REINFORCED AUTOCLAVED AERATED CONCRETE (RAAC) ROOF PANEL ASSESSMENT

FACILITY

Ontario Science Centre Building A – B14175
770 Don Mills Road, North York, ON

PREPARED FOR

Infrastructure Ontario and Ministry of Infrastructure
June 18, 2024

RIMKUS MATTER NUMBER

100237742

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SIGNATURE OF PROFESSIONALS

Rimkus was engaged by Infrastructure Ontario (IO) to confirm the presence and location of Reinforced Autoclaved Aerated Concrete (RAAC) roof panels throughout the Ontario Science Centre Building A and conduct a condition assessment and prepare a report summarizing the documentation review, field observations and providing guidance for proactive remediation and on-going monitoring.

This report was prepared for the exclusive use of Infrastructure Ontario (IO), Ministry of Infrastructure (MOI) and other Governmental Agencies and Ministries to which IO reports and was not intended for any other purpose. Our report was based on field observations, and a review of information publicly available to us at this time. Should additional information become available, we reserve the right to determine the impact, if any, the new information may have on our opinions and conclusions and to revise our opinions and conclusions if necessary and warranted. No other person or organization may rely on this report without expressed written authorization from Rimkus and Infrastructure Ontario. If any of the above limitations conflict with the Agreement, the Agreement governs.

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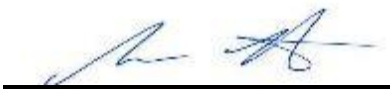

Marc Winters, P.Eng.
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EXECUTIVE SUMMARY

Reinforced Autoclaved Aerated Concrete (RAAC) is a lightweight concrete product which has been shown to have the potential to degrade due to water infiltration. To identify potential risks associated with existing RAAC an investigation of the both the in-situ RAAC roof panels as well as the roofing assembly is required.

Rimkus Consulting Group (Rimkus) was retained by Infrastructure Ontario (IO) to perform a visual condition assessment of all visible individual RAAC roof panels, and all roof assembly components of the Ontario Science Centre Building A located at 770 Don Mills Road, in Toronto, Ontario.

Building A has a total footprint of approximately 66,000 sq. ft. The building was constructed circa 1968 and contains multiple floors and mezzanine areas The roof deck types include RAAC panels, steel deck and conventional reinforced concrete flat slabs. The RAAC panel roof areas have a combined area of approximately 46,000 sq. ft, which is approximately 69% of the total roof area.

Roof assembly condition was observed at most roof areas for our investigation, inclusive of both RAAC panel and other roof deck type areas.

In order to mitigate all risks associated with RAAC it is recommended that all RAAC roof panels be replaced in their entirety with new steel deck in alignment with the next roofing assembly renewal. Given that roof renewal are not required immediately at all areas, the below risk descriptions summarize the interim recommendations, , which are discussed in detail in sections **4.1** and **4.2,** to address the distressed RAAC panels found during the condition assessment. These risk mitigation recommendations are in alignment with the risk category assigned to each RAAC panel assessed. Please refer to the risk category matrix presented in **Table 1** for further details and appended drawing S01 for panel risk category identification and location. The recommended actions and management not only require RAAC panel condition to be considered but to also consider roof assembly and concentration of risk RAAC panels.

Critical Risk (Blue) Panels

- Immediate installation of shoring (reinforcement) for all critical risk panels. These panel locations were identified immediately to the client and the work was previously completed prior to report preparation.
- Shoring to remain in place until panel remediation has been completed.

High Risk (Amber) Panels

- Replacement or reinforcement prior to October 31, 2024. (recommended timeframe)
- Implementation of a Rain/Snow load monitoring plan, refer to the Rimkus document titled ‘Snow Loading & Rainwater Management Plan’ for further details until the remediation has been completed.
- Where remediation cannot be completed within the recommended time frame, then one of the following supplemental risk mitigation options is recommended and should be implemented in conjunction with the snow/load monitoring program.

Option 1: Restricted access or full closure to prevent any persons from walking in areas where high risk panels are present.

Option 2: Installation of temporary shoring (reinforcement) to the underside of RAAC panels.

Option 3: If shoring is not possible, installation of horizontal hoarding near the underside of hard ceiling levels, or other building interferences (sprinkler mains/process piping etc.) which is also considered reinforcement.

- The above three recommended options are listed order of preference, with option 1 completing eliminating the risk to public or staff.

Medium Risk (Yellow) Panels

- Monitor and re-assess annually.

Low Risk (Green) Panels

- Monitor and re-assess at three-year intervals.

Roof replacement or reinforcement would significantly impact the activities that could be undertaken within and near the replacement areas.

RAAC Panels

The RAAC panel investigation was visual only and excluded any intrusive investigation. Panel by panel visual observations of the underside of panel condition were completed and documented. The RAAC panels within roof areas A5 and A6 were concealed by either hard ceiling finishes or concrete soffit panels. The interstitial space between the ceiling/soffit panels and RAAC panels was not accessible at the time of our site visits. Due to timing and impacts to the surrounding area these two RAAC panel areas were excluded from this assessment. It is recommended that these areas undergo investigations when timing and site conditions permit. As such, approximately 28% of the RAAC panels were not reviewed during the site investigation.

Vertical displacements were recorded at select areas where visible mid-span deflection was observed. The *Reinforced Autoclaved Aerated Concrete (RAAC) Investigation and Assignment – Further Guidance,* dated April 2023*,* prepared by the Institution of Structural Engineers, was referenced when establishing the assessment review protocol and determining risk level of the RAAC panels. The Institution of Structural Engineers and the Study Group which prepared this guide were based out of the United Kingdom. Signs of moisture ingress, field modifications, deflections, cracking and spalling were all considered when assessing risk level. A colour coding scheme was utilized and is annotated on drawing S01 in Attachment A and summarized as follows:

- Blue shading represents critical risk requiring immediate shoring (reinforcement) or panel replacement.
- Amber represents high risk requiring replacement or reinforcement prior to October 31, 2024
- Yellow represents medium risk requiring annual reassessment.
- Green represents low risk requiring reassessment at three-year intervals.

The overall RAAC panel risk level classifications based on Rimkus' investigation can be summarized as follows:

- One panel in total was placed in the critical risk (blue) category.
- Approximately 6% of the roof panels within the combined RAAC panel roof areas (approximately 2,000 sq ft) were placed into the high risk (amber) category.
- Approximately 9% of the reviewed RAAC panels were placed into the medium risk level (yellow) category.
- The remaining RAAC panels, around 84%, were placed in the low risk level (green) category.

The percentage of RAAC panels is only one indicator of next steps, as indicated above, the related roof assembly and concentration of RAAC panels requiring work also contribute to the useful life of these roofs.

The majority of the panel anomalies were the result of water ingress through the roof assembly. RAAC panel field modifications were also observed at many locations. The field modifications included unreinforced openings to facilitate localized roof penetrations. Both water ingress and unreinforced field modifications have permanently reduced the load carrying capacity of the RAAC panels. As such, the compromised panels have been functioning with a reduced factor of safety, when compared to the original design intent. A significant snow or rain loading occurrence could exceed the reduced load carrying capacity of the distressed panels, placing them at an increased risk of sudden collapse.

RAAC panel remediation recommendations and associated budgets for panels within the high-risk category, are summarized in **Table 7** of section 4.1. These panel reinforcements are recommended to be completed by October 31, 2024. On-going reassessment recommendations and associated budgets for the medium and low risk categories are presented in **Table 10** of section 4.2. Costs provided are for construction only, including materials and labour, and exclude applicable taxes, consulting fees, construction contingencies designated, substance survey (DSS) investigations and/or unknown site conditions.

Year	***RAAC Panel Recommendations***	***Budget Cost***
2024	Localized RAAC panel reinforcement at amber (high) risk category locations	$165,000
2025	Reassessment of RAAC panels identified as yellow (medium) risk category	$10,000
2026	Reassessment of RAAC panels identified as yellow (medium) risk category	$10,500
2027	Reassessment of all RAAC panels within facility	$45,000
2028	Reassessment of RAAC panels identified as yellow (medium) risk category	$11,500
2029	Reassessment of RAAC panels identified as yellow (medium) risk category	$12,000

Roofing & RAAC Panels

As was the methodology for the RAAC panel assessment, the roofing assembly evaluation was visual only and excluded any intrusive investigation. The roofing assembly was observed to be a conventional built-up roof system at all roof areas. As anticipated given the size of the facility, roof replacement has been completed under separate phases. As such, roof condition and anticipated remaining service life varied for each roof area. The roof assembly for the OMNIMAX dome and adjacent flat roof areas, constructed as part of the 1995 addition, were not reviewed. In addition, roof area A8 was not accessible at the time of the site review, it is assumed to be of the same construction areas A7. Roof areas A1, A4, A6a and A7 were assessed to be in fair condition with a serviceable life expectancy of five to 10 years. Roof Areas A2, A3, A5 and A6 were also assessed to be in fair condition however the required replacement of the RAAC panels will require removal of the existing waterproofing system to complete RAAC panel replacement.

Localized roof assembly maintenance repairs recommendations and associated budgets are presented in **Table 7** of section 4.1. Various maintenance type repairs are recommended for 2024 including sealant repairs at pitch pockets, and continual review and removal of debris at roof drains etc.

It is recommended to always replace RAAC panels at the time of the next scheduled roof assembly replacement. Anticipated remaining life expectancy and budgets for the recommended roof assembly & RAAC panel (where applicable) replacements by roof area, is presented in **Table 8**.

The budgetary costs for recommended roof assembly maintenance and roof & RAAC replacement (**Table 9**) is summarized below. Costs provided are for construction only, including materials and labour, and exclude applicable taxes, consulting fees, construction contingencies designated, substance survey (DSS) investigations and/or unknown site conditions.

Recommended Year	***Roof Assembly & RAAC Recommendation***	***Budget Cost***
2024	Roof Maintenance & Roof Assembly & RAAC Replacement	$3,864,600
2029-2034	Roof Assembly & RAAC Replacement	$1,955,400

1. INTRODUCTION

1.1 RAAC Background

Reinforced Autoclaved Aerated Concrete, also known as RAAC, has raised concern amongst building managers and owners worldwide, due to structural issues associated with public buildings in the United Kingdom. RAAC can be considered a generic product that was produced primarily in the United Kingdom, Europe, and North America under various trade names such as Siporex, Durox, Celcon, Hebel, and Ytong.

Siporex was a popular choice as a structural material in educational, institutional, and industrial buildings in Ontario from the mid-1950's to the mid-1970's. It was primarily used for wall panels and as planks or panels for flat roofs and floors. Panels could span up to lengths of 6.1 m (20 ft) between supporting structures. Siporex was produced in Canada by Domtar in their facility in Delson, Quebec from 1955 to 1972 and was the only proprietary brand of RAAC sold into the Ontario market.

Siporex at the time was a "go to" product as it was marketed as a lightweight material that in addition to its structural properties had excellent thermal insulation characteristics, functioned as a sound and fire barrier, provided an attractive finished ceiling, and worked well as a flooring or roofing substrate. It boasted versatile design, long economical spans, and a rapid controllable construction rate.

The term Autoclaved Aerated Concrete (AAC) is a slight misnomer in that AAC is not concrete in its constituent material or its physical properties. AAC was however, treated like concrete in its design and as such followed the Canadian Standards Association and American Concrete Institute specifications as well as the National Building Code of Canada and the Ontario Building Code which were current at the time. Structural steel reinforcing was added to AAC in the moulding process to create Reinforced Autoclaved Aerated Concrete (RAAC) products.

Reinforced Autoclaved Aerated Concrete:

An aerated blend of sand, Portland cement and aluminum powder. During the curing process the aluminum powder reacts with the lime constituents in the cement along with water creating hydrogen gas. This gas forms small air bubbles in the mixture resulting in a lightweight and relatively uniformly porous structure.

The Siporex product used conventionally placed reinforcing steel, for both tension and compression, along with transverse bars and was not prestressed. The transverse bars were not strategically placed for bearing strength but were used to form a reinforcing cage primarily for production purposes.

The slurry produced in the mixing process is poured into moulds. Once the mass has started to harden it is wire cut into blocks or slabs.

The slabs then undergo an autoclaving process that involves the curing of the material in high pressure steam chambers after they have been moulded and cut into the desired shape. The

combination of heat and pressure minimizes shrinkage and expedites the curing process of the material.

As a building material, RAAC has an overall reduced robustness compared to steel decks or traditional concrete, making it more susceptible to damage from impact and raising the risk of sudden failure. In general, the lifespan of RAAC panels is lower in comparison to other common roof deck types, including steel decks or traditional precast concrete panels.

Owners and facility managers are often not aware of the problems associated with their facility until there is physical evidence of a failure or deterioration is discovered during a roof system replacement project. Consequently, roof assemblies constructed with RAAC panels require closer monitoring by facility maintenance staff, and more frequent assessments for both the roofing assembly and RAAC panels.

Deficiencies developed over time in RAAC products installed in existing buildings pose an escalating risk for future failure, if subjected to on-going moisture ingress. If continual deterioration of the panels is allowed to occur, it poses an increasing likelihood of RAAC failure. The consequences of RAAC failure include potential building damage and risk to public safety.

In Ontario, the initial step for identifying whether RAAC panels exist is to determine the year of construction. Buildings built before 1955 and after 1975 are unlikely candidates, as RAAC product was not readily available outside of this timeframe. The second step would be visible observations once the top surface of underside of the roof deck is exposed. RAAC panels are light grey or off white in colour. If any spalled sections are observed, the inner surface of the panel will appear bubbly and will have no stones or aggregate present. RAAC panels supplied in Ontario were always 457mm (18”) in width and having spans up to 6.1m (20 ft).

Further background information on RAAC panel risks and management strategies can be found in the white paper produced by the Rimkus Consulting Group, titled *Understanding the Historic Use of Reinforced Autoclaved Aerated Concrete (RAAC) in building construction in Ontario*, dated May 25, 2024.

1.2 Scope of Work and Methodology

Rimkus completed a panel by panel visual assessment of all accessible RAAC roof panels within the facility. As the durability and lifespan of RAAC panels is heavily dependent upon the extent of moisture ingress, Rimkus’ scope of work also included a roof assembly condition assessment for all roof areas of building A. The investigation was completed by members of our structural engineering and roof consulting teams during multiple visits completed between December 6, 2023 and March 26, 2024.

The investigation of the RAAC panels was visual and excluded any intrusive investigation of the panels themselves. The panels were reviewed from the underside only. The interstitial space between the ceiling/soffit level and RAAC panels at roof areas A5 and A6 was inaccessible. Due to the laborious, obtrusive construction requirements, and costly efforts required to create access to view the RAAC panels at these roof areas, they were not reviewed as part of this initial assessment but this area is recommended for future assessments. Remediation recommendations provided within the report, for the inaccessible RAAC panel areas, were based on the observed RAAC panel conditions at the adjacent roof areas A2 and A3.

For each RAAC panel identified with anomalies, remediation or further monitoring recommendations are provided, along with a timeline and budgetary costs. For RAAC panels requiring immediate attention, the client and facility management were advised on the day of the site visit.

Photographs were taken during the field investigation and are presented within Attachment A of this report.

1.3 RAAC Risk Assessment

Site survey information was utilized to establish a risk classification system for the RAAC panels within the surveyed building. The BAYG (Blue, Amber, Yellow, Green) rating scale has been developed to help with this assessment, as described in **Table 1**.

Table 1 - Risk Classification Table

Risk Level	***Recommended Measures***
Blue – Critical Risk	Immediate restriction of access to occupied spaces below the RAAC panels followed by installation of shoring or replacement/reinforcement of the affected panels.
Amber – High Risk	Replacement or secondary support prior to the next major loading event. In Ontario, gravity snow loading is the governing load for most roof systems. As such, a date of October 31st in the same calendar year of assessment has been suggested as a target for completion of the work.
Yellow – Medium Risk	Annual reassessment required.
Green – Low Risk	Reassessment at three-year intervals.

Field modifications to the RAAC panels and water ingress were two key factors when determining level of risk.

The first step in risk level determination was to carefully review for field modifications made to accommodate duct penetrations or field cut panels supported by adjacent panels. Longitudinal rebar spacing for Siporex panels could fall within the 51 mm to 76 mm (2” to 3”) range. As an example, for a 152 mm (6”) diameter field cored penetration with a 76 mm (3”) rebar spacing, at least one rebar would have been field cut resulting in around a 20% reduction in flexural strength capacity. This would be a best-case scenario, there is also a possibility that two rebars would have been field cut resulting in a further reduction in bending capacity. This may not be a concern if the core location is not at the panel mid-span. However, there is also a risk if the core is located close to the support where cross sectional shear strength becomes more critical. This field panel penetrations were evaluated on a situational basis, as both core size and location along the span were key factors when assessing the level of risk.

The second step was visible observation and documentation for signs of water ingress. If no water ingress or staining was observed, **Table 2** was applied as a guide. If water staining was evident, then **Table 3** was used as a reference guide. These risk assessment guidelines follow a

slightly modified form of the recommendations contained within the Institute of Structural Engineers' RAAC assessment guidelines:

Table 2 – No Water Ingress Observed

Panel Mid-Span Vertical Deflection Δ_y	***Major Cracking/ Spalling Observed***	***Minor Cracking/ Spalling Observed Within 500 mm of Support***	***Minor Cracking/ Spalling Observed Further Than 500mm from Support***	***No Anomalies Observed***
Δ_y > span/100	Blue	Blue	Blue	Amber
span/100 < Δy < span/200	Blue	Amber	Yellow	Yellow
Δ_y < span/200	Amber	Yellow	Green	Green

Table 3 - Water Ingress Observed

Panel Mid-Span Vertical Deflection Δ_y	***Major Cracking/ Spalling Observed***	***Minor Cracking/ Spalling Observed Within 500mm of Support***	***Minor Cracking/ Spalling Observed further than 500mm from Support***	***No Anomalies Observed***
Δ_y > span/100	Blue	Blue	Blue	Blue
span/100 < Δ_y < span/200	Blue	Amber	Amber	Amber
Δ_y < span/200	Blue	Amber	Yellow	Yellow

The guidelines presented in the preceding tables are based solely on panel condition, signs of water ingress, and mid-span deflections, and do not consider any field modifications that may have been undertaken. If panels were observed to be in poor condition and have been field modified to accommodate roof penetrations, then all factors were carefully considered by the reviewing Engineer on site, when determining risk level.

1.4 Budgetary Costing

Based on the site survey information, select roofing assembly-RAAC panel replacement, or RAAC panel reinforcement remediation is recommended or required. For budgetary planning purposes, a +/-25% variance should be allocated to estimated costs provided in Section 4. It should be noted

that in preparing the budgets for individual items, it has been assumed that all recommended 2024 RAAC panel remediation would be completed under one project.

The cost of repairs is based upon the deterioration present at the time of the investigation and average current unit prices obtained from our experience on similar projects. It is important to realize that the prices are in current dollars and not based on tendered specifications, but instead on general approaches and assumed quantities. The actual repair costs will depend on the prices received at the time of competitive bid soliciting and/or the actual quantities established during the repair contract.

Costs provided are for construction only, including materials and labour. Please note that the listed prices do not include applicable taxes or engineering fees associated with the preparation of specifications, and review for conformance with the same. The costs provided also do not include for delivery nor contingency costs.

2. DOCUMENTATION & DRAWING REVIEW

To assist Rimkus in further understanding the roof deck/panel construction type, and roofing assembly condition and replacement history within the various roof areas, IO has provided the following documentation for reference and review:

1. Structural remediation drawings S1 to S4, prepared by the *Ontario Ministry of Government Services*, dated April 1991.

2. Structural renovation drawings S001 to S003, S206, prepared by *Yolles Partnership Inc*., dated November 1995.

3. Roof plan drawing A200 prepared by *Halcrow Yolles*, drawing issued as part of a 'Record Drawings' set, dated June 2008.

4. Base Building Assessment Report (BBAR) dated November 23, 2020.

The 1991 *Ontario Ministry of Government Services* drawings have identified that the roof structure consists of 10 feet long RAAC panels supported by precast concrete beams. The concrete beams span the building width in the east-west direction and are cantilevered on both the east and west sides for the length of the building. The canopy soffit/fascia for the cantilevered roof portions were constructed with precast concrete panels. The west portion of the canopy extend over the pedestrian bridge and into the ravine.

The 1995 *Yolles Partnership Inc*. drawings were prepared for the construction of the OMNIMAX theatre and entrance area addition on the east side of the building. As part of this building addition project, a portion of the original roof RAAC panels were to be removed and replaced with steel deck due to the additional snow drifting from the new/higher adjacent roof.

The 2008 *Halcrow Yolles* drawings have identified the existing roof deck/panel type for roof areas A4, A6a and A8. These drawings indicate two types of roof deck construction for the 3 roof areas, including steel deck and conventional reinforced concrete roof decks.

The 2020 BBAR has indicated that the roof assembly was last replaced circa 2012 and is due for replacement by 2037.

3. SITE OBSERVATIONS

3.1 General Observations

Building A has a total footprint of approximately 66,000 sq. ft. The complex's main mechanical / electrical service room areas are located on the north and south ends of the facility and these areas service Building B and Building C. The OMNIMAX theatre and entrance area addition are positioned on the east side of the facility. Since the time of the original construction, the area below the canopy soffit panels have been infilled with a curtain wall system along the east side of the building only. The concrete soffit panels were not removed as part of the curtain wall infill project. Along the building's west side, the area below the concrete soffit panels was not infilled and remains as a building 'canopy' area extending over the pedestrian bridge and ravine. The southern region of the building is single story, whereas a second level floor extends from the OMNIMAX area to the north end of the building below the central (non-cantilevered) portion of the roof. The cantilevered roof exists on both the east and west side of the building. The west side of the building extends over the pedestrian bridge which is currently closed and a ravine.

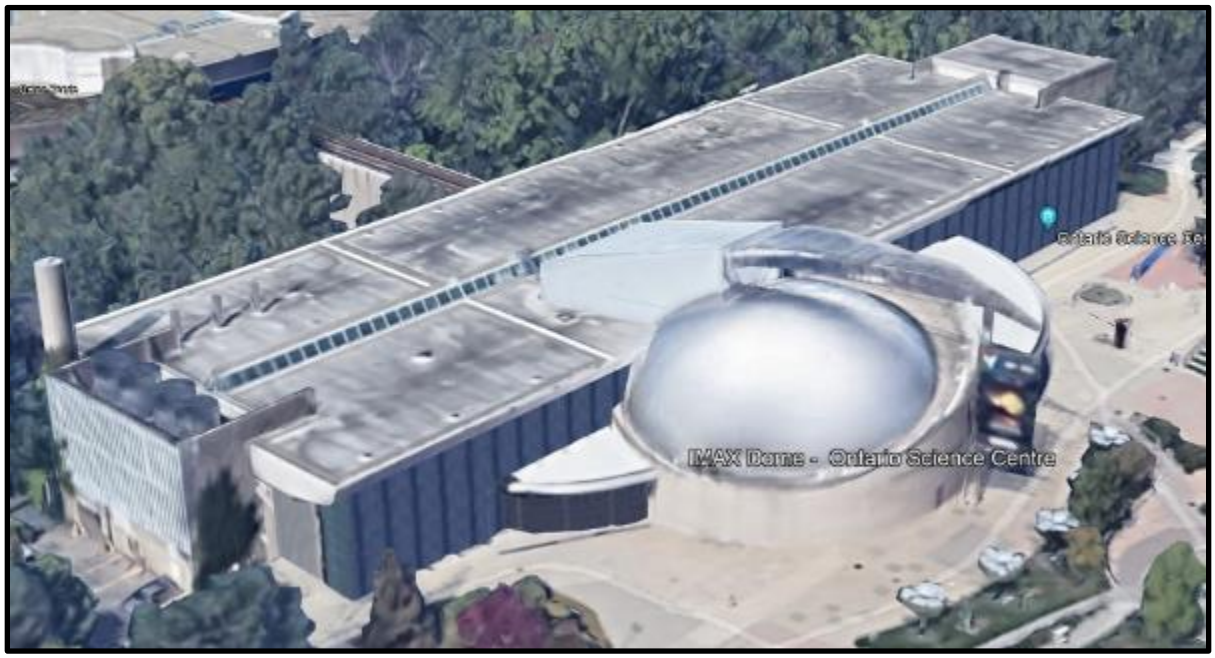


Figure 1 – Building A aerial view (image obtained from Google Earth)

The original building was constructed circa 1968. The superstructure incorporated conventional concrete precast concrete beams supporting the RAAC panels. The roof RAAC panel spans were noted to be 10 feet in length. Other roof areas were observed to be poured in place reinforced concrete flat slabs.

Overall, the roof deck construction types observed on site appeared to be in general agreement with the information provided on the 1991 *Ontario Ministry of Government Services* structural drawings, and the 1995 *Yolles Partnership Inc*. structural drawings. The observed deck construction types are presented for each roof area in section 3.2.

3.2 Roof Deck Type Determination

Roof areas were site reviewed from the underside to establish and confirm the roof deck/panel construction material, the results are shown below in **Table 4.** The various roof areas are shown on the Rimkus roof plan drawing included in **Appendix B**.

Table 4 – Roof Deck Types

Roof Area	***Confirmed Roof Deck Type***
A1	RAAC Panels
A2	RAAC Panels
A3	RAAC Panels
A4	Concrete Slab
A5	RAAC Panels
A6	RAAC Panels
A6a	Steel Deck
A7	RAAC Panels
A8	Concrete Slab

The RAAC panel roof areas have a total combined area of approximately 46,000 sq. ft which is around 69% of the total roof area.

3.3 RAAC Panel Observations

As the scope of work for this assessment was concerned solely with the RAAC panel condition, the other roof deck types will not be further discussed within this report.

The majority of the panel anomalies were the result of water ingress through the roof assembly or at roof penetration s. Water ingress can adversely impact the material strength and increase the likelihood of corrosion to the reinforcing steel. At locations where the water ingress has been addressed, the RAAC panels remain permanently compromised, as the load carrying capacity has reduced, placing the panels at higher risk.

RAAC panel field modifications were observed at many locations in order to accommodate roof penetrations. As the panels are 18” in width, and reinforcing bar spacing at select panel locations was visible and observed to be around 3” to 4”, any opening 2” or more in diameter has likely resulted in termination of at least one reinforcing bar, thereby reducing its load carrying capacity.

At most areas, no localized framing support had been installed at the field modified locations to transfer loading back to the RAAC panel supporting steel framing members.

Both water ingress and unreinforced field modifications have permanently reduced the load carrying capacity of the RAAC panels. Consequently, the compromised panels have been functioning with a reduced factor of safety, when compared to the original design intent. The factor of safety is defined as the applied loading divided by the load carrying capacity. If the applied loading exceeds the capacity, this results in a factor of safety less than one and a theoretical RAAC panel failure. For the compromised panels, a significant roof loading occurrence has potential to result in a factor safety of less than one, and RAAC panel failure. The RAAC panel load carrying capacity is directly proportional to observed anomalies and the risk category determination. The critical and high-risk panels have undergone the most significant loss in load carrying capacity and are at increased risk of sudden collapse.

Table 5 The RAAC panel observations are summarized in **Table 5.** All photographs referenced within the observation comments are included in **Attachment A**. The repair locations within each roof area are shown on the Rimkus roof plan drawing appended in **Attachment B. – RAAC Panel Observations**

Roof Area	***Observations***
A1	**General** - RAAC panels in good to fair overall condition - Some panels fall within the yellow and amber risk categories - Observed anomalies include moderate to excessive moisture staining; spalling and exposed reinforcement bars; unreinforced field modifications - Approximately 20 RAAC panels in total had been replaced with steel decking at two locations (**Photograph 1**)
A1	**Repair Location A1.1** - Spalling and exposed reinforcing bars close to support (**Photograph 2**)
A1	**Repair Location A1.2; A1.4** - Unreinforced field modifications at roof canopy vent locations (**Photographs 3 & 4**)
A1	**Repair Location A1.3** - Excessive moisture staining
A1	**Repair Location A1.5** - Unreinforced field modification (**Photograph 5**)
A1	**Repair Location A1.6** - Unreinforced field modification at vent location

Roof Area	*Observations*
A2	**General** - RAAC panels in poor overall condition - Several panels fall within the yellow and amber risk categories - Approximately 4 RAAC panels in total had been replaced with steel decking at one location - Spalling observed and exposed rebar observed (**Photograph 6)** - Unreinforced field modifications observed at numerous locations (**Photograph 7**) - Excessive water staining at unreinforced field modifications observed at a few locations. (**Photograph 8**) Unreinforced roof penetrations observed at numerous locations - Excessive water staining observed close at supporting concrete beam at one location (**Photograph 9**) - Wood framing had been installed to provide support to approximately four distressed RAAC panels, however the upper wood framing member was not in contact with the underside of the panels (**Photographs 10 and 11**)
A3	**General** - RAAC panels in fair to poor overall condition - Several panels fall within the yellow and amber risk categories - Visible displacement relative to adjacent panels observed at a few location (**Photograph 12**) - Unreinforced field modifications and moisture staining observed at numerous locations (**Photograph 13**) - Unreinforced field modifications at roof penetrations noted at several locations (**Photograph 14**)
A5	- RAAC panels not reviewed - Interstitial space between soffit/ceiling level and RAAC panels not accessible
A6	- RAAC panels not reviewed - Interstitial space between soffit/ceiling level and RAAC panels not accessible
A7	**General** - RAAC panels in good to fair overall condition - Some panels fall within the yellow and amber risk categories - One panel was placed in the blue risk category - Observed anomalies include moderate to excessive moisture staining; spalling and exposed reinforcement bars; unreinforced field modifications; notable displacement relative to adjacent panels - Approximately 24 RAAC panels in total had been replaced with steel decking at four locations
A7	**Repair Location A7.1** - Excessive moisture staining and unreinforced field modification

Roof Area	*Observations*
A7	**Repair Location A7.2 & A7.4** - Excessive moisture staining
A7	**Repair Location A7.3** - Spalling and visible deflection relative to adjacent panels, noted at unreinforced field modification for canopy vent (**Photographs 15 & 16)**
A7	**Repair Location A7.5** - Unreinforced field modification (**Photograph 17**)

3.4 Roof Assembly Observations

The scope of work for this assessment included a visual review of the roof assembly, for both RAAC and non RAAC roof areas of the original building roof areas. The roof assembly for the OMNIMAX dome and adjacent flat roof areas, constructed as part of the 1995 addition, were not reviewed. Furthermore, roof area A8 was not accessible at the time of the site review. The existing conditions and noted deficiencies are summarized in **Table 6**. All photographs referenced within the observation comments are included in Attachment A.

Table 6 – Roof Assembly Observations

Roof Area	*Observations*
A1	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years (**Photograph 18**) - minor sealant deficiency at stack supports and wall flashings was noted. - Exposed opening at the top of the spun aluminum tall cones for exhaust stacks. Possible water migration into the roof system
A1	**Repair Location A1** - Sealant deficiency at stack supports (**Photograph 19**) - Opening at the top of the spun aluminum tall cones (**Photograph 20**)
A2	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years. (**Photograph 21**) - Broken gas line support on the north end of Roof area A2 - Ponding water observed close to the centre of a roof area A2 - Excessive algae growth was observed on the north end of roof area A2 - The existing roof drain at the north end of roof area A2 is partially plugged with organic debris - Large amount of organic debris gathered at the expansion joint between roof areas A2 and A3

Roof Area	*Observations*
A2	**Repair Location A2** - Repair broken gas line support on the north end of Roof area A2 (**Photograph 22**) - Remove excessive algae growth on the north end of roof area. (**Photograph 23**) - Remove organic debris from roof drain at the north end of roof area A2. (**Photograph 24**) - Remove organic debris from expansion joint between roof areas A2 and A3. (**Photograph 25**)
A3	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years (**Photograph 26**) - Very low termination at the louvered grate located on the north end of Roof area A3, possibility for water migration into the existing roof system - Organic debris observed at the north end of roof area A3 - Minor algae accumulation at the north end of Roof area A3 - Area of deteriorated sealant, possibility of water migration into the existing roof system at the north end of roof area A3
A3	**Repair Location A3** - Remove organic debris observed at the north end of roof area A3. (**Photograph 27**) - Remove minor algae accumulation at the north end of Roof area A3 (**Photograph 28**) - Remove and replace area of deteriorated sealant at the north end of roof area A3 (**Photograph 29**)
A4	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years. (**Photograph 30**) - Sealant deficiency at reglet possible source of water migration into roof system - Minor organic debris accumulated at the existing roof drain
A4	**Repair Location A4** - Remove and replace Sealant deficiency at reglet (**Photograph 31**) - Remove minor organic debris accumulated at the existing roof drain (**Photograph 32**)

Roof Area	*Observations*
A5	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years (**Photograph 33**) - Questionable termination of the existing roof membrane occurring under the poured in place concrete wall on the north end of Roof area A5 - Poured in place concrete wall at the north end of Roof area A5 requires further structural review - Minor accumulation of organic debris at roof drain located on the north end of roof area A5 - Minor bare Felts, located at the roof drain in the centre of roof area A5 - Accumulation of organic debris between the skylight and concrete paver walkway also observed minor growth of moss at the skylight transition
A5	**Repair Location A5** - Remove minor accumulation of organic debris at roof drain located on the north end of roof area A5 (**Photograph 34**) - Repair minor bare felts, located at the roof drain in the centre of roof area A5. (**Photograph 35**) - Remove accumulation of organic debris between the skylight and concrete paver walkway (**Photograph 36**)
A6	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years (**Photograph 37**) - Areas of ponding water were observed on the south end of Roof area A6
A6a	**General** - The existing roofing assembly is considered to be in fair condition. With an expected serviceable life of 5 to 10 years (**Photograph 38**) - Minor depression in the existing membrane at the entrance to the mechanical room - Patio stone on roof area A6a appears to have been left on the roof area. No existing membrane protection under the existing patio stone - Exposed Felts directly west of the mechanical room - Openings in metal cladding on the southside wall of roof area A6A.
A6a	**Repair Location A6a** - Repair minor depression in the existing membrane at the entrance to the mechanical room. Install membrane protection under the existing patio stone (**Photograph 39**) - Repair area of exposed felt directly west of the mechanical room (**Photograph 40**) - Repair openings in metal cladding on the southside wall of roof area A6A (**Photograph 41**)

Roof Area	*Observations*
A7	**General** - The existing roofing assembly is considered to be in fair condition, with an expected serviceable life of 5 to 10 years (**Photograph 42**) - Minor algae are located at the south drain - Minor blisters located at the south A7
A7	**Repair Location A7** - Remove minor algae accumulation located at the south drain. (**Photograph 43**) - Repair minor blister located at the south A7 (**Photograph 44**)
A8	**General** - Roof area A8 was not accessible at the time of the site review

4. RECOMMENDATIONS

4.1 RAAC Panel and Roof Assembly Remediation Strategies

To completely mitigate all risk associated with RAAC it is recommended that all RAAC roof panels be replaced with new steel deck in alignment with the next roofing assembly renewal.

Specifically, and as outlined in **Table 1**, RAAC panels classified in the blue (critical) risk level require immediate action, and panels identified as falling within the amber (high) risk category require remedial work prior to the next snow season.

The recommended remediation procedure for the isolated RAAC repair locations discussed on **Table 5** and illustrated on the Rimkus roof plan in **Attachment B** are summarized in **Table 7**. Repair location A7.3 fell within the blue (critical) risk category and required immediate remediation. Temporary shoring was installed immediately to support the distressed panel. All other repair locations presented in **Table 7** fall within the amber risk category and require remediation prior to October 31, 2024.

Two repair strategies were considered for remediation for RAAC panels within the blue or amber risk categories. Localized roof assembly and RAAC panel removal and replacement with a new roof assembly and corrugated steel deck is one strategy and observed to already be implemented at isolated locations on roof areas A1, A2 and A7. A second strategy would be to maintain the existing roof assembly and distressed RAAC panels which are reinforced with new steel stud or engineered wood framing from below. The new framing supports would be framed into the supporting precast concrete beams, thereby significantly reducing the bending and shear forces within the panel. The reinforcement strategy should be feasible at all localized amber panel areas. Accessibility to either the rooftop or underside of RAAC panels, and costs were both considered when providing the recommended remediation strategies presented in **Tables 7 & 8**. It is Rimkus' recommendation to address all 2024 localized RAAC panel repair (amber risk) locations as a single project. As such, it is our opinion that the most cost-effective strategy would be a consistent repair approach. Localized panel reinforcement is considered to be the most cost effective and logical approach given the age of the roof assembly. As such, localized RAAC panel reinforcement costs are presented in **Table 7**. The budgetary costing for recommended localized roof assembly maintenance and repairs are also shown in **Table 7**.

At roof areas with a higher concentration of medium and high-risk panels, complete RAAC and roof assembly replacement is recommended for the entire roof area. Consequently, roof areas A2 and A3 are recommended for RAAC and roof assembly replacement in 2024. As stated in the observation **Table 5**, the underside of RAAC panels at roof areas A5 and A6 were not accessible for review. It has been presumed that the RAAC panels at roof areas A5 and A6, will be similar to the conditions observed at roof areas A2 and A3. Therefore, full RAAC and roof assembly replacement is also recommended for roof areas A5 and A6. RAAC and roof assembly replacement costs for roof areas A2, A3, A5 and A6 are shown in **Table 8**.

Roof & RAAC replacement and/or RAAC reinforcement would significantly impact the activities that could be undertaken within and near the work areas.

Recommended timelines and budgetary costs for complete roof assembly and RAAC panel replacements (where applicable) for the roof areas not already mentioned in the preceding paragraph, are also shown in **Table 8**. Costing is based on the deterioration of roof systems visually observed at the time of the site review and on average unit rate pricing obtained from our experience on projects for similar remediation work. For an inclusive budget estimate, a variance of +/- 25% should be allocated to the costing provided in the summary table of the recommended roof remediations. Remaining service life and performance of existing roof assemblies will be reduced if recommended repairs and regular roof maintenance are not performed.

Table 7 – Localized RAAC Panel and Roof Remediation Recommendations

Roof Area	*RAAC Panel Repair Location*	*RAAC Panel Recommended Remediation Strategy*	*Approximate Area (sq. ft)*	*RAAC Panel Reinforcement Budget*	*Roof Assembly Remediation Recommendations*	*Roof Assembly Repair Budget*	*Recommended Year*
A1	A1.1	Panel reinforcement	30	$15,000			2024
A1	A1.2	Panel reinforcement	30	$15,000			2024
A1	A1.3	Panel reinforcement	30	$15,000			2024
A1	A1.4	Panel reinforcement	45	$22,500			2024
A1	A1.5	Panel reinforcement	30	$15,000			2024
A1	A1.6	Panel reinforcement	30	$15,000			2024
A1			Item		Sealant deficiency at stack supports	$1,500	2024
A1			Item		Opening at the top of the spun aluminum tall cones	$900	2024
A2			Item		Repair broken gas line support on the north end of Roof area A2	$100	2024
A2			Item		Remove excessive algae growth on the north end of roof area	$300	2024
A2			Item		Remove organic debris from roof drain at the north end of roof area A2	$300	2024
A2			Item		Remove organic debris from expansion joint between roof areas A2 and A3	$200	2024
A3			Item		Remove organic debris observed at the north end of roof area A3	$200	2024
A3			Item		Remove minor algae accumulation at the north end of Roof area A3	$100	2024
A3			Item		Remove and replace area of deteriorated sealant at the north end of roof area A3	$1,000	2024
A4			Item		Remove and replace Sealant deficiency at reglet	$1,000	2024
A4			Item		Remove minor organic debris accumulated at the existing roof drain	$300	2024

Roof Area	*RAAC Panel Repair Location*	*RAAC Panel Recommended Remediation Strategy*	*Approximate Area (sq. ft)*	*RAAC Panel Reinforcement Budget*	*Roof Assembly Remediation Recommendations*	*Roof Assembly Repair Budget*	*Recommended Year*
A5			Item		Remove minor accumulation of organic debris at roof drain located on the north end of roof area A5	$300	2024
A5			Item		Repair minor bare felts, located at the roof drain in the centre of roof area A5	$1,500	2024
A5			Item		Remove accumulation of organic debris between the skylight and concrete paver walkway	$200	2024
A6a			Item		Repair minor depression in the existing membrane at the entrance to the mechanical room. Install membrane protection under the existing patio stone	$2,500	2024
A6a			Item		Repair area of exposed felt directly west of the mechanical room	$1,500	2024
A6a			Item		Repair openings in metal cladding on the southside wall of roof area A6A	$1,000	2024
A7	A7.1	Panel reinforcement	45	$22,500			2024
A7	A7.2	Panel reinforcement	30	$15,000			2024
A7	A7.3	Panel reinforcement	15	$7,500			2024
A7	A7.4	Panel reinforcement	30	$15,000			2024
A7	A7.5	Panel reinforcement	15	$7,500			2024
A7			Item		Remove minor algae accumulation located at the south drain	$200	2024
A7			Item		Repair minor blister located at the south A7	$1,500	2024

Table 8 – Complete Roofing Assembly and RAAC Panel Replacement by Roof Area

Roof Area	*Approximate Area (sq. ft)*	*Recommendation*	*RAAC & Roof Assembly Replacement Budget*	*Engineering 15%*	*Contingency 20%*	*Total*	*Recommended Year*
A2	13,081	Complete roof assembly and RAAC panel replacement	$1,570,000	$235,500	$314,000	$2,119,500	2024
A3	5,540	Complete roof assembly and RAAC panel replacement	$665,000	$99,750	$133,000	$897,750	2024
A5	5,540	Complete roof assembly and RAAC panel replacement	$665,000	$99,750	$133,000	$897,750	2024
A6	7,912	Complete roof assembly and RAAC panel replacement	$950,000	$142,500	$190,000	$1,282,500	2024
A1	6,110	Complete roof assembly and RAAC panel replacement	$733,200	$109,980	$146,640	$989,820	2029 - 2034
A4	3,050	Complete roof assembly replacement (non RAAC area)	$185,000	$27,750	$37,000	$249,750	2029 - 2034
A6a	3,409	Complete roof assembly replacement (non RAAC area)	$205,000	$30,750	$41,000	$276,750	2029 - 2034
A7	6,110	Complete roof assembly and RAAC panel replacement	$733,200	$109,980	$146,640	$989,820	2029 - 2034
A8	1,642	Complete roof assembly replacement (non RAAC area)	$99,000	$14,850	$19,800	$133,650	2029 - 2034

The recommended year for completion, remediation measures, and associated construction budget costs only. These costs provided are for construction only, including materials and labour, and exclude applicable taxes, consulting fees, construction contingencies, designated substance survey (DSS) investigations and/or unknown site conditions presented in **Tables 7 & 8**, are summarized below in **Table 9**.

Table 9 – RAAC Panel and Roof Assembly Remediation Summary

Recommended Year	***Remediation***	***Budget Cost***
2024	Localized RAAC Reinforcement at Isolated Locations	$165,000
2024	Roof Maintenance & Roof Assembly & RAAC Replacement	$3,864,600
2029-2034	Roof Assembly & RAAC Replacement	$1,955,400

4.2 Future Monitoring & Reassessment Recommendations

As mentioned previously in **Table 1**, RAAC panels classified in the yellow (medium) risk level require annual reassessment, and panels identified as falling within the green (low) risk category require a 100% level re-evaluation at three-year intervals. As a minimum, the reassessments should follow the procedure outlined in **section 1.2**. It would be at the discretion of the site reviewing Engineer, to determine if a more comprehensive assessment procedure should be undertaken at the time of the site evaluation, based on the observed conditions.

The reader is referred to the Rimkus roof plan in **Attachment B,** which annotates the panels identified in the yellow/medium and green/low risk categories. Budget costs for the reassessments over the next 5 years are presented in **Table 10**. Costs provided are for construction only, including materials and labour, and exclude applicable taxes, consulting fees, construction contingencies designated, substance survey (DSS) investigations and/or unknown site conditions.

Table 10 – RAAC Panel Reassessment Recommendations

Year	***Assessment Guidance***	***Budget Cost***
2025	Partial Reassessment of RAAC panels identified as yellow (medium) risk category only.	$10,000
2026	Partial Reassessment of RAAC panels identified as yellow (medium) risk category only.	$10,500
2027	Full Reassessment of **all RAAC panels** within facility	$ 45,000
2028	Reassessment of RAAC panels identified as yellow (medium) risk category only.	$11,500
2029	Reassessment of RAAC panels identified as yellow (medium) risk category only.	$12,000

4.3 Future Monitoring & Reassessment Recommendations

To completely mitigate all risks associated with RAAC it is recommended that all RAAC roof panels be replaced in their entirety with new steel deck in alignment with the next roofing assembly renewal. As roof renewals are not required immediately at all areas, the below summarizes the interim recommendations discussed in detail in sections **4.1** and **4.2,** to address the distressed RAAC panels found during the condition assessment. These risk mitigation recommendations are in alignment with the risk category assigned to each RAAC panel assessed. Please refer to the risk category matrix presented in **Table 1** for further details and appended drawing S01 for panel risk category identification and location.

Critical Risk (Blue) Panels

- Immediate installation of shoring (reinforcement) for all critical risk panels. These panel locations were identified immediately to the client and the work was previously completed prior to report preparation.
- Shoring reinforcement to remain in place until panel remediation has been completed.

High Risk (Amber) Panels

- Replacement or reinforcement prior to October 31, 2024.
- Implementation of a Rain/Snow load monitoring plan, refer to the Rimkus document titled 'Snow Loading & Rainwater Management Plan', dated April 26, 2024 for further details until the remediation has been completed.
- Where remediation cannot be completed within the recommended time frame, then one of the following supplemental risk mitigation options is recommended and should be implemented in conjunction with the snow/load monitoring program.

  Option 1: Restricted access or full closure to prevent any persons from walking in areas where high risk panels are present.
  Option 2: Installation of temporary shoring (reinforcement) to the underside of RAAC panels.
  Option 3: If shoring is not possible, installation of horizontal hoarding near the underside of hard ceiling levels, or other building interferences (sprinkler mains/process piping etc.) which is also considered reinforcement.

- The above three recommended options are listed order of preference, with option 1 completing eliminating the risk to public or staff.

Medium Risk (Yellow) Panels

- Monitor and re-assess annually.

Low Risk (Green) Panels

- Monitor and re-assess at three-year intervals.

5. REFERENCES

A. The Institute of Structural Engineers. *Reinforced Autoclaved Aerated Concrete (RAAC) Investigation and Assignment – Further Guidance.* RAAC Study Group, April 2023.

B. Rimkus Consulting Group, *Understanding the Historic Use of Reinforced Autoclaved Aerated Concrete (RAAC) in building construction in Ontario.* March 25, 2024

ATTACHMENT A: PHOTOGRAPHS

Photograph 1
Roof Area A1 – RAAC replacement with steel deck

Photograph 2
Repair Location A1.1 – Spalling and exposed reinforcing bars

Photograph 3
Repair Location A1.2 – Unreinforced field modification

Photograph 4
Repair Location A1.4 – Unreinforced field modification

Photograph 5
Repair Location A1.5 – Unreinforced field modification

Photograph 6
Roof Area A2 – Spalling and exposed reinforcing bars

Photograph 7
Roof area A2 – Unreinforced field modification

Photograph 8
Roof Area A2 – Excessive water staining and field modification

Photograph 9
Repair Area A2 – Water staining at supporting concrete beam

Photograph 10
Roof Area A2 – Existing wood framing intended for distressed RAAC panel support

Photograph 11
Roof Area A2 – Gap observed between wood framing support and underside of distressed RAAC panel

Photograph 12
Roof Area A3 – Visibly deflected RAAC panel relative to adjacent panels

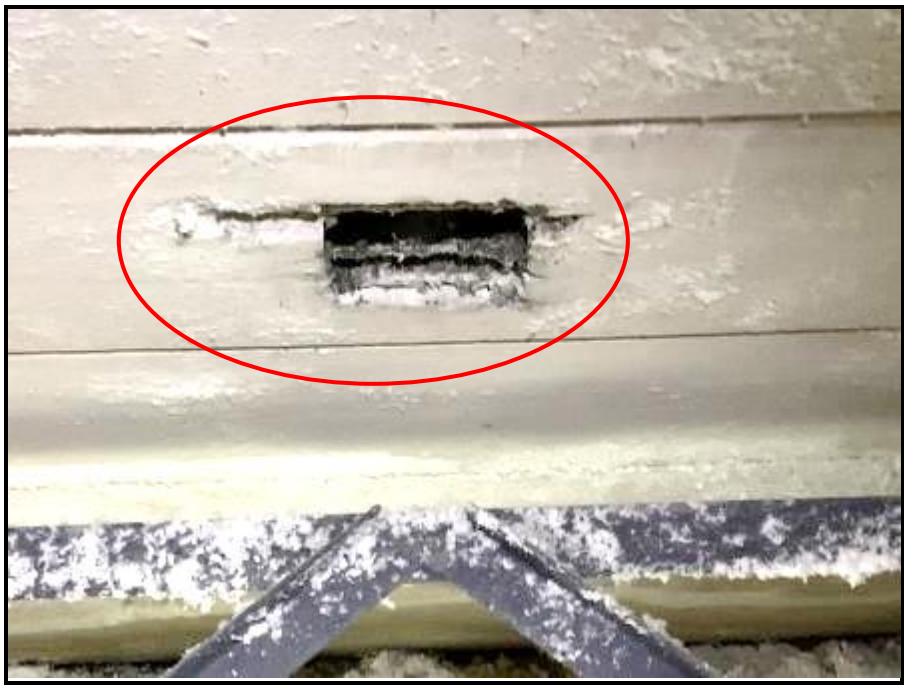
Photograph 13
Roof Location A3 – Unreinforced field modifications, spalling and moisture staining

Photograph 14
Roof Area A3 – Unreinforced field modification

Photograph 15
Repair location A7.3 – Spalling and visible deflection at unreinforced field modification

Photograph 16
Repair location A7.3 – Close up view of distressed panel at mid-span

Photograph 17
Repair Location A7.5 – Unreinforced field modification



Photograph 18
Roof Area A1

Photograph 19
Repair Area A1 - Sealant deficiency at stack supports

Photograph 20
Repair Area A1 - Opening at the top of the spun aluminum tall cones

Photograph 21
Roof Area A2

Photograph 22
Repair Area A2 - Repair broken gas line support

Photograph 23
Repair area A2 - Remove organic debris from roof drain at the north end of roof area A2

Photograph 24
Repair Area A2 - Remove organic debris from roof drain at the north end of roof area A2

Photograph 25
Repair Area A2 - Remove organic debris from expansion joint between roof areas A2 and A3

Photograph 26
Roof Area A3

Photograph 27
Repair Area A3 - Remove organic debris observed at the north end of roof area A3

Photograph 28
Repair Area A3 - Remove minor algae accumulation at the north end of Roof area A3

Photograph 29
Repair Location A3 - Remove and replace area of deteriorated sealant at the north end of roof area A3

Photograph 30
Roof Area A4

Photograph 31
Repair Area A4 - Remove and replace Sealant deficiency at reglet

Photograph 32
Repair Area A4 - Remove minor organic debris accumulated at the existing roof drain

Photograph 33
Roof Area A5

Photograph 34
Repair Area A5 - Remove minor accumulation of organic debris at roof drain located on the north end of roof area A5

Photograph 35
Repair Area A5 - Repair minor bare felts, located at the roof drain in the centre of roof area A5

Photograph 36
Repair Area A5 - Remove accumulation of organic debris between the skylight and concrete paver walkway
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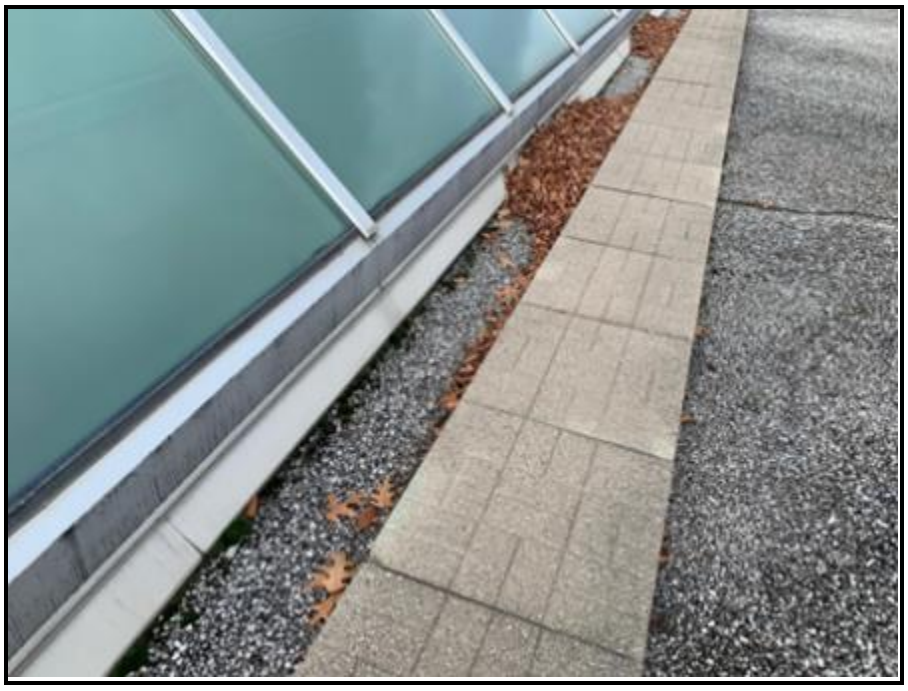


Photograph 37
Roof Area A6

Photograph 38
Roof Area A6a

Photograph 39
Repair Area A6a - Repair minor depression in the existing membrane at the entrance to the mechanical room. Install membrane protection under the existing patio stone

Photograph 40
Repair Area A6a **-** Repair area of exposed felt directly west of the mechanical room

Photograph 41
Repair Area A6a - Repair openings in metal cladding on the southside wall of roof area A6A

Photograph 42
Roof Area A7

Photograph 43
Repair Area A7 **-** Remove minor algae accumulation located at the south drain

Photograph 43
Repair Area A7 - Repair minor blister located at the south A7

ATTACHMENT B: ROOF PLAN DRAWING

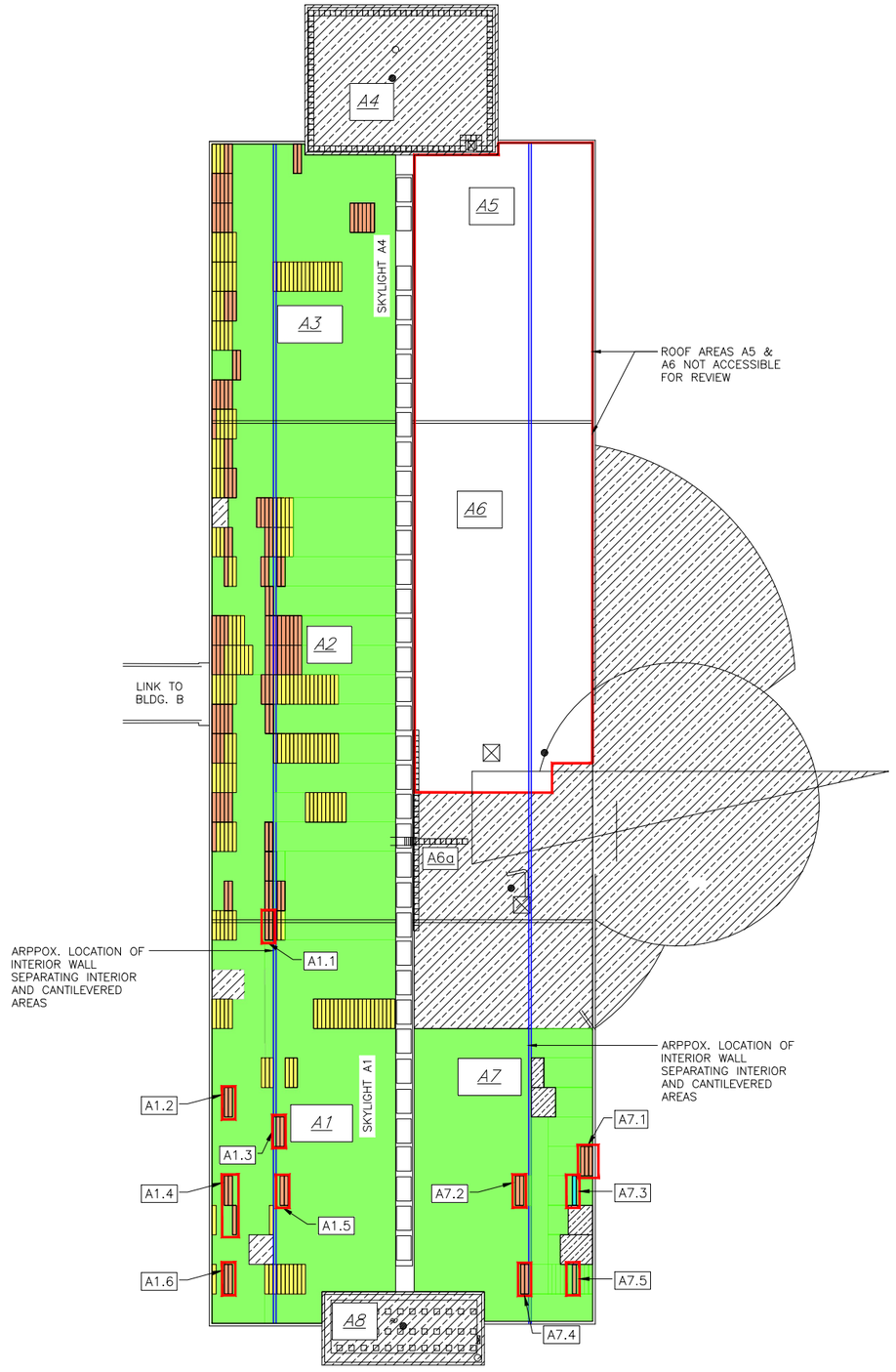
APPROX. TOTAL ROOF AREA = 66,432 sq.ft

APPROX. ROOF AREA CHECKED = 53,476 sq.ft (80% OF TOTAL ROOF AREA)

TOTAL ROOF AREA CONTAINING RAAC = 46,085 sq.ft (69% OF TOTAL ROOF AREA)

AREA OF RAAC NOT YET INSPECTED = 12,971 sq.ft (28% OF TOTAL RAAC AREA)

RAAC PANEL ASSESSMENT TABLE			
ASSESSMENT CATEGORY	RISK CATEGORY	COMMENTS AND REMEDIAL ACTION	PERCENTAGE BY AREA OF RAAC REVIEWED TO DATE
GREEN	LOW	NO VISUAL DISTRESS OBSERVED. REQUIRED PERIODIC ASSESSMENTS AT THREE–YEAR INTERVALS.	84%
YELLOW	MEDIUM	MINOR ANOMALIES OR VISUAL DISTRESS OBSERVED. REQUIRES ANNUAL ASSESSMENT.	9%
AMBER	HIGH	MODERATE ANOMALIES OR VISUAL DISTRESS OBSERVED. REQUIRES ADDITIONAL SUPPORTS OR REPLACEMENT BY OCT 31, 2024	6%
BLUE	CRITICAL	SIGNIFICANT ANOMALIES OR VISUAL DISTRESS OBSERVED. REQUIRES IMMEDIATE SHORING OR CORDONING OF FLOOR SPACES, FOLLOWED BY INSTALLATION OF ADDITIONAL SUPPORTS OR REPLACEMENT.	<1%



1 / S01 BUILDING A ROOF PLAN
SCALE N.T.S.

NOTES:

DRAWING LEGEND

– DENOTES ROOF AREAS NOT YET REVIEWED

– DENOTES CONFIRMED NON RAAC PANEL ROOF AREAS

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SEAL:

NO.	ISSUED FOR:	DATE (Y-M-D):
1.	OBSERVATION REPORT #1 PROGRESS UPDATE	24-03-21
2.	OBSERVATION REPORT #2 PROGRESS UPDATE	24-03-28
3.	REVISED PER CLIENT COMMENTS	24-04-03
4.	REVISED PER CLIENT COMMENTS	24-05-14
5.	DRAFT ASSESSMENT REPORT SUBMISSION	24-06-14
6.		
7.		

PROJECT:
ONTARIO SCIENCE CENTRE
770 DON MILLS ROAD,
NORTH YORK, ON.
BLDG. A RAAC PANEL ASSESSMENT

CLIENT:
INFRASTRUCTURE ONTARIO

SHEET TITLE:
RAAC PANEL ASSESSMENT CATAGORY PLAN

PROJECT NO:	100237742
DATE (Y-M-D):	2024-01-30
SCALE:	N.T.S.
DESIGNED BY:	G.T.
DRAWN BY:	A.T.
CHECKED BY:	G.T.

DRAWING NO: **S01**

SHEET NO: 1 OF 1