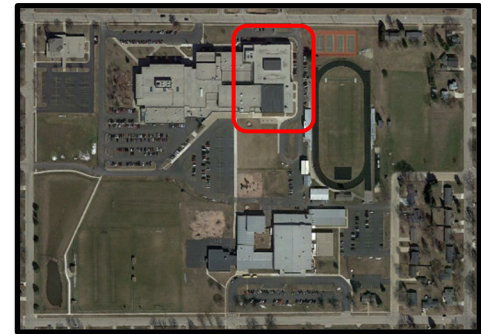


Berlin Middle School



Building Overview:

Berlin Middle School is a sixth through eighth-grade facility directly connected to the high school. The middle school was completed in 2015 and features classrooms, a media center, athletic facilities, and administration offices. The athletic facilities added during this construction include a middle school gym, a multipurpose athletic room, and a fitness center that is accessible to the public. This portion of the combined facility does not have cafeteria commons or an auditorium exclusive to the middle school but rather shares these functions with the high school.



The building's location is surrounded by residential neighborhoods to the west and east, with local businesses to the north and the elementary school to the south. The proximity to the Elementary School and being attached to the High School facility to the west on a contiguous property allows for convenient bus routes. Having a closely grouped campus allows for maximum efficiency for the Facilities and Grounds staff to effectively manage the District's buildings and grounds. The District's business office is also located just south and east of the paved parking lots servicing the elementary school. The Facilities and Grounds team practices diligence in maintaining the building's assemblies and HVAC equipment. The Middle School HVAC equipment and assemblies are not very old and are in good condition.

The District continues to perform regimented annual maintenance on systems, equipment, and interiors but also has a unique opportunity to replace existing systems with newer, more efficient technology and improve the learning environment by addressing some architectural features as well.

Building's Highest Priorities

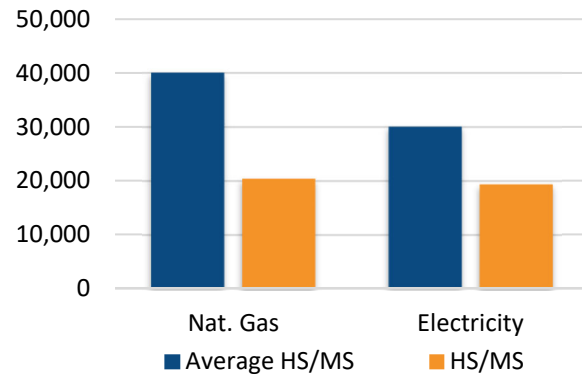
- 1) Reconfiguring public and high school locker areas for better public access to the fitness center
- 2) Repair undermining catch basin conditions

This summary of facility energy consumption and trends is for 2019 only. Due to COVID-19, electric and gas costs are assumed to be skewed for 2020 and 2021. The building performs with a total energy intensity usage of 39,645 BTU/SF. This is about what is anticipated for a high-performing High School/Middle School in the area.

Building Performance:

Building Area (est):	298,500 SF (includes HS)	
Annual Electric Cost:	\$187,176	\$0.63/SF
Annual Gas Cost:	\$8,836	\$0.03/SF
Total Utility Cost:	\$196,012	\$0.66/SF
Electric Usage Intensity:	19,277 BTU/SF	
Gas Usage Intensity:	20,367 BTU/SF	
Total Energy Intensity:	39,645 BTU/SF	

Average Usage vs. HS/MS (EUI)



Site Features & Improvements

Existing Condition Assessment:

Concrete walks: An observed condition is the patches installed as corrective action, where concrete has spalled near the edges of a control or construction joint (Figure Ext.1). These repairs, although unsightly, are to ensure that pedestrian traffic does not trip on the pothole created at the spalling.



Figure Ext. 1

Where the patching has not been installed, the concrete edges are gradually spalling and eroding (Figure Ext.2). This might be slowed down by sealing the concrete to protect this particular concrete mixture from the salt.



Figure Ext. 2

- Asphalt Paving: The asphalt paving is in generally fair condition. The cracks have been filled to prevent water from getting into the substrate. Some areas have tighter knit cracks that need to be monitored.



Figure Ext. 3

Maintenance may be deferred in most areas; however, one location is reported to have a potential issue. Figure Ext.4 shows the approximate location where a catch basin may be compromised, and the underground erosion is occurring. This could mean a storm pipe may be compromised and the catch basin leaking into the soil, washing soil into the storm system. This is causing the asphalt to sink around the immediate area of the catch basin (Figure Ext.5).

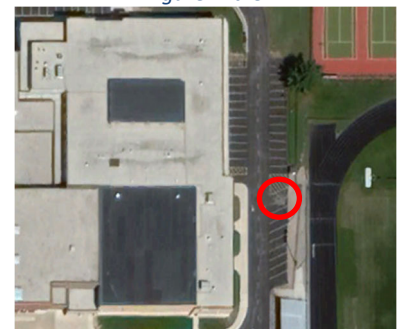


Figure Ext. 4

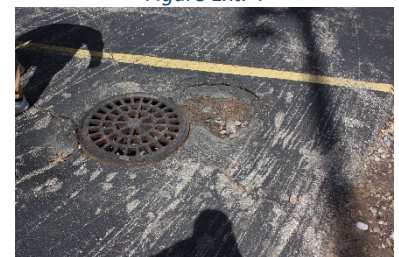


Figure Ext. 5

- Play Areas and Structures: These basketball hoops are newer than the ones at the elementary school. They are in much better condition and have the shooter's square on the backboard. There are no immediate concerns with these.

There is also a Gaga ball pit that is in good condition just south of the basketball hoop area, as well as open grass space for the students to use. No issues with these spaces were currently observed.



Figure Ext. 6

- Perimeter Foundation & Drainage conditions: At the front of the middle school on the north side of the building, the site required landscaping to adjust for the grade. At the northeast corner, there is a storm inlet that picks up the stormwater that runs around the corner of the building. No issues were observed at this installation.



Figure Ext. 7

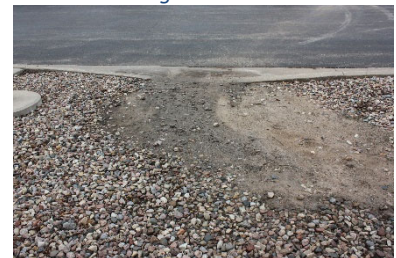


Figure Ext. 8

At the bike rack, there is an area with river stones in the landscaping. This is adjacent to a drainage path to a storm inlet; however, this area is too low and ponds water. The ponding is depositing sediment and causing an unsightly condition directly adjacent to the public entrance.



Figure Ext. 9

South of the building near the maintenance access drive is another catch basin in the grass that may have a compromised basin and pipe connection. The soil here is also getting undermined, and a sinkhole is beginning to form. This is causing a dangerous condition at the edge of the catch basin/yard drain (Figure Ext.10).



Figure Ext. 10

Building Envelope Conditions

Existing Condition Assessment:

- Exterior Openings:
- Exit/Entrance H: These doors are the main access for the public to the middle school gym for athletic events. These are aluminum framed full-lite leaves and in good condition. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.

There is a door panel that has had a glazing unit replaced as it was taped up for glazing sealant curing.



Figure Ext. 11



Figure Ext. 12

- Gym Storage Access: This is a hollow metal door opening used to directly access the gym storage from the exterior and as an exit from the space. It appears students have drawn on the door, but the writing is only ghosted in the chalky film that has oxidized on the paint. The balance of the door is in good condition. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.
- Locker Room Access: These two doors are the mud room access for athletic teams to get to the locker rooms during outdoor sporting events. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 13

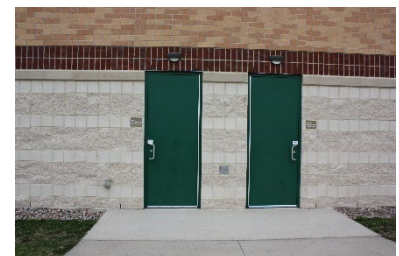


Figure Ext. 14

- Exit I: These full-lite doors are exit-only doors from the school serving as emergency exits. This is a hollow metal frame and door assembly, and there is a small amount of rust forming at the bottom of the jambs and center mullion. It is recommended to clean the rust off and touch up paint the frame to get ahead of the issue. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 15

- Exit/Entrance J: This triple leaf door is an aluminum framed entrance that has card reader access on the southern door leaf. The door is intended for public access to the fitness room. The door also serves as an emergency exit. The canopy protects against the weather allowing fewer salt requirements in the winter. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 16

- Exit/Entrance K: This full-lite aluminum framed entrance has card reader access and serves as an administrative staff entrance. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 17

- Locker Room Access: This door is the mud room access for public access locker rooms. The door has some slightly chipped paint and mastic residue from previous temporary signage being applied to the exterior surface. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 18

- Exit/Entrance L: The main public entrance to the middle school has a canopy and windbreaks to protect the entrance from the elements. It is an aluminum framed entry and has card access equipment. The doors are aluminum framed entry doors and are in good condition. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 19

This is the main security entrance to the school. Visitors arrive at the school and can access the first vestibule immediately. An added level of security could be to have these exterior doors locked and add a video phone to visually verify and verbalize the intent or reason for a visit before any access to the building.



Figure Ext. 20

- Exit M: This opening serves strictly as an emergency exit from the building. It connects to a stairwell from the second floor and to the interior corridor. This is also an aluminum framed assembly with two full-lite door panels. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 21

- Exit N: This opening serves as an emergency exit from the building near the music rooms. There is no lock cylinder or card reader, but this door does possess a handle indicating that it may be used for moving music equipment in an out of the building for off-campus events. This is also an aluminum framed assembly with two full-lite door panels. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 22

- Windows General Conditions:

- Window Type 1: These window openings are aluminum framed and have spandrel panels on the second-floor plane to match the look of the high school windows. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.



Figure Ext. 23

- Window Type 2: These window openings are aluminum framed to match the look of the high school windows. The sealant, seals, and sweeps are in good condition as they are new from the recent construction.

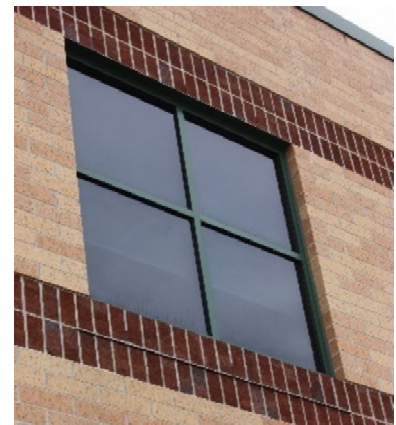


Figure Ext. 24

- Exterior wall conditions:

- Wall condition type 1: Most of the building enclosure falls under one wall type construction. The masonry wall is a cavity wall with CMU structural back-up and brick over a decorative masonry base stacked wall system. The wall consists of a modern cavity wall assembly. The masonry and grout are in good condition as it is still considered new construction.



Figure Ext. 25

- Wall condition type 1: In the penthouse areas on the roof, the walls are metal wall panels. These are all in good condition, and no immediate concerns were observed.



Figure Ext. 26

- Wall accessories:

- Masonry Weeps & Vents: The Vents (Figure Ext.27) and the weeps (Figure Ext.28) are amply placed in the wall. This will allow proper drainage and ventilation of the wall cavity. There are not any concerns currently with this installation. No issues were observed during the survey visit.



Figure Ext. 27



Figure Ext. 28

- Masonry Flashing: The through wall flashing installed at the base of the masonry walls is a stainless-steel flashing (Figure Ext29). This is the preferred material for this application as it is very durable and has a longer life cycle than a coated metal.



Figure Ext. 29

There are some locations where the flashing drip edge is bent. This may have happened during backfilling procedures. This may not have any negative effects, but it could be mechanically straightened out.

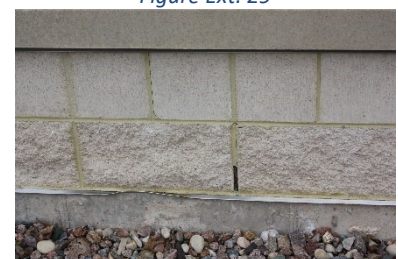


Figure Ext. 30

- Building Expansion Assemblies: The masonry expansion control joints are placed in the appropriate locations and frequency in the middle school. These installations are not very old and are in good condition; no separation, drying, or cracking was observed.

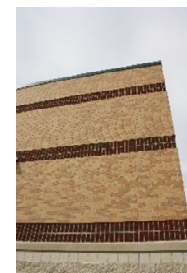


Figure Ext. 31

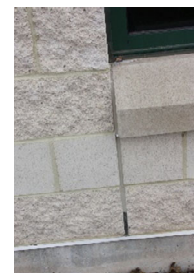


Figure Ext. 32

- Roofing:
- General Roofing condition: The roofing installations on the middle school roof are approximately 7 years old. They should be performing well. No issues were reported or observed during the survey visit.



Figure Ext. 33



Figure Ext. 34

- Roof section Types, Ages, and conditions: The roofing was installed in 2015 when the middle school addition was constructed. Two assembly types are finished with a fully adhered membrane on the high roofs and stone ballast on a single-ply membrane for the balance of the roof (Figure Ext.35).

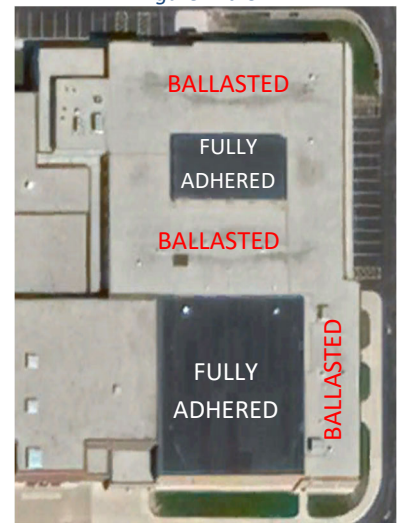


Figure Ext. 35

- Roof Penetrations: The penetrations are properly installed as expected. The mechanical curbs should be at least 8" above the roofing surface to properly combat snow drifting. A minimum 12" high curb is preferable but 8" is acceptable.



Figure Ext. 36

When multiple penetrations can be clustered together, deploying these curb caps with pipe portals (Figure Ext.37) are very effective.

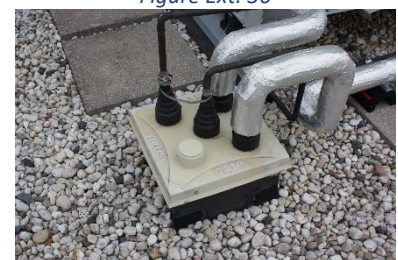


Figure Ext. 37

Figure Ext. 38 shows the correct flashing for vent stacks and heat stacks. It is important that if repairs or roofing replacements happen in the future that these types of features are reinstalled or replaced to maintain the roofing warranty.



Figure Ext. 38

- Flashings: Other roof flashings included in this roofing installation are the base flashings at the metal wall panels enclosing the penthouses' high roofs (Figure Ext. 39). These flashings are properly seamed and bent and have no observed deficiencies currently.



Figure Ext. 39

There is another high roof that has a fully adhered vertical flashing up to the high roof (Figure Ext.40).



Figure Ext. 40

- Parapet Copings: The coping caps are in good condition and appear properly seamed and mitered. The copings at uneven levels are shingle lapped (Figure Ext.41). This prevents water from infiltrating under the coping cap requiring sealant at the top edge, which eventually can fail like at some locations of the high school roofing.



Figure Ext. 41

- Roof Drainage Components: The roof drains have strainer covers to keep debris from getting in the storm conductors and prevent clogs.



Figure Ext. 42

There are overflow relief drains in locations that are enclosed by high walls on all sides (Figure Ext. 43)

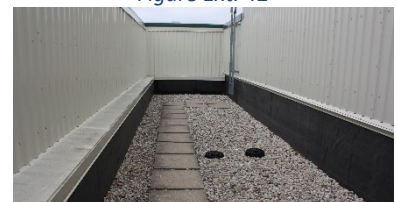


Figure Ext. 43

- Roof Drainage Components: At the clear stories, sealant has been added to the window frames to mitigate apparent window leaks (Figure Ext.44).



Figure Ext. 44

It is recommended to investigate this issue further to verify the issue behind this condition.



Figure Ext. 45

- Roof Walking Pads: The Highschool roof had very few walking pads, which are on the middle school roof (Figure Ext.46). These are recommended around all mechanical equipment and to and from roof access points to protect the roof membrane as maintenance contractors will be eventually walking on the roof. The middle school has these installed but not on every piece of equipment that might need servicing. We also typically recommend having these lead to the roof drains.

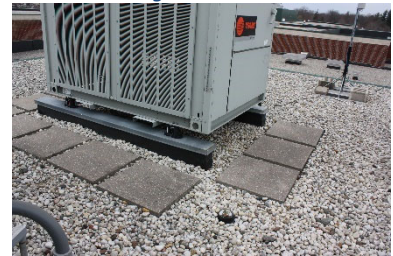


Figure Ext. 46

Proposed Exterior Solutions & Benefits:

- Exit Doors: No recommendations currently.
- Windows General Conditions: No recommendations currently.
- Stone and masonry sills: No recommendations currently.
- Roofing: No recommendations currently.
- Roofing Accessories: No recommendations currently.
- Control Joints: No recommendations currently.
- Walls: No recommendations currently.
- Paving and lots: Consider concrete replacement at the severely rust-stained stoops. Using a concrete additive and coated reinforcement can prevent rust staining. Consider replacing the concrete walks and curbs that are deteriorated and patched. Include the sections of concrete that are uneven and ones that need to be ground down.

Continue filling the cracks in the asphalt to keep water from infiltrating the subgrade. Monitor the cracking after every winter to verify the asphalt doesn't crack into small pieces or create potholes.

- Stormwater catch basin: Investigate the potential undermining at the two indicated catch basin locations. Repair these conditions to prevent dangerous sinkhole conditions.

Interior Spaces & Finishes

Existing Condition Assessment:

- **Ceilings General:** The common and circulation spaces have a 2x2 acoustical tile ceiling, and it is in good condition. The 2x2 tile will have a longer life cycle than the traditional 2x4 ceiling tile installation.

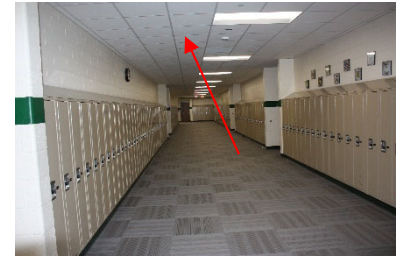


Figure Int. 1

- **Floors General:** There are several types of flooring in the middle school common and circulation spaces (Figure Int.2). Carpet tile is in some corridors and is in good condition. Carpet tile is recommended over sheet carpeting as individual tiles can be replaced when stains and damage occurs.



Figure Int. 2

Ceramic tile is also installed in some corridors on the first floor (Figure Int.3). This is a resilient type of flooring, but the grout may require maintenance eventually. If the grout does not have a stain-resistant additive, the maintenance will gradually increase to a higher frequency.



Figure Int. 3

There is also LVT (Luxury Vinyl Tile) in some locations (Figure Int.5). There may be a product issue or an installation issue with this flooring. There were observed locations where corners had chips, and some seams were slightly open.

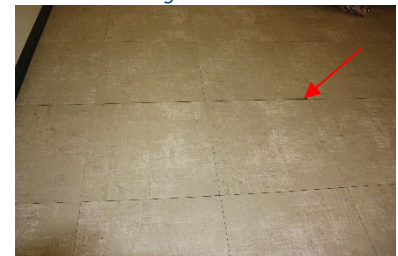


Figure Int. 4

At the vestibules, a durable walk of type carpet tile is installed (Figure Int.5). These are resilient and chemical resistant, making them have a robust life cycle.



Figure Int. 5

- Walls General:** The corridor and circulation spaces have CMU walls. There are decorative niches located at corridor intersections (Figure Int.6). These are burnished or polished blocks to resemble the common spaces in the adjacent high school.



Figure Int. 6

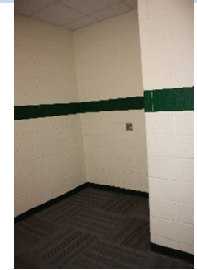


Figure Int. 7

There is an accent stripe on the corridor walls. Some locations have a painted stripe (Figure Int.7), and others have a polished block accent that resembles the CMU in the high school (Figure Int.8).



Figure Int. 8

- Classroom General Condition:**

- Classroom Doors:** The doors are wood veneer doors with narrow-lite glass. The doors are in good condition, and no immediate issues were observed currently.

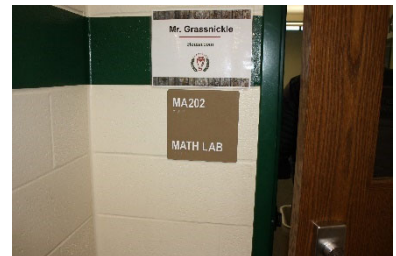


Figure Int. 9

- Classroom Ceilings:** Classrooms have a 2x2 acoustical tile ceiling, and it is in good condition. The 2x2 tile will have a longer life cycle than the traditional 2x4 ceiling tile installation.



Figure Int. 10

There was some small damage on a few tiles observed. Small damage does not need to be remediated, but periodic visual inspection of ceiling tiles is recommended to maintain aesthetics.



Figure Int. 11

- Classroom Floors:** There is sheet carpeting in some locations. In-room MA204, the sheet carpet has both stains, and the seam is fraying in one spot (Figure Int.12). There was also cracking in the concrete slab beneath the carpet that was detected during the survey by visible and tactile buckling.

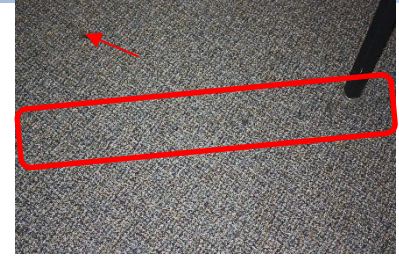


Figure Int. 12

There is Luxury vinyl tile in many of the lab classrooms (Figure Int.13). This tile is usually resilient and requires less maintenance than traditional vinyl composite tile (VCT). There were a few locations where a tile corner was chipped. The damage was small and can be deferred, but it may be desirable to eventually replace individual damaged tiles with attic stock.



Figure Int. 13

- Classroom Walls:** The exterior and corridor walls are CMU (Concrete Masonry Units) which are painted and very durable (Figure Int.14).



Figure Int. 14

The balance of the walls are framed, painted gypsum board, and are in good condition (Figure Int.15). These walls are in good condition but will need additional maintenance as they can be more easily damaged than the CMU walls.



Figure Int. 15

- Casework:** The wood look plastic laminate casework is in good condition (Figure Int.16). There are select cabinets with lockable cylinders, which are important for securing classroom supplies and teachers' items.



Figure Int. 16

- **Furnishings:** Newer modern furnishings is deployed in the classrooms. Larger tables for the science labs, allowing for lab partnering and collaborative learning (Figure Int.17).



Figure Int. 17

In the other classrooms, a modern-style table is flexible and configurable for collaborative learning (Figure Int.18). These furnishings are in good condition.



Figure Int. 18

- **Technology:** Some classrooms have projector smart boards installed (Figure Int.19). The District is planning to replace these with smart, multimedia touch panel screens (Figure Int. 20) installed in other locations.



Figure Int. 19

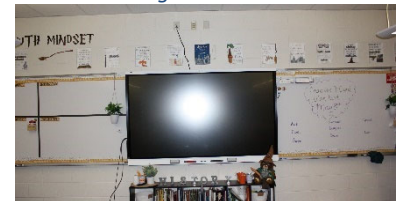


Figure Int. 20

- **Restrooms:** The restrooms are clad in ceramic tiles on the floor and the ceilings. The partitions are still in good condition (Figure Int.21), and the urinals have privacy screens (Figure Int.22).



Figure Int. 21

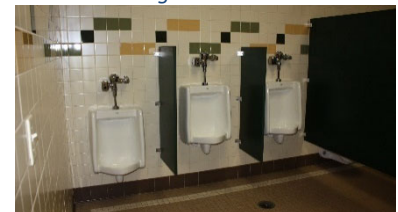


Figure Int. 22

The restrooms are ADA compliant as expected of a 2015 construction project.



Figure Int. 23

The water supply controls are touchless (Figure Int.23 & Int.24), offering water efficiency and reducing the potential spread of bacteria and viruses.



Figure Int. 24

- Drinking Fountains: The drinking fountains have bottle filling stations (Figure Int.25) installed, offering a touchless option to reduce the potential spread of bacteria and viruses.



Figure Int. 25

- Gymnasium: The middle school gymnasium has handicapped spectator accommodations (Figure Int.26).



Figure Int. 26

The flooring is in good condition and has light scratches and scuffs (Figure In.27). No immediate concerns for the floor finish were observed during the survey visit.



Figure Int. 27

The wood athletic floor has a ventilation system installed (Figure Int.28). This is designed to pull air under the flooring sleeper supports to ensure that the flooring stays dry and that humidity does not have adverse effects on the wood flooring.



Figure Int. 28

- **Multipurpose Room:** The multipurpose gymnasium is a two-story space with a floor level below the first floor. The space is accessible by two staircases (Figure Int.29) and an elevator.

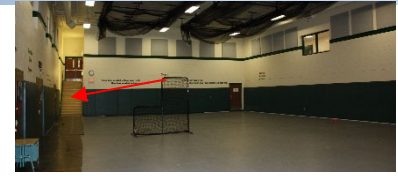


Figure Int. 29

The floor in the multipurpose room is a painted concrete slab and has many scratches in the finish (Figure Int.30). The floor should be refinished; however, it may be desirable to install a resilient athletic flooring to offer a surface that will provide less fatigue for the users.



Figure Int. 30

- **Music Room:** The music rooms are tall spaces that have acoustical tile ceilings (Figure Int.31) and sound dampening panels on the walls for added acoustical control (Figure Int.32).



Figure Int. 31

The lighting installed is a bidirectional light, and the housings cut off the sides limiting the light distribution. It is recommended to do a lighting study to make sure the lighting is adequate for the task of reading sheet music.

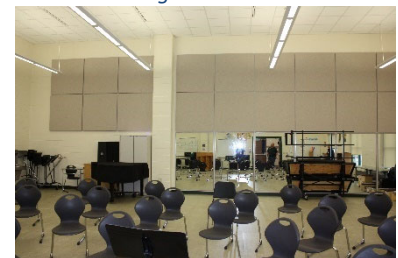


Figure Int. 32

- **Art Room:** The middle school art room appears to have adequate casework for storage and sinks for cleaning up (Figure Int.33).



Figure Int. 33

The art room is equipped with a kiln with a dedicated exhaust hood.



Figure Int. 34

The floor is painted concrete floor slab (Figure Int.35). The painted finish is severely chipped and flaking. This is likely due to the moisture level in the concrete when it was originally painted. It is recommended to refinish the floor. One popular option is to polish the concrete and sealing with clear epoxy. Additionally, decorative epoxy flooring is also a popular modern flooring installation for art rooms.



Figure Int. 35

- **Media Center:** The media center (MC) has a high clearstory over the stacks and main reading area (Figure Int.36). The ability to have natural light is very beneficial for learning environments.



Figure Int. 36

The portion of the media center with the lower ceiling is used as an instructional space (Figure Int.37). The MC staff reported the benefit of having this space separable.

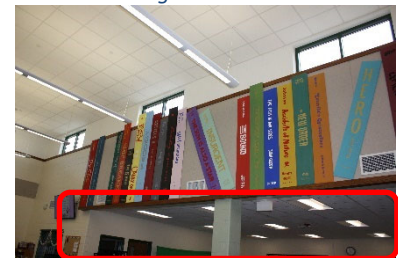


Figure Int. 37

There is modern individual study furniture with power ports for recharging workstations and personal phones.

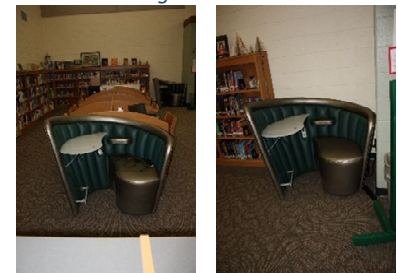


Figure Int. 38

The storage and office spaces are mostly used for storage, and there is a network data rack in one space (Figure Int.39).



Figure Int. 39

- Lighting Concerns:** The pendant lighting installed in many of the classrooms are not very effective (Figure Int.40 & Int.41). The configuration of the housing serves as a cutoff and limits the light distribution. Also, the upward lighting does not reflect well and is ineffectual.

The light fixture also allows for debris, such as pencils (Figure Int.41), to be lodged above the light bezel.

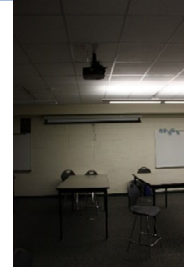


Figure Int. 40

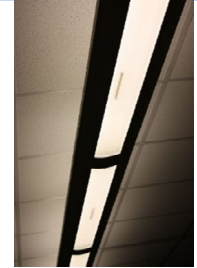


Figure Int. 41

- Fitness Center:** The fitness center was constructed interior to the building's exterior wall. This is only an issue as the public's access to the space is difficult.

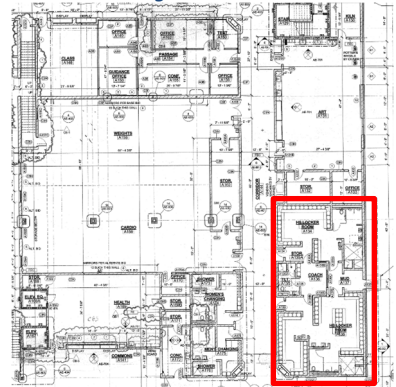


Figure Int. 42



Figure Int. 43

The public access to the fitness center takes users through portions of the school. This is an unsecured condition, and a new solution should be considered. The designated high school locker rooms located east of the fitness center are reported as very underutilized.



Potentially, these locker rooms could be reconfigured to allow the public to use them in conjunction with the fitness center, and a segregated entrance could be provided for public access. Additionally, the adjoining corridor can then have secured access installed.

- High School Lockers:** The high school locker rooms are intended for outdoor sporting events. The locker rooms are ADA compliant (Figure Int.44). It is reported that these locker rooms are underutilized.

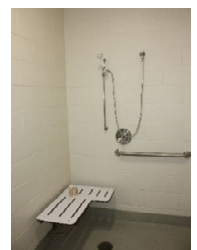
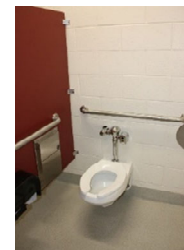


Figure Int. 44

There is a crack in the flooring in one of these locker rooms.

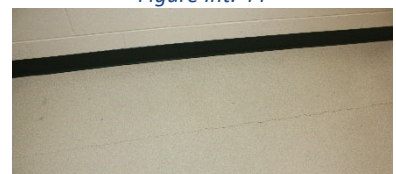


Figure Int. 45

- Acoustical readings and analysis: When evaluating educational spaces, it is important to keep in mind how rooms perform acoustically. Two distinct criteria can be evaluated for a sample set of rooms. These evaluations are best conducted in empty rooms with the normal operation of the HVAC systems.
 1. First is the ambient or background noise that persists in a classroom (noise from lighting, mechanical systems, exterior environment). It is important to keep these noises in check because instructors must be distinctively louder than the background noise at all locations where students are seated and listening for the student to adequately hear. Ideal Classroom Noise Criteria (NC) should be between 25-30. Alternatively, background noise, in general, should not exceed 35 dBA. We conclude that several learning spaces should be evaluated further to reduce noise from the mechanical systems.
 2. The second factor that should be evaluated is the reverb timing in the 500 Hz octave band, a band that is closely related to human speech. Reverb is the persistent echo of noise within a space, so the longer a space echoes (more live), the muddier the speech will sound and become less intelligible. Conversely, humans are naturally used to some reverberance, so too little reverb results in a space sounding too dead. The Acoustical Society of America has published a range of acceptable reverb times for different types of spaces within a school setting.

Proposed Interior Solutions & Benefits:

- Ceilings General: No recommendations currently.
- Floors General: No recommendations currently.
- Walls General: No recommendations currently.
- Classroom Doors: No recommendations currently.
- Classroom Ceilings: No recommendations currently.
- Classroom Floors: No recommendations currently.
- Classroom Walls: No recommendations currently.
- Casework: No recommendations currently
- Furnishings: No recommendations currently
- Technology: No recommendations currently.
- Boy's / Girl's Restrooms: No recommendations currently.
- Gymnasium: No recommendations currently.
- Media Center: No recommendations currently. Consider adding a folding partition or folding glass partition to separate the instruction area from the main media center.
- Public lockers / High school lockers: Consider reconfiguring the high school locker rooms and public locker rooms to make them more useable and gain better public access to the fitness center.

Heating System

Existing Conditions:

- These boiler plants provide hot water heating to the building through unit HW heating coils located in VAV terminal units, unit heaters, and cabinet unit heaters.
- The boiler plant serving the building consists of two (2) HW boilers from PK. The boilers are 2,850 MBH input each and up to 94% efficient. The boilers were installed in 2014 and are in good condition.
- The heating plant capacity equates to roughly 58 BTU/SF (output), which is slightly more than typical heating requirements in Wisconsin of approximately 40 BTU/SF, which provides some redundancy. A holistic approach is required when assessing the heating capabilities of the boiler plants.



- The hot water plant distributes hot water to the building by two (2) inline primary pumps and two (2) base-mounted distribution pumps. The inline boiler pumps are at a constant speed. The base-mounted distribution pumps are powered by variable frequency drives. The pumps are in good condition.
- The Middle School has a series of HW cabinet unit heaters which are located at the building perimeters and at entryways. These units are in good condition but, in almost every case, serve transitional spaces.
- The air handling units (AHUs) are equipped with HW heating coils that provide all the space heating for single zone and variable air volume systems.

Proposed Solutions:

- Review boiler supply water reset curve to determine if additional energy savings can be achieved.

Cooling System

Existing Conditions:

- All occupied spaces within the school are provided with air conditioning from (5) split DX air-cooled condensing units.
 - CU-1: 50 Tons
 - CU-2: 25 Tons
 - CU-3: 150 Tons
 - CU-4: 40 Tons
 - CU-5: 60 Tons

- The condensing units are all from the renovation project in 2014 and are in good condition. All units are located on the middle school roof on equipment rails with easy access for service.

- One (1) split DX condensing unit is located on the roof and serves the IT closet. This unit is in good condition and should last the District for some time with proper maintenance.



Proposed Solutions:

None at this time.

Classroom Air Distribution

Existing Conditions:

- All areas of the school are served with overhead air distribution from the AHUs and terminal equipment. The AHUs typically serve multiple spaces and utilize variable air volume (VAV) boxes with hot water reheat coils serving one or more rooms. The VAV boxes vary airflow and air temperature supplied to the space(s) to maintain temperature setpoints.
 - AHU-1: Multizone Variable Air Volume
 - AHU-2: Multizone Variable Air Volume
 - AHU-3: Multizone Variable Air Volume
 - AHU-4: Multizone Variable Air Volume
 - AHU-5: Multizone Variable Air Volume
 - AHU-6: Single Zone



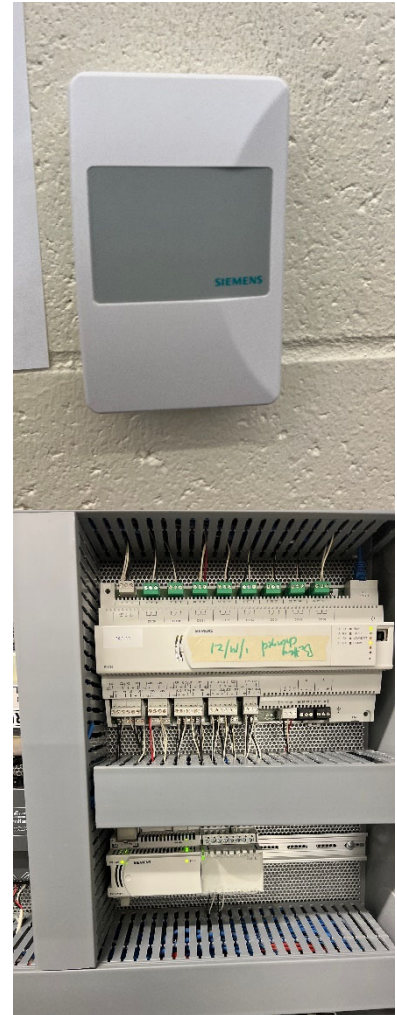
Proposed Solution:

- Continue maintaining the existing HVAC equipment.

Temperature Control System

Existing Conditions:

- The building controls systems are DDC with Siemens (BAS) interface. This system is comprehensive over all major HVAC equipment with zone/space controllers. The BAS appears to have the ability to fully control, trend, alarm, and notify the Customer of needs and inconsistencies in the system.



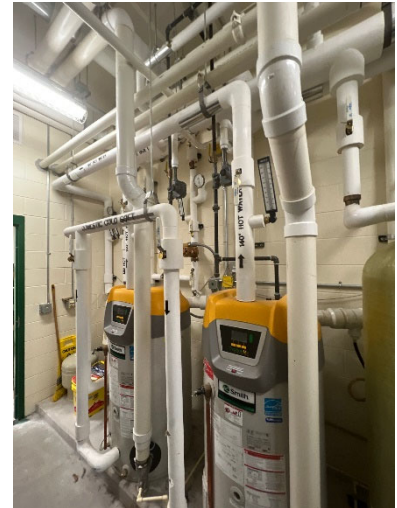
Proposed Solution:

- No recommendations currently.

Domestic Hot Water System

Existing Conditions:

- The building is served by two high-efficiency gas-fired water heaters and recirculation pumps. These units are in good condition.



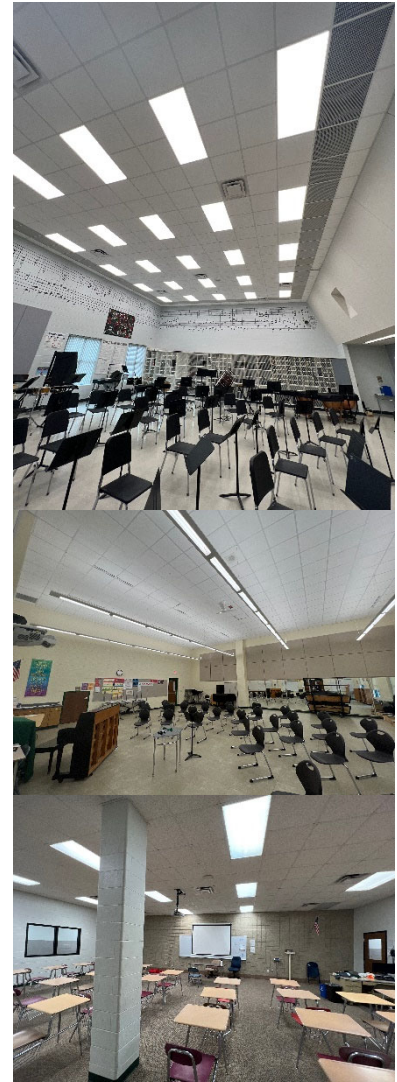
Proposed Solution:

- No recommendations currently.

Lighting System

Existing Conditions:

- All of the interior lighting appears to be LED fixtures that illuminate the space learning environment. Most of the spaces were observed to have adequate light levels.



Proposed Solution:

- No recommendations currently.

Berlin Middle School												
Building HVAC Equipment Inventory												
Equipment	Make	Model	Location	Quantity	Age	Expected Useful Life	Condition	Targeted Replacement Date				Outstanding Issues and/or Notes
								1-2 Years	2-5 Years	5-10 Years	10+ Years	
Air Cooled Condensing Unit (CU-03)	Trane	TTAE150E	Middle School Roof	1	8	15	Fair		✓	✓		R410 Refrigerant
Air Cooled Condensing Unit (CU-02)	Trane	RAUJC25	Middle School Roof	1	8	15	Fair		✓	✓		R410 Refrigerant
Air Cooled Condensing Unit (CU-01)	Trane	RAUJC50	Middle School Roof	1	8	15	Fair		✓	✓		R410 Refrigerant
Air Cooled Condensing Unit (CU-04)	Trane	RAUJC40	Middle School Roof	1	8	15	Fair		✓	✓		R410 Refrigerant
Air Cooled Condensing Unit (CU-05)	Trane	RAUJC60	Middle School Roof	1	8	15	Fair		✓	✓		R410 Refrigerant
Air Cooled Condensing Unit (CU-01)	Trane / Mitsubishi	TRUYA012	Middle School Roof	1	2	15	Good				✓	R410 Refrigerant
Air Cooled Condensing Unit (CU-02)	Trane / Mitsubishi	TRUYA024	Middle School Roof	1	2	15	Good				✓	R410 Refrigerant
Air Handling Unit (AC-6)	Trane	Climate Changer CSAA040U - HW/DX/NAV / 18,500cfm / 10hp	Middle School Mezzanine	1	8	22	Good				✓	R410 Refrigerant
Air Handling Unit (AC-5)	Trane	Climate Changer CSAA035U - HW/DX/NAV / 17,000cfm / 10hp	Middle School Mezzanine	1	8	22	Good				✓	R410 Refrigerant
Return Fan (RF-5)	Greenheck	Axial type 9,000cfm / 5hp	Middle School Mezzanine	1	8	20	Good				✓	
Air Handling Unit (AC-2)	Trane	Climate Changer CSAA017U - HW/DX/NAV / 8,275cfm / 10hp	Middle School Mezzanine	1	8	22	Good				✓	R410 Refrigerant
Return Fan	Greenheck	Axial type 6,000cfm / 3hp	Middle School Mezzanine	1	8	20	Good				✓	
Air Handling Unit (AC-3)	Trane	Climate Changer CSAA010U - HW/DX/NAV / 4,250cfm / 5hp	Middle School Ground FI Mech Room	1	8	22	Good				✓	R410 Refrigerant
Return Fan	Greenheck	12,500cfm / 7.5hp	Middle School Ground FI Mech Room	1	8	20	Good				✓	
Air Handling Unit (AC-1)	Trane	Climate Changer CSAA025U - HW/DX/NAV / 11,500cfm / 7.5hp	Middle School Ground FI Mech Room	1	8	22	Good				✓	R410 Refrigerant
Return Fan	Greenheck	Axial type 3,000cfm / 1hp	Middle School Ground FI Mech Room	1	8	20	Good				✓	
Boiler	PK Mach	2.85MMbu Condensing	Middle School Ground FI Mech Room	2	8	24	Good				✓	With boiler pumps
HW Pumps - Distribution	Armstrong	400gpm / 20 hp / 1750rpm / VFD	Middle School Ground FI Mech Room	2	8	20	Good				✓	
Cabinet Unit Heaters	Various	Used at entry and transition spaces	Various	Multiple	Varies	20	Fair/Good			✓	✓	
Air Handling Unit (AC-4)	Trane	Climate Changer CSAA025U - HW/DX/NAV / 12,000cfm / 7.5hp	Middle School Ground FI Mech Room	1	8	22	Good				✓	R410 Refrigerant
Water Softener - Boiler Room	Hellenbrand	H-2000	Middle School Ground FI Mech Room	3	8	18	Good				✓	
DHW Heater - Boiler Room	AO Smith	Cyclone Mx BTH120 / 200 gal	Middle School Ground FI Mech Room	2	8	15	Good			✓	✓	120MBH with 138.18 gal/hr recovery
Roof Mounted Exhaust Fans	Greenheck, Twin City, Cook	Various / 1/4-1.5hp	High School and Middle School Roof	31	Varies, many 15+	20	Fair		✓	✓	✓	No indicated inefficiency
Roof Mounted Exhaust Fans	Greenheck, Twin City, Cook	Various / 1/4-3hp	High School and Middle School Roof	30	Varies, many 15+	20	Fair		✓	✓	✓	No indicated inefficiency
Lighting	LED			Various	2+	20	Good				✓	Flourescent, HID, and LED
Building Automation Systems	Siemens		High School and Middle School Roof	Various	5+	15	Fair/Good		✓	✓		Direct Digital Controls with Electric Actuation