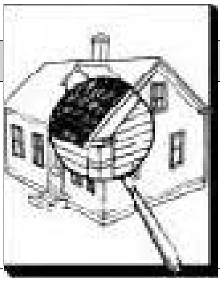
CASE IN POINT



Commercial Calamities

by William Lotz

Commercial calamities can happen to anyone. Here are a few I've run into.

Sugar-Cane Deck

The New Hampshire school was built in 1965 with a Tectum or Insul-Rock type structural deck on bar joists. The BUR (built-up roof) was applied directly to the deck. The deck is made from compressed bagasse (sugar-cane stalks) mixed with a cement-type binder. The deck is approximately 2½ inches thick and in addition to its structural properties, has accoustical properties and an R-value of about 4.5. This product is made by at least two manufacturers and has been especially popular for use in schools and motels.

This type of deck is frequently left exposed on the interior as it makes a nice looking ceiling. In this particular school, there was a suspended acoustical board ceiling. At some point in the 1970s the school added a backfill of fiberglass batts.

With this type of construction, there is no vapor barrier. The bagasse acts like a sponge all winter and soaks up the condensation that naturally will occur in the material. In the spring, the sun warms the BUR and vaporizes the moisture in the deck, hence, drying it out. After 22 years, the cement-like binder holding the bagasse stalks together turned to powder, as a result of the constant wet-dry cycling. The structural deck was no longer structural. The deck panels resembled slices of baled hay. They sagged. After a ram, one panel fell out, the BUR split, and water poured into the classroom. The photo shows the ponded water on the roof where the panels sag between the bar joists.

We recommended to the School Board that they remove the existing BUR and deck and install a new steel deck, vapor barrier, tapered roof insulation, and a new single-ply roof system at a cost of $10 per square foot. This failure demonstrates the need for a vapor barrier in the roof.

Damaged by winter condensation, the Tectum deck on this New Hampshire roof has sagged between the bar joists. Ponded water now collects in the depressed areas.

Leaky Washer

This warehouse was built in Maine 1980, is approximately 100 x 100-feet, and is of classic metal building construction. The roof was 24-feet high at the ridge and 16 feet at the eave. The fiberglass insulation had a VRF (vinyl-reinforced-foil) facer which looks good, has an excellent perm rate, and an excellent fire rating.

The roof had "leaked" at the eave on the North side (over the offices). The owner received a quote of $54,000 for a new roof. The owner assumed that the leaks were caused by ice back-up.

The owner called me at the eleventh hour just before signing a contract for a new roof. The acoustical ceiling and the carpet at the eave were a mess. I cut into the roof insulation in several areas at the eave and couldn't find any stains or other evidence that water was entering. The fiberglass, however, was soaked with water. Another cut into the roof insulation at the mid-point, revealed evidence of water flowing past this location. Cuts at the ridge showed several signs of leaks. I told the owner that the problem was not ice back-up but a faulty neoprene gasket at the ridge. He expressed "considerable disbelief" in my analysis. He arranged for 200 feet of water hose and we went up onto the roof with the hose. Needless to say, we couldn't make the roof leak anywhere except at the faulty ridge gasket.

A new ridge gasket cost less than $1,000 so the owner saved quite a few dollars. Over the past seven years, the water flowing down the insulation facer from the ridge had corroded the thin foil. Since the facer had lost its vapor-barrier rating, I specified a new layer of facer material.

A Sick Hospital

The eight-story, 500-bed Iowa hospital was completed in the fall of 1982. In February of 1983, the hospital engineer took a photo of the ice on the exterior of the brick (see next page).

The building was *covered* with ice. Hospitals must be humidified to 30 to 50 percent relative humidity by code. There was a 1½-inch air space between the bricks and the gypsum sheathing. Then—moving inward—there were steel studs with 6-inch fiberglass batts, foil-backed drywall, and paint. Every few feet, there was a steel angle connecting the steel structure to the bricks.

The architect had specified: "tape the joints on the foil side of the foil-backed sheetrock." I have yet to find anyone—including the contractor on the hospital job—who knows how to do this. Everywhere the steel angles penetrated the "vapor barrier" (that is, foil-backed sheetrock) there was another hole. There was no attempt to vapor seal the connection of the foil-backed sheetrock to the ceiling or floor or to the large wide-flange steel columns. The net result was a very "holey" vapor barrier.

The air in the hospital is moist, and the humidity condenses on the gypsum sheathing and on the bricks. The result: The sheathing has severely deteriorated, the steel ties are rusting, and the brick exterior is cracking. Eventually the brick will deteriorate from the constant wetness.

The repair will cost millions of dollars. Foil-backed drywall does not function as a vapor barrier in this type of building due to all of the joints and holes. At present, two repairs are being studied—adding an exterior Dryvit insulation system to the outside of the brick, or removing the brick, installing a vapor barrier and rebricking. The designers and builders are being sued for millions.

Ice on the walls of this hospital are a symptom of the multi-million dollar damage caused by a defective vapor barrier. The brick veneer, gypsum sheathing, and steel ties are all deteriorating from constant wetness.

Hot and Cold

The office in Maine consisted of an old two-story building connected to a new single-story ell, which was about 4 feet below the level of the floor in the main building. On the second story is the president's office with lots of east-facing glass. The HVAC contractor negotiated a design-build price that was rather tight. The contractor designed the heating and air-conditioning system using a single thermostat—single-zone equipment with flexible duct snaked around the building delivering air through ceiling grilles. The workers in the office were cold in the winter and hot in the summer. A lawsuit was filed. What was wrong? I found a variety of problems. The owner did not install the insulation R-values that they quoted to the HVAC contractor. The equipment hence had, at best, marginal Btu capacity The flexible duct—up to 50 feet long—provided more resistance and less airflow than planned.

To make matters worse, the owner set back the thermostat at night in the ell where a concrete slab-on-grade existed. The thermostat was turned up at 8:00 A.M. and it was near noon before the cold concrete floor warmed up again. While the ell was too cold, the President's east-facing, glassed office was overheated. There was no way a single-zone system could work in this three-level building. Someone was always too hot or too cold.

A completely redesigned HVAC system is being negotiated.

In Sum

There's probably no way to avoid every possible problem that a complex commercial building presents. But to start with; make sure the specs comply with good building practice, and that you follow them. ■

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