GRAHAM AND HYDE
ARCHITECTS, INC.

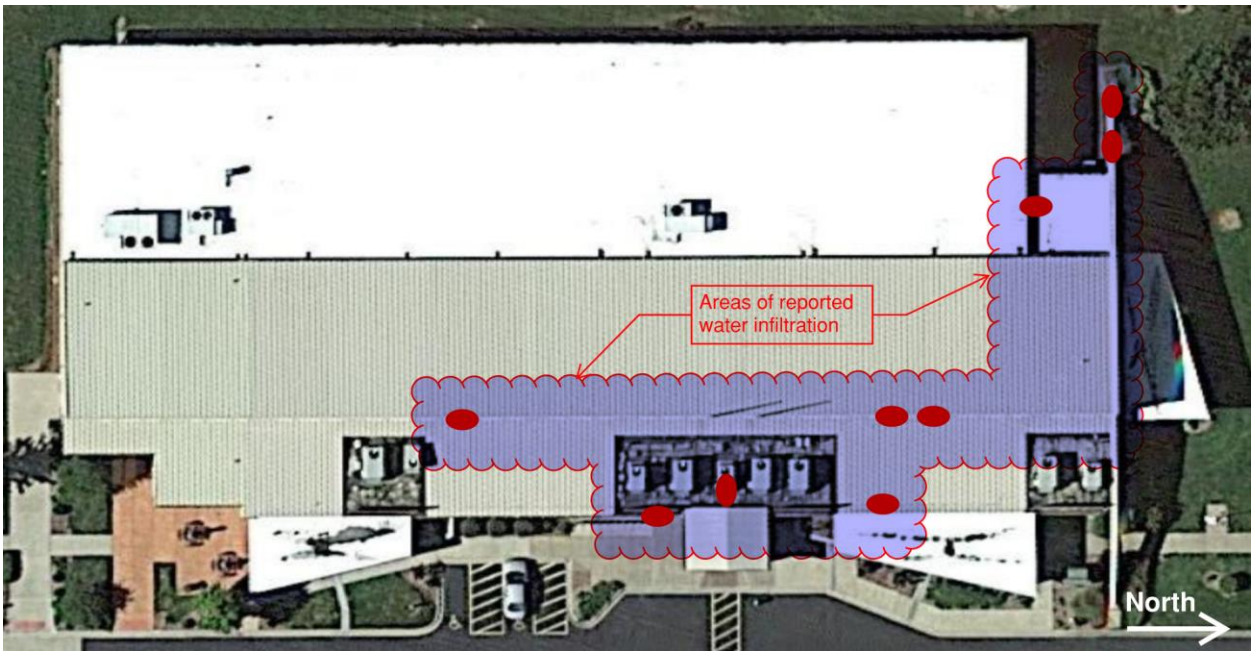
July 18, 2022

Ms. Amy Byers
Chatham Area Public Library District
600 East Spruce
Chatham, IL 62629

Re: Building Leak Investigation Report
Chatham Area Public Library

Dear Ms. Byers:

As per our agreement, Graham and Hyde Architects, Inc. (G&H) has completed the building leak investigation work. This report has been prepared based on on-site visual observation, conversations with library staff and review of existing construction documents provided by the client. In summary, we have discovered several poorly executed construction details including roof membrane terminations and flashings; EIFS (exterior insulation finish system) enclosures, drainage, and sealant conditions; and window enclosure details. The following satellite image documents where leaks have been reported by library staff in addition to problem areas discovered during our investigations.



These issues are further defined herein for the purpose of determining an order of magnitude for corrective work and establish the basis for cost of work which will be provided by O'Shea Builders.

Findings

Roof

Beginning with the roof assembly issues, we found deteriorated roof pavers and failed membrane flashings. The original built-up roofing membrane systems have been replaced with EPDM (a.k.a. rubber) and the existing thirty-eight year old standing seam metal roof system (SSMR) is still in place.



Several of the concrete pavers and even some concrete downspout splash pads have failed and disintegrated into gravel. Once this occurs, water gets trapped on the roof surface and the drainage systems get clogged. Obstructions to gutters, downspouts and area roof drains create ponding water which promotes vegetative growth, attracts insects, membrane discoloration, staining and water infiltration through the membrane itself.

There are open base flashings at various roof top equipment curbs and various other roof penetrations (i.e., steel supports for the screens, plumbing pipes, etc.).

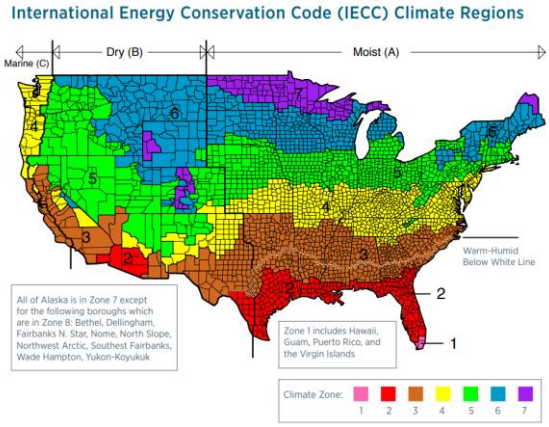


Leaks have been reported on the SSMR in several places. Other than chalking of the painted finish, the SSMR surfaces appear to perform well. and all appear to be due to deteriorated sealant and fasteners.

Since the base flashings, sealant and neoprene washers have failed at any of these locations there is virtually no protection from water infiltration caused by normal precipitation. Wind driven rain is even more troublesome at these locations without protection.

Several layers of sealant were discovered, many of of which are cracked, deteriorated and failing. For sealant to be affective, it must be installed continuous, bonding to all surfaces. Old sealants and residue must be thoroughly removed prior to the application of new sealant to provide proper bonding. To make the situation worse, there are no provisions for drainage of the EIFS present at any transitions to the SSMR.

EIFS



Drawings for the 1995 original building and the 2007 addition each indicate use of "drainable EIFS"; however, during our investigations no drainable systems were discovered. An EIFS assembly with no moisture drainage provisions is considered a face-sealed type of system and is designed primarily to keep moisture from penetrating the EIFS assembly itself through protection provided from the exposed finish coat. This type of system focuses on preventing moisture in the form of precipitation from entering at the exterior and without provisions for dealing with vapor infiltration from within the systems itself.

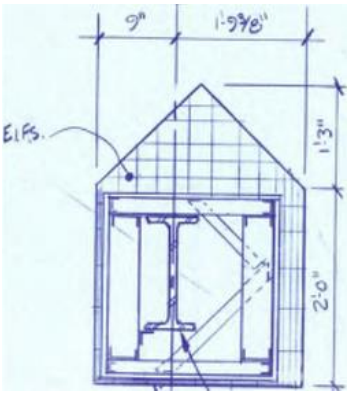
Due to the library's location in Chatham Illinois, the Department of Energy and International Conservation Code (IECC) classify this area as Climate Zone 5, which is both moist and cold. What does this mean for your facility? It means this particular climate only allows for limited drying potentials due to the high relative humidity levels that exist throughout the year. This inherently creates an inadequate drying condition for EIFS where moisture sensitive components are used without provisions for drainage.

When the rate a material is exposed to moisture (commonly referred to as "wetting") exceeds its ability to dry, moisture accumulates. If this occurs to a material or system, EIFS in particular, and the level of accumulation exceeds safe and tolerable capacity for moisture storage within the assembly, deterioration occurs as the moisture contributes to breakdown of the material. The rate of "wetting" for a building is a direct function of exposure (e.g., sun, wind, heat, cold), design, construction, operation, and maintenance.

The main source of moisture affecting a building exterior is precipitation (in moisture form such as rain, snow, etc.); however, water vapor is also transferred through the air. Once moisture in the form of vapor encounters a surface below the dewpoint condensation occurs. Wind and air movement created by HVAC systems transfer positive and negative pressures carrying vapor into the wall assemblies. Since a face-sealed system does not ventilate, if any moisture enters the system, it becomes trapped within.

As the system ages and continues cycling through the extreme heat of summer and drastic winter cold of we experience here in Central Illinois, moisture and/or vapor combined with other previously referenced environmental factors, the system weakens and eventually will fail. During our investigation we found several areas where this deterioration has reached the point of failure since there is no way for water to vacate the assembly. Once this occurs and topcoat fails, reinforcing mesh is exposed in the base coat. The extent of damage can only be realized through destructive investigation or demolition.

The last EIFS condition observed are at the east to west spanning "Architectural Elements" with concrete buttress bases, located on the north building façade. Again, this appears to have been clad without a drainable EIFS system and therefore there are no provisions for either ventilation or water to evacuate the system. Other than discoloration and accumulation of dirt and other organic material on the surface, this EIFS is in relatively decent shape. This is likely a direct result of their curved and pyramidal geometry.



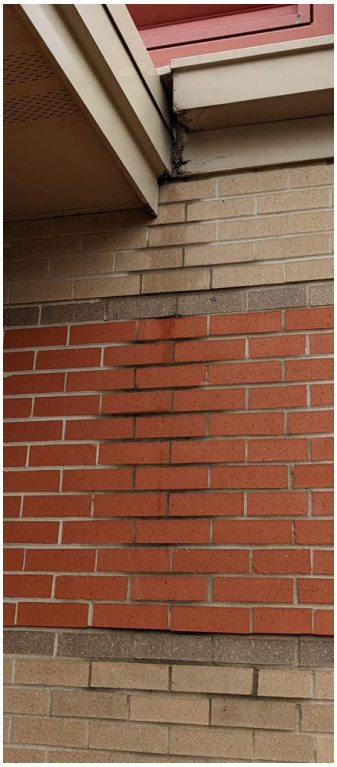
Discoloration of the EIFS and lower brick will continue to occur at the architectural elements without implementation of regularly scheduled cleaning. The following images illustrate the discoloration and terminations at the concrete buttress base.

Surface cracks were found at various transitions where expansion occurs. Some cracks have been repaired with sealant; however, without a sufficient expansion joint to allow for both thermal movement and building contraction and expansion, the cracks will forever continue to worsen and fail allowing moisture to enter the assembly. And without a way to vacate the system, deterioration of the EIFS will continue and eventually deteriorate.

Windows

The existing clerestory windows are believed to be wood clad windows manufactured by Andersen Corporation, Architectural (A-Series). This style of windows is a residential type commonly utilized in both homes and light commercial. Unfortunately, they have visibly exposed openings in the frames, glazing stops and sealant transition to the EIFS. Commercial window systems incorporate water management systems that allow the units to ventilate and properly mitigate any moisture that may enter the system either from direct participation and/or water vapor. The existing window systems to not appear to have any such provisions. We discovered sealant joints attempting to keep water out, but actually have contributed to trapping water within the wall system. There were no issues reported or observed at the existing window assemblies located in the lower masonry walls.

Exterior walls and planters



No specific exterior wall issues were reported regarding water infiltration; however, we did discover areas where sealant has failed and conditions where water runoff has stained the masonry below.

There were reports of water infiltration at the two planters located at both of the east entrance door locations. The water proofing membrane originally installed in 2007 is still be in-place, but torn, allowing water to become trapped below weeps that were designed to let water escape. The weeps that do exist appear inadequate and possibly clogged. No records of new waterproofing being installed have been discovered, but staff did suggest there have been water infiltration issues at these planters since the original building was constructed in 1995.

Recommendations

Roof

Foreign debris must be removed from all of the roof surfaces, drains, and gutters. All punctures, open seams, failed sealant joints, and deteriorated neoprene fasteners must be replaced. These and all other imperfections must be corrected immediately to prevent further water infiltration and will serve as a temporary correction until the extent of damage can be further evaluated through destructive measures.

Due to the estimated age of the existing roofing assemblies, all membrane (EPDM and TPO) systems are likely beyond their anticipated lifespan and will require either full replacement and/or application of a roof coating system once all wet areas have been rectified. The SSMR will not require total replacement, but rather corrections as noted above as well as application of a coating system or supplemental secondary roofing installed directly above.

Infrared (IR) thermal imaging scans should be conducted at all membrane roof areas to determine if and where wet insulation is present. If wet areas are identified, they will require removal and replacement prior to installation of new roofing membrane. For the SSMR, since both the exposed layer and under roof deck are both metal, this assembly is virtually impossible to perform accurate IR scans to either from the top or the underside. Typically, if there are any areas of water infiltration on the SSMR, they will be located in transitions and flashings which can be disassembled and corrected during the fastener and sealant replacement work.

EIFS

Due to the extent of deterioration and water infiltration present our recommendation is to remove the existing EIFS assembly in its entirety. Once the existing EIFS assembly has been removed all foreign adhesives and other existing contaminants must be thoroughly removed from the existing exterior wall sheathing. All substrate wall surfaces must be inspected for defects including, but not limited to, joint failure, fractures, and holes. Once the substrate has been properly prepared, all new flashings must be correctly installed.

Modern EIFS assemblies provide provisions for proper drainage, commonly referred to as "Drained EIFS," and can be installed in all climates and exposures. If it is the library's desire to maintain the look of EIFS, our recommendation is for installation of a new truly drainable EIFS assembly or with an entirely new wall cladding assembly such as insulated metal panels.

Based on the existing documentation, it appears a plastic vapor barrier is present in the wall assemblies; however, it is unclear of the exact location within. Assuming the vapor barrier is located directly behind the painted interior gypsum wall board, and due to the degree of disintegration observed, we recommend installation of a new breathable fluid-applied air/vapor barrier directly over the existing, and repaired, substrate prior to installation of a new cladding.

EIFS at the architectural elements can either be cleaned and refurbished or replaced its entirety. If refurbishment is selected proper ventilation will need to be installed on the underside and run continuous from the base to the highest points, respectively. Expansion joints will need to be added where surface cracks are present, which will require additional framing and patching.

Windows

Based on the age and current condition of the existing windows, our recommendation is for removal and replacement of all existing clerestory wood clad window assemblies in conjunction with the EIFS replacement work. New window assemblies should include new aluminum storefront type windows with 1" low-E insulated glass, weeps for water management, both metal and flexible thru-wall flashings, water proofing, backer rod and sealants. Although no water infiltration issues were reported at the existing storefront system assemblies, we recommend replacing the perimeter backer rod and sealant at each location due to their age.

Exterior walls and planters

Finally, we recommend cleaning and sealing of the exterior masonry walls and replacement of all backer rod and sealant adjacent to and within the masonry wall assemblies. To correct water infiltration at the planters we recommend replacement and re-routing of the downspout drainage piping and installation of a waterproofing membrane system on the interior of each planter condition. An alternative would be to remove the planters in their entirety; however, this will require repair and treatment to the exposed masonry located directly behind the planters themselves.

Conclusion

With the exception of the face brick, most of building's exterior envelope assembly including roofs, EIFS and windows have reached or exceeded its expected life-span. Several poorly executed construction details including roof membrane terminations and flashings; EIFS (exterior insulation finish system) enclosures, drainage, and sealant conditions; and window enclosure details have contributed to various areas of water infiltration. If these conditions are not corrected in a timely manner, water infiltration will continue along with further deterioration of the various assemblies described herein. To avoid additional damage to these and potentially other materials

and finishes, a long-term plan should be developed to determine how these issues can be corrected and prevent future problems.

Thank you for the opportunity to perform this analysis and evaluation work for the Chatham Area Public Library District. Once O'Shea Builders has an opportunity to provide cost information we are happy to discuss any future involvement by our office to assist in the corrective work.

Please do not hesitate to contact our office with any further questions, comments or concerns.

Sincerely,

David R. Leggans, AIA, LEED AP, NCARB