Moisture problems and solutions

Moisture problems can be one of the most destructive elements a building faces, leading to the quick deterioration of building materials, building contents, and possibly your reputation as a builder. At the time of their purchase, your customers probably won't worry as much over the long-term health of their new building as they will about what they want that building to protect. It is something Chris Davis, Filc USA, makers of DripStop sees firsthand all the time. A case in point: “When a farmer spends a half million dollars on a new piece of equipment, the first thing they want to do is go out and put a building up to protect it,” he said. Because addressing present or potential moisture problems is so critical, Rural Builder has teamed up with Joseph M. Zulovich, Ph.D, P.E., in a series of five articles that will look at the primary causes and cures.

An overview and strategy [Part 1]

Moisture problems are relatively easy to identify—liquid water or damp, wet materials exists where it shouldn’t. However, determining the best solution for a particular moisture problem is not straight forward because one solution does not fit all situations.

The strategy to understand and address moisture problems is common, but the details to address any one problem are more complicated.

There are four steps to undertake:

1. First, identify all the sources of moisture affecting a building envelope or a building system.
2. Second, determine if any of the moisture sources can be eliminated. Sometimes a source can be eliminated or at least minimized. However, many moisture sources cannot be eliminated and then must be addressed.
3. Third, the building envelope must be constructed and maintained to protect from moisture exposure.
4. Fourth, remove any accumulated moisture from the building system.

The first two steps of identification and elimination can be considered fairly straightforward. The third and fourth steps of protection and removal are dependent upon the moisture source, location of a potential moisture problem and specific building system details. The complexity of these last two steps dictates why one solution does not fit all situations.

Moisture sources can be categorized into three main groups:
- Surface water,
- Subsurface water, and
- Indoor sources.

The primary surface water source is due to precipitation from rain or melting snow. Surface water will almost always exist so it can’t be eliminated as a source; therefore, the building system must be protected from exposure to surface water.

Any building with a portion of the building volume below the outside finished grade soil surface may be exposed to subsurface water and soil moisture. Any building with a basement, partial basement, or walkout basement needs to be protected from potential subsurface water and soil moisture exposure.

A building that uses a slab-on-grade construction can have moisture challenges due to subsurface soil moisture with certain soil conditions. Regardless of building design, the building foundation must be able to cope with any soil moisture or subsurface water issues.

Indoor moisture sources causing moisture problems have increased as more buildings are built with heating systems and sometimes air conditioning systems. Buildings without climate control (heating and air conditioning) tend to have indoor temperatures very similar to outdoor temperatures and often have sufficient air exchange capability incorporated into the building system to adequately address indoor moisture sources.

When building envelopes are built to be more...
TIPS & TRICKS

BY JOSEPH M. ZULOVICH, PH.D, P.E

AIRtight TO REDUCE HEATING AND COOLing COSTS, ADEQUATE AIR EXCHANGE TO ADDRESS INDOOR MOISTURE GENERATION MAY NOT EXIST. THE LACK OF AIR EXCHANGE OR USER-SPACE VENTILATION CAN OFTEN RESULT IN INDOOR MOISTURE PROBLEMS.

THE ACTIVITY AND USE OF AN INDOOR BUILDING SPACE HAS THE POTENTIAL TO GENERATE MOISTURE THAT THEN MUST BE REMOVED FROM THE INDUSTRIAL SPACE. INDOOR MOISTURE SOURCES INCLUDE BUT ARE NOT LIMITED TO WET VEHICLES STORED IN BUILDINGS, PEOPLE, PLANTS AND OR ANIMALS INSIDE THE CONDITIONED SPACE.

INDOOR MOISTURE PROBLEMS CAN BE REDUCED OR ELIMINATED IF SOME OR ALL THE INDOOR MOISTURE GENERATION SOURCES ARE REMOVED OR STOPPED WITHIN THE CONDITIONED BUILDING SPACE. HOWEVER, THE INTENDED USE WILL DICTATE WHETHER MOISTURE WILL BE GENERATED INSIDE THAT BUILDING SPACE. A CHANGE IN ACTIVITIES OR USES CAN IMPACT WHETHER INDOOR MOISTURE PROBLEMS OCCUR.

ONE USER WHO GENERATED LITTLE MOISTURE MAY LEAVE AND THE NEW USER WHO GENERATES CONSIDERABLY MORE MOISTURE MOVES IN AND THE RESULT CAN BE A BUILDING THAT NOW HAS INDOOR MOISTURE PROBLEMS. THEREFORE, THE SOLUTION TO A PARTICULAR INDOOR MOISTURE PROBLEM IS CLOSELY TIED TO THE USE OF THE BUILDING SPACE.

TO SOLVE MOISTURE PROBLEMS, THE MOISTURE SOURCE MUST FIRST BE IDENTIFIED. THEN BASED ON THE MOISTURE SOURCE AND LOCATION OF THE PROBLEM, A SOLUTION CAN BE DEVELOPED.

A LOOK AHEAD

FUTURE ARTICLES IN THIS SERIES WILL LOOK AT SOLUTIONS TO PREVENT OR ADDRESS MOISTURE PROBLEMS BASED ON THE MOISTURE SOURCE.

ARTICLE TWO WILL ADDRESS PROTECTING THE BUILDING SYSTEM FROM SURFACE WATER AND HOW SOME BELOW-GRADE WATER PROBLEMS ARE REALLY CAUSED BY UNCONTROLLED SURFACE WATER.

ARTICLE THREE WILL FOCUS ON SUBSURFACE MOISTURE AND FOUNDATION PROTECTION.

ARTICLES FOUR AND FIVE WILL FOCUS ON CONTROLLING PROBLEMS CAUSED BY INDOOR MOISTURE GENERATION. THE FOURTH ARTICLE WILL FOCUS ON PROTECTING THE EXTERIOR BUILDING ENVELOPE FROM INDOOR MOISTURE BY USING AIRTIGHT CONSTRUCTION PRACTICES AND VAPOR RETARDERS. THE FIFTH ARTICLE WILL FOCUS ON INDOOR SPACE VENTILATION TO REMOVE MOISTURE FROM WITHIN THE CONDITIONED SPACE AND TO ENHANCE INDOOR AIR QUALITY.

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