Planning a Roof Replacement -
A Consultant's Guide to Reroofing Evaluation and Design

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Introduction

Roofs are an integral component of the building enclosure. They are the first line of defense against water intrusion into a building and are also typically the most exposed element of the building. Roofs are often tasked with managing the largest volume of rainwater on a building, experience the greatest degree of thermal changes in the building enclosure, and are required to perform for 20 years or more without interruption. As you can see, the roof is the workhorse of the whole building envelope. Why then do roofs often receive the least amount of attention when it comes to evaluating and designing a proper building envelope system? Too often, installing a new roof or replacing an existing roof is not done by a professional. When things go wrong, it is the building owner, management team, and occupants who suffer the headaches.

Where to Start

Approximately 75 percent of all new roofs occur in reroofing applications. When a new roof is needed on an existing building, two general reroofing options exist. The first would be to completely remove all of the existing roofing materials to expose the structural roof deck and install all new materials. This is known as a roof replacement. The second option would be to keep the original roof in place and install a new roof over the existing one, known as a roof re-cover. So which of these options is right for you? Well, both of these roof options first require an evaluation of the existing conditions along with a basic understanding of structure and general knowledge of the building codes. These are necessary in order to properly diagnose each specific circumstance and identify what can and cannot be done with regard to choices involving roof replacement, roof re-cover, and even roofing repairs. Determining a plan of action and identifying the right questions to ask frequently involves checking the building code requirements and performance issues as well as making informed cost considerations. There are many different types of roofing products available, and nearly an infinite number of building configurations and conditions. When it comes to reroofing, decisions and choices that you make matter, and certainly one size does not fit all.

Engaging a Registered Roof Consultant (RRC) or licensed design professional is often a prudent approach to beginning a roof replacement or re-cover project. However, when a building owner is faced with replacing a roof, calling a roofing contractor first seems to be the trend. After all, contractors will be installing the new roof, so they must know best, right? While there are many qualified roofing contractors, there is a lot more to replacing a roof than simply hiring a contractor, installing a new roof membrane, and obtaining a manufacturer's warranty. When a Registered Roof Consultant or licensed design professional is not involved, little effort may be made by the contractor to objectively assess the existing conditions so that an appropriate reroofing solution can be achieved. When a Registered Roof Consultant or design professional is involved, he or she can help navigate the potential options and solutions and work with building owners to provide impartial, unbiased, customized professional advice on the practical options for reroofing and repairs.

Evaluating Existing Conditions

In order to effectively install a new roof system, a thorough assessment of the existing conditions must be performed prior to any replacement or re-cover application. There are several factors to consider, including:

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- Drainage Requirements - Building codes establish minimum drainage slope to promote positive drainage and reduce ponding water. Roofs that pond water can lead to water intrusion and premature failure of the roof system. Having overflow drainage provisions in the event that the primary drainage system is clogged is often times equally as important. Structural failures or collapses, sometimes catastrophic, can ensue if drainage is not effectively designed and managed.
- Entrapped Water - Recovering an existing roof that ponds water or contains entrapped wet insulation is always detrimental to a new roof system and is not permitted by code.
- Structural Roof Deck and Substrate Conditions - The conditions present at the roof deck or on the existing roof surface may not be a suitable substrate for the application of a new roof system. Repairs to the existing roof deck or preparation of the existing roof substrate are often necessary as part of a reroofing project. In fact, the 2015 International Building Code, which will soon be adopted in the state of Georgia, contains provisions requiring certain aspects of the existing roof deck structure to be evaluated by a licensed design professional during roof replacements.
- Perimeter Conditions - The flashing conditions around the perimeter of the roof and at various mechanical equipment penetrations need to be considered and properly designed. Existing mechanical units may need to be raised, or existing deficient conditions modified, to ensure a proper roof replacement.
- Potential Leak Sources - Besides deficient roof conditions, several potential sources of water infiltration can exist that may result in water

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becoming entrapped in the roof assembly if they are not properly considered and addressed. These may include exterior walls, mechanical equipment, copings and parapets, or non-functioning drains or scuppers. The replacement or recover options also need to address these conditions so the new roof system is not comprised by an untreated condition.

Other Things to Consider in the Reroof Design

Once an evaluation of the existing roof system, structure, and surrounding building conditions has been performed, only then can the proper roof design be implemented. Things to consider during the reroofing design include:

- Conformance with Applicable Building Codes – The new roofing system configuration must conform to the applicable building codes for wind uplift resistance, fire resistance, drainage, insulation requirements, and material selection. Consideration also needs to be given to how the new roof system will be attached or adhered to the existing roof deck or roof system.
- Material Selection – There are seemingly endless options and possibilities for new roof systems, from single-ply thermoplastic membranes, rubber, sheet metal, multi-ply, liquid-applied membranes, and others. However, not all roofing materials and systems are appropriate for every building type. In fact, the wrong decision can lead to significant problems and increased costs over the long term. Experienced roof consultants have an in-depth knowledge of the various available roof systems and the strengths and weaknesses of each, and they will work with building owners to understand their goals so that the best solution can be provided.
- Energy Conservation – The 2012 International Energy Conservation Code, currently in effect in the state of Georgia, requires a minimum of R-20 of continuous roof insulation be provided above the roof deck for commercial building. Many existing buildings do not contain this minimum requirement; however, the building code requires roof replacements to meet this requirement during reroofing applications. This may mean additional insulation is required to meet the building code. Often, contractors ignore this requirement to be competitive when submitting reroofing proposals to building owners and property managers. This can result in more money spent by owners over the long term to heat and cool their buildings.
- Wind Uplift Resistance and Design – Roofs can vary widely in terms of wind uplift resistance, depending on a number of factors. These include the building location, building height, roof pitch, parapet wall height, building surrounding, and others. Each of these factors needs to be considered during a reroofing project so that an appropriate wind classification can be designated and accounted for in the design of the roof's attachment to the building structure. This can also have a significant impact on the building's ability to be properly insured, depending on the insurance carrier.
- Other elements to consider – Lightning protection systems, fire-protection systems, plumbing issues, specialized rooftop equipment, safety issues, facade access anchors and tie-backs, rooftop access, and structural issues with the roof deck are all elements that a Registered Roof Consultant or design professional should evaluate.

Conclusions

The International Building Code addresses provisions which govern the design, guidelines for materials, and construction for roof assemblies and rooftop structures. Experienced design professionals or roof consultants can be engaged to provide unbiased professional value on your association's roofing replacement or repair project. They can help evaluate the existing conditions and propose a suitable and cost effective roof design that will meet the building code once installed. Relying solely on contractors to be the designers of the roof during reroofing projects can increase the risk that building owners incur and potentially decrease the overall performance of the roof assembly and the building it is supposed to protect. For more information about connecting with a Registered Roof Consultant in your area, contact RCI, Inc. at www.rci-online.org or 800-828-1902. ■