MONTGOMERY COLLEGE - OFFICE OF PROCUREMENT
HIGH TECHNOLOGY AND SCIENCE CENTER ROOF REPLACEMENT AND FAÇADE REPAIRS
GERMANTOWN CAMPUS
RFP NO.: 624-006
RFP CLOSING DATE AND TIME: FEBRUARY 7, 2024 @ 2:00 PM
ADDENDUM #3
ISSUED: JANUARY 31, 2024

THE PURPOSE OF ADDENDUM IS TO MAKE CHANGES TO THE RFP DOCUMENTS AND PROVIDE ANSWERS TO THE REQUEST FOR CLARIFICATIONS TO THE RFP DOCUMENTS.

NOTE: Similar requests for information received from different Contractors have been grouped under a single addendum item where appropriate, with a single comprehensive answer provided.

3-1 To extend the RFP closing date and time from February 1, 2024 at 2:00 p.m. to **February 7, 2024 at 2:00 p.m.**

3-2 Question: Please provide layout area that will allow us to remove trash without interfering or closing any of the entrance during school hours.

Answer: A Pre-Construction meeting will be held with the successful contractor after the award. Taking into consideration the contractor's preferences and the MC operational needs and limitations, a plan will be developed. Special emphasis will be given to safety and the College's operations.

3-3 Question: During the site visit we encountered snow on the roof, and we need to know what the thickness for each roof section is. What the existing roof assemblies are? Is the existing insulation tapered or flat?

Answer: The following summarizes the existing roofing assemblies, from interior to exterior, identified during our investigation from limited exploratory openings:

- Concrete over metal deck (typical all roof areas) or gypsum sheathing over metal roof deck (present only on west portion of Auditorium Roof).
- Flat polyisocyanurate insulation (approximately 1 ½ to 3 in. thick) with layers set in asphalt.
- Tapered polyisocyanurate insulation (thickness varies, measured up to approximately 5 in. at perimeter) with layers set in asphalt.
- Fiberboard coverboard set in asphalt.
- Multi-ply built up roofing membrane (approximately 1 in. thick) with gravel surfacing.

See attached Investigation Report dated July 2023 for information. Original construction documents for the HT Building will be provided in the Addendum No. 4 expected to be issued tomorrow.

3-4 Refer to Partial Terrace Roof Plan 2/A101: Per detail 6/A500 a new knee wall (roof curb) is to be provided. The partial plan also indicated new primary roof drains (new 6 drains).

<u>Question (a)</u> There are no plumbing drawings showing as to how these roof drains are connecting to the existing storm system. Any chance that a riser diagram can be provided?

<u>Answer:</u> Paragraph 1.05.F of Section 075200 requires the Contractor to engage a Professional Plumbing Engineer to design the new drains, including sizing drain bodies and connections between new and existing plumbing. A new allowance (Allowance# 7) to tie the new primary roof drains to existing systems will be included in the reissued Price Proposal Form in the Addendum #4.

<u>Question (b)</u> Please provide project specifications for roof drains.

<u>Answer:</u> Paragraph 2.07 of Section 075200 states that primary and overflow roof drains are to be determined by the Contractor's Plumbing Engineer as part of the delegated design.

<u>Question (c)</u> Can floor plans be provided to review the existing spaces that will be impacted by the installation of the new roof drains?

<u>Answer:</u> Please refer to the original construction documents for the HT Building to be included in Addendum 4.

<u>Question (d)</u> It appears that the new tapered insulation between the new knee wall and the face of the building is about 4' wide. It appears that the new roof drains are shown to be too close to the new knee wall. Floor drains typically need 2' from the center of the drain to the parapet or to the perimeter wall.

<u>Answer:</u> Sheet Note 8 on A101 requires the Contractor to coordinate final drain locations with existing interior building components located below the roof deck.

<u>Question (e)</u> Detail 6/A500 indicates gypsum sheathing. Please confirm that plywood is not required. Usually plywood it is needed to accept the roof flashing per roof manufacturer requirements.

<u>Answer:</u> Published product information from the basis of design roofing manufacturer indicates that glass-fiber faced gypsum sheathing is an acceptable substrate for the roofing membrane.

Question (f) Condensing Unit are noted to be removed and re-installed. Any chance that we could receive a floor plan showing the areas that will be impacted by the removal and re-installation of the condensing units?

Answer: The College will coordinate with the selected contractor the impacts resulting from the removal and reinstallation of the condensing units, to minimize impact on the College's operations.

3-5 Refer to Partial Main Roof 1/A101.

Question (a) Please provide floor plan to see how interior spaces will be impacted by the replacement of the existing roof drain bodies and infill deck repair.

Answer: Please refer to the original construction documents for the HT Building to be included in Addendum 4.

Question (b) Existing Chain Link Fence & Gate. Please confirm that existing material is to be re-use. Not sure if main gate posts may be able to be re-used after removal.

Answer: Existing Chain Link Fence & Gate shall be re-used.

All other specifications, terms and conditions remain unchanged.

Sections or Portions Reissued in Entirety
None

Drawings
None

Sketches
None

Items Issued for Informational Purposes
High Technology & Science Center, Building Enclosure Water Infiltration Investigation, July 27, 2023.

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Judy Zhu
____
Patrick Johnson, MBA, CPPB
Director of Procurement

Please **sign** below to acknowledge receipt of this Addendum and return with the **Technical Proposal submission.** Failure to return this Acknowledgement of Addendum may deem a proposal nonresponsive.

NOTE: ACKNOWLEDGEMENT OF RECEIPT OF RFP ADDENDA WILL NOT BE ACCEPTED BY FACSIMILE OR E-MAIL.

____________________________________	____________________________________
Company Name	Authorized Signature
____________________________________	____________________________________
Date	Printed/Typed Signature

27 July 2023

Ms. Yuling Mei
College Architect
Montgomery College
9221 Corporate Boulevard
Rockville, MD 20850

Project 230706 – Montgomery College High Technology & Science Center, Building Enclosure Water Infiltration Investigation, 20200 Observation Drive, Germantown, MD (MC Project #FP23-037, High Technology & Science Center (HT) Roof Replacement)

Dear Ms. Mei:

Simpson Gumpertz & Heger Inc. (SGH) conducted a low-slope roofing water leakage investigation and a representative building facade and steep-slope roof survey of the Montgomery College High Technology & Science Center Building at the Germantown campus. This letter summarizes our investigation findings and repair recommendations.

1. BACKGROUND

The High Technology & Science Center (HT) on the Montgomery College (MC) Germantown campus was constructed in the 1990s and houses classrooms, laboratories, and computer halls (Photo 1). The HT is four stories above grade with several roofs, both low-slope and steep-slope. We identified six different roof areas across the building: Tower, Main, Terrace, Auditorium, Canopy, and Central Chiller Plant. See Appendix A for the location and extent of each roof area. A recent renovation project included a new internal elevator, and the various interior floors feature elevated walkways connecting classrooms on adjacent sides of the building across a full-height atrium. The building envelope at the HT generally comprises concrete masonry and large brick unit veneer, built-up low-slope roofs, concrete tile steep-slope roofs, cast stone window sills, and fenestrations in punched and multi-story openings.

As we discussed during our preproposal walk on 28 February 2023, MC plans to replace all low-slope roofs on the building and requested that SGH assess the existing building enclosure and identify other building enclosure elements rehabilitation needs (e.g., fenestration, steep-slope roof, masonry cladding, sealant joints, etc.) that should be considered in their current building envelope upgrade design.

2. INFORMATION FROM OTHERS

We discussed the performance of the HT building enclosure with Anthony Berardino and Mike Macek, on-site MC maintenance staff. Representatives from MC told us the following information about water intrusion:

- MC reported water intrusion into the following spaces (all are below the Main roof unless noted otherwise):
  - Classroom 405 – Near the chemical hood and in the middle of the room
  - Classroom 404 – Below the bolt connections of the rooftop siren
  - Atrium – Near the new elevator, outside Classrooms 405 and 406
  - Office 317 – Above desk workstation (under Terrace Roof)
- MC routinely replaces stained ceiling tiles approximately every four months.
- MC reported no water intrusion through the steep-slope roofs.
- MC reported that some of the glass spandrel panels have been removed and the inside of the panel was repainted as the original paint flaked off. The new paint on some panels is also flaking.
- MC reported no water intrusion through the roof slab above the northwest corner of the Central Chiller Plant room on the first floor.
- MC provided us with Sections 17 through 19 of Gale Associates' (Gale) 2018 Roof Condition Survey Summary Report (#GALE JN 655953). Gale concluded that the built-up roofing (BUR) membranes, base flashings, and penetrations were in poor condition and the overall drainage on the BUR roofs was in poor condition with numerous locations of ponding water throughout. Gale concluded that the steep-slope roof tiles were in fair condition with isolated missing, loose, and broken tiles.

3. DOCUMENT REVIEW

We received the original architectural drawings prepared by CHK Architects and Planners Inc. dated 15 March 1993 and 22 October 1993. We noted the following during our review:

- Detail C7/A6-4 illustrates the typical low-slope roof construction, from interior to exterior: concrete over metal deck, tapered insulation, four-ply built-up roofing (BUR), and gravel ballast. The detail shows the roofing termination at a rising wall condition. A concrete curb supports metal stud wall framing and rises less than 8 in. above the roof surface. The roofing turns up 8 in. and terminates against the exterior gypsum sheathing over the metal studs. The roofing termination is protected by a metal counterflashing shown integrated with the aluminum siding and building paper cladding on the rising wall above.

- Detail C5/A6-4 illustrates an expansion joint detail between two areas of the Auditorium roof: one with an assembly identical to that in Detail C7/A6-4, and the other with a similar assembly, but over a substrate of 5/8 in. gypsum sheathing over bare metal deck.

- Detail B1/A6-1 illustrates the typical 7:12 steep-slope roof construction, from interior to exterior: metal stud framing, 1-1/2 in. galvanized metal deck, 5/8 in. plywood sheathing, roofing felt, and concrete roof tiles.

- Detail B7/A6-4 illustrates the typical parapet wall construction around the Main and Auditorium roofs. The roof-facing side of the parapet wall assembly consists of aluminum siding over building paper over 1/2 in. gypsum sheathing over 6 in. metal studs. The exterior side of the parapet wall assembly (above the adjacent concrete tile roofs) consists of exterior insulation and finish system (EIFS) over 1/2 in. gypsum sheathing over the same 6 in. metal studs.

- Details D7/A6-1 and F7/A6-1 illustrate the glass spandrel panel assembly at grade on the east and west elevations, respectively. The assembly consists of a single lite of spandrel glass within an aluminum frame over a batt insulation-filled wall cavity with 2-1/2 in. metal studs, vapor barrier, and 1/2 in. interior gypsum board. The aluminum frame sits atop a cast stone sill sloped to the exterior. Detail F7/A6-1 also illustrates grade extending up to cover the below-grade waterproofing membrane that turns up the concrete foundation wall and into the wall cavity behind the masonry veneer and terminating on the CMU backup wall.

- Detail B5/A6-6 illustrates the Central Chiller Plant room roof construction, from interior to exterior: concrete deck, sloped topping, “waterproofing membrane,” protection board, 6 in. gravel layer containing a French drain, filter fabric, and earth fill. This detail shows the “waterproofing membrane” turning up and into the wall cavity behind the masonry veneer and terminating on the CMU backup wall.

- Detail A5/A6-2 illustrates the expansion joint at the steep-slope roof to rising wall. This detail shows a continuous wood curb that supports a 2 in. flexible expansion joint cover that bridges from the steep-slope roof to the masonry veneer at the rising wall. The upper leg of the flexible expansion joint cover is covered with a stepped through-wall or reglet-set flashing (difficult to discern on the detail). At the metal deck level, the detail calls for a flexible expansion joint gutter system with weeps that meet scuppers through the fascia board at the eave. This detail is not called out on plans or sections.

- Detail F5/A6-1 illustrates a continuous steel shelf angle at the second-floor slab edge that is covered by a sealant joint.

4. FIELD OBSERVATIONS

Taryn N. Williams, Samantha P. Corbel, and Alexander T. Boone of SGH visited the MC HT building on 7 June and 12 through 16 June 2023 to perform a visual survey of representative building components on the interior and exterior and to conduct diagnostic water testing and make and repair destructive openings in select roof assemblies. Western Specialty Contractors (Western) assisted us by operating an aerial lift and making and repairing exploratory openings in the steep-slope and low-slope roofs. We describe our findings below.

4.1 Interior Survey

We conducted a limited visual survey of interior spaces beneath all roofs with MC maintenance staff. We observed the following:

- Stains on ceiling tiles in Classroom 405, Seminar Room 216 (under the Auditorium roof), the second-floor lobby outside the auditorium, and several locations in the Atrium (Photos 2 and 3).

- Stains on the ceiling ties in Office 317. We removed the ceiling tile and observed an additional ceiling tile stacked on top of the stained ceiling tile. Using water-finding paper, we wiped the top surface of the second ceiling tile and the paper turned pink, confirming the presence of water. We identified the ceiling tile stack was directly below a primary drain leader of the Terrace Roof.

- Stains on the ceiling of the third-floor corridor that leads to the auditorium roof underneath the steep-slope roof–to–rising wall transition (Photo 4).

4.2 Low-Slope Roofs

The Terrace, Canopy, and portions of the Main and Auditorium roofs are low-slope built-up roofs (BUR). Most roof areas have little visually discernible slope, except a portion of the Auditorium roof. We noted the following about the low-slope roofs:

- The Main, Terrace, and Auditorium roofs have a varying amount and size of rooftop equipment and penetrations ranging from air-handling units (AHUs) and antennas to

MEP penetrations and structural supports (Photo 5). At larger penetrations/equipment (e.g., AHUs), the BUR turns up at curbs, while smaller penetrations (e.g., pipe penetrations) are set in pitch pockets with a pourable sealant.

- Western made openings on each low-slope roof, generally at a low point and a high point in the roofing. We observed for all but two openings on the Auditorium roof that the roofing assembly consisted of the following, from interior to exterior: concrete over metal deck, a varying amount of polyisocyanurate roofing with layers set in asphalt, a fiberboard coverboard set in asphalt, and a multiple-ply BUR (approximately 1 in. thick) with gravel surfacing (Photo 6). See Appendix A for the approximate location of all low-slope roof openings. The thickness of the insulation ranged in from approximately 3 in. at the drains to up to 7.5 in. at perimeters.

- In all roof openings, the brown insulation was either crumbling or soft. At Canopy Opening 2, the insulation has a sulfur-like smell.

- At Auditorium Roof Openings 2 and 3, we observed gypsum sheathing over the metal roof deck.

4.3 Aluminum Siding

The rising walls around the Main and Auditorium low-slope roofs are clad in aluminum siding over building paper and paper-faced gypsum sheathing on cold-formed metal framing. The aluminum siding-clad rising walls separate the low-slope roofs from a crawlspace underneath the adjacent steep-slope roofs. We were able to access the crawlspace and observe the condition of the back side of the gypsum sheathing. We observed the following at the aluminum siding-clad rising walls:

- Area of missing aluminum siding and building paper on the main roof. MC reported that the siding had been blown off the wall and pieces still remain on the roof (Photo 7).

- Staining on the back side of the gypsum sheathing in several locations (Photo 8).

- Staining on the back side of the gypsum sheathing at penetrations (Photo 9).

- Missing gypsum sheathing and building paper behind the aluminum siding (Photo 10).

- Staining on the steel studs (Photo 11).

- The bottom edge of the aluminum siding terminates with a continuous J-shaped metal flashing (Photo 12).

4.4 EIFS

The exterior side of the parapet walls around the Main and Auditorium roofs, above the steep-slope roofs, are clad in EIFS with decorative projecting bands. The EIFS is applied to paper-faced gypsum sheathing on metal studs. We were able to observe the back side of the gypsum sheathing via the aforementioned crawlspaces. We noted the following condition of the EIFS:

- Staining on EIFS (Photo 13).
- At the upper decorative projecting band and at limited locations at the bottom decorative band, we observed cracks and areas of missing coating, exposing the insulation (Photo 14).
- At the lower decorative projecting band, we observed cracks in the EIFS coating (Photo 15).
- At the main roof, staining on the back side of the gypsum sheathing (Photo 16).

4.5 Steep-Slope Roofs

The Tower and portions of the Main and Auditorium roofs are steep-slope roofs. The steep-slope roof construction is concrete roof tiles over horizontal wood battens attached through roofing felt on top of plywood sheathing and metal deck. We were able to observe the underside of the metal deck via the aforementioned crawlspaces. We noted the following conditions at the steep-slope roofs at both the Main and Auditorium roofs unless otherwise noted:

- Missing ridge tile on the Auditorium roof (Photo 17).
- Staining at isolated locations on the underside of the metal deck (Photo 18). It is unclear if the staining in this area is from construction or due to in-service leakage.
- Staining along light-gauge metal rafters supporting the metal deck (Photos 19).
- At the Auditorium roof to rising wall, we observed an approximately 2 in. gap between the steep-slope roof and the masonry veneer of the rising wall. The gap is covered by a reglet-set metal counterflashing set in a shallow slot cut in the face of brick masonry (Photo 20).
- With assistance from Western, we were able to remove and/or lift some concrete roof tiles and observe the condition of the roofing felt below. We noted the following:

- Concrete roof tiles have an approximate 3 in. vertical overlap (headlap).
- Each concrete roof tile is secured with one nail fastened to the horizontal wood battens (Photo 21).
- The wood battens have an approximate 1 in. gap between sections (Photo 22).
- The roofing felt of the Tower and Main steep-slope roofs is cracked and brown in color; brown staining is concentrated closer to the upslope side of the horizontal battens. The roofing felt appears to have a plastic layer in some locations (Photos 23 and 24).
- The roofing felt of the Auditorium roof is generally continuous (Photo 25).

4.6 Glass Spandrel Panels

Glass spandrels are located below windows in three locations on the building: first-floor east elevation, second-floor west elevation, and fourth-floor west elevation at the Terrace roof. The spandrel glass is monolithic (single-pane) and coated on the interior side with insulation in the cavity behind the spandrel, and insulation between the metal studs. There are two locations of captured curtain wall spandrels: one above each entrance on the west and east elevation of the building.

- Some spandrel glass has delaminated coating at the inside face (Photo 26). There is no discernable pattern to the location of coating delamination by elevation, height, or other aspects.

- Western removed two glass spandrels along the east elevation. Western easily removed the perimeter exterior gaskets and snap-in trim. Western then angled the top of the panel out and removed it from the frame. There is no sealant between these two spandrels and their respective window frames. At both openings, we observed one layer of batt insulation stuck to the back side of the panel and one layer of batt insulation in the metal stud wall cavity; the batt insulation is stained. Behind the insulation, there is a foil membrane attached to the back side of the gypsum wallboard. (Photo 27). One spandrel had cracked paint visible from the exterior (Photo 28). At the other spandrel we were unable to see the delaminated paint until the panel was removed (Photo 29).

- Western attempted to remove four other glass spandrels with delaminated or intact coating (as seen from the outside) but was unable to cut the perimeter sealant between the panel and the window frame without risk of damaging the glass (Photo 30).

- Loose perimeter exterior gasket on a spandrel on the west elevation.

- Some spandrel glass had snap-in trim visible from the exterior while others did not.

4.7 Facade

The facade consists of masonry veneer (two different sizes and colors) and cast stone copings at roof parapets and window sills. The fenestrations are aluminum-framed windows with isolated areas of curtain wall and limited locations of glass block masonry infill. The building has glass entrance doors and hollow metal doors to back-of-house areas. We noted the following about the condition of the facade:

- Isolated locations of stained masonry and mortar joints (Photo 31).
- Isolated recessed mortar joints, in particular, above the cast stone sills at the Level 2 slab elevation (Photo 32).
- Cracked sealant joints between cast stone coping blocks (Photo 33).
- Cracked sealant joints around window perimeters.
- Crack in the masonry facade on the second-floor level of the north elevation at the northeast corner of the building (Photo 34). The crack typically went through mortar joints and spanned eleven vertical courses. At the approximate midspan of the crack, the masonry appears to bow outward from the plane of the wall. This same location occurs at the horizontal control joint at the second-floor level.
- Many cast stone sills and copings exhibit alligator (grid-patterned) cracking with brown staining (Photo 35). This condition is most severe at the west elevation below the location of a roof eave at the Auditorium. One sill stone has a spall, and a few others have incipient spalls.
- Failed coating at center mullions at several windows on the west elevation (Photo 36).
- Unflashed mechanical penetrations on the west elevation (Photo 37).
- Corrosion at the underside of window lintels on the north, east, and west elevations (Photo 38).
- Localized damaged below-grade waterproofing termination along the west elevation (Photo 39). The below-grade waterproofing termination in some locations stops short of the top of the concrete foundation wall (Photo 39).

4.8 Central Chiller Plant Roof

The Central Chiller Plant Roof is at the northwest corner of the building (Photo 40). A small portion of the first-floor central chiller plant room is not covered by the second floor and has gravel fill over a self-adhered membrane covering the roof. The ceiling underneath the roof is covered with foil-faced insulation. We noted the following at the Central Chiller Plant Roof:

- The roof area is covered with gravel. After Western excavated approximately 1 ft of gravel, we observed punctures in a protection board, tears in a filter fabric, and brown earth fill material underneath (Photo 41).

- A self-adhered membrane turns up onto the face of the masonry wall. The membrane has fishmouths along the top termination (Photo 42). The membrane termination is sealed to the surface of the masonry, although most of the sealant has failed.

4.9 Water Testing

We performed limited water testing in order to inform our recommendations for repair design of the roofing. Our goal for the Main roof testing was to identify issues beyond the extent of the low-slope roof that may need to be included in the repair design, such as the roof–to–rising wall transitions. Our goal for the Auditorium roof was to better understand the performance of the transitions at the steep-slope roof–to–rising wall condition. We conducted our water testing in general conformance with ASTM E2128 – Standard Guide for Evaluating Water Leakage of Building Walls. We performed diagnostic water testing with a spray rack (calibrated per ASTM E1105) and nozzle (calibrated per AAMA 501.2). See Appendix A for the approximate locations of the water testing. We summarize our testing and results in the tables below.

Diagnostic Water Testing – Main Roof

Test	Test Area	Duration	Test Equipment	Results
WT1	Low-slope roof between emergency vent fire hood penetration and rising wall (Photo 43)	30 mins.	Spray Rack	No observed water intrusion

Test	Test Area	Duration	Test Equipment	Results
WT2	Low-slope–to–rising wall transition near WT1 (Photo 44)	16 mins.	Spray Rack	Approximately 15 mins into testing, we observed water intrusion at the chemical hood duct penetration in Classroom 405. We stopped the testing shortly after first observing the leakage due to the significant volume of water entering the interior.
WT3	Same location as WT1 (Photo 45)	30 mins.	Spray Rack	No observed water intrusion
WT4	Metal coping joint cover plate at rising wall above WT1 through WT3 (Photo 46)	30 mins.	Nozzle	We observed similar water intrusion as seen in WT2 but observed that the chemical hood duct penetration was unintentionally being sprayed. We adjust the nozzle to eliminate the penetration from being sprayed and the water intrusion stopped shortly thereafter. We observed no other water intrusion at the fourth floor or within the crawlspace.

Diagnostic Water Testing – Auditorium Roof

Test	Test Area	Duration	Test Equipment	Results
WT5	Steep-slope roof–to–rising wall transition	3 mins.	Spray Rack	Approximately 30 sec into the test, we observed water intrusion into the crawlspace. Water was dripping down the masonry veneer. We stopped the testing shortly after first observing the leakage due to the significant volume of water entering the crawlspace.
WT6	Lower portion of steep-slope roof valley near the intersection of Gridlines 12.7 and D	15 mins.	Spray Rack	No observed water intrusion
WT7	Upper portion of steep-slope roof valley near the intersection of Gridlines 13.1 and D (above WT6)	15 mins.	Nozzle	No observed water intrusion

Test	Test Area	Duration	Test Equipment	Results
WT8	EIFS above steep-slope roof near Gridline 14	15 mins.	Nozzle	No observed water intrusion

5. DISCUSSION

5.1 Low-Slope Roofs and Aluminum Siding

MC has already decided to replace all of the low-slope roofs. As we observed from our visual survey, water testing, and roof openings, the low-slope roofs are at the end of their expected service life, and we concur with MC's plan to replace them. We were able to replicate one reported leak in Classroom 405 indicating poor roof penetration detailing that will be addressed in the replacement project. The soft and crumbling coverboard we observed at roof openings further confirmed water intrusion into the low-slope roofs.

We understand that MC is undecided about the type of roofing membrane to replace the existing BUR. There are several options for replacement low-slope roofing systems: BUR, single-ply membranes (e.g., PVC, TPO, EPDM), or modified bitumen. MC's selection will likely be based on cost, lead time, and other factors, and we can assist MC in making a decision. The roofing replacement will require new insulation to meet the current Building Code. This will likely increase the overall thickness of the system and will possibly require changes at the perimeters to increase the perimeter flashing height commensurate with the new required thickness and provide new transitions to surrounding construction.

The aluminum siding is a rainscreen cladding and is designed to prevent bulk water from reaching the building paper, which forms the water barrier at the rising walls. Some of the siding had recently blown off, exposing the building paper and gypsum sheathing. We observed staining in several locations on the back side of the sheathing in both the Main and Auditorium crawlspaces, indicating breaches in the water barrier. We also observed locations of missing gypsum sheathing and building paper which create direct pathways for water intrusion. Though we are unable to confirm the exact leakage path, WT2, which sprayed water on the aluminum siding, created water intrusion on the interior under the penetration for the chemical hood vent (away from the wall). The aluminum-clad wall assembly could be allowing water to bypass the BUR termination and run beneath the roofing to enter the space below through the nearest penetration. Based on the original drawings, the exterior gypsum sheathing behind the aluminum siding is the substrate for the roofing termination. When water penetrates behind the building paper, it has a direct path behind the roofing termination and enter the roof assembly and building interior below.

Recladding the rising walls around the Main and Auditorium roofs will allow the installation of a durable cladding, a more reliable water barrier, and an opportunity to improve the termination of the roofing and the transition between wall cladding and roofing.

5.2 EIFS

The EIFS is a barrier system consisting of a thin cementitious layer with embedded mesh reinforcement over expanded polystyrene insulation and relies on an intact outer layer and perimeter sealants to prevent water from entering the wall assembly. The current EIFS on the building has cracks and areas of exposed insulation; this creates direct pathways for water entry behind the EIFS and into the building. We know from staining on the back side of the sheathing that some locations allow water to enter the crawlspace. This problem will only increase as time goes on and the EIFS further deteriorates. We recommend replacing the EIFS with a new drainage-style EIFS that will have an air/water barrier on the sheathing that prevents water intrusion even if water bypasses the exterior coating. Replacing the aluminum siding in combination with the EIFS will create the opportunity to repair the metal coping detail between the two systems. Though our water testing at the EIFS and the coping did not result in leakage into the crawlspace, the original drawings show a lack of water barrier continuity over the coping. As the building ages, the joint between sections of metal coping will deteriorate and eventually allow water leakage into the crawlspace.

Installing a new high-temperature self-adhering membrane underneath the metal coping will provide the opportunity for continuity of the water barriers behind the new cladding at the roof side and the new drainage EIFS at the exterior. The expected service life of a new drainage EIFS cladding is likely twenty to thirty years with typical maintenance and may be extended with application of a coating toward the end of the timeline. A lower-cost approach (with corresponding lower durability and reliability) would be to repair the EIFS in place by filling cracks and recoating all of the EIFS with an elastomeric waterproofing coating. Continuity of the air/water barriers could still be provided by installing a new self-adhered flashing under the coping, lapped over the face of the EIFS. This approach may extend the service life of the barrier EIFS assembly a few years, but the coating will have to be inspected and maintained to maximize resistance against water ingress. Additionally, the barrier EIFS assembly will continue to be vulnerable to leakage should defects in the coating occur due to the lack of water-resistive barrier behind the EIFS.

5.3 Steep-Slope Roofs

Steep-slope roofing relies on the slope and overlap of the tiles to shed bulk water off of the roof and limit water that reaches the underlayment below. We observed the tiles to be in generally good condition and observed only one missing ridge tile. The roofing felt appears to be in fair condition given its age, although we observed locations of cracked and lighter-colored felt that has weathered more extensively or collected more dirt. In a few isolated locations we observed staining at the underside of the steep-slope roof deck, but the staining may be from construction or due to transient condensation. Because there is no reported leakage through the steep-slope roofs, and we observed no leaks during our water testing in the field of the roof (at valleys and at the EIFS transition), the system generally appears to be functioning. Unless MC wishes to align the service life of all the roofs as part of this project, we recommend continued monitoring of the steep-slope roofs and maintenance of broken or displaced tiles at this time.

However, the transition of the steep-slope roof–to–rising tower wall contains a visible gap in the weather-resistive barrier, shows staining underneath, and leaked during our water testing. Detail A5/A6-2 provided in the original drawings shows a flexible expansion joint cover and gutter, neither of which were installed. Instead, only a reglet-set metal counterflashing covers the joint. This joint, and the corresponding joint on the west elevation (with slightly more complex geometry) will continue to leak unless a new expansion joint cover is installed. Proper integration with the porous brick masonry on the rising tower wall will require leg-and-leg removal of brick masonry to allow for installation of a through-wall flashing and roof counterflashing above the upturned roof termination.

5.4 Glass Spandrel Panels

The glass spandrels are constructed as shown on the drawings. The system is unvented and therefore relies on a complete perimeter seal to keep air, water, and water vapor out of the cavity behind the glass. The monolithic glass is coated on the interior side (back-painted), but over time, the coating has delaminated from several spandrels, prompting MC to remove and recoat them. Although the wall cavities behind the spandrels do not exhibit signs of chronic water leakage, the batt insulation is stained and discolored in some areas and the cavities are vulnerable to high temperatures and high humidity, given the relatively low U-value (high thermal transmission) of the single glass pane, the presence of a foil-faced vapor retarder at the back of the cavity, and the glass perimeter detailing, where gaskets are loose or missing, and many lites are unsealed. (Even lites that have sealant on the back side have delaminated coatings.) It is likely that even if installed optimally, these assemblies can no longer reliably resist all water ingress and trap moisture, leading to condensation that is causing coating delamination. Additionally, we were unable to observe the perimeter terminations of the interior foil vapor retarder and cannot rule out contribution of moist air from the interior. While a nuisance and unsightly, the condensation is likely transient in nature, as we did not observe corrosion of the metal framing in the spandrel panel opening and there are no reports of leakage at or below these assemblies.

The most durable solution is to replace the monolithic back-painted glass spandrels with a product that will not show coating delamination such as ceramic fritted monolithic glazing panel or a metal panel. For improved performance, an insulated glazing unit with ceramic fritted glass could be used, but the window frame may need modifications to accommodate the increased thickness of glazing. The window system manufacturer may be able to advise on available products to fit the existing system. The perimeter will require improved detailing in the form of replacement gaskets, sealant, or both to resist water infiltration around the panels.

Several spandrel units had no exterior snap-in trim so the spandrels were likely installed via the interior. Interior furniture and finishes would need to be removed to facilitate their replacement. This will cause an increase in the replacement cost if panels need to be replaced from the interior rather than the exterior.

5.5 Facade

The facade consists primarily of fenestrations and masonry veneer. The aluminum-framed windows appear to be in good condition with no reported leakage. The cracked and deteriorated perimeter sealant joints are past their service life and need to be replaced. The failed coating near the tops of the mullions exposes the underlying framing and should be locally recoated.

The masonry veneer issues include failed sealant joints, recessed (eroded) mortar joints, staining, cracking, unflashed penetrations, corroded lintels, and damaged below-grade waterproofing:

- The sealant joints between masonry elements at coping joints and masonry control joints prevent bulk water from entering the wall cavity and accommodate the movement between elements. The sealant joints on the building, similar to those at the fenestrations, are deteriorated, cracked, and past their useful service life. This work should be considered as part of the roof replacement work.

- We observed a limited amount of recessed mortar joints across the building. Most recessed joints are above the decorative projecting masonry bands. These joints have greater exposure to water during rains and will weather more quickly than joints on vertical surfaces. Repointing these joints will reduce the amount of water intrusion into the wall cavity, will better protect the masonry from accelerated freeze-thaw deterioration, and should be done as part of a regular maintenance cycle. This work should be considered as part of the roof replacement work.

- We observed localized staining of the masonry veneer and mortar joints. Most staining appears to be localized soiling due to rain, such as above decorative projecting masonry bands. The stains can likely be removed with low-pressure scrubbing and rinsing or moderate pressure washing, which could be done following other facade repairs. This work could be considered as part of the roof replacement work.

- The alligator cracking and staining in the cast stone copings and window sills is consistent with alkali-silica reaction (ASR), which requires laboratory testing to confirm. This phenomenon in concrete and cast stone occurs when the alkaline cement reacts with silica in reactive aggregates in the presence of water, creating a gel byproduct that eventually causes the alligator cracking and staining. We saw the most severe condition at the west elevation at a cast stone sill directly below a roof eave at a rising wall, which funnels water directly onto the sill. The only solution to ASR is to replace the units with new ones made with non-reactive aggregates. The units are currently serviceable (the few locations of spalls can be patched), but the deterioration (whether due to ASR or not) will continue. Alternatively, covering the copings with a metal flashing or a fluid-applied traffic coating (matching the color of the cast stone) would provide additional protection from water and extend the service life of the copings. This work should be considered as part of the roof replacement work.

- The cause of the cracking at the northeast corner is unclear based on our visual survey. The widest point of the crack occurs at the horizontal control joint at the second-floor level. Based on the drawings, we know this is a location of a steel shelf angle. The shelf angle could be corroding and causing the masonry to move out of plane. Alternatively, vertical cracks commonly occur at masonry building corners when adjacent vertical masonry movement joints cannot accommodate moisture or temperature-induced movement of the brick masonry stresses from adjoining masonry panels exceed the local strength of the brick at the corner. The condition can be further investigated by locally removing masonry to observe the shelf angle and backup wall condition. If the shelf angle is not corroded or contributing in another way, a masonry control joint could be installed at the building corner to allow for movement of the brick without further cracking.

- The unflashed penetrations at the west elevation create a direct path for water entry to the interior. These locations should be sealed. This work should be considered as part of the roof replacement work.

- The paint on the steel lintels is likely the original paint and has deteriorated over the years. The exposed portions of the lintels are corroding. During our limited survey, we did not observe any lintel that was showing signs of significant section loss or cracks in the brick masonry from rust jacking due to the corrosion. The existing paint and corrosion should be removed and the lintels reviewed for any section loss. The lintels should then be repainted with an anti-corrosion primer and then an exterior-grade, UV-stable coating. This work will require removal and replacement of brick masonry to confirm the performance of the through-wall flashings protecting the topside of the lintels. This work could be considered as part of the roof replacement work.

- The top of the below-grade waterproofing membrane is exposed and damaged, in particular along the west elevation. We do not know whether the below-grade waterproofing was constructed per the drawings, turning up the concrete foundation wall and into the wall cavity behind the masonry veneer. In certain locations along the west elevation, it appears that the grade has been lowered, thus exposing the below-grade waterproofing, and the waterproofing appears to terminate on the face of the masonry wall. Below-grade waterproofing is not UV-stable and requires protection, which previously was the soil around the building perimeter. Though there is currently no history of water intrusion along the west elevation, repairs to the membrane need to be made to prevent future water intrusion. To provide a proper repair to the below-grade waterproofing, the repair membrane needs to include a tie-in with a well-adhered portion of the membrane below, turn up and tie into the above-grade rising wall assembly, and be protected by protection board (where covered in soil) or by metal through-wall and protection flashing where exposed above-grade. This work could be considered as part of the roof replacement work.

5.6 Central Chiller Plant Roof

Based on discussions with MC staff and our observations, the self-adhering waterproofing membrane installed over the Center Chiller Plant roof appears to be functioning, despite the apparent membrane defects and the different termination detailing than shown on the original drawings. As designed, the membrane was intended to turn up behind the exterior masonry veneer, which is a more durable detail than a surface termination. While the membrane and surface termination appear to function currently, the termination will eventually leak if not repaired. Most sheet waterproofing membranes are not UV-stable and require protection, as well as a termination bar and sealant along the leading edge. The sealant we saw was cracked and the membrane termination had fishmouths. Given the lack of water intrusion history at this location, limited repairs to the membrane termination may be sufficient to protect the area. Alternatively, MC may choose to replace the roof to align the service life of all low-slope roofs on the building. Proper repairs will require removal and replacement of brick masonry to accommodate tie in of the roofing with the above-grade wall assembly in a watertight manner. This work should be considered as part of the roof replacement work. Replacement work must confirm the perimeter French drain draining this roof is clear and free flowing.

Our observations were limited by the presence of foil-faced insulation on the underside of the ceiling slab. Localized removal and reinstallation in a few areas would be a proactive way to further confirm that the waterproofing membrane is still functional.

6. CONCLUSIONS

Based on the information set forth herein, we conclude the following:

- The existing low-slope roofs are at the end of their expected service life and their replacement is prudent.

- The aluminum siding–clad walls appear to be allowing water infiltration that can damage the new roof assemblies and leak to the interior.

- The EIFS cladding on the exterior face of the Auditorium roof parapet does not have capacity to manage water infiltration behind the cladding and contains cracks and voids in the EIFS lamina that let bulk water penetrate the EIFS. The EIFS cladding appears to be allowing water infiltration into the wall and building interior.

- The steep-slope roofs appear to be performing adequately with isolated deterioration such as cracked or missing tiles or deteriorating underlayment. Leakage along the steep slope to rising tower wall is chronic and requires installation of a through-wall flashing at the brick masonry and new roof counterflashing to resist water infiltration.

- Glass spandrels have peeling paint due to high temperatures or condensation that occurs in the spandrels either from leakage at the exterior or moisture-laden air leakage from the interior into the spandrel assemblies.

- The building facade is generally in good condition with some limited deficiencies that likely allow water infiltration into the wall cavity or, at isolated locations, the building interior.

- The below-grade waterproofing and adjacent chiller plant roof has exposed waterproofing that contains defects that make the assemblies vulnerable to damage and water infiltration.

Photo 1

Montgomery College High Technology & Science Center Building.

Photo 2

Classroom 405. Stained ceiling tiles underneath chemical hood duct penetration.

Photo 3

Outside Classroom 404. Stained ceiling tiles near new elevator.

Photo 4

Auditorium Roof. Stains on the ceiling of the third-floor corridor underneath the steep-slope roof–to–rising wall transition.

Photo 5

Terrace Roof. Rooftop equipment and penetrations.

Photo 6

Main Roof, Opening 1: Concrete fill over metal deck. 7.5 in. of insulation, 1 in. BUR.

Photo 7

Main Roof. Area of missing aluminum siding.

Photo 8

Auditorium Roof Crawlspace. Staining on the back side of the gypsum sheathing.

Photo 9

Main Roof Crawlspace. Staining on the back side of the gypsum sheathing at penetrations.

Photo 10

Main Roof Crawlspace. Missing gypsum sheathing behind the aluminum siding.

Photo 11

Main Roof Crawlspace. Staining (circled) on the steel studs.

Photo 12

Main Roof. The bottom edge of the aluminum siding is captured by a continuous J-shaped metal flashing.

Photo 13

Auditorium Roof. Staining on EIFS.

Photo 14

Auditorium Roof. Missing EIFS coating exposing the insulation (circled) at the upper decorative projecting band.

Photo 15

Auditorium Roof. Cracks in the EIFS coating at the lower decorative projecting band.

Photo 16

Main Roof Crawlspace. Staining on the back side of the gypsum sheathing behind the EIFS.

Photo 17

Auditorium Roof. Missing ridge tile.

Photo 18

Main Roof Crawlspace. Staining on the underside of the metal deck.

Photo 19

Main Roof Crawlspace.
Staining along metal studs supporting the metal deck.

Photo 20

Auditorium Roof.
Steep-slope roof–to–rising wall transition.

Photo 21

Auditorium Roof. Each concrete roof tile was secured with one nail (circled) fastened to the horizontal wood battens.

Photo 22

Auditorium Roof. Approximate 1 in. gap between wood batten sections.

Photo 23

Tower Roof. Roofing felt at the eave.

Photo 24

Main Roof. Roofing felt near the eave.

Photo 25

Auditorium Roof. Roofing felt.

Photo 26

East Elevation. Spandrel panels; right panel has delaminated coating.

Photo 27

East Elevation. Glass Spandrel Panel Opening 1 wall cavity.

Photo 28

East Elevation. Delaminated coating of Glass Spandrel Panel Opening 1.

Photo 29

East Elevation. Delaminated coating view on back side of Glass Spandrel Panel Opening 2.

Photo 30

East Elevation. Perimeter sealant (circled) of spandrel panel that Western was unable to remove.

Photo 31

East Elevation. Stained masonry and mortar joints.

Photo 32

East Elevation. Recessed mortar joints (circled).

Photo 33

Canopy Roof. Cracked sealant joint between sections of cast stone coping.

Photo 34

Second Level of North Elevation at Northeast Corner. Crack in the masonry facade.

Photo 35

Terrace Roof. Cast stone coping with alligator cracking and brown staining,

Photo 36

West Elevation. Failed coating at center mullion.

Photo 37

West Elevation. Unflashed mechanical penetration.

Photo 38

North Elevation. Corrosion at the underside of window lintels (circled).

Photo 39

West Elevation. Damaged below-grade waterproofing termination and exposed concrete foundation wall (circled).

Photo 40

Central Chiller Plant Roof.

Photo 41

Central Chiller Plant Roof. Puncture in protection board with brown earth fill (arrow) underneath.

Photo 42

Central Chiller Plant Roof. Fishmouths (circled) in the membrane along the top termination against the building masonry veneer.

Photo 43

Main Roof. Water Test WT1.

Photo 44

Main Roof. Water Test WT2.

Photo 45

Main Roof. Water Test WT3.

Photo 46

Main Roof. Water Test WT4.

APPENDIX A

SGH

CLIENT	Montgomery College	SHEET NO.	1 / 1
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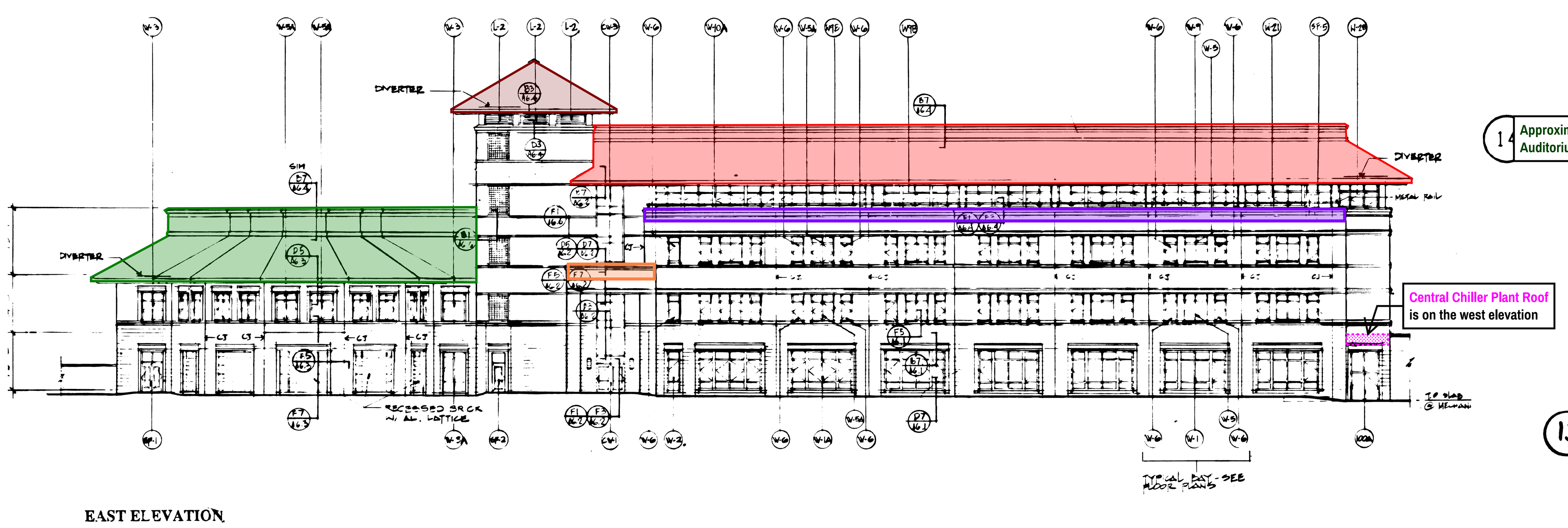
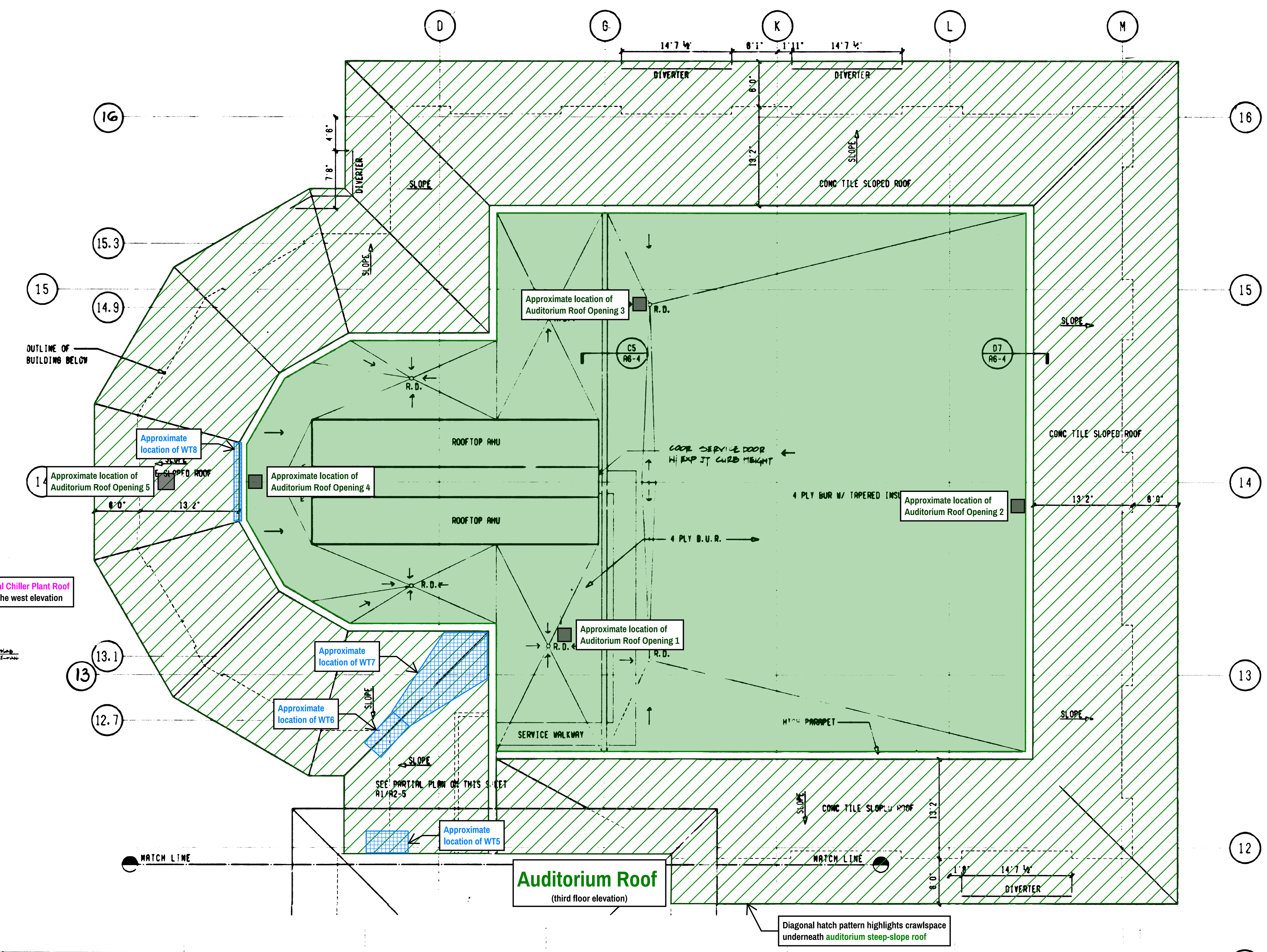
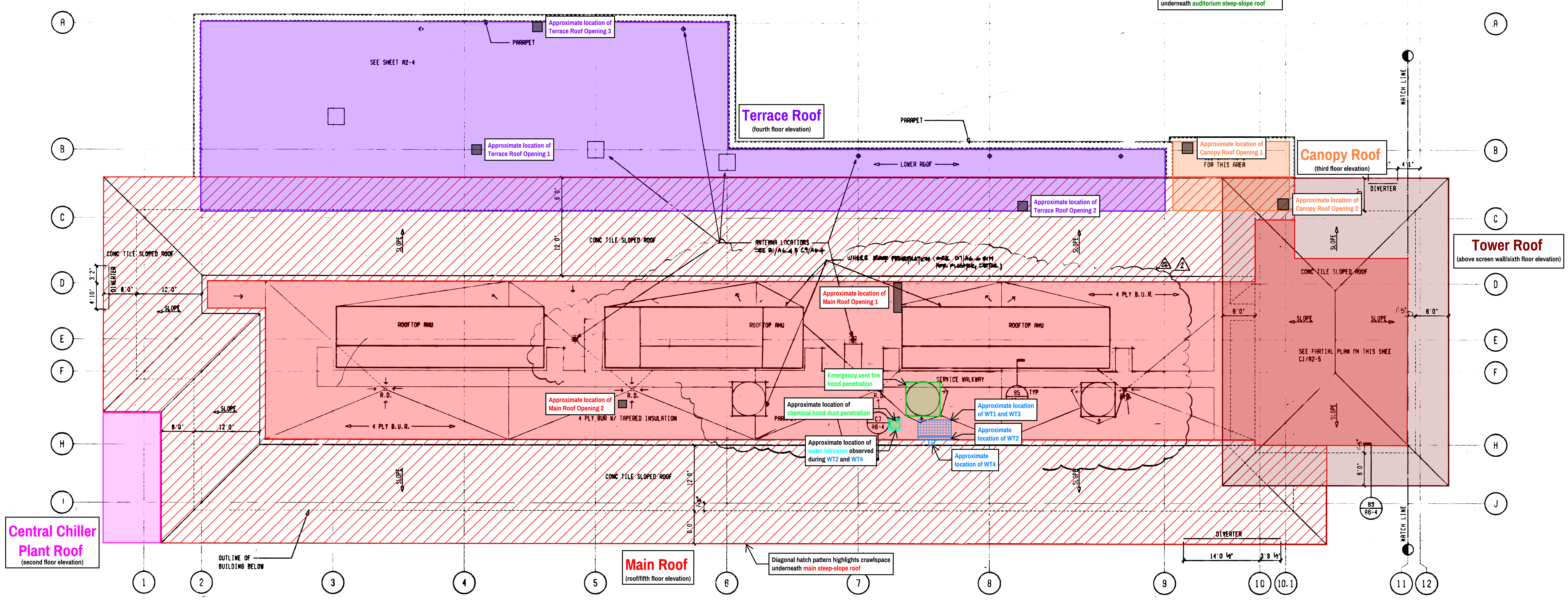
		DATE	27 July 2023
		BY	ATB
		CHECKED BY	TNW







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KEY PLAN

REVISION

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PROJECT NAME

HIGH TECHNOLOGY INSTRUCTIONAL CENTER

MONTGOMERY COMMUNITY COLLEGE

GERMANTOWN CAMPUS

DRAWING TITLE

ROOF PLAN

Drawn	Approved	Job No.
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Senior V.P. in Charge	Project Manager	Project Architect
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Scale 1/8"=1'0"	Drawing No.	
Date 10-22-93	A2-5	

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