BUILDING SCIENCE

Building Enclosure Condition Assessment Report | Project R-B4711.058

Quintet, 6695 W. Burnside Road, Portland, OR

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Revised March 14, 2022 by
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Contents

Appendices

1 Introduction

1.1 Terms of Reference

RDH Building Science Inc. (RDH) was retained by Kin Living to undertake an assessment of the current condition of the building enclosure of the buildings at the Quintet Condominiums complex located at 6695 W. Burnside Road, Portland, OR.

This report documents the current condition of elements of the building enclosure. It may also provide information related to the specific sources of moisture or other physical factors which have resulted in the observed conditions.

RDH Building Science Inc. has provided building enclosure condition assessment and follow up design and review services to the Quintet in the past.

This report has been undertaken for Kin Living and is not to be relied on by others.

1.2 Report Organization

Background information relevant to this building and the condition assessment is provided in Section 1 of this report.

The report is organized in accordance with five primary elements of the building enclosure as well as interior operating conditions:

1) Walls
2) Windows and Doors
3) Roofs
4) Balconies
5) At-Grade Assemblies

Section 2 and 3 discusses our observations, while Section 3 contains the discussion related to these observations. Recommendations for rehabilitation and renewal of building enclosure assemblies are provided where appropriate. The recommendations for rehabilitation and renewal are summarized in Section 4.

2 Investigation and Field Work

2.1 Building Description

The Quintet property consists of five mid-rise reinforced masonry condominium buildings and a single-story clubhouse building built between 1988 and 1991.

A description of the buildings is provided in Table 2.1 and Table 2.2. Photographs of the principal elevations of the buildings are provided in Figure 2.1 and Figure 2.2.

TABLE 2.1 DESCRIPTION OF RESIDENTIAL BUILDINGS	
Name	Quintet Condominiums
Address	6695 W. Burnside Road, Portland, OR
Date of construction	1990 and 1991
Number of suites	206 in five Buildings
Applicable building codes	1988 UBC
Building code classification	Type II F.R.
Number of stories	5
Type of construction	Concrete masonry construction
Principal occupancy	R-1 (Apartment Units)
Other occupancies	B-3 (Open Parking Garage)
Structural system	Structural concrete masonry unit (CMU) with hollow-core concrete floor slabs

Figure 2.1

North elevation at Building 4

Figure 2.2

Southeast elevation at Building 5

TABLE 2.2 DESCRIPTION OF CLUBHOUSE BUILDING	
Name	Quintet Condominiums
Address	6695 W. Burnside Road, Portland, OR
Date of construction	1990
Applicable building codes	1988 UBC
Building code classification	Type II F.R.
Number of stories	1
Type of construction	Concrete masonry unit (CMU) construction
Structural system	Concrete pile foundation; concrete framing at interior; structural concrete masonry at exterior walls; hollow core concrete floor slabs.

2.1 Occupant Questionnaire

A standard occupant questionnaire was distributed to each of the 206 suites. A total of 93 questionnaires were completed and returned which constitutes a 45% response rate.

Table 2.3 provides a summary of the information gathered from the questionnaires.

TABLE 2.3 RESPONSE TO OCCUPANT SURVEY QUESTIONS		
1)	Does your unit have any ongoing or undiagnosed leaks associated with the building enclosure (exterior walls, windows, roof, floor, etc.)? Please do not include plumbing leaks.	17/93 (18%)
2)	Do you have condensation problems at the inside face of any windows or doors??	25/93 (27%)
3)	Do you have glass block walls in your unit?	40/93 (43%)
4)	In the past 2 years have you noticed any leaking, condensation and/or cracking of the joints of the glass block section of the wall?	14/93 (15%)
5)	Have you had any difficulty operating exterior windows or doors?	14/93 (15%)
6)	Have you had any problems relating to decks or balconies?	28/93 (30%)
7)	Do you have problems with mold, fungi or mildew on walls or windows? This is typically black, brown, or orange staining.	32/93 (34%)
8)	Do you notice cooking or other odors from other units while inside your unit?	13/93 (14%)
9)	Have you noticed any other problems relating to the building exterior?	24/93 (26%)

Several observations can be made based on the responses to the surveys:

→ Condensation and organic growth are common problems for many of the owners at the Quintet. While not the sole cause, condensation can lead to organic growth at windows, doors, and interior finishes.

→ Problems with the balconies and decks are frequently mentioned by the owners.

→ 35% (14/40) of respondents with glass block windows reported leaking, condensation, or cracking.

The survey results can be valuable in that they support and guide further investigative work and direct us to issues or areas of concern. However, the results are not necessarily statistically significant or representative of the conditions within the building due to the limited response rate. In many cases, residents who do not have problems or concerns to report do not submit a survey.

A copy of the full survey responses is attached in Appendix A.

2.2 Building History

A brief history of activities and events relating to the building enclosure assemblies as reported to us or as described in the documents reviewed is listed in Table 2.4. The buildings are approximately 30 years old and as a result complete historical details are not available.

TABLE 2.4 BUILDING ACTIVITIES RELATED TO ENCLOSURE PERFORMANCE	
DATE	
1990	Original construction
1999	Concrete Slab Repair – Building 4
1999	Open-air corridors coated
2002-2003	Buildings 4 and 5 Painted
2003	Building 3 Painted
2006	Buildings 1 and 2 Painted
2008	Stairwell Repair and Coating
2008 - 2009	Clubhouse Pool Roof Repair and Membrane Replacement
2009	Window Replacement Guidelines Developed
2010	Building 5 Painted
2012	Building 4 Painted
2013	Stairwell Repair and Recoating
2013 - 2014	Building 3 Painted
2013 - Present	Glass Block Wall Repairs
2015	Building 1 Painted
2017	Building 2 Painted
2021	Building 1 Planter Renewals
2021	Targeted replacement of low-slope roof areas

2.3 Documents Reviewed

The documents provided to and reviewed by RDH are listed in Table 2.5

TABLE 2.5 DOCUMENTS REVIEWED	
DOCUMENT DESCRIPTION	
Architectural Drawings	Otak Architects
Structural Drawings	KPFF Consulting Engineers
Glass Block Investigation	RDH Building Science Inc. dated June 24, 2011
Building Enclosure Condition Assessment	RDH Building Science Inc. dated August 17, 2015
Window Replacement Specifications and Drawings	RDH Building Science Inc. dated December 14, 2015
Window Replacement Specifications	Certa Building Solutions dated May 21, 2021
Building 1 Planter Renewals Summary Presentation	Certa Building Solutions (No Date)
Building 1 Planter Renewals Field Reports 4 and 5	Certa Building Solutions dated August 11 and October 12, 2021

2.4 Field Work Investigation

Our field work for the condition assessment was conducted during October 2021 and consisted of the following:

→ General walk around of the building exteriors, open-air corridors, and parking garages.

→ A visual review of the sloped and flat roof areas of each building.

→ Interior walk through of 22 residential units, allowing for inspection of windows, exterior doors, balconies and decks, and interior operating conditions.

Field work is intended as a way of making general observations regarding the overall condition of building enclosure elements, exterior maintainable elements, and construction details.

TABLE 2.6 RDH FIELD WORK INVESTIGATION	
October 19, 2021	Exterior review at Clubhouse, Buildings 4 and 5
October 25, 2021	Roof review at Building 4 and 5 Exterior review at all buildings Interior review at Units 126, 216, 520, 524, 456, 340, 240, 327, 421, 545, 125
October 26, 2021	Roof review at Buildings 1, 2, and 3 Exterior review at Buildings 1 and 2 Interior review at Units 542, 333, 427, 111, 238, 135, 138, 143, 243, 537, 317, 434

TABLE 2.7 INSPECTED UNITS				
Building 1	Building 2	Building 3	Building 4	Building 5
Unit 111	Unit 216	Unit 317	Unit 421	Unit 520
Unit 125	Unit 238	Unit 327	Unit 427	Unit 524
Unit 126	Unit 240	Unit 333	Unit 434	Unit 537
Unit 138	Unit 243	Unit 340	Unit 456	Unit 542
Unit 143				Unit 545

3 Observations, Discussion and Recommendations

3.1 Interior Operating Conditions

Summary of Observations

Our observations relating to the interior operating conditions are listed below.

- → Each unit has a central gas or electric furnace as well as a natural gas fireplace. Condensation is observed inside the fireplace at the unoccupied Unit 340.
- → All units we accessed have installed an air conditioner condensing unit on their balcony to provide interior cooling.
- → Fresh air is provided through opening windows and doors and incidental air leakage.
- → Each unit has laundry facilities.
  - → Some units have designated laundry rooms while others have the washer and dryer housed in the closet.
  - → The dryers are vented to the exterior of units at the open-air corridors.
- → Kitchens are equipped with range hoods above stove tops.
- → Bathrooms are equipped with fans exhausting to the exterior to help manage additional moisture caused by cooking and bathing.
- → New owner-provided fans in bathrooms or range hoods in their kitchens are present at some units. Range hood updates are more common, with many units appearing to have original bathroom fans.
- → Condensation observed at windows and window frames in several units.
  Evidence of water damage on the adjacent gypsum and finish surfaces.
- → Evidence of historic elevated interior humidity, including stud shadowing, condensation, and damage to interior finishes.
- → Elevated moisture content (0.3 - 0.7%) of gypsum wallboard adjacent to windows and at the NW corner of Unit 111 indicating potential water ingress.
- → Damp surfaces and elevated moisture content at SW corner of Unit 524 adjacent to replaced glass blocks indicating potential water ingress.
- → Occupants of Units 238, 243, 248 reported hearing occasional loud popping sounds possibly related to building movement caused by heat cycling and environmental forces.

Discussion of Interior Moisture Concerns

Percent relative humidity (% RH) and air temperature readings were taken while conducting the walk-throughs. The dew point temperature is the surface temperature at which condensation occurs at a certain moisture content of the air, and was calculated using psychrometrics (physical properties of air and water). Warmer air holds more moisture and is associated with a lower % RH for the same amount of moisture content in the air. Cold surfaces at or below the dew point of the air will collect condensation.

Liquid water from condensation can be absorbed by porous materials, such as wood and gypsum finishes, where it may promote organic growth and material deterioration, with potential negative impacts to occupant health and durability of finishes. Minor surface condensation may also result in water stains or "stud shadowing" where dust is attracted to the wet surface. Neither are necessarily indicators of leakage, but may indicate a history of high humidity, poor air circulation, and lack of insulation.

Minimizing negative impacts of interior moisture includes managing temperature and humidity levels to keep the dew point below surface temperatures.

Table 3.1 summarizes the readings and corresponding dew point temperature associated with those readings. Units with interior moisture concerns are highlighted according to severity of observations, indicating **no/minor moisture concerns**, **moderate moisture concerns**, and **major moisture concerns/moisture damage**.

TABLE 3.1 RECORDED TEMPERATURE AND RELATIVE HUMIDITY READINGS			
Date: October 25, 2021; **Weather**: Cloudy, Light Rain			
Unit	Temperature (˚F)	Relative Humidity (%RH)	Dew Point (˚F)
Exterior	59F High/53F Low	83% High/49% Low	48F High/38F Low
125	74	52	55
126	68	56	51
216	70	46	48
240	67	66	55
317	65	52	47
327	68	60	53
340	--	--	--
421	75	56	58
434	77	50	57
456	70	52	52
520	68	65	56
524	66	47	45
545	76	50	56
Date: October 26, 2021; **Weather**: Cloudy, Light Rain			
Unit	Temperature (˚F)	Relative Humidity (%RH)	Dew Point (˚F)
Exterior	58F/52F	89%/69%	51F/46F
111	66	66	54
138	--	--	--
143	65	77	58
238	66	61	52
243	70	--	--

TABLE 3.1 RECORDED TEMPERATURE AND RELATIVE HUMIDITY READINGS			
333	62	74	54
427	64	82	59
537	71	54	53
542	62	63	49

Figure 3.1

Unit 520

"Stud shadowing" at vaulted ceiling

Figure 3.2

Typical original bathroom fan unit with bulb heater

Figure 3.3

Unit 340

Fogging observed in gas fireplace

Figure 3.4

Unit 111

Elevated moisture content and potential organic growth at NW corner of second bedroom.

Discussion and Recommendations

Condensation, moisture staining, and organic growth can result from enclosure assemblies with low thermal resistance when accompanied by high levels of humidity. Both the window and wall enclosure assemblies at the Quintet are not thermally broken, with the aluminum window frames and steel stud finish supports acting as significant thermal bridges. Interior humidity levels can be impacted by an enclosure's air and vapor tightness, the functionality and effectiveness of mechanical systems, as well as occupant activity.

Moisture sources associated with mechanical systems include leaking or blocked ventilation and exhaust systems. We did not review individual mechanical systems for deficiencies and recommend that the mechanical systems be inspected at regular intervals.

Moisture sources associated with occupant activities include breathing, bathing, cooking, cleaning, plants, pets, and children. Efficient bathroom, kitchen, and laundry room fans are critical to expelling moisture. Non-functioning and poorly functioning interior fans will be insufficient at mitigating problematic humidity levels.

Condensation and elevated humidity levels are overarching concerns because the condensate moisture can create the condition ideal for mold and organic growth at the finish faces and within the wall system, as well as decay to the wall structure. We recommend that the management at the Quintet continue to actively engage in managing moisture sources and humidity. This engagement includes distributing a memo to all residents providing guidance for how best to manage interior humidity. This memo should include the following:

→ Use bathroom fans when showering or bathing and run for 30 minutes after activity.

→ Use laundry room fans when washing and drying, run for 30 minutes after activity.

→ Use range hoods when cooking. Clean range hood filters to maintain good air intake.

→ Maintain interior air temperature between 68F and 73F.

→ Do not use the gas fireplaces as a primary heating source for the unit.

→ Open blinds during the day to increase air flow against the windows, especially in cold weather.

→ Sleep with a window cracked or a bedroom door open to increase air flow.

→ Open a window slightly when performing activities that produce excess water vapor to increase air flow.

We also recommend that the residents replace old bathroom and laundry exhaust fans with a new, quiet operation, high volume fans. Fans that are not operational should be repaired or replaced. Residents should also inspect their range hoods while in operation and feel for any air leaks at the exhaust pipe above the hood. Range hoods with low air intake or leaks in the exhaust should be repaired or replaced.

We note that the natural gas fireplaces at the Quintet are not intended as primary heat sources. The residential units do not appear to be designed with air circulation to keep the whole unit at a consistent temperature and humidity. Therefore, heating with the fireplace will increase the temperature in one part of the unit, but not the rest. This condition may result in regions of the unit not being adequately heated and consequentially cause surfaces at windows and walls to fall below the dewpoint, resulting in condensation. Additionally, natural gas fireplaces are an inefficient heat source compared to an electric central furnace. We recommend that a qualified natural gas fireplace inspector be engaged on a regular basis to conduct inspection and repair.

RECOMMENDATIONS	
1	*Deficiency*: Investigate potential leaks at Unit 111 and 524 causing surface wetting and elevated moisture content in interior finishes.
2	*Deficiency*: Investigate major humidity/moisture concerns at Units 126, 243, 333, 427, and 520.
3	*Deficiency*: Investigate popping sound occurring at Building 2.
4	*Maintenance*: Engage qualified personnel to inspect mechanical systems and fireplaces at regular intervals at all units.
5	*Maintenance*: Distribute a memo providing residents and owners with guidelines for managing interior humidity

RECOMMENDATIONS	
6	*Deficiency*: At non-operational and poorly operating fans in bathrooms, laundry rooms, and kitchens, repair or replace with higher capacity units.

3.2 CMU Walls

The primary above-ground structure of the Quintet consists of a reinforced Concrete Masonry Unit (CMU) wall assembly. This section focuses on the wall assembly itself, as well as penetrations and other features within the wall areas.

3.2.1 General Assembly

Based on record drawings, the typical wall assembly of the buildings at the Quintet consists of (from exterior to interior):

→ Exterior coatings (paint)

→ Single Wythe Reinforced CMU wall

  → Consists of standard 8x16 (7 5/8" x 11 5/8") concrete masonry units with 3/8" mortar joint, and rebar reinforcement

→ Steel studs insulated with fiberglass batt insulation

→ No vapor barrier present

→ Gypsum wall board

→ Interior finish (paint)

The structural drawings indicate that the cores in the CMU walls are grouted solid with reinforcing steel that is placed vertically in the cores, and horizontally at locations that must act as a beam (such as at window and door heads).

At most locations at the perimeter of the Quintet buildings, the CMU wall borders a residential unit or occupied space at the clubhouse. At these locations, a steel stud wall assembly is set immediately at the interior face of the CMU. The steel stud wall framing contains fiberglass batt insulation and supports the interior gypsum board and painted finishes. The enclosure assembly at the clubhouse pool consists only of a CMU wall with a finish coating on both the interior and exterior spaces.

At open-air walkways and balconies, the CMU walls and columns are exterior facing on both sides. The exterior block finish varies between a coarse split face texture and a smoother flat texture.

CMU walls and columns are coated at all exterior faces, including at landscaping walls. The walls at the Quintet have been painted multiple times with an elastomeric waterproofing coating.

All observations were made from ground level, open-air corridors at each floor, unit balconies, and roofs. The following observations were made during our review of the CMU walls:

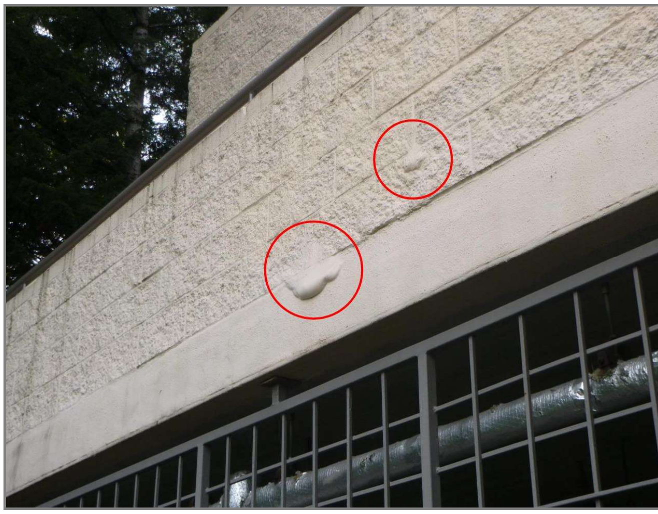

Figure 3.5

Building 4 west end

Blistering on exterior CMU

Figure 3.6

Building 3

Peeled and blistering coating

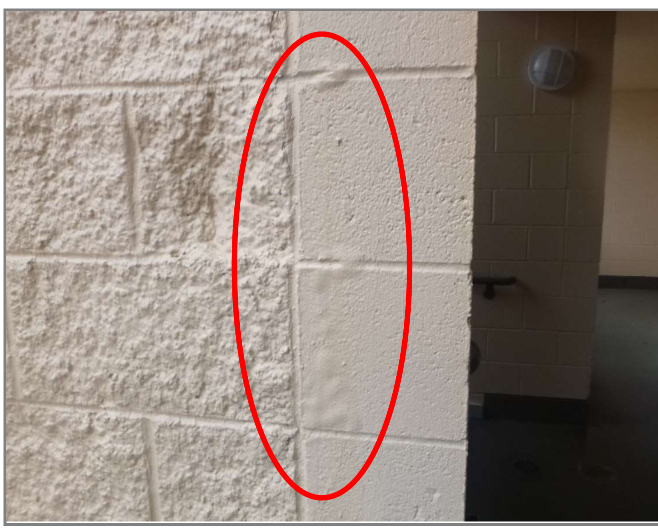

Figure 3.7

Building 1

Blistering coating at an open-air corridor

Figure 3.8

Building 1

Blistering coating at open-air corridor stairwell

Figure 3.9

Clubhouse

UV degradation resulting in pinholes in coating.

Figure 3.10

Building 1

Failed coating below scupper at open-air corridor

Figure 3.11

Building 5

Crack in coating and CMU at open-air corridor

Figure 3.12

Building 5

Organic staining at exterior CMU wall

Figure 3.13

Building 5

Failed coating at base of exterior wall

Figure 3.14

Building 3

Abrasion wear on open-air corridor coating

Different colors of paint may indicate possible history of repairs.

Typical Observations:

- → The coating is blistering intermittently on vertical surfaces at all buildings, including at the exterior façade and at the open-air corridors.
- → Minor UV degradation is observed at some places resulting in pinholes in the coating.
- → Staining is present around the base of walls, in the open-air corridors, below balcony drains, below windows, below wall vents, and at the chimneys.
- → The base of wall lacks a definite termination. Coating layers are not consistently applied to the base of wall.
  - → Plaza-facing elevations include planters, which are further discussed in Section 3.6.2. CMU wall generally extends into the planter.
  - → Exterior grade is in direct contact with CMU at non plaza-facing elevations. Dirt staining from splash back is prominent.
- → Organic staining is present on the walls throughout the perimeter of the buildings.
- → Some coating is peeled at the exterior walls.
- → The coating is failed at a few locations with cracks in the CMU walls.
- → The coating is failing at the transition from horizontal CMU surfaces to vertical CMU columns.

Discussion and Recommendations

The CMU wall assemblies at the Quintet can be classified as face-sealed mass wall systems. A face-seal strategy relies on stopping all water at a single surface located on the exterior face of the assembly, and is heavily reliant on continuity of exterior coating and sealant. A mass or storage system controls rain penetration by deflecting some water on the surface of the assembly and by storing moisture within the assembly materials, with the moisture eventually drying before it reaches materials that are susceptible to moisture damage.

CMU blocks can be quite porous, and also have a very limited capacity for storing moisture. Cracks in the concrete or mortar joints also serve as a direct pathway for water ingress. Moisture that penetrates the enclosure can cause damage to the insulation, steel stud framing, and interior finishes. Continual moisture exposure can eventually cause corrosion of the steel reinforcing materials. Steel expands as it corrodes causing the concrete to crack and spall. Consequentially, it is critical to manage moisture entry to the CMU walls continuously and effectively by maintaining a robust exterior coating.

We understand that the elastomeric paint coating product chosen after our previous assessment was Miller Paint StoCoat Acryl Plus. Repainting activities are currently scheduled as a touch up every 4 years and full painting every 16 years, relative to the Miller Paint warranty. The general material warranty, however, does not necessarily reflect the actual performance of the product as installed. We observed deteriorated and delaminated paint at both Building 5, with the oldest coating applied in 2010, and at Building 2, with the newest coating applied in 2017. The paint coating will deteriorate over time from various factors including exposure to UV, continuous wetting, and wearing down. All buildings at the Quintet have high exposure to UV from sunlight due to location overlooking the West Hills. This location also experiences excessive wetting due to the Pacific Northwest climate, high humidity causing fog and condensation during the winter, and proximity to trees and other plant life.

The paint will also deteriorate over time due to mechanical or abrasive wear. Mechanical wear refers to movement (expansion and contraction) of the material with temperature cycling, while abrasive wear refers to foreign objects rubbing on the coating, such as tree branches, and will accelerate this aging process.

Water can enter the wall system at penetrations and interfaces where the paint coating is deteriorated and discontinuous. This can contribute to the delamination and blistering observed in the exterior coating as outlined below:

- → Liquid moisture retained in the wall assembly can change state to a gas and expand when warmed, resulting in a pressure differential that separates the layers. The formation of blisters that can cause the coatings to delaminate. Over time these blisters can collect substantial amounts of moisture.
- → Blisters can also form because of moisture drying cycles. As there is no vapor barrier in the wall assembly, moisture can pass through the building enclosure, migrating to the inside of the building in cold, wet conditions, and the outside of the building in warm, dry conditions. When moisture is driven to the outside of the building it can delaminate the coating and form blisters.
- → Lack of adhesion between layers of coatings may result in delamination when the bond between layers fails.

Continuity of the exterior coating and sealants is crucial to the continued performance of the wall assembly. Additionally, applying new paint over top of delaminated paint is not effective, and will cause the new paint to also fail. It is not clear whether removal of failed paint was conducted during the most recent repainting event. Based on the condition of the coating we expect that targeted recoating and re-sealing is needed in the next 1-2 years, and whole-building recoating and re-sealing will be necessary within the next 5 years. This work should include removal of failed paint and use of any primers necessary to promote adhesion between the new paint and the substrate. Paint substrates need to be dry, as wet surfaces will interfere with the paint’s bond to the wall substrate. Considering the level of quality control that is likely required, we recommend developing a Project Specification for the painting work outlining the practices stated above. We also recommend the property manager's representative take an active role during painting work for additional quality control.

As a potential upgrade to the current wall system, over-cladding the wall system with a more durable cladding material to shed most of the exterior moisture and provide a mechanism for drainage and drying of the CMU can provide additional means to manage exterior moisture, as previously recommended in our 2015 report. Other considerations would be to provide metal coping or capping to any horizontal masonry surfaces that are more susceptible to moisture loading. Both options will likely come at a premium cost due to the extent of modification to the existing system.

RECOMMENDATION	
7	*Deficiency*: Perform targeted resealing and recoating within 1-2 years.
8	*Maintenance*: Reseal and re-coat buildings within 5 years with robust elastomeric coating.
9	*Improvement*: Consider over-cladding as an additional measure to decrease exposure of CMU walls.

3.2.2 Penetrations

Penetrations are located at a variety of locations at the CMU walls and include light fixtures, open-air corridor scuppers, balcony scuppers, drains, open-air corridor security bar mounts, exhaust vents, soffit vents, and various conduit lines.

Water can enter the wall system at penetrations and interfaces where the coating and sealants are discontinuous. Maintaining continuous waterproofing at penetrations is key to the performance of the face-sealed system.

The following observations were made during our review of the CMU penetrations:

Figure 3.15

Building 4

Failed sealant at conduit penetration

Figure 3.16

Building 4

Failed and missing sealant at conduit penetrations at balcony wall

Figure 3.17

Building 1, Level 5

Missing slats and staining at exhaust vents in open-air corridor

→ The perimeter sealant at wall mounted penetrations is failed or absent in multiple locations, including at light fixtures, balcony scuppers, exhaust vents, and conduit lines.

→ Many intake/exhaust vents are missing horizontal slats and have had mesh inserts added to deter birds. Mesh inserts should not be installed on dryer vents as they are a life safety hazard and a code violation.

Discussion and Recommendations

Continuity and maintenance of the watertight seals at penetrations in the CMU wall system is another important component of moisture maintenance. As discussed in 3.2.1 General Assembly, a robust and continuous face seal at the Quintet buildings is critical for keeping moisture out of the wall system and preventing damage to both interior finishes and the structural concrete and steel.

At penetrations with failed or absent perimeter sealant—as listed in our observations above—remove any existing sealant, thoroughly clean the surface according to sealant manufacturer specifications, and install new sealant to be continuous with the coating.

Vent penetrations should be fitted with hood flashings designed to shed water and deter birds.

We also recommend that the round PVC scupper drains be updated to sheet metal scuppers with face plates. The sheet metal scupper design would have a flange that integrates with the deck coating at the interior, providing a seamless water shedding surface. Similarly, the face plate would cover the interface between the concrete and the scupper on the exterior to reduce the risk of water tracking back into the wall. This work would ideally be conducted at the same time as deck recoating to allow the scupper flange to be fully sealed.

RECOMMENDATION	
10	*Maintenance*: Replace sealants at all penetrations concurrently with exterior coating.
11	*Improvement*: Replace broken/failed vent covers with hood flashings.
12	*Improvement*: Provide sheet metal scupper and face plates at all scupper drains.

3.2.3 Glass Block Masonry Units

There are areas of glass block assemblies inserted into the perimeter CMU walls at The Quintet. RDH was previously involved in assessing and designing repairs for the glass block wall sections. Phased glass block replacements are ongoing, with most of the units visited reporting that their glass block has been replaced.

As stated in previous reports, the glass blocks are highly exposed and have no provision for movement caused by thermal expansion and contraction of the surrounding concrete. This introduces stresses in the glass and mortar joints leading to cracking and leakage. Fogging (condensation within the glass block), degradation of materials, and potential organic growth can all result from this unwanted water. Additionally, the glass blocks have little insulating value and can promote condensation on the interior surface.

We observed instances of cracked and fogging glass at areas not yet replaced. We are not aware of significant cracked glass or leakage at the areas with new glass blocks. However, the glass blocks have a limited life expectancy and have poor thermal resistance. We recommend considering replacing the glass block areas with windows with insulated glazing units in the future.

Figure 3.18

Glass block inserts, typical

Figure 3.19

Adjacent to Unit 456

Fogging present in glass blocks.

Figure 3.20

Unit 327

Minor cracks present at glass blocks

Figure 3.21

Unit 340

Localized black organic growth at mortar and windows, indicating ongoing condensation issues.

RECOMMENDATION	
13	*Maintenance*: Continue glass block replacement program and monitor for additional and premature glass breakage or leaks.
14	*Improvement*: Consider replacing glass block areas with thermally broken windows with insulated glazing units.

3.2.4 Metal Railings

Security bars and metal handrails penetrate the walls at both vertical and horizontal surfaces on the building exterior. Surface corrosion is present at the ground level open-air corridor security bars and the upper-level open-air corridor railings. The coatings are blistering and peeling at the metal bars and railings, as well as at the horizontal and vertical CMU surfaces adjacent the bar and railing mounts.

Handrails are also present at the guard walls of individual unit balconies. The coating on guard wall metal railings is often cracking and peeling.

Figure 3.22

Building 1

Failed seal at corroding metal anchor mounts

Figure 3.23

Building 5

Peeled coating at metal railing

Figure 3.24

Unit 456

Worn handrail coating. Tape added by Owner.

Railings should be remediated and repainted on a regular basis. We recommend conducting this work concurrently with the next concrete resealing event. Railing surfaces should be prepared according to paint manufacturer specifications and painted with a direct-to-metal paint designed for exposure.

RECOMMENDATION	
15	*Maintenance*: Repaint railings concurrently with next concrete resealing event. Remediate corrosion and remove delaminated paint. Prime and paint metal railing components with a direct-to-metal paint.

3.3 Windows & Doors

Many window and door configurations are present the Quintet property. Unless noted otherwise, glazing lites are typically insulated glazing units (IGUs). We understand that windows located at individual units are generally owner responsibility, however the windows located at ground-floor lobbies and the clubhouse would be considered common property.

We observed the following window and door configurations:

→ Aluminum-framed punched windows in fixed and slider configurations. Some units have replaced windows with newer vinyl- or fiberglass-framed units.

- Aluminum-framed sliding doors at individual units. Some units have replaced with newer vinyl- or fiberglass-framed doors.
- Skylights at clubhouse.
- Aluminum-framed storefront system at entry and elevator lobbies.
- Individual unit hinged entry and balcony access doors with weather stripping. Some units have an Owner-added screen door.
- Hollow metal egress, service, and common area doors.
- Coiling overhead door at trash receptacles.

3.3.1 Glass Block Masonry Units

Glass block masonry units are present throughout the property. Detailed discussion of glass block masonry is included in Section 3.2.3 above.

3.3.2 Aluminum Punched Windows

The original windows in residential units and at elevator lobbies are operable horizontal sliders with double-pane IGUs. Sliding windows are present in 2-, 4-, and 8-pane configurations. Fixed exterior-glazed units are also present at the clubhouse in 4- and 8-pane configurations.

The aluminum window frames do not appear to be thermally broken. Some owners have replaced their windows with vinyl- or fiberglass-framed windows with better insulating value.

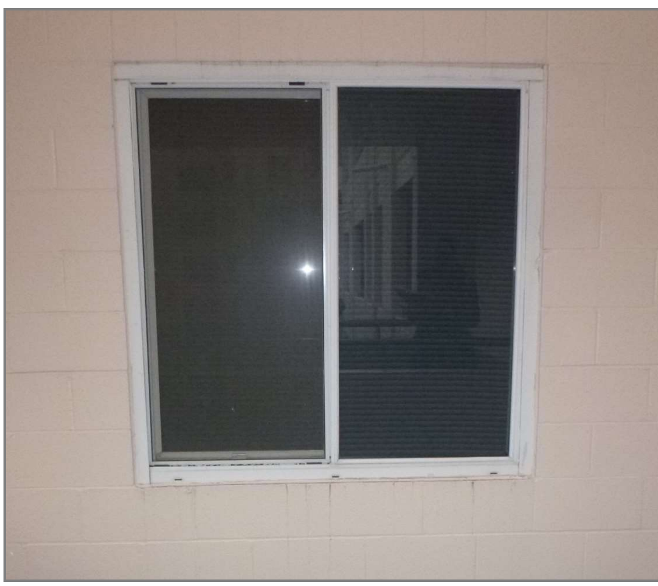

Figure 3.25
Building 2 corridor
Typical 2-pane sliding window.

Figure 3.26

Typical 4-pane sliding window.

Figure 3.27

8-pane sliding window. Example has been replaced with new vinyl-framed system.

Figure 3.28

Clubhouse south elevation

4-pane exterior-glazed fixed windows. Note inconsistently spaced weeps.

Figure 3.29

Clubhouse south elevation

8-pane fixed windows.

Figure 3.30

Unit 243

Failed glazing putty

Figure 3.31

Clubhouse west elevation.

Damaged glazing cap leading to missing/discontinuous glazing gasket.

Figure 3.32

Unit 427

Condensation on interior window face and organic growth on window frame and adjacent finishes

Figure 3.33

Unit 520

High levels of condensation and organic growth at interior finishes adjacent to window

Figure 3.34

Unit 520

Condensation and organic growth at interior finishes adjacent to window.

→ Original windows typically lack head and sill flashings. This is not an issue at the low-exposure lobby windows, but can contribute to leakage and premature degradation at high-exposure areas at individual units.

→ Installation detailing at replacement windows varies. Typically, sill pans are observed and many of the new windows also have head flashing installed. Our recommended detail for new windows moving forward includes waterproofing at the rough opening, back angle for interior air seal, head flashing, and 2-piece sill flashing.

- → Original windows typically have weeps placed at approximately 24 inches on-center. Weeps are generally aligned at the center mullion of sliders. Weeps are not consistently aligned at fixed windows.
- → Windows are primarily exterior-glazed with glazing putty and aluminum glazing cap. Many original windows have displaced glazing cap and failed glazing putty.
- → Several owners reported condensation or organic growth on window frames and adjacent interior finishes. Placement of curtains or blinds at windows can add insulating value to the window area, but can also contribute to lower surface temperatures on the window itself, promoting condensation and organic growth.
- → Most original aluminum framed horizontal slider windows are tight and difficult to open, and as a result are not frequently used for ventilation.
  - → Faulty window operation can indicate warping/damage to the window frame, blockage of moving components by corrosion or organic growth, or lack of maintenance.
  - → Faulty window operation can lead to windows not closing completely, allowing for air leakage.
- → There is organic growth at the exterior of some window frames, indicating inadequate water shedding.

Discussion and Recommendations

The original aluminum-framed punched windows are now over 30 years old and nearing end of life. Additionally, condensation and other problems with windows largely contributed to occupant survey results and the overall building enclosure performance.

We understand that the windows are the responsibility of unit owners from the standpoint of the homeowners' association bylaws and reserve study. However, we have included the windows in this report because they account for a large portion of the building exterior and have a direct influence on the building envelope performance.

We suggest that if there is widespread interest in window replacement among the owners, that the interested parties seek out bids from contractors for performing the multiple window replacements as a single or phased project. Replacing windows in multiple units at once may lower individual owner costs through group window pricing and more efficient mobilization and staging. An additional benefit to this approach is that having one contractor source and install many windows may make it easier to ensure consistent adherence to the established new window specifications and detailing.

We recommend that new windows be thermally broken vinyl- or fiberglass-framed units with IGUs. Rough openings should be detailed with a silyl-terminated polyether (STPe) fluid-applied flashing lapping over the sill back angle. Head and sill flashing should be provided to decrease exposure of the new window.. The reviewed Window Replacement Specifications document by Certa Building Solutions provides an acceptable reference for window replacement, however, we note that this document only provides specifications for the windows themselves and does not include waterproofing specifications or details.

We recommend that these specifications be used in conjunction with our recommended window wrap details included in Appendix B

Additionally, many problems with window operation can be mitigated with regular maintenance. Window components should be lubricated and inspected for damage on an annual basis. We recommend including window inspection and maintenance as part of the maintenance team's duties as a convenience to Owners and to ensure that it is conducted consistently.

RECOMMENDATIONS	
16	*Improvement*: Recommended to replace all original aluminum-framed windows. Work can be done at once or in phases to minimize individual cost to Owners.
17	*Improvement*: Provide thermally broken vinyl- or fiberglass-framed windows with IGUs. Detail window rough openings with waterproofing and sill back angle. Provide head and sill flashings to decrease window exposure.
18	*Maintenance*: Inspect and maintain windows annually.

3.3.3 Aluminum-Framed Sliding Doors

Aluminum-framed sliding doors are present at each unit at the balcony. Loft units with a second balcony have an additional siding door. The sliding doors appear to be of a similar assembly to the sliding windows. Primary concerns regarding sliding doors include air leakage and condensation.

Head flashings are not provided at sliding doors. While most sliding doors are relatively low exposure, doors at loft units with higher balcony ceilings have a greater risk of wetting and water intrusion.

Figure 3.35

Unit 340

Typical sliding door.

Figure 3.36

Unit 126

Organic growth/staining at frame.

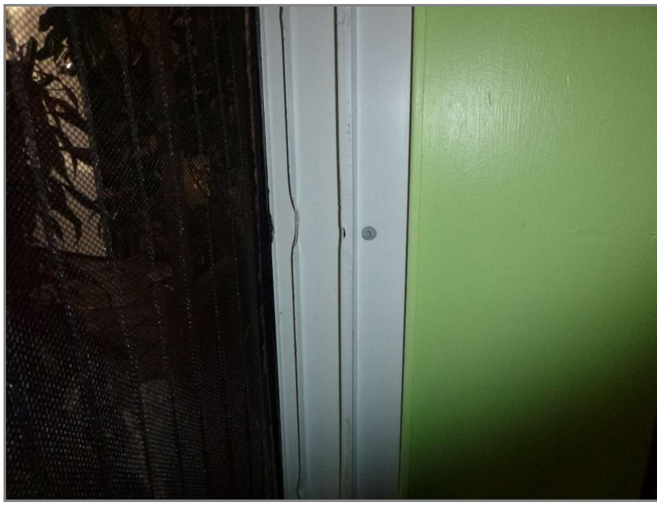

Figure 3.37

Unit 216

Damage to aluminum frame and door gasket.

Figure 3.38

Unit 427

Condensation and organic growth on sliding door glass, sliding door frame, and carpet

Figure 3.39

Unit 143

Displaced rubber gasket

- → Aluminum sliding glass doors at residential units often show signs of organic growth at the frame and adjacent interior finishes. Occasionally there is condensation on the frame and lower portions of glass, near the threshold.
- → Some aluminum sliding glass doors have damaged or displaced glazing gaskets.
- → Operation of aluminum sliding doors is typically acceptable. Some doors are difficult to operate and lock.
- → We did not observe condensation at the new vinyl sliding glass door systems reviewed.

Similar to the windows, the sliding doors are approximately 30 years old and nearing end of life. Additionally, they constitute a significant source of heat loss from each unit, which impacts occupant comfort and energy use. Several owners interviewed indicated plans to replace their sliding doors in the near future. We recommend replacing sliding doors concurrently with the windows to minimize individual owner cost. New units should be thermally broken vinyl- or fiberglass-framed units. Head flashings should be provided at all doors but are especially important to provide at units with high exposure.

As with the windows, continued maintenance of doors will ensure longevity and proper performance.

RECOMMENDATIONS	
19	*Improvement*: Replace sliding doors with thermally broken vinyl- or fiberglass-framed units within 5 years. Highly recommended to provide head flashings at all units, at a minimum they should be provided at units with high exposure.
20	*Maintenance*: Inspect and maintain sliding doors annually.

3.3.4 Skylights

Skylights are present at the clubhouse atrium. Skylights appear to be a similar configuration to the aluminum-framed storefront system. We did not closely review the skylight assemblies. Skylights should be routinely inspected and cleaned to ensure acceptable performance for the remainder of their service life.

Figure 3.40

Clubhouse atrium skylights.

RECOMMENDATION	
21	*Maintenance*: Inspect and clean skylights twice annually.

3.3.5 Aluminum-Framed Storefront System

Aluminum framed storefront windows and doors are manufactured by Pacific Aluminum Company and are present at the entry doors at the clubhouse, entry lobbies, and elevator lobbies at the central and auxiliary elevators.

At the central entry lobby of each building are two sets of aluminum framed double doors with full height double-pane glass. One set of doors provides access to the exterior and the second set of doors provides access to the conditioned elevator lobby. Within the elevator lobby is an additional single aluminum frame door with full height glass which provides egress to the rear.

Two metal hollow frame doors per building provide egress at each end of the ground level open-air corridors. The buildings also have one set of aluminum framed double doors with full height double pane glass at the exterior auxiliary elevator vestibule.

Figure 3.41

Building 5

Storefront system at building entry.

Figure 3.42

Clubhouse west elevation

Storefront system at clubhouse atrium

Figure 3.43

Building 4

Typical auxiliary elevator lobby storefront door.

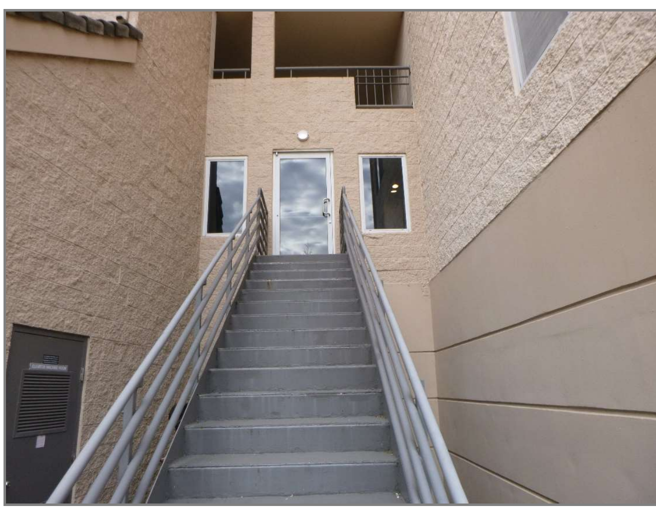

Figure 3.44

Rear door at central elevator lobby

Aluminum storefront components are generally in good condition. Gaskets are typically properly seated. Perimeter seals are painted over, but appear continuous and free of damage. Weeps are present in the horizontal mullions approximately 6 inches from corners. At most areas, the sidewalk/hardscape is covering the bottom edge of the storefront frame.

Figure 3.45

Building 1

Typical storefront gasket, mullions, and perimeter seal.

Figure 3.46

Building 1

Typical weeps.

Figure 3.47

Clubhouse west elevation

Hardscape covers bottom edge of storefront system.

The aluminum framed double doors at the entrance lobbies, elevator lobbies, and auxiliary elevator vestibules often do not form a full seal at their perimeter. In some locations the doors are misaligned and their locking mechanisms are difficult to operate

(Building 2). Additionally, failed sealants and damaged sweeps are observed at the door sill.

Figure 3.48
Building 1
Gap between aluminum doors

Figure 3.49
Clubhouse south elevation
Failed sealants and sweep.

Discussion and Recommendations

Despite the storefront systems being approximately 30 years old, most components appear to be in acceptable condition. This is primarily due to the storefront system not generally constituting the separation between conditioned and unconditioned spaces, and mostly being protected under large overhangs. The lack of a temperature and humidity differential and protection from wetting helps to protect against premature degradation of the gaskets and glazing units.

The systems installed at the clubhouse and the residential elevator lobbies do constitute the separation between conditioned and unconditioned space. However, they are still observed to be in good condition. We expect that with continued maintenance, including replacement of gaskets and sweeps, the storefront systems should continue to perform for the rest of their service life.

Faulty operation and locking of storefront doors are a potential security concern, and should be serviced to maintain acceptable function.

RECOMMENDATION	
22	*Maintenance*: Service and clean storefront system annually. This work should include replacing failed sealants, gaskets, and sweeps.
23	*Maintenance*: Service locking and operation mechanisms.

3.3.6 Hollow Metal Doors and Unit Doors

Each residential unit has one exterior hinged door at the unit entry, and one hinged light wood frame door at the balcony storage room. Most units also have a hinged door with a double-pane glass panel insert that leads to the balcony from the living room. Some loft units have a second sliding glass door which leads to their upper balcony through the upstairs bedroom. In one inspected loft unit (Unit 545), a storage room at the upper level has been connected and converted into living space with an exterior hinged door that provides access to the upper-level open-air corridor.

Additional communal exterior doors at each building include one metal hollow frame louvered door at each of the two elevator machine rooms.

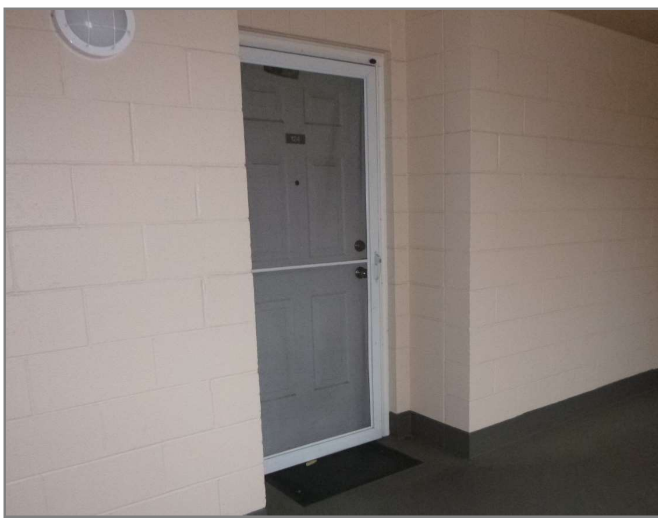

Figure 3.50

Unit 124

Typical unit entry door with Owner-added screen door.

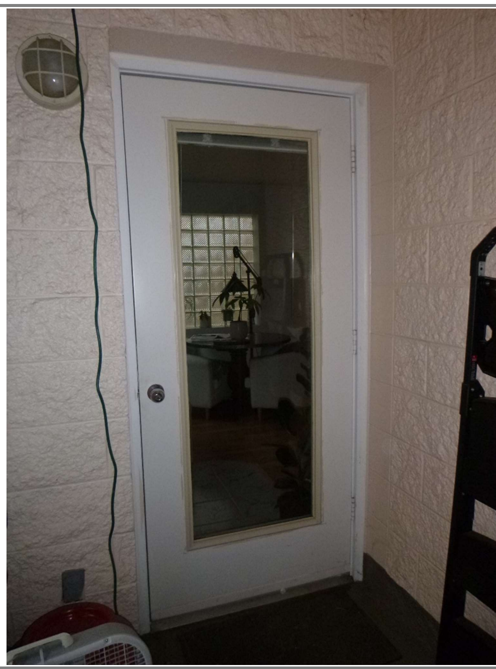

Figure 3.51

Unit 126

Typical balcony hinged door.

Figure 3.52

Building 1

Typical elevator machine room door.

→ There is often a large gap at the bottom of the hollow metal egress doors. At some door locations, the exterior walkway is backsloped towards the building and water enters the open-air corridors through the gap under the door.

→ Many of the exterior front doors at residential units have damaged or missing weatherstripping and door sweeps.

Figure 3.53

Building 4

Water ingress below metal hollow core egress door

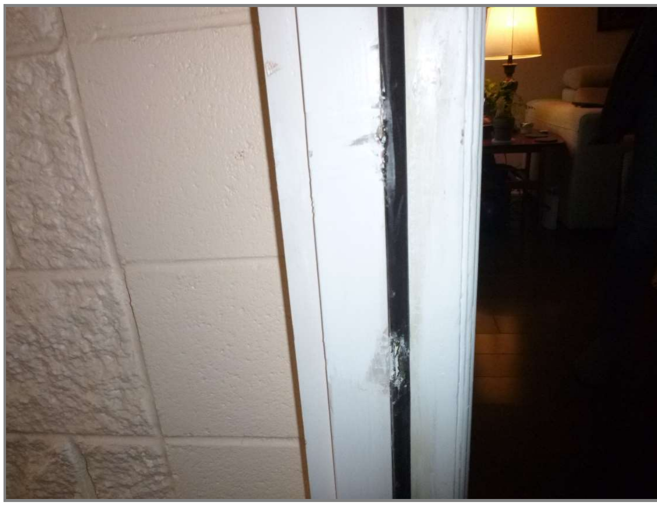

Figure 3.54

Unit 216

Damaged weatherstripping

Figure 3.55

Unit 340

Damaged sweep

Unit doors constitute a separation between conditioned and unconditioned spaces, and should be a priority for maintenance. Failed weather stripping and sweeps at unit entries and balcony doors should be replaced with new materials.

Metal egress and access doors are highly exposed, and in some cases are allowing unwanted water entry into corridor and service areas. Installation of awnings may reduce the moisture load on these doors, but will not address issues with slope. At a minimum, service and egress doors should be inspected and cleaned on a regular basis to ensure continued acceptable operation.

RECOMMENDATION	
24	*Maintenance*: Replace weather stripping and sweeps at unit doors and all other doors separating conditioned and unconditioned spaces.
25	*Improvement*: Consider installing awnings at exposed doors to decrease the moisture load.
26	*Maintenance*: Inspect and clean service and egress doors annually.

3.3.7 Trash Receptacle Coiling Overhead Doors

Overheard coiling doors are present at the ends of each building facing the plaza at the trash receptacles. Paint is failing at the edges of some overhead rolling door frames near the ground, leading to surface corrosion.

Figure 3.56

Building 1

Typical overhead coiling door.

Figure 3.57

Building 1

Corrosion at coiling door frame.

RECOMMENDATION	
27	*Maintenance*: Remediate surface corrosion and remove failed paint. Repaint coiling doors and frames with a durable direct-to-metal paint.

3.4 Balconies, Decks, and Open-Air Corridors

Prior to discussion of balconies, decks, and open-air corridors, it is useful to state the definitions of these three terms within the context of this report.

- → Balcony refers to a horizontal surface exposed to outdoors and intended for pedestrian use but projecting from the building so that it is not located over a living space.
- → Deck refers to a horizontal surface exposed to outdoors, located over a living space, and intended for pedestrian use in addition to performing the function of a roof.
- → Open-air corridor refers to a hallway or passage connecting different parts of a building, while providing a means of egress.

The importance of the distinction between the three types of assemblies lies in the degree of risk associated with failure of waterproof membranes in each case. A leak in a balcony or open-air corridor membrane will not generally result in water entering the interior of the building and is therefore, to some degree, is less consequential than leakage in a deck where it is likely that water will penetrate to the interior of the building or parking structure. Most exposed areas at the Quintet are best categorized as balconies not over living space, while the ground-floor open-air corridors and plaza terrace are located over the parking garage and are therefore categorized as decks. Discussion of the plaza terrace is included in section 3.6.1 below.

The balcony, deck, and open-air corridor assemblies consist of the following elements (as viewed from the underside to the top side of the system):

- → Painted gypsum board (not present at parking garage)
- → Steel stud framed soffit / ceiling support (not present at parking garage)
- → Precast concrete hollow-core structural slabs
- → Topping slab
- → Paint or waterproof coating

The guard walls at the balconies and open-air corridors are constructed of CMUs and have a half-block solid grouted top cap. The guard walls are painted with a coating that covers both vertical faces and the horizontal top plane. Railings are cast into the tops of the guard walls.

3.4.1 Residential Unit Balconies

The following observations were made while conducting a visual review of the residential unit balconies:

Figure 3.58

Unit 340

Typical residential unit balcony

Figure 3.59

Unit 340

Failed coating at downspout penetration

Figure 3.60

Unit 216

Typical round scupper.

Figure 3.61

Unit 456

Standing water at balcony corner with no scupper

Figure 3.62

Unit 524

Failed coating at floor to wall transition

Figure 3.63

Unit 427

High levels of organic staining at balcony horizontal and vertical surfaces adjacent to tree

Figure 3.64

Unit 520

Blistering coating and gypsum board at soffit with downspout penetration

Figure 3.65

Unit 111

Large blister in coating at vented soffit with downspout penetration

- → Areas of poor drainage and standing water are common at the exterior corners of the balconies.
- → Most balconies have two PVC pipe drains—one at each corner. However, some units only have one drain for the whole balcony. These scuppers are relatively small (<3”) in diameter and are easily obstructed.
- → In some locations, the coating is failed at a horizontal to vertical transition or at a termination edge.
- → Some owners have installed new paint or coating at their balconies. In most instances, this appears to be a thin paint layer. The new coating at Unit 238 appears to be a urethane traffic coating with embedded granules.
- → Some Owners have overlaid wood or tile decking over the balcony surface. Unit 216 and Unit 327 have installed floating slatted floor tiles and Unit 545 has installed bedded stone tiles at their balconies.
  - → Overlay materials are problematic because they can frequently trap water against the coating surface, leading to accelerated degradation.
  - → Tile applied directly to coating also does not allow for inspection or replacement of the waterproof coating without removal of all finish materials.

- → Generally, the balcony coatings are in fair condition. The coating is a thin layer of paint and is not necessarily appropriate for foot traffic and managing water. At some units, signs of abrasion wear in the balcony field is evident.
- → Some balconies have downspouts penetrating their floor and ceiling. This condition is often accompanied by water damage to the ceiling coating and gypsum board at the unit below, as well as failed coating at the floor penetration.
- → The ceiling coating is blistering at the balcony edges.
- → At some locations, trees have grown to where their branches are within 16 inches of the building. Balconies in these locations appear to exhibit accelerated staining and wall coating deterioration.
- → The guard walls lack coping caps, with the horizontal surface coated with the same product as the vertical walls. These areas are especially vulnerable and increase the likelihood of water penetrating the coating.
- → The installation of air conditioning units varies: most support structures sit on top of the coating, but some have the coating applied overtop.

Discussion and Recommendations

The coating at unit balconies is primarily a thin paint layer, which is not generally appropriate for managing water on a horizontal surface. However, due to the large overhangs, low exposure, and acceptable slope at a majority of the balconies reviewed, we do not anticipate a high priority to replace balcony coating. Eventually, we recommend replacing the balcony coatings with a urethane pedestrian traffic coating and replacing through-wall scuppers with sheet metal scuppers with face plates. We recommend scuppers measure 4-inch x 6-inch to effectively manage water.

Units with downspouts penetrating the deck surface are extremely problematic for several reasons. Firstly, this configuration does not allow for the downspouts to be easily cleaned, which may cause debris to build up and clog the downspout. Secondly, in the case of clogged or leaking gutters, the downspout may become a pathway for leaks to penetrate the wall or soffit assembly. Finally, the metal downspouts expand and contract with temperature at a different rate than the rest of the building. This introduces stresses in the coating, which will fail. This failure then allows for water on the balcony surface to penetrate the soffit below. From our previous building enclosure assessment conducted in 2015, it is known that the gypsum sheathing is standard interior paper faced gypsum board and is not moisture rated. When replacing soffits, fiberglass moisture treated core material should be used.

Downspouts penetrating balconies need to be removed and re-routed to the exterior of the building. All damaged coating and soffit areas need to be repaired.

RECOMMENDATION	
28	*Improvement*: Recommended to replace balcony coatings with urethane traffic coatings. This work should include replacement of PVC scupper pipes with sheet metal scuppers with face plates.
29	*Maintenance*: Trim tree branches that are within 16 inches of the guard walls.

RECOMMENDATION	
30	*Deficiency*: Remove downspouts that penetrate decks and re-route on the exterior of the building. Repair damaged coating and soffit areas.

3.4.2 Open-Air Corridors

The open-air corridors constitute a large portion of the common area of the buildings. The concrete slabs at corridors are surfaced with a thin traffic coating similar to what is typical at balconies. The ground floor corridor is categorized as a deck as it is located directly above the parking garage.

Ground Floor Terrace Corridor

The following observations were made while conducting a visual review of the ground-floor open-air corridors:

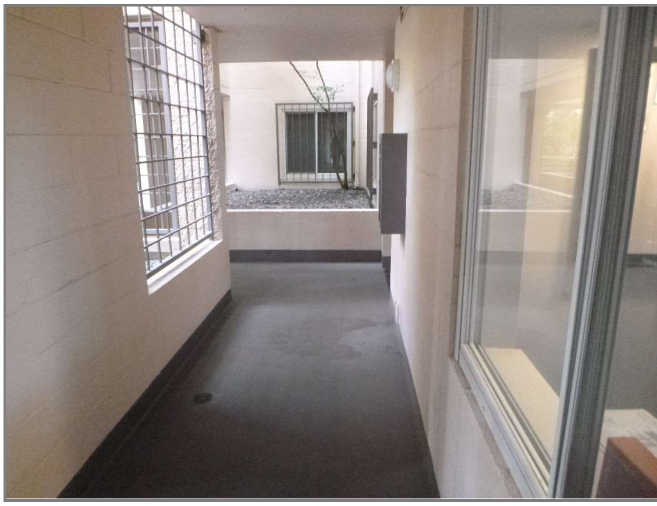

Figure 3.66

Building 5

Typical ground floor open-air corridor.

Figure 3.67

Building 5

Lack of slope resulting in poor drainage

Figure 3.68
Building 5
Typical floor drain.

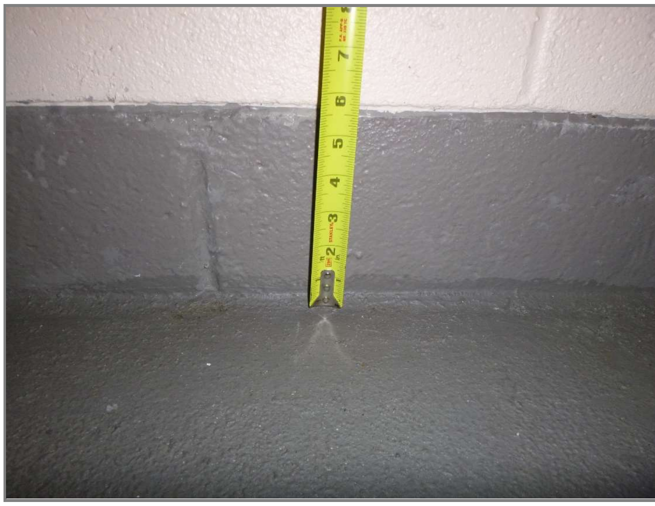

Figure 3.69
Building 5
Typical coating termination.

- Ground floor corridors tend to be less exposed to weather compared to upper levels due to bordering larger shear walls and the presence of the enclosed elevator lobby. However, this also means water that does penetrate the ground-floor corridor space is less likely to dry in the sunlight.
- Standing water is observed as an issue adjacent to lightwell planters, which collect the water runoff from the walls above.
- The ground floor is level with the exterior grade, allowing water to occasionally enter from the egress doors. See Figure 3.53 above.
- Floor drains are present intermittently at the ground floor. Drain bodies measure approximately 4 ½ inches in diameter with a 3-inch-wide flange.
- Deck coating typically turns up the wall approximately 6 inches.
- The ground floor experiences higher foot traffic due to building circulation.
  - There are typically three egress doors per building on the ground floor, located at the center lobby and at either end of the building.
  - The two stairwells located at each end of the building and the center elevator are the only ways to access the parking garage.

Floors 2-5 Balcony Corridor

The following observations were made while conducting a visual review of the upper floor open-air corridors:

Figure 3.70

Building 5

Typical open-air corridor at elevator lobby.

Figure 3.71

Building 5

Debris in scupper and failed coating at walkway

Figure 3.72

Typical localized failure of coating at open-air corridor floors where coating is worn off, revealing the lighter surface below

Figure 3.73

Building 1

Chipped and worn coating at drain flange.

Figure 3.74

Building 1

Failed coating and spalling gypsum board at corridor ceiling

Figure 3.75

Building 1

Drain pipe at underside of floor in Figure 3.73

→ Upper-level balcony corridors have significantly more surface area than the ground floor due to the open elevator landing area.

→ Balconies generally slope toward the plaza. However, areas with poor floor drainage are common, especially at the elevator landings, where water must travel 40+ feet across the corridor surface to drain. Inadequate slope and drainage paths result in areas of standing water.

→ Scuppers consist of openings in the concrete that are inconsistently fitted with PVC pipe extensions. The scuppers are relatively small in diameter and some are obstructed by debris.

→ Coating in the corridor floor field is locally failed in multiple locations.

→ In some locations, the coating is failed at a horizontal to vertical transition or at a termination edge

→ At Buildings 1 and 5, we note that floor drains have been installed in corridor floor, with pipes that drain at the exterior of the building. Coating is worn at the drain flange, indicating a combination of high foot traffic and potential lack of adhesion to the metal flange.

→ There are soffit vents at the outer edge of some open-air corridor ceilings. Occurrence of soffit vents is not consistent across the property. It is not clear whether these are original or have been added.

→ At the ceilings, the coating on the gypsum board is locally blistering along the soffit edge.

→ Sections of gypsum are spalling or missing where damage to the soffit paint and gypsum board has progressed, leaving openings in the ceiling.

→ At one location at Building 2, level 4, an opening in the corridor ceiling appears to remain from a previous exploratory opening.

→ Staining of coating is typical at areas of standing water or runoff.

→ The top surfaces of the fire extinguisher housings are corroded.

Discussion and Recommendations

Similar to the individual unit balconies, the thin corridor coating is not highly durable and is not generally appropriate for managing foot traffic and horizontal water. This is especially true at the ground floor deck corridors which must resist moisture migration into the parking garage. The scuppers are also problematic as they penetrate the CMU block. Discontinuities in the coating within the scupper opening can lead to leakage into the wall, contributing to blistering in the wall coating and degradation of the wall assembly. We recommend replacing the balcony coating with a more robust urethane pedestrian traffic coating and scupper openings with sheet metal scuppers.

Standing water at the corridor leads to unsightly ponding and staining, and can be a potential safety hazard. Over time, standing water can lead to degradation of the coating and concrete, leading to leaks. However, this is a systematic design issue that is not easily fixed. The corridor surface can be locally re-sloped to direct water away from corners, but does not address the amount of water penetrating the corridor space. Overhangs or glazing panels at the corridor openings can reduce the amount of water that penetrates the corridor space, especially at the higher exposure elevations facing away from the plazas, which are at the high side of the corridor space.

We recommend a combined approach to locally re-slope the corridor surface and provide overhang flashings to manage standing water and reduce the moisture load. It should be noted that passive drainage efforts have limited efficacy in abnormal weather conditions and routine maintenance and sweeping will still be required.

Additionally, the soffits lack a drip edge, which may allow water to wick back inward. This was evidenced in the damage observed to the soffit drywall, and corrosion to metal fixtures such as fire extinguisher housings. Providing drip edge flashings to direct water away from wall openings and soffits will mitigate this damage potential.

RECOMMENDATION	
31	*Deficiency*: Repair localized damage to corridor soffits. Provide moisture-resistant gypsum board.
32	*Improvement*: Recommended to recoat corridor spaces with a urethane pedestrian traffic coating.
33	*Improvement*: Replace scupper openings with sheet metal scuppers concurrently with recoating work.
34	*Deficiency*: Locally re-slope corridor concurrently with recoating work to direct water away from walls and walking areas.
35	*Improvement*: Provide overhangs at corridor openings, especially at the high exposure elevations facing away from plazas.
36	*Improvement*: Provide drip edges at soffits.

3.5 Roofs

There are two main types of roofs found at the Quintet complex: sloped gable roofs and low-slope roofs. On the residential buildings, the low-slope roofs cover the 5th floor open-air corridor and some partial living space of the 5th floor units. The remainder of the living space is covered by sloped gable roofs. At the clubhouse, the majority of the occupied space is covered with a low-slope roof, with only the main entrance foyer being covered by sloped gable roofing.

3.5.1 Residential Buildings – New Roofing

The installation of new roofing was in-progress at the small residential low-slope roof areas at the time of field review. The new roofing work appears to include single ply thermoplastic membrane, new sheet metal scuppers, and new sheet metal coping.

The installation of the roofing was incomplete at the time of our review and RDH is not involved in its design or construction. Standing water at low-slope roofs can lead to premature degradation of the roof membrane. These roof areas should be monitored for signs of ponding water and other drainage and leak issues. Any deficiencies should be corrected by the roofer within the installer’s warranty period, typically one year from completion.

Figure 3.76

New roofing installation in-progress at Building 4

RECOMMENDATION	
37	*Maintenance*: Monitor new roof areas for standing water and drainage deficiencies. Deficiencies to be corrected by the roofer during the installer's warranty period.

3.5.2 Residential Buildings – EPDM

The low-slope roofing system at the residential buildings consists of a 45-mil EPDM membrane ballasted with river rock. Record documents indicate 2 inches of rigid insulation and structural hollow core slab deck below the roof membrane. We understand that this is the same roofing system installed at the time of original construction.

The following are observations made regarding the primary residential building low-slope roofs:

Figure 3.77

Building 5

Temporary patch of self-adhesive material.

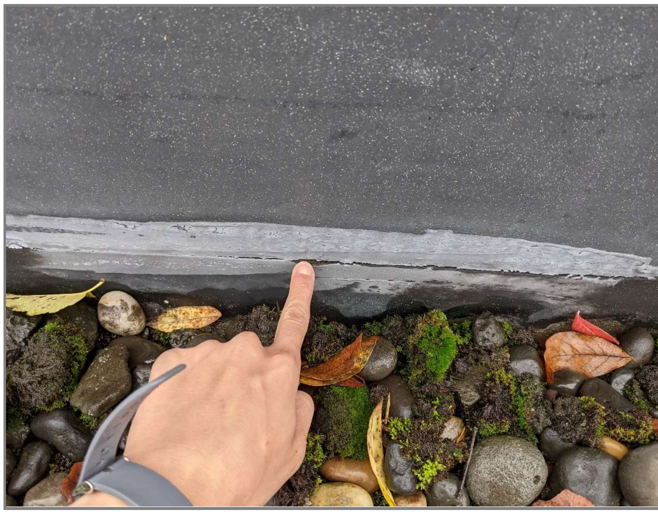

Figure 3.78

Building 2

Failed seal at patch to roofing membrane

Figure 3.79

Building 2

Failed seal at roofing membrane corner up-turn detail

Figure 3.80

Building 5

Crack repair in EPDM membrane. UV degradation (crazing) is present due to exposure.

Figure 3.81

Building 4

Missing sealant at flashing fastener

Figure 3.82

Building 2

Failed sealant at coping lap

Figure 3.83

Building 3

Typical unwanted organic growth and standing water on roof ballast

→ The EPDM membrane is cracking and scaling.

→ The roofing membrane is patched in several locations.

→ The sealed joint at membrane transitions is failed in some locations.

→ At the roof membrane termination bar, gum lip sealant is in poor condition.

- → Sealant is damaged and missing at fasteners installed through the counter flashing.
- → Sealant at the coping flashing is failed, with large gaps at the flashing laps.
- → There is an accumulation of unwanted organic growth on the roof ballasts.
- → Roof access hatches have stiff hold open arms and latch mechanisms. At one roof access hatch at Building 2, the hold open arm mechanism is disconnected. At other hatches at Buildings 1 and 2, the latch mechanism is loose and is not fully sealed, allowing water to leak onto the mechanism and to the interior.
- → Some of the roof access hatches are installed in atypical orientations for entry and exit.

Discussion and Recommendations

The expected service life of a ballasted EPDM roof ranges from 15 to 20 years. The low-slope roofs at the residential buildings were originally installed in 1990 and 1991, making them 30 to 31 years old. The roofs are showing signs of deterioration associated with their age. With increased roof age comes an increased risk of leaks, which can cause significant damage to interior living spaces and the soffits of the open-air corridors. Debris build-up and poor slope can lead to the ponding water that is present on the roof, which in turn can increase the likelihood and severity of leaks

The Quintet low-slope residential roofs have reached the end of their service life in terms of both expected age and current physical condition.

We understand that the Association currently plans to begin re-roofing activities starting in 2022 and that the program will last eight years. This generally aligns with our recommendation that the roofs be replaced within approximately 5 years. The existing roofing should be carefully monitored for leaks and additional damage until its replacement. We recommend replacing the ballasted EPDM system with a more robust roofing system that will provide a 30-year service life such as a two-ply SBS modified-bitumen (asphalt) roofing system, similar to the roof installed on the clubhouse low-slope roof. The two plies of modified bitumen sheet are generally cold-adhered or torch-applied, and provide an added layer of protection as compared to single-ply systems, such as EPDM, PVC, or TPO membranes. Re-roofing also provides the opportunity to install additional roof insulation, if desired.

The Quintet buildings do not have roof anchors, which limits façade access. Installing new roof anchors would allow for safer and easier access to the building exterior when painting the CMU walls, replacing windows, and conducting enclosure assessments. Roof access hatches should also be replaced as part of the re-roofing process.

RECOMMENDATIONS	
38	*Deficiency*: Plan to replace the existing residential building low-slope EPDM roofs and associated flashings within the current replacement timeline of approximately 5 years.
39	*Deficiency*: Replace broken and faulty roof access hatches.
40	*Improvement*: Consider installing roof anchors when replacing the existing low-slope roof system.

3.5.3 Residential Buildings – Concrete Tiles

Sloped gable roofs cover the majority of the residential living spaces. Record documents indicate the roof assembly consists of the following (as viewed from top down):

- → Concrete roofing tiles on furring strips.
- → Underlayment paper
- → Plywood sheathing
- → Insulated metal stud ceiling joists.

Loose tiles onsite indicate that the concrete tiles are manufactured by Monier Barge.

The following are observations pertaining to the concrete tile roofs on the residential buildings of the Quintet.

Figure 3.84

Cracked concrete tile at Building 2 roof

Figure 3.85

Building 5

Failed sealant repair at concrete tiles.

Sealant is not a permanent solution to address leaks between concrete tiles.

Figure 3.86

Building 2

Missing tiles at gable end reveal deteriorated plywood sheathing

Figure 3.87

Debris and standing water at cricket valley between adjacent gabled roofs

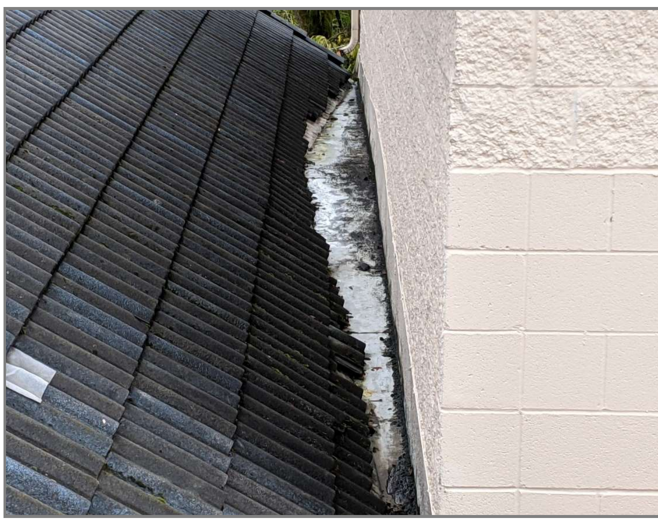

Figure 3.88

Typical valley to wall metal flashing transition with debris accumulation

→ Some concrete tiles are cracked, displaced, or missing. Cracked tiles occur throughout the roofs, while missing tiles are located primarily at the gable ends and ridge caps. At the west end of Building 1, concrete tiles appear to have fallen from the roof onto the landscaping at ground level below. Residents also voiced concerns over falling tiles during our unit access and occupant interviews.

- → Repairs have been attempted at some locations with cracked or displaced concrete tiles, however cracks in the water shedding surface remain.
- → The plywood sheathing is deteriorated beneath the concrete tiles where edge tiles are missing at the end of one gable on Building 2.
- → At valleys between gables and at the intersection between a gable and vertical CMU wall, the concrete tiles appear to transition to a metal flashing cricket. We did not closely review the cricket areas. Staining and debris is common at the cricket edges.

Discussion and Recommendations

The concrete roof tile system on the sloped roof sections of the residential buildings is in fair to poor condition, with localized evidence of broken, missing, and replaced tiles. Some unit owners raised safety concerns of broken roof tiles falling to the ground below. Concrete tiles are a durable system, however, they do degrade over time from environmental elements such as UV, rain, wind, freeze-thaw cycles, and the accumulation of organic matter. Transitions and interface details can also be problematic if the underlayment is not prepared correctly. Aside from the decay of exposed plywood sheathing, we are not aware of any significant performance issues with the concrete tile roof system.

It is difficult to predict the service life of the concrete tile roof system, but it is important to perform regular maintenance and to reinstall or replace damaged tiles in a timely manner to maximize the system's lifespan. Broken and missing tiles should be replaced, and displaced tiles should be reinstalled to maintain the performance of the water shedding surface. We recommend cleaning organic growth and debris from the roof as part of the roof maintenance plan. With routine maintenance, the overall system can be expected to have a service life of 40 to 50 years. Based on the current conditions, the remaining service life of the sloped roof system is likely less than 10 years.

The missing tiles and decayed plywood sheathing at the gable end at Building 2 should be replaced as soon as possible to limit water infiltration and further damage to the sheathing. We recommend localized removal of the roofing system within the damaged area to allow for replacement of the sheathing and underlayment, after which existing concrete tiles can be reinstalled with new replacement tiles.

RECOMMENDATIONS	
41	*Maintenance*: Replace all cracked or missing concrete roof tiles and reinstall all displaced concrete roof tiles.
42	*Deficiency*: Replace plywood sheathing at the identified location of decay at Building 2 and any decayed areas discovered during the process of replacing missing tiles.
43	*Maintenance*: Clean organic growth and debris from concrete roof tiles annually.

3.5.4 Flashings, Scuppers, Gutters, and Downspouts

Flat roof areas are generally drained using through wall scuppers onto adjacent roof areas and into downspouts. Sloped roof areas are generally drained through gutters and downspouts.

The following are observations made regarding the downspouts and gutters:

→ The downspout cross-sectional tube dimensions are approximately 3 inches by 2 and 1/4 inches. This size of downspout is likely too small for the total capacity requirements of buildings the height and size of those at the Quintet.

Figure 3.89

Building 1

Downspout drains into PVC pipe that extends below raised planter

→ At grade, downspouts drain into a pipe that extends under the parking garage or below grade

Figure 3.90

Building 5

Damaged downspout at transition to grade

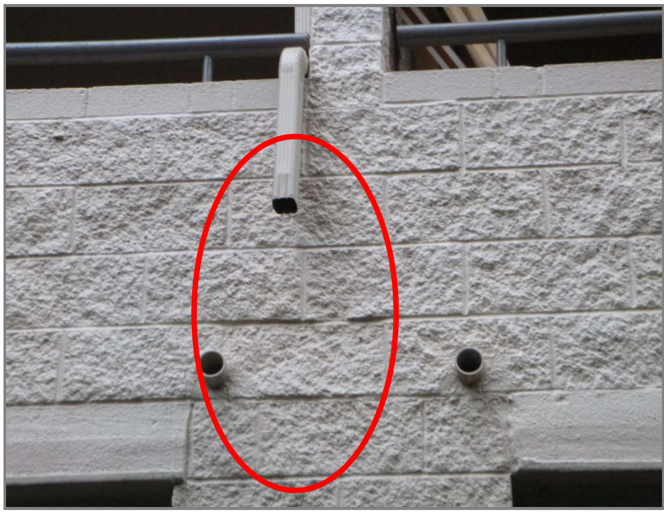

Figure 3.91

Building 2

Missing section of downspout

→ Some sections of downspout are displaced from their intended drainage path, damaged, or are missing entirely

Figure 3.92

Building 4

Extension on downspout where grade slopes back towards building

→ Downspouts at the rear of buildings drain onto grade. Some of the downspouts have been extended to drain far away from the buildings where the grade slopes towards the building

Figure 3.93

Building 2

Standing water in gutter at sloped roof

→ Some gutters at the sloped roofs are not adequately draining and are collecting water.

→ At multiple locations throughout the residential buildings, downspouts are routed to penetrate through balconies. This condition is further discussed in Section 3.4.1.

→ Downspouts and scuppers at the residential buildings are widely undersized for the quantity of precipitation that the buildings receive and the size of their catchment area. Additionally, small downspouts and scuppers are prone to blockages from debris, which can limit drainage and cause ponding water or overload other nearby drainage routes, if present. When a downspout extending from a gutter cannot provide adequate drainage, the weight of the water collecting in the gutter can exceed the gutter's structural capacity and lead to water management and safety concerns.

RECOMMENDATIONS	
44	*Maintenance*: Clean gutters and downspout cleanouts twice annually.
45	*Maintenance*: Clear all scuppers of debris twice annually.
46	*Deficiency:* Repair and replace displaced, damaged, or missing downspouts.
47	*Improvement:* Consider replacing scuppers, downspouts, and gutters with a larger capacity system during building recoating or low-slope roofing replacement.

3.5.5 Clubhouse Roof

We did not access the clubhouse roof for review. Review of the clubhouse roof was conducted from the adjacent Building 3 roof and from the ground.

Figure 3.94

Clubhouse roof overview, as viewed from Building 3.

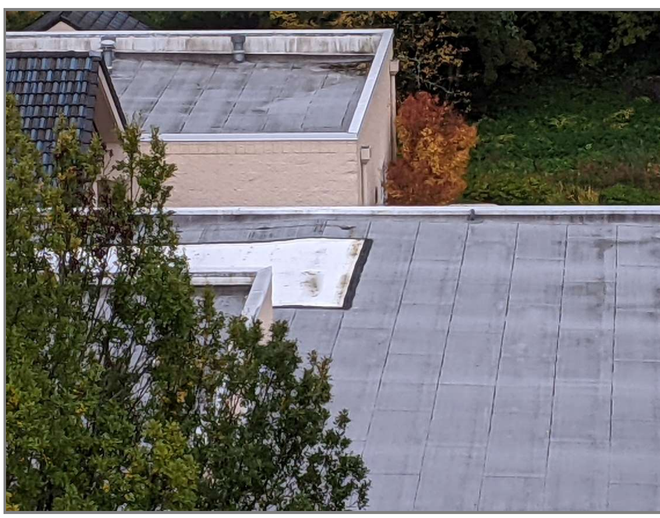

Figure 3.95

Apparent repair patch at center of roof area.

Figure 3.96

Debris accumulation at scuppers.

Figure 3.97

Clubhouse

Gutter along main gabled roof at the entry does not appear to have any means to drain.

Figure 3.98

Clubhouse

Typical scupper box with overflow.

→ The low-slope roof membrane appears to be a multi-ply modified-bitumen system with a granulated cap sheet. Discoloration is prevalent, indicating potential degranulation or debris accumulation.

- A large white patch is present at the center area which appears to be a repair. This area corresponds to a previous leak area brought to our attention by the property management which was recently repaired.
- Debris accumulation is visible at the scuppers on the east elevation. Debris can trap moisture against the roof surface and contribute to premature deterioration.
- The three gabled roofs at the clubhouse consist of concrete tiles similar to the residential buildings.
- The gabled roofs drain through gutters and downspouts. One gutter at the main gabled roof at the entry does not appear to have any means of drainage, and can potentially introduce an excessive moisture load on adjacent building components.
- The low-slope roofs drain through scuppers connected to downspouts through a collector box. The collector boxes feature overflows to manage excessive water flow.

Our records indicate that the low-slope portion of the clubhouse roof was wholly or partially replaced in circa 2009, making the newest portion of the roof assembly approximately 12 years old. We generally expect a modified-bitumen roof system to last between 30 and 40 years with proper cleaning and maintenance. This maintenance should include twice annual cleaning of scuppers and drains, and localized repair of degranulation and UV damage.

RECOMMENDATION	
48	*Maintenance*: Clean scuppers and drains at clubhouse roof twice annually.
49	*Maintenance*: Locally repair degranulated and failed roofing at clubhouse.

3.5.6 Pump House Roof

We did not closely review the pump house but understand that the roof consists of EPDM membrane of similar age to the main roofs. We recommend replacing this roof at the same time as the main roofs with the same roofing material.

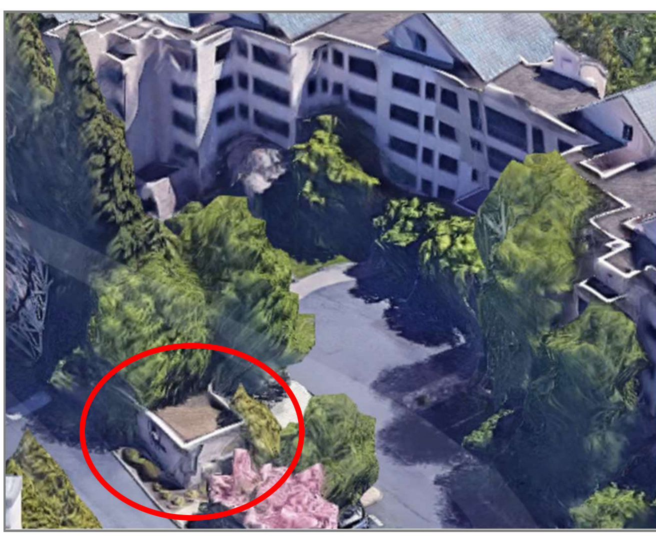

Figure 3.99

Pump House Roof as viewed from Google Maps.

RECOMMENDATION	
50	*Maintenance*: Replace pump house roof with same material as the main roofs.

3.6 Below and At-Grade Assemblies

For ease of discussion this section of the report will be broken into three subsections: Parking Structure, Raised Planters, and Retaining Walls.

3.6.1 Parking Structures

Parking structures at the Quintet are partially below grade due to the sloped terrain throughout the property. The parking structures extend beneath the raised planter beds and semi-circular loading plaza at the main entrance of each building. As the grade lowers approximately towards the south, the parking garage becomes level with the grade at the rear of the buildings. The below grade walls of the parking garage are constructed of cast-in-place concrete foundation walls, with the structure changing to be primarily CMU walls where at grade-level. The structural slab above the parking garage is a concrete hollow core system, while the parking slab is poured concrete slab-on-grade. Openings in the CMU walls provide natural light and ventilation to the space, while also exposing the parking structure to exterior environmental conditions. Similar to the level 1 open-air walkways, security bar grills are installed at the openings at the parking garage.

The following are observations relating to the parking structures at the residential buildings of the Quintet:

Figure 3.100

Building 3

Active leak at conduit penetration at joint between wall and floor slab, located beneath raised planter

Figure 3.101

Building 3

Mineral deposits at underside of hollow-core slab

Figure 3.102

Building 3

Efflorescence and staining at the cast-in-place concrete and CMU walls

Figure 3.103

Building 4

Rust staining below conduit penetration at cast-in-place concrete wall

Figure 3.104

Building 1

Water leaking through crack at cast-in-place concrete wall

Figure 3.105

Building 1

Foil-faced insulation boards applied to underside of conditioned space. Foil tape is discontinuous.

Figure 3.106

Building 4

Discontinuous and damaged insulation board at edge of parking garage.

Figure 3.107

Building 3

Crack at stairwell

Figure 3.108

Building 5

Deteriorated plywood installed in wall opening

- → Water stains and active leaks are present at the joint between the cast-in-place concrete walls and the precast hollow core slabs, particularly at locations with conduit penetrations.
- → Water stains, mineral deposits, and active leaks occur at the precast hollow core slabs along the plaza elevations.
- → Efflorescence is visible on the surface of the cast-in-place concrete walls and the CMU walls.
- → Rust staining below conduit penetrations in the cast-in-place concrete walls is common and indicates water infiltration
- → Some cracking is present at the cast-in-place concrete walls. Mineral deposits and staining on the walls are present at the cracks and are associated with water migration through the cracks.
- → Foil-faced rigid insulation panels are installed at the underside of the hollow core floor slab in some locations, typically below conditioned space. Seams between boards are sealed with foil tape, which is discontinuous or missing in some places.
- → At the north stairwell in Building 1, we observed water penetrating the open-air-corridor above, travelling down the stairs, and entering the parking garage.

- → The Property Manager brought to our attention a crack present in the stairwells at the parking structure level at Buildings 2 and 3. The crack is located at the underside of the level 1 floor slab, midway between the stairwell wall that borders the parking structure, and the slab edge.
- → Plywood is installed to cover some of the wall openings and is attached to the security grills. The plywood shows significant rot, but it does not support other surfaces. However, the deteriorated plywood is unsightly and can retain moisture, introducing a moisture load to the steel grills and contributing to surface corrosion.

Discussion and Recommendations

We understand that previous leaks from the raised planters and plaza deck resulted in water retention in the hollow core slabs. Draining this excess water is an ongoing effort, and represents a moisture source which may be contributing to the leaks observed.

We also understand that condensation in the parking garage occurs quite frequently during the winter due to high humidity and cold surface temperatures. While this may contribute to some of the water staining observed, the efflorescence (white powder and mineral deposits) is indicative of water travelling through the concrete and bringing minerals from within the concrete mixture to the surface.

The majority of leaks and stains observed occur along the plaza elevations at the cold joint between the top of the foundation wall and the level 1 floor slab. This area is directly beneath the plaza and planters at the front of each building. We are not able to comment on the condition of the below-grade and plaza-deck waterproofing. Replacement of below-grade and plaza-deck waterproofing is a difficult and costly process, and would require removal of all landscape and hardscape elements from the front of buildings.

A more feasible approach to addressing leakage into the parking garage may be chemical grout injection, where a flowable material such as polyurethane or epoxy grout is pumped into cracks to fill voids within the concrete. This does not address the source of the leak, however, and is just as likely to direct water to the next path of least resistance. As a result, grout injection can be a long, iterative process, and may be comparable to replacing the plaza deck waterproofing in one project instead. Based on the amount of leaks observed, full-scale plaza deck waterproofing replacement is likely not necessary in the short term, but may become advisable in the next 10 to 20 years.

RECOMMENDATION	
51	*Deficiency*: Address leakage at Building 1 north stair tower.
52	*Deficiency*: Perform iterative grout injection to address current leaks
53	*Improvement*: Replace plaza deck and below-grade waterproofing at plaza elevation in the next 20 years.

3.6.2 Raised Planters

The residential buildings of the Quintet include integrated raised planters, including the main planters at the front of the buildings and smaller planters at the level 1 open-air corridors.

The front walls of the exterior raised planters are constructed of three courses of CMU block plus one half-block top cap, one wythe thick, while the back of the planters is bordered by the level 1 open-air corridor CMU wall. Planters at the building ends are bound on one side by a stairwell and open-air corridor wall, while the far side is contained by a masonry retaining wall or slopes to integrate with grade.

Planters located within the level 1 open-air corridors typically border residential unit CMU walls on two sides, with the third side and fourth sides constructed of three courses of CMU block with a half-block top cap, one wythe thick.

Renewed Planters at Building 1

The center front planters at Building 1 have recently been renewed with a PUMA (polyurethane methacrylate) cold-fluid-applied waterproofing. The renewal work also included reconstruction of the surrounding CMU planter walls with solid cast-in-place (CIP)concrete, and additional drains installed. The perimeter wall is coated in PMMA (polymethyl methacrylate) on both sides which terminates onto concrete at the horizontal, approximately 6” out from the wall. This work provides a robust waterproof coating superior to the aging sheet-applied system found at the other buildings, and we recommended renewing the other planters with a similar system.

While the coating system as reported to us appears to be sound, some discontinuities and vulnerabilities in the perimeter flashing do exist, as outlined below.

Figure 3.109

Building 1

Renewed planter with coated CIP concrete wall

Figure 3.110

Building 1

Inconsistent sealant fillet bead width at new counterflashing.

Figure 3.111

Building 1

Failed sealant and flat seam at base flashing lap

Figure 3.112

Building 1

Downspout penetrates base flashing

→ The planter renewal at Building 1 includes the installation of new stainless-steel flashing and counterflashing at sections of the building perimeter. The counterflashing appears to be set in a reglet cut into the CMU, and sealed with a fillet bead of sealant with sanded finish.

- → The sealant fillet bead has inconsistent width due to variation in the CMU surface texture. At some places, the bead is thin to the point of being almost nonexistent. Sealant needs to be applied in a consistent thickness or it will prematurely fail due to thermal movement.
- → At one location, the base flashing lap joint is discontinuous. The lap joints between flashing sections are comprised of flat seams, which do not appear to be sealed. Sealed standing seams are recommended for flashings and copings.
- → At another location, a downspout penetrates the base flashing. The downspout appears to be sealed with a combination of white and black sealants. The sealants are inconsistently tooled, but do not appear to be discontinuous.

→ Drains and conduit are correctly placed in defined non-vegetated zones with gravel topping. Plants should not be allowed to grow in these zones to prevent blockage of drains.

→ Large trees have been removed and replaced with small plants, as well as some small trees and shrubs. Landscaping efforts should continue to manage the size of these plants, to reduce the damage possible to the planter waterproofing due to roots, and to the adjacent walls due to contact with branches.

Existing Planters

Our records indicate that the exterior planters are waterproofed using a bituthene system terminating on surrounding CMU masonry walls. Planters at Buildings 2-5 still have the original waterproofing system. The French drain channel is separated by pressure treated lumber and filled with pea gravel. Some of the planters located within the open-air corridors are also waterproofed.

Figure 3.113

Building 4

Large established trees growing in center front planters

Figure 3.114

Building 4

Discontinuous termination bar with failed sealant

- → Large established trees are growing in the planters along with smaller shrubs. At Building 1, large trees remain at the building-end planters, including at the southwest planter, which extends over the entrance to the parking garage and is terminated by a brick retaining wall.
- → CMU coating, sealant, and bituthene is typically discontinuous and/or failed at-grade and at the termination bar on the raised planter walls.
- → Most planters within the open-air corridors contain vegetation which grows vertically up the lightwells. The size of the vegetation varies, but some plants are large enough to have a substantial root system.
  - → Tall plants also contact the walls and windows, introducing additional moisture load and abrasive wear.
- → At some building walls, no termination bar is present and soil has migrated to between the wall and peeling bituthene.

Discussion and Recommendations

Based on the floor plans reviewed, we identify that the planters are all at least partially located over the parking garage. Planter waterproofing continuity is critical when located over occupied or parking space. The plants and soil in planters retain water and may also remain wet in dry weather if active irrigation systems are used. The planters also constitute the base of wall transition at the front elevations and are responsible for managing water away from vulnerable interfaces such as cold joints.

The planters at Building 1 have minor flashing and sealant discontinuities that should be addressed. Replacement of the planter waterproofing, however, has only partially addressed the leakage and water staining observed at the parking garage. Additional factors are present including water retention in the hollow core planks, excess condensation on parking garage surfaces, and potential water leakage through the concrete wall from the plaza beyond the planters. Replacement of the plaza waterproofing may be necessary as outlined in Section 3.6.1 above.

The planters at Buildings 2-5 should have their waterproofing and planter walls replaced with a similar system as Building 1. Base of wall flashings should be provided, have standing seams, and be shingle lapped over the new waterproofing membrane.

RECOMMENDATION	
54	*Deficiency*: Repair minor flashing and sealant discontinuities at Building 1 rehabilitated planters.
55	*Improvement*: Replace planter waterproofing at Buildings 2-5 with system similar to Building 1. Include base of wall flashings shingle lapped over the waterproofing membrane.

Retaining Walls

Retaining walls consist of fan-shaped concrete masonry units stacked without mortar. The masonry units are not sealed and organic growth is frequently seen on surfaces.

The retaining walls interface with the CMU walls and foundation walls. At Building 5, cracks are forming in the CMU wall at the interface with the retaining wall. At Building 4, rebar is protruding from the ground near the retaining wall, and is possibly part of a footing.

Figure 3.115

Building 5

Crack in CMU at retaining wall at perimeter of raised planter

Figure 3.116

Building 4

Exposed rebar at retaining wall.

RECOMMENDATION	
56	*Deficiency*: Address cracking at CMU wall to retaining wall interface at Building 5.

4 Recommendations

4.1 Summary of Recommendations

Table 4.1 lists all building enclosure rehabilitation and renewal tasks that were identified in Section 3 of this report.

TABLE 4.1	SUMMARY OF RECOMMENDATIONS
1	Deficiency: Investigate potential leaks at Unit 111 and 524 causing surface wetting and elevated moisture content in interior finishes.
2	Deficiency: Investigate major humidity/moisture concerns at Units 126, 243, 333, 427, and 520.
3	Deficiency: Investigate popping sound occurring at Building 2.
4	Maintenance: Engage qualified personnel to inspect mechanical systems and fireplaces at regular intervals at all units.
5	Maintenance: Distribute a memo providing residents and owners with guidelines for managing interior humidity
6	Deficiency: At non-operational and poorly operating fans in bathrooms, laundry rooms, and kitchens, repair or replace with higher capacity units.
7	Deficiency: Perform targeted resealing and recoating within 1-2 years.
8	Maintenance: Reseal and re-coat buildings within 5 years with robust elastomeric coating.
9	Improvement: Consider over-cladding as an additional measure to decrease exposure of CMU walls.
10	Maintenance: Replace sealants at all penetrations concurrently with exterior coating.
11	Improvement: Replace broken/failed vent covers with hood flashings.
12	Improvement: Provide sheet metal scupper and face plates at all scupper drains.
13	Maintenance: Continue glass block replacement program and monitor for additional and premature glass breakage or leaks.
14	Improvement: Consider replacing glass block areas with thermally broken windows with insulated glazing units.
15	Maintenance: Repaint railings concurrently with next concrete resealing event. Remediate corrosion and remove delaminated paint. Prime and paint metal railing components with a direct-to-metal paint.
16	Improvement: Recommended to replace all original aluminum-framed windows. Work can be done at once or in phases to minimize individual cost to Owners.
17	Improvement: Provide thermally broken vinyl- or fiberglass-framed windows with IGUs. Detail window rough openings with waterproofing and sill back angle. Provide head and sill flashings to decrease window exposure.
18	Maintenance: Inspect and maintain windows annually.
19	Improvement: Replace sliding doors with thermally broken vinyl- or fiberglass-framed units within 5 years. Highly recommended to provide head flashings at all units, at a minimum they should be provided at units with high exposure.

TABLE 4.1	SUMMARY OF RECOMMENDATIONS
20	Maintenance: Inspect and maintain sliding doors annually.
21	Maintenance: Inspect and clean skylights twice annually.
22	Maintenance: Service and clean storefront system annually. This work should include replacing failed sealants, gaskets, and sweeps.
23	Maintenance: Service locking and operation mechanisms.
24	Maintenance: Replace weather stripping and sweeps at unit doors and all other doors separating conditioned and unconditioned spaces.
25	Improvement: Consider installing awnings at exposed doors to decrease the moisture load.
26	Maintenance: Inspect and clean service and egress doors annually.
27	Maintenance: Remediate surface corrosion and remove failed paint. Repaint coiling doors and frames with a durable direct-to-metal paint.
28	Improvement: Recommended to replace balcony coatings with urethane traffic coatings. This work should include replacement of PVC scupper pipes with sheet metal scuppers with face plates.
29	Maintenance: Trim tree branches that are within 16 inches of the guard walls.
30	Deficiency: Remove downspouts that penetrate decks and re-route on the exterior of the building. Repair damaged coating and soffit areas.
31	Deficiency: Repair localized damage to corridor soffits. Provide moisture-resistant gypsum board.
32	Improvement: Recommended to recoat corridor spaces with a urethane pedestrian traffic coating.
33	Improvement: Replace scupper openings with sheet metal scuppers concurrently with recoating work.
34	Deficiency: Locally re-slope corridor concurrently with recoating work to direct water away from walls and walking areas.
35	Improvement: Provide overhangs at corridor openings, especially at the high exposure elevations facing away from plazas.
36	Improvement: Provide drip edges at soffits.
37	Maintenance: Monitor new roof areas for standing water and drainage deficiencies. Deficiencies to be corrected by the roofer during the installer's warranty period.
38	Deficiency: Plan to replace the existing residential building low-slope EPDM roofs and associated flashings within the current replacement timeline of approximately 5 years.
39	Deficiency: Replace broken and faulty roof access hatches.
40	Improvement: Consider installing roof anchors when replacing the existing low-slope roof system.
41	Maintenance: Replace all cracked or missing concrete roof tiles and reinstall all displaced concrete roof tiles.

TABLE 4.1	SUMMARY OF RECOMMENDATIONS
42	Deficiency: Replace plywood sheathing at the identified location of decay at Building 2 and any decayed areas discovered during the process of replacing missing tiles.
43	Maintenance: Clean organic growth and debris from concrete roof tiles annually.
44	Maintenance: Clean gutters and downspout cleanouts twice annually.
45	Maintenance: Clear all scuppers of debris twice annually.
46	Deficiency: Repair and replace displaced, damaged, or missing downspouts.
47	Improvement: Consider replacing scuppers, downspouts, and gutters with a larger capacity system during building recoating or low-slope roofing replacement.
48	Maintenance: Clean scuppers and drains at clubhouse roof twice annually.
49	Maintenance: Locally repair degranulated and failed roofing at clubhouse.
50	Maintenance: Replace pump house roof with same material as the main roofs.
51	Deficiency: Address leakage at Building 1 north stair tower.
52	Deficiency: Perform iterative grout injection to address current leaks
53	Improvement: Replace plaza deck and below-grade waterproofing at plaza elevation in the next 20 years.
54	Deficiency: Repair minor flashing and sealant discontinuities at Building 1 rehabilitated planters.
55	Improvement: Replace planter waterproofing at Buildings 2-5 with system similar to Building 1. Include base of wall flashings shingle lapped over the waterproofing membrane.
56	Deficiency: Address cracking at CMU wall to retaining wall interface at Building 5.

4.2 Next Steps

The condition assessment report presents conceptual level recommendations with respect to rehabilitation and renewal activities. It is important to understand that these recommendations do not provide a basis for implementing remedial work. Conceptual recommendations need to be developed, refined, and documented in detail before the construction work can be tendered to contractors or a building permit obtained.

The next step typically begins with a planning and design process where the Owners and Consultant consider alternative ways of addressing existing problems and assist you in making decisions with respect to specifics of the recommendations. Once decisions are made, a complete repair program can be developed and documented in greater detail in the form of drawings and specifications that can be used as the basis of bids from Contractors.

In addition, the information in the report should be reviewed from the context of updating the maintenance plan and reserve study.

4.3 Closure

We trust that this report has provided some insight into where the building stands from a condition standpoint and provides a direction for Kin Living in moving forward with maintenance and renewal needs.

Yours truly,

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Appendix A

Occupant Survey

	Does your unit have any ongoing or undiagnosed leaks associated with the building enclosure (exterior walls, windows, roof, floor, etc.)? Please do not include plumbing leaks.	Do you have condensation problems at the inside face of any windows or doors?	Do you have glass block walls in your unit?	In the past 2 years have you noticed any leaking, condensation and/or cracking of the joints of the glass block section of the wall.	Have you had any difficulty operating exterior windows or doors?	Have you had any problems relating to decks or balconies?	Do you have problems with mold, fungi or mildew on walls or windows? This is typically black, brown or orange staining.	Do you notice cooking or other odors from other units while inside your unit?	Have you noticed any other problems relating to the building exterior?
110	No	No	No	No	No	Yes	No	Yes	No
111	No	Yes	Yes	Yes	No	Yes	Yes	No	No
112	No	No	No	No	No	No	No	No	No
113	No	No	Yes	No	No	No	No	No	No
114	No	No	No	No	No	Yes	Yes	No	Yes
118	No	No	Yes	No	No	No	Yes	Yes	No
119	No	No	No	No	No	Yes	No	Yes	Yes
122	No	No	No	No	No	No	No	No	No
124	No	No	No	No	No	No	No	No	No
125	Yes	No	No	No	Yes	No	No	No	Yes
126	No	Yes	Yes	Yes	No	No	Yes	No	No
133	No	No	Yes	No	No	No	No	No	No
135	No	Yes	No	No	Yes	No	Yes	No	No
136	No	No	Yes	No	No	No	Yes	No	Yes
138	No	No	Yes	No	No	Yes	No	Yes	Yes
142	No	No	Yes	No	No	Yes	No	No	Yes
143	No	Yes	Yes	Yes	No	No	Yes	No	No
143	No	No	No	No	No	No	Yes	No	No
154	No	No	Yes	No	No	No	No	No	No
210	No	No	No	No	No	No	No	No	No
211	No	No	Yes	No	No	Yes	No	No	No
213	No	Yes	Yes		No	No	Yes	No	Yes
214	No	No	No	No	No	No	No	No	No
216	Yes	Yes	No	No	No	No	Yes	No	No
217	No	No	Yes	No	No	No	No	No	No
222	No	No	No	No	No	No	No	No	No
226	No	No	No		No	No	No	Yes	Yes
231	Yes	No	Yes	No	No	Yes	No	No	Yes
235	No	No	No	No	No	No	No	Yes	No
236	No	Yes	No	No	Yes	No	No	No	No
238	No	No	No		No	Yes	No	No	Yes
240	No	No	Yes	No	No	No	Yes	No	No
241	No	No	No	No	No	No	No	No	No
243	No	Yes	No	No	No	No	Yes	No	Yes
251	No	No	Yes	No	No	No	No	No	No
310	No		No		No	Yes	Yes	No	No
311	No	No	Yes	No	No	No	No	No	No
313	No	Yes	Yes	Yes	No	No	No	No	No
317	No	Yes	Yes	Yes	No	Yes	Yes	No	No
318	Yes	No	No	No	Yes	Yes	Yes	No	Yes
320	No	Yes	No	No	No	No	Yes	No	No
321	No	No	Yes	No	No	No	No	No	Yes
322	No	No	No	No	No	No	No	Yes	No
326	No	No	No	No	No	No	No	No	No
327	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
328	No	No	No	No	No	No	No	No	No
333	Yes	Yes	Yes	Yes	No	No	Yes	No	No
337	No	No	Yes	Yes	No	Yes	No	No	No
338	No	No	No	No	Yes	No	No	No	Yes
340	No	No	Yes	No	Yes	Yes	Yes	No	No
342	Yes	Yes	Yes	Yes	No	Yes	No	No	No

	Does your unit have any ongoing or undiagnosed leaks associated with the building enclosure (exterior walls, windows, roof, floor, etc.)? Please do not include plumbing leaks.	Do you have condensation problems at the inside face of any windows or doors?	Do you have glass block walls in your unit?	In the past 2 years have you noticed any leaking, condensation and/or cracking of the joints of the glass block section of the wall.	Have you had any difficulty operating exterior windows or doors?	Have you had any problems relating to decks or balconies?	Do you have problems with mold, fungi or mildew on walls or windows? This is typically black, brown or orange staining.	Do you notice cooking or other odors from other units while inside your unit?	Have you noticed any other problems relating to the building exterior?
345	No	Yes	No	No	No	No	Yes	No	Yes
351	No	Yes	Yes	No	No	No	Yes	No	No
353	No	No	No	No	No	No	No	No	No
416	Yes	Yes	Yes	Yes	Yes	No	Yes	No	No
417	No	No	No	No	No	Yes	No	No	No
420	No	No	No	No	No	No	No	No	No
421	No	Yes	Yes	Yes	No	Yes	No	No	No
421	No	No	Yes	No	No	Yes	No	No	No
427	Yes	Yes	No	No	Yes	No	Yes	No	No
430	No	No	No		Yes	No	Yes	Yes	No
432	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
432	No	No	No	No	No	No	No	No	No
434	Yes	No	No	Yes	No	Yes	No	No	Yes
435	Yes	No	No	No	No	No	No	No	No
436	No	No	Yes	No	No	No	Yes	No	No
437	No	No	No	No	Yes	No	No	No	No
439	No	Yes	No	No	No	No	Yes	No	No
441	No	No	No	No	No	No	No	No	No
445	No	No	Yes	No	No	No	No	Yes	No
446	No	No	No	No	No	No	No	No	No
447	No	No	Yes	Yes	No	No	No	No	No
452	Yes	No	No	No	No	Yes	No	No	Yes
454	No	No	Yes	No	No	No	No	No	No
456	No	Yes	Yes	No	No	Yes	No	No	Yes
511	No	No	Yes	No	No	No	No	No	No
512	No	No	No	No	Yes	No	No	Yes	No
514	No	No	Yes	No	No	Yes	No	No	Yes
520	No	Yes	No	No	Yes	Yes	Yes	No	No
522	No	Yes	No		No	No	Yes	No	No
523	No	No	No	No	No	No	No	No	No
524	Yes	Yes	Yes	No	No	No	Yes	Yes	No
526	No	No	Yes	No	No	No	No	No	No
535	No	No	No	No	No	No	No	No	No
536	No	No	Yes	No	No	No	No	No	No
537	No	No	No	No	No	No	No	No	Yes
541			No	No	No	Yes		No	Yes
541	No	No	No	No	No	No	No	No	No
542	Yes	Yes	No		No	Yes	Yes	No	Yes
545	Yes	No	Yes	No	No	No	Yes	No	No
610	Yes	No	No	No	No	Yes	No	No	No

Appendix B

Recommended Typical Window Details

SECTION 01 10 00 – SCOPE OF WORK

PART 1 - GENERAL

1.1 PROJECT INFORMATION

A. Project Title: Quintet Window Replacement Specification

B. Project Location: 6195 West Burnside Way, Portland, OR

C. Owner: The Quintet Homeowners Association

D. The Project consists of replacement of existing windows in CMU exterior walls in individual residential units. The property includes five multi-residential buildings. The window replacements are focused on individual residents wanting to replace their windows in and of the five buildings

E. Work covered by these Construction Documents includes replacement of exterior windows in residential units.

F. Specifications and Drawings have been prepared for the Project by RDH Building Sciences, Inc., 308 SW First Ave, Suite 300, Portland, OR 97204.

G. The following scope of work is intended to outline the general nature of the project and is not intended to be inclusive or limit the extent of the Work.

H. Contractors are required to complete the Work in compliance with the Construction Documents.

I. The words 'install' and ‘provide’ mean 'supply and install' unless there is a specific instruction that the materials or products are to be re-used or Owner supplied.

J. This scope of work and specification has been prepared with the intent of having access to the exterior of the building for the purpose of placing sealant, coatings, framing, etc.

1.2 SCOPE OF WORK

A. Start-up

1. Coordinate Work in accordance with Sections 01 00 00 General Conditions and 01 30 00 Administrative Requirements.

2. Supply and maintain all temporary construction facilities and services.

3. Make all submittals as described Section 01 30 00 and the individual Technical Specification Sections.

4. Ensure project schedules are submitted and accepted at project start-up.

B. General

1. The Work includes accessing, entering, and repair work to occupied residential units.

2. The Contractor is to conduct all Work efforts to be respectful of property and residents.

3. Liaise with Owner's representative and Consultant with respect to all issues impacting the building occupant's use of the site and building.

4. Prepare for and attend all project progress meetings.

5. Protect landscaping and existing finishes not affected by repair work and from damages resulting from the rehabilitation work.

6. Maintain all existing means of egress from the buildings at all times during work.

7. Maintain traffic entry and access from property and at main entrance at all times during the work.

C. Contractor Use of Premises:

1. Coordinate work to minimize disruption to vehicle traffic, foot access, resident occupancy and access, and other owner's functions and services.

2. Keep in-use driveways and entrances serving premises clear and available to Owner, Owner's Guests, Owner's employees, and emergency vehicles at all time.

3. Maintain work area for the in a weather-tight condition throughout construction period.

4. Construction equipment, material storage, equipment and vehicles are to be stored and parked in the owner designated areas only.

5. Remove all vehicles from site at the end of each working day.

6. A trash dumpster will be allowed on site for use during construction at the owner designated area.

7. Working hours: 8am to 4:30 pm.

8. Communication with the Homeowners Representative (Owners' Representative) is key to success of the project. The Contractor will work with the Owners' Representative to arrange access to units for work, access to decks required to access the work, provide notices regarding key steps in the work, etc.

9. Contractor to keep site and work areas clean and free of hazardous material and equipment.

10. Conduct demolition to minimize interference with adjacent and occupied building areas.

11. The Contractor shall coordinate with the Consultant when it is necessary to access, measure and/or photograph existing conditions prior to execution of the work.

12. Do not close or obstruct egress from any building exit or site exit.

13. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

14. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

D. Repair Damage Caused by Construction Operations.

1. Take precautions necessary to protect building and its occupants during construction period.

2. Provide, erect, and maintain temporary barriers to protect scaffolding and prevent unauthorized access.

3. Erect and maintain weatherproof closures for exterior openings.

4. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued building occupancy.

5. Protect existing materials that are not to be demolished.

6. Contractor to advise the owners before work begins of any significant landscaping damage or tree removal that will be required as part of the work.

7. The Contractor may be held responsible for any excessive damage to landscaping not identified at the project start up, particularly as a result of uncontrolled dropping of glass block.

E. Work Sequence and Notification

1. The Contractor to work with Owners Representative to arrange access to units a minimum of 72 hours prior to requiring access.

2. The Contractor shall notify the Owner with sufficient advance notice of any excessively loud operations and shall make efforts to perform such tasks during agreed upon hours.

3. The Contractor should take care to ensure that fumes or other noxious gases remain outside of the structure. Take all required measures to maintain acceptable interior air quality.

4. Plan unit access and rehabilitation work to minimize access units and disruption to residents. Work areas will be occupied by Owners during the rehabilitation.

F. Site Clean-up at Completion

1. Remove all site protection, materials, debris, tools and equipment.

2. Clean site to reinstate original finishes and surfaces.

3. Ensure that no construction debris is left in landscaping.

G.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 START-UP

A. Make all submittals including product system including but not limited to product, system or material submittals, schedule of values, project schedule as described in the Contract Documents.

B. Supply and maintain all temporary construction facilities and services.

C. Provide a project cost summary or schedule of values. Clearly identify the value of the work in each area and break each area into tasks, attaching the value of the work of each task as a percentage of the total project value for the purpose of evaluating applications for payment.

D. Submit a project schedule including dates associated with the work in each residential unit.

3.2 GENERAL

A. Communicate with Owner's representative and Consultant with respect to all issues impacting the building occupants use of the site and building including progress of the work, access, repairs, etc.

B. Prepare for and attend all project progress meetings.

C. Coordinate with Owner's Representative for the placement of trash bins, material storage, sanitary facilities, and parking while on site.

D. Access to the residential units may be made via the freight or service elevator and stairwells and through residential units. Note: the freight elevator has a capacity limit of 4000 lbs. Contractor to load and use elevator equipment with caution.

E. Minimize use and occupancy of workers within elevators, corridors, and other interior areas.

3.3 ACCESS TO WORK AREAS

A. Supply (place, relocate, remove) and maintain suitable scaffolding, boom lifts, ladders, boatswain chairs and other necessary means to access the work safely for all trades .

B. Provide protection to the roofing membrane and / tiles as necessary to place, move, or maintain scaffolding system.

C. Repair scaffolding tie-back penetrations with non-shrink grout and paint. Owner has paint product to cover areas of damage.

3.4 INTERIOR ACCESS AND PROTECTION

A. Coordinate unit access for all interior work by providing the Owner's representative with a written notice a minimum of 72 hours prior to commencing work. A copy of the notice is to be faxed or emailed to the Owners Representative at the same time.

B. Coordinate with Owner's representative regarding duration of work within each unit, entry times, access, furniture removal, etc.

C. Contractor to provide flooring runners to protect unit floors when accessing these areas. Contractor to wear protective booties when walking through residential units.

D. Erect temporary interior work enclosures and protection for work area to protect finishes and furniture beyond the work area.

E. Work enclosures to be dust tight fit to ceiling and floor.

F. Enclosure to include protective floor covering in the work area, as well as floor runners leading into the unit.

G. Contractor may be requested to provide assist with the movement of small furniture. This service is to be offered to the resident as a convenience service only with limited scope.

H. Vacuum clean up dust at the end of each work day to control dust during the time when access into the unit is required.

I. Remove interior protection and dust screen at completion of the interior repairs (drywall preparation to paint ready state)

3.5 DEMOLITION

A. Remove and dispose of existing window system to minimize damage to exterior CMU wall surfaces and rough opening surfaces.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members and adjacent construction.

C. Minimize damages to interior wall finishes.

D. Provide temporary weather and security barrier to rough opening after demolition work is complete, after work hours, and until the window installation is complete.

E. Perform work in a safe manner at all times in accordance with OSHA, project, and reference standard safety requirements and protocols.

F. Prepare surfaces and remove surface finishes to provide for proper installation of new Work and finishes.

G. CMU substrates not affected by demolition are to be protected. Do not over cut.

H. Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as work progresses.

I. At the end of each day's work, leave work in safe condition so that no part is in danger of toppling or falling. Protect interiors of units, and adjacent elements not be demolished at all times. Protect interior of units from weather penetration and damage at all times.

J. Provide clean straight cut lines at the extent of all removals as indicated to allow future tie-ins.

K. Demolish to minimize dusting, airborne fungi, and other debris. Keep materials wetted as directed by Consultant.

L. Carry out demolition work in accordance with applicable laws governing demolition of existing structures.

3.6 WINDOW REPLACEMENT

1. New Work
    a. Provide new vinyl windows and sliding glass doors per attached Current window specification.
        1) Install in accordance with the most recent manufacturer's installation guidelines.
    b. Provide new rough opening flashings and sill attachment via metal back dam as shown in the Drawings.
        1) Back dam shall be formed with a metal angle along the full width of the rough opening.
        2) Rough opening flashings shall consist of fluid-applied air and water-resistive barrier materials (windows)
            a) Product: Prosoco R-Guard FastFlash
        3) Attach windows and sliding glass doors to metal angle as shown in the Drawings.

B. After removal of the old windows, clean CMU rough opening to remove burrs, and old sealant

C. Patch any defects or spalled surfaces of CMU in the rough opening or at the exterior surfaces that have occurred or resulted from removal of the existing windows.

D. Clean and remove paint to expose outside face of the CMU wall. Clean wall surfaces to receive 4” of liquid applied flashing material lapping over 3” of exterior paint surfaces.

E. Install interior aluminum sill back angle. Bed angle in liquid-applied flashing.

F. Prepare sill and lower 4” of jamb sections to receive the liquid applied flashing material. Extend flashing material onto outer face of exterior wall as described above. Install flashing material onto the rear, interior sill back angle.

G. Provide new vinyl windows and sliding glass doors per attached Current window specification.

H. Install new window sill flashing complete with shims for drainage as shown in the Drawings

I. Install in accordance with the most recent manufacturer’s installation guidelines.

   1. Provide new window sill flashings and sill attachment via metal back dam as shown in the Drawings. Wet seal window tight to sill angle as shown.

J. Place exterior sealant at head, sill and jambs as show in the Drawings.

   1. Product: Dow 790

      a. Color: to match existing

K. Place interior sealant at head, sill and jambs as shown in the Drawings.

   1. Product: Dow 790

      a. Color: to match existing

L. Install new head flashing complete with sealant as shown in the Drawings.

M. Provide exterior paint tie-in with existing wall finishes.

   1. Tie-in to include a 6” clean line of paint at exterior wall surfaces.

   2. Cover the face of the fluid applied flashing materials with exterior paint.

   3. Owner has stored exterior paint product for use by the Contractor for this tie in work

3.7 INTERIOR REPAIRS

A. Repair any damaged interior gypsum board finishes as a result of removal and reinstallation of glass masonry units.

   1. Repairs to include interior gypsum board surfaces repaired complete with paint.

2. Install new sill finishes to match existing.

3.8 CLEAN-UP

A. Clean work area to remove all dust and debris.

B. Remove interior protection.

C. Remove all tools and materials.

D. Repair any tie-back anchor holes in exterior CMU wall systems that are made to secure scaffolding or other access equipment.

END OF SECTION

RDH Comments 7/11/2014:

Residential window with the recommended performance grade are available from some manufacturers. For example, VPI Quality Windows' Endurance Series products have the following performance characteristics:

Endurance AAMA Certified Window Performance Ratings

	Performance Grade	Uniform Structural Load	Water Resistance	Air Infiltration
Casement Single Vent	CW-PG70	105.0 PSF 202.52 MPH	15 PSF 76.55 MPH	.01 cfm/ft^2
Vent-Fixed-Vent	CW-PG70	105.0 PSF 202.52 MPH	15 PSF 76.55 MPH	.03 cfm/ft^2
Awning Window	CW-PG35	52.5 PSF 143 MPH	15 PSF 76.55 MPH	.01 cfm/ft^2
Picture Window	FW-CW50	75.0 PSF 171 MPH	15 PSF 76.55 MPH	.01 cfm/ft^2

Endurance AAMA Certified Window Performance Ratings

	Performance Grade	Uniform Structural Load	Water Resistance	Air Infiltration
Horizontal Slider	LC-PG40	60.0 PSF 153.09 MPH	8.3 PSF 57 MPH	.35 cfm/ft^2
Vertical Slider (Single Hung)	LC-PG55	82.5 PSF 182 MPH	8.3 PSF 57 MPH	.55 cfm/ft^2
Picture Window	FW-CW50	75.0 PSF 171 MPH	15 PSF 76 MPH	.01 cfm/ft^2

We recommend the owners consider VPI or a similar high-quality brand if windows and doors with the specified design pressure are desired.

See other comments throughout specification section.

Quintet Condominiums
Barns & Burnside
Portland Oregon

February 20, 2009

Steve Meyer
Quintet Condominiums
6695 W Burnside Road
Portland, OR 97210

Mr. Meyers:

Enclosed is a Residential Window Replacement Guideline package that includes a written specification and architectural details.

These documents were prepared to assist Quintet Homeowners in selecting and installing appropriate vinyl replacement windows, and should be considered minimum standards.

Guidelines are for residential windows only, and deal primarily with weatherproofing. It is the responsibility of the manufacturer / installer to determine which units require tempered glass, and those that must meet egress requirements. These guidelines are not applicable to exterior doors.

We are available to answer any questions or respond to concerns regarding the enclosed. Thank you for the opportunity to be of service.

Sincerely,

// SENT VIA EMAIL //

Aaron Bartel

Enclosures – 2

RDH BUILDING SCIENCES INC.

☒ REVIEWED AS NOTED ☐ NOT REVIEWED ☐ REJECTED
☐ REVIEWED ☐ REVISE AND RESUBMIT REVIEWED BY:

7/11/2014

REVIEW IS FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT OF THE PROJECT AND GENERAL COMPLIANCE WITH THE INFORMATION GIVEN IN THE CONTRACT DOCUMENTS ONLY. ANY ACTION SHOWN IS SUBJECT TO THE REQUIREMENTS OF THE PLANS AND SPECIFICATIONS. CONTRACTOR IS RESPONSIBLE FOR ALL DIMENSIONS, AND COORDINATING ITS WORK WITH THAT OF ALL OTHER TRADES.

Quintet Clubhouse
Barns & Burnside
Portland Oregon

We recommend a field testing section be added to this specification to verify in-situ performance of units.

800 DOORS, WINDOWS AND GLASS

862 VINYL WINDOWS & SLIDING GLASS DOORS

862.1 DESCRIPTION

A. Application of General Conditions: The A.I.A. General Conditions, latest edition, are a part of this specification and the Contractor shall consult them in detail for instructions pertaining to his work.

B. Work Included: This specification includes the furnishing of all labor, material, equipment and superintendence necessary to replace damaged or broken windows

This is an outdated reference. The new NAFS / CSA A440 2011 calls out updated nomenclature: CW-PG40 (essentially the same rating). The Quintet buildings are as high as six storys above grade with a site elevation of approximately 500 feet. As a result, our recommendation for windows would also be CW-PG40

C. Windows shall comply with the requirements of AAMA/NWWDA 101/I.S.2 - 97(American Architectural Manufacturer's Association).

B. Units shall be Commercial Class, Performance Grade 40 (C40), or greater.

USE AND INTERPRETATION

A. Drawings, Specifications, Directives, Correction Notices, and all other written or graphic material are Instruments of the Architect's Service, and are not work product.

B. The Architect, or his designated representative, is the sole interpreter of the Instruments of Service. All content is original unless cited. All rights, including copyright, are reserved.

C. Implementation of the Instruments of Service requires that the Architect be allowed and compensated for Construction Observation.

This is an outdated reference. The new NAFS / CSA A440 2011

862.3 PERFORMANCE REQUIREMENTS

A. Testing standards for air infiltration, water penetration and structural performance: AAMA/NWWDA 101/I.S.2 - 97 for type of window configuration indicated.

B. Air infiltration: Maximum 0.14 CFM per square foot of overall sash crack at inward test pressure of 1.57, ASTM E 283 - 91.

In general terms, RDH concurs with this value

C. Water penetration: No water penetration at inward test pressure of 6.00 psf, ASTM E 547 - 93.

In general terms, RDH concurs with this value

D. Structural performance: No glass breakage, damage to hardware, permanent deformation at positive and negative test pressure of 60.0 psf, ASTM E 330 - 90.

862.4 SUBMITTALS

A. Product data: Submit manufacturer's product specifications, technical support data, installation and maintenance recommendations and standard details for each type of unit required, including finishing methods, hardware and accessories.

B. Product drawings: For each type of window specified, submit standard assembly and details complying with the project documents for stucco.

C. Color samples: Submit samples of each required exterior finish on PVC sample. Submit sample of coextruded PVC material with required interior and exterior finish.

D. Certification: Provide certification by a recognized, independent testing laboratory certifying that each required type of window complies with performance requirements indicated.

862.6 DELIVERY, STORAGE AND HANDLING

A. Protect windows from damage during transit, storage and installation. Tool marks and other damage will not be acceptable. Store material at locations as directed by Architect.

B. Individually wrap frames in polyethylene or other acceptable wrapping.

862.8 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing extruded tubular vinyl windows with welded corners and a minimum five years documented experience.

862.10 WARRANTY

A. Provide manufacturer's standard warranty which agrees to repair or replace units that fail in workmanship for a period of ten years from the original date of purchase.

B. Warranty [shall] include coverage of materials and labor in full by the manufacturer.

862.12 MANUFACTURERS

A. Subject to the requirements of this specification.

862.14 MATERIALS

A. Vinyl: Comply with requirements of AAMA/NWWDA 101/I.S.2-97, ASTM 4216 specification for rigid (Poly Vinyl Chloride) PVC and related plastic building product compounds.

B. PVC compound containing impact-resistant, solid plasticizer titanium dioxide, surface and color stabilizers.

C. All solid and coextruded color applications are to be homogeneous. Coextruded capstock is produced when an additional color compound is fused to the base color. This fusion process takes place in the extrusion die under approximately 4,000 PSF and 358 degrees forming one rigid Poly Vinyl Chloride extrusion.

Structural sufficiency of anchorage not reviewed by RDH

D. Anchors

i. Masonry: 3/8" Simpson Titan Masonry Anchors of sufficient length to insure 3" minimum embed into fully grouted CMU cell.
ii. Angle to Frame: Stainless 7/8" #8 Truss Head Screw
iii. Head Flashing to Frame: ½ #8 Flat Head Screw

E. Sill Flashing: 12 Gauge

i. 304 Stainless
ii. Anodized Aluminum
iii. Galvanized Double Sided Oven Baked Enamel. Primed & Painted at cuts & abrasions.

F. Head Flashing: 24 Gauge

i. 304 Stainless
ii. Anodized Aluminum
iii. Galvanized Double Sided Oven Baked Enamel. Primed & Painted at cuts & abrasions

862.16 GLASS AND GLAZING:

A. Provide the manufacturer's standard clear sealed insulating glazing material that complies with ASTM E 774 - 92 Class A and is at least 1" overall in thickness.

B. Spacer Bar: Warm-edge steel spacer or aluminum spacer.

C. Provide PVC snap-on interior glazing stops (beads) to match window finish.

C. Glazing area in vent to be equally proportional to glazing area in fixed unit resulting in equal sight lines.

862.18 HARDWARE:

A. Provide the manufacturer's standard hardware fabricated from a non-corrosive resistant material and of sufficient strength to perform its intended function.

B. For application of exposed hardware, use fasteners that match the finish of the hardware being fastened. All locking hardware must have certified forced entry positive Action locking mechanism. Concealed block and tackle balancer.

862.20 ACCESSORIES

A. Weather-stripping: Operating sash members shall be double weather-stripped with either fin seal, silicone treated polypropylene or Q-lon weather-stripping.

B. Insect Screens: Provide insect screens for each operable exterior sash or ventilator. Locate screens on inside or outside of window sash or ventilator, depending on window type. Design windows and hardware to accommodate screens in a tight-fitting removable arrangement with a minimum of exposed fasteners and latches.

862.22 FABRICATION

A. Fabricate framing, mullions and sash members with mitered and fusion welded corners and joints. Supplement frame sections with internal reinforcement where required for structural rigidity. Trim and finish corners and welds to match adjacent areas.

B. All windows shall be integral units with continuous perimeter frames. Factory or field mulled units are not acceptable. Vertical and horizontal sashes shall be solid, one piece extrusions.

B. Frame: Per manufacturer's specifications.

C. Sash: Per manufacturer's specifications.

D. Internal Grids: Specified insulated glazing shall included between the panes of glass 3/16" by 5/8" roll formed aluminum mountain bars configured in divided light patterns as shown on the drawings.

E. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

F. Provide internal offset weepholes and channels to migrate moisture to exterior.

G. Prepare components to receive anchor devices.

H. Provide double or triple seal polypropylene for weather-stripping.

I. Assemble insect screens to fully integrate with window frame. Frames to be manufactured of cambered formed aluminum and reinforced with rigid plastic corner keys. Screen mesh to fit taut in frame and secured. Door screens made of extruded aluminum for strength and durability.

862.24 FINISHES

A. PVC: (Poly Vinyl Chloride) solid, homogeneous.

B. Color: Integral white, interior and exterior.

This standard deals primarily with flanged windows and does not apply: 2400-10

862.25 EXECUTION

There have been updates to the various standards

A. Comply with all requirements and recommendations of ASTM 2112 & AAMA 2400 / 2410.

ASTM 2112 - 07 is the correct standard / version

B. Verify wall openings and adjoining materials are ready to receive work of this section.

C. Comply with manufacturer's specifications and recommendations for installation of window units, hardware, operators, accessories and other window components.

D. Windows shall be factory sized to fit in each framed opening so that the net sized window is 1" smaller than the framed (rough) opening to allow ½ clearance on all sides. (tolerance +/- 1/16").

E. Opening panels must be closed and locked during installation. Windows must be installed level, plumb and square with ½ clearance on all sides and with weep holes at bottom.

E. Sill pans shall be in place prior in installation; full support shall be provided at sill in accordance with manufacturer's written instructions.

F. Anchor holes shall be pre-drilled. Place PVC shims at all anchor locations. Drive anchor tight against frame without any distortion of frame, sash, or glazing seals.

G. Operating sash and hardware should fit tight at contact points and weather-stripping.

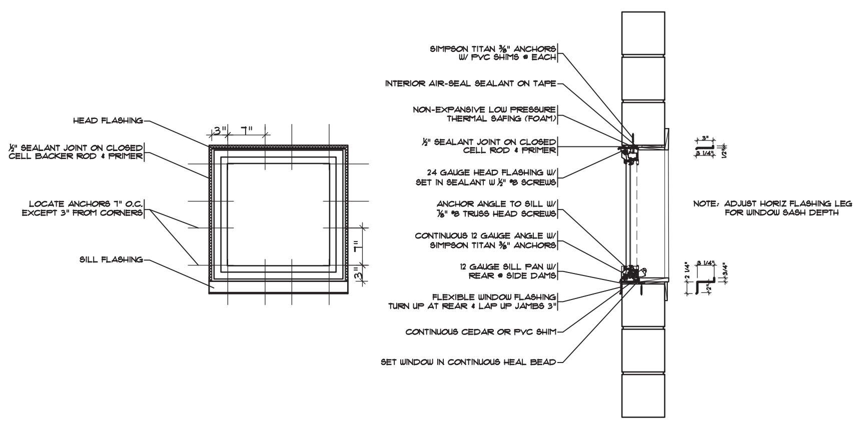
862.26 ADJUST

A. Remove protective material from pre-finished surfaces.

B. Wash down surfaces with solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

C. Do not use petroleum distillates to clean windows.

END OF SECTION



We would suggest a similar installation detail to that that is provided with the glass block system.

1 WINDOW INSTALL GUIDELINES
1½" = 1'-0"

Raymond J. Bartel
Architect and Planner
at
Hawthorne Crest
P.O. Box 700 · Oregon City, OR 97045 · (503) 631-7800 · (503) 659-3988

QUINTET CONDOMINIUMS

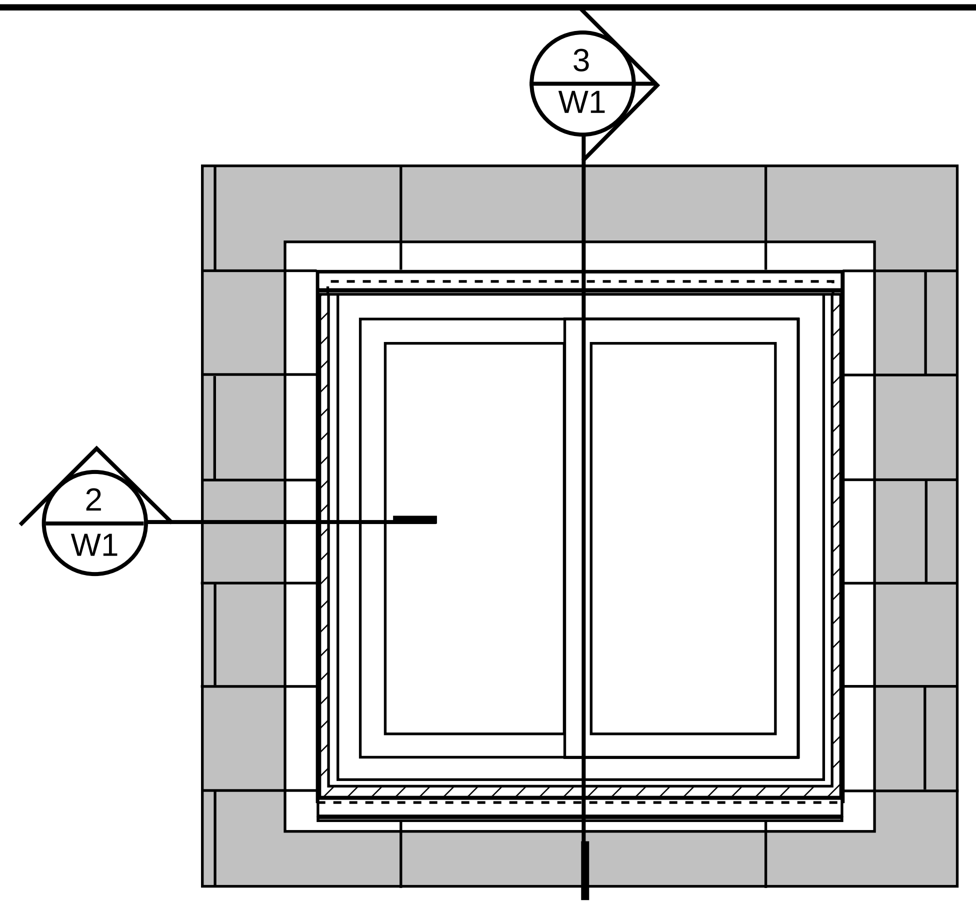
WINDOW RETROFIT PROTOCOL

PORTLAND, OREGON

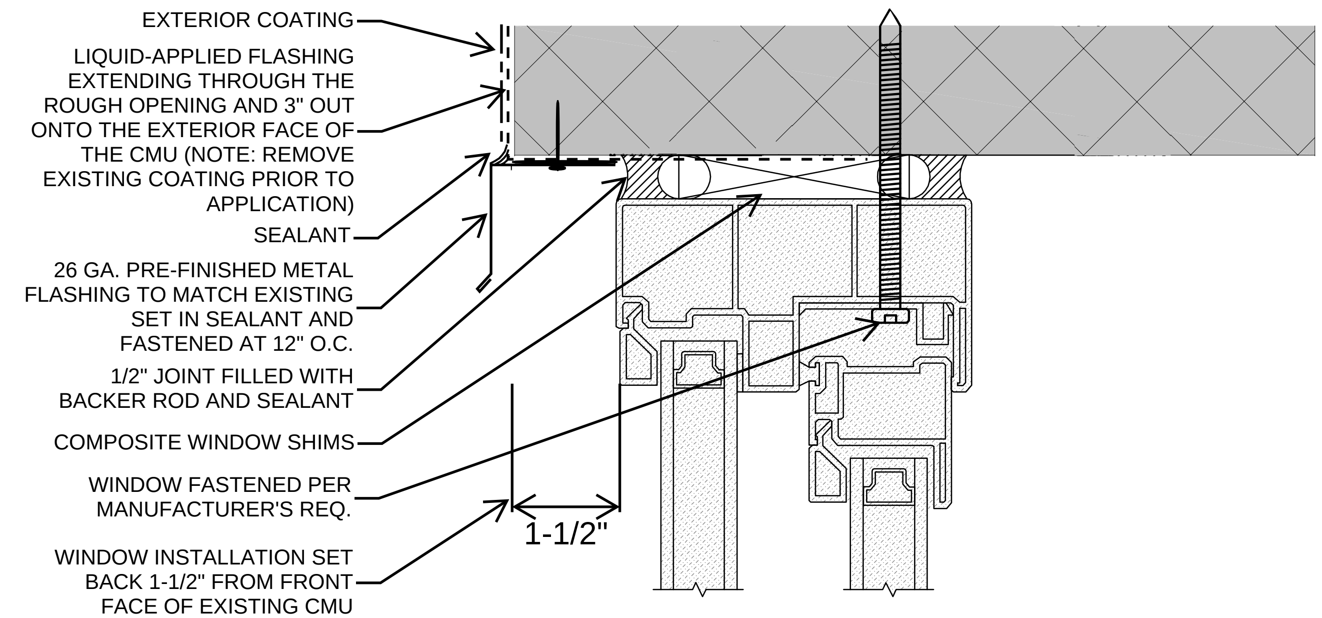
0 — 1
ONE INCH

WINDOW GUIDELINES

DATE 2/18/2009	
PROJECT #	
REVISION	



1 W1 WINDOW ELEVATION

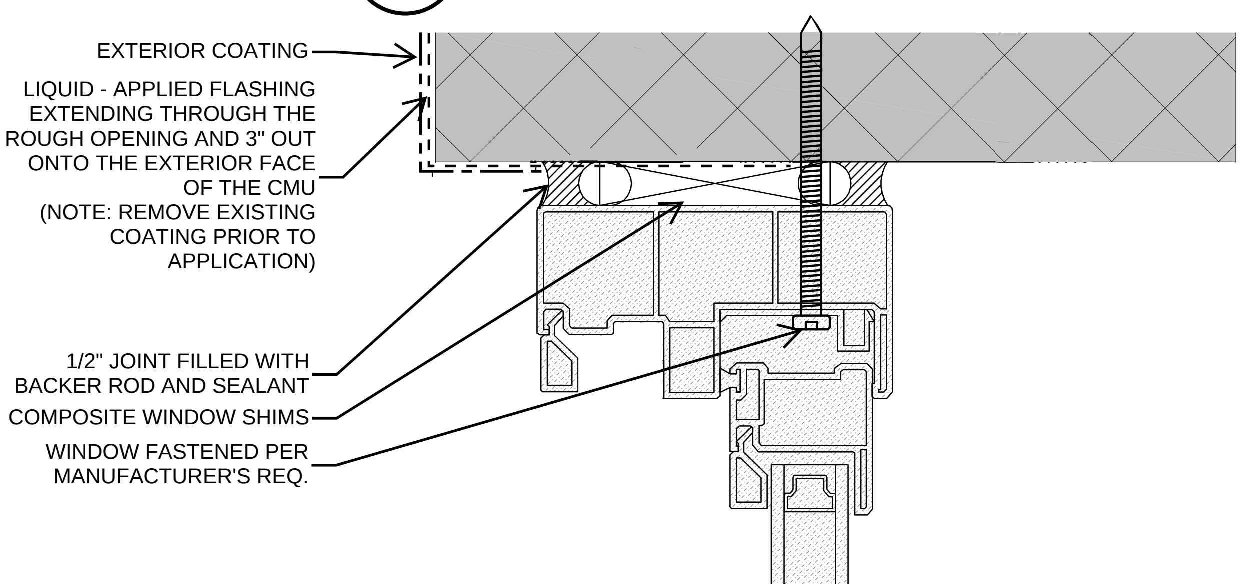


GENERAL NOTES

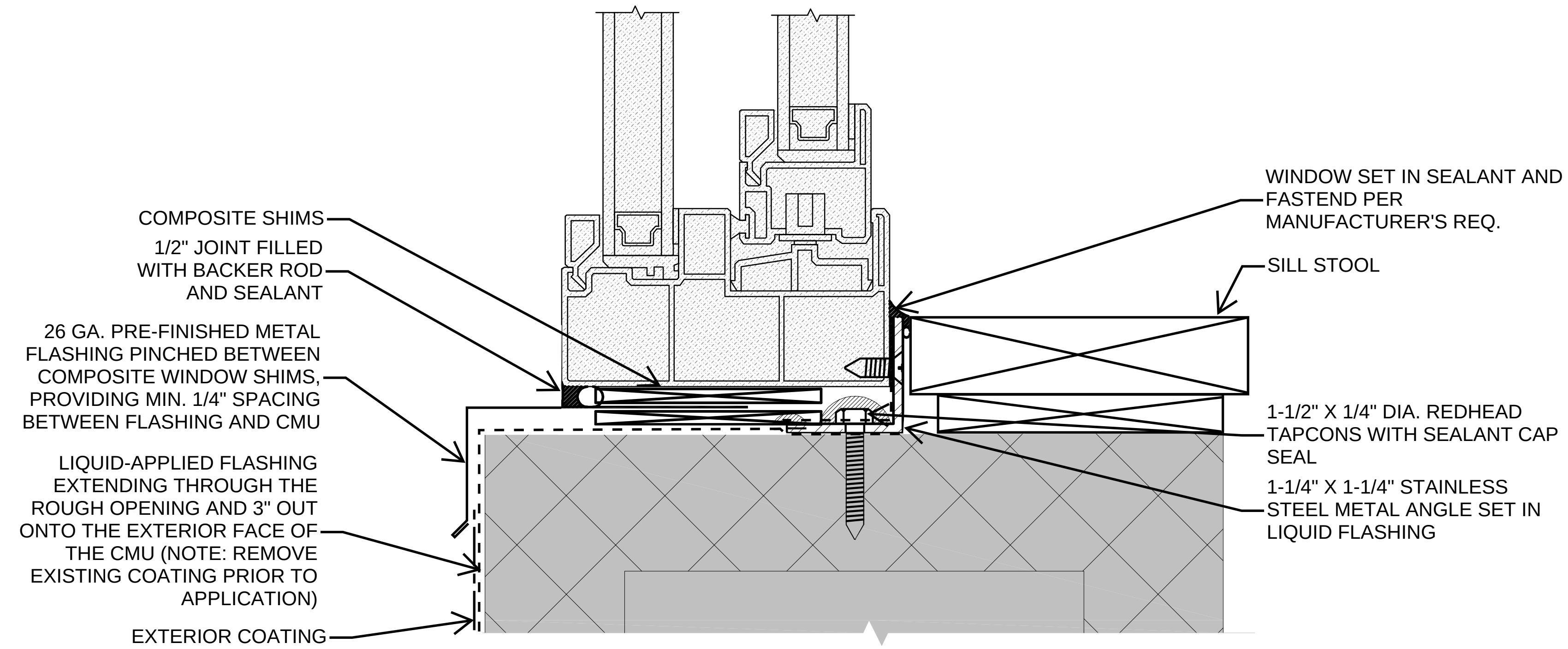
LIQUID-APPLIED FLASHING: PROSOCO FASTFLASH

SEALANT: DOW 790

EXTERIOR COATING: STO ACRYLPLUS OR EXISITING PAINT



2 W1 JAMB SECTION DETAIL



3 W1 HEAD/SILL SECTION DETAIL

308 SW 1ST AVENUE, SUITE 300 TEL 503 243 6222
PORTLAND, OR 97204 WWW.RDHBE.COM

ISSUE	DESCRIPTION	DATE

DATE: 07 - DEC - 2015
SCALE: NTS
DRAWN BY: LN
CHECKED BY: ---

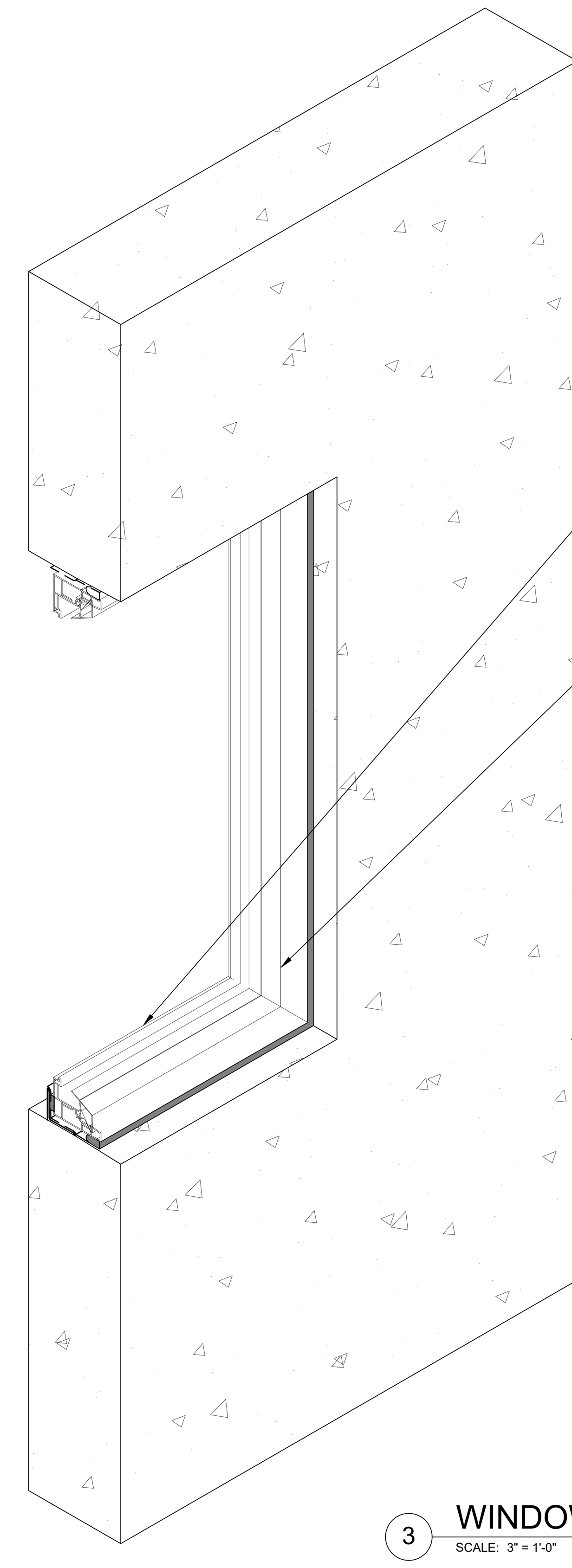
RDH

PROJECT: Quintet Condominiums
Portland, OR

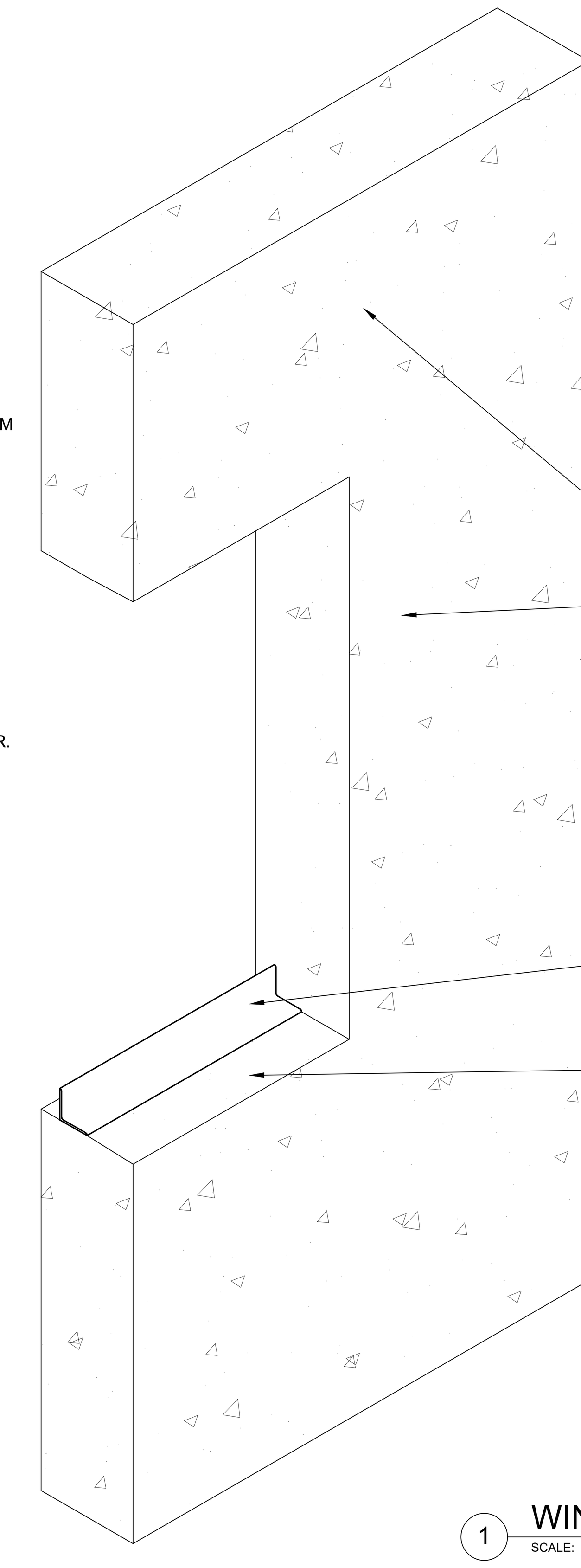
PROJECT NO.: B4711.054

DETAIL TITLE: Window Specification Drawings

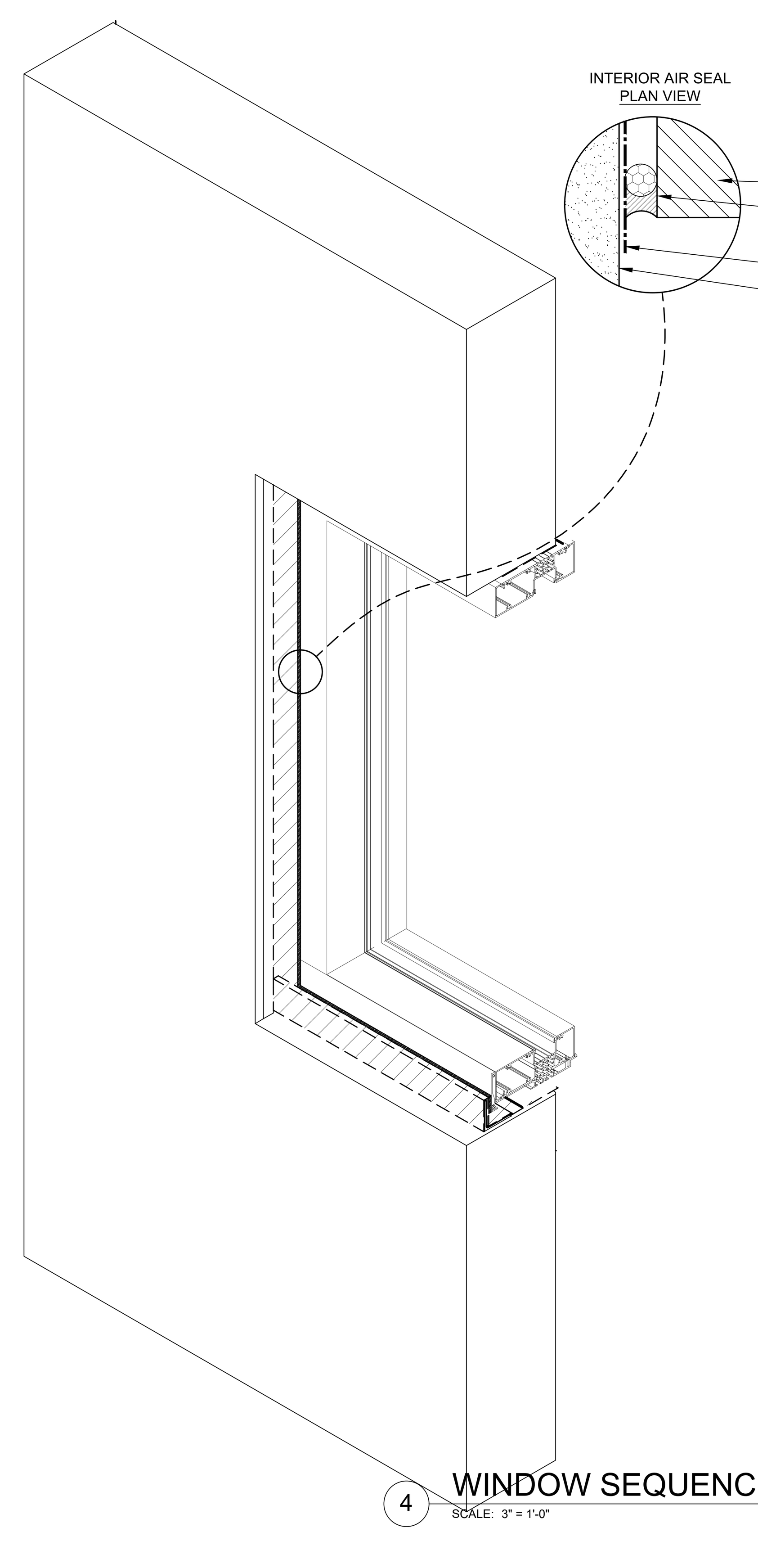
DRAWING NO.: W1



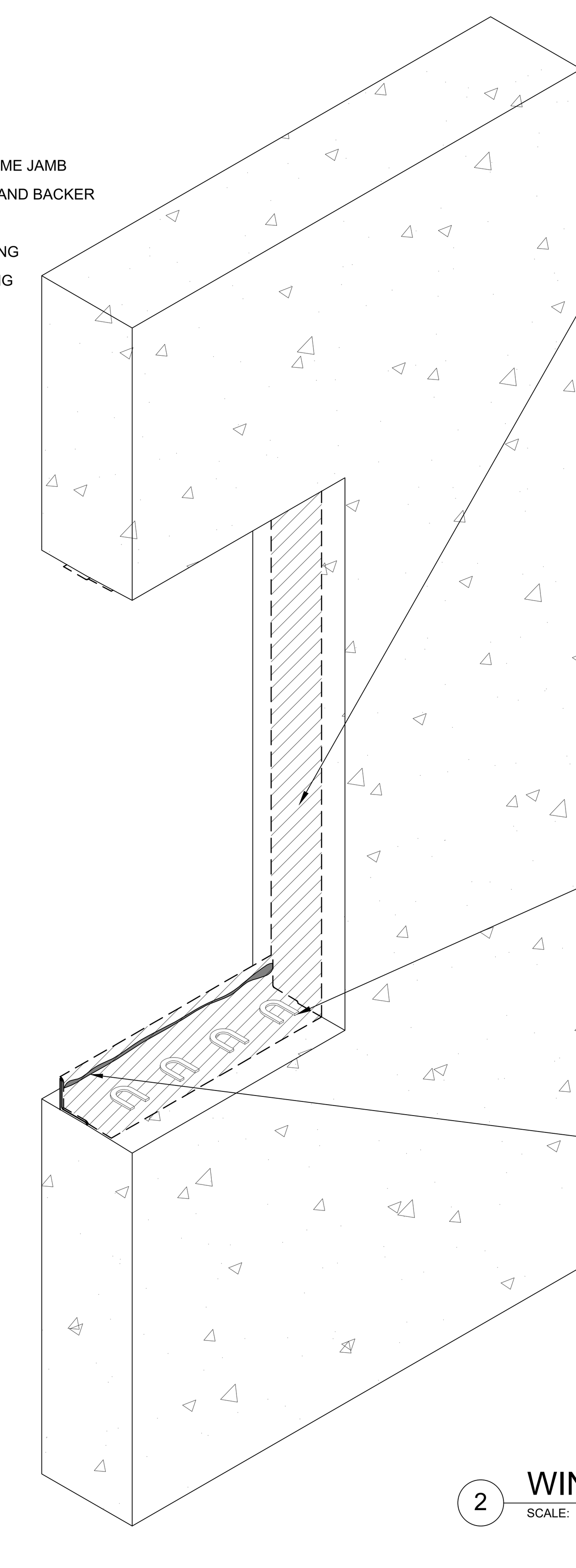
3 WINDOW SEQUENCE - STEP 3
SCALE: 3" = 1'-0"



1 WINDOW SEQUENCE - STEP 1
SCALE: 3" = 1'-0"



4 WINDOW SEQUENCE - STEP 4
SCALE: 3" = 1'-0"



2 WINDOW SEQUENCE - STEP 2
SCALE: 3" = 1'-0"

RDH
2101 N. 34TH STREET, SUITE 150
SEATTLE, WA 98103
WWW.RDH.COM
TEL 206 324 2272

STAMP:

DRAFT NOT FOR CONSTRUCTION
engineers stamp

ORIGINAL PRINT SIZE 30" x 42"

LEGEND:

ISSUE/REVISION	DESCRIPTION	DATE
	ISSUED FOR REVIEW	MAY 6, 2013

PROJECT NO.:
B0000.00

PROJECT TITLE:
RDH WINDOW FLASHING SEQUENCES
2101 N 34th St, Seattle, WA 98103

SHEET TITLE:
NO WRB - LA FLASHING
CONCRETE RO - FLANGELESS

DRAWING NO.:
BE5.06

SCALE: As Noted	DRAWN BY: ----
DATE: Jun. 04, 2015	CHECKED BY: Initials

November 29 2018 10:24 AM