30 September 2019

1. General

In accordance with your request and authorization, this office has performed a limited evaluation of the results reported in Investigation of Relative Humidity, Temperature and Dew Point, by American Geotechnical, Inc., dated September 10, 2019, as well as the Bridgeport Classroom Slab Moisture Report by R. Godfrey Consulting, dated July 31, 2019.

Following a review of these reports and test results, we have summarized our findings in this report, which reflects our general opinions regarding the results of the testing. The complete reports which provide the data for this analysis are attached to the end of this report. It is submitted, herewith, as a part of the investigation report for the exclusive use of the Saugus Union School District.

2. Scope of Services

The scope of this assignment included the following:

- A review of Investigation of Relative Humidity, Temperature and Dew Point, by American Geotechnical, Inc., dated September 10, 2019, as well as the Bridgeport Classroom Slab Moisture Report by R. Godfrey Consulting, dated July 31, 2019.
- A written report to document our observations and any opinions regarding the reported results.

3. Test result analysis

a. Investigation of Relative Humidity, Temperature and Dew Point

This investigation involved monitoring and recording the ambient air temperature, relative humidity and dew point temperature of the four (4) classrooms over a period of 2 weeks. The reason that dew point temperature is pertinent is that when the dew point temperature is at, or near, the ambient air temperature, conditions are present which facilitate the water vapor in the air condensing out of the air into liquid form onto any surface in the room which is below the dew point temperature. When the relative humidity goes up, the dew point temperature tends to move closer to the ambient air temperature, making conditions for condensation more favorable. When condensation onto building materials occurs, mold growth is possible. While it is true that mold needs a food source, conducive temperature and water to grow, water is the key variable to control to prevent its growth. At no point in the sample period does the dew point temperature get close enough to the ambient air temperature to facilitate water condensation onto building surfaces. It should be noted that when the mechanical systems are operating, the environment is less favorable for mold growth. In part, this is due to the fact that refrigerant air conditioning systems remove water vapor from the air during their operating cycle. This is significant because a normal biproduct of human respiration is the exhalation of water vapor. A typical classroom with 30 people will introduce a significant amount of water vapor into the air over the course of a day. A properly functioning mechanical system should also introduce fresh exterior air into the room. This is important to prevent the buildup of carbon dioxide, which is also a normal biproduct of human exhalation. There are three takeaways from this report as follows:

1. Generally, the psychrometric conditions in the classrooms are not favorable to microbial growth.
2. The conditions are notably better for preventing mold growth when the mechanical system is operating.
3. There is nothing in the data collected that would suggest a problem that would generate occupant health complaints.

b. Bridgeport Classroom Slab Moisture Report –

This investigation measured the amount of vapor flow through the concrete slab foundation using the American Society of Testing and Materials (ASTM) test F1869. This test uses calcium chloride, which is a desiccant, to measure the amount of water vapor which which is emmited from the top of the slab over a specific period of time (60 to 72 hours). By measuring the weight gain of the desiccant material, a calculation of the amount of vapor pressure, in lbs/1000 sf/24 hours is arrived at. The accepted industry standard for installation of non-permeable flooring materials is 3.0 lbs/1000sf/24 hours. Non-permeable flooring materials are materials which qualify as vapor barriers. In reality, flooring materials allow vapor transmission over a spectrum. Materials such as vinyl composition tiles (VCT), and certain rubber backed carpet squares (non-permeable) will block the transmission of water vapor being emitted from the slab. This will cause a build-up of water between the slab surface and the flooring material; not only does this provide water for microbial growth, there is another associated issue.

On a pH scale where 1 is a strong acid and 7 is pH neutral, cement powder, which is a main ingredient of concrete has a pH of 13 (strong alkaline). Note that the maximum pH is 14. When concrete is placed, the surface of the concrete is exposed to carbon dioxide in the air and the result is the pH of the concrete surface drops to approximately 8. This is close to pH neutral. When water travels up through the concrete slab it will also bring high pH elements from the middle of the slab to the surface. Frequently, this high pH water will re-emulsify the adhesives used to adhere the flooring materials to the floor. When you pull a section of the flooring up you will observe that the adhesive has re-emulsified into a sticky gooey mess.

Regarding the results of the testing, the two rooms with the UZIN vapor retarder had vapor emission rates of approximately 1 lb/1000 sf/24 hours. With the UZIN applied to the floor you can install just about any flooring product without concern. On the floors without the UZIN vapor retarder application, none of the test results were within the industry standard of 3.0 lbs/1000 sf/24 hours. That said, the rest of the rooms were not significantly over the industry standard. The highest was 4.41 lbs/1000 sf/24 hours. Generally speaking, results under 5.0 lbs/1000 sf/24 hours, while beyond industry standards, are not a cause for concern. In slabs with significant water issues it is not uncommon to see results in excess 10 or even 15 lbs/1000 sf/24 hours. More permeable floor coverings, like broadloom carpets, are more forgiving and will allow the vapor to pass through to the air and be removed by the mechanical system. The area where more attention should be paid are the results of the pH testing. The floors with the UZIN vapor retarders measured at a pH of 9. This is not very concerning. The floors without the UZIN vapor retarders measured a consistent pH of 12. The maximum pH is 14 and is completely alkaline. This is not a concern regarding microbial growth, but may indicate the need for a premium adhesive that is compatible with high pH (alkaline) environments.

The bottom line conclusion is that the results of these tests do not indicate an issue that would create favorable conditions for microbial growth.

4 Closure

This report was prepared for the use of the Saugus Union School District. The opinion expressed here is based on our visual observations, test results, and experience. As in most projects of this nature, conditions in the future may differ from the conditions at our testing. The recommendations made in this report are based on data that represent conditions at the specific time of testing only. If a change in condition occurs, the changed condition must be evaluated further to adjust our recommendations. The professional services performed by this office for the subject property were conducted in a manner consistent with current technical knowledge in the field of microbial investigation, sound engineering judgment and the writer’s own professional judgment. No other warranty is expressed or implied as to the professional advice, conclusions and recommendations included in this study.

Thank you for the chance to be of service. Should you have any further questions or comments regarding our observations or report above, please do not hesitate to contact us at (661) 510-6181.

Respectfully submitted,

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