



Monongalia County Health Department  
453 Van Voorhis Rd  
Morgantown, WV 26505

To Whom It May Concern,

March-Westin Company, Inc was hired by the owner of the building that serves as the meeting place for the WV Academy school. March-Westin was hired to help increase the outside air intake to lower the carbon dioxide levels inside the building. March-Westin contracted this work to ADI, a mechanical contracting group. This work was performed during the winter break while students were not present.

March-Westin first did some initial monitoring with a carbon dioxide monitor to measure the levels inside the building while students were present. The monitoring sessions took place prior to fresh air being introduced to the building and after fresh air was introduced. These results are listed below along with the initial results from the day WVU performed their monitoring.

After investigation it was found that the existing building is served by eleven furnaces with split AC systems. On the return duct of each furnace, ADI installed an eight-inch tap with a balancing damper and ducted each furnace individually to the outside of the building. This allows the furnace to draw outside air and mix it with the return air from the rooms being served, creating a supply air with a carbon dioxide concentration closer to the outside air conditions. Secondly, all accessible exhaust fans in the building were rewired for continuous operation to bring the building to a slightly negative pressure and expel as much



stale air as possible. This was the best retrofit/improvement ADI could do with the time allotted by the winter break.

After work was completed, March-Westin once again performed carbon dioxide monitoring. This was completed before students returned and one day while students were present in the building. The results were substantially lower than the initial readings. These readings are also listed below.

360 Frontier Street  
Morgantown, WV 26505  
304.599.4880 phone  
info@marchwestin.com

Sincerely,

Cody Rodeheaver MS, GSP

*Cody Rodeheaver*

Safety Director

March-Westin Company, Inc

[crodeheaver@marchwestin.com](mailto:crodeheaver@marchwestin.com)

(304) 599-4880

Building: West Virginia Academy

Date: 12-8-2022

Table 1: Visual Environmental Assessment

Location	Concern	Findings	Recommendations
West Virginia Academy	<p>School has had multiple complaints from parents about their children experiencing headaches.</p> <p>EHS was contacted by Dr. Lee Smith to assist MCHD in assessing the West Virginia Academy for IAQ concerns.</p>	<ul style="list-style-type: none"><li>• Note that these readings are a snapshot in time and are not data logged over a period of time.</li><li>• All parameters for indoor air quality were within accepted ranges, with the exception of carbon dioxide. Based on accepted comfort measurements of ASHRAE they recommend adding 700ppm to the outside carbon dioxide levels recorded.</li><li>• During IAQ sample (12/8/22) the highest value recorded for Carbon Dioxide was 2516 ppm. Here are the established standards/guidelines that are based on an 8-hour time weighted average TWA.<ul style="list-style-type: none"><li>• OSHA PEL 5,000ppm</li><li>• NIOSH REL 5,000ppm</li><li>• ACGIH TLV 5,000ppm</li></ul></li><li>• Many of the supply and return vents were not supplying or pulling much area.</li><li>• Many rooms have been reconfigured during renovation, that has caused the supply and return vents to be relocated to hallways and not replaced in rooms.</li><li>• All other parameters were within acceptable levels.</li></ul>	<ul style="list-style-type: none"><li>• Based on the established limits the carbon dioxide levels are less than 50% of the dose of the TWA of the CO<sub>2</sub> levels.</li><li>• WVU EHS recommends the building owner consult a qualified HVAC engineer/technical representative to determine the HVAC output needs based on occupant loads. Other recommendations may include:<ul style="list-style-type: none"><li>• Ensure all supply and return vents are not being blocked by furniture.</li><li>• Increase fresh air flow to the building, through HVAC unit manipulation.</li><li>• Ensure the building is getting the proper amount of air exchanges.</li></ul></li></ul>

Building: West Virginia Academy  
Date: 12-8-2022

Table 2: Indoor Air Quality Measurements (ASHRAE Comfort IAQ Parameters)

Location	Date	Temperature (F)	Relative Humidity (%)	TVOC (ppb)	CO (ppm)	CO <sub>2</sub> (ppm)
Outside in parking lot	12/8/2022	56.1	56.5	84	0.4	893
Room 72 Art Room First table (Second Floor, No Students)	12/8/2022	69.6	51.3	490	1.4	2445
Room 72 Art Room Back Table (Second Floor, No Students)	12/8/2022	70.6	51.8	467	1.5	2516
Hallway outside Room 72	12/8/2022	71.6	47.5	360	1.6	2270
Hallway outside of Room 71	12/8/2022	71.8	49.2	366	1.3	2410
Attic Area	12/8/2022	71.2	49.7	341	1.4	2330
Second Floor Printer Room	12/8/2022	71.3	50.2	347	1.3	2340
Admin Custodial (HVAC Space)	12/8/2022	73.5	44.5	332	1.2	2055
Room 16 (1 <sup>st</sup> floor, Students Occupied)	12/8/2022	76.0	44.9	443	1.7	2438
Hallway outside Room 16	12/8/2022	75.2	44.2	320	1.4	2288
Target Range		Summer: 73-79 Winter: 68-74.5	30-65	No specific guidance on ranges	≤ 9.0	700 + outside CO <sub>2</sub>

WVU readings day health department was onsite

## West Virginia Academy

Date: 12/9/2022 Time: 2:00 PM

## Indoor Air Quality Measurements

Location	Temperature (F)	Relative Humidity (%)	CO2 (ppm)	Notes
Outside in parking lot	62.5	35	580	306 ppm lower than 12/8/2022
Room 72 Art Room 2nd Floor	70.1	43	1540	No kids in classroom
Hallway Outside Room 72	70.1	43	1560	
Hallway outside room 71	69.9	44	1660	
Attic Area	70.2	47	1420	
Second Floor Printer Room	69	45	1640	
Admin Custodial HVAC Space	69.3	41	1190	
Room 16 1st Floor	70.3	44	1720	Kids in the classroom
Hallway Outside room 16	70.7	42	1470	

Fresh air was circulated throughout the building at 12:30 PM for 20 minutes.

West Virginia Academy  
Date: 12/12/2022 Time: 7:20 AM  
Indoor Air Quality Measurements

Location	Temperature (F)	Relative Humidity (%)	CO2 (ppm)	Notes
Outside in parking lot	68.8	57	490	
Room 72 Art Room 2nd Floor	60.1	44	480	
Hallway Outside Room 72	60.6	43	480	
Hallway outside room 71	61.5	43	500	
Attic Area	62.1	42	490	
Second Floor Printer Room	62.1	43	700	Teachers occupying space at the time
Admin Custodial HVAC Space	63.7	42	480	
Room 16 1st Floor	63.3	42	480	
Hallway Outside room 16	64.1	42	510	

## West Virginia Academy

Date: 12/14/2022 Time: 12:15 PM

## Indoor Air Quality Measurements

Location	Temperature (F)	Relative Humidity (%)	CO2 (ppm)	Notes
Outside in parking lot	56	34	490	
Room 72 Art Room 2nd Floor	67.1	46	2200	Kids in classroom
Hallway Outside Room 72	67.5	47	1980	
Hallway outside room 71	67.2	43	1980	
Attic Area	66.8	42	1640	
Second Floor Printer Room	68.	42	1820	
Admin Custodial HVAC Space	68.3	38	1330	
Room 16 1st Floor	68.9	42	1780	
Hallway Outside room 16	69	39	1640	

No outside air introduced at the time of readings.

## West Virginina Acadamy

Date: 1/16/2023 Time: 10:30 AM

## Indoor Air Quality Measurements

Location	Temperature (F)	Relative Humidity (%)	CO2 (ppm)	Notes
Outside in parking lot	39.2	27.7	447	
Room 72 Art Room 2nd Floor	69.2	17.7	553	
Hallway Outside Room 72	69.2	17.7	559	
Hallway outside room 71	68.9	18.4	610	
Attic Area	66.6	21.4	575	
Second Floor Printer Room	67.6	19.4	570	
Admin Custodial HVAC Space	69.2	20.7	745	
Room 16 1st Floor	65.2	23.6	575	door closed
Hallway Outside room 16	68.8	30.9	660	

Teachers occupying the building prepping for return to school  
on 1/17/2023.

## West Virginia Academy

Date: 1/17/2023 Time: 10:30 AM

## Indoor Air Quality Measurements

Location	Temperature (F)	Relative Humidity (%)	CO2 (ppm)	Notes
Outside in parking lot	49.8	86.6	455	
Room 72 Art Room 2nd Floor	70.3	37.7	1288	No kids in room Door open
Hallway Outside Room 72	69.1	40.2	1258	
Hallway outside room 71	67.7	43.5	1170	
Attic Area	68.9	36.9	1124	
Second Floor Printer Room	69.8	38.5	1280	
Admin Custodial HVAC Space	69	42.8	1145	
Room 16 1st Floor	67.2	52.3	1395	Kids in room Door closed
Hallway Outside room 16	66	52.3	787	Close to exterior door that opens during day