Roof Evaluation of Margaret Batts Tobin Laboratory
The University of Texas At San Antonio
Performed for UTSA

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Project: Margaret Batts Tobin Laboratory
Owner: The University of Texas at San Antonio
Client: The University of Texas at San Antonio
Project Location: San Antonio, Texas
Architect: FKP Architects, Inc.
Construction Manager: Vaughn Construction
Date of Report: August 12, 2011
Report Author: Bill Coltzer, Jr., AIA, Principal
Texas Architect #14298
Services Performed: Visual Inspections
Water Infiltration Testing per AAMA 501.2.8
Infrared Thermography
The project is a single story laboratory building located on the campus of The University of Texas at San Antonio. Exterior building envelope specifics include:

- Building structure is comprised of a steel frame on a concrete foundation.
- Exterior walls are constructed of light gauge metal framing, sheathing, vapor barrier, masonry veneer and stucco. See photo number 1.
- Fenestrations are primarily aluminum framed punched windows. See photo number 1.
- Roof systems include a modified bitumen low slope roof surrounded by a standing seam metal panel roof installed over a solid deck. Low slope has numerous blisters and there is evidence of numerous patches. See photos number 10, 13 and 16 as well as IR photo number 3 on page 19. Standing seam metal roof is generally in a good state of repairs, with minor deterioration at low, leading edge conditions. See photos number 1, 2, 3 & 4.

User representatives report that while water infiltration has been observed during rain events, water infiltration has also been observed during periods when there has been no rainfall. At the time of our visit, there were three obvious areas of water infiltration that were identifiable by stained ceiling tiles. All three were in the corridor that runs east west under the low slope built up roof. There were also areas along the rise wall that separates the low slope roof from the metal standing seam roof (cat walk areas) where remedial efforts related to water infiltration were observed. See Photos 7, 8, 9 & 11.

End of Project Synopsis
In July of 2011, Zero/Six Consulting, LLC (ZSC) was commissioned to determine the sources of water infiltration experienced through the horizontal envelope of the Margaret Batts Tobin Laboratory on the campus of The University of Texas at San Antonio.

Processes utilized by ZSC to assist in the determination of water infiltration included:
- Interviewing users
- Review of original construction documentation
- Visual inspection of project site
- Water infiltration testing consistent with AAMA 501.2.8
- Thermal Imaging via infrared equipment

Although our study was not exhaustive, we can state with confidence that water infiltration experienced at the Tobin lab is the result of at least two separate issues.

The first issue is related to the maintenance of the Air Handling Units. Certain maintenance procedures require the use of water inside the unit as part of the cleaning process. Although the interior of these units include a floor drain, the floor does not slope to the drains and there are various penetrations through the floor. On July 26, 2011, ZSC was able to observe this process, and the results, first hand. Water from this process cannot only travel down penetrations into occupied space, but it can also travel on the concrete deck, below the roof system, damaging the roof system and causing blisters in the roofing membrane. See photos number 13 through 24.

The second issue has to do with penetrations through the rise wall that separates the low slope roof from the cat walk areas under the metal standing seam roof. The design of the rise wall is such that all penetrations (ducts, pipe, conduit, etc.) through the rise wall must be sealed behind the metal panel siding at the drainage plane, not the metal panels. Minimal water testing was conducted, but what was tested did produce water infiltration. See photos number 4 through 12.

A separate issue, but still related to the rise walls, is the manner in which the through wall flashing is terminated to the drainage plane behind the metal panel siding. Thermal imaging exposed possible breaches in the envelope (at the height of the through wall flashing). These breaches were later confirmed via the water testing process. See photo number 12 on page 11 and IR photo number 2 on page 18.

In short, water infiltration at the Tobin lab is the result of uncontrolled water within Air Handling Units and breaches in the building envelope at rise walls. The recommended next steps for remediation are outlined on the next page.

End of Executive Summary
- Review AHU operation and maintenance with maintenance staff and envelope consultant. It is important for the envelope consultant to understand how the unit works and how it is to be maintained so that the proper remedial plan with regard to water infiltration can be prepared.
- Remove enough metal siding to expose duct to drainage plane transitions and through wall flashing to drainage plane transitions. Approximately ten lineal feet in the correct location would suffice.
- Perform a nuclear study of roof to determine the existence or extent of moisture under the roof system. If roof proves to be dry, then uplift testing should be performed to ensure that the roof has not been damaged by previous water infiltration to the point that it would affect uplift. *Thermal imaging results combined with the numerous blisters observed, suggest that water is present under roof system.*
- Develop a remedial plan to repair roof, more completely seal the floors of AHU’s, seal penetrations through the floors of AHU’s and repair breaches in the envelope at rise walls.

End of Recommended Next Steps
Rooftop mechanical equipment is screened by metal roofing.

Metal roofing

Exterior View @ Entry

Metal panels are deteriorating at panel edge. Condensation was observed at joints.

Metal Roof Eave

Baffle is set in seal tape and roof pitch is such that water infiltration below is not associated with this detail.

Metal Roof Rake

UTSA Tobin Laboratory
Seal between ductwork and drainage plane behind metal panels is typically a concern. Water testing at similar conditions produced water infiltration.

Jacket around ductwork has been notched at steel support. See photo no. 6.

Water infiltration was observed in cat walk when water was applied to this area.
Water infiltration from water test.

Drywall removed prior to Zero/Six involvement.

Duct through Rise Wall
Area of water infiltration

Previously noted blister.

Area of previous water infiltration noted in photo no. 10

Water infiltration observed during water testing of through wall/counter flashing.
Area of roof leak below (water testing of roof drain did not produce water infiltration).

Roof blister

Drain noted in photo no. 13.
Water damaged insulation on roof drain leader.

Water damaged insulation on piping.
Water damaged ceiling tiles.
Ductwork shown in photo no. 14 is concealed within this unit.

Roof blister

Wet and rusty metal from water infiltration related to unit above.

Water damaged ceiling tile.
Piping shown in photo no. 20 is concealed within this unit.

Water damaged insulation at piping.

Water stained piping related to unit above.

Water damaged ceiling tile.
Penetration pocket is not sealed to floor, it is just tack welded.

Water standing on floor from maintenance activities.

Floor drain serves as a sink for condensate lines and emergency drains. Floor does not slope to drain.

Hole in floor of AHU.
| Conditioned Air Outlet | 25 |

Dampers have been (typically) closed off at cat walks.
Piping shown in photo no. 20 is concealed within this unit.

North of AHU (east) 1

Thermal shorts at through wall flashing

Through Wall Flashing 2
Assumed patch at roof core.

Thermal shorts through AHU walls

Through Wall Flashing
SECTION DETAIL—DUCT THROUGH RISE WALL

CONCEPT ONLY—NOT FOR CONSTRUCTION
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Texas Architect #14298
End of Report

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