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WAVE ENERGY RETROFIT INCENTIVES ELECTRICITY LOAD REDUCTION BONUSES

Roof Retrofit Minimizes Waste, Maximizes Performance

Revised Specifications Achieve Owners' Objectives and Cost Savings

By Tom Shreeve



The implications of the proposed drain installations – with concrete coring through the deck, coupled with disruptions to the interior space for the installation of the lateral lines – were problematic. The costs would be high, and the new system, although fully tapered, would not guarantee the elimination of standing water on the roof due to normal structural settlement in the deck.

WORKABLE ALTERNATIVE

The contractor's competitive bid led to further exploration of how to meet the design goals. The R-value of a suggested optional system was approximately double that of the specified conventional replacement system.

Lightweight insulating concrete has been used for a number of years in Canada, having originally been developed in the United States. It allows for

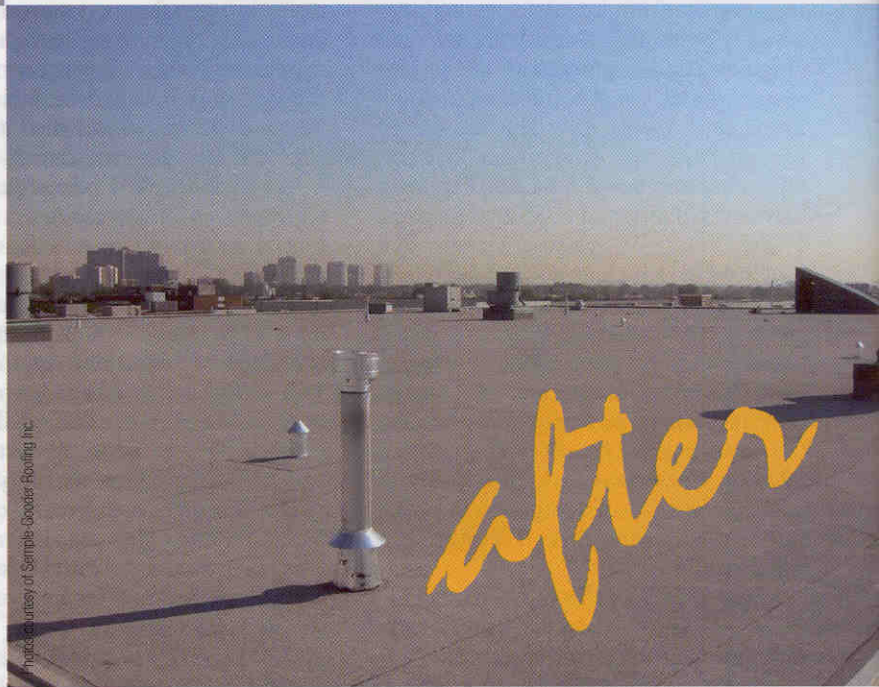
EARLY IN 2003, Ontario Power Generation Inc. budgeted for the replacement of a warehouse roof covering 136,000 square feet of building space at its Kipling Complex in the west end of Toronto. Numerous leaks had developed on the existing 30-year-old built-up roofing assembly, causing ongoing problems, and the owner was considering vacating the building and offering it for lease.

Design factors were established with priorities established:

- eliminating standing water on the roof,
- energy conservation matching or increasing the thermal resistance (R-value) of the roof assembly;
- minimizing disruptions to the occupants; and
- developing a long term serviceable trouble-free roof.

The original precast tee structural deck had settled over time with ponded water evident in many locations. The original roof was not sloped to drains – something common to the vast majority of flat roof construction in Ontario today.

The new assembly had to match or exceed the original in terms of R-value and provide a trouble-free roof for years to come. OPG called for tenders on a design proposal to double the roof drains from 12 to 24 to assist a fully sloped roofing system, along with interior drain laterals that would be tied into the existing drainage system. It also stipulated that the existing roof, containing moisture where leakage had occurred, would be removed and disposed of in its entirety to ensure that the new system would provide the anticipated performance for its complete service life of some 20 years or so.



flexibility in accommodating existing drain locations and settled structures, to achieve a completely sloped to drain assembly, with no residual standing water on the roof. With this option, the requirement to add additional drains was discarded, eliminating disruptions and construction to the interior operations of the building.

The contractors also advocated a thermal scan to identify and replace only the existing wet insulation, reusing the sound insulation, and installing the lightweight insulated concrete assembly. The option achieved success in eliminating standing water on the roof, as well as substantially reducing impacts on landfill.

A professional engineer assessed the weight and determined that loose gravel had to be removed from the existing assembly to accommodate the

additional weight of the new system. A modified roofing assembly was chosen to enhance the weight issue, as well as providing the owner with a longer-term 20-year warranty – something that was not part of the original design criteria. As well, the membrane colour was chosen in light gray to enhance reflectivity.

The cost of the alternative system was more economical when compared with the roofing and plumbing alterations that

were part of the original bid. Cost savings of 10% of the tendered conventional savings were realized, bringing the project in well under budgeted costs.

Pumping the mixed lightweight concrete the 40-foot height of the building was not an issue, as the material can be pumped some 400 feet vertically without concerns. Some alterations were undertaken to accommodate the thickness of the system at the perimeter, ensuring that

proper design criteria of standard trade practice for roofing membranes was met.

SUSTAINABLE RESULTS

Don Lewis, Facility Manager for Ontario Power Generation, notes that OPG's ongoing commitment to energy conservation, coupled with the opportunity to reuse the existing insulation made this approach appealing. Bill Gray, General Sales Manager at Semple-Gooder Roofing Limited, confirms that a total of 517 metric tonnes was kept out of landfill as a result of this system.

Additionally, the life cycle replacement of the roof will necessitate only the installation of a new cap sheet to the top of the existing modified roofing assembly. This means future saving of landfill capacity and dramatically reduced costs for replacement of the roofing assembly.

An important side benefit, according to Lewis, was that the integrity of the roof was maintained continually throughout the process so the interior of the building was never at risk of water infiltration during the removal/replacement operation. This meant peace of mind for concerns about valued equipment and product in the building.

Doubled thermal value and a long warranty were a bonus, as the optional system also resulted in a saving to the owner of some 10% of the tendered original system. These items were not even considered as part of the original design criteria.

Today, the new roofing assembly is performing well, exceeding all of the original design requirements. There have been no callbacks for leakage. As the roofing consultant involved satisfactorily noted: "No news is good news".

The improved R-value has led to more consistent inside temperatures, particularly in the summer months, as the building is not air-conditioned. Energy costs are down, resulting in an ongoing saving. The new roofing assembly was also a positive factor in OPG successfully leasing the building on a long-term basis following completion of the work. ■



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