Re-roofing design considerations

There are several design aspects to be considered during re-roofing that may affect the serviceability of a newly installed roof system including structural loading, roof deck condition, roof drainage and hazardous materials.

It is the responsibility of building owners to obtain the advice of experienced professionals, particularly a structural engineer or other professionals that are familiar with the implications of roof replacement.

Structural loading

The design loads for the original building and roof structure may change as the result of changes to the type of roof system or any roofing component or addition of rooftop equipment. The roof deck and underlying structural members support both the roofing components and rooftop equipment, such as heating/air conditioning units.

A change in the entire roof system or even an individual component could impose different loads than the original structure was designed for. Converting an existing built-up roof system to a ballasted roof system or a protected membrane system could have significant structural implications to the roof structure.

The existing structure must also be reviewed when new rooftop equipment is to be installed on an existing roof deck. A review of the structure, particularly at the openings, must be completed to determine if the existing structure has sufficient capacity to accommodate the new equipment. Additional structural members may have to be installed to accommodate new equipment.

The addition of new materials and/or equipment can impose different loads than the original structure was designed for. Therefore, it is important that loading conditions be evaluated.

Deck condition

Roof decks that have been subjected to accumulated water due to infiltration or condensation may exhibit damage or deterioration that could reduce the structural integrity of the deck. A review of the surface of the existing roof deck should be completed by a qualified professional. A roof deck inspection should also include a review of the underside of the deck where visible and accessible.

Damage or deterioration may require further review by a structural engineer such as:

- corrosion of a steel deck,
- delamination and/or spalling of a concrete deck, or
- damage or rotting of a wood deck.

The cost to complete deck repairs and/or replacement may not be part of the original project.

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Roof slope and drainage

Roofs are meant to shed water not hold water. Standing water on the roof surface increases the risk of leakage and decreases the expected service life of the roof membrane. Therefore, roofs must be properly sloped, either by a sloped deck or insulation and contain an adequate number of drains and scuppers.

Effective drainage relies on both an adequate number of drains and adequate slope to the drains. Drains, even if numerous, are inadequate if they are located at a high point on the roof or obstructed by rooftop equipment.

Roof slopes must be considered when a roofing system is changed. This is particularly important when changing from a conventional roof system to a protected membrane system. An existing conventional roof that has relied on tapered insulation to provide an adequate slope to roof drains/scuppers is limited by the slope of the roof deck. In a protected roof system, the waterproofing membrane is installed below insulation and effective drainage relies on the slope of the roof deck. If the existing roof deck was not originally designed to slope, it could result in ponded water when a different roof system is installed without the necessary considerations to allow for proper drainage.

Depending on the type of surface cover, an existing roof surface may hide minor areas of ponding water that may become evident when the roof system is replaced. When replacing a gravel surfaced roof with a lower profile surface such as granule surfaced modified bitumen or smooth surfaced membranes, bird bath ponding may become more evident. Bird bath ponding can be defined as shallow areas where attempts at correction usually result with the bird bath being displaced to an adjacent area. It has been our experience that this type of bird bath ponding is minor ponding and does not have a detrimental effect on the new membrane. As opposed to "water ponding" which can be defined as the excessive accumulation of water that remains on a roof 48 to 72 hours under conditions conducive to drying.

Hazardous materials

Building owners or property managers are responsible to ensure that all necessary maintenance and environmental assessments have been completed. These assessments would identify the presence of hazardous materials including asbestos in roofing or other materials. The roofing contractor should be advised as to the presence and location of any hazardous materials at the time of project tendering such that roof replacement can be completed in a safe manner.

Undertaking roof replacement represents an opportunity to protect and enhance a building. A building owner should obtain the advice of experienced professionals, particularly a structural engineer or other professionals, that are familiar with the implications of roof replacement to ensure that the structural and serviceability of the roof system and entire building is maintained.

the roofing information contained herein or the consequences of any interpretation which the reader may take from such information.