

On May 26, 2015 ATS&R visited the site, observed existing roof 1 conditions, reviewed current leak locations, met with and discussed past leaks and observations with the district's current roofing maintenance contractor, Knickerbocker Roofing and Paving and note the following conditions:

EXISTING ROOF 1 MATERIALS:

The existing roof 1 roof was installed in 2000 with a 20 year warranty.

The roof materials consist of granule surfaced APP modified on Kraft vapor retarder, on ¾" fiberglass insulation on a temporary 2 ply 43# coated base sheet on 1-1/2" polyisocyanurate / tapered perlite on 2-ply glass base and APP modified on 22 gauge metal deck. Roof structure slopes from the gym wall down the west wall of the north – south corridor and from the west exterior wall down to the same west corridor wall.

ROOF MAINTENANCE DISCUSSIONS:

Discussions with the roofing maintenance contractor noted that multiple repairs have been made over the past few years in an attempt to discover, isolate and repair the roofing leaks. ATS&R was provided with copies of the repair invoices beginning in 2013. Maintenance has consisted of roofing repairs with cotton reinforcement fabric and roofing cement, caulk of various roof vents, skylights and roof coping joints, and patch of open, cracked or split roof material including leaks at previous repairs. An area of approximately 700 sf in the south portion of roof 1 above the corridor where the existing roofing and insulation was removed to the vapor barrier and new insulation and bitumen membrane installed in the late spring / early summer of 2014. Below this area there are some leaks currently occurring at both the corridor and room sides of the corridor wall.

Areas around roof drains at the front vestibule, by Room 121 and by the north end of the corridor have been patched. The north end roof drain sump does not appear to be leaking after previous repairs.

OBSERVATIONS:

Vestibule / Reception:

There is stained drywall ceiling and water stains on the west wall of the entry vestibule. There is a related stain directly opposite the vestibule water stain on the reception/secretary side of the wall at the ceiling and a water stain down the wall from the ceiling. (Photos 1, 2)

Observation was made above the corridor ceiling at the vestibule door. There is a roof drain just south of the interior vestibule doors that exhibits water stains on the pipe and on the pipe insulation. There is significant evidence of water leaking on the wall, vestibule wall insulation and on the roof drain pipe insulation which is falling off the pipe. (Photos 3, 4). Repairs have been made by the maintenance roofer including the re-setting of the roof drain into new roofing at the area drain at the roof drain. It is

believed that a plumber has not been contacted to check the roof drain and rainwater leader piping connections.

The intervening vestibule stud wall above the corridor ceiling, coupled with the data cables on the ceiling at the wall prevents physical touch of the insulation to see if it is wet.

A related water stain is on the secretary side of the wall to the vestibule and south of the wall mounted technology rack. Above ceiling observation shows water from around the roof drain pan / from the roofing felts has dropped onto the top of the wall between vestibule and secretary and staining both sides of the wall. (Photos 5, 6).

There is a water stain at the southeast corner of the reception/secretary room. (Photo 7) The stained acoustic ceiling tile could not be removed to observe this stain. Repairs of the corner of the parapet above this area have been reported to have been made. This location is adjacent to the vestibule roof drain but is a bit southwest and outside of the location of the roof drain sump pan. The above ceiling observation reveals significant stain of the wall directly above the ceiling at this location. (Photo 8) The stain appears to be coming out of the deck flute at the exterior wall intersection of the east-west exterior wall of the office and the north-south exterior wall of the vestibule. The exterior wall at this corner was observed and the parapet walls above were also examined. Another observation may be in order. Several layers of caulking attempts on the wall and the parapet are visible. However, there are not self-evident leaks at these locations.

There is stained ceiling tile adjacent to the wall mounted technology rack in the reception/secretary room. (Photo 9) This rack is mounted to the vestibule wall but is north of the interior vestibule doors and is not directly adjacent to the observed stain in the vestibule. There is an unused conduit above this area with a weatherhead on the end of the conduit above the roof. The conduit weatherhead appears to be dry and the leak appears to be from water in the roofing system coming out around the conduit penetration or hole(s) in the metal deck and / or roofing above. (Photo 10)

Classroom 118 / Corridor:

Water stains are evident on the corridor side and the classroom side of the wall of Room 118. (Photo 11 corridor), (Photo 12 classroom)

At the classroom side of the building, the west wall roof coping from the southwest corner of the building to about the location of the gas pipe on the roof has open joints. Moisture could be entering the roof edge and following the sloped joist down to the flutes of the deck or on top of the vapor barrier to an open deck lap or hole in the vapor barrier to the classroom side of the wall.

There are water stains on the ceiling grid and the above ceiling ductwork insulation above the door from the corridor. (Photo 13)

At the corridor side of room 118 there are water stains are visible at two locations adjacent to the corridor door to 118. One is due to water dripping from the roof deck and one where water is dripping from the roof joist which slopes down to the corridor wall from the gym wall to the east. The relief vent drip pan in the corridor was examined and there is no current evidence of water standing in the pan or leaking from the pan. This relief vent hood has been caulked at the exterior above the roof and the base flashing repaired in the past.

Note that the east and west roof joists do not directly line up at the corridor wall so moisture from one side may not be crossing to the west side and may be an indication of separate roof leaks.

Corridor by Classroom 121:

There is a small water stain by the roof drain at the corridor side of Room 121. This could be from the roof drain above or from the roof joist above which slopes down to this corridor wall from the east side of the roof.

Roof / Exterior Wall:

There are no self-evident leak points visible on the roofing.

There are some suspect areas to be addressed:

- West wall roof coping with apparent open seams. (Photo 14)
- Roof drain sump above the front entry vestibule and at the surrounding area including the area of the conduit penetration.
- Roof cap / wall construction at the intersection of the vestibule and office wall to be water pressure tested for leaking through the wall. Southwest roof coping intersection to be caulked weathertight. (Photo 15)
- Blister which may have water or air in it at the south wall adjacent to the roof drain / conduit penetrations. (Photo 16)
- Potential opening of seams at the perimeter of the roofing replacement around the roof drain, relief vent at the corridor and at room B118. (Photo 17)
- Soft area by exhaust fan serving office changing room / toilet. (Photo 18)

RECOMMENDATIONS:

Step 1 / Option 1: Determine Extent of Moisture in the Roofing System

- Because the roof slopes down from the west wall and from the gym wall to the corridor wall confirmation of extent of water in the system is needed.
 - Within two days of a major rain event, perform either infrared analysis or have test cuts taken to check for location of water in the system. Take test cuts at the 15' on center along the north south (west) corridor wall from the vestibule roof drain to the west end

of Room 121 and then 10' out to the west and east on the same 15' on center and then again until water is no longer found in the system.

- The extent of where water is found is the indicator that the water entering the building is within the perimeter of the dry system and an indicator of the extent of roofing replacement that could be performed
- Estimated Moisture Extent Project Cost: \$ 5,000

Option 2: Repair apparent and suspect roofing conditions

- Request plumber to examine the vestibule roof drain bell and pipe to confirm it is not leaking. If it is leaking then replace the drywall vestibule ceiling with lay-in vinyl faced drywall tile ceiling and replace roof drain / reinsulate piping, replace roof drain pan and replace roofing to the vapor barrier on the deck to a minimum distance of 4' around the roof drain and create a new roof drain sump from tapered insulation. If water is found in the existing roofing system, then extend roofing replacement out to the extent where moisture is no longer discovered in the system.
- Cover and caulk the pre-finished cap joints on the south parapet walls and the west wall of the canopy including the vertical joints
- Cover and caulk the pre-finished cap joints on the west walls including the vertical joints
- Repair blister /soft area at the south wall southwest of the vestibule roof drain
- Repair soft areas by exhaust fan serving office changing room / toilet
- Patch seams of roof replacement above corridor to existing roofing by stripping new roofing felts into the existing felts instead of the reinforced cotton fabric and roofing cement previously employed.
- Estimated Roof / Plumbing Repair Project Cost: \$ 14,000

Option 3: Partial Replacement of Roofing South of Room 121 with EPDM

- In lieu of repairs in Option 2, replace roofing and pre-finished metal cap flashing south of the west exterior exit from Room 121. Install a control joint from the wall at the exit to the point north of the gym wall and then south to the gym wall
- Estimated Partial Roof 1 Replacement Project Cost: \$ 156,000

Option 4: Replace Entire West Part of Building (Except Gym Roof)

- Replace west roof of the building with EPDM, provide additional tapered insulation thickness to meet current energy codes requirements, replace roof edge pre-finished metal cap flashing, replace rooftop relief vent, provide new curbs for rooftop equipment, removed unused roof penetrations and infill with metal deck and insulation
- Estimated Replace Roof 1 Project Cost: \$ 335,300
- Option 4A Add Replace Gym Roof 2 Estimated Project Cost: Add \$ 62,700
- Total Replace Original Building Roofing Estimated Project Cost: \$ 397,300

We recommend that, at a minimum, Options 1 and 2 should be performed. Depending on the extent of moisture found there may be a need to proceed with Option 3 instead of Option 2.

Additional items unrelated to the water intrusion of roof 1 are the following:

The newer boiler stack above the mechanical room is not guy wired to the roofing or walls to support it and to maintain it in a vertical position in a strong wind. The guy wires are present but are no longer fastened to the building or roofing. The boiler installer should be contacted to correct this installation by the district. (Photo 20)

Roof 2 skylights are leaking and the southeast skylight leaks the most. Because the water falls onto the gymnasium floor and presents a slipping hazard to students and staff in this activity area it is recommended that repairs be implemented at the earliest possible date. Re-caulk of the skylights to the frames and to the curbs is recommended.

Other areas of Roof 1 are exhibiting stress and recent repairs around the northern roof drain are of concern although a need for immediate repairs is not anticipated.

PHOTO APPENDIX:

INTERIOR PHOTOS:



Photo 1: Vestibule Ceiling / Wall



Photo 2: Vestibule Ceiling / Wall

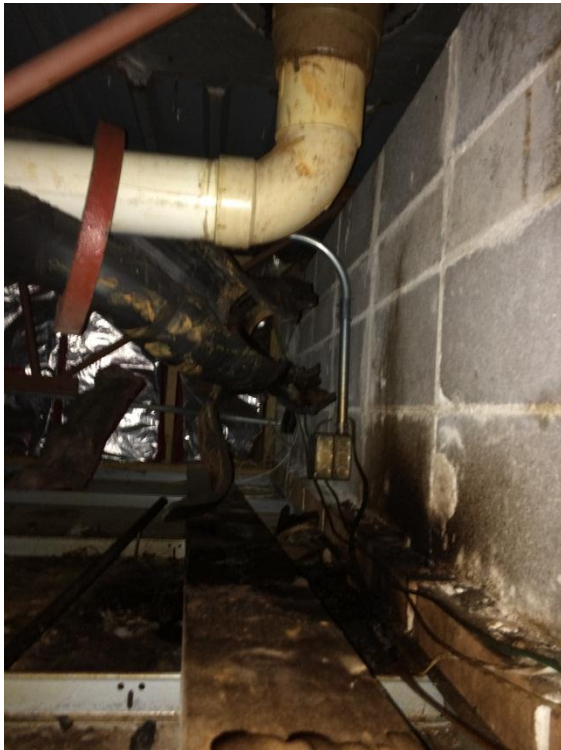


Photo 3: Above Vestibule



Photo 4: Above Vestibule



Photo 5: Wall – Secretary to Vestibule



Photo 6: Above Secretary to Vestibule



Photo 7: SE Corner Secretary

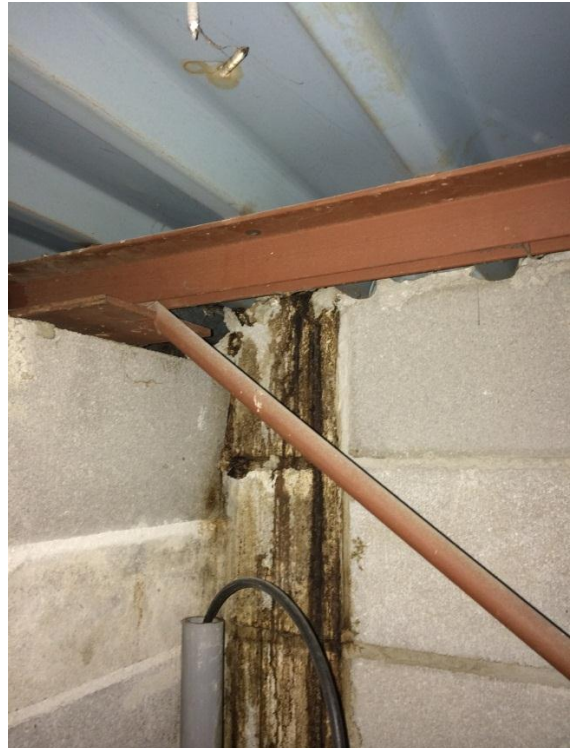


Photo 8: SE Secretary Above Ceiling



Photo 9: Stain by Technology Rack



Photo 10: Conduit Above The Ceiling Stain



Photo 11: Corridor by Room 118



Photo 12: Room 118 Corridor Wall



Photo 13: Room 118 Duct Insulation Stain

ROOF PHOTOS:



Looking South



Looking Southwest



Looking West



Looking Northwest



Looking North

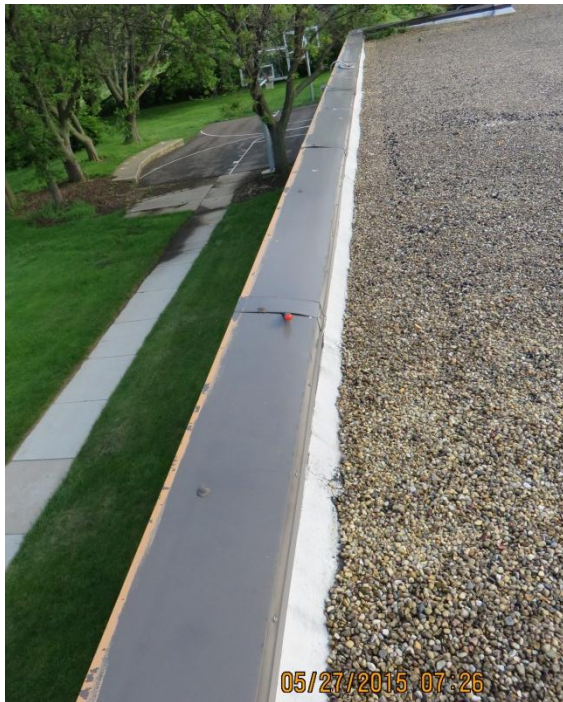


Photo 14: West Wall Roof Coping



Photo 15: SE Roof Coping Intersection



Photo 16: S Wall Blister By Vestibule Roof Drain



Photo 17: Vestibule Drain / Conduit Area

July 10, 2015



Photo 18: Roof Replacement Seam



Photo 19: Soft Area By Office Exhaust Fan



Photo 20: Unsupported Boiler Stack