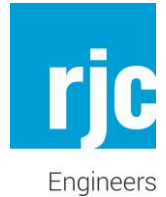


ATTACHMENT A



April 08, 2021

Marcus van Zyl, Construction Project Manager
Engineering and Public Work - City of Nanaimo
411 Dunsmuir Street
Nanaimo, BC V9R 0E4

Dear Marcus,

**RE: Nanaimo Aquatic Centre Parapet Repairs
Mechanical Mezzanine Roof**

RJC No. NAN.101523.0006

In follow up to previous email correspondence, teleconferences, and site visits, Read Jones Christoffersen Ltd. (RJC) provides the following summary information regarding the mechanical mezzanine roof and the adjacent wall assemblies, as well as recommendations for addressing these areas. Figure 1 shows the mechanical mezzanine as well as several annotations pertaining to locations described throughout this report. The Nanaimo Aquatic Centre (NAC) is currently in the midst of a two-phase reroofing project. Phase 1 included parapet work at the upper roof and Phase 2 includes reroofing the lower roof and mechanical mezzanine roof, along with associated parapet work. Currently the contractor is approximately 75% complete the work of Phase 2.

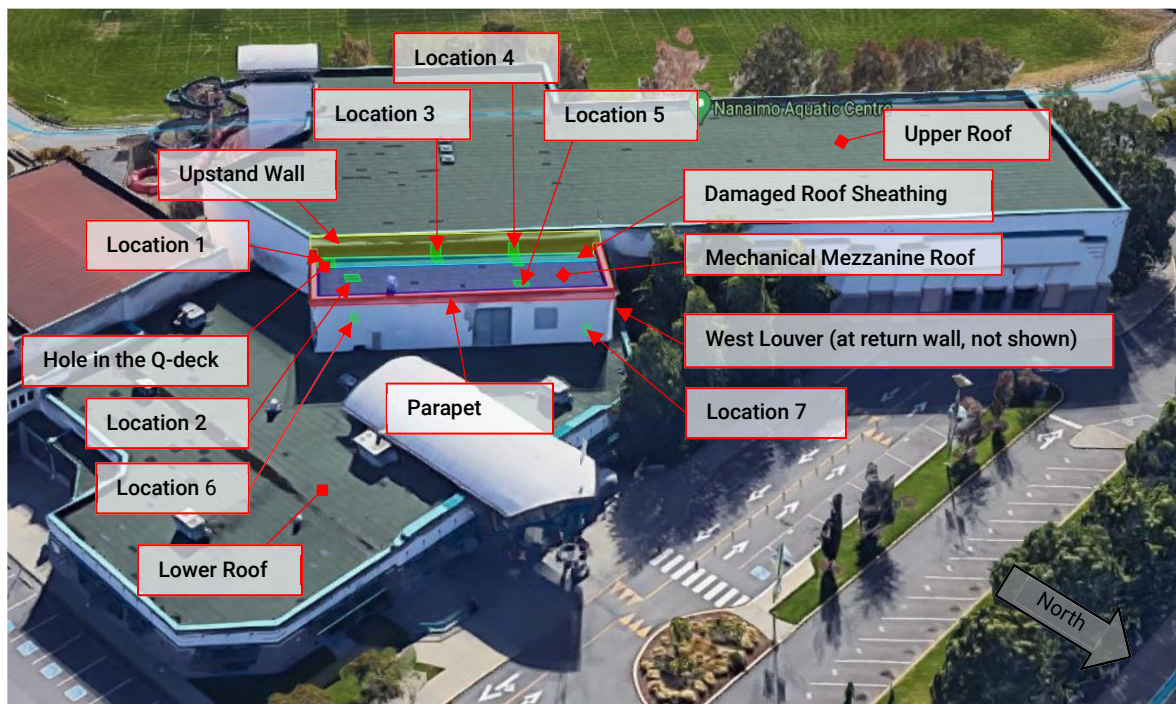


Figure 1: Orthographic view of NAC, highlighting the mechanical mezzanine roof. Language used in this report to identify other components are also included.

1.0 BACKGROUND

During RJC's site visit of March 10, 2021, organic growth was observed within the parapet walls on the back side of the paper-faced gypsum sheathing at the mechanical mezzanine. As the tear-off of the existing roofing at the mechanical mezzanine continued, additional organic growth was reported to RJC by the contractor. On March 12th, RJC returned to site following correspondence from the contractor advising of a hole in the structural Q-deck, water-damage to the existing gypsum roof sheathing, and moisture in the previously completed parapet tie-in at the upstand wall.



Photo 1: Location 1; Hole in the Q-deck circled in red, deteriorated gypsum sheathing on the surface of the roof and at the parapet. Inset shows damage to Phase 1 gypsum sheathing at the parapet wall.

At RJC's request, the contractor removed two sections of roof sheathing, allowing RJC to review the underlying condition of the Q-deck (Locations 1 and 2, Figure 1). The roof sheathing at Location 1 had failed and could be crumbled by hand (Photo 1). Adjacent parapet sheathing that had been previously replaced as part of the Phase 1 work in 2020, had also failed. At the parapet, the fibreglass facing of the new gypsum sheathing easily separated from the gypsum core, and the gypsum core was saturated with water (Photo 1, inset).

The sheathing at Location 2 appeared to be in serviceable condition, however the sheathing at the perimeter of the recess could be lifted from the surface of the Q-deck approximately one inch indicating insufficient fastening of the sheathing to the Q-deck.

On March 19th, RJC teleconferenced with the City of Nanaimo Stakeholders (the City) to determine the next steps. During this teleconference, RJC recommended additional investigation to determine the extent of the damage, and possible cause of the moisture-damaged parapet sheathing at Location 1. This investigation was conducted on March 25th.

2.0 UPSTAND WALL

During the March 25th investigation, two additional areas of roof and upstand wall sheathing were removed (Locations 3 and 4, Figure 1). Based on the findings at these locations, along with Location 1, and a visual review of the remainder of the roof sheathing adjacent to the upstand wall, it appears that the strip of existing roof sheathing adjacent to the upstand wall has failed, and will require replacement (Photos 1, 2, 3, and 4).



Photo 2: Location 3; deteriorated gypsum sheathing.



Photo 3: Location 4; deteriorated gypsum sheathing. Refer to Photo 5 for close up of indicated area.



Photo 4: Location 4; deteriorated gypsum sheathing.

In addition, the new gypsum sheathing installed on the upstand wall at Locations 3 and 4 as part of Phase 1 in 2020 has been exposed to excessive moisture and should also be replaced. The source of this moisture appears to be an unsealed gap between the new track assembly and the adjacent flute of the Q-deck (Photo 5). The air within the flutes of the Q-deck is conditioned to the interior air of the mechanical mezzanine, which has similar characteristics to the pool hall; warm air, with a high relative humidity.

When completing Phase 1 work, the roofing assembly at the mechanical mezzanine was still in place. The old parapet wall was removed, and a new parapet wall was framed in its place without removing the mechanical mezzanine roofing. Spray foam insulation was applied between the new studs, down to the sill track. New sheathing was installed, but since the existing roof was still in place, the sheathing did not extend down to the structural decking as shown in the Contract Documents (Figure 2, Photo 6 and 7). The resultant gap is visible in Photo 7, creating a void at the bottom of the upstand wall assembly interconnecting each stud cavity and allowing warm, moisture-laden air to circulate to the exterior side of the new upstand wall assembly where it would cool and the water vapour condense.

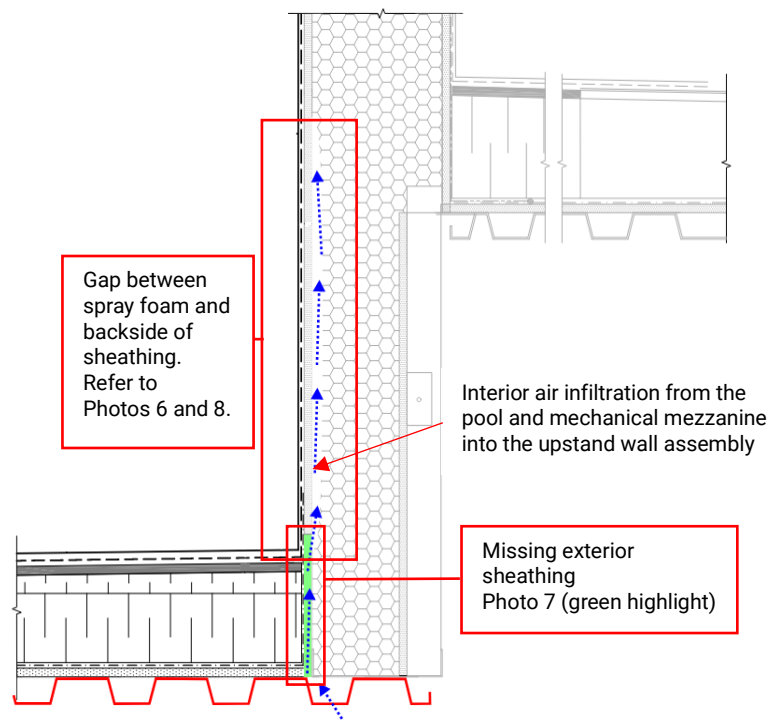


Figure 2: Section at the upstand wall.



Photo 5: Location 4; sheathing shown in Photo 4 was removed on the right side of the photo exposing the gap outlined in red.



Photo 6: Location 3; new sheathing on the upstand wall was removed exposing a gap between the face of the spray foam and the backside of the sheathing (top right red rectangle, shown in Photo 8). Missing sheathing was also confirmed at the bottom of the recess (bottom left red rectangle, shown in Photo 7).



Photo 7: Missing sheathing at the base of the upstand wall. The new vapour retarder was not adhered creating a void the length of the upstand wall.

In addition, a review of the spray foam revealed that it did not completely fill the stud cavities, nor was it in intimate contact with the gypsum sheathing (Photo 8).

In one exposed location, a void was observed in the spray foam (Photo 9). This void would further facilitate the movement of interior air within the upstand wall.

The roof sheathing in Location 5 appeared to have minor moisture-related damage. As well, similar to Location 2, the attachment of the sheathing was suspect. BC Building Code requires that CSA A123.21:20 – Standard Test Method for Dynamic Wind Uplift Resistance of Membrane-Roofing Systems be met for new roofing. It is likely that the current fastening does not meet these requirements.

A review of the larger recess at Location 4 revealed that the existing roof sheathing is only nominally fastened, with one screw visible at each of the exposed corners. In this location, the screw pulled through the sheathing when the sheathing was lifted by hand. The presence of moisture within this roof assembly has compromised the fastening originally provided.

Based on our review, it appears that the fastening of the existing sheathing is insufficient to meet the current wind uplift requirements noted within the BC Building Code. Similar pull-through of fasteners was observed at the upstand wall, where the new sheathing pulled through the fasteners used to secure the sheathing (Photo 10). As the sheathing at the upstand wall has also been damaged by moisture, it should be replaced. Although the visible moisture damage in the field of the roof is minimal, the sheathing's structural integrity appears to have been compromised by what moisture has penetrated and it should be replaced throughout the mechanical mezzanine roof.

3.0 PARAPET ASSEMBLY

In order to determine if the organic growth at the parapet walls extended into the main walls of the mechanical mezzanine, two interior recesses were made (Locations 6 and 7, Figure 1). Due to the mechanical equipment in place, access to exterior wall areas was limited.



Photo 8: Close up of the gap shown in Photo 6 and Figure 2.



Photo 9: Void in the spray foam application. It is unknown how far the void extends.

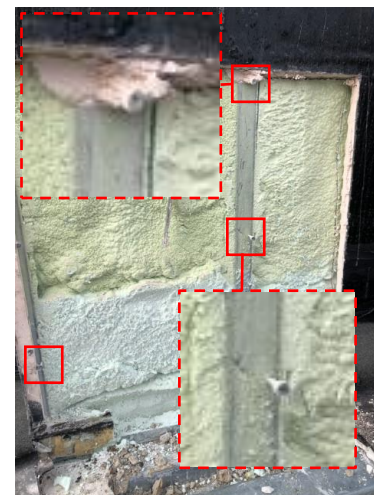


Photo 10: Fasteners in the new sheathing could be pulled through the sheathing with minimal effort.

Location 6 was selected based on its proximity to the discolouration observed within the parapet wall and Location 7 was selected based on its proximity to the discolouration at the west louver previously reviewed with the City. No organic growth or moisture damage was observed within either of the wall cavities reviewed (Photos 11 and 12). It appears that the observed organic growth within the parapet is limited to the parapet assembly. Refer to email correspondence sent March 17, 2021 for more information on the sheathing deterioration at the west louver.



Photo 11: Location 6; no damage observed within the wall cavity.



Photo 12: Location 7; no damage observed within the wall cavity.

4.0 RECOMMENDATIONS

4.1 Roof Sheathing

Based on its condition, RJC recommends replacing the existing roof sheathing at the mechanical mezzanine with new, fibreglass-faced gypsum sheathing. This new sheathing would be fastened to the existing Q-deck in accordance with the wind uplift requirements of the BC Building Code. The roofing system previously specified could then be installed on this new substrate.

4.2 Upstand Wall

To address the moisture within the upstand wall, RJC recommends the removal of the new exterior sheathing and spray foam insulation. In order to regain intimate contact between the spray foam and the steel studs, cleaning of the studs and track to bare metal will be required. Removal of the steel stud framed wall and replacement of the entire assembly may be less time consuming.

RJC recommends an air seal be added as a precautionary measure, bridging from the vapour retarder on the roof sheathing onto the steel stud track. This could be accomplished with a metal angle that transitions from the horizontal roof surface to the metal track with foam tape and fasteners (Figure 3 Inset). This seal would then be picked up by the spray foam to transition to the air/vapour retarder at the underside of the main roof, previously completed as part of Phase 1.

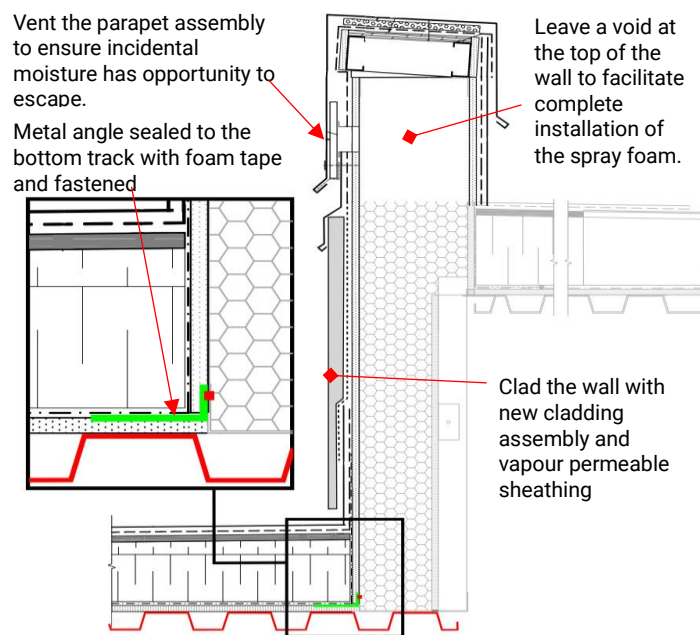


Figure 3: Section at the upstand wall – Revised wall assembly. This detail is schematic only. Design drawings would be prepared by RJC for implementation by the Contractor.



In addition to the air seal, and due to the complexity of the installation, RJC recommends replacing the continuous membrane upturn at the upstand wall with a cladding assembly and vented parapet cap. This should facilitate the installation of the detail. (Figure 3).

4.3 Parapet Assembly

To address the organic growth within the parapet assembly RJC recommends that the parapet sheathing be removed and replaced with new, fibreglass faced gypsum sheathing, and any impacted EIFS cladding be replaced.

We trust the above is sufficient at this time. Please contact the undersigned with any questions.

Yours truly,

READ JONES CHRISTOFFERSEN LTD.

Jennifer McAskill, ASCT, PMP, CCCA, LEED® AP
Regional Manager, Project Technologist

JHM/rt