

# Construction Defects

## A “Net Zero” Educational Facility Gets a Big Repair

### The Project

The project was a 13,500 square foot educational facility in the Pacific Northwest designed as a “Net Zero” building, meaning it generates as much energy as it consumes. It was certified LEED Platinum (the highest level) and won numerous design awards. The walls and roof were built using structural insulated panels (SIPs), which consist of an insulating foam core sandwiched between two structural facings, typically (and in this case) oriented strand board (OSB). The exterior envelope was dominated by storefront windows and doors, metal panels, aluminum curtain wall, brick, built-up roofing, and standing seam metal roof. The original project cost \$7.2 million (\$533/SF which is about double the national average) and was completed in 2011.

### The Problem

Due to excessive moisture in, and damage to, the SIP system at the roof, the Owner, replaced the entire assembly in 2015 at a cost of \$3 million (another \$222/SF). Unfortunately for all involved, the operation and maintenance personnel warned everyone involved that they believed use of the SIPs was going to end in a tragedy similar to what ultimately came to be.

### The Solution

PFCS represented the trade contractor who installed the membrane roofing system in the area that was damaged and being replaced. PFCS prepared a preliminary report in January 2017 and a final report in May 2017. We concluded that the damage was caused by a handful of primary failures including:

1. The SIPs were mishandled during construction, allowing them to get wet during storage on-site and during the wet winter installation. In addition to other materials in the assembly, the SIPs then had peel & stick membrane applied over the top surface, which inhibited drying potential of the engineered and sawn wood material, that was wet from construction. This combination alone may have been enough to cause the damage that ultimately manifest.
2. The installation of the SIPs was defective and did not allow the joints to be properly sealed, as required by the manufacturer. These joints became a location of damage on the top side of the SIPs, where warm moist air from the conditioned space below was able to migrate from the interior through the system and condense on the underside of the cold membrane roof system, installed by our client.
3. The relative humidity inside the facility was too high, contributing to the volume of moisture in the warm, wet air that migrated through the roof system and condensed on the underside of the cold, membrane roof system. PFCS argued successfully that none of the causes and none of the damage was, in any way related to the membrane roofing installer, and they were dismissed from the litigation.



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