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Making Buildings Better™

TO **The Owners, Sno-Isle Libraries**
C/O **R. D. Burley**
EMAIL **RBurley@sno-isle.org**
Sno-Isle Libraries
7312 35th Ave NE
Marysville, WA

30978.000
Mukilteo Library
Leak Investigation

DATE November 18, 2024

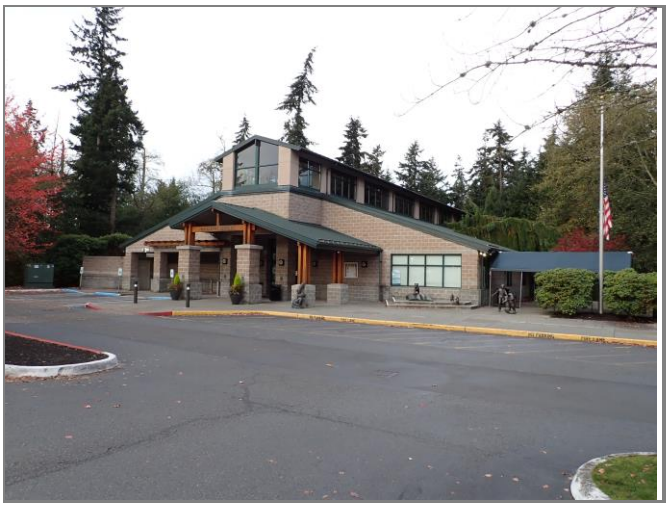
REGARDING **Follow-Up Leak Investigation Summary Letter**

Dear Mr. Burley,

We are pleased to provide you with this updated summary letter for our follow-up review of the water intrusion occurring at the Mukilteo Library. This report provides additional information from our site visit with AJP Engineering.

1. Background

On September 24, 2024, RDH was contacted to review and identify the cause of water intrusion into the large meeting room of the library. We performed an initial site visit and provided preliminary recommendations as noted in our Summary Letter on the Initial Leak Investigation dated October 07, 2024. Our recommendation was to have a structural engineer review the damaged water framing below the windowsill to determine if structural repairs would be required. The structural repair scope was to assist in providing a waterproofing repair to address the water intrusion occurring at the aluminum framed window. We also recommended that water testing be performed to determine potential pathways for water intrusion into the interior.



Mukilteo Library during the morning of the follow-up site visit.

2. Follow-Up Site Visit

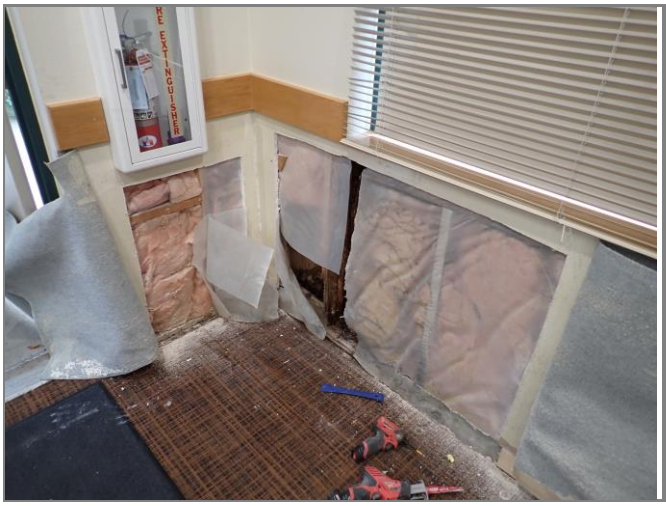
RDH returned on November 8, 2024, and met with Timothy Stoker of Sno-Isles Libraries. As discussed on-site, the opening below the east end of the aluminum framed window needed to be enlarged with an opening performed at the west end of the window to review the extent of water damage within the wall cavity. As the water damage on the east

end of the window was extensive, the opening was enlarged 3-feet towards the west as well as extending towards the east elevation wall.

From our on-site review of the opened wall cavity, the wall assembly consists of the following components from the exterior towards the interior:

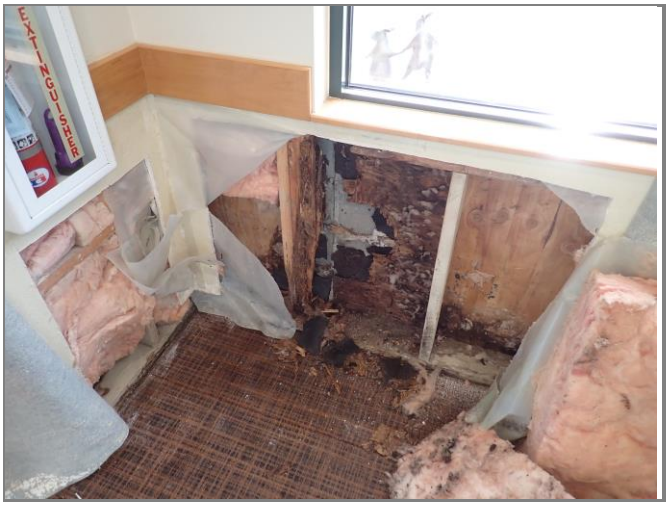
- CMU veneer block.
- Asphalt based 50-minute building paper.
- ½-inch plywood sheathing.
- Fiberglass batt insulation.
- 2-inch by 6-inch wood stud framing.
- ½-inch gypsum wall board.
- Interior space.

The wood stud framing is secured at the base of wall with a 2-inch by 6-inch wood sill plate that is secured to the concrete slab on grade. We observed a flexible, plastic masonry flashing had been installed from the plywood sheathing, returning underneath the bottom course of CMU block. The large aluminum window is supported by the wood stud framing and wood frame sill top plate.

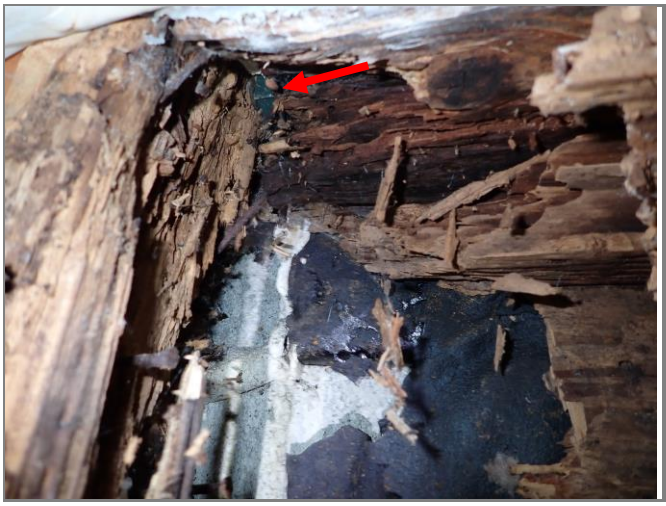


Interior drywall and fabric overlay was removed below the east end of the aluminum framed window to review the water damaged wood framing.

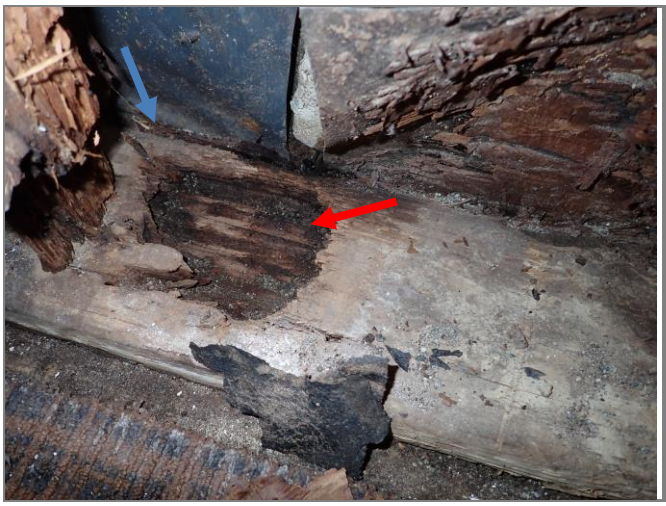
RDH observed that the wood stud framing, wood sill top plate end and exterior wall plywood sheathing were decayed. The bottom sill plate wood support secured to the concrete slab on grade was decayed as well. The majority of the water damage was observed below the east end of the window but additional damage to wood components was also observed on the opened east elevation wall cavity and west of the windowsill corner.



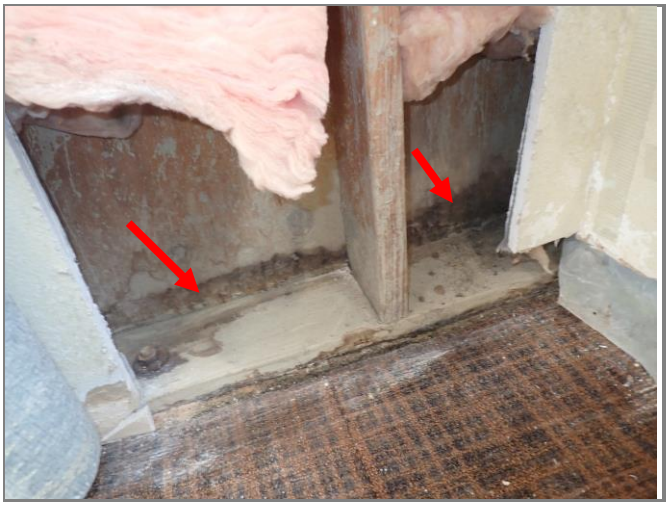
The interior side vapor barrier was opened to review the extent of water damaged wood framing.



Within the opening, the wood sill top plate support had severely decayed leaving the corner of the window frame exposed (red arrow).

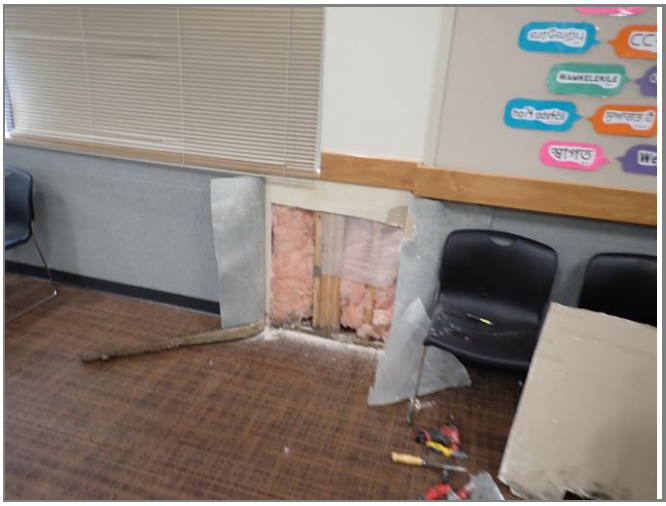


Severe decay was observed at the supporting sill plate directly below the east end corner of the window (red arrow). Note an accumulation of dirt was observed between the sill plate and the CMU veneer plastic masonry flashing (blue arrow).

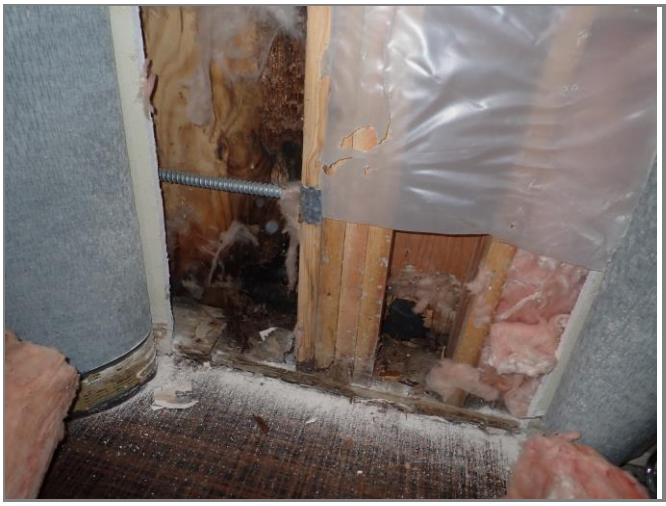


Water damaged exterior plywood sheathing was observed on the opened east elevation wall cavity. The supporting sill plate appears to be mostly intact with some softness noted on select portions on the interior side edges.

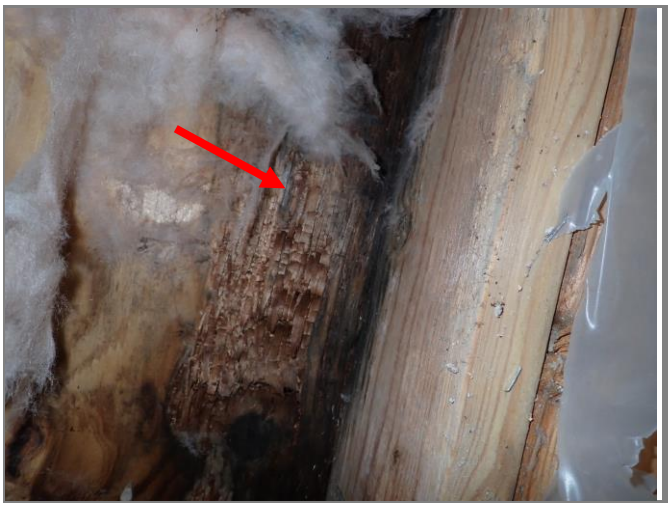
At the west end of the aluminum framed window, a 2 foot opening was performed to exposed the wall cavity to review for water damaged components. We observed water damaged exterior sheathing below the west end of the window frame.



An opening was performed below the west end of the aluminum framed window to expose the wall cavity for review.

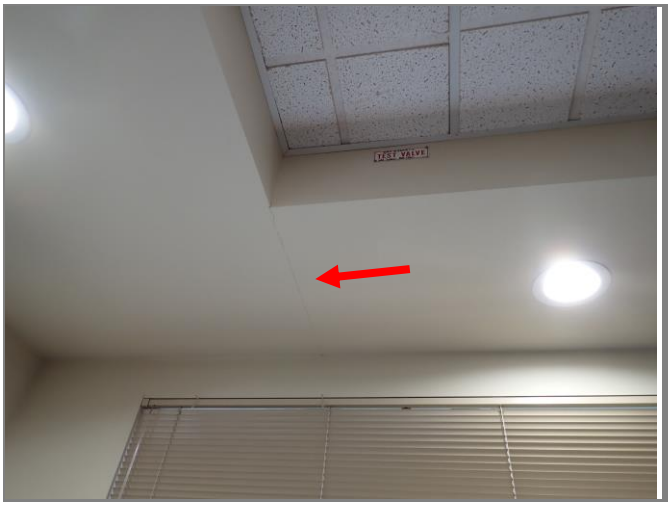


Water damaged exterior plywood sheathing was observed. Water staining with some minor water damage was observed for the wood stud and sill plate framing.

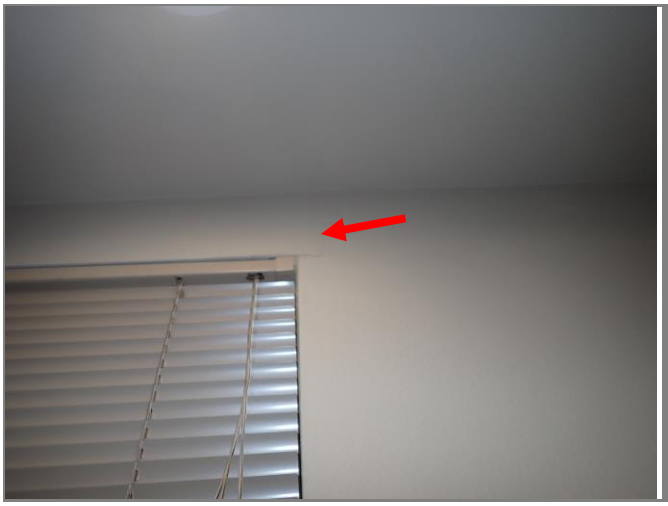


Water damaged exterior plywood sheathing was observed below the window sill corner.

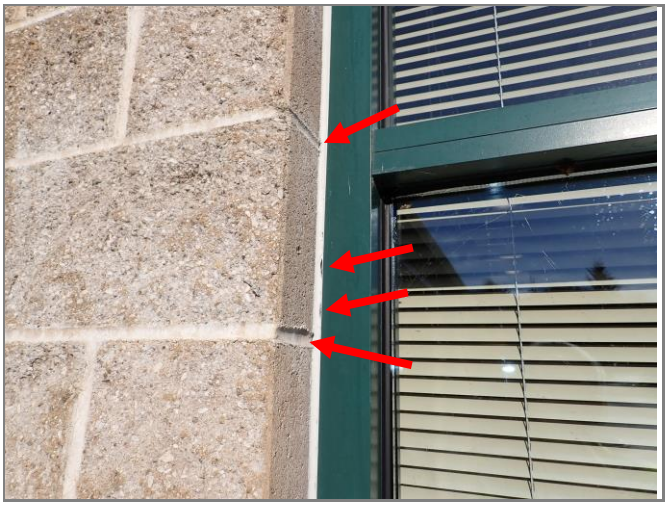
Aaron Pambianco of AJP Engineering reviewed the wood stud framing that was exposed. Mr. Pambianco noted that the south elevation wall is not a load bearing wall and that the slab on grade concrete had not been compromised where the water damaged conditions were observed. Mr. Pambianco observed stress cracks in the ceiling gypsum board and at corners of the interior drywall at the head of the window. From both AJP's and RDH's on-site observations, we noted that the window is experiencing some movement due to the lack of support at the east end. It was recommended that the wood bracing be added to on the east end of the window in the interim for additional support. A summary email was prepared noting his recommendations for temporary bracing of the decayed wood stud frame and sill plate as well as future repairs.



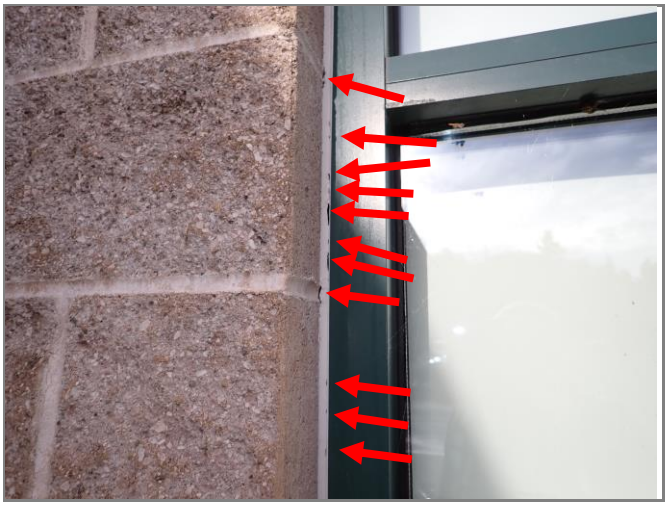
Stress crack in ceiling gypsum board was observed.



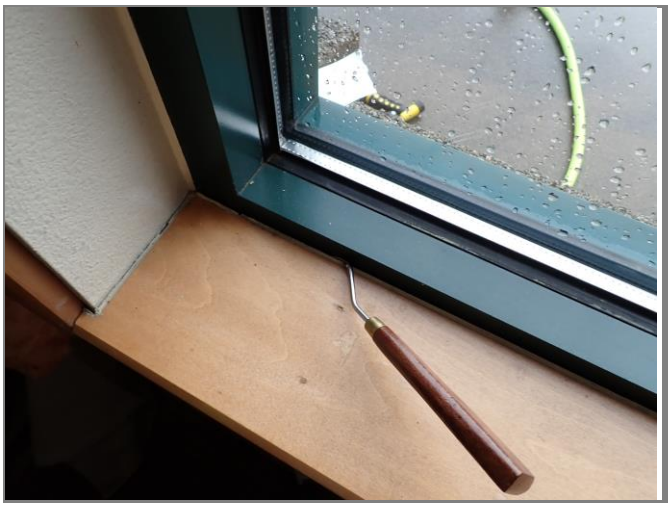
Additional cracking was observed in the interior drywall at the head of the window.



During the site visit performed on September 30, 2024, we observed some separation in the sealant joint at the west end window jamb (red arrows).

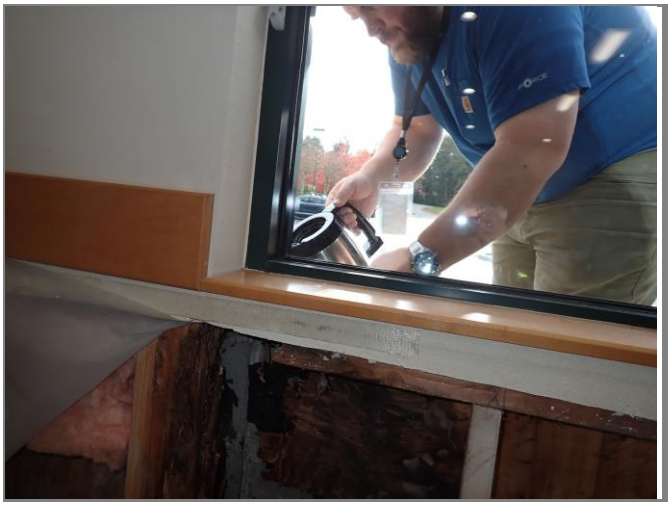


During the follow-up site visit, several openings were observed in the same sealant joint at the window jamb with the previously observed openings becoming larger (red arrows).

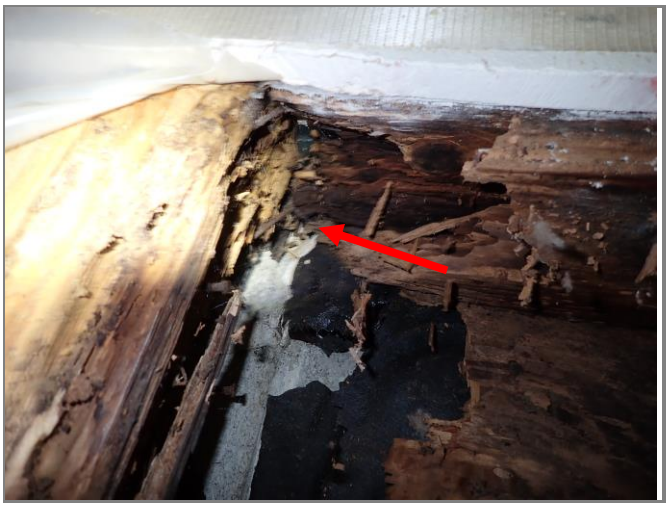


A gap was observed between the interior side wood sill trim and the window sill frame at the east end of the window.

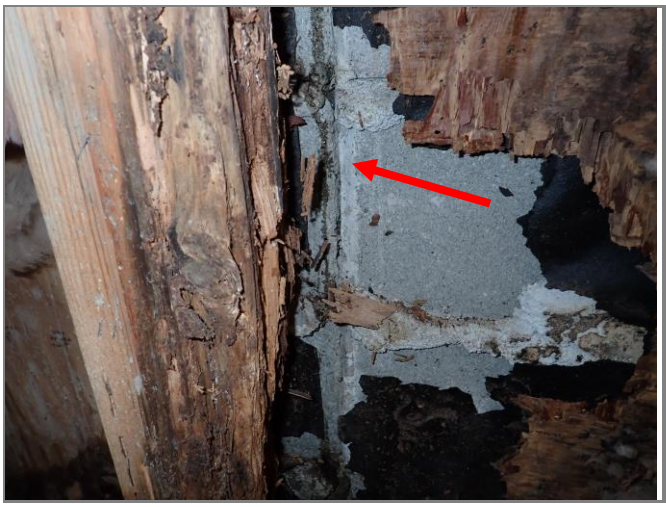
While on-site, water was placed on the exterior windowsill corner to review potential pathways for the water intrusion. Water was first poured at the east end of the windowsill frame that interfaces with the CMU veneer. We observed water entering through the frame interface as well as an open joint in the CMU veneer. The interior side joint of the veneer continues vertically from the windowsill down to the slab on grade concrete.



Water being poured at the window sill corner.

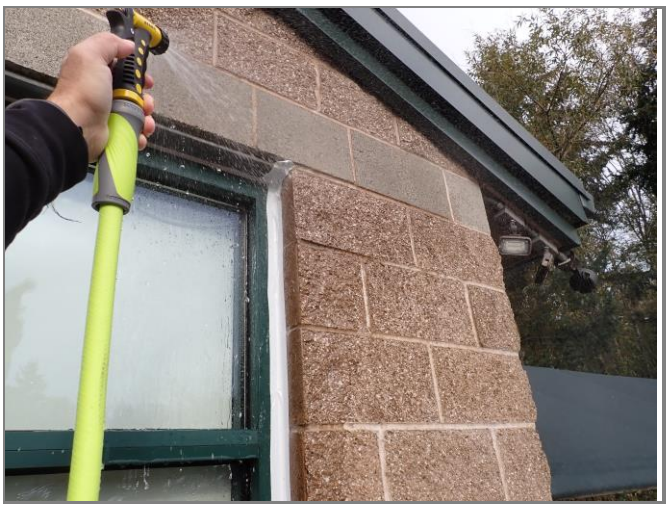


Water was observed entering at the window sill corner first (red arrow).

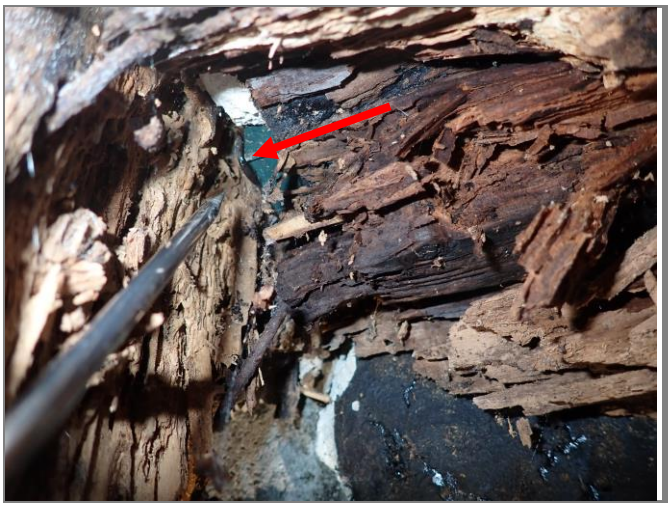


Water was also observed entering through an open joint in the CMU block veneer.

Water was then applied at the head if the window on the exterior side of the wall. PVC tape was used to cover the window jamb and sill sealant joint to isolate the water pathway. During the water testing at the head of the window, water was observed entering the interior



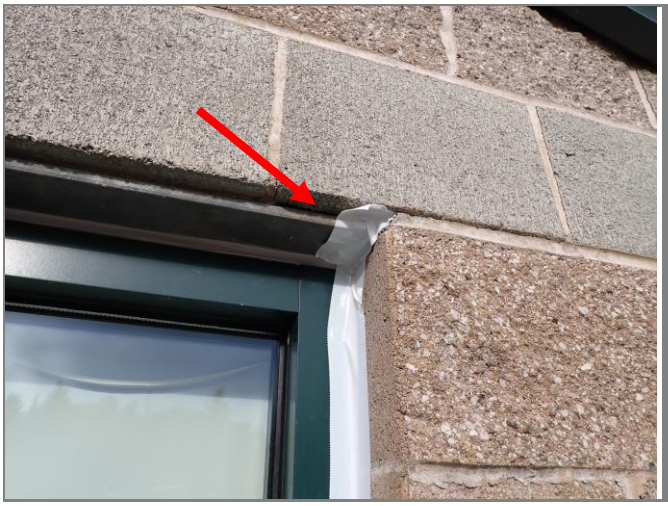
Water applied at the head of the window.



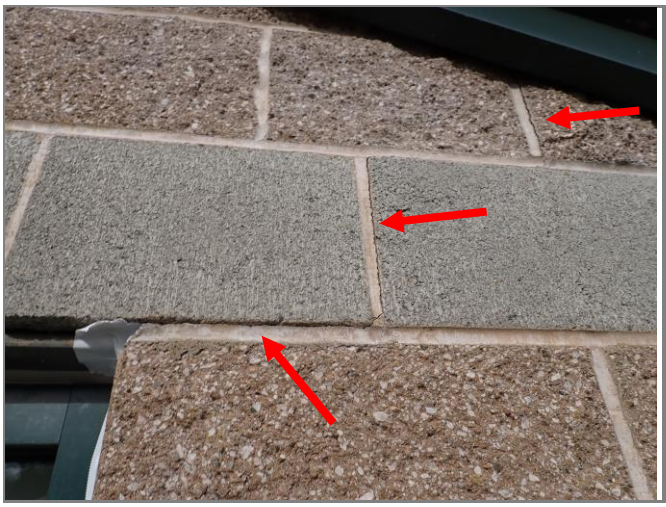
During the testing, water was observed on the backside of the sill frame (red arrow) indicating another pathway for water to enter the interior.

3. Conclusion and Recommendations

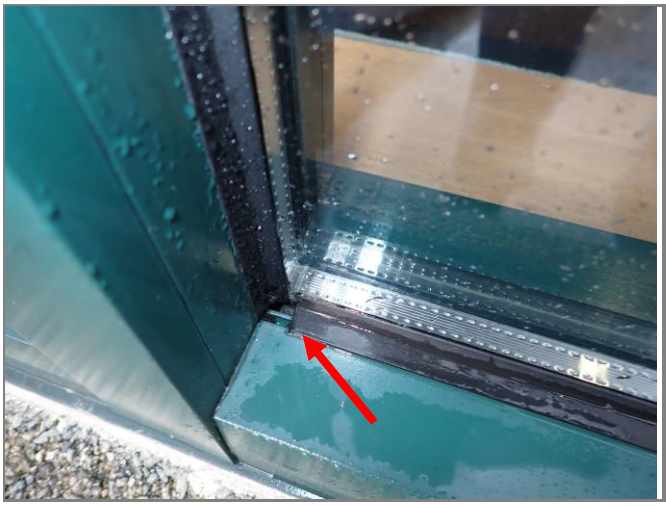
Water has entered the interior through multiple pathways on the exterior wall. The window frame is set to the CMU veneer which does not allow for a proper sealant joint. Normal expansion and contraction of the window frame has stressed the applied sealant and created openings in the sealant over time. There are open joints at the head of the window to veneer interface that are additional pathways for water to enter behind the frame. No control joints are present in the CMU veneer to compensate for movement. The missing control joints have created cracks in the mortar joints that allow water behind the veneer system. To further compound this condition, the concrete slab poured to the base of exterior wall prevents water from draining through weep openings in the CMU veneer. Any water that enters behind the masonry system becomes trapped within the wall assembly. We also noted that the exterior glazing gaskets have shrunk and created openings at corners for water to enter.



An opening is present where the steel ledger interfaces with CMU veneer.

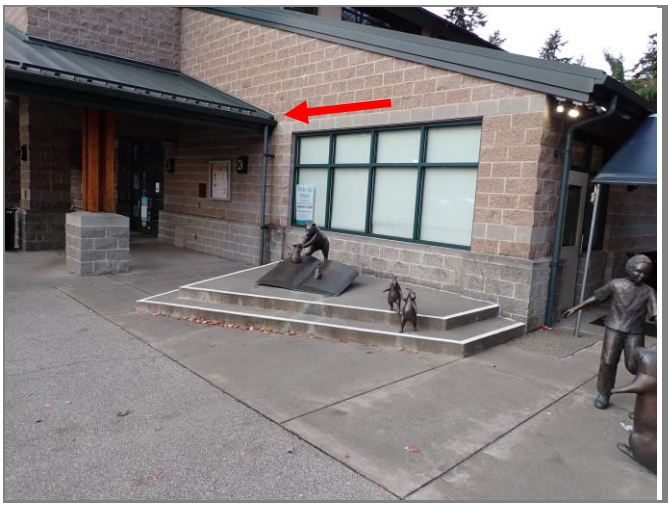


Without control joints in the masonry wall, cracks develop in the mortar joints (red arrows) and are pathways for water to enter behind the veneer.

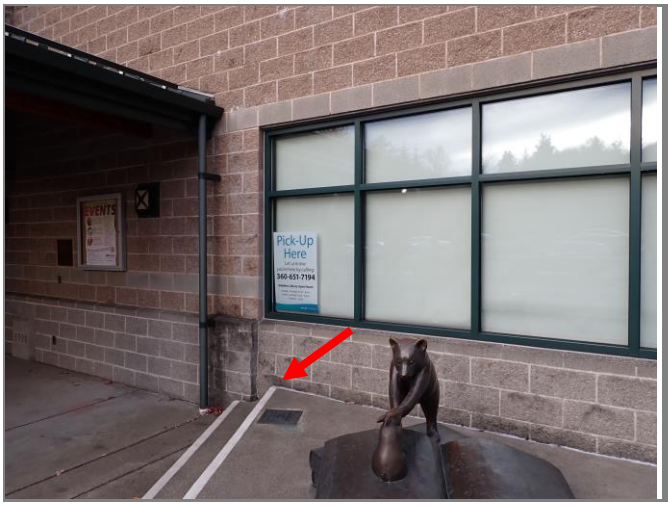


Openings at the corners of the glazing gaskets were observed.

From our on-site review, the east end of the window experiences more of the weather conditions as it is exposed. The west end of the window is partially protected with the eave edge of the main entrance sloped roof hence the less severe water damage at this end.



The west end of the window has some partial coverage with the sloped roof eave edge.



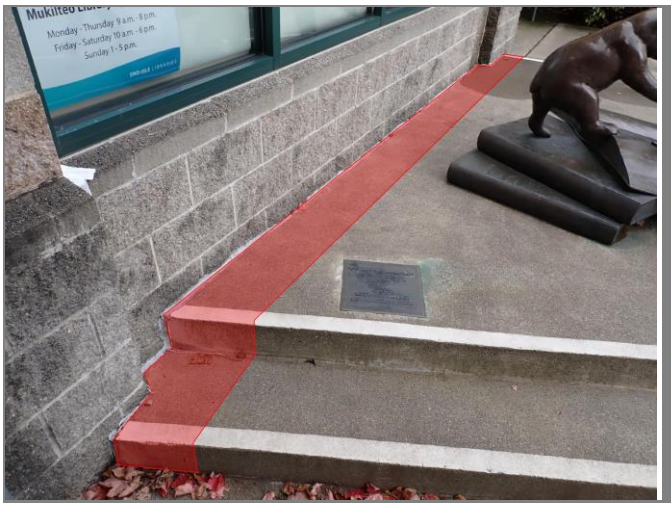
Also the concrete slab poured to the CMU veneer wall is less then the east side leaving the potential for some water drainage at this end.

To effectively repair this condition, we recommend the following:

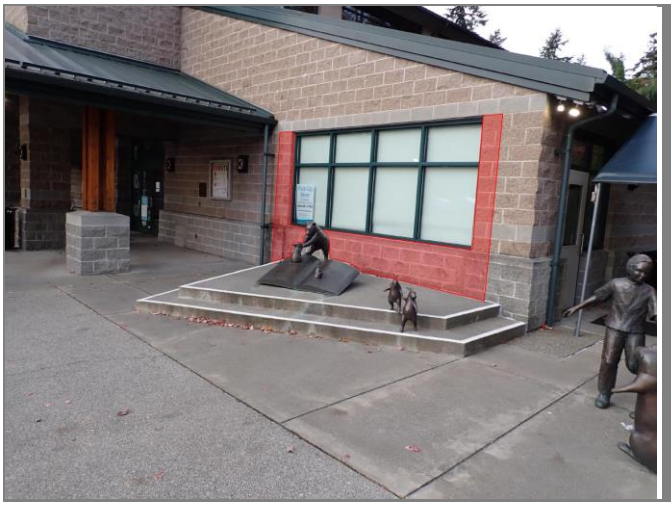
TABLE 3.1 CONCEPTUAL REPAIRS	
	• Remove a portion of the poured feature slab from the base of the exterior wall. • Remove the CMU masonry below the window and at the window jambs. Salvage the CMU masonry for reinstallation. • As recommended by the Structural Engineer, remove the interior drywall around the window to review the wood framing for any potential damage. Structural Engineer to provide recommendations for repairs for damage that is observed. • Install new water resistive barrier membrane with self-adhering strip flashing to replace the damaged and/or missing flashings at the window

rough opening. During this phase, the window will need to be examined and re-secured to the rough opening frame.

- Prior to reinstalling the CMU masonry, perform water test to confirm new waterproofing provides a watertight seal.
- Re-install CMU masonry after a successful water test.
- Install new waterproofing and means for water drainage at the base of the reinstalled CMU block. This is needed if the removed concrete slab portion needs to be replaced. Another consideration would be to install a grate covering so that access to the base of exterior wall can be provided for future maintenance and repairs.
- Complete repair to interior finishes.



Proposed poured slab removal section.



Proposed CMU veneer removal portion.

Please let us know if you would prefer to have a meeting to discuss our findings and repair recommendations.

Yours truly,

Tom Cuevas | RRO
Project Consultant
tcuevas@rdh.com
T 206-324-2272
RDH Building Science Inc.

Paul Duffy
Principal, Senior Project Manager

Encl. – AJP Engineering Summary Email and Sketch Drawing

Tom Cuevas

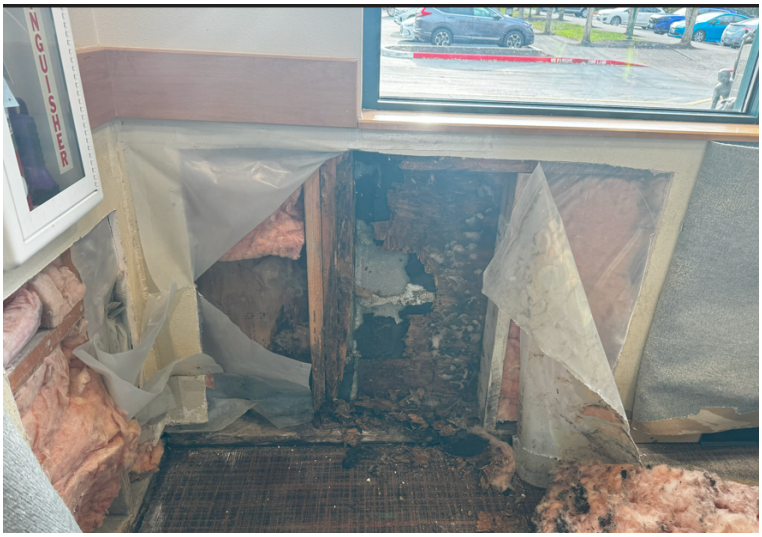
From: Aaron Pambianco <apambianco@ajpeng.com>
Sent: Friday, November 8, 2024 4:35 PM
To: Tom Cuevas
Cc: Timothy Stoker
Subject: RE: Mukilteo Library - Follow-up Site Visit to Review Conditions
Attachments: PCHS Respite - Progress 241106.pdf

Hi Tom and Tim,

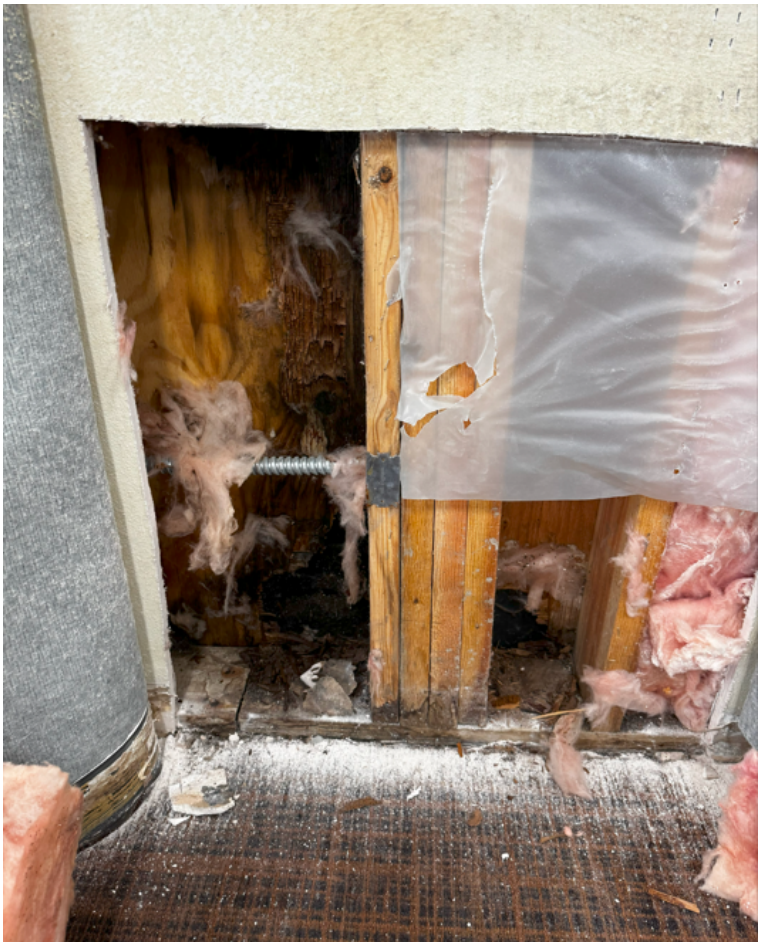
Good meeting the both of you on site today at the Mukilteo library, the intent was to observe the south wall around the primary window for degradation at the sill due to water intrusion. Previously, Timothy S., provided (2) observation openings by removing the drywall at the north and south window corners.

I observed substantial plywood and stud degradation at the north corner and plywood degradation at the south corner. The exterior face was clad in split-face CMU veneer, only minimal cracking was observed at the veneer.

North:



South:



Due to the minimal cracking at the exterior veneer, we believe the foundation did not experience differential settlement and do not recommend any foundation repairs.

The interior wood framing requires further investigation to verify extent of degradation and associated mitigation. Mitigation will take the form of replacement-in-kind because the framing assembly is consistent with current rough-in framing best practices.

After a waterproofing design is complete, we request all drywall around the window be removed to verify all degradation is identified.

In the interim, we recommend implementing temporary shoring SSK1, attached. This was reviewed on site with Tim and we believe he is in the process of installation. Once installation is complete, please send a pic. To verify.

Feel free to reach out of you have any further questions,

aaron

Aaron Pambianco, SE, LEED AP
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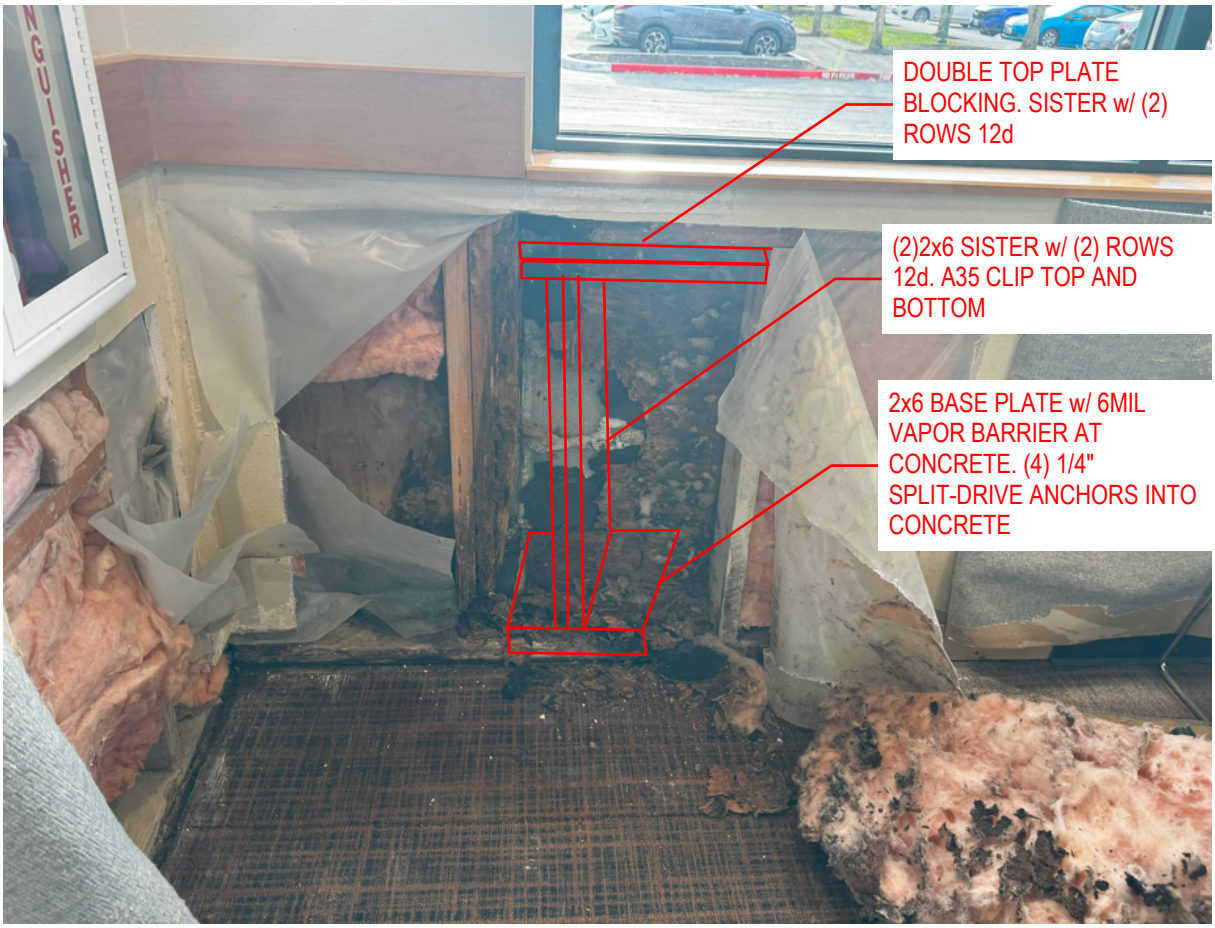
D: 206.452.1419

AJP Engineering



SSK
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11/08/2024