Dallas–Ft. Worth: "THE HAIL BELT"

By Keith Simmons, RRO

Hailstorm losses in the U.S. exceeded $924 million in 2010, according to the National Oceanic and Atmospheric Administration.[1] For the second year in a row, the Dallas-Ft. Worth area suffered a severe hailstorm in June 2012. Damage estimates predict the first billion-dollar loss to the insurance companies in a single hailstorm event, reported the Insurance Council of Texas.[2] "This will be up there in the rankings of Dallas's worst hailstorm in ten years," said Nick Hampshire with the National Weather Service.[3]

Massive amounts of roof damage assessments were produced overnight, while some were still performing work from the previous year's storm. Catastrophic losses of this order of magnitude present the opportunity to evaluate the performance of different roofing systems to impact resistance in a central location. The largest hail was centered in the Lakewood area of Dallas. Tile roofs on historic Swiss Avenue were completely destroyed, as well as thousands of automobiles and even the greens on the Lakewood Country Club.

Photo 1 – Damage to exhaust fan at modified bitumen roof system.

LOW-SLOPE ROOFING

Some steep- and low-slope roofs will show all of the damage from hail immediately, although TPO and PVC roof membranes do not reveal all of the damage instantly. Pockmarking with the loss of granules and asphalt-top coating is easily visible the day the damage occurs on asphalt shingles and modified-bitumen cap sheets. Damage to PVC and TPO membranes underneath the weathering side of the scrim will not breach the top of the sheet promptly. Differential movement and thermal cycles will need to take their course for the damage to surface visually.[4] If the building owner initiates a claim and the adjuster inspects the roof immediately, a complete assessment of the hail damage is not possible.

PVC roof membranes have improved from the thin-profiled membranes of the '80s but are still performing poorly for impact resistance. ASTM Subcommittee D08.18 is currently working on a revision for ASTM Standard D6878 titled *Standard Specification for Thermoplastic Polyolefin-Based Sheet Roofing*. The new standard would ensure that the added thickness would include more polymeric coating on

Photo 2 – Aggregate-surfaced BUR and modified-bitumen comparison.

Photo 3 – Hail damage to modified roof system.

Photo 4 – Damage to exhaust fan at aggregate surfaced BUR.

the weathering side of the TPO sheet.[5] Consideration should be given for a similar proposal for PVC roofing membranes.

From observing damage to low-slope roofs, it is apparent that aggregate-surfaced BUR and ballasted single-ply roofs performed best in the worst-hit areas. The heavy flood coat of asphalt and gravel ballast protects the underlying plies of fiberglass felts in BUR roofs against large hail. The presence of the large ballast stones above the EPDM membrane presents a hard "line of defense" from the attacking hail. On a strip center in the hardest-hit area, a white granule-surfaced modified-bitumen roof system showed thousands of pocked marks, while the aggregate-surfaced BUR roof adjacent to the white granule-surfaced modified-bitumen roof showed no signs of damage to the field of the roof. All mechanical equipment revealed equivalent damage, and only minor damage was observed to the wall and curb flashings of the aggregate-surfaced BUR roof (*Figures 1*, *2*, *3*, and *4*).

Fully adhered EPDM membranes have historically performed well for impact resistance in test laboratories conducted by the EPDM Roofing Association, National Institute of Standards and Technology, Underwriters Laboratory, Factory Mutual, and ASTM. Using either steel darts or ice spheres, 60-mil field-aged EPDM samples were not damaged in 96% of the testing when impacted with 3-in. hail balls.[6] With the attention of owners drawn towards "cool roofing," it's difficult to find a black EPDM roof to observe in this area following a hail event. RICOWI did not observe any black EPDM membranes in its 2011 investigation.

Impact resistance can be improved by installing a more rigid cover board with a higher compressive strength. The conven-

Photo 5 – Damage to copper standing seam.

Photo 6 – Damage to concrete tile.

tional perlite cover board on hot asphalt-applied roofing transfers the impact throughout the roof assembly. A few manufacturers of modified-bitumen roofing offer a sheet with a 180-gram polyester or fiberglass scrim. The enhanced sheet, in a two-ply application on top of a rigid cover board, creates a dynamic puncture resistance that can be covered under some manufacturers' warranties for up to 4-in. hail.

STEEP-SLOPE ROOFING

The frequency of large hail events in the Dallas-Ft. Worth area is alarming. Roofs in areas of Coppell, Texas, were totaled by hail two years in a row, after being reroofed in 2003 following hail damage. That's three roof replacements in nine years, and concerns have been raised about the integrity of the decking being compromised from the repeated damage from shingle and underlayment removal. Many track housing and apartment complexes in this region have 3/8-in. plywood decking. The thin decking—coupled with standard fiberglass-impregnated shingles—are a poor roof assembly, given the repeated hailstorms in the area.

RICOWI has yet to complete this year's report, although the 2011 Report #1 showed superior performance of modified-bitumen shingles. State Farm offers a 21-25% discount on premiums to homeowners who install impact-resistance (IR) class 4 shingles conforming to UL 2218. Hailstones of 0.25 in. to 2.5 in. diameter revealed surface impact marks without fractures or minimal damage on 75% of the IR roofs observed in the RICOWI 2011 hail investigation. Standard fiberglass-impregnated asphalt shingles showed moderate to severe damage with hailstones 1.25 in. or larger in 93% of the observations conducted by RICOWI in 2011.[7]

Stone-coated steel performs well, with hailstones up to 2.5 in. causing no apparent damage. Similar results have been reported with synthetic slate (shingles) and up to 2-in. hail, and metal roofs uniformly "dimple," causing a more aesthetic issue than a waterproofing problem (*Figure 5*). Concrete and clay tile fare well overall, with 2-in. hail causing only a few broken tiles; however, the slate and tile roofs in the Lakewood area were beat to small pieces from 4-in. hail (*Figure 6*). All the roofs were immediately covered with tarps.

ECONOMIC AND ENVIRONMENTAL IMPACT

The economic impact of a hailstorm is extremely beneficial to numerous trades, services, and manufacturing. Supply houses add warehouse, sales, and delivery personnel. Roofing manufacturing plants add a second or maybe a third shift. Deposits in the local banks soar, as do truck sales. (If only politicians could take credit for the sudden jobs created by inclement weather, they might get reelected every year.)

Although the economic impact to some trades may be beneficial, there is a downside. In the chaos, unscrupulous start-up contractors and scam artists converge on the public. White-collar thieves have collected insurance checks and disappeared, leaving homeowners with no roofs or funds to replace them. Others have received sloppy workmanship that does not reveal itself until heavy rains months later. Few mandatory roof inspections are performed in any

municipality in North Texas on residential roofs. How can this industry go unchecked? Professional roofing contractors belonging to the Roofing Contractors Association of Texas (RCAT) have taken the liberty of instituting a registration of their membership in an attempt to bring stability and to educate the public without governmental involvement. The United Association of Storm Restoration Contractors is a nonprofit organization dedicated to informing homeowners in order to prevent contractor fraud.

Another downside to the economic impact is the obvious increase in insurance premiums. In recent years, insurance companies have raised deductibles dramatically in hail-prone areas to combat losses.

As for the environmental impact of past error and waste in the industry, look in the landfills. There are several companies in the Dallas-Ft. Worth area offering the service of recycling of asphalt shingles. Manufacturer sponsorship, along with contractor participation, is vital to promote the responsible disposal of asphalt roofing products. Savvy contractors should showcase the recycling of the roofing debris in their bids to homeowners. Roof consultants should consider including recycling in specifications.

Not all roof coverings are included in this article, just the roofs this author encountered during the 2012 Dallas-Ft. Worth hailstorm. When specifying a roof system in this region, it would be prudent to consider impact resistance along with all the factors it takes to design a successful roofing system.

REFERENCES

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