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March 13, 2019

Mr. Gerald Greeson
Executive Director of Maintenance
Guilford County Schools
3920 Naco Road
Greensboro, North Carolina 27401

Transmitted via email: greesog@gcsnc.com

Re: *Industrial Hygiene Services Report
Gateway Education Center*

Dear Mr. Greeson:

The enclosed report presents the result of the Preliminary Mold and Baseline Indoor Air Quality Assessment services conducted on March 11, 2019, at the Gateway Education Center. Please call me at 336-931-5046 if you have any questions or need additional assistance with this project.

Thank you for the opportunity to provide this service.

Sincerely,

A handwritten signature in black ink, appearing to read "Dennis W. Forbis", is written over a light blue horizontal line.

Dennis W. Forbis, CIH, CSP
Industrial Hygiene Consultant

Enclosures

**PRELIMINARY MOLD AND
BASELINE INDOOR AIR QUALITY ASSESSMENT
Gateway Education Center
3205 East Wendover Avenue
Greensboro, North Carolina**

Submitted To:

Mr. Gerald Greeson
Executive Director of Maintenance
Guilford County Schools
3920 Naco Road
Greensboro, North Carolina 27401

Submitted By:

Workplace Hygiene, Inc.
420-B Gallimore Dairy Road
Greensboro, NC 27409

Date Submitted:

March 13, 2019

Project ID:

GCS031119

BACKGROUND AND METHODS

Workplace Hygiene conducted Preliminary Mold and Baseline Indoor Air Quality (IAQ) assessment services for Guilford County Schools (GCS) at the Gateway Education Center (Gateway) on March 11, 2019. The Gateway facility is located at 3205 E. Wendover Avenue in Greensboro, North Carolina. This assessment was performed at the request of GCS by the Program Administrator Health and Safety reportedly after GCS concerns about the potential presence of mold growth in the school. Gateway has reportedly been the subject of ongoing water infiltration events. Workplace Hygiene was engaged to provide a Preliminary Mold and Baseline Indoor Air Quality Assessments in accordance with our Proposal No. 160307.

The assessment involved a visual and odor evaluation of the accessible areas of the subject facility. The purpose of the mold assessment was to look for evidence of mold growth and water damage including:

- the presence of standing water, visible mold, fungus, or mildew,
- wet stains, eroding surfaces, efflorescence,
- dank, musty odors, and
- rust and corrosion stains on metal elements.

Additionally, Workplace Hygiene collected baseline air-quality measurements using direct read instrumentation for basic indoor air quality (IAQ) constituents such as carbon dioxide concentrations, temperature and relative humidity inside the facility. These short-term air-quality measurements were compared to the current Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA) recommendations and other consensus standards.

During the March 11, 2019 site visit, Workplace Hygiene toured the common areas of the facility and was led to the areas of known persistent, or ongoing water intrusion points at the Gateway Center by the facility staff. Mr. James Smith, the GCS Program Administrator Health and Safety provided background information concerning the facility, prior to leaving the site. The tour of the building was led by Ms. Sara Nachtrab, Principal, of Gateway and Ms. Lynn Wyeth, the facility's Lead Custodian.

This investigation involved interviews with the above-noted representatives of the subject GCS facility, a visual assessment of the known areas of water infiltration of the subject facility, and the short-term measurement of baseline indoor air quality (IAQ) parameters. These short-term IAQ measurements included temperature, humidity, and carbon dioxide concentrations. The assessment was limited to the common areas of the building, and those areas identified by the staff as having been subject to water infiltration. The visual assessment was conducted to determine if there were conditions within the space that could contribute to indoor air quality stressors.

Baseline Indoor Air Quality parameters (carbon dioxide, temperature, and relative humidity) were measured using a TSI Corporation Q-Trak™ Model 8551 Indoor Air Quality Monitor. The instrument was calibrated prior to use in accordance with

manufacturer's specifications. The measurements were compared to the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) standards for acceptable indoor air quality.

Moisture testing was performed with a General Electric (GE) Protimeter Surveymaster™ dual-function (radio-frequency and conduction) moisture meter. Moisture measurements were taken on interior finishes that exhibited water staining or other water damage.

SITE ASSESSMENT AND FINDINGS

The Gateway Education Center is a single-story steel-framed masonry building that was initially constructed in the 1980s with an addition added in the 1990s. The facility is composed of four educational pods (denoted as Green, Purple, Blue, and Red), surrounding a central office and therapy building (Yellow). A support building to the west of the Blue and Red Pods serves as the facility's Cafeteria and Gymnasium. This west-most building also houses a pool structure that is presently not in use (drained). The four pods, central office structure, and the support building are connected with enclosed corridors. The majority of the interior partitions and structural walls are masonry, with a relatively small number of gypsum board interior partitions used to demise some spaces.

The floors are finished with terrazzo, carpet or resilient tiles. The ceilings are finished with an acoustic lay-in tile system. The facility is conditioned with a forced-air ducted Heating Ventilation and Air Condition (HVAC) system. The HVAC system was operating during the site visit with reportedly normal school-hour set-points.

Employee Interviews

Discussions with GCS personnel at the site revealed the following:

- There reportedly have been a series of water infiltration events that affected the subject space, including:
 - Roof leaks and window leaks.
 - Water sometimes enters the school from under doors and the window walls.
 - Condensation drips from both roof drain leaders and HVAC piping above the suspended ceilings have also been an occasional source of water intrusion at the site.
- In addition, there have been concerns by some staff regarding fuzzy or chalk-like substances appearing on the masonry walls of some classrooms and on the exterior of the building.

Visual Assessment

During this visit, an assessment of the common areas of the building was made along with those areas identified by the school staff as having persistent or active water leaks. Within the student-occupied portions of the building, there were no visible signs of mold

growth, or dank odors suggesting that concealed mold growth present in these spaces. The areas identified as having suspect materials on exterior masonry walls were observed to be masonry efflorescence and not mold-related. However, a small (<1 square foot) area of visible suspect mold growth was observed on the gypsum roof deck, above the ceiling in the teacher's lounge in the Purple Pod at the site of a roof drain leak, that is believed to be inactive. The water-damaged deck was dry at the time of the assessment. Additionally, multiple areas of ongoing water infiltration were observed at the facility. These included several areas where water enters the building from the paved or landscaped surfaces just outside structure through exterior doorways and under window walls; along the upper edges of the windows used in the corridors used to connect the pods; near at least one skylight, and from at least one active roof leak. Please see Table 1 for information regarding the individual assessment sites in the building.

Temperature, Humidity and Carbon Dioxide Measurements

The temperature, humidity and carbon dioxide measurements are also summarized in Table 1. The measured temperatures in the building ranged from 68.6° F to 73.4° F. While the indoor relative humidity readings ranged from 27.5% to 39.2%. Each of the humidity and temperature measurements was found to be within the range recommended for occupant comfort and to reduce the potential for microbial growth in the structure by the ASHRAE, EPA, and OSHA.

The concentration of carbon dioxide was measured in the subject spaces. Based upon ASHRAE recommendations, the carbon dioxide (CO₂) concentration inside conditioned spaces can be used as an indicator of adequate fresh air intake into the HVAC system. ASHRAE indicates that the carbon dioxide concentrations should not exceed 700 parts-per-million (ppm) above the outdoor concentration (measured to be 386 ppm during the March 11th assessment, or 1,086 ppm). It should be noted that the ranges discussed in the ASHRAE 62 Standard (and shown in Table 1) are recommended maximum carbon dioxide concentrations and are used only as an indicator for the buildup of indoor air contaminants because of lack of fresh air exchange. The ASHRAE standard should not be utilized as a benchmark for hazardous carbon dioxide concentrations (e.g., the current OSHA - Permissible Exposure Limit for carbon dioxide in the workplace is 5,000 ppm). Carbon dioxide levels inside the subject facility ranged from 457 to 604 parts per million (ppm). Such measurements suggest sufficient fresh air intake into the HVAC systems serving these areas.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this preliminary assessment, the following conclusions and recommendations are made:

1. Observations and indoor air quality measurements in the known areas of previous water infiltration found no obvious sources of poor indoor air quality stressors on the day of the survey, except a small area of suspect mold growth above the ceiling in the Purple Pod Teacher's Lounge. Workplace Hygiene recommends removing this area of microbial growth using the methods discussed in the EPA document, *Mold Remediation in Schools and Commercial Buildings Guide* (EPA 402-K-01-001).
2. There was however significant evidence of previous and current water infiltration into the building (i.e., water-stained building finishes, efflorescence on masonry, and active roof/flashing leaks). Based on these observations, Workplace Hygiene recommends that the building's gutters, roof, and windows be evaluated, as well as the grading and paved surfaces surrounding the structure. Repair these and other building envelope systems as needed to excluded water from the structure.

Submitted By:

Workplace Hygiene, Inc.



Dennis W. Forbis, CIH, CSP
Industrial Hygiene Consultant

Attachment: Table 1 – Temperature, Relative Humidity, and Carbon Dioxide
Measurements

**TABLE 1 – TEMPERATURE, RELATIVE HUMIDITY AND
CARBON DIOXIDE MEASUREMENTS
MARCH 11, 2019**

Item No.	Location	Temperature (° F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Observations
1.	Principal's and Data Manager's Offices	68.6	39.2	539	Water staining and efflorescence on the wall. Water reportedly enters under the wall. Carpet and wall are dry.
2.	Green Pod, Classroom 4	70.5	39.0	538	Roof leak above the ceiling (active), a leak diverter has been installed above the ceiling. Stained gypsum was observed on the roof deck. Ceiling tiles are dry and appear to have been recently replaced.
3.	Purple/Green Pod entrance	69.9	37.2	487	Water-stained ceiling tile at the Exit sign (dry) and efflorescence on masonry. School reports that previous gutter leaks at this site repaired.
4.	Purple Pod, Teacher's Lounge	73.2	36.1	585	Water-stained section of gypsum roof deck (dry) observed above ceiling at roof drain. Small area <1 s.f. of suspect mold growth observed on deck.

ppm = parts per million

Recommended Indoor Environmental Conditions

ASHRAE (Standard 55-1992)

Temperature (Dry Bulb): 73.0-80.0° F (Summer), 67.5-75.5° F (Winter)

Carbon Dioxide: Indoor carbon dioxide concentrations should not be greater than 700 ppm above outdoor levels

OSHA (Technical Manual, Section III, Chapter 2, Subsection V)

Temperature (Dry Bulb): 68.0-76.0° F

Relative Humidity (RH): 20-60 %

EPA (Mold Remediation in Schools and Commercial Buildings Guide - EPA 402-K-01-001)

Relative Humidity (RH): <60%, ideally 30-50%, if possible.

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MARCH 11, 2019**

Item No.	Location	Temperature (° F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Observations
5.	Purple Pod, Classroom 3	71.8	35.4	568	Efflorescence on the interior wall (damp), and water stain on the floor (dry). Exterior staining suggests a gutter leak. Hole observed in the gutter.
6.	Purple Pod, Corridor between Classrooms 5 and 6	70.1	34.9	542	Water staining on the floor at the exterior door. Rags used by staff to collect/direct water on the floor. Water appears to enter under door or sidelite.
7.	Purple Pod, Classroom 9	70.4	36.8	560	Water staining on the floor at the exterior door. Water appears to enter under door or window wall. Exterior wall staining suggests a gutter leak. Exterior sidewalk grade may contribute to water intrusion.
8.	Physical Therapy Hall, Skylight outside of PT Gym.	72.4	35.1	604	Water staining and moisture damage on gypsum board skylight well. Moisture content suggests an active roof/flashing leak.

ppm = parts per million

Recommended Indoor Environmental Conditions

ASHRAE (Standard 55-1992)

Temperature (Dry Bulb): 73.0-80.0° F (Summer), 67.5-75.5° F (Winter)

Carbon Dioxide: Indoor carbon dioxide concentrations should not be greater than 700 ppm above outdoor levels

OSHA (Technical Manual, Section III, Chapter 2, Subsection V)

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**TABLE 1 – TEMPERATURE, RELATIVE HUMIDITY AND
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Item No.	Location	Temperature (° F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Observations
9.	Hall outside of Health Room	70.4	36.2	518	Water-stained ceiling tile (dry) at fire annunciator. School reports that a previous leak was repaired.
10.	Vocation Education Hallway	70.9	35.4	499	Active roof leak with water collecting on light fixture diffuser. The staff has positioned a wastebasket and towels on the floor to catch drips.
11.	Hallway between Purple and Yellow building sections	71.4	33.2	514	Water-stained ceiling tile at Exit sign (dry).
12.	Yellow section North entrance doors	70.6	30.1	502	Water staining on the floor at the exterior door. Water appears to enter under door or window wall. Exterior sidewalk grade may contribute to water intrusion.

ppm = parts per million

Recommended Indoor Environmental Conditions

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Temperature (Dry Bulb): 73.0-80.0° F (Summer), 67.5-75.5° F (Winter)

Carbon Dioxide: Indoor carbon dioxide concentrations should not be greater than 700 ppm above outdoor levels

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Temperature (Dry Bulb): 68.0-76.0° F

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MARCH 11, 2019**

Item No.	Location	Temperature (° F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Observations
13.	Vocational Education (at the greenhouse)	69.2	34.9	457	Water staining on the floor at the exterior door. Cabinet damage. Water appears to enter under door or window wall. Exterior wall staining suggests a gutter leak. A flashing leak over the greenhouse is also plausible. Exterior sidewalk grade may contribute to water intrusion.
14.	Blue Pod, Records Room	73.4	29.4	483	Water-stained roof drain leader insulation (dry) observed above ceiling at roof drain. Basin insulation has been removed (a possible condensation issue).
15.	Cafeteria	71.9	27.5	600	Corrosion, wall damage and staining at cafeteria windows. Moisture measurements suggest active leaks. Staff reports intermittent water drips (usually) from the top flanges of the window frames.

ppm = parts per million

Recommended Indoor Environmental Conditions

ASHRAE (Standard 55-1992)

Temperature (Dry Bulb): 73.0-80.0° F (Summer), 67.5-75.5° F (Winter)

Carbon Dioxide: Indoor carbon dioxide concentrations should not be greater than 700 ppm above outdoor levels

OSHA (Technical Manual, Section III, Chapter 2, Subsection V)

Temperature (Dry Bulb): 68.0-76.0° F

Relative Humidity (RH): 20-60 %

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MARCH 11, 2019**

Item No.	Location	Temperature (° F)	Relative Humidity (%)	Carbon Dioxide (ppm)	Observations
16.	Connector Corridors	-	-	-	Corrosion, wall damage and staining at windows that runs down to lower walls in some areas. Moisture measurements suggest some active leaks. Staff reports intermittent water drips (usually) from the top flanges of the window frames. Screws placed in some window frame holes by staff to stop drips.
17.	Exterior	68.9	20.4	386	Some lawn and planting beds are not sloped away from the building. Likewise, paved surfaces adjoining the building are not always sloped appropriately or sealed at the building interface. Masonry weep holes may be below grade in some areas. Gutters are in poor repair with visible holes, open seams, and loose attachment points

ppm = parts per million

Recommended Indoor Environmental Conditions

ASHRAE (Standard 55-1992)

Temperature (Dry Bulb): 73.0-80.0° F (Summer), 67.5-75.5° F (Winter)

Carbon Dioxide: Indoor carbon dioxide concentrations should not be greater than 700 ppm above outdoor levels

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