

FROM **Shinji Coram**  
TOTAL PAGES 13**R-B4711.059**  
**Quintet**  
**Roof Replacement**

DATE November 21, 2022

TO Jimmy Songvilay Kin Living

EMAIL quintet@kinliving.com

REGARDING **Quintet Clubhouse Roof Replacement**

MESSAGE Dear Jimmy,

As requested by Kin Living, on behalf of the Quintet Condominiums Association, RDH performed review of the Quintet Condominiums Clubhouse building, to verify the findings presented in a Roof Condition Assessment Report authored by PONO Building Consultants (PONO). RDH has performed various assessments for the Quintet Condominiums in the past, including most recently a Building Enclosure Condition Assessment (BECA) in March 2022.

**Background**

The Quintet Condominiums Clubhouse is a one-story structure housing the property management office, a private residence, community meeting rooms, exercise room, and pool/spa area. The primary construction consists of concrete masonry unit (CMU) walls, with laminated lumber (Glulam) and engineered wood I-joist (TJI) framing in the low-slope and steep-slope roof areas. The primary roof assembly at low-slope areas is a multi-ply modified bitumen roof applied directly to the roof deck, with insulation primarily installed in the TJI space beneath the roof deck. At the pool area, the assembly appears different, with some insulation installed above the roof deck. Slope appears to be provided at the low-slope roofs through a tapered insulation or cricket system. The steep-slope roof areas include concrete tile shingles over a waterproof underlayment. Our review primarily focuses on the low-slope roof areas, which to our knowledge were last replaced in 2009.



*Quintet Clubhouse Roof  
(Image from Google Maps)*

*Red box indicates known  
leak/damage area at exercise  
room.*

We are aware of multiple ongoing leaks associated with the low-slope roof areas, including a major leak above the exercise room which caused substantial damage to the

plywood roof deck. This area was temporarily patched with an overlay of single-ply membrane at some point prior to our 2022 BECA. While we did not access the clubhouse roof during the BECA, we did observe this patch and apparent issues with drainage and granule loss from an adjacent building. At the time we recommended, at a minimum, localized repair and replacement of degranulated and failed roofing.

Following our BECA, we understand that PONO was retained in July 2022 to conduct a more thorough assessment of roof systems at the Quintet, including the clubhouse roof. Their report was made available to us by Kin Living, and indicates end-of-life problems with the low-slope roof areas. We understand that PONO recommends immediate and complete replacement of the low-slope roof areas. Because the cost of roof replacement is so high the Association has asked us to also review the low-slope roof areas to determine if there are any options for phasing the roof replacement.

### Observations

RDH accessed the clubhouse low-slope roof areas on November 10<sup>th</sup>, 2022 to review general roofing conditions. We also conducted moisture measurement readings using a Delmhorst BD2100 pin probe moisture meter at the roof deck from the interior of the building where accessible, mainly in the pool hall and exercise room.

Generally, the roof appears to be ageing at an accelerated rate compared to what is typical for an approximately 13-year-old system. Loss of granules in the capsheet is systematic, exposing the black asphaltic component of the membrane. Additionally, we observe localized failed laps in the flashing membrane at parapet walls.



*Figure 1*

*Clubhouse roof, above property management office, conference room, and residence area.*



*Figure 2*

*Most significant area of granule loss*



*Figure 3*

*Localized failure of flashing membrane laps.*

Primary drainage for the roof involves through-wall scuppers and collector boxes at each area. There are typically low spots in front of the scuppers, possibly relating to irregularities in the roof deck, where debris and water are accumulating. Scuppers generally show signs of repair with addition of mastic and granules. The mastic at repair areas shows signs of UV damage in the form of localized cracking and peeling.



Figure 4

Low spots in front of scupper. Note framing telegraphing through roofing.



Figure 5

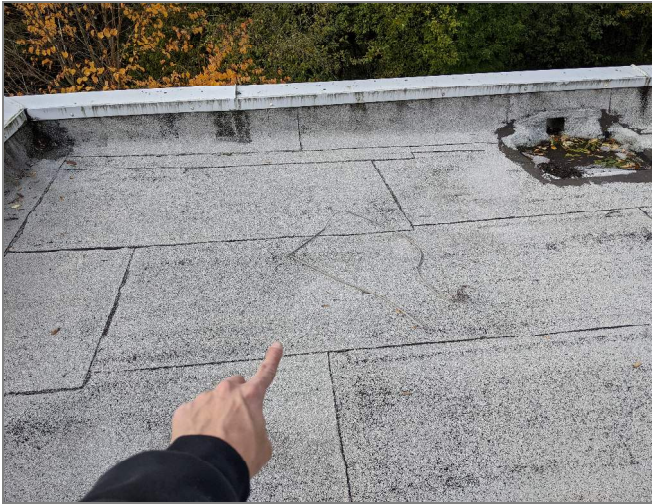
Scupper sump at pool hall roof.

Additionally, at the pool hall roof, the roof deck appears to be bowing slightly in between structural beams. There is some apparent flex in the roofing at cricket valleys.



Figure 6

Apparent bowing or crowning of pool hall roof between glulam beams.



*Figure 7*

*Soft spot in roof apparent at cricket valley.*

The exercise room roof, while a different assembly than the pool room roof, appears as a continuation of the pool room roof membrane, sloping the opposite direction from the ridge. The previous repair area at the exercise room roof has been covered with additional sheeting, which is sealed to the roof surface with mastic. We anticipate that this is either a remedial or proactive measure from the roofer to protect the damaged roof deck below. Ponding water on the tarping reveals lack of slope in the roof area, which may contribute to the leaks and damage previously observed.



*Figure 8*

*Tarped off area above exercise room roof.*

From the interior, we reviewed the sheathing condition at the pool hall roof. At the areas near the through-wall scuppers, we observed damaged paint and plywood, and recorded high moisture in the plywood.



*Figure 9*

*Known leak and damage area at pool hall roof.*



*Figure 10*

*Damaged and wet plywood deck at pool hall roof.*

Additionally at the pool room, we observed staining and peeling paint on the glulam beams and adjacent CMU walls which may indicate a history of condensation.



Figure 11

*Peeling paint at wood beams and CMU block.*



Figure 12

*Apparent history of condensation, potential leakage.*

The exercise room has a drop ceiling assembly forming a crawlspace between the interior and the roof assembly. We reviewed the condition of the sheathing and TJIs in the roof assembly above the drop ceiling. We also reviewed the CMU wall, which separates the pool room and exercise room, and serves as the bearing point for the Glulam beams in the pool room.

Wood components generally appear to be in sound condition, with the exception of the leak damaged area. Surface corrosion on metallic elements such as bolts indicate a history of high moisture in the environment. Foam is packed between the CMU and the Glulam beams, but is not fully sealed and allows for high moisture air from the pool room to enter the crawlspace.



Figure 13  
Drop ceiling at exercise room.



Figure 14  
Damaged plywood area at



Figure 15  
Glulam beams bearing in CMU wall.





Figure 16

*Not sealed between CMU and Glulam, allowing for high moisture air to enter the crawlspace.*



Figure 17

*TJI's and plywood deck appear in sound condition, corrosion on structural bolts.*

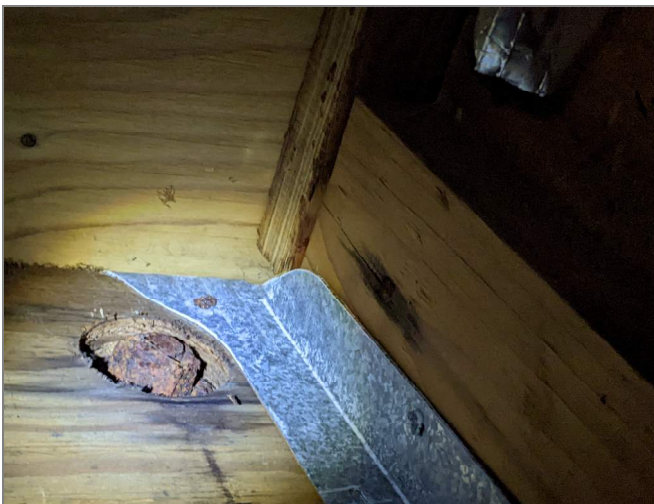


Figure 18

*Corrosion on structural bolts indicating high moisture environment.*

We also accessed the conference room on the east side of the building but were unable to directly observe the roof deck. Staining at the CMU wall may indicate a history of moisture retention or air movement in the crawlspace above the drop ceiling.



*Figure 19*

*Roof insulation at conference room.*



*Figure 20*

*Staining at CMU indicates history of moisture in crawlspace.*

## Discussion

### Roofing Membrane System

Generally, the roofing system appears to be in poor condition. A modified bitumen roof membrane is typically expected to last 25-30 years with proper design, installation, and maintenance. The membrane system at the clubhouse does not appear to be meeting these expected values for a variety of reasons.

There appears to be a problem relating to the through-wall scuppers. In viewing the Pono photographs in the area of repair, the damage at the plywood deck appears to be concentrated at the valley leading towards the scupper. At the pool room, previous leaking was reported to us at the south side scupper, where peeling paint on the underside of the plywood deck is apparent. Moisture probe measurements inside the pool

room, at the underside of the plywood at this area indicate a local Moisture Content (MC%) of 40, which is the maximum reading of the probe and indicates the wood is wet. The immediately surrounding area reads a %MC of 13-22 %MC indicating elevated risk of moisture damage. Measurement of the north side scupper, which was not reported to leak but shows signs of peeling paint, reveals similar findings of 20-40 %MC readings. %MC readings taken at areas away from the scuppers at the roof ridge and crickets indicate a typical %MC of 7-11 %MC, revealing the scupper areas to be an anomaly and likely associated with a leak. Based on the number and condition of repairs apparent at the scuppers, we anticipate that leakage from the scuppers have contributed to damage at the pool hall roof, and at least localized replacement of insulation and roof deck will be necessary.

A second major concern is granule loss, which exposes the asphaltic component of the membrane to ultraviolet (UV) degradation. Granule loss can be caused by a number of factors including material deficiencies, exposure to standing water, or excess movement in the material loosening the granules. Once the asphaltic component of the membrane is exposed to UV accelerated aging of the system can be expected. .

Open lap seams in the membrane system were also noted.

In addition to the roofing condition we noted a number of other concerns that should be properly addressed in design efforts prior to having the roofer undertake work. Based on the bid documents prepared by Pono, it is not clear that these efforts have been completed. We list these concerns below:

1. Apparent bowing or irregularity in the roof deck. The roof deck consists of structural plywood, of an unknown age. The plywood deck is installed over engineered wood joists at most areas, and in the pool is supported by dimensional lumber roof rafters. There may be a number of factors that could cause bowing of the sheathing including moisture damage over time, inadequate thickness, or inadequate support (in the pool area), To understand this condition, test cuts would be required to verify the roof deck sheathing thickness and overall condition. This condition should be verified prior to construction because it could result in additional cost during construction.
2. At the majority of the roof conditions, the insulation is placed below the roof deck. It is very difficult to effectively hang and support batt insulation systems from the underside of a deck. Discontinuities and voids above the insulation often occur. These conditions often result in the roof deck being colder than the conditioned interior space creating a risk of moisture from interior sources accumulating or condensing occurring on the underside of the deck. While the foil-faced batt insulation installed in the roof assembly does serve as a vapor retarder, it is not fully continuous and does not completely prevent moisture migration from the interior. This risk is especially pronounced at areas like the exercise room. Generally, Pono's scope includes a vapor retarder placement at the topside of the deck to address these concerns.
3. At the pool room it appears that some amount of insulation is installed above the plywood roof deck. Pool spaces are high humidity spaces where elevated interior moisture is expected. Care must be taken to ensure that a proper vapor barrier is

placed, along with interface detailing at exterior walls to manage the elevated moisture conditions.

4. There is an apparent transition between the exercise room and the pool room roof assemblies. At the exercise room, the insulation is below the deck, while in the pool room the insulation is above the deck. The existing roofing system, however, completely covers this transition. There is a concern that air leakage occurs where these two systems adjoin. Detailing of this condition needs particular care to ensure that warm, moist air from the pool region does not flow through and cause damage to the exercise room, and potentially passes through the demising wall. Our moisture probe readings at the underside of the exercise room roof indicate a percent by weight moisture content (%MC) between 14 and 17 %MC toward the ridge of the roof away from the leak/damage area. Expected %MC values for wood components within conditioned space are less than 10 %MC. Readings above 16 %MC indicate there may be an elevated risk of moisture-related issues including organic growth and structural degradation. Elevated %MC readings at the Quintet clubhouse roof indicate potential moisture-related problems affecting the roof's performance.

## Recommendations

Generally, RDH agrees with PONO's assessment that the clubhouse low-slope roof areas should be a priority for complete replacement. The new roof assembly should also include a continuous vapor barrier below the insulation. To be continuous, the vapor barrier needs to terminate and seal to all adjacent assemblies such as parapets and the demising wall between roof areas. It may also be beneficial to install some exterior insulation, to keep the roof decking warmer and less susceptible to moisture damage. We recommend the installation of a new 2-ply SBS modified bitumen roof system with PMMA liquid flashing applied at scuppers and penetrations for increased resistance to leakage at these vulnerable details.

Two major areas on the club house roof including the exercise room and the area above the pool room are in poor condition and require replacement as soon as possible.

While there may be an opportunity to defer some of the other, smaller areas such as the lower residential roof area, the mechanical penthouse roof and the conference room roof the timeline for the subsequent replacement should be planned for within three years. If the association wants to explore a phased re-roofing approach, test cuts will need to be made at the lower residential roof areas of the clubhouse, the upper mechanical penthouse roof, and the southwest conference room roof to verify that there are no hidden moisture conditions within the assembly.

However, the savings realized by breaking the roofing into two separate phases will only be short term. Given inflation and the cost of a contractor's mobilization now and again in the future to undertake two smaller projects will result in a higher, overall end cost, and will also present some risk to the association that leakage may develop causing damages to interior finishes and contents.

*Maintenance: Steep Slope Roof Areas*

While steep slope roof areas are not the subject of this investigation, we recommend routine maintenance and repair to ensure they continue to perform as expected.

We were not engaged to discuss the proposed Pono roof replacement specification, however we feel that it is important to mention that care and attention to the interface and transition details, vapor retarder provisions and proper separation of the exercise and pool room roofs should be incorporated into a design exercise. In addition, the roof deck thickness and support provisions should also be carefully reviewed.

### Closure

Please do not hesitate to contact us with any questions. We would be happy to discuss any of the above findings and recommendations with you. Thank you for this opportunity to work with the Quintet Condominiums and Kin Living and we look forward to any future efforts together.

Yours Truly,



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