



SITE VISIT REPORT No. 3 | September 30, 2021

Diablo Valley College Gymnasium Roof Assessment

Observation and Assessment of Existing Roofing Assemblies at Gymnasium

REPORT DATE	October 15, 2021	WJE PROJECT NO.	2021.2538.0
REPORTED BY	David Ferreria	WJE PROJECT MGR.	Ann Coleman
OWNER/ CLIENT	Contra Costa Community College District	CONTRACTOR/ PROJECT NO.	Lathrop Construction Associates (LCA)
WORK IN PROGRESS	N/A	WEATHER	Sunny and Clear, upper 80s
PRESENT AT SITE	David Ferreria (WJE)	DISTRIBUTION	Ron Hoyle, Kitchell Mike Owens, Kitchell Kyle Robinson, Kitchell Eddie Delgadillo, Kitchell

3.1 OBSERVATIONS OF GYMNASIUM ROOF

On September 30, 2021, WJE accessed the gymnasium to complete our assessment of the existing gymnasium roof assemblies and observe the interior of the gymnasium for potential signs of water intrusion. As part of the assessment, WJE used a Tramex moisture meter and a FLIR thermal imaging camera as tools to help identify potential moisture in the main roof assembly. Roof cores were made at the main roof and the upper canopy roof to expose the construction of the roofing assemblies. A diagram of the gymnasium roof areas is provided in Figure 1.

Exterior Observations

The main roof at the gymnasium is made up of a Sarnafil PVC, single-ply membrane (PVC membrane), which is mechanically fastened to the deck sheathing with heat welded at seams between the PVC membrane sheets (Figure 2). Numerous roof patches and core locations have been repaired with either welded PVC membrane patches or a liquid-applied sealant, all of which appear to be in fair but serviceable condition (Figure 3 and Figure 4). Roof integrated gutters are located at the north and south edges of the roof, spanning the entire length of each edge. Roof drains are located within each integral roof gutter: three drains along the south gutter and three drains along the north gutter. WJE observed stains on the roof from ponding water within six feet of the gutter, along seams of the PVC membrane (Figure 5). The roof has 14 pipe penetrations that are flashed with preformed PVC boots and sealant. Existing vaulted skylights have been abandoned and covered with a metal standing seam roof with perimeter flashings. The PVC membrane extends onto the walls of the vaulted skylights, though the termination detail could not be observed below the metal standing seam cover. Biological growth exists across the vertical faces of the PVC membrane on the skylight vaults (Figure 6). An elevated electrical raceway is supported by DuraBlock rubber supports.

A total of three roof cores were taken at the main roof to observe the roofing assembly and the condition of the roof assembly. The PVC membrane is installed over a fiberglass-faced gypsum roof sheathing, over kraft paper, over a wood plank roof deck (Figure 7). A thin black membrane could be seen on the wood plank roof deck (Figure 8). WJE did not observe any evidence of moisture within the roof core locations.

Each span of standing seam metal panel roofs includes two sections of sheet metal with seams. The metal standing seam roofs have some corrosion at seams and sealant failures at corner joints and lap seam joints (Figure 9). At some seam locations, an aluminum faced tape covers the seam (Figure 10 and Figure 11). The standing seams include intact rivets along the length of the standing seams. Several screw fasteners around the perimeter of the metal standing seam roof and the flashing below are disengaged from the underlying skylight vault framing (Figure 12 and Figure 13). Where the fasteners do not fully engage, there are likely holes through the PVC membrane that may cause leaks.

A canopy roof at the east entry of the gymnasium consists of a bituminous built-up roof with a granule-surfaced cap sheet (Figure 14). Staining was common along the east edge of the canopy, as it appears the roof is designed to permit overflow drainage onto the adjacent roof and ground level due to the absence of a roof drain (Figure 15). A lower canopy roof to the north of the main canopy has a gutter along its east edge (Figure 16). The complete built-up roofing assembly was measured to be 1/2 inch. A fiberglass - faced deck sheathing was observed below the built-up roofing assembly (Figure 17).

Interior Observations

WJE observed the underside of the roof deck from the interior, including the skylight vaults, adjacent wall areas, and other rooms within the footprint of the gymnasium. Kitchell reported one previously repaired interior leak location at the head coach's office along the east edge of the gymnasium, directly below the overhang with the built-up roof assembly. We observed minimal paint cracking and staining on the underside of the wood plank roof deck (Figure 18 and Figure 19).

3.2 Moisture Survey

A moisture meter survey was completed to identify potential moisture trapped within the roofing assembly at the main roof. Moisture readings were taken in a grid pattern across the main roof and at various roofing seam conditions to assess any evidence of moisture in the roofing assembly. The moisture meter was calibrated to scan a single-ply roofing membrane with a high-signal sensitivity level. Each surveyed roof location displayed a moisture reading of zero on the moisture relative scale, indicating that the moisture meter was unable to detect moisture within the PVC roofing assembly (Figure 20).

WJE revisited the main roof at the gymnasium after sunset to perform a thermal imaging survey of the roofing assembly. Temperature readings across the horizontal field of the PVC membrane were within a range of 58 degrees Fahrenheit to 65 degrees Fahrenheit. Variances in the temperature across the horizontal field of the PVC membrane were identified as joint lines between the roof deck sheathing board. A roof core was made roof deck sheathing joint to observe any conditions which may have led to the clear thermal imaging variance. Moisture was not observed below the PVC membrane or on the surface of the roof deck sheathing. The observed temperature variance is likely a result of air movement within the joint opening between two roof deck sheathing panels due to the consistency of the findings at this and similar roofing locations. The vertical sections of the PVC roof membrane at the skylight vaults were typically warmer than the surrounding PVC membrane and the metal standing seam roof.

Temperature variance at these locations is likely due to the air pockets below the PVC membrane and the absence of insulation which allows warm interior air to radiate to the PVC membrane.

3.3 RECOMMENDATIONS AND CONCLUSIONS

In its current state, the PVC roof assembly can likely provide six to ten years or more of useful service life if regularly inspected and maintained. Staining observed at seams in the PVC membrane do not appear to be adversely affecting the performance of the roofing assembly at this time. The roofing assembly at the main roof does not display deficiencies that warrant an immediate reroofing recommendation. WJE recommends engaging a qualified roofing contractor to perform annual or bi-annual roof inspection and maintenance services to monitor and repair the roof membrane before deficiencies arise.

Based on the roof cores and lack of moisture trapped within the existing roofing system, future reroofing options include, tearing-off the existing roofing membrane and installing a new roofing membrane, or overlay the existing roofing with a new roofing system.

The current ongoing construction at the PEK building, gymnasium, and ART building provides an opportunity to reroof the gymnasium with limited disruption to events that normally take place on campus in the vicinity of this building. At a minimum, the main roof should be permanently patched at roof core and other deficient locations and across the metal standing seam roof. Also, the fasteners that are disengaged from the underlying substrate should be drilled back into their former position and then sealed over with sealant.

Figures

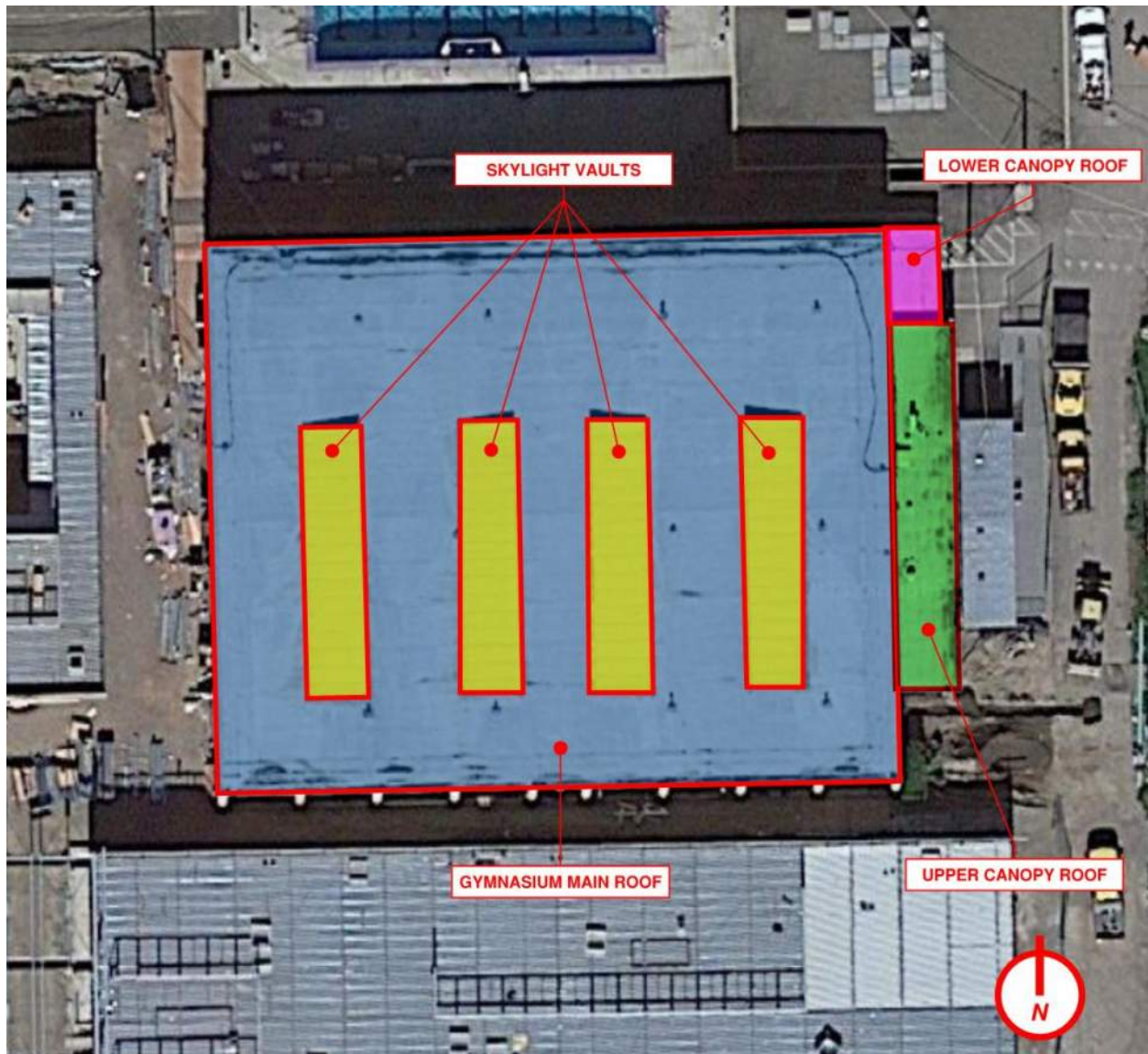


Figure 1. Overall roof plan. Photo from Google Maps. Annotations by WJE.



Figure 2. Overall view of gymnasium main roof and skylight vaults.



Figure 3. Sealant repair patch over PVC membrane at main roof.



Figure 4. Corner detail patch and repair patch at main roof.



Figure 5. Ponding stains commonly observed within six feet of gutters along PVC membrane seams.



Figure 6. Biological growth is common on the vertical PVC application at the skylight vaults.



Figure 7. Roof core made at gymnasium main roof.



Figure 8. Thin black membrane is installed over the work plank roof deck.



Figure 9. Overall view of a skylight vault, metal standing seam roof.



Figure 10. Aluminum-faced tape installed over lap seam joint in metal standing seam roof.



Figure 11. Corrosion observed at the lap seam condition where the aluminum faced tape has deteriorated.



Figure 12. Disengaged fastener at the base of the metal standing seam roof.



Figure 13. Disengaged fastener at the base of the metal standing seam roof with failed sealant.



Figure 14. Overall view of upper canopy roof.



Figure 15. Moisture staining across the outer edge of the built-up roof membrane.



Figure 16. Overall view of lower canopy roof. Roof gutter spans the east edge of the roof.



Figure 17. Roof core made at upper canopy roof.



Figure 18. Underside of wood plank roof deck.



Figure 19. Paint peeling at the underside of the wood plank roof deck.



Figure 20. Tramex moisture meter used across the roof deck to assess moisture content of roof assembly.