality control issues as well as weather "washing off" the factory applied mineral coating causes these areas. Typically this is indicated by accumulations of mineral where ponding is present. Bare felts cause exposure of the membrane to the sun/UV rays, which cause rapid membrane deterioration. Therefore, it is extremely important to coat these areas as soon as they appear.



*Photo 8*

**Mineral Roof Granule Deterioration:** It is very common for mineral finished roofs to experience bare felts as early as five years after installation. Manufacturing quality control issues as well as weather “washing off” the factory applied mineral coating causes these areas. Typically this is indicated by accumulations of mineral where ponding is present. Bare felts cause exposure of the membrane to the sun/UV rays, which cause rapid membrane deterioration. Therefore, it is extremely important to coat these areas as soon as they appear.



*Photo 9*

**Ponding:** Ponding water occurs when moisture collects in large pools on the surface of a roof system. These pools begin to form due to the following: 1) roof drains are blocked or clogged with debris, 2) the insulation package has lost dimensional stability and has reduced in thickness, 3) poor slope to drain design via overbuilt crickets or tapered insulation system, 4) roof drains are built along side building support columns which maintain a consistent height under load while the balance of the roof system is applied over a live deck which tends to move and deflect under normal seasonal load. In all cases, roof depressions that collect and hold water will tend to grow in size as the added weight of the ponding water will continue to deflect the roof deck even further.

This condition can damage the roof in a number of ways. Additional structural loads create more movement of the roof assembly creating more tear stress and of course a potential for structural failure. UV intensity also increases under ponding conditions as the sun’s rays are increased to the point where it accelerates deterioration in most all roof systems. In asphalt based assemblies the natural waterproofing oils in the asphalt will separate from the membrane if the system remains submerged under water for sustained periods. Single ply roof system rot and burn out when the ponding area is exposed to sunlight. The added weight can crush insulation increasing the ponding condition and creating a condition where the insulation becomes a useless thermal barrier. This condition then affects the mechanical system and the cost of heating and cooling the building. In the winter ponding water will expand as it freezes. This expansion will weaken small imperfections in the roof system. Small cracks and tears will widen until they rupture to allow water into the building. And finally, a negatively deflected deck becomes a structural concern.



*Photo 10*

**CLEAR Analysis:** Removal of membrane sample.



*Photo 11*

**CLEAR Analysis:** Repair of membrane sample.



*Photo 12*

**CLEAR Analysis:** Imbedded with granules from perimeter to reinforce and protect against UV.




# Solution Options

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(West)

## Maintenance Options

<b>Solution Option:</b>	Maintenance 	<b>Action Year:</b>	2022
<b>Square Footage:</b>	6,118	<b>Expected Life (Years):</b>	3
<b>Budget Range:</b>	\$2,500.00 - \$5,000.00		

### Scope of Work: Routine Maintenance

1. Repair all open fish mouths using high grade mastic reinforced with mesh
2. Re caulk all coping cap seams
3. Fill all pitch pockets using high grade mastic
4. Re seal around all penetrations using high grade mastic
5. Repair sagging curb flashings on units and around perimeter




# Solution Options

**Client:** City of Prince Albert

**Facility:** Municipal Services Centre

**Roof Section:** Upper Section(West)

## Restore Options

<b>Solution Option:</b>	Restore 	<b>Action Year:</b>	2023
<b>Square Footage:</b>	6,118	<b>Expected Life (Years):</b>	20
<b>Budget Range:</b>	\$110,000.00 - \$135,000.00		

### Scope of Work: Full Restoration with 15 year watertight warranty

1. Power wash the entire surface including flashings
2. For the field of the roof and flashings, apply 1.5 gal./100 sq. ft. (24 wet mils) of base coat
3. Embed reinforcement fabric by brushing or rolling into place from the center out.
4. Next, top reinforcement with 1 gal./100 sq. ft. (16 wet mils) Allow to dry for 24-48
5. Finally, apply an additional 2 gal./100 sq. ft. (32 wet mils) to the entire roof by brush, roller or spray.