

MEMORANDUM

July 2, 2010

Rick Givas, President
Eagle's Nest Townhouses of Mt. Crested Butte
Condominium Association
PO Box 5066
Mt. Crested Butte, CO 81225

Re: CrawlSpace Moisture Investigation

Dear Rick:

I have completed the crawlspace monitoring during the spring snowmelt at Eagle's Nest. This investigation was performed over five site visits starting in early April and finishing the end of June, 2010. Details of these site visits were recorded and distributed in Field Reports 04, 05, 06, 07, and 08.

The intent of the investigation was to determine a.) the general conditions of the crawlspaces; b.) presence and/or amount of moisture in the crawlspaces; and c.) fluctuations in the presence/amount of moisture compared to snowpack located behind the units. Units 9, 10, 17, 24, and 40 were strategically chosen to give a broad overview of the complex as a whole.

Moisture was recorded in Units 9, 10, 17, and 24. Unit 40 crawlspace appeared dry throughout the investigation. Pertaining to this report, the term "water" applies to the physical presence of water, either pooled or moving, and "moisture" applies to soil or rock appearing damp.

Synopsis of Field Reports

Field Report 04 determined that moisture migration occurred in the bedrock below the foundation wall.

Field Report 05 did not reveal any significant increase in moisture or water migration. It was determined via test pits dug in the snow that melting was occurring in the layer adjacent to the ground. The soil was saturated and no surface discharge was noted.

Field Report 06 revealed additional moisture in the crawlspaces indicated that surface drainage may contribute to the water intrusion. Aggressive snow melt conditions were also noted.

Field Report 07 was performed 2 weeks later after the snowpack had completely melted. It was determined that the entirety of the snow behind the units had either evaporated or percolated into the soil. This dissipation was apparent due to the lack of visible surface drainage patterning in the new drainage ditch.

Field Report 08 revealed little change in the moisture content of the crawlspaces after nearly six weeks. Flowing water was not noted however areas of moisture remained consistent.

General Conclusions

From these observations, it is evident that some moisture/water originates from surface drainage; the persistent presence of moisture is most likely from sub-surface drainage. Based on prior experiences with the geology on this slope, sub-surface drainage will likely flow horizontally on impermeable layers not unlike the exposed bedrock in the crawlspaces.

Conservative estimates of four feet of accumulated snow equates approximately 1200 cubic feet of snowpack behind each unit. This amount of snowpack contains approximately 900 gallons of water. Over the course of 30 to 40 days of aggressive snowmelt, it can be estimated that 1/4 will evaporate or sublimate, 3/4 will melt and percolated through the immediate soil. Specifically to this case, no snowmelt will discharge as surface runoff. Conservatively, these figures would indicate approximately 16 gallons per day of water percolation behind each of the units.

The interior of the crawlspaces appeared to be in good condition. No signs of undermining on the foundation walls were noted. While an exhaustive search was not performed, no mold, mildew, or unusual discolorations were noted.

The apparent under-foundation drainage is likely responsible for undermining garage slabs. It is also likely that the discharge water is following the sewer lines and causing additional settlement related damage.

Concerns

Moisture is a key component to mold growth. Wet crawlspaces can present an odor problem in the laundry and garage. Air infiltration upward may contribute to moisture problems within the units. Long term structural damage may occur to the floor and subfloor from prolonged exposure to moist environments.

Recommendations

I would recommend one additional crawlspace investigation in late August of this year to confirm whether or not the problem is seasonal.

The current construction and site conditions are not conducive to intercepting sub-surface drainage for several reasons. The confined working area makes extensive excavation to install foundation drainage and waterproofing cost prohibitive. Subsurface drainage is entering the crawlspaces below the bottom of the wall. Placement of a drainage system below the level of the concrete wall will be problematic. The depth of the excavation into apparent bedrock is also a concern.

Redirecting groundwater or moisture within the crawlspace is also not recommended. The foundation walls were poured directly on the bedrock without a concrete footer. Excavation around the perimeter of the interior of the crawlspace might undermine the foundation walls. Even permissible, this option is also very costly.

Surface mitigation techniques such as shallow foundation drains or drainage planes would likely have minimal effect on persistent moisture in the crawlspaces due to sub-surface drainage. It is recommended that sealing all pipe penetrations into the crawlspaces be included with any mitigation work.

All organic debris, wood, construction materials, left-over form work, etc. should be removed from the crawlspaces to prohibit any potential mold growth.

Immediate Measures to Lessen Moisture Quantities

A.) Work with the Town of Mt. Crested Butte to limit or prohibit snowplows from disposing of road-snow from Morning Glory Way and Sunflower Drive.

B.) Seal all pipe penetrations into crawlspaces to prohibit water intrusion.

Measures to Deal with Presence of Moisture in Crawlspaces – Phase II

A.) If necessary, install 6 mil plastic sheeting on grade in crawlspaces. Ends should be extended up the foundation wall a minimum of 12” and sealed. All seams should be lapped 6” and taped. This technique will prevent ground moisture from migrating into the unit above.

B.) The crawlspaces are not currently vented. While it is not practical to install passive vents due to the location of the crawlspaces, mechanical venting may be an option. Mechanical venting should be installed in the floor above and air exhausted from the space. The fan should be controlled by a humidistat and make-up air should be conditioned.

Repair Measures Already in Place

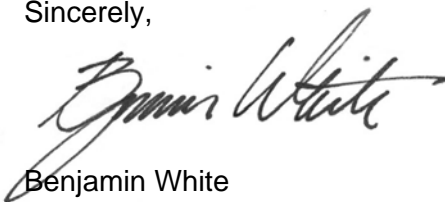
A.) Mud-Jack garage slabs as needed to insure proper bearing and support.

B.) Repair existing sewer lines and install additional drainage if needed.

While there is no apparent damage to the foundation walls or evidence of deterioration of the floor structure above, moisture within the crawlspaces is not ideal. Settling of the garage slabs and damage to the sewer lines are likely linked to the sub-surface flow. Coordination with a contractor familiar with moisture mitigation techniques would provide the most cost effective and practical solution.

As always, please do not hesitate to contact me with any questions or comments.

Sincerely,



Benjamin White
Ben White Architecture, LLC