APPENDIX B

SYSTEMIC SOURCES OF MOISTURE INTRUSION

As noted above, wind driven rain appears to be causing moisture intrusion and resultant damage at wall (i.e., cladding and fenestration) areas of the building, particularly at areas associated with cladding transitions, fenestration rough openings, and through-wall penetrations.

Porous CMU Cladding

Wind driven rain appears to be penetrating directly through the unsealed and porous CMU block cladding at all phases of the Building. Existing visual indications, such as extensive staining and efflorescence, RILEM tube porosity testing, and diagnostic water spray testing clearly indicate that rain water is easily absorbed by the porous CMU block, both through the block itself and through the porous and dis-bonded mortar joints. Moisture then migrates to the interior face of the CMU block where a water-resistive barrier (WRB) is generally not present, thus water coming through the CMU wall is inside the wall and inside the building causing staining and damage.

Photo No. 1. Overview of masonry exterior at the head of the east entry area fenestration. Extensive efflorescence and staining at the masonry window rough opening is visible, particularly at the mortar joints, indicating that moisture is present within the mortar joints and the cement stucco plaster above.

Photo No. 2. Effloresce and moisture staining is clearly visible at the interior of the east entry fenestration indicating that moisture has penetrated the porous and disbonded mortar joints and is migrating to the interior face of the masonry wall.
Photo No. 3. View of efflorescence and evidence of ongoing water intrusion at the backside of the CMU above a window head at the Phase 2 water test window specimen where interior trim was removed for observation.

Photo No. 4. View of efflorescence and evidence of ongoing intrusion at the backside of the CMU at the East Elevation entry vestibule.

Photo No. 5. RILEM tube testing indicated that moisture is being readily absorbed by the porous CMU masonry system. As is demonstrated by this photo, moisture spreads rapidly throughout the CMU masonry system during testing.

Photo No. 6. Depicts moisture staining observed during diagnostic water spray testing adjacent a window at the south elevation. Water delivered to the wall area during diagnostic spray testing migrated rapidly through the CMU system and was observed in the air cavity between the inside face of the CMU wall and the wood-framed and insulated interior stud wall.
Unflashed Fenestration (i.e., Windows & Doors) Rough Openings

Extensive water staining and damage to interior trim was noted at the interior finishes adjacent windows throughout the building. Staining was particularly evident at varnished wood window sills and the bases of wood jamb casing trim. It appears that water is able to migrate into the building at window perimeters that lack proper through-wall sheet metal flashing and flexible membrane flashing and are dependent on a single exterior sealant joint for water and weather-tight integrity. Throughout the building, the existing window perimeter sealant joints are heavily degraded and are no longer providing weather-tight service.
Compromised Fenestration (i.e., Windows & Doors) Units

The existing anodized finished extruded aluminum-framed fenestration systems, both windows and doors, at the Building are, in many cases, allowing moisture intrusion directly through the fenestration units in addition to the significant moisture intrusion occurring at the window and door rough openings. BET&R observed a variety of conditions contributing to the failure of the existing fenestration units including shrunken and too short glazing gaskets, distorted and displaced window frame and sash components, improperly adjusted operable components, and incompletely sealed sash and frame components, failed IGU’s. Many of these conditions are likely contributing to evidence of leakage observed at the interior.
Photo No. 15. Depicts displaced window sash component at area where window sash is improperly fit into the extruded aluminum window frame leaving a large open gap at the head of the window. Spray testing indicated that this area was vulnerable to moisture intrusion.

Photo No. 16. Depicts water present at the interior of a spray tested window where the aluminum sash extrusion at the window head is twisted and displaced within the extruded aluminum window frame.

Photo No. 17. Depicts overview of East Main Entry door. The entry doors at Phase 1 generally are not functioning properly. See next photo for additional information.

Photo No. 18. Close up of wear observed at the Door threshold produced from friction from improper door action.
Compromised and Failing Stucco Cladding

The portland cement plaster (stucco) cladding at the building is experiencing several types of failure and degradation, including cracking and delamination of the stucco system, corroding and failing control joints, casing beads, and weep screeds, displacing stucco panels, and incompletely and improperly flashed stucco transitions and terminations.

Photo No. 19. Depicts damages interior gypsum ceiling board observed at the interior of the Southwest curtain wall. This damage is evidence of previous and likely ongoing water leakage at the fenestration system.

Photo No. 20. Depicts failed IGU observed at the Southwest Entry curtain wall system at Phase 3. It appears several IGU’s require replacement at this time, and likely more IGU seals will fail in the future.

Photo No. 21. Shows example of widespread cracking of stucco cladding at Phase 3 portion of building.

Photo No. 22. Depicts example of widespread cracking of stucco cladding at Phase 1 stucco at the South Elevation of the Building.
Photo No. 23. Depicts widespread delamination of stucco finish coat observed at the Phase 3 portion of building.

Photo No. 24. Vegetative growth observed on the surface of the stucco cladding at the location of the Phase 2 Test Opening indicating water accumulating in the lower portion of the stucco clad building wall.

Photo No. 25. Depicts fractured stucco observed at stucco reveal at Phase 1 Roof Penthouse.

Photo No. 26. Depicts fractured stucco at base of wall panel observed at Phase 1 Roof Penthouse.
**Cladding Too Close To Grade**

At the west elevation, particularly near the entry door and storefront window system at the northwest corner of the building, the stucco cladding was observed to terminate too close to adjacent hardscapes and landscapes at grade. At the west entry Facility Staff reported that there have been prior issues with moisture intrusion at the carpeted interior floor adjacent the cladding and fenestration terminations, and it appears that this is likely due to improper clearance between these terminations and the adjacent grade.

![Photo No. 27. Overview of the West Elevation of Phase 3 and widespread areas of grade encroaching onto the base of the stucco clad wall.](Image)

![Photo No. 28. Closer view of soil and beauty bark placed against the base of the stucco-clad wall.](Image)

![Photo No. 29. Overview of the storefront fenestration systems at the West Elevation of Phase 3 show widespread areas of grade encroaching onto the base of the wall.](Image)

![Photo No. 30. Overview of the widespread areas of grade encroaching onto the base of the wall at the West Elevation of Phase 3 near storefront fenestration systems.](Image)

In addition to areas where the cladding terminates too close to grade and adjacent hardscapes and landscapes, BET&R noted an area at the north elevation where it appears that significant ponding of water at planter locations has occurred up to and potentially in contact with the adjacent cladding. At these areas it appears that during sustained heavy rainfall and/or if the drainage system were blocked or impeded the building wall would be at risk of moisture intrusion at the base of cladding/ top of concrete slab intersection.
Photo No. 31. Overview of the North Elevation of Phase 3 where there appear to be drainage issues within the plaster and widespread areas of grade encroaching onto the base of the stucco clad wall.

Photo No. 32. Close-up of the North Elevation of Phase 3 and areas of grade encroaching onto the base of the stucco clad wall and drainage at planer area appears deficient. This combination can lead to water intrusion within the building.

Flashing and Sealant Deficiencies

BET&R observed aged, failed, and or disbanded sealant joints at cladding transitions and at penetration and fenestration perimeters. Additionally, complex intersections at changes of cladding systems, and transitions appeared to lack underlying saddle flashings, which protect these vulnerable areas of a building. Failed sealant and/or lack of appropriate flashings appear to be a primary source of water intrusion.

Photo No. 33. Depicts flat probe inserted behind side ears of sheet metal transition flashing through failed sealant joint.

Photo No. 34. Depicts flat rule inserted through failed sealant joint at CMU-to-stucco cladding transition.
Photo No. 35. Depicts probe inserted through failed sealant joint at wall penetration at stucco cladding.

Photo No. 36. Depicts flat probe inserted behind sealant joint seal at coping-to-wall intersection. It appears a fully integrated saddle flashing is lacking at this location.

Photo No. 37. Depicts flat probe inserted behind unsealed flange at pipe penetration.

Photo No. 38. Depicts flat probe inserted through failed sealant joint at perimeter of tie-back wall attachment at stucco cladding.

Photo No. 39. Depicts flat probe inserted through failed sealant joint at perimeter of tie-back wall attachment at CMU cladding.

Photo No. 40. Depicts flat probe inserted at improperly sealed expansion joint flashing where the remaining 1965 wall intersects with the Phase 2 Building at the South Elevation near the Loading Dock.
Photo No. 41. Depicts flat probe inserted through failed sealant joint at sheet metal panel cladding-to-aluminum-framed window unit intersection.

Photo No. 42. Depicts flat probe inserted behind sheet metal panel cladding termination at vertical lap. Generally several sheet metal cladding panel and sheet metal flashing laps appeared to lack proper sealant seals.

ROOF RELATED DEFICIENCIES & POTENTIAL SOURCES OF MOISTURE INTRUSION

As noted, moisture intrusion and resultant damage was observed at low-slope-single ply thermoplastic roof areas of the building at Phase 3, while, generally speaking, Phase 1 and 2 portions of the building appear to be functioning largely as intended with the exception of the through-wall scuppers. The primary general deficiencies and those that may be allowing current and/or future moisture intrusion appear to include the following:

Aging and Degradation of the Existing Low-Slope Single-Ply Membrane and Its Components

As noted throughout this Roof Condition Assessment, the existing single-ply roof membrane has been in service for approximately 18-years and has experienced water intrusion in the past. As such, it is exhibiting the effects of significant heat aging and UV degradation; including oxidizing top coating, membrane tightening and buckling. Degradation of the membrane is particularly evident where seams were heated during installation, as the membrane at these laps is aged, embrittled, and exhibiting severe erosion or oxidation of the membrane’s coating over the reinforcing scrim. BET&R noted that at numerous locations the membrane base flashings at rising parapet walls have become disbonded from the parapet substrate and are loose, unadhered, and billowing. This disbondment results in decreased wind uplift resistance for the existing roof system and resultant increased likelihood of roof system blow-off during future high wind events. The single-ply thermoplastic roof membrane at Phase 3 roof areas is in need of replacement.
Photo No. 1. Overview of coating repairs at P3-RA 1 and an apparent attempt to address leakage at scupper locations as evidenced by damage observed below.

Photo No. 2. Overview of coating repairs at P3-RA 1 and an apparent attempt to address leakage at scupper locations as evidenced by damage observed below.

Photo No. 3. Depicts unadhered base flashing membrane at parapet loose and billowing away from parapet the observed at P3-RA 1.

Photo No. 4. Depicts wrinkling and buckling membrane at P3-RA 7 where the aged existing single ply membrane has become disbonded from the underlying roof system.

Photo No. 5. Depicts open membrane lap at preformed penetration flashing. BET&R noted numerous areas where existing seams and laps at preformed penetration flashings were degraded and failing.

Photo No. 6. Depicts improperly installed and sealant dependent appurtenance bracket mounting flange.
Open and Unsealed Low-Slope Membrane Laps and Seams

Numerous welds at laps and seams in the low-slope TPO roof membrane are cold-welded, not bonded, and in some cases open all the way through the seam lap leaving open gaps vulnerable to moisture intrusion.

Photo No. 7. Depicts open membrane lap.

Photo No. 8. Depicts open membrane lap.

Photo No. 9. Depicts blunt probe inserted into open membrane lap at base flashing.

Photo No. 10. Depicts blunt probe inserted at membrane seam at membrane termination at scupper throat.
Vapor Retarder Not Apparent at Wood Roof Deck

A vapor retarder is not apparent at the wood roof deck level on Roof Area P3-RA 1. An interior foil-faced vapor retarder sheeting installed at the bottom of the roof trusses is in place. However, numerous openings and/or cuts in the sheeting were observed that reduce the effectiveness of the interior vapor retarder.

Photo No. 11. Overview of the location of Test Cut No. 1 on Roof Area P3-RA 1.

Photo No. 12. A vapor retarder at the roof deck level was not apparent at the test cut location. However, the wood roof deck in this location returned a Delmhosrt meter moisture reading of 7% moisture content on the Wood Scale, indicating the wood roof deck is dry at this location.

Photo No. 13. Location of leak evidence at the north perimeter wall below Roof Area P3-Ra 1. At this location, interior aluminum-faced vapor retarder had previously been pulled back, by others, in effort to observe and/or repair leaks in to the classroom.

Photo No. 14. Depicts circular hole cut in the vapor retarder to allow clearance for the sprinkler head. This is one of numerous unsealed penetrations reducing the effectiveness of the interior vapor retarder.
**Improper Slope at Drain Scuppers-Phase 3**

At several locations the finished single-ply thermoplastic roof systems on Phase 3 roof surfaces do not slope-to-drain appropriately to the through-wall scuppers. Instead, the roof surface slopes to a depression or “low spot” in front of the scupper resulting in substantial areas of ponding water on the roof surface adjacent through-wall scuppers that do not drain, but sit as ponding water. This condition should be corrected during reroofing to allow the roof system drainage to function properly and as intended.

**Deficient Perimeter Edge Flashing at Small P3-RA 6 Roof Area Over Southwest Curtain Wall**

The single-ply thermoplastic membrane roof installed above the curtain wall at the Southwest corner of the Building appears to lack properly integrated flashing, including at roof-to-wall areas and at
perimeter edge metal. Closer review of the membrane roof should be conducted prior to a retrofit design, as access was not achievable during this Envelope Survey.

**Photo No. 45.** Overview of singly ply roof over the south entry curtain wall.

**Photo No. 46.** Depicts deficient edge flashing at the perimeter of the single ply roof. The membrane appears to be secured directly to the sheet metal fascia and does not appear to incorporate a drip edge or roof edge closure flashing.

**Unadhered Side Laps and Wall Flashings at Multi-Ply Roof System**

There are several locations on select Phase 1 & 2 roof areas where the modified-bitumen membrane wall flashings are not fully-adhered and may be vulnerable to further adhesion deterioration as a result of wind pressures.

In addition, several voids or openings in membrane laps at angle changes (roof-to-parapet transitions) were observed, as well as membrane base or wall flashing terminations not secured nor flashed. Perform spot repair of these items as appropriate as a maintenance item.

**Photo No. 1.** Depicts one of numerous locations on Phase 1 Roofs where membrane base and wall flashing have voids and are open to moisture intrusion at roof-to-parapet or rising wall transitions. This condition is further deficient in that the cap sheet is also short lapped. This photo is on Roof Area (P1-RA 4).

**Photo No. 2.** Depicts membrane wall flashing (one of several locations) that is not fully adhered on Roof Area P1-RA 4.
Photo No. 3. Membrane wall flashing is open to moisture intrusions and is not mechanically terminated and not flashed. (P1-RA 5).

Photo No. 4. Depicts a typical void at membrane flashing termination in through-wall scupper throat in need of PMMA repair. Photo taken on Roof Area P1-RA 6.

Lack of Overflow Drains

Roof Area P2-RA 1 is the large central roof area on Building 11, and has in-field primary drains on the west portion of the roof area, but has through-wall scuppers as primary drains on the east portions of the roof area. As typical with most Phase 1 Roof Areas, there is no provision for overflow or secondary drains on this roof area.

As these roof areas appear to be “recovers” (i.e., new membrane roofing installed over, or on top of, the intact previous roof system), applicable Codes do not require the recover installation to be compliant with current Code requirements for secondary or overflow drains. However, the potential problem resulting from a blocked or plugged scupper remains. Due to the lack of overflows it is imperative that drains are consistently cleaned and free of blockages.

Photo No. 47. Depicts one of four (4) infield drains on Roof Area P2-RA 1 that needs to be cleaned to remove organic debris and roof granule accumulations clogging the drains strainers. Additionally, drain strainers and clamping rings are badly corroded and deteriorated and should be replaced.

Photo No. 48. Depicts one of two (2) infield drains on Roof Area P1-RA 4 where drains are clogged with organic debris likely affecting proper drainage.
Non-Compliant Existing Overflow Drains

Roof Area P1-RA 4 is a small ancillary roof that has two (2) in-field primary drains each with a small 3 x3-inch through-wall overflow scupper adjacent the field drain. However, the overflow scuppers are 4-inches above the level of the field drains which is not compliant with current applicable Codes, and should the field drains become plugged substantially large (and heavy) areas of water would back up and be held on the roof before and after the overflow scuppers become activated. Ensure drains are thoroughly cleaned on a regular schedule throughout the year.

Severely Corroded Drain Components

The drain bowl clamping rings and strainers at the four (4) in-field drain locations at P2-RA 1 are severely corroded and deteriorated and should be replaced.
**Imoor Slope at Drain Scuppers-Phase 1 & 2**

Finished roof system surfaces do not slope-to-drain appropriately to the through-wall scuppers. Instead, the roof surface slopes to a depression or “low spot” in front of the scupper resulting in substantial areas of ponding water on the roof surface adjacent through-wall scuppers that do not drain, but sit as ponding water until the water evaporates. This condition should be corrected to allow the roof systems drainage to function properly and as intended.

![Photo No. 53. Depicts negative slope observed to be typical at P1 & P2 roof drain scupper location.](image1)

![Photo No. 54. Depicts typical staining and collection of granules at the large ponding depression adjacent the scupper upslope to the scupper opening. This condition causes large areas of water to pond on the roof surface until it evaporates, and is typical at most Phase 1 through-wall scupper locations. This photo of scupper location on Roof Area P1-RA 2.](image2)

**Cap Sheet Termination Deficiencies at P1 & P2 Roof Areas**

At numerous locations, the granule-surfed cap sheet membrane side laps were short lapped and/or installed with selvage edges exposed.

![Photo No. 55. Depicts deficient or short-lapped cap sheet side laps. This photo showing selvage edge of cap sheet exposed at Roof Area P1-RA 1.](image3)

![Photo No. 56. Depicts deficient or short-lapped cap sheet side laps. This photo showing selvage edge of cap sheet exposed at Roof Area P2-RA 1.](image4)
**Coping Corner Deficiencies**

Sheet metal coping corners do not appear to be sealed to corner backer-plates, and in numerous cases the standing seam at the corner joint is open to moisture intrusion.

**Photo No. 57.** Depicts deficient or short-lapped cap sheet side laps. This photo showing selvage edge of cap sheet exposed at Roof Area P1-RA 5.

**Photo No. 58.** Depicts cap sheet end laps aligned for the length of the roof area adjacent the ridgeline. Consider installing a full cap sheet to cap the ridge, to strip-in and flash the inappropriately lined-up end laps. This condition at Roof Area P2-RA 1.

**Photo No. 59.** Depicts a standing seam sheet metal coping corner that is open to moisture. It does not appear that the corner coping joint has a backer-plate (typical of copings on Building 11), and is therefore open to moisture intrusion into the roof system and the building below. This photo is on Roof Area P1-RA 1.

**Photo No. 60.** Depicts a standing seam sheet metal coping corner that is open to moisture. It does not appear that the corner coping joint has a backer-plate (typical of copings on Building 11), and is therefore open to moisture intrusion into the roof system and the building below. This photo is also on Roof Area P1-RA 1.
Surface Mounted Flashings

Sheet metal reglets at roof-to-wall terminations appear to be surface mounted and therefore sealant dependent and maintenance item. Sheet metal reglets and counterflashings should be retrofit to be through-cladding reglets that are stripped-in (i.e., sealed) to the backer-wall with self-adhering membrane when Building 11 cladding is retrofit.

![Photo No. 61](image1.jpg) Depicts a parapet-to-wall transition that appears to be sealant dependent without saddle flashings. This is a typical condition at most Roof Areas on Building 11. This photo is on Roof Area P1-RA 5.

![Photo No. 62](image2.jpg) Depicts a parapet-to-wall transition that appears to be sealant dependent without saddle flashings. This is a typical condition at most Roof Areas on Building 11. This photo is on Roof Area P1-RA 6.

Scupper Deficiencies

Through-wall scupper conductor heads are surface-mounted and sealant dependent. Several were observed to be incompletely sealed and open to moisture intrusion into the building wall. Where this condition is at a building wall rising from a roof deck, the water intrusion in the wall may migrate into the roof system (wetting and deteriorating its components), as well as into the interior of the building. Maintain sealant seals and consider retrofit of the integration of the conductor head flashings during a recladding project in the future.

![Photo No. 63](image3.jpg) Depicts typical conductor head overview as observed at the North Elevation of P1-RA2.

![Photo No. 64](image4.jpg) Depicts flat probe inserted behind surface mounted conductor head flashing.
Infrequent Coping Securement

Coping securement seem to vary with several locations having inboard fasteners as infrequent as 35-inches O.C. It may be prudent to retrofit spacing to a more conservative 12-18-inches O.C. or as otherwise may be appropriate for long-term wind uplift securement and current codes dictate.

Photo No. 65. Depicts fastener spacing at approx. 35-inches at coping of P3-RA4.

Photo No. 66. Depicts fastener spacing at approx. 26-inches at coping of P2-RA1.

Granule Loss

Granule loss appeared to be significant and was observed collecting in the ponding water areas adjacent through-wall scuppers. If similar degree of granule loss continues, some areas of the cap sheet may need to be coated or stripped-in the next five to seven years where granule loss is extreme.

Photo No. 67. Depicts significant granule loss and the collection of granules at P1-RA 6.

Photo No. 68. Depicts significant granule loss and the collection of granules at P1-RA 6.
Insufficient Flashing Heights

Mechanical unit curbs on Roof Areas P1-RA 1 and 2, and P2-RA 1 appear to be low to the roof deck and not compliant with Industry Good Roofing Practice of curb heights being 8-inches above the finished low-slope roof system. Similarly, Roof Area P1-RA1 has an abandoned electrical conduit pipe penetration, which is only membrane flashed to a height of 4-inches above the roof surface, and above that is open to the weather and vulnerable to moisture intrusion.

Screen Wall Cladding Need of Retrofit

The existing stucco cladding is fractured and failing and is in need of retrofit. Consider removal of screen wall or recladding with an appropriately durable and cost effective cladding system such as sheet metal panel.
Screen Wall Stanchions in Need of Retrofit

The existing membrane flashings appear to be currently functioning adequately; however, they appear to be in need of retrofit due to condition of steel tubing. Consider PMMA liquid-applied membrane flashing retrofit at screen wall stanchion bases for long-term performance.

Screen Wall Tube Framing in Need of Retrofit

Thorough cleaning of corroding screen wall tube frames is need and application of carefully designed multi-coat high-performance coating system.
OTHER AREAS OF CONCERN

Steel Canopy Roofs

The steel canopy roofs over entrance areas at the south, west, and north elevations are exhibiting a variety of conditions which are concerning, regarding both the canopy roofs’ longevity and the potential effect on the Building where the canopy roofs abut and attach to the main building. The canopy roofs appear to generally consist of a galvanized, but not coated, steel type “B” fluted roof deck, plug welded to a painted steel “C” channel frame and draining to a sheet metal gutter trapped between the building wall and the canopy roof. These steel “C” channel frames are attached to the building by brackets through the cladding and supported by steel threaded rod suspension brackets similarly attached higher up the building wall and surface mounted directly to or through the Building’s exterior cladding. In one case, the large walkway canopy at the east side of the south main entry, the exterior edge of the canopy is supported by large CMU columns rather than the threaded rod suspension brackets.

Photo No. 77. Depicts overview of the canopy roofs at the Southwest Main Entrance. Note that the downspout at the west elevation canopy roof (arrow) appears to be placed at the upslope end of the sloped gutter and thus does not fully drain the gutter. In addition, the downspout daylights on to this heavily-trafficked entry hardscape, and may present an ice or slip safety hazard, and as such, should be reconfigured and incorporated into the building’s drainage system.

Photo No. 78. Depicts heavily corroded galvanized steel decking at the canopy above the Bookstore entry at the south elevation. Steel decking used at the canopy roofs was observed to be galvanized only and not coated, and is exhibiting extensive corrosion of the surface the steel decking.

The canopy roofs appear to be suffering from a variety of issues, including: corrosion of the galvanized steel roof panels; coating failure of the canopy’s steel channel frames and brackets; moisture intrusion at building connection; unsealed gutter laps and improperly sloped gutters; and moisture intrusion at supporting CMU columns.
Photo No. 79. Depicts failing paint coating at the steel canopy frame above the Bookstore entrance. Similar failure of the paint coating was observed at canopy’s steel framing throughout the complex. This condition of disrepair leaves the structural steel framing and support brackets vulnerable to continuing corrosion and degradation.

Photo No. 80. Example of water remaining in a canopy roof’s sheet metal gutter. BET&R noted that the sheet metal gutters and downspouts were clogged, with stagnant water trapped in many locations, and leaking in numerous locations. In addition, at several locations, it appears that upper roof areas are being drained onto the canopy roofs and this combined volume of storm water may exceed the drainage capacity of the canopy roof gutter and downspouts.

Photo No. 81. Upper support brace mounting brackets were noted to have failed sealant and to be vulnerable to moisture intrusion into and behind the adjacent cladding surfaces.

Photo No. 82. Lower mounting brackets are similarly unsealed and vulnerable to moisture intrusion into and behind the adjacent cladding surfaces.
Photo No. 83. The outer CMU support columns at the large south covered walkway canopy appear to be constructed around a steel framing member and are open at their tops to moisture intrusion (see inset photo). It appears that water flowing along the steel framing members is able to flow down the inside of the CMU column and potentially affect the integrity of the structural steel post concealed within the CMU surround.

Photo No. 84. At numerous locations it appears that the bolt holes through structural steel framing may have been miss drilled during original fabrication and additional filed-drilled oversized holes were drilled during assembly. It is not known whether this condition affects the structural integrity of the roof canopies, however it is recommended that the condition be reviewed by a licensed and experienced structural engineer and any necessary corrections executed.

Photo No. 85. Depicts damaged downspout at canopy roof area at South Elevation of bookstore in need of retrofit.

Photo No. 86. Overview of the South Elevation of Phase 3 depicts a roof drainage concern with regard to two select Upper Main Roof Areas that drain to an Entry Area Canopy Roof, which is drained by only one downspout. Drainage calculations should be conducted during a Project Retrofit to determine if the current drainage capacity is sufficient.
Soffit Damage

Soffits at Phase 1 entry areas appear to be water damaged at select locations. It was not determined if the damage was pre-existing prior to reroofing, or from currently active leaks.

Photo No. 87. Depicts damaged soffit components observed at the East Main Entry to Phase 1 Student Lounge. The damage appears to have likely been pre-existing from prior roof leakage.

Photo No. 88. View from interior of soffit cavity. Active leakage could not be confirmed at this location.
PHASE 3 METAL PANEL STEEP-SLOPE ROOF AREAS

Summary of Findings

The existing, circa 2000, green colored standing seam metal panel roof system is an interlocking “structural” standing seam roof system (approximately 1-1/4-inches tall with a factory-placed butyl in-seam sealant at the standing seam). Based on the Student Union Expansion as-built drawings, the metal panel roofs decks at Building 11 are wood framed and sheathed, with an air vent cavity immediately below the plywood roof deck, and above batt insulation in the roof truss cavities.

As indicated in the provided original drawings, above the plywood roof deck is a mechanically attached No. 30 asphalt-saturated felt underlayment and then the metal roof panels. The metal panel roof system is vented below the roof deck with outflow at the ridge. Eave-edge intake is obvious on the “as-builds” on the west side of the gabled roof, but does not have an external intake on the east eave of the gabled roof. Drawings show the air cavity continuing beneath the adjacent roof and into the occupied spaces. This would not be an efficient venting strategy.

The radiused metal panel roof similarly has a vent cavity above the batt insulation between roof joist cavities below the plywood roof deck. However, there does not appear to be intakes, and there is no apparent outflow at the crest of the radiused roof nor at rake ends. An interior vapor retarder was observed below the batt insulation in this roof area, but also contained numerous breaches, openings, discontinuous application of the poly-sheeting, rendering the vapor retarder inefficient.

Photo No. 89. Overview of the West facing eave-edge and gutter at the radiused metal panel roof on Roof Area P3-RA 2

Photo No. 90. Overview of the East-facing metal-panel roof termination of Roof Area P3-RA 5.
Photo No. 91. Depicts coping-to-sheet metal roof that is sealant dependent and in need of attention.

Photo No. 92. Depicts standing seam eave termination open and not sealed as required by Metal Panel Roof Manufacturer.

Photo No. 93. Depicts oxidized and asphalt depleted, (i.e., once asphalt-saturated), roofing felt protruding from under the metal roof panel into the gutter, and vulnerable to wick water from the gutter back up under the metal panels of the roof and wet the roof system components.

Photo No. 94. Overview of the radiused Metal Panel Roof Area P3-RA 2 without apparent crest or rake end vents.