

# SPECIAL CIRCUMSTANCE

## ON-SITE REVIEW REPORT

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### ***Lincoln County Facilities***

September 2021

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Office of Support &  
Accountability



**West Virginia Board of Education  
2021-2022**

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## Introduction

At the specific direction of the West Virginia Board of Education (WVBE), the Office of Accountability conducted a Special Circumstance Review of Lincoln County Schools, August 30, 2021 through September 3, 2021 to obtain specific information regarding the school facilities. The Review process was conducted as outlined in WVBE Policy 2322: West Virginia System of Support and Accountability. The review included facility visits, interviews of school and central office personnel, and document review.

A Team consisting of staff members from the West Virginia Department of Education (WVDE) compiled the information gathered during the onsite review and provided findings and non-compliances outlined in this report. The report will acknowledge identified strengths and provide recommendations and corrective actions to support the operation of school facilities that serve the student population in a safe, efficient, and effective manner. The report will be presented to the WVBE at the October 13, 2021 board meeting.

## Onsite Review Team Members

- Emmit Allen, HVAC Technician, Office of School Operations and Finance, WVDE
- Alexandra Criner, Coordinator, Office of Accountability, WVDE
- Ken Hughart, HVAC Technician, Office of School Operations and Finance, WVDE
- Matthew Hicks, Director, Office of Accountability, WVDE
- Micah Whitlow, Manager, Office of School Operations and Finance, WVDE
- Amy Willard, School Operations Officer, Office of School Operations and Finance, WVDE
- Susan Young, Coordinator, Office of Accountability, WVDE

## Background

On March 11, 2020, a report of the findings from a Special Circumstance Review conducted by the WVDE at Guyan Valley Middle School was presented to the WVBE. Based on the findings in that report, the WVBE directed the Office of Accountability to conduct a Special Circumstance Review of the Lincoln County School System. This commenced with a review of the Lincoln County Schools Finance and Transportation Offices. The report of the findings from that review was presented to the WVBE on November 16, 2020. Following consideration and review of the Finance and Transportation Report, the WVBE moved to declare a State of Emergency in Lincoln County Schools pursuant to W. Va. Code §18-2E-5(m)(2). The State Superintendent was directed to appoint designees to be employed pursuant to W. Va. Code §18-2E-5(j) to coordinate on-site school improvement efforts and to provide recommendations for the correction of the extraordinary circumstances. Two designees, one with extensive superintendent experience and one with expertise in school and system financial practices were appointed by the State Superintendent and approved by the WVBE on January 13, 2021, for this purpose. The WVBE further directed, if progress in correcting the extraordinary circumstances is not made within six months, the WVBE shall intervene in the operation of Lincoln County Schools.



## District-wide Findings

- The asbestos and pest management plans were found to be accessible, current, properly labeled, and tabbed for easy review.
- Multiple emergency egress paths and stairwells contained stored items, furniture or equipment that impede emergency egress. WV State Fire Code does not permit items, either temporary or permanent, to be located in these areas. (Photo Appendix, Figures 1 and 2)
- Many electrical panels and HVAC units do not have accurate mechanical identification labels. Labeling electrical panels and HVAC units enables accurate and proper identification of the equipment by first responders, HVAC contractors, designers, and all other personnel involved in the maintenance and operation of a building's systems.
- Roofs across the county have not been appropriately maintained. The Team observed multiple examples of vegetation growth, various kinds of debris, and obstructed roof drains. (Photo Appendix, Figure 3)
- Most mechanical, electrical, and custodial spaces were not properly maintained. These areas had various levels of trash, clutter, and unrelated materials that restricted access to equipment that requires routine access and/or maintenance. West Virginia State Fire Code restricts items from blocking access to electrical panels. These areas were also found to have illumination levels that are not conducive to diagnosing and maintaining equipment.
- The Team observed multiple instances of unrestricted access to hazardous areas and equipment throughout.
- Several facilities do not have all exterior windows and doors labeled with numbers, as required by the WV Safe Schools Act. The Team observed missing, inaccurate, or obstructed room number identifiers in multiple facilities.
- There are numerous building automation sensor failures related to improper HVAC controls operation.
- There are stained, moldy or missing ceiling tiles in various areas of all schools. Ceiling tiles are a part of the fire protection system and WV State Fire Code requires the ceiling grid and tiles be complete and in working order.
- Most thermostats not part of a building automation system had improperly set fan switches and operational modes.
- Multiple facilities have HVAC equipment that is operating past the equipment's expected life span of 12-15 years. Staff at multiple facilities expressed concern about times of excessive heat or cooling.
- Lighting levels in multiple rooms across the county were significantly below the requirements of WVBE Policy 6200 and the guidelines of the Illumination Engineering Society (IES).
- Most facilities in the county are not fully handicapped accessible and do not meet the requirements of the Americans with Disabilities Act (ADA).
- Principals and staff were untrained in emergency shut off procedures for equipment and/or supply lines.

- Multiple fire doors and exit doors were propped open with rocks or wedges. Fire doors are required by the WV State Fire Code to work in coordination with the fire alarm system and cannot do so if they are held open with objects. Propping doors greatly reduces the lifespan of door hinges and closing devices. Additionally, the practice of propping doors allows for unauthorized access to the school facility.

## District-wide Corrective Actions

- Restrict access to roof tops, mechanical rooms, electrical equipment, custodial rooms, sewage treatment plants, and other areas that pose similar safety risks.
- Remove any debris and clear roof drains on a routine basis as part of a coordinated, scheduled preventive maintenance program. Ensure maintenance staff have a safe and appropriate means to access all roof levels.
- Clean and properly maintain all mechanical support spaces as part of a regular program of preventive maintenance. Train staff to refrain from using these rooms for anything other than their intended purposes. The placement of signage may also serve as a reminder of this requirement.
- Label all electrical panels and HVAC units with laminated, engraved labels, using the same identification assigned by the electrical and mechanical drawings for the project. WVDE staff can aid with this process if necessary.
- Ensure all exterior windows and doors have the required numbering system as defined the WV School Access Safety Act (§18-9F-1). Label all rooms in a manner that corresponds to the room numbering system noted in the fire alarm system, asbestos management plan, emergency response plan, and all other relevant documentation. Task school personnel with ensuring room numbers remain visible.
- Ensure all failed lamps or lighting ballasts are replaced and additional light fixtures are added where necessary. Light replacement should be placed on a regular facility maintenance schedule. Per the IES, light levels in a classroom should measure 30-50 foot-candles of lighting.
- Evaluate all site and facility features for ADA accessibility and renovate as needed to achieve compliance.
- Train multiple staff members in emergency shut off procedures for supply lines for domestic water, the sprinkler system, electric, gas, and any additional equipment that must be shut off in the event of an emergency.
- Exit doors, stairwells, and paths of egress must be kept clear of obstacles and flammable materials at all times. Restricting access to building exits poses a severe life safety risk and appropriate measures should be quickly taken to alleviate this risk. Staff and students should be trained to stop the practice of propping doors open.
- Ensure any source of water intrusion is repaired and all stained, damaged, or missing ceiling tiles are replaced.

- Repair or replace all failed HVAC devices and automation systems and calibrate them to maintain system specifications. The Team recommends staff who operate the building automation system be trained on the proper use and troubleshooting procedures of the HVAC or automation systems.
- Ensure staff and students do not have access to control the supply fans of HVAC systems. A thermostat fan switch set to “AUTO” will turn off outside ventilation when the temperature point is satisfied. A constant volume of air is required by WVBE Policy 6200 to maintain proper ventilation rates while a space is occupied. Conversely, rooms that are unoccupied should have their HVAC system set to unoccupied to reduce energy usage and elevated humidity levels related to over ventilation.
- It is recommended all HVAC systems be controlled by a building automation system with the capability to monitor and control individual room temperatures, outside air supplies, humidity levels, and space-pressure relationships.
- Confirm outside air dampers are operating correctly.
- Replace systems not capable of providing outside air ventilation with an HVAC system and controls capable of providing the required amount of outside air as defined by The American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) 62.1 and 90.1 Standards, and W. Va. Code.
- As funds are available, replace HVAC systems operating beyond their expected life range with an HVAC system and controls capable meeting the standards of ASHRAE 62.1 and 90.1, WVBE Policy 6200, and all other required building codes.
- Review controls for the respective facilities to determine the cause of the temperature control issues and address the findings accordingly. HVAC Technicians from the WVDE are available to assist with this review upon request.
- Review the county’s preventive maintenance program to ensure a balanced relationship between planned preventive maintenance and unplanned corrective maintenance. HVAC Technicians are available to assist with this review.
- Evidence suggests preventive maintenance is not being performed districtwide. A preventive maintenance plan is required by WVBE 6200. A strategic examination of the roles and responsibilities of all maintenance staff is recommended, followed by creation of a plan to utilize staff in a manner to ensure efficient, timely preventive maintenance occurs. Furthermore, it is essential county office administrative staff monitor maintenance projects to ensure completion.

# School Facility Findings

## **DUVAL PREK-2 (PORTABLE CLASSROOMS)**

Due to structural issues, the main Duval PreK-8 Facility has been deemed unsafe for occupation. The students in grades PreK-2 are currently being served in the detached portable structure that was excluded from the professional engineer's recommendation to vacate. These findings are specific to the portable structure currently housing grades PreK-2.

Lincoln County is applying for a NEEDS grant from the School Building Authority of WV (SBA) to close the current Duval PreK-8 facility. The proposed new facility would consolidate Duval PreK-8 and Midway Elementary School. Should this application be approved, it may become unfeasible to complete some of these recommendations. However, the district maintains the responsibility of providing clean and safe facilities until such time as the new school is constructed.

### **Findings:**

- The entry to the portable structure does not meet the requirements of a safe school entry and offers no method to monitor entry and exit. The facility's proximity to the main road and lack of controlled entry and exit increase the risk of accidents and unauthorized access to students.
- Water from site drainage, roof drains and HVAC condensation are draining under the facility, causing the skirting to deteriorate and creating an ideal environment for mold growth and metal corrosion.
- Single, residential style thermostats represent two classroom spaces in each modular section. The thermostats are located on an exterior wall that receives the evening sun, causing significant issues with temperature control. WVBE Policy 6200 requires each classroom to be considered a single zone with controls allowing direct control of the space temperature
- The access panel for the crawl space had been removed and was leaning against the building.
- Sections of the handrail on the front deck are failing, presenting a safety hazard. (Photo Appendix Figure 4)
- Air quality measurements at the time of the Review revealed elevated CO2 levels in Rooms 301 and 302, indicating improper outside air ventilation.

### **Corrective Actions:**

- Install cameras and monitoring equipment to observe entry and exit into the building. Consideration may be given to installing a door alarm to notify staff in the event of any unauthorized exit.
- Provide a means of drainage to adequately remove water from the perimeter of the facility.
- Thermostats should not permit occupants control of the outdoor air supply fan. Consideration may be given to replacing existing thermostats and/or adapting the current building automation system to control the units in the correct manner.
- Replace missing access panel in order to prevent unauthorized access.
- Repair or replace deck to prevent injury to staff and students.

- Set the fan switch to ON for each of the thermostats during occupied hours. Verify that the outside air damper opens when the supply fan is operating.

### **DUVAL 6-8 (CENTRAL OFFICE)**

Due to structural issues, the main Duval PreK-8 facility has been deemed unsafe for occupation. The students in grades 6-8 are currently being served in the central office facility. These findings are specific to that location.

#### **Findings:**

- Most parts of this facility are not handicapped accessible and do not meet the requirements of the Americans with Disabilities Act (ADA).
- Multiple classrooms are controlled by a single thermostat. The fan mode switch is accessible to the occupants. WVBE Policy 6200 requires that each classroom be considered a single zone having the controls that allow direct control of the space temperature. Thermostats should not permit occupants control of the outdoor air supply fan.
- Residential style HVAC units are being used throughout the facility. These units are not designed to provide outside air ventilation or humidity control. Team members measured elevated CO2 levels in the classroom, indicating inadequate outside ventilation.
- Rooms 105, 105-A, and 105-B share a common furnace and thermostat. This configuration does not provide adequate supply and return air ducts are not in place for effective heating and cooling in this space.
- The Team observed evidence of roof leaks in Rooms 106, 107-A, and in the corridor outside Room 124.
- The ceiling exhaust fan in Room 109 has a broken louver, allowing an unrestricted path for air to infiltrate or escape the space.
- In Room 109, the Team observed electrical wires connected with wire nuts and not terminated inside an electrical junction box.
- Rooms 109 and 109-A share a furnace with the food service dry storage warehouse. The thermostat for these spaces is in the food service dry storage area. The heating and cooling loads for the warehouse and the classrooms will be very different and will cause temperature control issues.
- In the warehouse space adjacent to rooms 109 and 109-A, a propane powered fork truck is being used. The ceilings from the warehouse are open to the classrooms allowing exhaust from the fork truck to reach the classroom areas.
- **The Team observed a thermostat containing mercury in Room 119.**
- The furnace located in the band room does not have a drip-leg on the incoming natural gas line. The thermostat is mounted directly on the furnace.
- The kitchen doesn't have an exhaust fan for the dishwasher, and there is a gas-fired water heater in the space. An exhaust hood is necessary to control moisture levels, prevent contamination from the kitchen, and prevent adverse effects on the function of the water heater.
- The electrical outlet located near the water fountain in the cafeteria needs to be ground fault protected.

- The team observed an open flame, hanging unit heater in the cafeteria area. WVBE Policy 6200 prohibits open-flame, fuel burning heaters in student- and staff-occupied spaces.
- There is a residential-style furnace located in the cafeteria that serves Room 120-A. Condensation is leaking near and under the furnace, causing the area to be conducive to mold growth.
- The lighting levels in many classrooms are below acceptable levels due to failed light fixtures or expired bulbs.
- The Team observed missing ceiling tiles in several rooms.

**Corrective Actions:**

- Renovate the facility and grounds to comply with ADA requirements.
- Replace current thermostats with controls that do not permit the occupants to alter the operation of the supply fan and represents both classrooms for temperature control. Some stand-alone thermostats may have this capability, but the current building automation system may be adapted to control the HVAC units in the correct manner.
- Replace HVAC systems and controls be replaced with units that can meet the requirements of WVBE Policy 6200, ASHRAE 62.1 and ASHRAE 90.1. Contact an HVAC design engineer to determine the proper air volumes and other relevant conditions needed for each space.
- Determine the cause of water intrusion, make necessary repairs, and replace all damaged materials.
- Determine if the exhaust fan is still required in Room 109. Repair or replace the louvers if the exhaust fan is to remain in place.
- Contact a licensed electrician to place the wires in the junction box and install a cover on the box.
- Maintain a negative pressure on the warehouse when the fork truck is being used or consider switching to a battery-operated forklift to eliminate exhaust fumes.
- Remove and properly dispose of the mercury thermostat and replace it with an electronic thermostat or covert the HVAC to the building automation system.
- Install a drip leg on the gas line and relocate the thermostat to an area that better represents the temperature of the space.
- Contact an engineer to design an exhaust and makeup air system for the kitchen. A carbon monoxide sensor must also be installed.
- Install ground fault protection on all electrical circuits located within six feet of a water source.
- Insulate the ductwork and drain the condensate water to the exterior of the building.
- Replace all failed lamps and ballasts to restore proper lighting levels to the classrooms. Place this task on a frequent housekeeping schedule.
- Replace all missing or damaged ceiling tiles to maintain smoke barriers, acoustics, and aesthetics of the spaces.

## **GUYAN VALLEY MIDDLE SCHOOL**

### **Findings:**

- Most parts of this facility are not handicapped accessible and do not meet the requirements of the ADA.
- The HVAC equipment at this site has exceeded the life expectancy of 12-15 years and does not meet ASHRAE standards for proper ventilation or temperature control.
- One of the unit heaters in the gymnasium has a hot spot on the bottom of the unit, which typically indicates a failure of the heat exchanger. Cracked heat exchangers cause carbon monoxide gases to be introduced into the occupied spaces. (Photo Appendix Figure 5)
- A high voltage breaker panel box in the basement is missing the front cover, thereby exposing the electrical busses. (Photo Appendix Figure 6)
- The union on one of the heating loop hydronic heaters is badly corroded and is at risk for a major failure. (Photo Appendix Figure 7)
- The roof area has several areas of vegetation growth and roof drains are substantially blocked by vegetation, causing large areas of ponding water. A large volume of water on the roof may damage the structure and cause roof leaks. Vegetation on the roof membranes prematurely degrades the rubber materials. (See Photo Appendix Figure 3)
- The gym has several lights that have failed and four missing light fixtures.

### **Corrective Actions:**

- Renovate the facility and grounds to comply with ADA requirements.
- Replace the current HVAC system and controls with systems that meet ASHRAE 62.1 and 90.1 Standards, as required by W. Va. Code.
- Inspect the heat exchanger in the gym and replace if needed.
- Replace the breaker box front panel to prevent access and reduce the risk of electrocution.
- Install controls to properly regulate the heat.
- Replace the corroded union as soon as possible.
- Remove all vegetation on the roof and around the drains and place this task on a routine maintenance interval.
- Replace the failed and missing light fixtures to restore proper lighting levels to the gymnasium.

## **HAMLIN PREK-8**

Due to structural issues, the main Duval PreK-8 Facility has been deemed unsafe for occupation. The Duval students in grades 3-5 are currently being served in available classrooms at this facility. These findings are related to the facility as a whole and not specific to the areas that serve Duval or Hamlin students.

### **Findings:**

- Most parts of this facility are not handicapped accessible and do not meet the requirements of the Americans with Disabilities Act (ADA).
- The HVAC equipment at this site has exceeded the life expectancy of 12-15 years and is not labeled as required by WVBE Policy 6200. The Team noted excessive noise due to high water flow on the gym HVAC units. The right-hand HVAC unit is not working in Room 204, and there is excessive HVAC noise in Room 205. There are numerous temperature control complaints from the staff about excessive heat or cooling.
- During the visit, the Team observed several issues with the facility's doors. The door in Room 104 will not close automatically. The emergency exit door in Room 108 opens inward and does not have panic door hardware. Additionally, the exterior door labeled 15 has a bent door closure bracket that prevents the door from closing automatically.
- The handle on the emergency shut off valve in Room 102 is broken.
- The wooden stairs in Room B4 were built to be used for emergency exits, but they do not meet the building code requirements for exit stairs. The emergency exit door for Room B1 is sticking and does not have panic door hardware for emergency egress. (Photo Appendix Figure 8)
- The Team observed water-damaged flooring in both the boys' and visitors' locker rooms. The insulation on the chilled water pipes is covered with mold growth in the storage room of the boys' locker room. The HVAC unit is not operating in the boy's locker room. The door from the coach's office to the storage area is badly corroded.
- There is an active leak from the ceiling in Room B1 from the HVAC unit above.
- Numerous issues were discovered in the boiler room. The temperature and pressure relief valve on Boiler #1 is improperly plumbed to a plastic 55-gallon drum. A portion of insulation has been removed from the chilled water side stream filter causing water to condense on the unit. Evidence of high temperatures was discovered around the sight glass on the rear of Boiler #2. Standing water was observed on the floor around the sink. (Photo Appendix Figures 9, 10, 11)
- In the kitchen, the exhaust fan for the dishwasher is not adequately capturing the steam, causing the ceiling grid and diffusers in the area to rust.
- The small overflow cafeteria has 4 damaged floor tiles at the exit and tables block the emergency egress path.
- Portions of insulation have been removed from the service valves on the chilled water and hot water piping in room 113.
- The stairwell by room 105 has structural cracks and water ponding at the footing.
- The elementary elevator certification was dated in 2019. The air in the elementary elevator smells very musty and water is ponding in the elevator pit.



- There are stained and moldy ceiling tiles around the roof drains in the cafeteria and throughout the facility.
- The lighting levels in many classrooms are below acceptable levels due to failed light fixtures or expired bulbs.
- There were several exit doors found to be blocked open with rocks.
- Elevated carbon dioxide levels were measured in several classrooms, indicating inadequate outside air ventilation.

**Corrective Actions:**

- Renovate the facility and grounds to comply with ADA requirements.
- Replace the current HVAC system and controls with systems that meet ASHRAE 62.1 and 90.1 Standards, as required by WV Code. Repair the HVAC unit to maintain proper humidity levels and to replace the moldy insulation. Balance the water flow to HVAC units to reduce the excessive noise. Noise levels should be maintained at or below 35 dBA. Permanently label all HVAC units with mechanical ID numbers that are unique for each piece of equipment. Review the controls and HVAC units for this site to determine the causes of the temperature control issues. WVDE staff members can assist with this review if desired.
- Repair the door to allow the door to close and latch as designed. Replace the door with a proper fire rated door and equip the door with the correct hardware. Verify exit door changes with the State Fire Marshall. Repair or replace the door to maintain a proper fire rating for the space. Replace the door with a door that swings outward, has the correct fire rating, and is equipped with panic hardware. Verify exit door changes with the State Fire Marshall. Replace the bent door closure bracket. Exit doors should close and latch automatically to provide a safe environment. Instruct all staff and students to stop this practice.
- Replace the broken valve handle.
- Revise the stairs to meet WV State Fire Code and install grabbable handrails, balusters and risers on the stair treads.
- Repair any source of the water intrusion and replace the damaged flooring. Carpeting in this area is not a recommended material for the locker rooms due to the high potential of water intrusion into this area.
- Plumb the drain on the T&P valve to a floor drain that terminates with 6" of the floor as required by plumbing code. Replace the missing or damaged insulation and instruct maintenance staff that insulation must always be reinstalled upon completion of a repair. Inspect the boiler operation and check for cracked fire bricks that may be allowing the metal at the base of the boilers to become excessively hot.
- Determine and repair the source of the standing water around the boiler room sink.
- Determine if the dishwasher exhaust fan is operating at the design air flow, and to increase the exhaust air flow, if possible, to capture more steam.
- Replace the damaged floor tiles and maintain a clear path of egress from the overflow cafeteria to the exit doors.

- Contact a structural engineer to evaluate the structural integrity of the stairwell and to develop a solution to prevent the water ponding. Over time, water intrusion could deteriorate the foundation.
- Elevator certification letters must be kept up to date and posted in the elevator cab. Obtain and install a current certification letter in the cab. Determine the cause of the water infiltration into the elevator pit and clean the elevator pit of dirt and debris. A sump pump may be required to keep this area clear of water.
- Repair the roof leaks and replace all stained or missing ceiling tiles.
- Replace all failed lamps and ballasts to restore proper lighting levels to the classrooms. Place this task on a frequent housekeeping schedule.
- Determine if the outside air dampers are opening and the building automation controls are set to control the dampers correctly during the occupied mode. WVDE staff members can assist with this finding if desired.

## **HARTS PREK-8**

### **Findings:**

- All areas of the facility were well ventilated. Indoor air quality readings were acceptable.
- At the time of the visit, the ceiling heater for the office entry was on, while the facility controls were set to cooling.
- The side stream filter for the chilled water loop is not insulated and condensation is running onto the floor.
- The insulation has been removed from the triple duty valve that serves chilled water pump # 1. This is causing the valve to corrode and will cause damage to the insulation below the valve.
- There is evidence of high temperatures around the sight glass on the rear of the boilers due to over firing. (Photo Appendix Figure 12)
- There is a leak in the domestic water line near the hot water tanks in the boiler room. There is no acid neutralizing media in the condensate drain device for the domestic water heaters.
- The time on the fire alarm system was incorrect by four hours.
- There were multiple active roof leaks in the corridors.
- The fire door on the second floor is being held open with a door stop.
- There were multiple complaints that the building had been experiencing temperature control issues. When the control system was checked, some classrooms were overcooling.

### **Corrective Actions:**

- Adjust the thermostat or replace the limit switch that is holding the fan on. Investigate why spaces are overcooling and correct the issues. WVDE HVAC Technicians can assist with this item if desired.
- Replace all missing or damaged insulation and to instruct maintenance staff that insulation must always be reinstalled upon completion of a repair.

- Inspect the boiler operation and check for cracked fire bricks that may be allowing the metal at the base of the boilers to become excessively hot.
- Repair the water leak in the domestic water line in the boiler room.
- Replace the acid neutralization media in the condensate lines of the domestic water heaters to prevent corrosion to the drain lines of the facility. The media is a consumable item and must be replaced at scheduled intervals. Place this task on a routine maintenance schedule.
- Correct the time and date on the fire alarm system. Task school staff with monitoring the panel to ensure that the time and date are correct.
- Repair the roof leaks and replace all stained or missing ceiling tiles.
- Fire doors should not be physically held open as they are required to close on activation of the fire alarm system. Repair the magnetic hold back that normally keeps this door open.

## **LINCOLN COUNTY HIGH SCHOOL**

### **Findings:**

- The school is experiencing maintenance issues disproportionate to the age of the facility. Mechanical systems and components have required premature replacement due to inadequate preventative maintenance. The age of the facility suggest that much of the equipment is toward the end its expected life span, and critical maintenance is necessary to prolong equipment life and reduce repair cost. Due to the size of the equipment at this facility's overall budget would be significantly impacted by system failures at this school.
- The condition of the HVAC equipment and controls indicates poor maintenance and housekeeping practices. The last date on the maintenance log was 2016. The chilled water coils for the rooftop HVAC units are very loaded. Interior insulation on the units is loose and being entrained into the breathing zone. Several air filters had fallen out of the filter rack on the roof top units. (Photo Appendix Figures 13 and 14)
- Both the maintenance and information technology needs are currently served by a single individual in a dual role. Consistency of interview responses and document review indicated this arrangement is not currently conducive to maintaining a facility of this size.
- Custodians report they are commonly called multiple times during a workday to reset the elevator. When the safeties on mechanical or electrical equipment are tripped, the cause of the failure should be investigated. Frequent failures of the elevator safeties may indicate serious issues that need to be repaired before continued use of the elevator. Safeties should not be reset over and over without investigating the cause of the failure to avoid the risk of harming or entrapping staff and students.
- The kitchen staff report failures of various kitchen appliances that have been failed for up to 4 years. These appliances include the pass-through refrigerator, garbage disposal, ice machine, and auto function on the dish washer. Other repairs that were reported as long term were a leak in the drain for the sink in the small kitchen work room and the dishwasher has steam escaping into the workspace due to a curtain assembly that needs replaced on the dishwasher. The elastomeric insulation on the walk-in freezer and coolers has badly degraded and is missing in places. The bird screens are missing on the freezer and cooler condensers.

- The electric ceiling heater was on in the storage room of the kitchen with a room temperature of 82°f.
- A repair has been made to the domestic water the mixing valve in the kitchen storage room. The insulation has not been replaced.
- The drain at the base of the loading dock was collecting debris and grass was growing from the drain.
- The filters in the range hood of the pro start kitchen were very dirty. The service tag showed the last cleaning was 2018.
- The perimeter baseboard heaters under the art room windows are partially detached from the wall and are filled with debris.
- The anchor bolts securing the pull up bar in the main gym were pulled out of the wall.
- Boiler #1 was in alarm mode, showing a flame failure.
- One of the chilled water pumps was missing insulation and was dripping condensation.
- The dust collection system in the building construction shop is not operational. The instructor reported it has been out of service for many years. A proper dust collection system is essential to maintain proper indoor air quality in the space.
- The ice machine in Room 1205 has not been serviced or cleaned in many years.
- The band storage room was excessively cluttered with stored materials that impede access to the HVAC system unit and controls within that space. Excessive clutter and stored items were also present on the mezzanine of the ROTC classroom. This clutter prevents emergency egress from the mechanical rooms adjacent to this space and prevents access for maintenance of the HVAC equipment. (Photo Appendix Figure 15)
- The weather stripping on several exterior doors is missing or badly damaged, allowing air infiltration and heat loss. (Photo Appendix Figure 16)
- There were several stained and damaged ceiling tiles in the art room hallway and the media center. The girl's locker room has damaged ceiling tiles due to a water leak.
- There are many building automation sensors that are failed or that need to be calibrated.

**Corrective Actions:**

- Evidence suggests preventive maintenance is not being performed at this site. HVAC units are excessively loaded, fan belts are very loose on most of the units inspected and the mechanical rooms are unkept. A preventive maintenance plan is required by WVBE 6200. A strategic examination of the roles and responsibilities of all maintenance staff in order to ensure preventive maintenance occurs is recommended.
- Contact the vendor responsible for the maintenance of the elevator to schedule a service visit.
- Ensure all failed kitchen appliances have been reported utilizing the established system for maintenance work orders. Once these have been reported, the items be repaired or replaced in a timely manner.

- Thoroughly clean and service the rooftop equipment. Additionally, replace all damaged insulation on the access doors and interior surfaces of the units and determine why these units have reached this state of disrepair. Ensure that these units are serviced as stated in the Operations and Maintenance manuals for the equipment. Revise the size of the filters to ensure that the filters remain in their racks even when the supply fan turns off.
- Replace the degraded insulation and paint the insulation with UV protective paint.
- Replace the missing bird screens to prevent damage by birds and other pests.
- Adjust the thermostat on the unit to turn off at 60°F.
- Replace the insulation on the mixing valve and instruct maintenance staff that insulation must always be reinstalled upon completion of a repair.
- Clear the drain of debris and remove all vegetation and to place this task on a routine housekeeping schedule.
- Clean the filters on the range hood in the Pro Start room and place this task on a routine maintenance schedule.
- Reattach the perimeter heaters in the art room and remove all foreign materials within the heaters. Additionally, verify that these units are operational and repair any failed heaters if necessary.
- Properly store all items on a shelf and maintain clear paths to allow service and maintenance of equipment. Instruct staff and students to properly store all items to provide a path of emergency egress from the mechanical rooms and a means to move equipment and parts in and out of the mechanical rooms.
- Properly secure the pull up bar with fasteners rated for the expected loads on the bar.
- Diagnose the cause of the flame failure and repair to return the boiler to operational status.
- Replace any missing insulation and instruct maintenance staff that insulation must always be reinstalled upon completion of a repair.
- Determine the cause of the failure on the dust collection system in the building construction shop return it to normal service. If it cannot be repaired, the unit be replaced.
- All ice machines require regular maintenance and cleaning to provide ice that will be consumed. Thoroughly clean and service all ice machines and place this task on a routine maintenance schedule.
- Replace all damaged or missing weather stripping on the doors and place this task on a routine maintenance schedule.
- Repair roof leaks and other sources of moisture and replace any stained and damaged ceiling tiles.
- Each of the sensors on the building automation system are required to be operational and accurate to enable the controls to properly control the HVAC systems in the facility. A list of failed or inaccurate sensors has been attached as Appendix A. Replace or calibrate the sensors listed to enable the control system to operate the HVAC systems.

## **MIDWAY ELEMENTARY SCHOOL**

### **Findings:**

- Most parts of this facility are not handicapped accessible and do not meet the requirements of the Americans with Disabilities Act (ADA).
- The HVAC equipment at this site has exceeded the life expectancy of 12-15 years and does not meet ASHRAE standards for proper ventilation or temperature control.
- Recommendations to mitigate indoor air quality (IAQ) issues on WVDE IAQ reports from 2016 and 2019 have not been initiated. Most of the indoor air quality issues that were cited in these reports still remain.
- The fire alarm panel has a fault indicated as “Trouble Telco Line #1”.
- There are drainage issues in the area around the main entry to the building, as indicated by traces of dirt and debris. There are also roof drains that terminate at ground level near the building, causing water to pond under the portable units. There is no vapor barrier to help prevent mold growth or rotting of the structure.
- The combustion air dampers in the furnace room are more than fifty percent blocked. Emergency egress from furnace room is blocked by water hoses and debris piled up outside the exit door. There are no carbon monoxide detectors in this room. (Photo Appendix Figure 17)
- The Team noted efflorescence and peeling paint in multiple spots on the exterior of the building, indicating water intrusion into the block.
- The interior roof access for the original structure is constructed of wood and is not an OSHA approved ladder. The roof hatch is not hinged and is difficult to remove and replace. The roof over the original structure has insulation fasteners that are beginning to protrude through roofing, rubber coating, and membrane. (Photo Appendix Figure 18)
- Two rooftop HVAC units are missing condensate traps. Condensate traps are essential for proper drainage of condensate water.
- There are two ground mounted package HVAC units that have condensate water constantly draining to the ground around the unit, causing the soil to stay moist and covered with vegetation and mold. The outside air intake for both units is very near the soil, causing the outside air to be contaminated as it travels across the moist and moldy soil. This issue was cited in previous WVDE Indoor Air Quality reports. (Photo Appendix Figure 19)
- The HVAC unit for the cafeteria was not working at the time of the visit.
- The HVAC unit for Room 100 is mounted ground level outside of the room. The insulation for the ductwork is missing and there is a space near the roof edge where pests have damaged the insulation and have been entering the building. A service disconnect is not provided at this unit as required by code. (Photo Appendix Figure 20)
- The decking and stairs to the classrooms located at the portable units are in disrepair. The deck is sagging, and the stairs and handrails do not meet ADA requirements or standard building practices. The wood is aged and splintering. (Photo Appendix Figure 21)
- The evaporator coil and air filter are excessively dirty in the window air conditioner serving room 202. There is visible mold growing inside the unit.
- Room 114 was originally a storage room but is now an occupied space that is being used as

a “calming room.” No alterations in the HVAC systems were made to provide ventilation or temperature control in the space. The service entrance for the domestic water is also located within this space.

- The fencing that prevents access to the creek is not intact.
- There is mold on a ceiling tile in Room 108.
- The fan switch was set to the auto mode in several classrooms, causing inadequate outside air ventilation. This issue was previously cited on the WVDE IAQ reports that are also provided in appendix b of this document
- Electrical control boxes for the package sewage plant were unlocked, and access was not restricted to this area. These panels contain live high voltage electrical circuits that may be lethal if accessed by unauthorized staff or students.
- Rooms 108, 118, and the modular and portable classrooms have elevated CO2 levels. This issue has been cited on previous WVDE Indoor Air Quality reports.
- Stairwells are being used for storage of paper products, furniture, and other combustible materials that are not permitted in paths of emergency egress. (Photo Appendix Figures 22 and 23)
- The water heater in the custodial room has a drain on the temperature and pressure relief valve that is not plumbed into a drain or acceptable receiver.
- The Energy Usage Intensity (EUI) for the facility is nearly twice the average of the other schools in the district.

	<b>2018 EUI</b>	<b>2019 EUI</b>
<b>MIDWAY ES</b>	<b>118.6</b>	<b>100</b>
<b>COUNTY AVERAGE</b>	<b>76.9</b>	<b>68.25</b>

**Corrective Actions:**

- Renovate the facility and grounds to comply with ADA requirements.
- Replace the current HVAC system and controls that ASHRAE 62.1 and 90.1 Standards as required by WV Code.
- Resolve indoor air quality issues cited in all previous WVDE IAQ reports.
- Diagnose and correct the fire alarm fault to restore the fire panel to normal operation.
- Slope the grounds around each facility so that water does not drain under the structures and plumb all roof drains to a storm drain. Install a vapor barrier and a means to ventilate the areas beneath each raised structure to prevent ground moisture. Replace all rotted and damaged skirt panels.
- Clear the intake grilles of the combustion air dampers and install a carbon monoxide detector. Additionally, all obstacles blocking the path of egress from the furnace room should be removed.
- Determine the cause of any water intrusion and seal areas as necessary. Damaged areas should be repainted once repairs have been completed.

- Replace the interior roof access ladder with an OSHA approved ladder and consider replacing the existing roof hatch with a spring-assisted hatch.
- Contact the roofing contractor for the roof to determine if this issue is covered under warranty. Repair the roof before the fasteners penetrate the roof membrane.
- Replace the missing condensate traps. Repair or replace the HVAC unit for the cafeteria.
- Replace the missing insulation around the HVAC unit for Room 100 and close all gaps that allow pests to enter the building. Additionally, install an electrical service disconnect within site of the unit as required by NEC codes.
- Rebuild or replace the decks, stairs, and handrails to comply with ADA standards and meet standard building practices.
- Properly clean and sanitize the window air conditioner in Room 202 and place this task on a routine maintenance schedule.
- Install an HVAC system in Room 114 that provides adequate ventilation for the maximum number of occupants to utilize the space, as well as temperature and humidity control as required by ASHRAE 62.1 and 90.1. Additionally, determine if the dangerous components of the service entrance pose a hazard to the students that use this space, and cover the components with closed cell elastomeric insulation if padding is deemed necessary. Cease the use of Room 114 as a calming room until proper ventilation is installed.
- Repair the fence to provide complete isolation from the creek.
- Remove the ceiling tile from the indoor environment. Determine the source of moisture allowing the ceiling tile to get wet and eliminate the source. Replace the ceiling tile once repairs have been completed.
- Replace all thermostats with fan control with thermostats that do not allow the occupants to alter the fan operation. The fan switch should be set to the ON mode to cause the supply fans of the HVAC units to run continuously during the occupied mode causing the introduction of outside air into the spaces. When the fan is switched to the AUTO mode, outside air is not introduced to the spaces for long periods of time and negatively impacts the indoor air quality.
- The most effective means of controlling the HVAC units is to convert the controls to a building automation system. A building automation system could provide remote control and monitoring of the HVAC systems throughout, providing monitoring and alarming of temperatures, humidity levels, equipment failures, and indoor air quality indicators.
- Immediately secure all panels throughout the facility to prevent unauthorized access.
- Review the schedules and HVAC operations for this site and determine why the energy usage for this site is excessive.



## **RANGER ELEMENTARY SCHOOL**

### **Findings:**

- Most parts of this facility are not handicapped accessible and do not meet the requirements of the Americans with Disabilities Act (ADA).
- The HVAC equipment at this site has exceeded the life expectancy of 12-15 years and do not provide outside air to the facility. HVAC units installed within the classroom exceed acceptable noise levels when operating. The HVAC equipment is not labeled as required by WVBE Policy 6200.
- All programmable thermostats are set to the hold mode preventing the normal schedules from controlling the HVAC units. Programmable thermostats were purchased as an energy saving effort. Placing the thermostats on HOLD causes the HVAC system to maintain daytime comfort levels 24 hours per day.
- The lighting levels in many classrooms are below acceptable levels due to failed light fixtures or expired bulbs.
- There is a strong sewer odor on the grounds of the school emanating from the school's sewage treatment plant.
- The exterior door frame for the kitchen is deteriorated, and paint peeling off the block near the exterior door in the kitchen. This is being caused by water intrusion.
- There is no exhaust hood for the dishwasher in the kitchen and the excess moisture has caused the ceiling grid to rust.
- The cafeteria/multipurpose room has two open flame hanging unit heaters.
- The computer room has a mercury containing thermostat mounted on the wall.
- The room identified as a calming room does not have air conditioner or outside air for ventilation. All occupied spaces must have proper ventilation and temperature control.
- The flooring throughout the facility is in poor condition.

### **Corrective Actions:**

- Renovate the facility and grounds to comply with ADA requirements.
- Replace the current HVAC system and controls with systems that meet ASHRAE 62.1 and 90.1 Standards, as required by WV Code.
- Replace all failed lamps and ballasts to restore proper lighting levels to the classrooms. Place this task on a frequent housekeeping schedule.
- When operated in a proper manner, sewage plants produce little odor. Verify that the sewage plant is operating correctly and make necessary repairs to mitigate the strong odor.
- Relocate the HVAC units or provide sound attenuation materials to reduce the ambient sound levels to meet acceptable noise levels of 35 dBA.
- Plumbing code requires that the drains on temperature and pressure relief valve be plumbed to a drain or other acceptable receiver. Plumb the temperature and pressure relief valve to a floor drain or sink to prevent water damage when the valve trips or fails.

- Repair or replace the exterior kitchen door frame and determine what is allowing water to penetrate the block wall. Repaint the wall once corrections have been made.
- An exhaust hood is needed to control moisture levels and prevent contaminants migrating from the kitchen to surrounding areas. Contact an HVAC design engineer to design an exhaust and makeup air system for the kitchen. A carbon monoxide sensor should also be installed in the kitchen area.
- WVBE Policy 6200 prohibits open-flame, fuel burning heaters in student and staff occupied spaces. Replace these heaters with a system that meets ASHRAE 62.1 and 90.1.
- Remove and properly dispose of the mercury containing thermostat and replace it with an electronic thermostat or convert the HVAC to a building automation system.
- Replace the floor as funds become available.
- Labeling HVAC units enables accurate and proper identification of the equipment by first responders, HVAC contractors, designers, and all other personnel involved in the maintenance and operation of a building's systems. Label all HVAC units with laminated, engraved labels that use the same identification nomenclature assigned by the mechanical drawings for the project. WVDE staff can assist in creating mechanical ID labels if requested.
- The HVAC systems and controls for these rooms were not designed to meet the required ventilation rates of classroom spaces. Replace the HVAC systems and controls with units that can meet the requirements of WVBE Policy 6200, ASHRAE 62.1 and ASHRAE 90.1.
- Return all thermostats to their normal schedule and instruct school staff not to modify this mode. If the spaces are not reaching comfort level temperatures before staff arrives, adjust the schedule to start earlier until the room temperature is satisfied prior to arrival.

## **WEST HAMLIN ELEMENTARY SCHOOL**

### **Findings:**

- The HVAC equipment at this site has exceeded the life expectancy of 12-15 years.
- All spaces are experiencing elevated humidity and temperature levels due to the chiller operating at low capacity.
- The control panel doors on the chiller are not accessible due to the wooden structure over the pipes.
- Staff have expressed concerns about how classroom doors are to be secured in the event of a lock down event. Several doors are not lockable from the inside of the classroom, requiring a key to lock the door from the hallway side of the door. School staff members state that keys are not available to substitutes. County maintenance has suggested that all classroom doors be continuously locked.
- The temperature and pressure relief valve on the domestic hot water heater, located between the two hydronic water heaters, has a significant, continuous leak.
- A domestic water heater that has been installed between the two hydronic loop water heaters now restricts the needed clearance to properly service the hydronic loop water heaters.
- There is a significant volume of trash and clutter inside the chiller fence and surrounding area.

- The red failure indicator light on the sewage lift pump is illuminated, indicating the unit has failed.
- A path leading to the emergency exit door in the media center is blocked.
- The lighting levels in many classrooms are below acceptable levels due to failed light fixtures or expired bulbs.
- The energy usage intensity (EUI) for the facility is nearly twice the average of the other schools in the county.

	<b>2018 EUI</b>	<b>2019 EUI</b>
<b>WEST HAMLIN</b>	<b>127.6</b>	<b>120</b>
<b>COUNTY AVERAGE</b>	<b>76.9</b>	<b>68.25</b>

**Corrective Actions:**

- Replace the current HVAC system and controls with systems that meet ASHRAE 62.1 and 90.1 Standards, as required by W. Va. Code.
- Repair the chiller to enable the unit to operate at full capacity. Remove part of the wooden walkway to allow access to the chiller controls.
- Assure school safety procedures have been reviewed with all school staff and ensure any safety concerns have been addressed. Replace or repair locks as necessary to comply with local emergency plans.
- Replace the temperature and pressure relief valve on the domestic hot water heater and place the inspection of these units on a routine maintenance interval.
- Each of the hydronic loop water heaters requires a minimum clearance for operation and service. Relocate the domestic water heater if the minimum clearance is not present.
- Remove all trash and clutter within the fenced in area around the chiller and place this task on a routine housekeeping schedule.
- Diagnose and repair the cause of the failed sewage lift pump.
- Clear all stored items that block the path of egress from the media center. Periodically monitor to ensure the emergency exits are clear of stored materials at all times.
- Replace all failed lamps and ballasts to restore proper lighting levels to the classrooms. Place this task on a frequent housekeeping schedule.
- Review the schedules and HVAC operations for this site and determine why the energy usage for this site is excessive

# Photo Appendix

**Figure 1**

Emergency egress blocked in West Hamlin Elementary Media Center



**Figure 2**

Emergency egress blocked at Midway Elementary School





**Figure 3**

Vegetation and blocked drains on the roof at Guyan Valley Middle School



**Figure 4**

Handrail on the front deck at Duval PK-2 (Portables)





**Figure 5**

Hot spot on unit heater in the gymnasium at Guyan Valley Middle School



**Figure 6**

High voltage breaker panel box in the basement of Guyan Valley Middle School





**Figure 7**

Corroded union on heater at Guyan Valley Middle School



**Figure 8**

Wooden stairs in Room B4 at Hamlin PK-8





**Figure 9**

Boiler at Hamlin PreK-8



**Figure 10**

Boiler at Hamlin PreK-8





**Figure 11**

Temperature and pressure relief valve at Hamlin PreK-8



**Figure 12**

Boiler #2 at Harts PK-8





**Figure 13**

Chilled water coils at Lincoln County High School



**Figure 12**

Interior insulation on the HVAC units at Lincoln County High School





**Figure 15**

ROTC classroom mezzanine at Lincoln County High School



**Figure 16**

Damaged weather stripping on an exterior door at Lincoln County High School



**Figure 17**

Blocked combustion air dampers in the furnace room at Midway Elementary



**Figure 18**

Insulation fasteners on the roof at Midway Elementary





**Figure 19**

HVAC units at Midway Elementary



**Figure 20**

HVAC Unit ductwork at Midway Elementary





**Figure 21**

Decking and stairs to portable classrooms at Midway Elementary



**Figure 22**

Stairwells at Midway Elementary



# Previous WVDE Facilities Reports

## WVDE Data Sheet

County Lincoln

School Duval / BOE

Area \_\_\_\_\_

Technicians EA / KH

Date 8/30/2021

Year Built 2021 Renovation

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	474 ppm	76.0	72.0	0		Outside air for ventilation is not being provided to any of the classrooms.
Café	1,040	78.0	68.0	0	RTU / Unit Heater	Partially Full
PE Room	2,400	74.0	60.0	0	Package Unit	Full
118A	1,820	74.0	56.0	0	Package Unit	Full Classroom
119	1,400	74.0	72.0	0	RTU	Full
101A	1,350	74.0	52.0	0	Split System	Partially Full Classroom
101B	1,486	74.0	52.0	0	Split System	Partially Full Classroom
102	1,257	70.0	50.0	0	Split System	Partially Full Classroom
107	1,795	72.0	53.0	0	RTU	Partially Full Classroom
109B	990	74.0	64.0	0	Split System	Empty Classroom shared unit and thermostat with food warehouse.
111	1,500	73.0	65.0	0		Partially Full Classroom
113	1,522	73.0	65.0	0		Partially Full Classroom

## WVDE Data Sheet

County Lincoln

School Duval / Modular

Area Modular Classrooms

Technicians EA / KH

Date 8/30/2021

Year Built \_\_\_\_\_

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	459 ppm	75.0	70.0	0		
301	1,200	78.0	70.0	0	CRU	Partially Full Classroom
302	1,240	74.0	50.0	0	CRU	Partially Full Classroom
303	912	70.0	51.0	0	CRU	3 Adults in The Classroom
304	900	70.0	48.0	0	CRU	Partially Full Classroom
305	950	72.0	64.0	0	CRU	Full Classroom
307	1,100	73.0	67.0	0	CRU	Full Classroom
308	740	73.0	73.0	0	CRU	Empty Room
309	716	72.0	60.0	0	CRU	Partially Full Classroom
310	750	72.0	72.0	0	CRU	Partially Full Classroom



## WVDE Data Sheet

County Lincoln

School Guyan Valley MS

Area \_\_\_\_\_

Technicians \_\_\_\_\_

Date 8/31/2021

Year Built 1926

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	463 ppm	70.0	73.0	0		The CHV unit was not operating. Window AC Units for Cooling.
303	1,436	75.0	44.0	0	CHV	Full Classroom
302	1,300	76.0	54.0	0	CHV	Full Classroom
304	1,400	76.0	54.0	0	CHV	Full Classroom
317	1,471	75.0	46.0	0	CHV	Full Classroom
316	2,000	75.0	44.0	0	CHV	Full Classroom
320	1,470	75.0	38.0	0	CHV	Partially Full Classroom
207	900	74.0	43.0	0	CHV	2 Students

# WVDE Data Sheet

County Lincoln

School Hamlin PK-8

Area \_\_\_\_\_

Technicians EA / KH

Date 9/2/2021

Year Built 1954

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	427	76.0	72.0	0	CUV	Empty Classroom
201M	434	74.0	49.0	0	CUV	Empty Classroom
202	600	72.0	50.0	0	CUV	Empty Classroom
207	770	71.0	52.0	0	CUV	4 Students
204M	1,190	71.0	49.0	0	CUV	Empty Classroom
205	1,400	74.0	47.0	0	CUV	Empty Classroom
206	1,368	72.0	47.0	0	CUV	Full Classroom
104	1,800	72.0	50.0	0	CUV	3 Students
103	1,380	71.0	49.0	0	CUV	Full Classroom
105	1,700	72.0	63.0	0	CUV	Empty Classroom
107	1,400	72.0	62.0	0	CUV	Full Classroom
102	861	74.0	48.0	0	CUV	Empty Classroom
104	495	73.0	53.0	0	CUV	Empty Classroom
B4	975	72.0	53.0	0	CUV	Full Classroom
Gymnasium	787	71.0	62.0	0	CUV	Empty
B	2,122	71.0	50.0	0	CUV	Full Classroom
B1	1,087	74.0	56.0	0	CUV	Partially Full Classroom
108	994	71.0	50.0	0	CUV	Full Classroom
502	1,100	79.0	36.0	0	CUV	Empty Classroom
B3	1,000	75.0	49.0	0	CUV	Partially Full Classroom
Cafeteria	700	74.0	57.0	0	RTU	Empty
113	847	72.0	54.0	0	RTU	1 Student
114	618	71.0	53.0	0	RTU	Full Classroom
111	2,179	72.0	59.0	0	RTU	Full Classroom
112	1,650	72.0	51.0	0	RTU	Full Classroom
101	980	73.0	56.0	0	RTU	Partially Full Classroom
103	830	73.0	53.0	0	RTU	Full Classroom
102	1,100	72.0	53.0	0	RTU	Full Classroom
104	845	72.0	57.0	0	RTU	Full Classroom
105	820	72.0	52.0	0	RTU	Full Classroom
106	1,086	73.0	45.0	0	RTU	Full Classroom
107	996	71.0	53.0	0	RTU	Partially Full Classroom
109	1,021	71.0	54.0	0	RTU	Full Classroom

## WVDE Data Sheet

County Lincoln

School West Hamlin

Area \_\_\_\_\_

Technicians EA / KH

Date 8/31/2021

Year Built 1980

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	481 ppm	74.0	80.0	0		The inside temperatures and humidity are elevated due to the chiller operating at 15%.
Gymnasium	700	80.0	66.0	0	RTU	Empty
156	870	73.0	71.0	0	CRU	Full Classroom
160	880	75.0	76.0	0	CRU	Full Classroom
016	762	76.0	76.0	0	CRU	Partially Full Classroom
017	904	77.0	79.0	0	CRU	Partially Full Classroom
018	1,352	77.0	80.0	0	CRU	Empty Classroom
019	930	76.0	77.0	0	CRU	Full Classroom
161	1,500	78.0	73.0	0	CRU	Full Classroom
162	811	77.0	71.0	0	CRU	1 student in room
163	655	72.0	72.0	0	CRU	Empty Classroom

## WVDE Data Sheet

County Lincoln

School Midway Elem

Area \_\_\_\_\_

Technicians EA / KH

Date 8/30/2021

Year Built 1951

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	463 ppm	70.0	70.0	0		
Café'	609	78.0	72.0	0	RTU	
205	940	83.0	49.0	0	CHV/ Window AC	Full Classroom
204	1,100	78.0	47.0	0	CHV/ Window AC	Full Classroom
202	640	78.0	55.0	0	CHV/ Window AC	Three Adults in room with windows partially open
108	1,244	73.0	78.0	0	RTU	Full Classroom
110	1,150	73.0	73.0	0	RTU	Full Classroom with thermostat set in the auto fan mode.
112	1,185	73.0	50.0	0	RTU	Full Classroom
116	1,237	73.0	46.0	0	RTU	Full Classroom
118	1,260	71.0	49.0	0	RTU	Partially Full Classroom with thermostat set in the auto fan mode.
117	1,140	72.0	54.0	0	RTU	Full Classroom with thermostat set in the auto fan mode.
115	1,260	76.0	53.0	0	RTU	Full Classroom / shared thermostat
17	2,000	77.0	47.0	0	PTAC	Portable Classroom students had just left. One PTAC is not working
18	1,700	73.0	36.0	0	PTAC	Portable Classroom students had just left.
19	700	73.0	40.0	0	PTAC	storage Room
20	1,930	74.0	52.0	0	Bard CRU	Full Classroom in Modular Building
21	1,950	75.0	54.0	0	Bard CRU	Full Classroom in Modular Building

## WVDE Data Sheet

County Lincoln

School Harts PK-8

Area \_\_\_\_\_

Technicians \_\_\_\_\_

Date 9/1/2021

Year Built 2012

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	450	70.0	0.7	0		Multiple areas are cooled beyond the room sensor setpoint.
8	773	69.0	57.0	0	RTU	Full Classroom
9	764	69.0	55.0	0	RTU	Full Classroom
102	930	68.0	55.0	0	RTU	4 students
103	841	67.0	67.0	0	RTU	Partially full classroom
104	1,000	68.0	58.0	0	RTU	Full Classroom
105	990	68.0	56.0	0	RTU	Full Classroom
121	1,100	71.0	60.0	0	RTU	Full Classroom
209	815	72.0	67.0	0	RTU	Partially full classroom
203	850	72.0	67.0	0	RTU	Partially full classroom

## WVDE Data Sheet

County Lincoln

School LCHS

Area \_\_\_\_\_

Technicians EA / KH

Date 9/2/2021

Year Built 2008

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	455 ppm	72.0	71.0	0		
1134	1,200	72.0	60.0	0	AHU	Empty Classroom
1125	1,100	72.0	55.0	0	AHU	Partially Full Classroom
1127	968	71.0	56.0	0	AHU	Full Classroom
1130	1,200	72.0	72.0	0	AHU	Partially Full Classroom
1112	1,240	73.0	55.0	0	AHU	Partially Full Classroom
1105	1,248	73.0	55.0	0	AHU	Partially Full Classroom
1103	1,300	72.0	56.0	0	AHU	Partially Full Classroom
1042	1,214	71.0	61.0	0	AHU	Full Classroom
1045	775	71.0	62.0	0	AHU	Full Classroom
1035	878	71.0	60.0	0	AHU	Full Classroom
1024	658	72.0	55.0	0	AHU	Empty Classroom
1108	546	72.0	57.0	0	AHU	Empty Classroom
1015	488	76.0	55.0	0	AHU	Empty Classroom
1020	682	74.0	56.0	0	AHU	Empty Classroom
1207	858	71.0	54.0	0	AHU	Full Classroom
2119	1,000	71.0	53.0	0	AHU	Full Classroom
2110	812	70.0	55.0	0	AHU	Full Classroom
Cafeteria	953	69.0	65.0	0	AHU	Fully Occupied

## WVDE Data Sheet

County Lincoln

School Ranger Elem.

Area \_\_\_\_\_

Technicians \_\_\_\_\_

Date 8-31021

Year Built 1958

Location	CO2 (ppm)	Temp (°F)	rH (%)	CO (ppm)	Unit Type	Comments
Range	< 1200	68 - 75	30 - 60%	<10		
Outside Air	455	70.0	75.0	0		Outside air for ventilation is not being provided.
Computer Room	630	74.0	69.0	0	Split System	Empty Classroom
108	585	73.0	60.0	0	Split System	Empty Classroom
105	539	72.0	59.0	0	Split System	Empty Classroom
102	2,000	72.0	58.0	0	Mini Split	Full Classroom
101	1,470	72.0	59.0	0	Mini Split	Full Classroom
106	1,100	72.0	67.0	0	Bard / CRU	Full Classroom
109	925	72.0	64.0	0	RTU	Partially Full Classroom
103	852	72.0	53.0	0	RTU	Partially Full Classroom
107	888	72.0	63.0	0	Package Unit	Partially Full Classroom

**BAS Findings and Comments for Lincoln Co Schools**

Item	Device ID	Name	Value	Units	Status	Finding	Recommendation
1	Lincoln\HamlinJunior\GeneralOffice	CwValve	100	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
2	Lincoln\HartsPk-8\RTU_3B	CwValve	100	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
3	Lincoln\HamlinJunior\RmB3	HwValve	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
4	Lincoln\HartsPk-8\RTU_3B	HwValve	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
5	Lincoln\HartsPk-8\RTU_5A	MinOADamper	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
6	Lincoln\HamlinJunior\BoysLockerRm	OADamper	20	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
7	Lincoln\HamlinJunior\Rm102	OADamper	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
8	Lincoln\HamlinJunior\Rm203B	OADamper	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
9	Lincoln\HamlinJunior\RmB1	OADamper	10	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
10	Lincoln\HamlinJunior\YearBook	OADamper	Off	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
11	Lincoln\WestHamlin\Rm016	OADamper	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
12	Lincoln\WestHamlin\Rm019	OADamper	10	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
13	Lincoln\WestHamlin\Rm134	OADamper	0	%Open	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
14	Lincoln\LincolnHigh\AHU_1A3CVB	RetRH	67	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
15	Lincoln\LincolnHigh\AHU_1B2cvb	RetRH	29	%RH	Enabled	Humidity is excessively low.	Calibrate or replace the sensor
16	Lincoln\LincolnHigh\AHU_1B3	RetRH	30	%RH	Enabled	Humidity is excessively low.	Calibrate or replace the sensor
17	Lincoln\LincolnHigh\AHU_1B6	RetRH	64	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
18	Lincoln\LincolnHigh\AHU_1C5cvb	RetRH	63	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
19	Lincoln\LincolnHigh\AHU_1D2cvb	RetRH	62	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
20	Lincoln\LincolnHigh\AHU_1D3	RetRH	64	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
21	Lincoln\LincolnHigh\RTU_1E2	RetRH	9.7	%RH	Enabled	Humidity is excessively low.	Calibrate or replace the sensor
22	Lincoln\LincolnHigh\RTU_1E4	RetRH	82.1	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
23	Lincoln\HartsPk-8\RTU_5A	RmRH	10.7	%RH	Enabled	Humidity value excessively low	Calibrate or replace sensor
24	Lincoln\LincolnHigh\AHU_1A1	RmRH	100	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
25	Lincoln\LincolnHigh\AHU_1A2	RmRH	65	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
26	Lincoln\LincolnHigh\AHU_1A4	RmRH	65	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
27	Lincoln\LincolnHigh\AHU_1A5	RmRH	63	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
28	Lincoln\LincolnHigh\AHU_1A6	RmRH	68	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
29	Lincoln\LincolnHigh\AHU_1B1	RmRH	67	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
30	Lincoln\LincolnHigh\AHU_1B4	RmRH	68	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
31	Lincoln\LincolnHigh\AHU_1B5	RmRH	79	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
32	Lincoln\LincolnHigh\AHU_1B7	RmRH	67	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
33	Lincoln\LincolnHigh\AHU_1C3	RmRH	68	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
34	Lincoln\LincolnHigh\AHU_1C4	RmRH	62	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
35	Lincoln\LincolnHigh\AHU_1C7	RmRH	75	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
36	Lincoln\LincolnHigh\AHU_1E1	RmRH	72	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
37	Lincoln\LincolnHigh\AHU_1E2	RmRH	63	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
38	Lincoln\LincolnHigh\AHU_1E3	RmRH	62	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
39	Lincoln\LincolnHigh\AHU_1E4	RmRH	62	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
40	Lincoln\LincolnHigh\AHU_1F1	RmRH	100	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
41	Lincoln\LincolnHigh\AHU_2C1	RmRH	69	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
42	Lincoln\LincolnHigh\Rm1246	RmRH	67.5	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
43	Lincoln\LincolnHigh\RTU_1E1	RmRH	100	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
44	Lincoln\LincolnHigh\RTU_1E3	RmRH	73	%RH	Enabled	Humidity is excessively high.	Calibrate or replace the sensor
45	Lincoln\HartsPk-8\ElectRm	CoolerTemp	188	°F	Enabled	Temperature value excessively high	Calibrate or replace sensor
46	Lincoln\LincolnHigh\AHU_2C2cvb	CwCoilRetTemp	50	°F	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
47	Lincoln\LincolnHigh\Rm1004	DAT	78.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
48	Lincoln\LincolnHigh\Rm1019	DAT	74.2	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
49	Lincoln\LincolnHigh\Rm1021	DAT	78.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
50	Lincoln\LincolnHigh\Rm1046	DAT	78.8	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
51	Lincoln\LincolnHigh\Rm1056	DAT	74.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
52	Lincoln\LincolnHigh\Rm1074	DAT	76.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
53	Lincoln\LincolnHigh\Rm1083	DAT	72.7	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
54	Lincoln\LincolnHigh\Rm1096	DAT	74.9	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
55	Lincoln\LincolnHigh\Rm1097	DAT	76.7	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
56	Lincoln\LincolnHigh\Rm1098	DAT	78.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
57	Lincoln\LincolnHigh\Rm1103	DAT	78.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
58	Lincoln\LincolnHigh\Rm1104	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
59	Lincoln\LincolnHigh\Rm1105	DAT	76.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
60	Lincoln\LincolnHigh\Rm1108	DAT	77.7	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
61	Lincoln\LincolnHigh\Rm1112	DAT	78.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
62	Lincoln\LincolnHigh\Rm1115	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
63	Lincoln\LincolnHigh\Rm1118	DAT	75.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
64	Lincoln\LincolnHigh\Rm1119	DAT	79.3	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
65	Lincoln\LincolnHigh\Rm1127	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
66	Lincoln\LincolnHigh\Rm1132	DAT	79.8	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
67	Lincoln\LincolnHigh\Rm1142_1	DAT	77.2	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
68	Lincoln\LincolnHigh\Rm1142_2	DAT	79.8	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
69	Lincoln\LincolnHigh\Rm1176	DAT	79.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
70	Lincoln\LincolnHigh\Rm1177	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
71	Lincoln\LincolnHigh\Rm1178	DAT	77.5	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
72	Lincoln\LincolnHigh\Rm1246	DAT	75.4	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
73	Lincoln\LincolnHigh\Rm1250	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
74	Lincoln\LincolnHigh\Rm1253	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
75	Lincoln\LincolnHigh\Rm1255	DAT	78.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
76	Lincoln\LincolnHigh\Rm2109	DAT	79.3	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
77	Lincoln\LincolnHigh\Rm2116	DAT	78.8	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
78	Lincoln\LincolnHigh\Rm2122	DAT	77.9	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
79	Lincoln\LincolnHigh\Rm2124	DAT	76.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
80	Lincoln\LincolnHigh\Rm2136	DAT	73.9	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
81	Lincoln\LincolnHigh\Rm2139	DAT	79.6	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
82	Lincoln\LincolnHigh\Rm2142	DAT	79.5	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
83	Lincoln\LincolnHigh\Rm2146	DAT	78.1	°F	Enabled	Box HW Valve Open, Unit CW Valve Closed but little to no heat	
84	Lincoln\LincolnHigh\AHU_2C3cvb	MAT	75	°F	Disabled	Point should not be disabled.	Determine why the point is disabled and repair.
85	Lincoln\LincolnHigh\Rm1004	CfmAir	514	CFM	Enabled	AHU is off, Air flow should be 0	Calibrate or replace air flow station
86	Lincoln\LincolnHigh\Rm1019	CfmAir	373	CFM	Enabled	AHU is off, Air flow should be 0	Calibrate or replace air flow station
87	Lincoln\LincolnHigh\Rm1021	CfmAir	0	CFM	Enabled	Displays 0 CFM at all times	Calibrate or replace air flow station



October 5, 2016

Mr. Jeff Midkiff  
Superintendent  
Lincoln County Schools  
10 Marland Avenue  
Hamlin, WV 25523

Dear Mr. Midkiff,

On October 3, 2016, staff members of the Office of School Facilities, visited Lincoln County Schools to respond to an indoor air quality complaint at Midland Elementary School. The following are findings and recommendations from that visit.

**FINDING – 10-03-16-01**

**There were elevated humidity and carbon dioxide levels in most rooms of the school facility. The Fan Mode switches on all thermostats were in the AUTO position. Most roof top units have fixed position outside air dampers.**

**RECOMMENDATION**

Humidity levels should be maintained at 60% relative humidity or less. The programmable thermostats currently in use do not have the capability to monitor or control humidity levels. Modulating or operable outside air dampers are needed to provide adequate outside air ventilation to classrooms and control humidity. Recommend replacing the fixed position outside air dampers on all roof top units with economizing dampers that are controlled using dehumidification logic and demand ventilation control logic. Instruct school staff to keep the switch controlling the Fan Mode to the On position while students are present.

**FINDING – 10-03-16-02**

**Most roof top have excessive dust accumulation and display poor preventive maintenance.**

**Recommendation**

Preventive maintenance should be performed on all units at semi-annual intervals.

**FINDING – 10-03-16-03**

**There are stained ceiling tiles in several classrooms.**

Recommendation

Repair any roof leaks and replace any stained or damaged ceiling tile in a timely manner.

**FINDING – 10-03-16-04**

**The outside air dampers on roof top units serving the 1998 addition classrooms were not closed when the supply fan was off.**

Recommendation

The outside air dampers should close when the supply fan turns off. Adjust the damper linkages so that the outside air dampers are fully closed when the supply fan turns off.

**FINDING – 10-03-16-05**

**The washable metal air filters for the Columbus Furnace supply fan were loaded and were not fully covering the outside air intake area. Filters are cleaned once per year and are difficult to access.**

Recommendation

Policy 6200 recommends filters with a MERV 7 filtration level. Replace the metal filters with filter media with a dust spot efficiency of 25% or MERV 7 rating. Redesign the filter rack to prevent the filter media from becoming wet and provide better accessibility. Replace the filter media on a routine basis based upon the loading rate of the filters.

**FINDING – 10-03-16-06**

**The Columbus Furnace supply fan provides unconditioned outside air to the 1951 portion of the facility. The supply fan has excessive dust accumulation on the blades and housing.**

Recommendation

Outside air should be properly filtered and conditioned prior to being delivered to the classrooms. Introducing unconditioned air will increase humidity levels in the summer months and very cold air during the heating season when the gas furnace is off. The Columbus Furnace unit is very inefficient and should be replaced with a suitable HVAC system when funding permits.

**FINDING – 10-03-16-07**

**The outside air dampers for the supply air of the Columbus Furnace does not close when the fan turns off.**

Recommendation

Repair or replace the two damper actuators to allow the dampers to fully close when the supply fan is off.

**FINDING – 10-03-16-08**

**The washable filter on the window air condition for room 106 was loaded.**

**Recommendation**

Clean the washable filters on all window air conditioners. Place this task on a routine maintenance interval.

**FINDING – 10-03-16-09**

**Controls for the Columbus Furnace and roof top units are not remotely accessible for control or monitoring purposes.**

**Recommendation**

Recommend upgrading the controls at this site to the county wide building automation control system to allow control and monitoring of humidity, ventilation and other energy conservation measures on the HVAC systems.

**FINDING – 10-03-16-10**

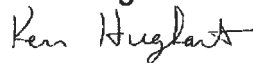
**The two HVAC units serving the 1983 classroom addition rests directly on the ground. Ground water, leaves and other debris accumulate around the unit and in the pathway of the outside air.**

**Recommendation**

Clean the area around these units frequently. Insure that down spouts are not permitted to drain around these units. Recommend raising these unit of the ground if possible, preferably to the roof level.

If I can be of any further assistance with this matter, please let me know.

Ken Hughart



WV Department of Education  
Office of School Facilities

## WVDE Data Sheet

County Lincoln School Midland Elementary

Technicians KH Date 10/03/16

Classroom/Area	CO <sub>2</sub> (ppm)	Temp (°F)	rH (%)	Comments
Range	<1122	68 - 75	30 - 60%	
Outside Air	422	64.0	57.0	
100	1,100		72.0	Stained Ceiling Tiles
101	2,000		73.0	
106	911		71.2	Window A/C unit for Heat and Cool
107	700		70.0	
108	1,896		73.0	Stained Ceiling Tiles
110	1,935		69.0	Stained Ceiling Tiles
112	1,455		68.0	
113	965		60.0	
114	956		64.0	
115	1,624		61.0	Roof Leak
116	1,960		70.0	
117	1,600		59.0	Stained Ceiling Tiles
118	1,700		69.0	
Cafeteria	1,360		71.0	



1900 Kanawha Boulevard, East, Building 6 • Charleston, WV 25305  
wvde.us

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November 6, 2019

Jeff Midkiff  
Superintendent  
Lincoln County Schools  
10 Marland Avenue  
Hamlin, WV 25523

Dear Mr. Midkiff:

On October 1, 2019, staff members of the Office of School Facilities, visited Lincoln County Schools to respond to an indoor air quality complaint at Midway Elementary School. The following are findings and recommendations from that visit.

**FINDING – 10-01-19-01**

**There were elevated carbon dioxide levels in most rooms of the school facility. The Fan Mode switches on all thermostats were in the AUTO position.**

**RECOMMENDATION**

The elevated carbon dioxide levels indicate that the classroom spaces are not sufficiently ventilated. Properly ventilated classrooms receive 12 cfm of outside air per occupant which equates to approximately 1100ppm of CO<sub>2</sub>. The CO<sub>2</sub> readings taken at this site where started at 8:00am and the levels rise throughout the day therefore the CO<sub>2</sub> levels if taken later in the day would be significantly higher than the morning readings. Most of the spaces being served by roof top units have modulating outside air dampers and should be able to achieve the desired ventilation rates. Several of the roof top units have fixed position dampers that will need to be manually adjusted to achieve the correct ventilation rate. The window air conditioners and portable terminal air conditioners, PTACs, are not capable or designed to provide outside air ventilation. For spaces using this type of equipment the HVAC system must be upgraded to provide the correct ventilation. Until this equipment is upgraded, the only option available for spaces using this type of equipment is to open windows to achieve proper ventilation. For spaces that have thermostats with fan switches, instruct school staff to keep the switch controlling the Fan Mode to the ON position while students are present.



**FINDING – 10-01-19-02**

**The ceiling tiles in most spaces are drooping indicating a history of long-term elevated humidity levels.**

Recommendation

Improper operation of the HVAC equipment during the summer months is the primary cause for elevated humidity levels and issues caused by humidity. During the summer months, when students are not present, all fans should be set to the AUTO mode, room set points raised to 80°F, close all outside air dampers and turn off all exhaust fans. At the end of each school year, prior to the Summer months, WVDE sends out a recommended guideline of HVAC operations to all counties. Operating the school facility in accordance with these guidelines will reduce the humidity levels in the spaces over the Summer months.

**FINDING – 10-01-19-03**

**There are missing and stained ceiling tiles in several classrooms.**

Recommendation

Repair any roof leaks and replace any stained or damaged ceiling tile in a timely manner.

**FINDING – 10-01-19-04**

**The outside air intake dampers on the Columbus Furnace were disconnected and open. The combustion air intake louvers for the unit was substantially blocked closed.**

Recommendation

Repair or replace the damper actuator and dampers providing outside air to the classrooms. These dampers should be fully closed during summer months to limit air infiltration into the facility. Remove the plywood from the combustion air intake to allow adequate combustion air flow to the burners.

**FINDING – 10-01-19-05**

**The door seals are missing around the exterior door in classroom 19 allowing air infiltration into the space.**

Recommendation

Replace the missing door seals.

**FINDING – 10-01-19-06**

**The evaporator coils on most of the window air condition and portable terminal air conditioning, PTAC units, were loaded.**

Recommendation

Properly clean the coils and air filters on all units on an annual basis or more frequently if needed. Place this task on a routine maintenance interval.

**FINDING – 10-01-19-07**

**The manually controlled outside air dampers on the PTAC units for the 1<sup>st</sup> Grade classrooms were closed while students were present.**

Recommendation

The fan should be set to operate continuously, and the outside air dampers should be manually opened on all PTAC units when students are present. After students leave the fans should be set to AUTO and the dampers manually closed. PTAC units do not have the capacity to provide adequate ventilation for more than 2 occupants at best but it will provide some air exchange when the supply fan is on and the outside air dampers are open. During summer month the fans should remain in the AUTO mode and the outside dampers should remain closed.

**FINDING – 10-01-19-08**

**Controls for the Columbus Furnace and roof top units are not remotely accessible for control or monitoring purposes.**

Recommendation

Recommend upgrading the controls at this site to the county-wide building automation control system to allow control and monitoring of humidity, ventilation and other energy conservation measures on the HVAC systems.

**FINDING – 10-01-19-09**

**The two HVAC units serving the 1983 classroom addition rests directly on the ground. Ground water, leaves, and other debris accumulate under the outside air intake of the unit and contaminate outside air supply being delivered to the classroom.**

Recommendation

Clean the area around these units frequently. Ensure that down spouts are not permitted to drain around these units. Recommend raising these unit off the ground if possible, preferably to the roof level.

**FINDING – 10-01-19-10**

**The HVAC equipment does not have mechanical ID labels to properly identify the units.**

Recommendation

Install mechanical ID labels on each RTU, exhaust fan and other HVAC units to allow positive identification of the unit. Use the ID labels established on the mechanical drawings for this purpose.

Jeff Midkiff  
November 6, 2019  
Page four

If I can be of any further assistance with this matter, please let me know.


Sincerely,



Ken Hughart  
HVAC Technician  
Office of School Facilities  
WV Department of Education

KH/rc

Attachment

c:  Thomas L. Young, Executive Director, Office of School Facilities and Transportation  
Mike Hall, Assistant Director of Architectural Services, School Building Authority  
Greg Gosnay, Facilities Director Lincoln County Schools  
Emmit Allen, HVAC Technician, Office of School Facilities  
Preston Richmond, HVAC Technician, Office of School Facilities

# Recommended Guidelines for Summer Operations of HVAC Systems in School Facilities

## Occupied Mode

- Classrooms that are occupied must maintain proper room temperatures (72 °F – 75 °F) and proper outside air ventilation rates (12- 15 cfm per occupant).
- Schedule the start times of make-up air units, heat recovery units and outside air dampers to coincide with the arrival of students in the mornings.
- If applicable, operate chilled water loops at their lowest design cooling temperature set point.
- If possible, group summer classes into one HVAC zone so that multiple cooling zones are not required.
- Purge the facility at the end of the day rather than in the morning.

## Unoccupied Mode

- **HVAC Adjustments**
  - Raise the cooling set points of all unoccupied spaces to 80 °F or above.
  - Set the controls of the supply air fans to cycle on only when a call for cooling is active.
  - Ensure that all exhaust fans are off in areas that are not occupied.
  - Close all intake vents and motorized relief vents.
  - Close the outside air dampers on all HVAC units serving unoccupied areas. This will be a manual operation on units that do not have automatic controls.
  - Manually disable the outside air dampers to the closed position on units that are interlocked with the operation of the supply air fans.
  - Turn off all heat recovery and make-up air units serving areas that are not occupied.
  - If spaces are cooled during unoccupied times, operate chilled water loops at their lowest design cooling temperature set point.
- Periodically check the entire facility to look for signs of areas with high humidity or mold growth.
- If a building automation system has the available capacity, install humidity sensors in key locations around the facility that will allow the owner to monitor the humidity levels and alarm when the space humidity conditions exceed 60% rH.
- Keep exterior doors and windows closed.

Verify that all controls and hardware have been returned to their original positions and condition at the end of the summer vacation period.



# WVDE Data Sheet

County Lincoln  
 Technicians KH, EA, PR

School Midway Elem Date 10/01/19 Contact Greg Gosnay Area 17,340 sq. ft.  
 Phone # \_\_\_\_\_ Year Built 1951, 1963, 1980, 1998

Location	CO <sub>2</sub> (ppm)	Temp (°F)	rH (%)	CO (ppm)	HVAC Unit Type	Occupants	Comments
Range	<1170	68 - 75	30 - 80%	30			
Outside	470	70	78	0.0			Time 8:00am
16	1,773	68	54	0.0	PTAC	15	PTAC has dirty coils and drain pan
17	1,840	70	73	0.0	PTAC	20	
18	1,866	70	62	0.0	PTAC	11	Center of ceiling indicates air infiltrations
19	2,641	70	62	0.0	PTAC	17	Weather seal on exterior door is missing - large gaps
112	950	70	62	0.0	RTU	0	Shared with 118, mold and water infiltration on ext. door
115	1,223	72	47	0.0	RTU	24	Shared with 117
116	1,083	70	58	0.0	RTU	20	Shared with 118
117	1,274	70	48	0.0	RTU	26	Fan Switch - Auto, ceiling tile missing and stained
118	1,150	69	52	0.0	RTU	25	Fan Switch - Auto
201	2,400	71	51	0.0	Window A/C	21	Window A/C coils are obstructed with dust
202	2,870	71	49	0.0	Window A/C	19	
203	800	72	46	0.0	Window A/C	0	
204	2,600	69	43	0.0	Window A/C	18	
205	2,044	73	48	0.0	Window A/C	0	





W. Clayton Burch  
West Virginia Superintendent of Schools