Helena School District

Deferred Maintenance

Report

January 31, 2022

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Helena Public Schools
Stacy Collette
1325 Poplar Street
Helena, MT 59601

RE: Deferred Maintenance Review
Helena Public Schools
Final Report

Dear Ms. Collette:

Thank you for the opportunity to provide the attached Deferred Maintenance Report for Helena Public Schools. This report includes 9 Elementary Schools, 2 Middle Schools, 3 High Schools and 5 District Support Buildings.

The report includes the following scope of services for each school.

SCOPE: Narrative and estimates of probable costs for the following categories

- Mechanical Equipment
- Energy Management Systems
- Plumbing Fixtures
- Windows and Doors
- Building Envelope Repair
- ADA Deficiencies
- Electrical Systems
- Electrical Systems – special systems including fire alarm
- Lighting retrofits
- Roof Replacements from the 2020 Roof Assessment adjusted to current market.
- Parking, playground surfaces (not playground equipment), and Sidewalk repair.

*Asbestos abatement and other hazardous material costs are not included but should be anticipated with all projects within the building envelope.

*The Roof Replacements Assessments from Cushing Terrell is a standalone document that is in addition to this report, and works hand in hand with this report.

This report consists of 2 documents, a Word document that addresses existing conditions and recommendations with pictures as appropriate. The excel document includes a high-level opinion of cost and each system is assigned a priority of Low, Medium or High. High priority is before 5 years, Medium priority is 5 -10 years, and a low priority is over 10 years. This information provides you with a detailed list of needs that need to be addressed to provide a warm, dry, safe and accessible schools for the Helena community.

It has been a pleasure to work with you and the building maintenance staff while developing the attached reports.

Sincerely,
Hulteng CCM, Inc.

Shane Swandal

Hulteng CCM, Inc.

6417 Trade Center Avenue Billings, Montana 59101 • 1210 West Kent Avenue Missoula, Montana 59802

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Contact List and Responsibilities

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- Overview
- Parking, Sidewalks and Site

Con'eer Engineering
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Responsibilities:
- HVAC
- Controls
- Fire Suppression

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Contact: John Kauffman
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Responsibilities:
- Electrical
- Low Voltage
- Public Address Systems
- Fire Alarm

Slate Architecture
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Helena, MT 59601
406.457.0360

Contact: Jacob Augenstein
jacoba@slatearch.com

Responsibilities:
- Windows
- Doors
- Exterior Cladding
- Accessibility

Cushing Terrell
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Contact: Patrick Todd
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Responsibilities:
- Roofing

Elementary Schools

Of the twelve (12) Elementary Schools only nine (9) are included in this report.

Broadwater

Four Georgians

Hawthorne

Jefferson

Kessler

Ray Bjork

Rossiter

Smith

Warren

Schools not Included in the Report

Bryant

Central

Jim Darcy

Broadwater Elementary School

Overview

Address:

900 Hollins Avenue

Helena, MT 59601

Year Built:

1942

Building Area:

33,566 SF

Parking, Sidewalks and Site

Recommendations

Entry 6 - Stairs to Playground - Remove and replace existing stairs including handrail.

Entry 5 - New sidewalk - Replace existing sidewalk that has significant surface damage

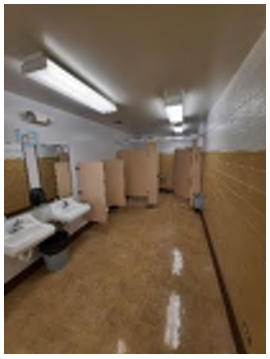
Playground asphalt surfaces - Repair cracks, potholes and seal coat.

HVAC

Existing Conditions

Heating System: A (2) boiler system provides hot water for the building from a central boiler room located in the building basement. Burnham Cast Iron Sectional Boiler Model 4FHW.154A with Power Flame Burner Model C2-G-20B and Lochinvar Seasonal High Efficiency Boiler Model KBN 800.

Plumbing: Fixtures are older but functional with no operational issues reported regarding the building piping systems.



The building domestic system is not equipped with a required water tempering valve. Device is required by code. The devices maintain the temperature of domestic water discharge from the water heater to a code designated range.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Classroom spaces are primarily served with floor mounted unit ventilators. The unit ventilators are of three different vintages. The equipment is original to the building construction.

The gymnasium (multi-purpose space) is served with an original to the building Trane multi-zone air handler in the lower-level equipment room.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The building is not equipped with mechanical cooling systems

Recommendations

Ventilation: Classroom unit ventilator should be replaced with new equipment to improve space comfort, improve indoor air quality, and reduce equipment noise within the teaching environment.

The lower-level multi-zone air handler should be replaced with a variable speed air handler connected to air terminal units.

Mechanical ventilation system should be added to the office space to ensure proper indoor air quality for staff and students.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

Direct Digital Controls (DDC) provide boiler staging and control in the equipment while the classroom spaces utilize pneumatic controls.

Recommendations

With the replacement of the classroom ventilation equipment, the pneumatic controls should be replaced with new DDC to improve space comfort, system monitoring and reduce energy consumption.

Fire Suppression

Existing Conditions

The building lower level is equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. The existing building lower-level system should be expanded to serve the entire building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from a primary riser pole located in the alley across Garfield St. to the east of the property. The primary continues underground to the west, under a paved access drive on the north side of the building, terminating at a 75 kVA pad mounted transformer located approximately eight feed from the wall and directly outside of the old boiler room (Figure 1). The service characteristics are 120/240 volts, single phase, three wire. The access drive on the north side of the building is restricted to district vehicles or contractors, but even so, the transformer could be vulnerable to damage from accidental contact.

The secondary service conductors run underground to the building foundation and rise to a metering cabinet. Inside of the cabinet, the secondary penetrates the wall into the old boiler room and terminates in a 600A-2P main breaker in a distribution board. The distribution board is of newer construction. It is a GE Spectrum style panelboard with additional space for possibly up to four breakers (Figure 2). The highest recorded demand from Northwestern Energy was 62 KW in February, 2021. Based on this reading, the calculated demand is about 325 amps, meaning that the service has about 30% to 35% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

Figure 2 – Main Distribution Board & 600 Main Breaker

Electrical Distribution: A newer branch panelboard, with spare capacity, is located in the Old Boiler Room adjacent to the distribution board (Figure 3). There are also two panelboards in the new Boiler Room, one with 20% spare capacity and five additional panelboards in the Classroom Wings for which there are few spare circuits available.

At least one of the panelboards (Figure 4 - Panel B4 in the 1949 Addition at the west end of the school) is obsolete and replacement parts are not available. The remaining original panelboards appear to have been upgraded in the 1970's or 80's, and are not obsolete, but are lacking in space for additional circuit breakers (Figure 4).

Figure 3 – A Newer Panelboard with Spare Capacity

Figure 4 – An Original Panelboard

Figure 5 – An Upgrade of an Original Panelboard

Branch Circuiting: Classrooms and Workrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet today's needs. Most classrooms have four to six receptacles in usable locations often resulting in the need for two or more power strips. In some cases, power cords are run along walls, around cabinets or even on the floor in a protective cover. New receptacles and circuits were added with the Safety-Security Upgrades project in 2019.

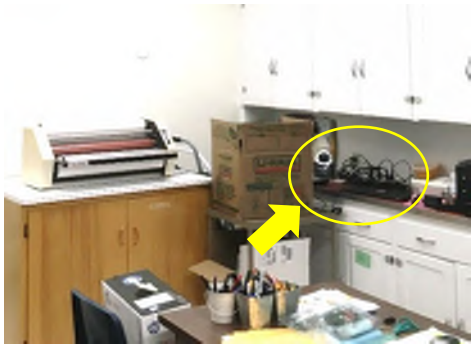


Figure 6 – Numerous Appliances in Workroom Using Power Strip for Connection

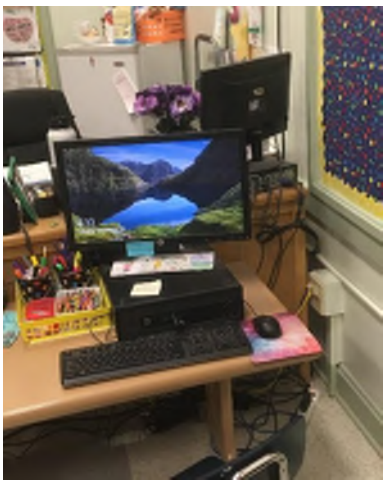


Figure 7 – Typical Classroom Clustering of Appliances Near Teacher Desk

Lighting: Administrative areas that were remodeled in recent Safety-Security Upgrades are LED. 4 foot T8 fluorescent fixtures with wraparound acrylic lenses, mostly 4-lamp in most classrooms, except for the Library and west end classrooms in the lower level which are recessed parabolic troffers. Corridors, lobbies, restrooms, stairs, storage rooms and ramp areas are mostly 2-lamp, 4 foot T8 fluorescent with wraparound lenses, surface or suspended. Much of the building has been equipped with occupancy sensors, but only the areas with the LED lighting have dimming capability. The Gymnasium lighting is 4 foot T-8 fluorescent with wire guards (Figure 8).

Figure 8 – Gymnasium Lighting

Nearly all of the exit signs have been retrofit with LED. Many of the exit signs contain internal emergency battery packs to provide code required illumination during a power failure, but there are a few of the original recessed exit signs that don't appear to have backup (Figure 9). Replacement with new is recommended.

Figure 9 – An Original Exit Sign LED Upgrade Without Emergency Backup

Emergency egress lighting throughout the building consists of mostly battery powered, sealed-beam incandescent lamp heads on a steel housing. The units are plain, simple and easy to maintain. The newer LED style with decorative poly housings were provided in the recently remodeled Administrative areas.

Exterior emergency egress lighting has been provided at the recently remodeled entry areas under the Safety-Security Upgrade. The remaining existing exit discharge areas are not provided with emergency backup illumination (to the public way) and are not required to be unless they are remodeled. As older (non emergency backup) exterior lighting is replaced with new, it may be cost effective as well as desirable to include battery backup.

Recommendations

Electrical Service: The existing service is capable of supporting some additional load, which could include small air conditioning systems for spot cooling portions of the building. However if a larger, central AC system is required a new 3-phase electrical service is recommended, or actually required. Larger AC systems are not available in single phase configurations. There are solutions for conversion to 3-phase using variable frequency drives or converters, but it this case the ampacity of the larger equipment would most likely exceed the service size anyway.

Electrical Distribution: An upgrade to the electrical service will require replacing the existing single phase main distribution board, or possibly maintaining the board and installing a new main board either inside or on the building exterior if interior space is not available (See Jefferson Elementary School). The service voltage configuration will change from 120/240 volts single phase to 120/208 volts 3-phase. This should not be a major concern, but there may be a few items, i.e. old 240 volt motors that may need to be replaced. Additional branch circuit panelboards are recommended in the classroom wings to increase circuiting to the classrooms and workrooms. The obsolete panelboard is recommended for replacement. The other panelboards do not necessarily need to be replaced, especially since some of them are located in corridors or other locations where a larger panelboard will not have adequate clearances.

Branch Circuiting: Additional receptacles and circuits are badly needed in the classrooms and workrooms, particularly near the teacher's desks. Replacing existing receptacles and adding up to 8 additional and increasing branch circuiting to a minimum of two dedicated circuits per classroom and one for workrooms is recommended. The wiring could be installed in a concealed manner if the cost of cutting and patching walls is acceptable. Otherwise exposed Wiremold raceway or possibly even conduit would be used.

Lighting: Replacement of fluorescent with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement. Replacement of the original exit signs with new LED signs with battery backup is recommended. After removal of the interiors of the old exit signs, the new exit signs would be mounted directly over the old to cover the opening.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service enters the basement boiler room, underground from the north and terminates on the west wall near the Data Rack.

Most classrooms and workrooms are provided with two or more data outlets. The Safety-Security Upgrades included a few additional data outlets for video projectors, exterior PA speakers, clock/program/message boards wireless access points. There are no known issues either with quantities or deficiencies.

IP based security cameras were provided in the recent Safety-Security Upgrades project on the exterior of the building covering all entry points, playgrounds and drop off locations. Interior cameras were also located in the entry vestibules and lobby. All cameras are POE and are connected to the data switches at the main rack. A new UPS was recently added to provide a minimum of two hours of backup power, should there be an extended power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system with manual pull stations at exit pathways, horns and strobes in all rooms and corridors and smoke detectors in elevator lobby. The Control Unit is a Silent Knight. Magnetic holders were added to some doors during the Safety-Security Upgrade, but they are not for fire; only security during lockdown situations. There are no known issues with the system at this time, but it should be noted that the AHJ will require this system to be upgraded to Voice Evacuation and additional automatic detection coverage if the building is significantly upgraded. One minor issue is that the Control Unit is physically located in the Principal's Office (Figure 10), making it difficult for the maintenance staff to troubleshoot.

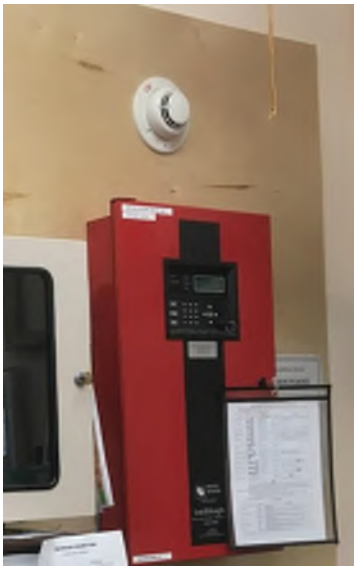


Figure 10 – Fire Alarm Control Unit Prior to Safety-Security Upgrades

Recommendations

Relocation of the Control Unit to a more assessable location for maintenance is recommended.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade. There are no known serious issues with the system.

Recommendations

None

Windows

Existing Conditions

Aluminum Double Pane: About 2/3 of the building has newer aluminum framed double paned windows. These windows appear to be in good condition and have additional life remaining.

Vinyl Windows: The additional 1/3 of the building has older vinyl windows that appear to be nearing the end of their useful life.

Glass Block: There is a small section of glass block in the girl's restroom that has broken cells and is in need of being replaced.

Recommendations

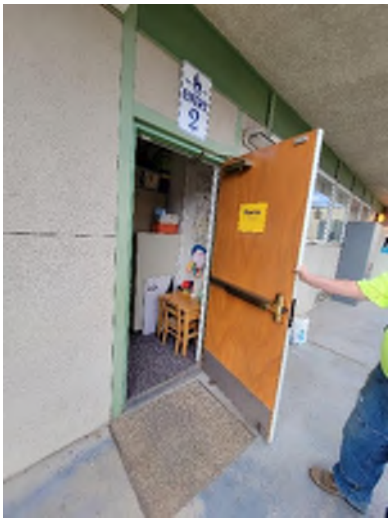
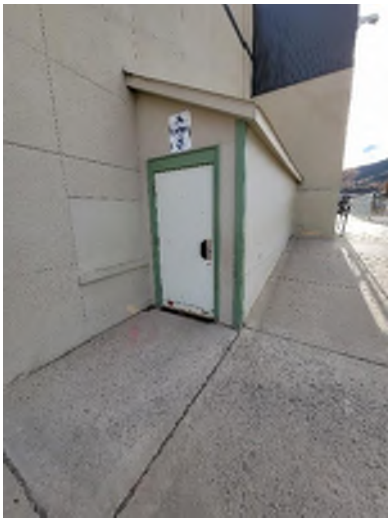
Vinyl Windows: Replace all the vinyl windows with new thermally broken aluminum frames and double pane low-e glazing. **(High Cost, Low Priority)**

Glass Block: Remove and replace the glass block. I would be recommended to use a thermally broken window with double pane low-e glazing in place of new glass block. As this is a restroom there would need to be a window film installed so the glazing is translucent. **(Low Cost, Medium Priority)**

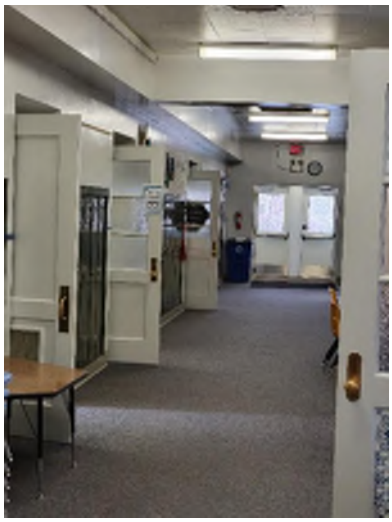
Doors

Existing Conditions

Exterior Doors: There are a half dozen exterior doors that are wood slabs and are not able to hold up to the exterior elements. These doors are in dire need of being replaced.


Interior Doors: Most of the interior doors have knobs and not handles. These need to be upgraded with lever sets for better life safety and accessibility.




Recommendations

Exterior Doors: Replace the half dozen old/wood doors with new insulated galvanized hollow metal doors and frames. **(Medium Cost, High Priority)**

Interior Doors: Most of the interior doors have knobs and not handles. These need to be upgraded with lever sets. **(Medium Cost, High Priority)**

Exterior Cladding

Existing Conditions

Cladding: The exterior cladding is primarily a stucco system and is in good shape. There are a few areas that should be patched and repaired. This system is not an EIFS system and so does not have the bird issues.



Exterior Stair and Guard Railing: The main level exterior stair is deteriorating and the existing railing that was installed is rusting at the base. The railing does not have adequate fall protection and should be replaced.

Recommendations

Cladding: Touch up the exterior stucco. **(Low Cost, High Priority)**

Exterior Stair and Guard Railing: The concrete stair structure should be repoured and a new handrailing should be installed. This fall protection is essential to the life safety of the school aged children. **(Medium Cost, High Priority)**

Accessibility

Existing Conditions

General ADA: Overall the accessibility of this building is in good shape. There appears to be an accessible parking spot. The route into the building appears to be in good condition. There are accessible restrooms on each level. The building has an elevator from the first floor to the basement and the basement to the gym floor already has a platform lift that can be used.

Entry Ramp and Stairs: The ADA ramp and stairs does not have an acceptable handrailing and the concrete is beyond repair.


Interior Stair Railing: The interior main stair does not have the acceptable fall protection. With this being a K-5 School it is critical to protect the younger kids.

Recommendations

Entry Ramp and Stairs: The ADA ramp and stairs does not have an acceptable handrailing and the concrete is beyond repair. **(Medium Cost, Medium Priority)**

Interior Stair Railing: Replace the existing railing with a Guard Railing 42" tall and that will not allow a 4-inch sphere from passing through. **(Low Cost, High Priority)**

Roofing

Existing Conditions

The roof is in excellent condition. A new PVC roofing system was installed on the building in 2018.

Recommendations

Perform annual roof maintenance.

Four Georgians Elementary School

Overview

Address:

555 West Custer Avenue

Helena, MT 59601

Year Built:

1977

Building Area:

56,942 SF

Parking, Sidewalks and Site

Recommendations

Brick pavers are damaged and holding water and ice - Replace brick pavers in front of school with concrete.

Playground fence have exposed concrete posts - Install edge and fill with appropriate material.

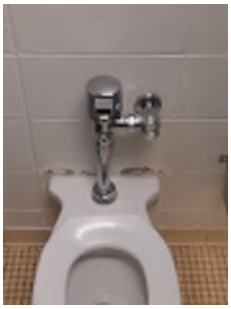
Minor concrete and asphalt cracks - Repair asphalt cracks and seal coat, Replace concrete in back of school.

HVAC

Existing Conditions

Heating System: A (2) boiler system provides hot water for the building from a central boiler room located in an equipment loft adjacent to the gymnasium space. The boilers are Lochinvar Crest Model FBN 2001. Units installed in 2019 as a portion of a boiler room upgrade project.

Plumbing: Fixtures are older but functional. The water closets are wall hung units. The fixture wall nipples are weeping which in numerous spaces have created damage to the adjacent wall surfaces. The nipples are being addressed by the district staff. No operational issues reported regarding the building piping systems.



The building domestic system is not equipped with a required water tempering valve. Device is required by code. The devices maintain the temperature of domestic water discharge from the water heater to a code designated range.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Classroom spaces are primarily served with floor mounted unit ventilators. The unit ventilators are original to the building. The central spaces in the original building are served with small fan coils located in the ceiling cavity of the janitor spaces.

The Roof fans have been through several hail events.

The gymnasium (multi-purpose space) is served with an original to the building Trane air handler located in the equipment mezzanine.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The building is not equipped with mechanical cooling systems. Small ductless split systems at the time of the inspection were in the process of being installed in IT rooms throughout the building.

Recommendations

Heating: No improvements are recommended at this time.

Ventilation: Classroom unit ventilator should be replaced with new equipment to improve space comfort, improve indoor air quality, and reduce equipment noise within the teaching environment.

The gymnasium air handler should be replaced with a variable speed unit to reduce energy consumption during periods of low or intermittent load.

The ceiling mounted fan coils should be replaced with roof mounted equipment to improve service access, relocate equipment noise outside the learning environment and improve indoor air quality.

Mechanical ventilation system should be added to the office space to ensure proper indoor air quality for staff and students.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

Direct Digital Controls (DDC) provide boiler staging and control in the equipment while the classroom spaces utilize pneumatic controls.

Recommendations

With the replacement of the classroom ventilation equipment, the pneumatic controls should be replaced with new DDC to improve space comfort, system monitoring and reduce energy consumption.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV primary distribution line on a riser pole located across Custer Avenue to the North. The primary line crosses under Custer Ave. and terminates in a junction can on the exterior of a CMU block screen wall at the northeast side of the building (Figure 1). The primary line then runs underground from the junction can to a 150 kVA pad mounted transformer on the south side of the screen wall inside a locked utility yard (Figure 2). The secondary service characteristics are 120/208 volts, three phase, four wire. The secondary conductors exit the transformer underground and then rise on the east wall of the building, inside of the utility yard, then terminate in a metering cabinet (Figure 3). The utility meter is adjacent. The secondary conductors from the metering cabinet

connect to a 600A-3P fusible main disconnect switch. There is a 100A load center panelboard adjacent with a 100A-2P main breaker for the parking lot lighting. The conductors for the panel board are tapped off the lugs inside the main disconnect switch.

Figure 1 – Utility Co. Primary Junction Can Metering Enclosure and Meter

Figure 2 – Utility Yard and Service Entrance

Figure 3 – Utility Co. Transformer, Metering Enclosure, Meter, Main Disconnect & Parking Lot Lighting Load Center

The highest recorded demand from Northwestern Energy was 85.6 KW in January, 2020. Based on this reading, the calculated demand is about 372 amps, meaning that the service has about 30% to 35% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

The secondary service conductors run under the building foundation, then up to the Boiler Room on the Mezzanine level above the Gym. At this point, they terminate in a 600 amp, 2-section Main Distribution Board. The Main Distribution Board is a Square D Power-Style (Figure 4). Section 1 of the board contains 12 original QMB fusible switches and 2 newer switches that may have been added for a recent boiler upgrade. Section 2 contains eight NEMA Size 1 combination fusible switch/motor starters. They serve the air handler, fan motors and pumps. The maintenance staff has indicated that parts for the motor starters are hard to obtain and may be obsolete. The original QMB fusible switches in Section 1 also appear to be obsolete; but the newer QMB fusible switches that were recently installed indicate that a replacement solution is available.

Figure 4 Main Distribution Board

Figure 5 – A Typical Branch Panelboard

Electrical Distribution: There are seven Square D QOB branch panelboards located throughout the building. Most of the panelboards in the classroom wings have some spare capacity, but the panels in the Administration and Food Service areas do not. There is a new UPS panelboard located in the Mezzanine with spare capacity, but it is used to provide backup for the data systems and for security, and cannot be used to support non-critical loads. None of the panelboards are obsolete; breakers and parts are still obtainable (Figure 5).

Figure 6 – Typical Classroom Appliances and Heavily Loaded Power Strip Below

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have four to six receptacles in usable locations often resulting in the need for two or more power strips (Figure 6). In many cases the power strips are overloaded, resulting in additional power strips being added.

Receptacles and circuits were added to the new Staff Break Room, Offices, Reception, Nursing and other Administrative areas with the Safety-Security Upgrades project in 2019.

Lighting: Staff Break, Nursing and Administrative areas that were remodeled in recent Safety-Security Upgrades are mostly recessed LED troffers. In the remaining portions of the building that were not remodeled, the corridors are mostly 4 foot T8 fluorescent fixtures with wraparound acrylic lenses, and classrooms are predominately 2x4 fluorescent troffers with parabolic louvers or acrylic lenses and 4 foot T8 lamps. The Library lighting is surface metal sided, 2x4 fluorescent parabolic louvers with T8 lamps. Storage and utility areas are mostly 2-lamp surface fluorescent fixtures with wraparound lenses. The building has been equipped with occupancy sensors, but only the areas with the LED lighting have dimming capability. The Gymnasium lighting is 4 foot T-5 fluorescent fixtures with wire guards (Figure 8).

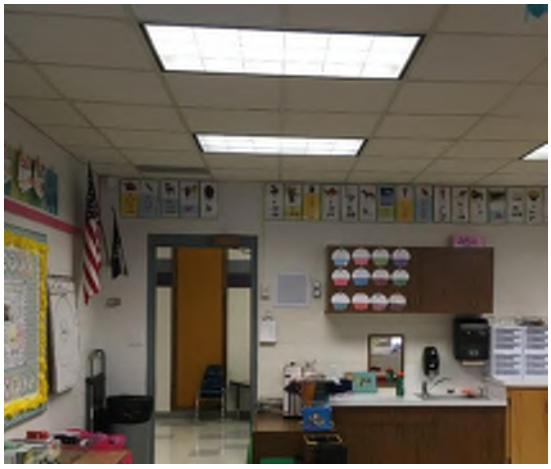


Figure 7 – Typical Classroom Lighting

There is a central battery inverter in the Boiler Room on the Mezzanine that provides standby power for the exit signs and emergency egress lighting throughout the building. Exit signs appear to be mostly the original, die-cast aluminum housings with incandescent lamps that have been replaced with LED retrofit lamps. Selected fixtures and exit signs in the corridors and other egress pathways are connected to a branch circuit that is fed from the inverter. The maintenance staff reports no problems with the inverter. None of the exterior egress lighting is connected to the inverter and it is not likely that the inverter has capacity for adding the exterior lighting.

Recommendations

Electrical Service: The existing service is capable of supporting some additional load; however, the Main Distribution Board cannot accommodate additional loads due to limited mounting space for new fusible switches.

Electrical Distribution: It is recommended that the Main Distribution Board be replaced with a new board that has the capacity to support the power requirements for a new central AC system. This would likely require increasing the service from 600 to 800 amps. The branch panelboards do not necessarily need to be replaced, especially since many of them are located in corridors or other locations where a larger panelboard would not have adequate clearances. Instead, it may be necessary to install two or more panelboards in locations in the classroom wings to allow additional receptacle circuits to be extended to the classrooms.

Branch Circuiting: Additional receptacles and circuits are badly needed in the classrooms and workrooms, particularly near the teacher's desks. Replacing existing receptacles and adding up to eight additional, and increasing branch circuiting to a minimum of two dedicated circuits per classroom and one for workrooms is recommended. The wiring could be installed in a concealed manner if the cost of cutting and patching walls is acceptable. Otherwise, exposed conduit or Wiremold raceway, would be used.

Lighting: Replacement of fluorescent with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. In addition, it would be a benefit if all of the classrooms had a standard fixture that was consistent, rather than a variety. Replacement of the original exit signs with new "onboard" LED signs is recommended. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service terminates in the Main Data Rack in a locked room at the south end of the Mezzanine. The security electronic door access equipment is also located in this room, on the south wall behind the data rack.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known deficiencies.

IP based security cameras were provided in the recent Safety-Security Upgrades project on the exterior of the building covering all entry points, playgrounds and drop off locations. Interior cameras were also located in the entry vestibules and lobby. All cameras are power over ethernet (POE) and are connected to the data switches at the main rack. A new UPS was recently added to provide a minimum of two hours of backup power, should there be an extended power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system with voice evacuation. The Control Unit(s) are located on the east wall of the Reception Office (Figure 10). There are manual pull stations at exit pathways, speaker/strobes in all rooms and corridors, and smoke detectors in the corridors for release of magnetic door holders. The Control Unit is a Silent Knight Model 5808. The Voice Evacuation Unit is a Silent Knight Model SKE. There are no known issues with the system.

Figure 10 – Fire Alarm Control Unit Prior to Safety-Security Upgrades

Recommendations

None

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade. There are no known deficiencies with the system.

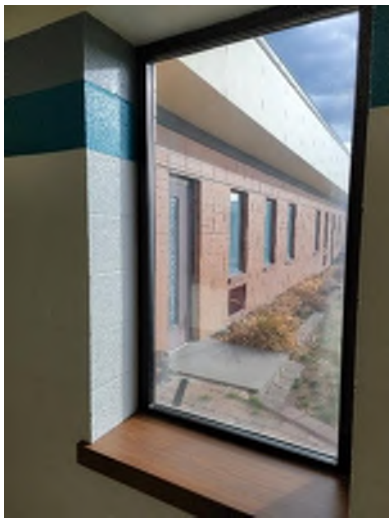
Recommendations

None

Windows

Existing Conditions

The windows are all thermally broken aluminum frames and double paned glazing. It is anticipated that the seals will start to break down, but at this time they are all in good working condition and still have usable life.



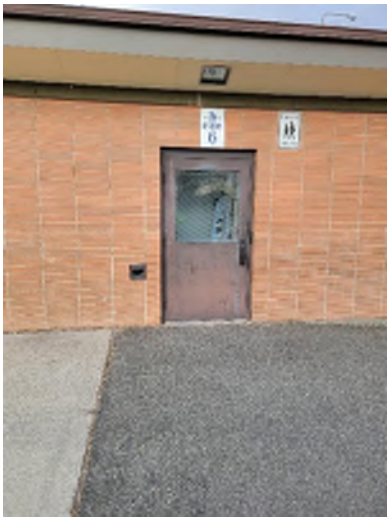
Recommendations

Currently there are no recommendations.

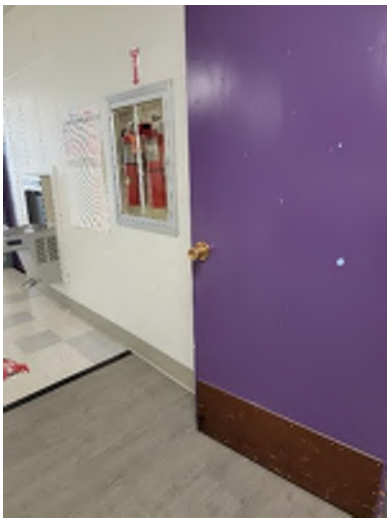
Doors

Existing Conditions

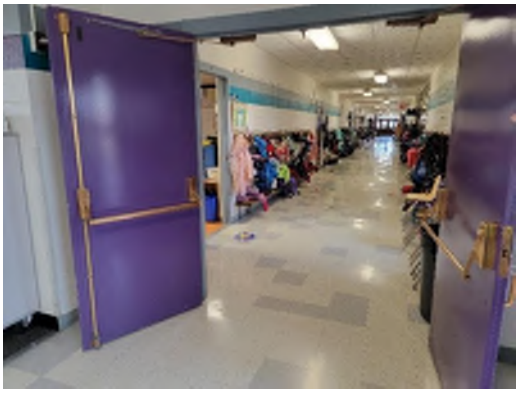
Exterior Doors: There are only a few exterior hollow metal doors and frames doors that need being replaced. The majority are in good working condition.



Interior Doors Hardware: Most of the door hardware has been updated to levers, but there are a few locations that are still in need of being upgraded to lever sets.



Interior Fire Doors: The two double fire doors in the school are constantly needing adjusted and one door currently does not have a bottom rod or fire pins. These two doors should be replaced.

Recommendations

Exterior Doors: Replace the few exterior doors that are deteriorated. **(Low Cost, Medium Priority)**

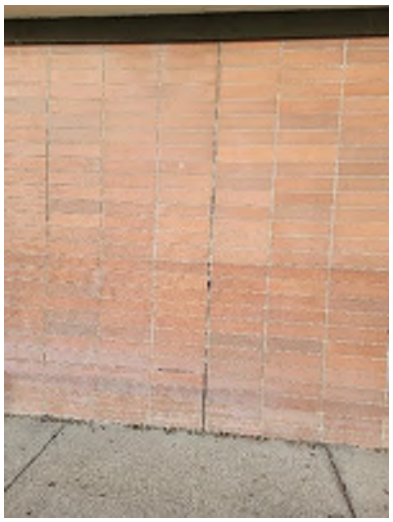
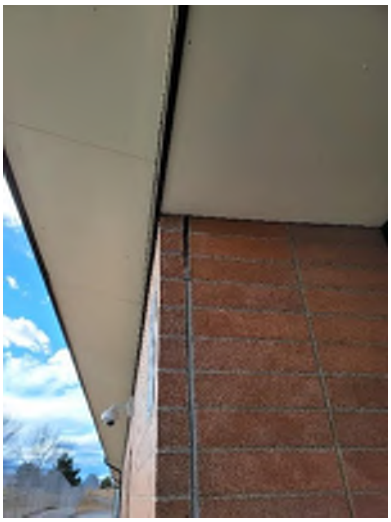
Interior Doors Hardware: Replace the knobs in the school with new lever sets. **(Low Cost, Medium Priority)**

Interior Fire Doors: Replace hallway fire doors. **(Low Cost, High Priority)**

Exterior Cladding

Existing Conditions

Masonry: The exterior face brick is good shape. However about 10% of the mortar joints need being repointed. In addition, all the control joints need new sealant.

Fascia and Soffit: The soffits and fascia on the south exposure is breaking down and needs to be replaced.


Recommendations

Masonry: Repoint mortar joints as needed. Replace all the control joint sealant. **(Low Cost, Medium Priority)**

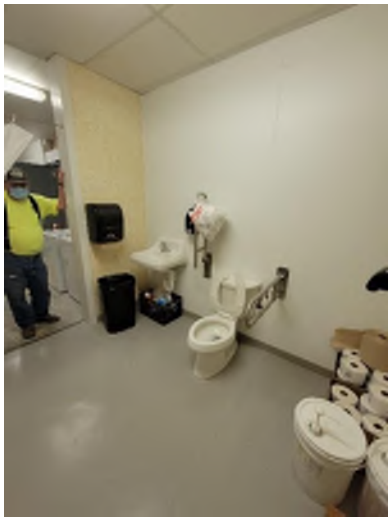
Fascia and Soffit: Replace the Fascia and Soffit material. To keep it uniformed we would recommend replacing the entire building. **(Medium Cost, Low Priority)**

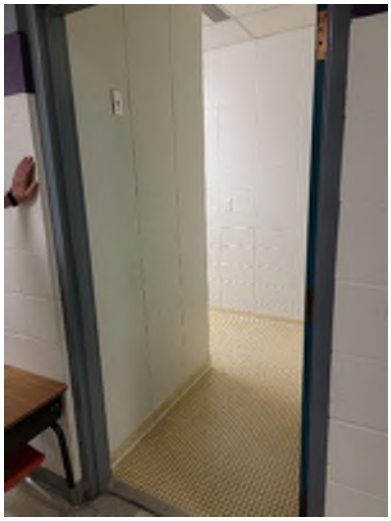
Accessibility

Existing Conditions

Parking: There are good ADA parking spaces, at this school. Some of the cross slopes do appear to be greater than the 2% allowed. It would be recommended that these be replaced at some point.

Restrooms: There are several restrooms that almost meet ADA requirements. However, none of the facilities restrooms meet the current ADA clearances. It is recommended that at least two of these facilities be renovated.





Recommendations

Parking: Replace the concrete site that has larger cross slope than 2%. **(Low Cost, Low Priority)**

Restrooms: Renovate two (2) of the existing restrooms. **(High Cost, Low Priority)**

Roofing

Existing Conditions

The roofing system will be in excellent condition. A new thermoplastic single ply roofing system was installed over the gym in 2021. The balance of the school is scheduled to be reroofed in the summer of 2022.

Recommendations

Perform annual roof maintenance.

Hawthorne Elementary School

Overview

Address:

430 Madison Avenue

Helena, MT 59601

Year Built:

1921

Building Area:

27261 SF

Parking, Sidewalks and Site

Recommendations

Playground Asphalt Surface - Repair cracks, repair potholes and sealcoat entire area.

Cracked and uneven concrete - Replace concrete that is cracked and uneven.

HVAC

Existing Conditions

Heating System: A (3) boiler system provides hot water for the building from a central boiler room located in an equipment room on the second floor of the building. The boilers are Burnham Cast Iron Sectional Boilers Model 810B-WI 600 MBH input. Installed date 1991.

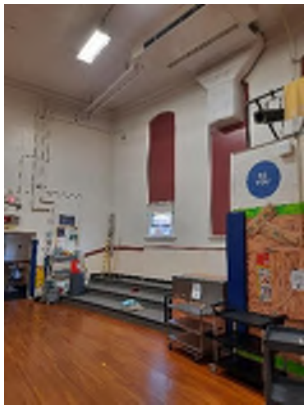
Abandoned steam boiler in basement of Library Building. Unit should be removed.
As a portion of the Safety and Security building upgrades radiant slab snow melt was added at the building entrances. This system utilizes ceiling mounted circulation pumps near the building exterior wall to circulate glycol solution through the slab.

Plumbing: Fixtures are older but functional. The water closets are wall hung units.

The building domestic system is not equipped with a required water tempering valve. Device is required by code. The devices maintain the temperature of domestic water discharge from the water heater to a code designated range.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Classroom spaces are primarily served with unit ventilators. The unit ventilators are both floor and ceiling mounted. The floor mounted unit ventilators are older, the ceiling mounted units in the end classrooms are newer. The building cafeteria and library spaces are served with ceiling mounted horizontal unit heaters.



The cafeteria space is served with ceiling mounted unit ventilators

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The building is not equipped with mechanical cooling systems.

Recommendations

Heating: Replace the cast iron sectional boilers with new high efficiency boiler equipment to reduce building energy consumption.

Ventilation: Classroom unit ventilator should be replaced with new equipment to improve space comfort, improve indoor air quality, and reduce equipment noise within the teaching environment.

The gymnasium unit ventilators a variable speed air handling unit to reduce energy consumption during periods of low or intermittent load.

Mechanical ventilation system should be added to the office space to ensure proper indoor air quality for staff and students.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

Tekmar boiler staging panel stages the modular boiler plant. Limited Direct Digital Controls (DDC) were installed to sequence the new snow melt heating system. The classroom spaces utilize pneumatic controls.

Recommendations

The building DDC system should be extended to all boiler equipment (pumps, mixing valves and boilers) replacing the Tekmar boiler staging controller.

With the replacement of the classroom ventilation equipment, the pneumatic controls should be replaced with new DDC to improve space comfort, system monitoring and reduce energy consumption.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 7.2 kV primary on a riser pole located near the southeast corner of the property. The primary crosses under the alley and continues underground to the approximate center of the building's east side and terminates in a 50 kVA (est.) pad mounted transformer on a plastic pad about six feet from the building (Figure 1). The secondary service characteristics are 120/240 volts, single phase, three wire with a nominal 400 amp rating. The secondary exits the transformer underground and then rises on the east wall of the building and terminates in a metering cabinet (Figure 2). The utility meter is adjacent. The secondary from the metering cabinet connects to an 600A-2P fusible Main Disconnect adjacent. The fuse size was not verified but is estimated to be 400 to 450 amps based on size of the conduit and the demand reading.

Figure 1 – Pad Mounted Transformer, Metering Cabinet, Meter and Main Disconnect

The highest recorded demand over the last two years from Northwestern Energy was 20.4 KW in March and April 2021. However a peak of 37.6 KW occurred in December, 2018 and there was a 37.2 KW peak recorded in February 2019, which was known to be a historically cold month. Using the higher reading, the calculated demand is about 250 amps, leaving a spare capacity of about 35% after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. The service seems adequately sized for the building's current needs.

Figure 2 – Main Distribution Panel

There is a separate electrical service for the Music Building located southwest of the main building. It is a direct metered 100 amp underground electrical service fed from a riser pole with a single phase mounted transformer in the alley to the south of the building.

Distribution: There is a 600A Main Distribution Panel in the center of the lower level in a closet in the northwest corner of an office (Figure 2). This is a 42 circuit panelboard. The panel directory does not identify the panelboard breakers clearly, but using the sizes as a guide, a fairly reasonable assumption can be made that two 150 amp, three 100 amp and one 50 amp breaker for feeders to branch panelboards and load centers in the building. The Distribution Panel also feeds two handicapped power lift chairs on the ramps, the fire alarm panel and a few miscellaneous loads. It has approximately 40% spare capacity.

Figure 3 – Panel B

There are five branch panelboards in the building and two load centers. A third load center is located in the Old Boiler Room under the Library Building to the South. A new 42 circuit panelboard was recently added in the Reception Office. None of the panels in the building are obsolete and there is some spare capacity except for panels B and C (Figure 3) located in the classroom areas on the north side of the building. There is an 8-circuit load center panel in a former computer classroom at the north end of the lower level that was used for workstation receptacles that are no longer needed. Another small load center is located in the Kitchen area, on the west side of the gymnasium.

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have four to eight receptacles but they are not in locations where they are needed, i.e. near the teacher's desk, PC workstations or in the adjacent workrooms. This results in the need for power strips.

Figure 4 – Typical Classroom Lighting in Main Building

Lighting: Most of the lighting in the classrooms of the main building are 2x4 recessed T8 fluorescent with parabolic louvers and are controlled with occupancy sensors (Figure 4). Corridor fixtures and a few classrooms are 2x4 troffers with acrylic lenses. New recessed 2x4 LED fixtures with dimming and occupancy sensors were installed in the Reception, Nursing and Administrative areas that were remodeled in recent Safety-Security Upgrades. Storage, ramp, utility spaces, Library and Music Classroom (Figure 5) have surface 4-foot fluorescent T8 lamps with acrylic wraparound lenses with occupancy sensors. The Gymnasium lighting consists of surface mounted 4 foot T-5 fluorescent with wire guards.

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Figure 5 – Music Classroom Lighting

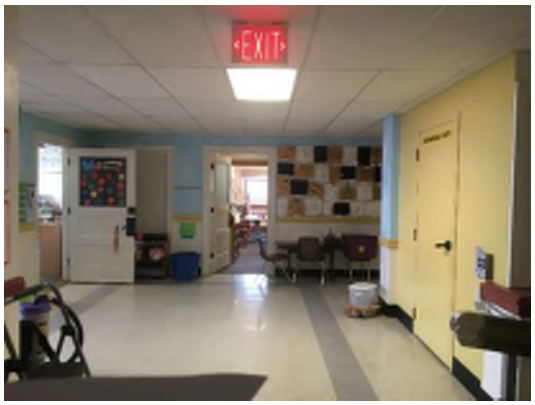


Figure 6 – Exit Signs in Main Building

Most of the exit signs in the main building are newer LED (Figure 6). The Library and Music Classrooms are cardboard; not powered or self-illuminated (Figure 7). Codes do not allow this, unless the face of the sign is illuminated with five foot candles of emergency lighting, for which they do not appear to be. Emergency egress lighting is very sparse in all the buildings. There are a few wall mounted battery units but overall there does not seem to be adequate levels of egress illumination during a power failure, particularly on the ramps and stairs (Figure 8). The new exterior ADA ramp is equipped with emergency egress lighting and battery backup.

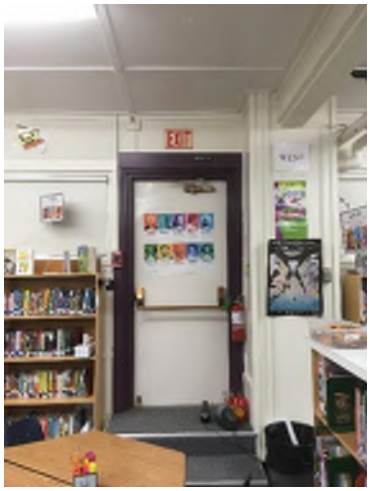


Figure 7 – Paper Exit Sign in Library

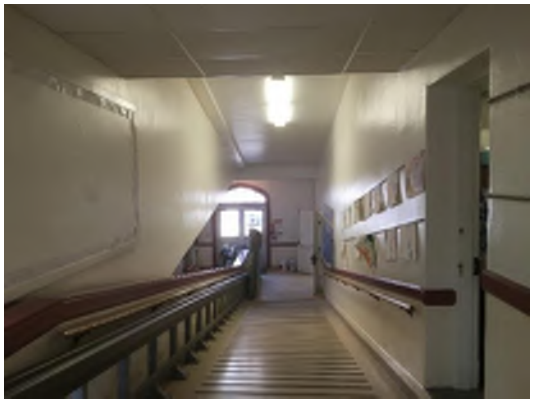


Figure 8 – No Exit Signs or Emergency Egress Lighting in Ramp Areas

Recommendations

Electrical Service: The existing service is capable of supporting some additional load, which could include small air conditioning systems for spot cooling portions of the building. However if a larger, central AC system is required a new 3-phase electrical service is recommended.

Larger AC systems are not available in single phase configurations. There are solutions for conversion to 3-phase using variable frequency drives or converters, but it this case the ampacity of the larger equipment would most likely exceed the service size anyway. It does not appear that Northwestern Energy has 3-phase distribution lines in the vicinity of the property. The nearest 3-phase lines are several blocks away. If 3-phase must be brought to the site, the cost for this would have to be paid for by the Owner, in addition to a new pad mounted transformer, excavation and new underground secondary.

Electrical Distribution: If an upgrade to the electrical service is required to support air-conditioning, a new main distribution board, either inside or on the building exterior (See Jefferson Elementary School) will need to be installed. The service voltage configuration will change from 120/240 volts single phase to 120/208 volts 3-phase. This may not be a major concern, but there are some 240 volt motors, i.e. boiler circulation pumps, that may need to be

replaced. In one scenario, the existing Main Distribution Panel would simply be reconnected to a new Distribution Board and continue to be fed with single phase. New air conditioning loads would then be connected to the new MDB. In a second scenario, the existing Main Panel could be replaced with a new interior 3-phase distribution board that would allow the existing single phase panels to be reconnected in a manner which would balance the load, and to feed the new air conditioning equipment. The outdoor location is probably more practical however, due to limited space inside the building.

Regardless of whether a new service is installed, it is recommended that at least one additional branch circuit panels be added to each level of the building, near the center to provide additional circuits for adding receptacles to classrooms and work areas. This could be accomplished by adding a 150A-200A circuit breaker in the existing Main Distribution Panel and feeding a new panel in the Lower Level, then sub-feeding the second panel on the main level.

Branch Circuiting: Additional receptacles and circuits are needed in the classrooms and workrooms, in the corners, near the teacher's desks and in work areas. Replacement of existing receptacles is recommended. Circuiting will be increased to a minimum of two dedicated circuits per classroom. Wiring can be run above lay-in ceilings or other accessible locations, then drop down into the classrooms, where it will be surface mounted in Wiremold or exposed conduit, or it could be installed in a concealed manner if the cost of cutting and patching walls is acceptable.

Lighting: Replacement of fluorescent with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The fixtures in the Reception Area, Nursing Office and Admin Areas have already been replaced in with 2x4 recessed LED troffers. The remaining classrooms and corridors in the main building, Library and the Music Classroom would be replaced with the same. Additional LED exit signs and emergency egress lighting should be added to the corridors, ramps, stairwells, the Library and Music Rooms to ensure compliance with the Life Safety Code. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service enters the building from the north into the lower level and terminates in the Main Data Rack in a locked room at the north end of the Main Level. The door access equipment behind a locked door for the ramp access to the attic at the south end of the main level.

Most classrooms and workrooms are provided with two or more data outlets, and another at the ceiling for wireless access. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. Integrated A/V system controllers

have not been installed in this building, which require an additional data cable connection if they are added in the future.

IP based security cameras were provided in the recent Safety-Security Upgrades project on the exterior of the building covering all entry points, playgrounds and drop off locations. Interior cameras were also located in the entry vestibules and lobby. All cameras are POE and are connected to the data switches at the main rack. A new UPS was recently added to provide a minimum of two hours of backup power, should there be an extended power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. The Control Unit(s) is located next to the Main Distribution Panel in a closet in the northwest corner of an office near the center of the building (Figure 9). It is a Silent Knight Model SK-4224. There are four addressable initiating zones; Main Bldg, Boiler Room, Library and Music, and two notification circuits; Main Bldg and Out Bldgs. There is a remote annunciator located in the main entry lobby (Figure 10). There are manual pull stations at exit pathways, horn/strobes in the corridors, common areas, the Gym, Auditorium, Library and Music Classroom. There are a few heat detectors in the Old Boiler Room under the Library and a smoke detector near the Fire Alarm Control Unit.

Figure 9 – Fire Alarm Control Unit

Recommendations

There are no known issues with the fire alarm system. In the future, a major renovation may require replacement of the fire alarm system with a new addressable voice evacuation system, but that seems unlikely.

Figure 10 – Fire Alarm Remote Annunciator and Pull Station

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade. The staff reports that there are no known serious issues with the system.

Recommendations

None

Windows

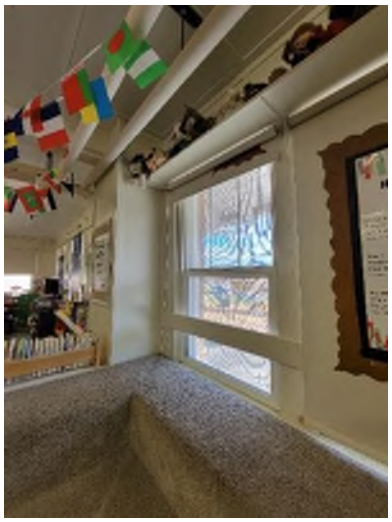
Existing Conditions

Main Building: In the main building the windows are not original to the school and have been replaced in the recent past. They are thermally broken aluminum framed windows with double pane glazing. The windows are in good working condition and do not appear need replacement.

Some of these windows have fixed glazing but the vast majority are operable hopper style windows that open interior to the room. None of these operable windows currently have bug screens and during the shoulder heating season can allow pest into the building.


Library Outbuilding: The library windows are much older. Each window is constructed with an interior single hung window and an exterior storm window. The interior window appears to be vinyl and the exterior window appears to be wood. While old they appear to be in good working condition. The exterior windows need paint touch up.





Music Outbuilding: The music building is a modular building that appears to be at the end of its useful life without major renovations including the windows.

Recommendations

Main Building: It is recommended that bug screens be added to all the operable windows in the school to help with the ability to get fresh air and reduce the introduction of pest. **(Medium Cost – High Priority)**

Library Outbuilding: The library windows should eventually be replaced but with the relative conditions this is not a high priority need. The exterior windows should be on the list of touch painting every three to five years. **(Medium Cost – Medium Priority)**

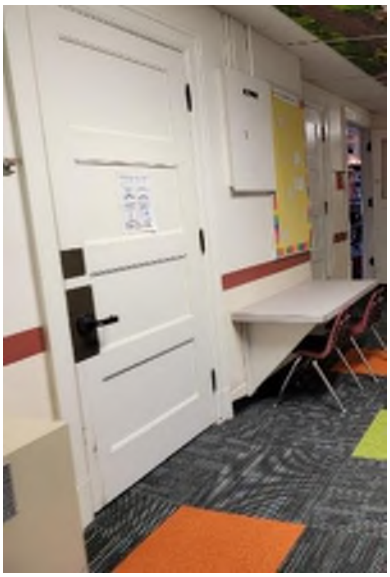
Music Outbuilding: While these windows need being replaced the entire building is at the end of its useful life and in need of being replaced. I would recommend replacing the entire structure instead of putting a lot more money into the existing maintenance. **(High Cost – Low Priority)**

Doors

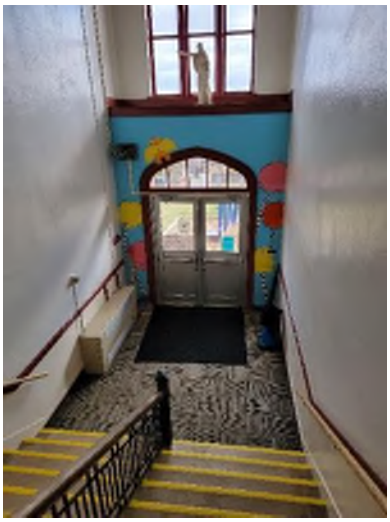
Existing Conditions

Main Building:

Interior Doors: The interior doors are all wood doors and wood frames. They are old but in the recent past all the knobs had been replaced with lever sets.

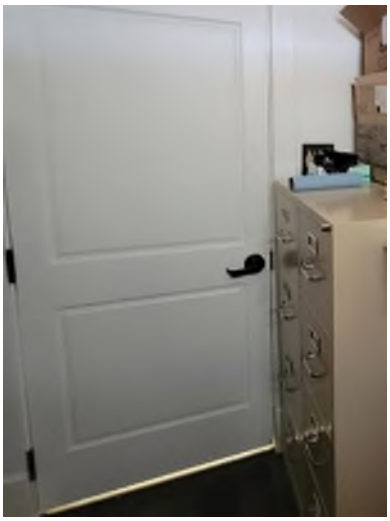


Exterior Doors: The exterior doors are all aluminum systems. Of the (5) locations, (2) were upgraded during the safety and security project and the existing (3) are constantly being repaired or adjusted by the district.


Library Outbuilding:

Interior Doors: The interior doors in the library are like those on the main building and in good working condition.



Exterior Doors: Of the (2) main exterior doors on the library one was recently replaced during the safety and security project, and one is an old wood door that should be replaced in the near future.

Music Outbuilding: The music building is a modular building that appears to be at the end of its useful life without major renovations including the windows.

Recommendations

Main Building:

Interior Doors: It is recommended that the doors be replaced at some point. **(High Cost – Low Priority)**

Exterior Doors: The (3) old doors requiring a lot of maintenance should be replaced soon. **(Low Cost – High Priority)**

Library Outbuilding:

Interior Doors: It is recommended that the doors be replaced at some point. **(Low Cost – Low Priority)**

Exterior Doors: The (1) old door should be replaced when the rest of the exterior doors do. **(Low Cost – High Priority)**

Music Outbuilding: I would recommend replacing the entire structure instead of putting a lot more money into the existing maintenance. **(High Cost – Low Priority)**

Exterior Cladding

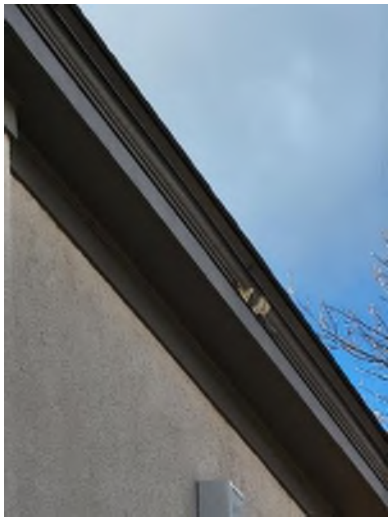
Existing Conditions

Main Building: The exterior cladding of the main building is a stucco or an Exterior Insulation Finishing System (EIFS) system. At some point this exterior was repainted. However, there a lot of locations that are cracking, the system is falling off (and potentially can injure someone), in addition paint is peeling and allowing moisture into the system. There are also a few locations where electrical boxes are exposed and should be closed in.

The Fascia around the building is a wood system and is cracking and peeling and should be repainted and/or replaced with a metal fascia system.








Library Outbuilding: The exterior cladding on the library outbuilding is face brick that is in good shape. However, the mortar joints need being repointed.

Music Outbuilding: The music building is a modular building that appears to be at the end of its useful life without major renovations including the windows.

Recommendations

Main Building: The exterior stucco and facia needs being repaired. **(Medium Cost – High Priority)**

Library Outbuilding: Repoint the brick mortar joints. **(Low Cost – High Priority)**

Music Outbuilding: The music building is a modular building that appears to be at the end of its useful life without major renovations including the exterior cladding. **(High Cost – Low Priority)**

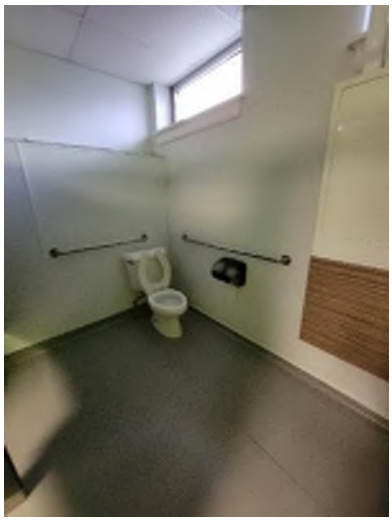
Accessibility

Existing Conditions

ADA Parking and Exterior Route: The existing ADA parking spot does not meet the required ADA slopes or cross slopes. The asphalt at the ADA parking spot is also cracking and in need of replacement. Once you get past the edge of the building the ADA route appears to be in good shape.


Interior Route: With the use of the Ramp/Stair lift on the main ramps, the school meets the primary ADA need. However, in the basement (4) of the (5) classrooms have a threshold with a 3" tall by 12" long ramp well over the allowable 1":12" ramp slope. Modifying these would be technically difficult and with other classrooms in the school meeting the ADA requirements it is not a huge need.


Restrooms: While not all the restrooms are ADA compliant there is at least one facility per floor that is compliant. The ADA stalls are missing Vertical 18" grab bars that should be added.




Library Outbuilding: Appears to be in ADA compliance from an architectural standpoint. There are boxes in back that are in the door ADA clearance to the restroom and should be relocated.

Music Outbuilding: The main ramp on the music room is new and appears to meet the necessary ADA requirements.

Recommendations

ADA Parking and Exterior Route: This ADA parking spot should be rebuilt to meet ADA. **(Medium Cost – High Priority)**

Interior Route: While it would be great for all of the classrooms to be ADA accessible, because there are classrooms in the building and the problematic fix for these locations, it is not a high priority. **(Medium Cost – Low Priority)**

Restrooms: New vertical grab bars should be added to all toilet stalls. **(Low Cost – High Priority)**

Library Outbuilding: The boxes should be relocated. **(No Cost – High Priority)**

Roofing

Existing Conditions

The building roofing system in in fair / good condition. There is a mix of thermoplastic single ply roofing materials and asphalt shingle.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof section J are T-Lock roofing shingles over a modular building – **(Low Cost - High Priority)**

Reroof roof sections A,B,C,D,E,F,G,H,I,K these roofs are comprised of single ply and asphalt shingle roofing material on the main school and out building – **(High Cost - Low Priority)**

Jefferson Elementary School

Overview

Address:

1023 Broadway

Helena, MT 59601

Year Built:

1948

Building Area:

34,965 SF

Parking, Sidewalks and Site

Recommendations

Playground Asphalt Surface - Repair cracks, repair potholes and sealcoat entire area.

West side Asphalt and Parking - Repair cracks, repair potholes and sealcoat entire area.

HVAC

Existing Conditions

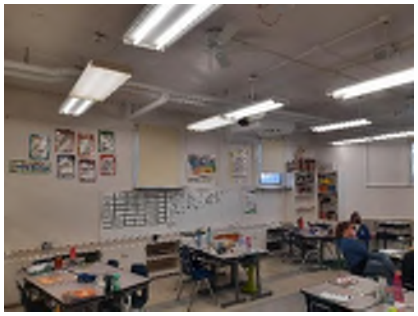
Heating System: A (2) boiler system provides hot water for the building from a central boiler room located in an equipment room on the lower level on the West end of the building. The boilers are Riello Model AR 2001. Units Installed in 2021 as a portion of a boiler room upgrade project.

Plumbing: Fixtures are older but functional. The water closets are floor mounted units. Floor mounted wall urinals are still in operation in the building. Fixtures are stained and chipped, but no operational issues reported with either the fixtures or the building piping systems.

The building domestic system is not equipped with a required water tempering valve. Device is required by code. The devices maintain the temperature of domestic water discharge from the water heater to a code designated range.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Central air handling units provide ventilation air for most of the building. Floor mounted unit ventilators are utilized in the cafeteria while ceiling mounted unit ventilators are used in the northside lower-level classrooms. All ventilation equipment was replaced as a portion of a building retrofit in the summer of 2021.



Fintube radiation provides individual space temperature control for the individual classroom spaces.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The building is fully equipped with mechanical cooling systems. Small ductless split systems provide cooling to the kitchen and lower-level office spaces. All air handling equipment is equipped to exterior dx cooling systems.

Recommendations

Heating: No improvements are recommended at this time.

Ventilation: No improvements are recommended at this time for the classroom spaces.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

The 2021 mechanical system replacement replaced the building temperature control system with new Direct Digital Controls.

Recommendations

No recommendations at this time.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV primary distribution line on a riser pole located across South Dakota Street to the East. The primary line crosses under South Dakota St. and terminates in a 150 kVA pad mounted transformer on a concrete pad near the main entrance on the east side of the building (Figure 1). The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 600 amp rating. The secondary conductors exit the transformer underground then rise on the north wall of the building, near the east end, terminating in a metering cabinet (Figure 2). The utility meter is adjacent. The secondary conductors from the metering cabinet connect to an 600A-3P main circuit breaker in the Main Distribution Board (MDB).

Figure 1 – Pad Mounted Transformer

The highest recorded demand over the last two years from Northwestern Energy was 54.8 KW in November, 2021. Based on this reading, the calculated demand is about 238 amps, meaning that the service would have about 50% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. However, an air conditioning upgrade is currently being constructed and the recorded value does not give an accurate depiction of what the peak demand will be during the next cooling season. Using the highest peak demand prior to November and adding the additional demand load for the current air conditioning upgrades, show that the new connected load will be approximately 500 amps, but the connected load is often much higher than the actual recorded demand. The demand seen in the coming cooling season is estimated to be 80 to 100 kW.

Figure 2 – Main Distribution Board, Metering Enclosure and Meter

Distribution: The 600A-3P main breaker in the MDB (Figure 3) has a maximum rating of 630 amps with an adjustable instantaneous trip setting. There are five distribution breakers; 400A-3P for Panel A, 225A-3P for Panel F, 200A-3P for Condensing Unit 1, 100A-3P for Condensing Unit 2 and 100A-3P for the elevator. There is one provision remaining for up to a 225A breaker.

Figure 3 – Interior of Main Distribution Board

Panel A is located in a storage closet in the lower level near the Art Classroom (Figure 4). It has a 400A main breaker. There are two 150A-3P breakers that feed Panels B and C. There is also a 100A-3P breaker for Panel D. Panel B is located next to Panel A (Figure 5) and serves mostly loads in the east end of the lower level. It has a 100A-3P breaker for Panel E. All of the branch panelboards, except for Panel D, are new and in good to excellent condition. However, the recent HVAC upgrades have used most of the spare capacity, leaving no space for future loads. Panel D is located in the Auditorium on the stage (Figure 6). It is an original panelboard that is obsolete. It serves a stage lighting system and a few other miscellaneous loads in the Auditorium.

Figure 4 – Panel A

Figure 5 – Panel B

Figure 6 – Panel D

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have six to eight receptacles but there are not enough in locations where they are needed, i.e. near the teacher's desk, PC workstations or in the adjacent workrooms. This results in the need for power strips.

Lighting: The Library, Staff Break, Nursing and Administrative areas that were remodeled in recent Safety-Security Upgrades were provided with LED troffers in lay-in ceiling areas, and surface or suspended 4 foot LED fixtures with acrylic wraparound lenses. In the East portion of the building, the corridors and classrooms are mostly 4 foot T8 surface and suspended fluorescent fixtures with wraparound acrylic lenses (Figure 7). In the West portion of the building, Classroom lighting is predominately 2x4 troffers in lay-in ceilings with acrylic lenses and 4 foot T8 lamps (Figure 8). The building has been equipped with occupancy sensors, but only the areas with the LED lighting have dimming capability.

Figure 8 –Classroom Lighting in West Portion of Building

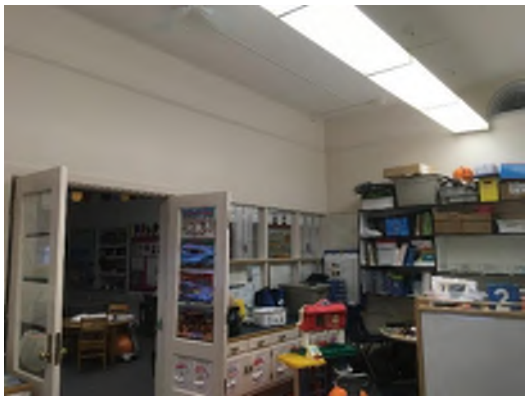


Figure 7 –Classroom Workroom Lighting in East Portion of Building

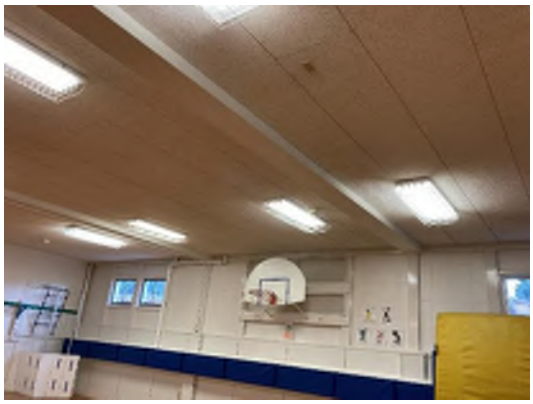


Figure 9 –Gymnasium Lighting

The Gymnasium lighting consists of surface mounted 4 foot T-8 fluorescent with wire guards (Figure 9).

There are several different types and styles of exit signs in the building, ranging from some newer LED fixtures to antique glass globes (Figure 10). The older exit signs have been retrofit with LED lamps, but they are not usually equipped with emergency battery packs. and emergency egress lighting throughout the building. Emergency egress lighting is very sparse. There are some wall mounted battery units and combination exit and emergency lighting units, but overall there does not seem to be adequate levels of egress illumination during a power failure.

Recommendations

Electrical Distribution: It is recommended that at least two additional branch circuit panels be added to the building, near the classroom wings in order to provide additional circuits for classrooms and work areas. This could be accomplished by adding a 200A circuit breaker in the MDB and feeding a new panel in the East portion of the building and one in the West portion. In addition, the obsolete Panel D on the stage of the Auditorium should be replaced with a new panelboard.

Figure 10 –Exit Signage

Branch Circuiting: Additional receptacles and circuits are needed in the classrooms and workrooms, in the corners, near the teacher's desks and in workrooms above counter tops. Existing receptacles is recommended. Circuiting will be increased to a minimum of two dedicated circuits per classroom and one for workrooms, where applicable. The new panelboards can be located in storage or similar areas. Wiring can be run above lay-in ceilings or other accessible locations and then drop down into the classrooms, where it will be surface mounted in Wiremold or exposed conduit, or could be installed in a concealed manner if the cost of cutting and patching walls is acceptable.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The fixtures in the Library and surrounding corridor have already been replaced in the West portion of the building with 2x4 recessed flat panels. The remaining classrooms and corridors in the West end should be replaced with the same. The surface and suspended wraparound fixtures in the East portion should be replaced with a similar style fixture with onboard LED's. This will also include the gymnasium lighting. Replacement of remaining older exit signs with new "onboard" LED signs, with combination emergency egress heads, is recommended and will help standardize the building. Additional LED emergency egress lighting should be added to the corridors and stairwells to ensure compliance with the Life Safety Code. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service enters the building from the south into the lower level and terminates in the Main Data Rack in a locked room on the southwest area of the Auditorium Stage. The door access equipment is also located in this room, on the west wall behind the data rack.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known issues either with quantities or deficiencies.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. The Control Unit(s) is located on the south wall of Workroom located off of the entry ramp at northeast entry. It is a Fire Lite Model MS-9200UDLS. There is a remote annunciator located in the main entry lobby. There are manual pull stations at exit pathways, horn/strobes in the corridors, common areas, the Gym and Auditorium. There are a few smoke detectors in the elevator lobbies, corridors for release of magnetic door holders and the coiling doors at the Reception windows. There was recently a trouble signal that could not reset. The malfunction was found to be caused by a short circuit in signal wiring.

Figure 10 – Fire Alarm Control Unit

Recommendations

The fire alarm system issues and wiring are of concern. It is an addressable system, but some of the wiring from the original fire alarm system appears to have been reused. This will most likely continue to cause trouble alarms and temporary shutdowns of the system. Replacement of the fire alarm system with a new, addressable voice evacuation system is recommended.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** The staff reports that there are no known serious issues with the system.

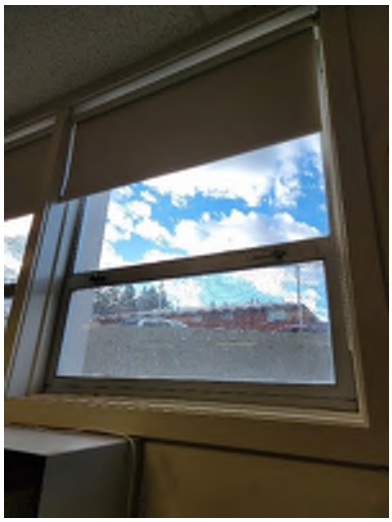
Recommendations

None

Windows

Existing Conditions

The existing windows are all non-thermally broken frames with insulated glazing. They are in relatively good shape, but will eventually need to be replaced.



Recommendations

The existing windows should eventually be replaced with new thermally broken aluminum frames and low-e double pane glazing. **(High Cost – Low Priority)**

Doors

Existing Conditions

The doors all appear to be in working order. Most of the doors had their knobs replaced with lever sets. However, there are still about a dozen doors with knob that need to be replaced. It should be noted that these doors are not heavily used and are to rooms like storage or janitor so the priority of replacing these is low.

Recommendations

Replace the knob with new lever sets to meet current ADA and life safety codes. **(Low Cost, Low Priority**)

Exterior Cladding

Existing Conditions

The exterior of Jefferson was updated recently and is in good shape. As such, there is no exterior cladding work required.

Recommendations

Currently there are no recommendations.

Accessibility

Existing Conditions

There is an elevator that was installed at the building. Each floor has accessible restrooms. The accessible route from the parking spot looks to be in reasonable condition and appears to meet the required slopes.

Recommendations

Currently there are no recommendations.

Roofing

Existing Conditions

The building roofing system is in excellent condition. The entire roofing system will be replaced in 2022. The new roofing system will be a single ply thermoplastic roofing system.

Recommendations

Perform annual roof maintenance.

Kessler Elementary School

Overview

Address:

2420 Choteau Avenue

Helena, MT 59601

Year Built:

1936

Building Area:

24,926 SF

Parking, Sidewalks and Site

Recommendations

Replace concrete at Entry #3 - Remove and replace concrete at Entry #3.

Parking Lot - Parking lot is difficult to plow and does not provide an area to pile snow.

HVAC

Existing Conditions

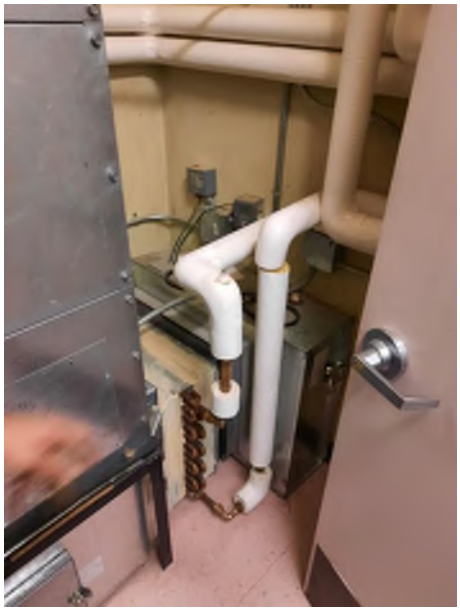
Heating System: A (5) boiler system provides hot water for the building from a central boiler room located in basement area. The Boilers are (4) Weil McLain Model GV Cast Iron Sectional Boilers and a Lochinvar Knight High Efficiency seasonal boiler. The cast iron sectional boilers were installed in the early 1990's, the Lochinvar boiler was added to the plant as a portion of the building (2) story addition in the early 2000's.

Plumbing: HPS staff is in the process of replacing the toilet room fixtures. No operational issues reported regarding the building piping systems.

The building domestic system is not equipped with a required water tempering valve. Device is required by code. The device maintains the temperature of domestic water discharge from the water heater to a code designated range. The domestic hot water system is generated in (2) locations. An electric water heater under the gym provides hot water for the kitchen. A gas fired unit in the basement equipment room provides hot water for the central toilet rooms.

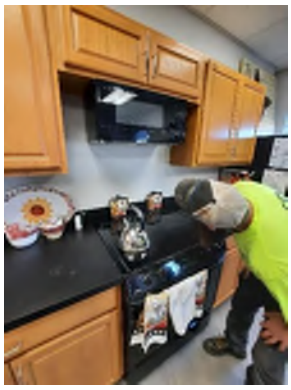
Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Fan coil units provide space temperature and ventilation to the classroom spaces. The units are in the basement equipment room, above the ceiling in the building core, and in (4) equipment rooms in the 2-story building addition. The fan coils are equipped with hot water coils for ventilation air tempering, but room temperature control is provided with duct mounted reheat coils.



The multi-purpose space air handler is located below the space and is original to the building.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.



The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The office and kitchen area are equipped with ductless split system cooling equipment.

Recommendations

Heating: Replace the cast iron sectional boilers with new high efficiency boiler equipment to reduce building energy consumption.

Ventilation: The gymnasium air handler should be replaced with a variable speed air handling unit to reduce energy consumption during periods of low or intermittent load.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

The building equipment utilizes older Johnson Control Direct Digital Controls. The system is obsolete.

Recommendations

The building DDC control system controllers and front end should be replaced.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV primary distribution line on a riser pole located just to the west of the property on Granite Avenue. The primary line crosses a playground and rises into a 150 kVA pad mounted transformer located about 10 feet from the west wall of the school, near Entry 7 (Figure 1). The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 800 amp rating. The secondary conductors exit the transformer underground then rise on the west wall of the building, terminating in a metering enclosure (Figure 2). The utility meter is adjacent. The secondary conductors from the metering cabinet connect through a wireway to two 400A main disconnects and a 200 amp main circuit breaker. There is a separate underground electrical service for a Modular Classroom Building located south of the main building. It is derived from a pole mounted transformer on a riser pole, also located to the west adjacent to Granite Avenue. The secondary service characteristics are 120/240 volts, single phase, three wire with a nominal 225 amp rating. The secondary conductors rise from underground on the west wall of the building, terminating in combination meter/main breaker assembly with the utility meter (Figure 3).

Figure 1 – Pad Mounted Transformer

Figure 2 – Main Distribution Board, Metering Enclosure and Meter

Figure 3 –Modular Classrooms Meter/Main Panel

The highest recorded demand for the main school building, over the last two years from Northwestern Energy, was 61.2 KW in January 2020; and there are several additional months in the 59 to 60 KW range. Based on this reading, the calculated demand is about 266 amps, meaning that the service would have about 50% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. The peak demand recorded for the Modular Classroom Building, was 26.28 KW in March 2021, which seems a bit high since most months are 10 to 16 KW. Using the peak demand, the calculated demand is approximately 170 amps, leaving about 20% spare capacity.

Distribution: One of the 400 amp main disconnects feeds a wireway in the basement. Above the wireway, there are two 200A fusible disconnect switches, a 100A circuit breaker and two load centers (Figure 4). It is assumed that some of this equipment is a hold-over from the original electrical service, which was 120/240 volts, single phase. None of the disconnects is labeled for the load controlled, which is a safety concern and a possible code violation. It is assumed that they serve branch panelboards, miscellaneous loads and possibly a well pump.

Figure 4 – Wiring Gutter and Disconnects in Basement

Another 400 amp main disconnect serves Distribution Panel MA which is located in a basement space below the gymnasium, which was added in 1987 with the addition (Figure 5) Panel MA serves several branch panelboards and load centers in the school. There are also some new load centers installed in the building for recent remodel projects that are connected to Panel MA. The 200 amp main breaker appears to serve Panel F in the Basement (Figure 6). Panel F serves mostly HVAC load equipment.

Figure 5 – Panel MA

Figure 6 – Panels E and F

A load center in the Kitchen is also labeled as Panel F (Figure 7). The branch panelboards installed in the 1987 Addition (A1, B1 and A2) are all in good condition. There are single phase panelboards located in the north classroom areas that were installed for some of the earliest additions to the building in the 1960's, and are now nearing obsolescence.

<u>Branch Circuiting:</u> Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have four to six receptacles and are not in locations where they are needed, i.e. near the teacher's desk or at PC workstations. This results in the need for power strips.

Figure 7 – Load Center Panel F

Lighting: The Staff Break, Entry Lobby and Administrative areas that were remodeled in recent upgrades were provided with LED troffers in lay-in ceiling areas, and surface or suspended 4 foot LED fixtures with acrylic wraparound lenses in gypsum board ceiling areas. In the East portion of the building, the corridors and classrooms are mostly 4-foot T8 surface and suspended fluorescent fixtures with wraparound acrylic lenses (Figures 8 & 9). Most of the building has been equipped with occupancy sensors, but only the areas with the LED lighting have dimming capability.

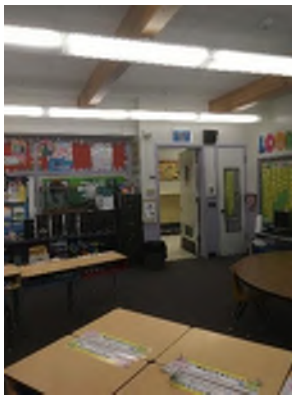


Figure 8 – Typical Classroom Lighting

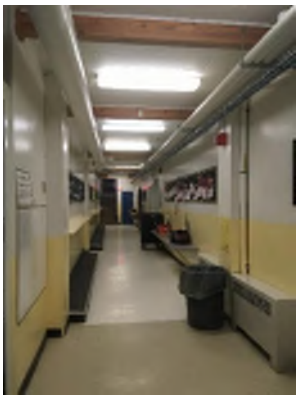


Figure 9 – Typical Corridor Lighting

Figure 10 – Gymnasium Wall Mounted Lighting

The Gymnasium lighting consists of surface mounted 4 foot T-5 fluorescent fixtures with wire guards on the ceiling and 4 foot T-8 wall mount units with polycarbonate lenses (Figure 10).

The exit signs are mostly red LED with battery backup (Figure 11). Dual-head emergency lighting units are located in corridors for egress lighting. Four of the wall mounted fluorescent fixtures (Figure 10) in the Gymnasium are equipped with emergency battery packs, although it is not known if they are functional.

Figure 11 –Exit Sign & Em. Egress Light

Recommendations

Electrical Service: The three main disconnects should be replaced with a single main disconnect; 800 to 1000 amps, depending on the need for air conditioning. An outdoor distribution board (See Jefferson Elementary School) could be used for connection of outdoor loads, i.e. the well pump and AC condensing units.

Electrical Distribution: The existing disconnects and wireway in the basement are not safe. They lack labeling and identification, access is restricted and clearances around the equipment do not meet code. A new 800 amp distribution board is recommended. The new distribution board will be used to reconnect existing and new branch panelboards. Much of the school has an accessible crawlspace or basement area below that will allow routing for new feeders.

Branch Circuiting: Additional receptacles and circuits are needed in the classrooms is badly needed. Circuiting is recommended to be increased to a minimum of two dedicated circuits per classroom. The new panelboards can be located in storage or similar areas. Wiring can be run above lay-in ceilings or other accessible locations and then drop down into the classrooms, where it will be surface mounted in Wiremold or exposed conduit, or could be installed in a concealed manner if the cost of cutting and patching walls is acceptable.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The surface and suspended wraparound fixtures in the classrooms should be replaced with a similar style fixture with onboard LED's. This will also include the gymnasium lighting. Replacement of older exit signs with new "onboard" LED signs, with combination emergency egress heads, is recommended and will help standardize the building. Additional LED emergency egress lighting should be added to the corridors and stairwells to ensure compliance with the Life Safety Code. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades, but new integrated A/V systems were not. The internet provider is Vision Net. The fiber optic cable service enters the building from the west into the lower level and terminates in the Main Data Rack in a locked storage room in the Library. The door access equipment is also located in this room, on the west wall of the room.

Most classrooms and workrooms are provided with two or more data outlets and wireless access points. There appears to be a shortage of data/voice outlets in the classrooms on the north end of the building as evidenced by patch cabling run around the door frame. Most of the cables run in this manner are for phones.

Figure 12 – Example of a Patch Cable Run Around Door Opening

Recommendations

Add at least one data outlet to the north classrooms.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. The Control Unit(s) is located on the north wall of the Entry Lobby (Figure 13). It is a Silent Knight Model SK-6324, conventional fire alarm panel with six Class B initiating circuits. It is an obsolete Control Unit and parts are only available from re-sellers of used equipment.

There are manual pull stations at exit pathways, horn/strobes in the corridors, common areas and the Gym. There are a few smoke detectors in the Entry Lobby for release of magnetic door holders and the coiling doors at the Reception window.

Figure 13 – Fire Alarm Control Unit

Recommendations

Replacement of the fire alarm system is overdue. Much of the original wiring may still be in place. Replacement of the complete fire alarm system with a new, addressable voice evacuation system is recommended.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** The school is also equipped with exterior PA speakers, clock/program/message boards. There are no known issues either with quantities or deficiencies.

Recommendations

None

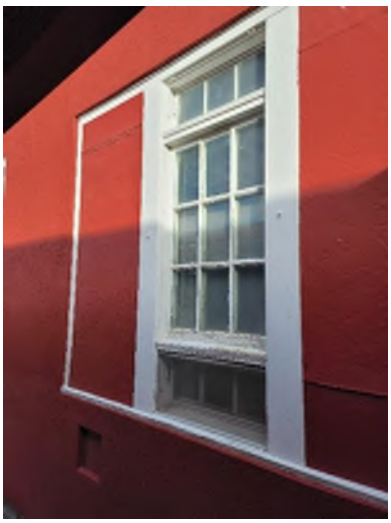
Figure 14 – Example Clock/Program/Message Board

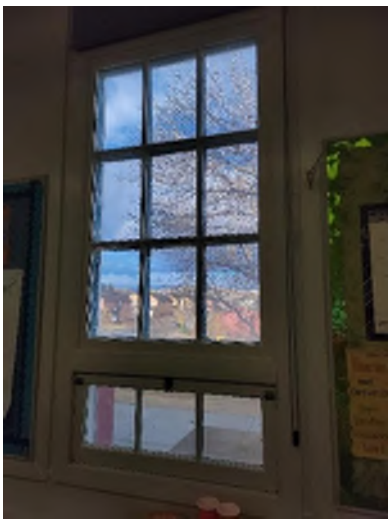
Windows

Existing Conditions

Main Building: There are three types of windows.

Wood Framed Single Paned: Most of the school still has the old wood Framed Single Pane Windows that are at the end of their usable life and need to be replaced.





Old Aluminum Windows: There are some older aluminum framed double paned windows on the gym and the classroom wing that appear to be in good shape. However, on the classroom wing the south facing windows need to be replaced. All these windows will eventually need to be updated.


New Thermally Broken Aluminum Windows: There are also few new thermally broken aluminum framed double paned windows that were replaced recently in the basement and during the safety security project.

Music Outbuilding: This buildings windows appears to be in good shape.

Recommendations

Main Building:

Wood Framed Single Paned: Replace all these windows with new thermally broken aluminum double paned windows. **(High Cost, High Priority)**

Old Aluminum South Windows: The South facing windows should be replaced sooner than later, with new thermally broken aluminum double paned windows. **(Medium Cost, Medium Priority)**

Old Aluminum Windows: The rest of the older aluminum windows have a little bit more life in them but should eventually be replaced with new thermally broken aluminum double paned windows. We would recommend replacing the gym windows with a Kalwall system. **(High Cost, Low Priority)**

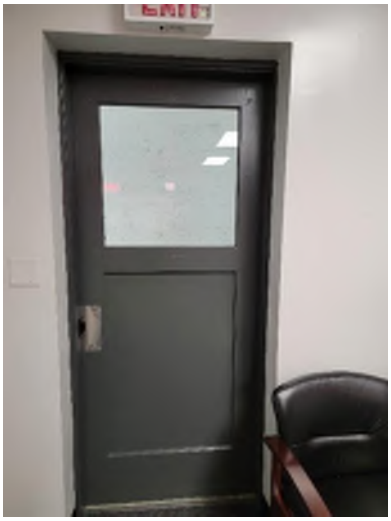
Doors

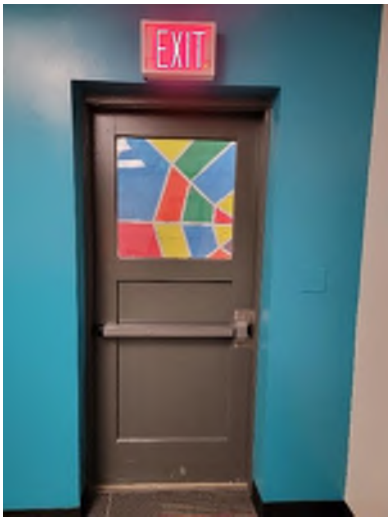
Existing Conditions

Main Building: Many of the doors in Kessler are in good working order. However, there are a few locations that need to be upgraded.

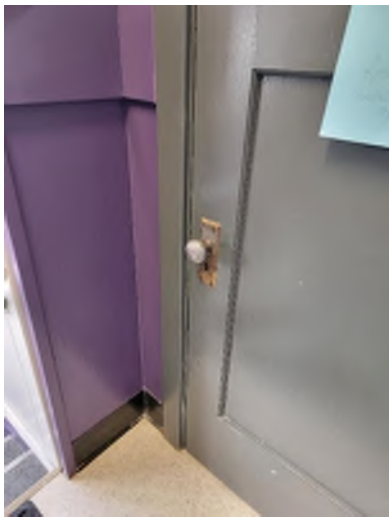
Exterior: There are (3) exterior doors that need replaced as they are constantly being maintained by the district.







Interior: There are (2) interior doors that still have knobs in place of lever handles that should be upgraded.



Music Outbuilding: The outbuilding's doors are all in good working condition.

Recommendations

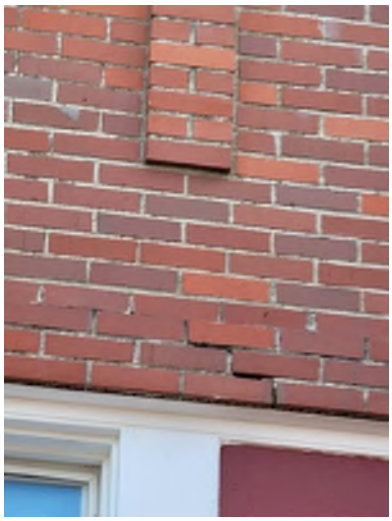
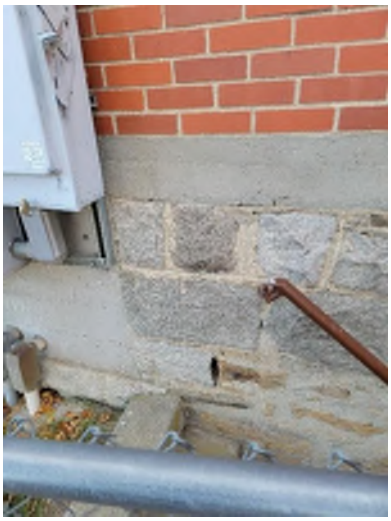
Main Building Exterior: There are (3) exterior doors that need being replaced. **(Low Cost, High Priority)**

Main Building Interior: There are (2) interior doors that still have knobs in place of lever handles that should be upgraded. **(Low Cost, High Priority)**

Exterior Cladding

Existing Conditions

Main Building Brick: The exterior brick mortar joints need to be repointed.

Main Building Window Infill: Some of the original windows were infill with a prefinished paneling wall system. These panel are in disrepair and in need of being replaced. It would be our recommendation to replace these panels with windows in place of a new exterior finish.


Music Outbuilding: The music outbuilding is in good working condition.

Recommendations

Main Building Brick: The exterior brick mortar joints needs being repointed. **(Medium Cost, Medium Priority)**

Main Building Window Infill: Replace infilled wall panels with new windows. **(High Cost, High Priority)**

Accessibility

Existing Conditions

Main Building: The main restrooms are in the process of being completed to meet ADA requirements. The only assessable issue observed was, the access from the ADA parking spot appeared to have more than a 2% cross slope.

Recommendations

Main Building: The cross slope at the parking spot should be rebuilt to meet the code minimum of 2%. **(Medium Cost, Low Priority)**

Roofing

Existing Conditions

The building roofing system in in fair / good condition. There is a mix of thermoplastic single ply roofing materials and asphalt shingle.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof section B, K are over office and stairways. These roofs are both single ply roofing materials– **(Low Cost - Medium Priority)**

Reroof roof sections D, J are over storage and the gym. Both roof sections have shingle roofing installed. – **(Low Cost - Low Priority)**

Ray Bjork Elementary School

Overview

Address:

1600 8th Avenue

Helena, MT 59601

Year Built:

1959

Building Area:

22,294 SF

Parking, Sidewalks and Site

Existing Conditions

Back Parking lot and Maintenance trailer outside storage area is currently gravel, not graded for proper drainage, and not connected to the city storm sewer.

Recommendations

Design the approximately 22,000 square feet area to current code and connect to city storm sewer. Layout, pave and paint parking spots as appropriate. $130,000

HVAC

Existing Conditions

Heating System: A (2) boiler system provides hot water for the building from a central boiler room located in basement area. The Boilers are (2) Apex High Efficiency condensing units. The boilers were installed in 2014. The boilers are separated from the building heating season via a flat plate heat exchanger. The system contains a complicated system of in-line pumps and control valves that makes the system temperamental and maintenance intensive.

The original building heating distribution system was concealed in the floor slabs to conceal it. The system was replaced during the 2014 building renovation and the underslab piping was rerouted overhead. All boiler room pumps are equipped with variable frequency drives yet controls only operated at constant speed.

Plumbing: The building water service entrance is not equipped with the code required backflow preventer.

Building plumbing fixtures are older, chipped and stained but no operational issues reported.

Domestic hot water for the building is generated with an indirect water heater connected to an additional Apex condensing boiler. The domestic hot water system is equipped with a tempering valve as required by code.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Classroom spaces are equipped with floor mounted unit ventilators and perimeter fintube radiation. The unit ventilators provide both space comfort control and required space ventilation. The unit ventilators are original to the building.

The two classrooms in the building lower level are not equipped with a mechanical ventilation system. The space temperature control is provided thru wall mounted fintube radiation.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The office and limited classroom area are equipped with ducted evaporative cooling units. These provided a limited amount of space cooling. The units are obsolete and required service and spare parts are becoming difficult to obtain.

Recommendations

Heating: Revise the boiler near boiler piping scheme to simplify the system and improve system reliability.

Ventilation: Replace the floor mounted unit ventilators with new equipment. Review equipment sizing because multiple spaces within the building have been sub-divided or repurposed.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

The revised boiler room equipment is controlled with a FICO Direct Digital Control System. The system frontend is obsolete and needs to be updated. Most of the classroom equipment utilizes pneumatic controls. Factory electric control manipulate newer floor mounted unit ventilators installed in the past couple of years.

Recommendations

Update the boiler room DDC control system to district standard and extend the system to rest of the building.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 7.2 kV single phase primary distribution line on a utility pole located across a delivery and parking area west of the building. There is a 50 kVA utility company oil filled transformer on the pole (Figure 1). The secondary service characteristics are 120/240 volts, single phase, three wire with a nominal 320 amp rating. The secondary aerial conductors cross the parking area and connect to a lighting pole, where they are spliced to a set of parallel conductors before continuing to two service masts and weather heads located on the roof above the boiler room (Figure 2). The secondary conductors have a nominal rating of 400 amps, and drop down inside of the service masts to a metering cabinet that is located in the southwest corner of the

Figure 1 – 50 KVA Pole Mounted Transformer

Boiler Room, adjacent to the Main Distribution Board (MDB). The utility company meter is on the exterior of the building opposite the metering enclosure.

Figure 2 – Utility Co. Light Pole and Aerial Service

The highest recorded demand over the last two years from Northwestern Energy was 57.8 KW in April, 2020. However, this may have been an anomaly, since the second highest peak was 42.2 KW, recorded in November 2019, and is more in line with most of the heating season recordings. Based on the higher reading, the calculated demand is about 376 amps, meaning that the service is already exceeding capacity. Using the lower reading, of 42.2 KW, the calculated demand is 275 amps, leaving approximately 20% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. In either case, it is obvious that the ampacity of the service is at or near its maximum. Based on the 1959 electrical drawings for the building, it appears that the original rating of the service was 800 amps, but at some point, the service conductors from the weather heads down to MDB were replaced with a lower rated ampacity.

Distribution: The MDB (Figure 3) contains five fusible main switches and there is a sixth main disconnect, an enclosed circuit breaker, on the adjacent wall that is a tapped from the MDB bus. Main Switch #1 is 250A and feeds South Wing Panels A, B and C. Switch #2 is 200 amps and feeds North Wing Panels D, E and F. Switch #3 is 200 amps and feeds Gymnasium Panel G. Switch #4 is 20 amp and is labeled “fire alarm”. Switch #5 is a spare. Switch #6, the enclosed breaker, feeds Panel H in the Boiler Room. It has a 400-amp rating.

Panels A, B and C are 70 amp, 14-circuit Square D NQO panelboards with main breakers. One panelboard serves two classrooms. There are four or five spare breakers in each. They are located in vestibule areas between classrooms. Panels D, E and F in the North Wing are similar, except that F does not have a main breaker. Panel G is located in the Gymnasium near the Kitchen. It is a new Square D, 72-circuit, NQ panelboard. It serves the Kitchen, the Reception/Administrative offices, the Gymnasium and the Stage. There are only 5 spare breakers available. Panel H is a relatively new panel that was installed for a boiler upgrade project. H serves boilers, pumps and equipment loads. There may be one spare 20 amp breaker available. Panel I is located adjacent to MDB. It is a Square D NQO panelboard was the original Boiler Room electrical panel. It serves miscellaneous

Figure 3 –Main Distribution Board MDB and Main Breaker #6

loads, the Fire Alarm Control Unit and receptacles in the Boiler Room and basement classrooms. No spares are available.

Figure 4 – Panel C in South Classroom Wing

Figure 5 – Panel D in North Classroom Wing

Figure 6 – Panel H

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have five or six receptacles and there are not enough in locations where they are needed, i.e. near the teacher's desk, PC workstations or above the work counters. This results in the need for power strips.

Lighting: The Entry Lobby, Staff Break, Workroom, Nursing and Administrative areas that were remodeled in recent Safety-Security Upgrades were provided with surface mounted 4 foot LED fixtures with acrylic wraparound lenses. The remaining portions of the building; the corridors, classrooms and vestibules, are mostly 4 foot T8 surface and suspended fluorescent fixtures with wraparound acrylic lenses (Figure 7). They are aligned in continuous rows in the north and south classroom wings. Most of the wraparound fixtures in the lower level classroom are missing the acrylic lenses and the fluorescent lamps are exposed.

There are a few areas, i.e. the hallway and ramp adjacent to the Gymnasium, with 2x4 troffers in lay-in ceilings with direct/indirect diffusers and T8 lamps. The building has been equipped with occupancy sensors, but only the areas with the LED lighting have dimming capability. The Gymnasium lighting consists of surface mounted 4 foot T-5 fluorescent with wire guards

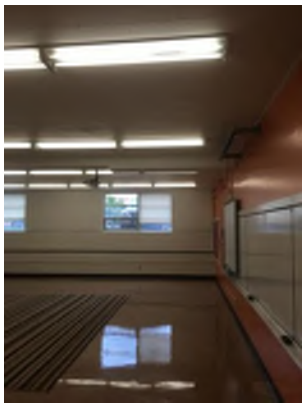


Figure 7 – Lower-Level Classroom Lighting

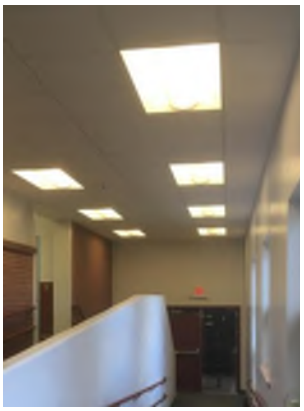


Figure 8 – Lighting over the Ramp

Exit and Egress Lighting: Exit signs in the Administrative and Gymnasium areas of the building are mostly LED with emergency battery packs. Some are combined with emergency lighting heads. There are stand-alone emergency lighting fixtures in commons corridors and lobbies in the area as well.

The vestibules between the classrooms in the North and South wings do not have illuminated exit signs (Figure 10). They are paper. At the time of installation the Life Safety Code may have allowed external illumination (5 footcandles) from an emergency source, but it doesn't appear that there are any emergency lighting units in the vicinity. Emergency egress lighting units are also very sparse in these areas.

Figure 9 –Gymnasium Lighting

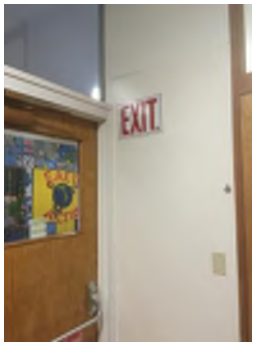


Figure 10 – Paper Exit Sign

Recommendations

Electrical Service: A new underground electrical service is recommended. This will involve the utility company as they will most likely prefer to remove the existing pole mounted transformer and arial service, and place a new pad mounted transformer near the Boiler Room, feeding it underground from a riser pole. The new service will be 120/208 volts, 3-phase and probably a minimum of 600 amps, which should be sufficient to support future air conditioning loads. A new metering cabinet, meter and a single main disconnect will be installed on the exterior wall near the current location of the meter. Consideration should be given to placing an external

main distribution board with a main breaker, similar to Jefferson Elementary, with spare capacity to connect a future AC condensing unit that may be in the vicinity.

Electrical Distribution: It is recommended that building be converted from 120/240 volts, single phase, to 120/208 volts, 3-phase. The existing fusible distribution board and separate main breaker will be replaced with a new 3-phase main distribution board with circuit breakers. The existing single phase panelboards G (Gymnasium) and H (Boiler Room) and are new, and do not necessarily need to be replaced, but they will have to be reconnected for balanced phase loading to the new MDB. The remaining panelboards in the building, A through F in the Classroom Wings, and I in the Boiler Room should be replaced with new 3-phase panelboards. New feeders will need to be run to the Classroom Wing Panelboards. The panelboards in each wing will have feed-through lugs and individual main breakers so that only one feeder is needed per wing. They will be mounted directly over the existing locations. Unfortunately, there are no attic or crawl spaces in the classroom wings, so the feeders may need to be run exposed at the ceilings or enclosed in a new furred chase.

Branch Circuiting: Additional receptacles and circuits are needed in the classrooms, in the corners, near the teacher's desks and in work areas above counter tops. Circuiting will be increased to a minimum of two dedicated circuits per classroom where applicable. Wiring will be run in existing conduits where possible, but new circuits will need to be run in exposed surface mounted raceways, i.e., Wiremold or exposed conduit, or could be installed in a concealed manner in furred chases or walls.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The fixtures in the administrative areas in the southwest end of the building and adjacent lobby have already been replaced. The classrooms and corridors in the North, South and Lower-Levels should be replaced with the same. The gymnasium lighting should be replaced with LED fixtures with wire guards and multi-level lighting controls.

Exit and Egress Lighting: New LED exit signs, with combination emergency egress heads, is recommended for the classroom vestibules and adjoining egress pathways. Additional LED emergency egress lighting should be added to the corridors and stairwells to ensure compliance with the Life Safety Code. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service enters the building from the west into the lower level and terminates in the Main Data Rack inside a locked chain link fenced

area in a hallway of the lower level near the Boiler Room. The door access equipment is also located in the fenced area, on the east wall.

Most classrooms and workrooms are provided with two or more data outlets, and another on the ceiling for the wireless access points. It appears that additional data outlets may be needed in the large lower-level classroom, but otherwise there are no known issues either with quantities or deficiencies.

Recommendations

Add data outlets in classroom locations as needed.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. The Control Unit(s) is located on the south wall of Boiler Room in the lower level (Figure 11). It is a Silent Knight Intel-Knight Model 5808 addressable panel. There is a remote annunciator located in the main entry lobby. There are manual pull stations at exit pathways. Horn/strobes are located in the lower-level classrooms, corridors, common areas and the Gym. The north and south wing classrooms are not equipped with horn/strobes, but they are in the vestibules between classrooms. There are a few smoke detectors in the building for release of magnetic door holders.

Figure 11 – Fire Alarm Control Unit

Recommendations

The fire alarm system issues and wiring are of concern. It is an addressable system, but some of the wiring from the original fire alarm system appears to have been reused. This will most likely continue to cause trouble alarms and temporary shutdowns of the system. Replacement of the fire alarm system with a new, addressable voice evacuation system is recommended.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** The staff reports that there are no known serious issues with the system.

Recommendations

None

Windows

Existing Conditions

All the windows in Ray Bjork are aluminum framed windows with double pane glazing. While they are not new, they do appear to have useful life remaining.



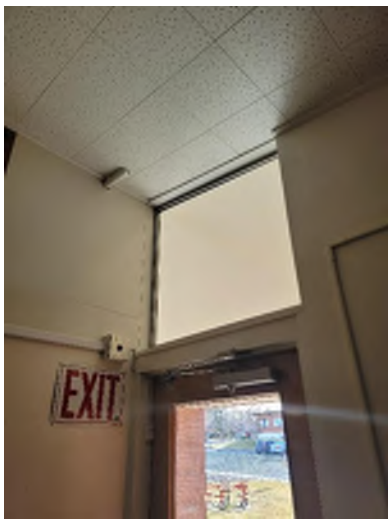
Recommendations

Currently there are no recommendations.

Doors

Existing Conditions

Exterior: The exterior doors are in good working condition.



Interior: The interior door hardware is currently all knobs. The district already has new levers to install at this building.

Recommendations

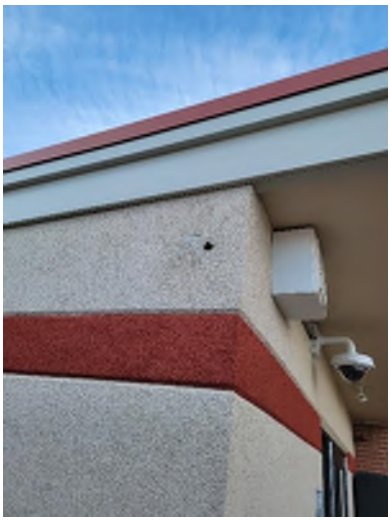
Currently there are no recommendations.

Exterior Cladding

Existing Conditions

Brick: The face brick on the exterior is in relatively good shape. However, the north facing brick that is getting sprayed by the sprinkler system needs having the mortar repointed.

EIFS: The External Insulation and Finish System that was used has a lot of birds making their nests in the walls. These need to be patch as maintenance, but the best way to fix the issue is to replace the exterior system with either a metal lath-based stucco system or some other cladding system.



Recommendations

Brick: Repoint the mortar on the brick that is being sprayed by the sprinkler system. We would also recommend adding a 18" to 24" landscaping rock edge next to the building to reduce the deterioration in the future. **(Low Cost, Low Priority)**

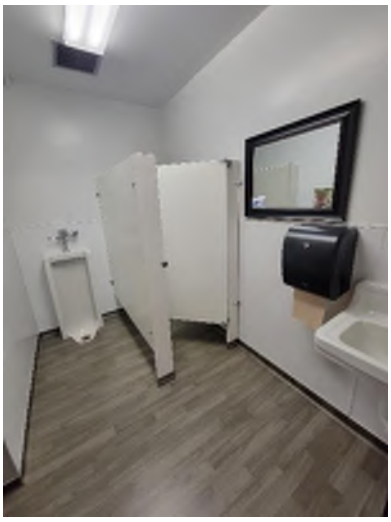
EIFS: Replace the EIFS system with a fiber cement or metal panel system. **(Medium Cost, Low Priority)**

Accessibility

Existing Conditions

Parking: The Parking is steeper than allowed. In addition, the ADA curb ramp is not very close, and the cross slope would also be too steep.

Restrooms: Most of the restroom facilities do not meet ADA. There is one restroom near the front office that could be renovated to be a single user ADA restroom fairly easily if the stalls were removed and grab bars be installed.



Accessible Routes: The ADA accessibility route inside the building is in good shape.

Recommendations

Parking: Rebuild the ADA parking spots to have a zero clearance to the sidewalk this will reduce the steepness of the slope and give direct accessibility. **(Medium Cost, High Priority)**

Restrooms: Renovate the front restroom to a single user ADA restroom. **(Medium Cost, High Priority)**

Roofing

Existing Conditions

The building roofing system in in fair / good condition. The roof is a EPDM single ply roofing material.

Recommendations

Perform annual roof maintenance. Roof overview drawings are available in the Roof Assessment Report. Roof sections identified to be reroofed are over the gym and office area. The classroom locations are in good condition.

Reroofing roof section A, B, C – **(High Cost - Low Priority)**

Rossiter Elementary School

Overview

Address:

1497 East Sierra Road

Helena, MT 59601

Year Built:

1966

Building Area:

43,793 SF

Parking, Sidewalks and Site

Recommendations

Playground Asphalt - Provide adequate drainage on playground and install new asphalt play surface.

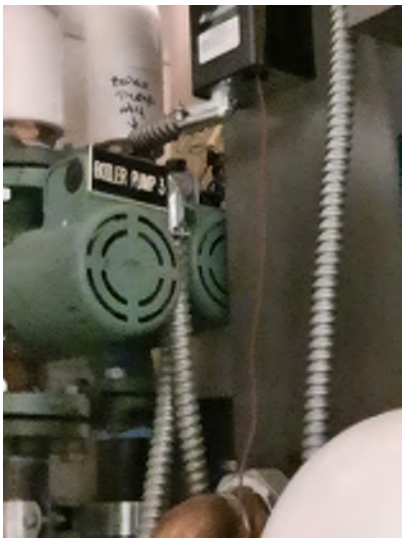
West Parking Lot - Repair cracks, repair potholes and install 2-inch asphalt overlay.

North Parking Lot - Repair cracks, repair potholes and sealcoat entire area.

HVAC

Existing Conditions

Heating System: A (4) boiler system provides hot water for the building from a central boiler room located adjacent to the gymnasium space. The Boilers are Lochinvar Knights Model KBN 800. The boilers are installed in a stacked 2 x 2 arrangement. The upper two units are installed on field constructed frames. The stacked arrangement makes service difficult. Each boiler is equipped with a dedicated circulation pump. With the stacked arrangement access to



the lower-level circulation pumps is not possible without removing the stacked equipment.

Hot water is distributed throughout the building via a system of (5) different in-line circulation pumps. The pumps serve individual heating loops within the building. The distribution system has no redundancy.

Plumbing: The building domestic water is provided via an on-site well. not equipped with the code required backflow preventer.

Building plumbing fixtures are older, chipped and stained but operational with no reported operational issues.

Domestic hot water for the building is generated with a Bradford White sealed combustion high efficiency water heater. The unit was installed as a portion of the boiler room upgrade. The domestic hot water system is equipped with a tempering valve as required by code, but the unit is need of replacement.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: Original building classrooms are equipped with floor mounted unit ventilators for space temperature control and ventilation. In the most recent building addition utilizes a roof mounted air handler and individual space duct mounted reheat coils.

The gymnasium space is equipped with a ceiling mounted air handling unit.

The (2) classroom spaces on the second floor are equipped with ceiling mounted unit ventilators. This equipment is not connected to the building exterior therefore the spaces are not provided ventilation air.

Two of the original building classrooms have become interior spaces. With the space now being interior spaces, the floor mounted unit ventilators are no longer able to draw ventilation air into the spaces. To prevent overheating the units now are operated as heating only cabinet heaters rather the required space ventilation units.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

The office space is not equipped with any means of mechanical ventilation. The area relies on operable windows and occupant manual interaction to keep the space atmosphere acceptable.

Air Conditioning: The office and limited classroom area are equipped with ducted evaporative cooling units. These provide a limited amount of space cooling. The units are obsolete and required service and spare parts are becoming difficult to obtain.

Recommendations

Heating: Revise the boiler arrangement to create better service access for the equipment.

The individual zone distribution pumps should be replaced with two central distribution pumps. The parallel pumping system will create redundancy and better system reliability.

Ventilation: Replace the floor mounted unit ventilators with new equipment. Replace integrated fan coil units with floor mounted unit ventilators.

Modify the duct mounted reheat coil distribution system to utilize air terminal units. The air terminal system will minimize energy consumption and improve space temperature control.

Extend ventilation air to the ceiling unit ventilators to restore the ventilation function to the upper-level gymnasium classroom spaces.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

The revised boiler room equipment and latest addition air handling unit are controlled with an Electro Controls Direct Digital Control System. The system frontend is obsolete and needs to be updated. Most of the classroom equipment utilizes pneumatic controls.

Recommendations

Update the boiler room DDC control system to district standard and extend the system to rest of the building.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system. With the building water supply being provided via a well any fire suppression system will require an underground tank, fire pump and emergency power generator.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from an underground 12.47 kV primary distribution line. The primary line originates from a riser pole located across Sierra Road, north of the property. The primary line terminates at a primary junction can and then continues to a 150 kVA (estimated) pad mounted transformer on the southeast side of the school near the Boiler Room (Figure 1). The secondary service characteristics are 120/208 volts, three phase, four wire. The conductors are parallel sets of 4#500 XHHW run in parallel in 3-inch conduits with a nominal 800 amp rating. The secondary exits the transformer underground and then rises into the bottom of the Main Distribution Board inside of the Building.

Figure 1 – Pad Mounted Transformer

Figure 2 – Single Phase Pad Mounted Transformer for Out-Buildings

The highest recorded demand over the last two years from Northwestern Energy was 84 KW in April, 2020. Based on this reading, the calculated demand is about 365 amps, meaning that the service has about 40% to 45% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

Outbuilding Services: There are other services on the site; a modular classroom building, a sewage lift station building and a well pump house. The services to the well pump house and the sewage lift station buildings are 3-phase, underground, and appear to originate from fusible switches in the Main Distribution Board in the school. There are two switches labeled for the sewer system, one of which is most likely for an older system that was replaced. The labeling for the switches should be updated.

The modular classroom building service is underground, 120/240 volts, 100 amps and originates at a 25 kVA single phase pad mounted transformer near the Boiler Room (Figure 2). There is a demand meter on the building with a peak of 24 kW over the last two years, and six consecutive

months in the 23 kW range. This seems a little high, since the demand slightly exceeds the rating of the main breaker. There were also two, six month consecutive periods when the demand was essentially zero as well as the KWH usage (Figure 3). Part of this could be explained by seasonal changes as the higher demand readings are in the cooling season and the near zero values in the winter, but that doesn't explain why the usage would be near zero as well. It is possible that the building was shut down for several months on two separate occasions. This should be verified with Facilities, and if this is not the case, Northwestern Energy should be notified to check the meter.

Read Date	Metered Usage	KW Reading	KW Usage
11/11/2021	50.0	0.0800	0.080000
10/14/2021	1,482.0	21.7000	21.700000
9/15/2021	9,330.0	23.8000	23.800000
8/12/2021	10,046.0	23.4400	23.440000
7/19/2021	9,144.0	23.9100	23.910000
6/14/2021	3,957.0	23.7300	23.730000
5/13/2021	2,265.0	23.8100	23.810000
4/13/2021	77.0	3.9600	3.960000
3/12/2021	44.0	0.0700	0.070000
2/15/2021	58.0	0.0700	0.070000
1/13/2021	59.0	0.0700	0.070000
12/11/2020	53.0	0.0700	0.070000
11/11/2020	46.0	0.0700	0.070000

Figure 3 – Metering Records for Modular Classroom

Figure 4 – Fusible Main Distribution Board with Main Disconnect No. 1

Electrical Distribution: The Main Distribution Board is located in a separate Electrical Room adjacent to the Boiler Room. It is a General Electric QMR fusible distribution panel with a 600 amp main switch, fused at 450 amps and labeled "Main Disconnect No. 1" (Figure 4). The Main Switch is located in Section 1 of the distribution panel along with a 30 amp switch for Emergency Panel X. The bottom of section 1 contains the incoming lugs and the service entrance conductors. The utility company metering equipment is also located in this section and the meter is installed adjacent to the distribution board. Section 2 contains eight, 30 amp and seven, 100 amp fusible switches. The 100 amp switches feed branch panelboards A, B, C, D, K, the well pump and the septic system. The 30 amp switches feed the boiler, pumps, an air compressor and the sewer lift station. There may be space for adding another switch if a twin module was installed in the bottom to replace the single switch module.

There is a tap ahead of the main switch with a feeder to a 2nd main disconnect switch which is adjacent to the MDB. It is a 600 amp switch, fused at 450 amps and labeled, Main Disconnect No. 2" (Figure 5).

Main Disconnect Switch No. 2 was installed to serve the 1972 addition to the school. It feeds another distribution panel, Panel H, that is located directly across from the Electrical Room in the Boiler Room.

Panel H is a General Electric CDP 600 amp distribution style panelboard with two, 20 amp circuit breakers for heating water pumps, a 225 amp for Panel G, a 175 amp for Panel F and a 150 amp for Panel E. There is space for one more 225 amp circuit breaker (Figure 6).

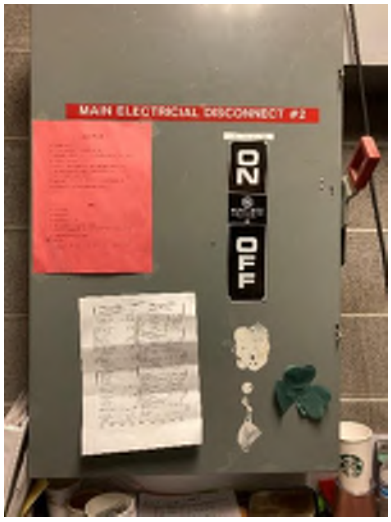


Figure 5 –Main Disconnect No. 2

Figure 6 –Panel H

The service conductors have sufficient spare capacity for additional loads, but there are not enough spaces in the distribution board to install new switches or circuit breakers if a major air conditioning upgrade was needed. The spare 225 amp space in Panel H could be used to serve one large AC unit, but is not enough for the entire school.

There are seven original General Electric NLAB style (Figure 7) panelboards in the school, a new 18 circuit Square D NQ panel in the Kitchen and a new UPS panel that was recently installed. The original panelboards are mostly lacking any spare breakers or spaces. GE no longer manufactures the NLAB panelboard or replacement parts. There are circuit breakers available, i.e. the newer THQB style that will adapt with hardware. However, any major upgrades would probably be easier to accomplish if the panelboards are replaced with new.

A 4 kVA UPS and UPS panelboard was also added recently for battery backup of the IT equipment, in a storage room in the Library, that also contains the main data rack.

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms originally had only two receptacles along the walls sharing a circuit with the adjacent room and a receptacle above the work counter that is on the same circuit as the other classrooms in a pod. Later the receptacle total was increased to five or six per classroom using exposed Wiremold raceway and boxes (Figure 8).

The lack of receptacles often results in the need for two or more power strips. Some of the classroom have receptacles above work counters that are all on the same circuit in the pod. There is generally one circuit per classroom. This was not unusual in the 1970s, when the school was built. However, technological advances have necessitated more computer equipment to be located in classrooms.

New receptacles and circuits were added to the new Staff Break Room, Offices, Reception, Nursing and other Administrative areas with the Safety-Security Upgrades project in 2019.

Figure 7 –A GE NLAB Branch Panelboard

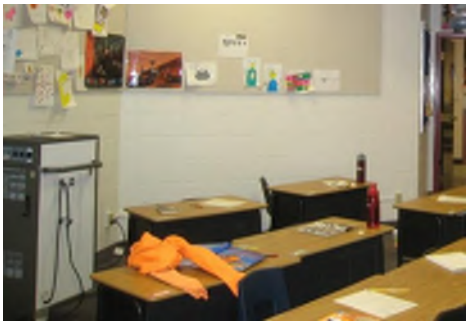


Figure 8 – Typical Classroom with Receptacle Added Using Wiremold

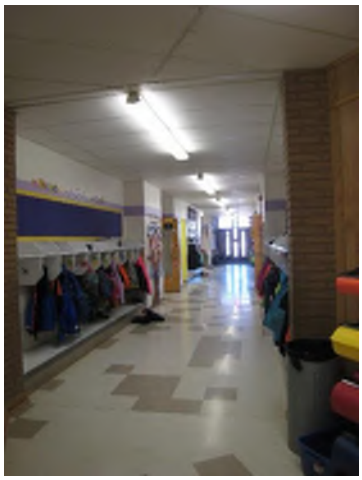


Figure 9 –Corridor Lighting

Lighting: Staff Break, Nursing, Reception and Administrative areas that were remodeled in recent Safety-Security Upgrades are mostly recessed LED troffers with some smaller surface styles used in the Vestibule. Most of the existing fixtures in Corridors are 4-foot T8 fluorescent fixtures with wraparound acrylic lenses (Figure 9).

Figure 10 –North Pod Classroom Lighting

Classroom lighting in the North Pod is a combination of suspended 4-foot long T8 fluorescent acrylic wraparound lenses and 2x4 parabolic troffers (Figure 10). Classroom lighting in the South Pad is suspended 4-foot long T8 fluorescent fixture (Figure 11). The Gymnasium lighting is 4-foot T-5 fluorescent fixture with wire guards. The building is equipped with occupancy sensors, but only the areas with the newer LED lighting have dimming capability.

Figure 11 –South Pod Classroom Lighting

Exit and Egress Lighting: Due to the nature of the "pod" style design of the school, there are many corridors and exits. Overall, the building seems to be lacking in both exit signs and emergency egress lighting. The South pod has an emergency lighting inverter located adjacent to Panel G near the Kitchen (Figure 12) that provides emergency power to selected luminaires for egress lighting and for exit lighting in the gym and corridors. There was originally an emergency lighting inverter in a storage room in the Library of the North pod, but it has been removed. This resulted in the installation of battery powered emergency lighting units in the corridors and classrooms (Figure 13). It is not known if the exit signs in the North pod were equipped with batteries after the inverter was removed. Six of the eight classrooms in the North pod with exterior doors are designated as Entries 2 through 9 with exterior placards. The six are marked only with non-illuminated cardboard signs (Figure 14). The signs may have been added because they are not shown on the As-Built drawings and may be in conflict with the IBC and Life Safety Codes. If these are *required* exits, they should have an illuminated exit sign and emergency egress lighting. In general, there does not seem to be sufficient amounts of emergency egress lighting in the building, other than in the center pod around the recently remodeled Reception and Administrative areas.

Figure 12 – South Pod Emergency Lighting Inverter

Figure 13– Emergency Lighting Unit & Illuminated Exit Sign in North Pod

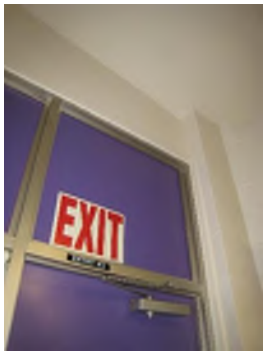


Figure 14 – An Non-Illuminated Exit Sign

Recommendations

Electrical Service: The electrical service ampacity is approximately 800 amps, and seems to be sufficient to support future air conditioning loads. However, the existing distribution board(s) do not have the physical space to add larger A/C loads. This issue would probably best be remedied by installing a new outdoor main distribution board.

The single-phase electrical service to the modular classroom should be investigated further and if the demand readings are accurate, increased to 200 amps. This will likely require an increase

in the conductor size to the Modular classroom, requiring cutting and patching of the parking lot. If a new outdoor distribution board is installed, then it may be more advantageous to refeed it from there instead of having the separate utility company transformer and secondary service. This would also remove the meter and the billing account for the Modular classroom, thereby moving it to the main account.

Electrical Distribution: A new outdoor metering cabinet, meter and an exterior main distribution board is recommended. Panel H would remain and would be reconnected to the new outdoor distribution board. The indoor Main (fusible) Distribution Board should be replaced with a new circuit breaker distribution board with the capacity to support additional panelboards to the Classroom pods for more convenience receptacles. The existing branch panelboards do not necessarily need to be replaced, as parts may still available, but the lifespan is limited. With the recent announcement by General Electric that the company will be split into three parts, the Power division being one of those, it calls into question how long breakers will be available for panelboards that are already obsolete.

Branch Circuiting: Additional receptacles and circuits are badly needed in the classrooms and workrooms, particularly over work counters and near the teacher's desks. Replacing existing receptacles and adding up to eight additional receptacles and increasing branch circuiting to a minimum of two dedicated circuits per classroom is recommended. The wiring will most likely need to be run in exposed raceways, i.e. Wiremold, since many of the walls are CMU block construction.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. New fixtures would be very similar in appearance to the existing and could utilize the same circuiting, pendants and suspension mounting hardware. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Exit and Egress Lighting: Replacement of the exit signs with new "onboard" LED signs is recommended. New exit signs combined with LED emergency egress lighting heads should be installed at all exit doors that do not have an illuminated sign and possibly in other locations where an adjacent emergency lighting unit can be deleted and combined. Wall and ceiling mounted emergency egress lighting with battery packs and LED heads should be added to every corridor to ensure the lighting level meets the minimum requirements of the Life Safety Code and IBC. The emergency battery inverter system near the Gym should be investigated further to determine its best use; it may be that it can continue to serve the emergency lighting for the Gym

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service terminates in the Main Data

Rack in a storage room located in the Library. The door access equipment is also located in this room, adjacent to the data rack.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known issues either with quantities or deficiencies.

IP based security cameras were provided in the recent Safety-Security Upgrades project on the exterior of the building covering all entry points, playgrounds and drop off locations. Interior cameras were also located in the entry vestibules and lobby. All cameras are POE and are connected to the data switches at the main rack. A new UPS was recently added to provide a minimum of two hours of backup power, should there be an extended power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. The Control Unit is located in the Boiler Room, near Panel H (Figure 15). There are manual pull stations at most exit pathways, but not at the six of the exit doors in the North classroom pod, which is required. Horn/strobes are present in all rooms and corridors. There are a few smoke detectors in the building that are used to release smoke/fire doors and shutters. Upon detection of smoke, all magnetic door holders are released and large HVAC fans are shut-down. The Control Unit is a Silent Knight Model 5820XL.

Figure 15 – Fire Alarm Control Unit

Recommendations

Install additional manual pull stations where required by Code.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade. There are no known serious issues with the system.

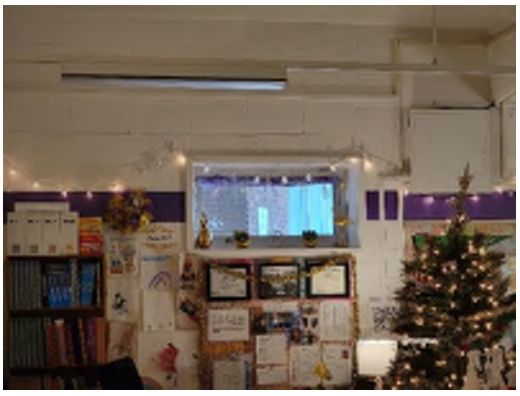
Recommendations

None

Windows

Existing Conditions

Windows: All the windows are older aluminum non-thermally broken frames with single pane glazing. These windows are well beyond their useful life.



Classrooms without Windows: None of the classrooms in the library addition have real windows, they have a sidelight next to the door. While this is not a violation of the code, it has been proven that natural lighting in classrooms helps facilitate learning and retention.

Recommendations

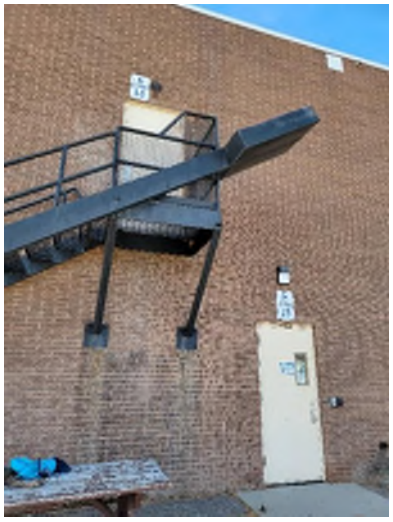
Windows: Replace all the existing exterior windows with new aluminum thermally broken double pane low-e glazing. **(High Cost, Low Priority)**

Classrooms without Windows: It would be highly recommended to cut in windows into all the classrooms. **(Medium Cost, Low Priority)**

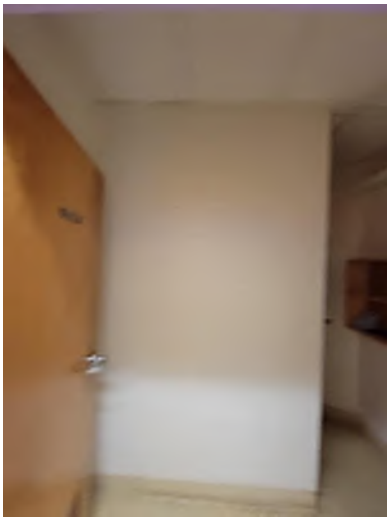
Doors

Existing Conditions

Exterior Doors: All but two of the exterior doors are old and require constant maintenance. They are all beyond their useful life and should be considered being replaced.



Interior: The interior doors are in good working condition. They do not need to be upgraded currently.



Recommendations

Exterior Doors: Replace all older exterior doors with new galvanized insulated hollow metal doors or thermally broken aluminum doors. **(Medium Cost, Medium Priority)**

Exterior Cladding

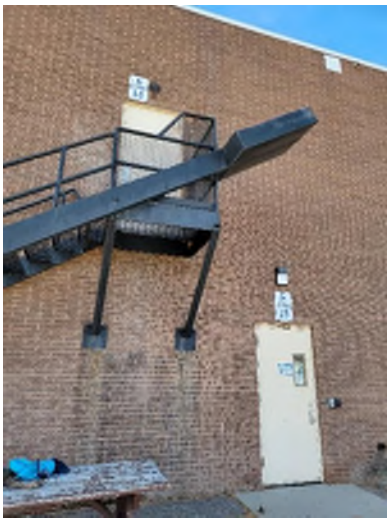
Existing Conditions

Masonry: The face brick masonry is in good shape. However, the control joints are cracked or missing and should be resealed with caulking.

Outbuilding: The older music outbuilding is well past its useful life and should be scheduled to be replaced or have a lot of money put into it to renovate it.

Storage Addition: There is a wood framed storage addition that was added to the southwest of the gym. This structure's prefinished paneling is degrading and should be replaced.

Exterior Stair Railing: The railing on the exterior stair does not meet current requirements and should be renovated. There is also a large counterweight that was installed and should be removed.



Recommendations

Masonry: Reseal all masonry control joints. **(Low Cost, High Priority)**

Outbuilding: Replace or remodel the Music Outbuilding. **(High Cost, Low Priority)**

Storage Addition: Replace all exterior siding on the storage addition with new metal wall panels. **(Medium Cost, Medium Priority)**

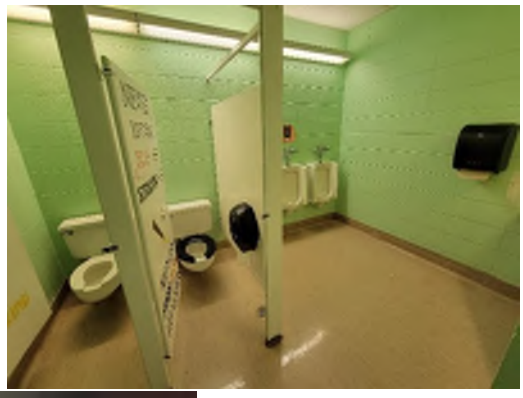
Exterior Stair Railing: Modify the railing on the exterior stair to meet guard railing requirements and give better fall protection from the young students. We would also recommend removing the counterweight as it is not needed any longer. **(Medium Cost, High Priority)**

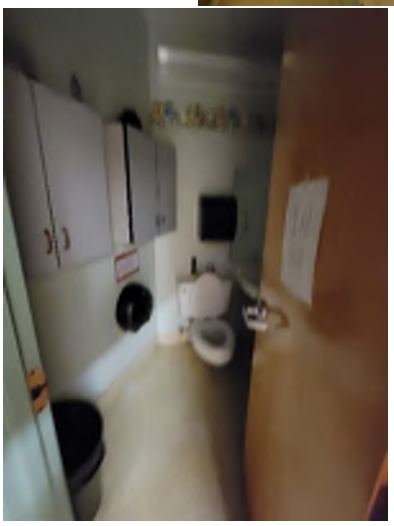
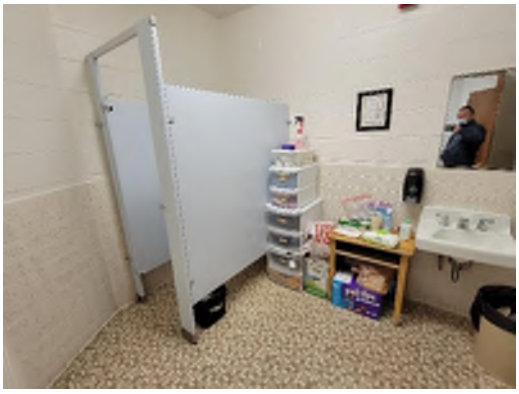
Accessibility

Existing Conditions

Parking: The exterior parking is in good shape from the parking lot to the sidewalk next to the building. However, sidewalk under the overhang into the building is pitted out and should be replaced.

Bathrooms: Rossiter has more restroom fixtures and facilities than any other elementary school with a total of (15) rooms and (45) water closets or urinals). Of these restrooms only one currently meets ADA standards. While additional rooms could be brought up to current standards it would require masonry to be removed as none of the entries meet the required clearances. I would not recommend putting these updates on the current priority list, but if the restrooms are updated in later years the ADA status should be reevaluated.




Second Floor: There are currently two classrooms on the second floor that are currently not accessible. It would be possible to relocate these functions for any accessible needs. Adding a lift to the exterior might be a good idea in the future however, I do not think this needs to be on the current priority list.

Recommendations

Parking: Repour the sidewalk under that canopy to verify a smooth transition. **(Medium Cost, Medium Priority)**

Roofing

Existing Conditions

The building roofing system in in good /excellent condition. There is a mix of different thermoplastic single ply roofing materials hat have been installed.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof section A, C are over the bulk of the school area. These roofs are both single ply roofing materials– **(High Cost – Low Priority)**

Smith Elementary School

Overview

Address:

2320 5th Avenue

Helena, MT 59601

Year Built:

1966

Building Area:

41,498 SF

Parking, Sidewalks and Site

Recommendations

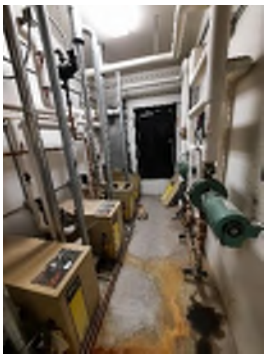
Parking Lot and adjacent sidewalks - Repair cracks, repair potholes and sealcoat entire area.

Playground Asphalt - Repair cracks, repair potholes and sealcoat entire area.

HVAC

Existing Conditions

Heating System: The building heating consists of five separated boiler systems distributed throughout the building in four different boiler rooms. The building boilers are all cast iron sectional designs. The boilers are of three different manufacturers and four different sizes. There are a total of 14 different boilers within the building. In one instance, there are 2 separate boiler plants in a single boiler room. One of the systems is a single unit while the other boiler system is a four-unit modular system. There are a total of three modular systems within the building and two single boiler plants.



Each boiler plant is connected to a separate distribution system with separated pumps, air separator, and expansion tanks. No boiler plant provides redundancy for any other system.

Plumbing: The building domestic water is provided via a single city water supply that has been upgraded to meet current entry service requirements.

Building plumbing fixtures have recently been replaced by HPS staff.

Domestic hot water for the building is generated with three separate gas fired water heaters. These systems are distributed in various equipment rooms throughout the building. The domestic hot water systems are not equipped with a tempering valve as required by code.

Between the building and the sanitary sewer connection in the street, the building sanitary sewer main has been breached. The piping was damaged when data conduit was brought into the building.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: The building ventilation is provided via five different roof mounted air handling units and a lower area crawlspace unit. The units are equipped with hot water coils to temper the ventilation air, but the individual space temperature control is via duct mounted reheat coils. These coils are located within the building in closet spaces.

Ductwork is extended to the individual spaces from the closets via underground ductwork. The ventilation system utilizes plenum return. The return passes through the classroom doors and

down the corridor to a central return located in the common space. The use of the corridor as an air passageway is a code violation.

The gymnasium space is equipped with a roof mounted air handling unit. This unit is exposed on the roof and has become a haven for a flock of pigeons. This flock of pigeons creates a non-sanitary area around the unit.

Library is conditioned with ceiling mounted unit ventilators

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

Air Conditioning: The air handling equipment is not equipped with any means of mechanical equipment. All units are sized for economizer cooling.

Recommendations

Heating: Replace the cast iron section boiler plants. The design effort should be to consolidate equipment and provide system redundancy. Consideration should be given to piping between the different equipment rooms and establishing a single boiler plant with the building.

Ventilation: Replace the roof mounted equipment with new unit equipped with air cooled mechanical cooling.

Modify the duct mounted reheat coil distribution system to utilize air terminal units. The air terminal system will minimize energy consumption and improve space temperature control.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

The building boiler equipment utilize individual boiler mounted controls or electric boiler sequencer panels. None of the panels are linked or monitored remotely. Space temperature control is accomplished with pneumatic controls.

Recommendations

Update the boiler room DDC control system to district standard and extend the system to rest of the building.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from an underground 12.47 kV primary. The original drawings show the primary originating from a riser pole located southwest of the property in the alley adjacent to California Street. However, at some point this may have changed because a riser pole does not appear to be at that location. There is a riser pole located east of the property at Colonial Drive and Reber Broadwater Cupola Park, that may be the origination point of the primary now. The primary terminates at a 150 kVA pad mounted transformer on the southeast side of the center pod of the school (Figure 1). The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 600 amp rating. The secondary exits the transformer underground and then passes through the foundation wall where it terminates at the Main Distribution Board (Figure 2). The utility meter is adjacent. The utility metering current transformers appear to be located in the bottom of the MDB in a separate compartment. One area of concern with this installation is that the transformer is just a few inches from the exterior building wall and positioned directly under an overhang and just a few feet from windows. The clearances are not adequate to meet current utility company standards or safety codes.

Figure 1 – Pad Mounted Transformer

The highest recorded demand from Northwestern Energy was 80.8 KW in March, 2020. Based on this reading, the calculated demand is about 350 amps, meaning that the service has about 30% to 35% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

The Main Distribution Board is a Westinghouse Model CDP (Figure 2). The incoming electrical service enters the side of the cabinet, then turns downward and terminates in the metering compartment. The service conductors are parallel sets of 4#350 THW run in parallel in 3-1/2 inch conduits. The distribution board is obsolete but apparently Cutler-Hammer can provide compatible circuit breakers. There are five 3-pole distribution breakers in MDB feeding six branch panelboards in the school as follows; 350A - Panels F & G, 225A - Panel D, 200A - Panel B, 175A – Panel E, 100A - Panel C. There is also a 150A spare breaker and two 20A-1P breakers for exit and egress lighting.

Figure 2 – Main Distribution Board

Figure 3 – Typical Branch Panelboard

Electrical Distribution: There are 5 original branch panelboards in the school. All are Westinghouse panelboards. Circuit breakers are available through Cutler-Hammer. One of the original panelboards (Panel B in the Boiler Room) was recently replaced with a Square D NQ branch panelboard to provide additional circuits for new equipment installed for the Safety-Security Upgrades. A 4 kVA UPS and UPS panelboard was also added recently for battery backup of the data switches. The original panelboards are for the most part lacking any spare breakers or spaces.

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have five to six receptacles in usable locations often resulting in the need for two or more power strips (Figure 4). In addition, there are only three circuits are shared between four classrooms, so essentially there is less than one circuit per classroom. This

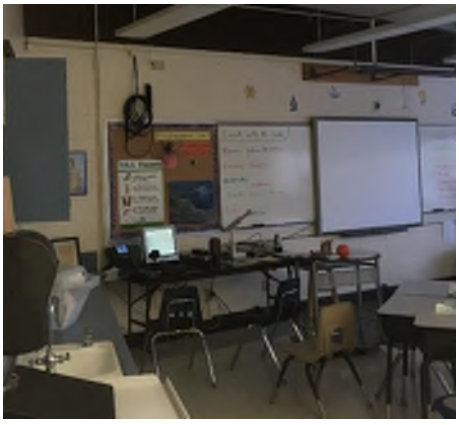


Figure 4 – Typical Classroom Clustering of Appliances and Power Strip

was not unusual when the school was built in the 1970's, before the computer age.

New receptacles and circuits were added to the new Staff Break Room, Offices, Reception, Nursing and other Administrative areas with the Safety-Security Upgrades project in 2019.

Lighting: Staff Break, Nursing, Reception and Administrative areas that were remodeled in recent Safety-Security Upgrades are mostly recessed LED troffers with some surface wraparound styles used in the Lobby. The remaining existing fixtures in Corridors are mostly 4 and 8-foot T8 fluorescent fixtures with wraparound acrylic lenses (Figure 6). Classrooms and Library are suspended 4-foot long T8 acrylic wraparound lenses mounted in continuous rows (Figure 5). Storage and utility areas are mostly 2-lamp surface fixtures with wraparound lenses. The Gymnasium lighting is 4-foot T-5 fluorescent with wire guards. The building is equipped with occupancy sensors, but only the areas with the newer LED lighting have dimming capability.

Exit and Egress Lighting: Due to the nature of the "pod" style design of the school, there are many corridors and exits. Not surprisingly, overall, the building seems to be lacking in both exit signs and emergency egress lighting. There are exterior exit doors shared by each pair of classrooms. A few of these are identified as exits with a non-illuminated cardboard sign (Figure 7), but the majority have no signs at all, even though they are identified as "Entries" with a placard on the building exterior. This may be in conflict with the IBC and Life Safety Codes because if these are *required* exits then they should have an illuminated exit sign (Figure 8) and emergency egress lighting. In general, there is very little emergency egress lighting in the building, other than in the center pod around the recently remodeled Reception and Administrative areas. Commons areas, i.e. the Gym and Library have some emergency lighting, but even these areas seem to be underlit for egress.

Figure 5 – Typical Classroom Lighting

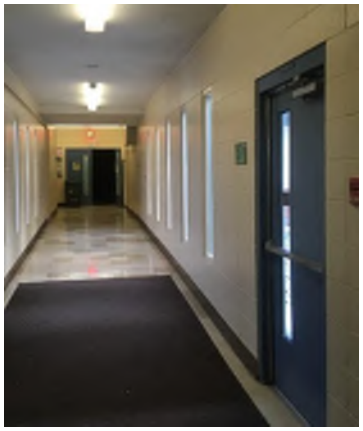


Figure 6 – Typical Corridor Lighting and Non-illuminated Exit Sign

Figure 7 – A Non-Illuminated Exit Sign

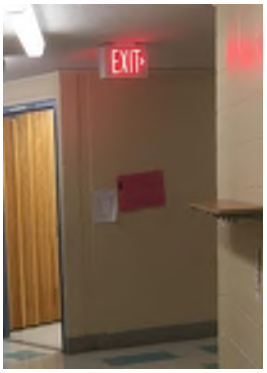


Figure 8 – An Illuminated Exit Sign

Recommendations

Electrical Service: The close proximity of the pad mounted transformer to the building is a concern because the transformer is so close to the building and the overhang extends over it. Transformer faults are rare but do happen on occasion. A fault could start a fire or worse. Relocation of the transformer to a location at least 5 feet from the building and 10 feet from any windows is recommended and would meet current utility company safety requirements. If this were to be done, then it would be an opportune time to increase the electrical service ampacity from 600 to 800 amps or more, depending on future air conditioning loads. The service upgrade would also provide an outdoor metering cabinet, meter and an exterior main disconnect.

Electrical Distribution: It is recommended that the Main Distribution Board be replaced with a new board with the capacity to support the power requirements for a new central AC system and add additional panelboards to the Classroom pods for more convenience receptacles. The existing branch panelboards do not necessarily need to be replaced, as parts are still available.

Branch Circuiting: Additional receptacles and circuits are badly needed in the classrooms and workrooms, particularly over work counters and near the teacher's desks. Replacing existing receptacles and adding up to 8 additional and increasing branch circuiting to a minimum of two dedicated circuits per classroom and one for workrooms is recommended. The wiring could be installed in a concealed manner if the cost of cutting and patching walls is acceptable. Otherwise exposed Wiremold raceway or possibly even conduit would be used.

Lighting: Replacement of fluorescent with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. New fixtures would be very similar in appearance to the existing and could utilize the same pendants and suspension mounting hardware. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Exit and Egress Lighting: Replacement of the original exit signs with new "onboard" LED signs is recommended. New exit signs should be installed at all exit doors that do not have an illuminated sign. The new exit signs could be a combination unit that is equipped with a battery pack and two LED emergency lighting heads. Wall and ceiling mounted emergency egress lighting with battery packs and LED heads should be added to every corridor to insure the lighting level meets the minimum requirements of the Life Safety Code and IBC.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The fiber optic cable service terminates in the Main Data Rack in separate communications room adjacent to the boiler room. The door access equipment is also located in this room, on the north wall across from the data rack.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known issues either with quantities or deficiencies.

IP based security cameras were provided in the recent Safety-Security Upgrades project on the exterior of the building covering all entry points, playgrounds and drop off locations. Interior cameras were also located in the entry vestibules and lobby. All cameras are POE and are connected to the data switches at the main rack. A new UPS was recently added to provide a minimum of two hours of backup power, should there be an extended power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is an automatic detection system with voice evacuation. It was installed in 2019 as part of the Safety-Security Upgrades.

Figure 10 – Fire Alarm Control Unit Prior to Safety-Security Upgrades

The Control Unit(s) are located on the east wall of the Reception Office. There are manual pull stations at exit pathways, speaker/strobes in all rooms and corridors. 100% Area-Wide detection is provided in all corridors and commons areas. Projected beam style smoke detection was provided in the gymnasium. Upon detection of smoke, all magnetic door holders are released and large HVAC fans are shut-down. The Control Unit is a Fire Lite Model ES-200X capable of supporting up to 198 addressable devices. The Voice Evacuation Unit is a Fire Lite Model ECC-50/100. There are no known issues with the system.

Recommendations

None

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** There are no known serious issues with the system.

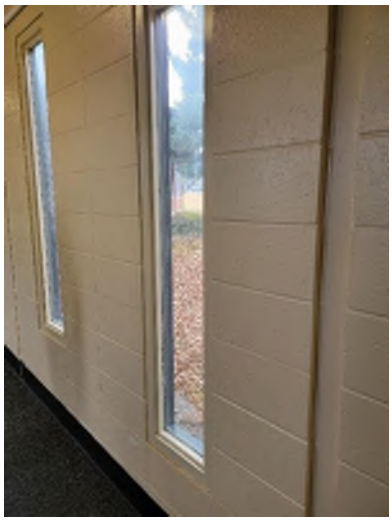
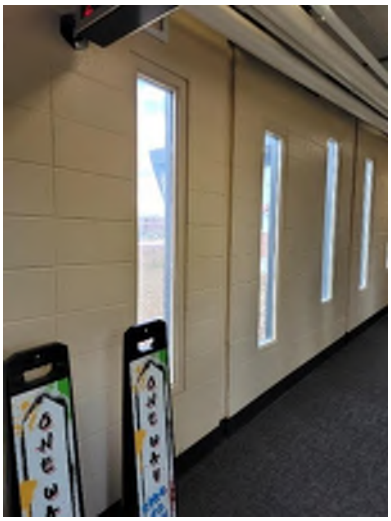
Recommendations

None

Windows

Existing Conditions

Hollow Metal Windows: There were new windows installed on the connection Corridors that have hollow metal window frames with single pane wire glass. These should be replaced.

Aluminum Windows: The rest of the school has non-thermally broken aluminum framed windows with single pane glazing. These should be replaced.


Recommendations

Hollow Metal Windows: Replace the hollow metal windows with thermally broken frames and double pane low-e glazing. **(High Cost, Medium Priority)**

Aluminum Windows: Replace the aluminum non-thermally broken windows with thermally broken frames and double pane low-e glazing. **(High Cost, Medium Priority)**

Doors

Existing Conditions

All of the doors at Smith Elementary School are in good working condition. The district has minimal job orders with the doors at Smith.

Recommendations

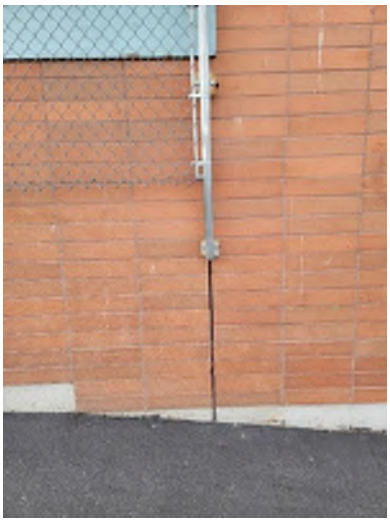
Currently there are no recommendations.

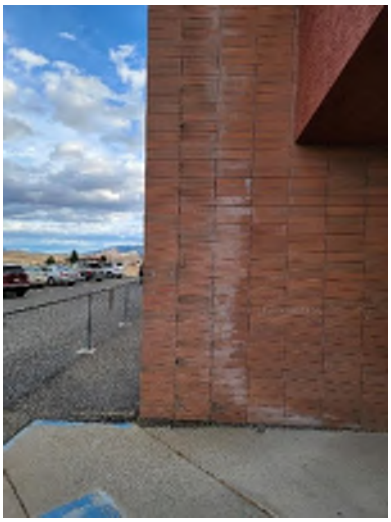
Exterior Cladding

Existing Conditions

Exterior Stairs: There is a set of exterior egress stairs where hand/guard railing have much larger openings that the current code allows. This should be considered a fall hazard and should be updated.

Masonry: There are a few locations that the exterior masonry is in need of being repointed and all of the control joints need to be filled in with new sealant.





Exterior Finished Panels: The exterior finished panels were just updated and repainted the summer of 2021 and in good shape, no additional work is need for them at this time.

Recommendations

Exterior Stairs: Replace the existing railing with a Guard Railing 42" tall and that will not allow a 4-inch sphere to pass through. **(Low Cost, High Priority)**

Masonry: Repoint the few locations of masonry that the mortar joints are cracking. Replace all sealant at the masonry control joints. **(Low Cost, High Priority)**

Accessibility

Existing Conditions

Parking: The lower-level parking at the gym isn't in horrible shape, but it appears that the cross slopes might be out our compliance.

Restrooms: The restrooms in the school were just updated and ADA accessible facilities were included in the renovation.

Recommendations

Parking: Rebuild the ADA parking spots to have less than 2% cross slope. Extend the access lane to the building with an approved sidewalk. **(Medium Cost, Low Priority)**

Roofing

Existing Conditions

The building roofing system in in fair / excellent condition, mostly in fair condition. There is a mix of thermoplastic single ply roofing materials and EPDM rubber roofs.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof section A, E, F, G, H, I, J are over gym and classroom space. These roofs are both single ply roofing materials– **(High Cost – High Priority)**

Warren Elementary School

Overview

Address:

2690 York Road

Helena, MT 59601

Year Built:

1968

Building Area:

31,904 SF

Parking, Sidewalks and Site

Recommendations

Parking Lot - Repair cracks, repair potholes and sealcoat entire area Including adjacent sidewalks.

Parking and Sidewalks in Front of School - Repair cracks, repair potholes and sealcoat entire area Including adjacent sidewalks.

Playground asphalt - Repair cracks, repair potholes and sealcoat entire area.

HVAC

Existing Conditions

Heating System: The building heating consist of three separated boiler systems. All are in a central boiler plant with a limited amount of interconnecting piping. As the building was expanded, an additional boiler system was added to the building. All three systems utilize cast iron sectional boilers. Each system has their own air separator, expansion system and distribution pumps. Two of the systems have dedicated combustion air systems while the third system is not equipped with a combustion air system. The plant is significantly oversized for the installed building load connected to the individual systems.

Plumbing: The building domestic water is provided via a water well on property. This well system is equipped with a chlorination system. The piping on the chlorination system is beginning to fail and should be re-piped to ensure proper water quality.

Building utilizes wall mounted flush tank toilets. The fixtures are older but no reported operational issues with the fixtures or piping systems.

Domestic hot water for the building is generated with a single Lochinvar high efficiency water heater. The system is not equipped with a tempering valve as required by code.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: The building ventilation is equipped with four different ventilation systems:

1. The original building is equipped with floor mounted unit ventilators. The unit ventilators are original to the building.

2. The first addition is equipped with fan coil units which are integral with the classroom perimeter casework.

3. The latest addition utilizes a central air handler connected to buried distribution ductwork and perimeter hot water fintube radiation.

4. The office space utilizes a mezzanine blower coil unit and individual duct mounted reheat coils to provide individual space temperature control. The blower coil is original to the building.

5. The gymnasium utilizes a mezzanine mounted blower coil. The blower coil is original to the building.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped to required hoods.

Air Conditioning: The air handling equipment is not equipped with any means of mechanical equipment. All units are sized for economizer cooling.

Recommendations

Heating: Replace all cast iron section boilers into a single integrated boiler system utilizing high efficiency condensing boilers. The boiler room pump scheme should be combined to allow system redundancy and simplification of maintenance.

Ventilation: Replace floor mounted unit ventilators new equipped. The mezzanine blower coils should be replaced with small air handling equipment capable of variable flow operation.

Modulating airflow based on room demand will improve space comfort and minimize energy consumption.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Controls

Existing Conditions

The boiler room equipment and latest addition air handling unit are controlled with an Automatic Logic Direct Digital Control System. The system frontend is obsolete and needs to be updated. Most of the classroom equipment utilizes pneumatic controls.

Recommendations

The boiler room DDC control system should be upgraded to district standards and extend the system to rest of the building.

Fire Suppression

Existing Conditions

The building is NOT equipped with fire suppression system. With the building water supply being provided via a well any fire suppression system will require an underground tank, fire pump and emergency power generator.

Recommendations

Current code requires an elementary school be protected with a fire suppression system. It would recommend installing a fire suppression system throughout the building.

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV primary distribution line on a riser pole located across Tizer Road to the East. The primary line crosses under a parking lot and terminates in a 150 kVA pad mounted transformer near Entry 5 on the east side of the building (Figure 1). The gas service is also in the same area. The transformer is much too close to the building. The safety clearances for pad mounted, oil filled transformers are a minimum of three feet from non-combustible construction, six feet from combustible materials and ten feed from windows. The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 600 amp rating. The secondary conductors exit the transformer underground then rise up into the incoming section of Main Distribution Board (MDB), located in Mechanical Equipment Room 126 (Figure 2). The meter is at the top of the incoming section and the utility metering equipment is below. There is a separate overhead service drop to a Modular Music Classroom located south of the school. It has its own meter/main at 120/240 volt, single phase.

The highest recorded demand over the last two years from Northwestern Energy was 66.4 KW in May, 2021. Based on this reading, the calculated demand is about 288 amps, meaning that the service would have about 45 to 50% spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

Figure 1 – Pad Mounted Transformer

Distribution: The MDB consists of two sections. There is a 600A-3P main disconnect, a bolted pressure switch in the incoming section (Figure 3). The utility metering and meter are above the switch. Bolted pressure switches are susceptible to failure unless they are maintained and exercised regularly. Capital High School a similar switch in the main building that failed in the summer of 2021 and had to be replaced.

Figure 2 – Main Distribution Board, Metering Enclosure & Meter

Figure 3 – Bolted Pressure Switch

Figure 4 – MDB Section 2

Section two of the MDB contains ten distribution breakers; four 125A-3P for Panels A, B, C & D; one 70A-3P for a Range; one 150A-3P for Panel E, four 200A-3P for Panels F, G, ME (Figure 4) and a Modular Classroom/Library. The labeling and identification needs improvement because two breakers are not identified properly. There appear to be spaces for additional circuit breakers. Panel A is an old panelboard, located in the original school area. It does have some spare breakers, but they may be obsolete (Figure 5). Panel B is located in the administrative area, was recently installed during the Safety-Security Upgrades and has spare capacity. Panel ME (Figure 6) is in the Boiler Room and Panel D is adjacent. Panel ME has at least 50% spare capacity but Panel D does not have any spares. Panel C is located in the Kitchen, is also an original panel and has just a small amount of spare capacity. Panels E and F are located in the south classroom wing additions. Both have spare capacity.

Figure 5 – Panel A

Figure 6 – Panel ME

Figure 7 – Panel E

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have four to eight receptacles but there are not enough in locations where they are needed, i.e. near the teacher's desk, PC workstations or over work counters.

Lighting: The Nursing Office, Administrative areas in the recent Safety-Security Upgrades were equipped with LED troffers in lay-in ceiling areas. Four-foot surface mounted LED fixtures were install in the entry corridor lobby. In the remaining portions of the building, the corridors and classrooms in the original school and the 1977 Addition are mostly 4 foot T8 surface and suspended fluorescent fixtures with wraparound acrylic lenses (Figures 8 & 9). In the 1992 building addition, the lighting is predominately 2x4 troffers in lay-in ceilings with acrylic lenses and 4 foot T8 lamps (Figure 10). The building has been equipped with occupancy sensors, but only the areas with the LED lighting have dimming capability.

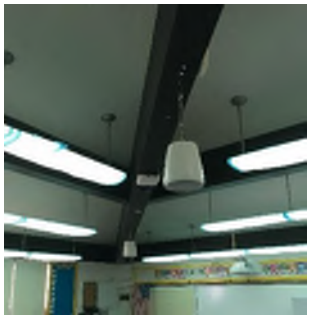


Figure 8 – Classroom Lighting in the Original Building & IP Speakers

Figure 9 – Classroom Lighting in the 1977 Addition

Figure 10 –Classroom Lighting in the 1992 Addition

Figure 11 –Gymnasium Lighting

The Gymnasium lighting consists of suspended 4 foot tandem T-8 fluorescent fixtures with wire guards (Figure 11).

Most of the exit signs in the building are steel housings with stencil faces that have been converted to LED (Figure 12). There are a few exit doors that are not provided with illuminated exit signs that are not Code compliant (Figure 13). Both interior and exterior LED emergency egress lighting was provided in the recent Safety-Security Upgrade. There are some 2x4 troffers in the 1992 Addition that were equipped with emergency battery backup. Emergency egress lighting in the original portion of the school and in the 1977 Addition appears to be very sparse. A few wall mounted units have been placed in some corridors (Figure 14), but they are lacking in most.

Figure 12 –Exit Signage

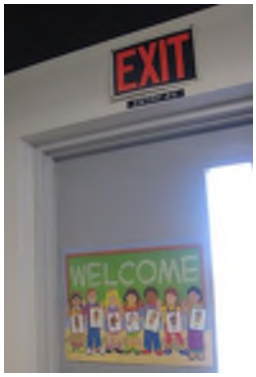


Figure 13 – Non-Illuminated Exit Sign

Figure 14 – Wall Mounted Emergency Lighting Unit

Recommendations

Electrical Service: The pad mounted transformer is too close to the building and its relocation is recommended, if not immediately, at least in the long term. When this is done, the metering enclosure, meter and main disconnect will be moved to an outside wall. The service ampacity would likely be increased to 800 amps. This will allow additional capacity for adding air conditioning loads. An outdoor main distribution board, similar to Jefferson Elementary could be installed.

Electrical Distribution: A new electrical service will allow the existing bolted pressure switch to be removed. A main lug kit can be installed in its place in order to maintain Section 2. It is also recommended that at least one additional branch circuit panel be added to the building, near the original classrooms and replacing original panels A and C with new.

Branch Circuiting: Additional receptacles and circuits are needed in the classrooms. There may be adequate spare capacity in the existing panelboards in the 1977 and 1992 additions to accommodate the new circuits. Circuiting will be increased to a minimum of two dedicated circuits per classroom. Wiring can be run above lay-in ceilings in the 1992 addition, or possibly in other accessible locations, i.e. attics, then drop down into the classrooms, where it will be

surface mounted in Wiremold or exposed conduit, or could be installed in a concealed manner if the cost of cutting and patching walls is acceptable.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls in classrooms, corridors, gymnasium and other areas is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The fixtures in the Modular Classroom Library and Music Classrooms will be included. The 1992 addition will have recessed 2x4 LED flat panels. The surface and suspended wraparound fixtures in the original school classrooms and the 1977 Addition should be replaced with similar style fixtures with onboard LED's. The existing exit signs may be reusable, but it may be more advantageous to replace them with combination exit signs with emergency egress heads. Cardboard and paper signs will be replaced with new illuminated exit signs with emergency heads. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The Main Data Rack is located in storage room 97 in the southeast corner of Classroom 576. The door access equipment is also located in this room, on the east wall next to the data rack.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known issues either with quantities or deficiencies.

Surveillance cameras were provided in the Safety-Security Upgrades at the exterior entry doors and main lobby. The cameras are powered over the ethernet wiring from the data switches in the main IT rack. UPS backup power has been recently added to provide continuous power for up to a 2-hour power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. The Control Unit(s) is located on the east wall of Mechanical Equipment Room 126. It is a Silent Knight Model SK-6324 (Figure 15). There is a remote annunciator located in the Reception Office 144. There are manual pull stations at exit pathways, horn/strobes in the corridors, common areas, the Gym, Auditorium and Modular Classrooms. Only a few of the classrooms in the school have horn/strobes. There are a few smoke detectors in the corridors for release of magnetic door holders and the coiling doors at the Reception windows (Figure 16).

Figure 15 – Fire Alarm Control Unit

Recommendations

The fire alarm system appears to be functioning correctly at the present. However, it should be upgraded in the next few years to a new addressable voice evacuation system with speakers and strobes added to every room to comply with current Fire Codes. Usually any failure of the existing equipment will require the system to be upgraded to meet current codes anyway, although sometimes the AHJ will allow temporary exceptions.

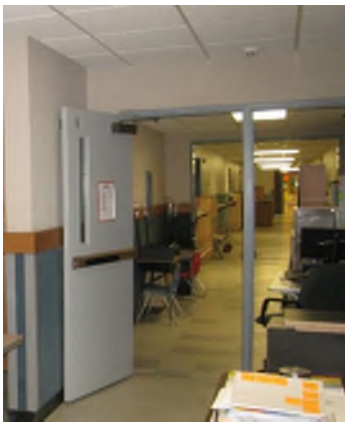


Figure 16 – Smoke Detector and Magnetic Door Holder

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** The staff reports that there are no known serious issues with the system.

Recommendations

None

Figure 17 – IP Based Clock/ Program/ Messaging Board

Windows

Existing Conditions

There are three different types of widows at Warren Elementary School;

Aluminum Single Pane: The original gym, library and classroom area of the building had non-thermally broken aluminum framed windows with single paned glazing. These windows should be replaced as they are beyond the useful life.

Wood Windows: The first addition to the school (about 1/3 of the school) has wood frames and single pane windows. These windows are beyond their useable life and should be replaced.


Aluminum Double Pane: The second addition was constructed with thermally broken aluminum framed windows with double pane glazing. These windows are still in good shape and require no work currently.


Recommendations

Aluminum Single Pane: Replace the original aluminum framed single pane windows with new thermally broken double pane low-e windows. **(Medium cost, Medium Priority)**

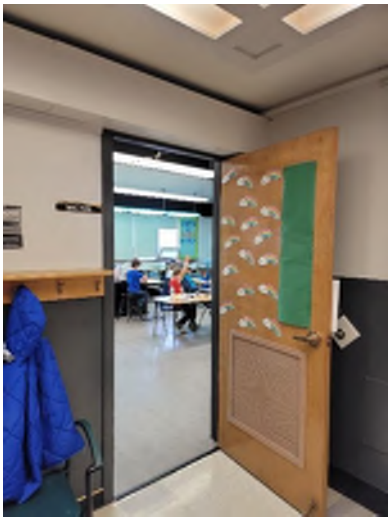
Wood Windows: Replace the wood frames and single pane windows with new thermally broken double pane low-e windows. **(Medium Cost, High Priority)**

Doors

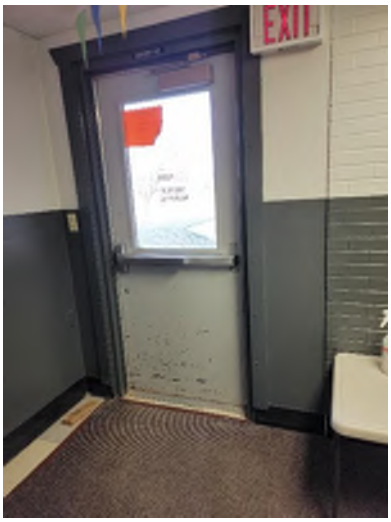
Existing Conditions

Interior Rated Doors: The newest addition had fire rated doors installed at the corridors. These doors were blocked open, or their closers were removed. This is a breach in fire code and can be fixed with the installation of magnetic hold opens.

Older Interior Doors: None of the older doors were required to be rated and are separated from the new addition with a fire barrier. No additional work required at this time.



Exterior Doors: Three of the exterior doors are constantly being adjusted by the maintenance staff and need being replaced.

Recommendations

Interior Rated Doors: Install mag holds on all interior fire rated doors to allow them held open without infringing on the fire code. **(Medium Cost, High Priority)**

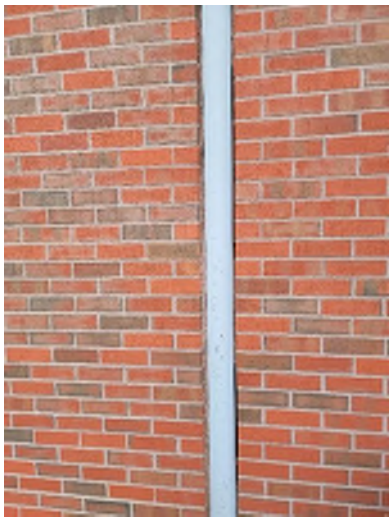
Exterior Doors: Replace the three exterior door creating heavy maintenance issues. **(Medium Cost, Medium Priority)**

Exterior Cladding

Existing Conditions

Old Warren School: The old Warren School is currently only being used as a cold storage building. They are not actively heating this building and if it were to be occupied in the future it would need to undergo a lot of additional work.

Masonry: Most of the exterior cladding on the Warren School is a face brick masonry. The finish is in good shape however the control joint need to be re-sealed.




Fascia and Soffits: The fascia and the soffits appear to be in good condition. There is one location that could use some modifications, but we are not going to include in this deferred maintenance report as it can easily be fixed by district crew.


Outbuildings: There is also two outbuildings located on the school grounds. These appear to be in good condition.


Recommendations

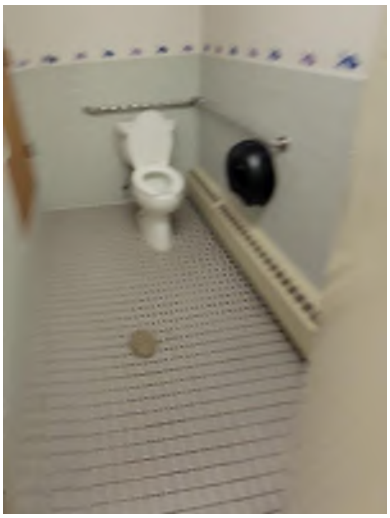
Masonry: Reseal all the masonry control joints. **(Low Cost, High Priority)**

Accessibility

Existing Conditions

Outbuilding ADA Ramp: One of the outbuilding buildings has an ADA ramp was built out of plywood and needs to be replaced.

Restrooms: While not all of the facilities in the school meet current ADA requirements the newest addition does have restrooms that are fully accessible. Not additional work is required at this time.



ADA Parking: The ADA parking from the front of the building appears to meet all requirements. No additional work is required at this time.

Recommendations

Outbuilding ADA Ramp: Rebuild the plywood ramp to be more durable. We are including a price for concrete to be used. **(Medium Cost, Medium Priority)**

Roofing

Existing Conditions

The building roofing system in in fair / good condition. There is a mix of thermoplastic single ply roofing materials.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Roof section A over the gym area. **(High Cost – High Priority)**

Roof sections D, E are over common space. Both roof sections have PVC single ply roofing installed. – **(High Cost - Medium Priority)**

Roof section C is over the main entry to the building. The roof is a TPO single ply roofing installed. – **(Low Cost – Low Priority)**

Middle Schools

CR Anderson

Helena Middle School

CR Anderson Middle School

Overview

Address:

1200 Knight Street

Helena, MT 59601

Year Built:

1959

Building Area:

124,000 SF

Parking, Sidewalks and Site

Recommendations

Back Asphalt and sidewalks, Entry #7 - Repair cracks, repair potholes and sealcoat entire area.

Parking and Driveway at Module Classrooms, including sidewalks - Repair cracks, repair potholes and sealcoat entire area.

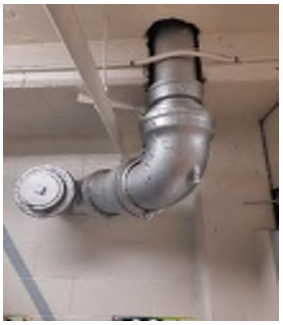
HVAC

Existing Conditions

Heating System: The building heating plant is (2) Hydro Therm Condensing Cast Iron Sectional boiler, Model KN 30. The boilers were installed in 2013. The boilers were installed within the existing equipment room. (2) Original to the building, Pacific Fintube fire tube boilers are abandoned in the boiler space. During the boiler upgrade in 2013 the boilers and a limited amount of piping to and from the boilers were replaced. The building distribution pumps, and system control valve are still original to the building.

Plumbing: The building domestic water is provided via a single city water supply that has not been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building.



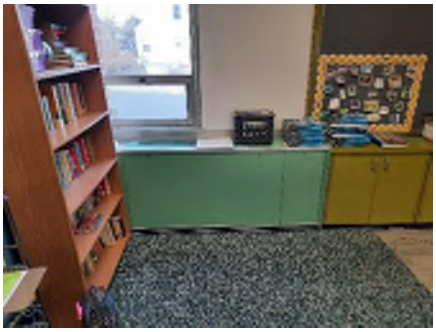
The building sanitary sewer system is cast iron. The exposed piping is starting to show indication of age and wear. No issues were reported currently but review of the system indicates that several sections of the system have been replaced due to age and fatigue.

The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut-off to allow service.

Domestic hot water for the building is generated with single Bradford White water heater. The domestic hot water system is not equipped with a tempering valve as required by code. The building's (3) domestic recirculation loops contain individual circulation pumps. These pumps are original to the building

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: The building classroom spaces are served with individual classroom unit ventilators. These units appear to be of three different vintages. The vintages coincide with building additions.



The Central area of the original building; Library, and lower-level interior classrooms are served via (2) Trane air handlers located in the lower-level crawlspace area. The cafeteria is similarly served with another air handler in a separate crawlspace area. All this equipment is original to the building.

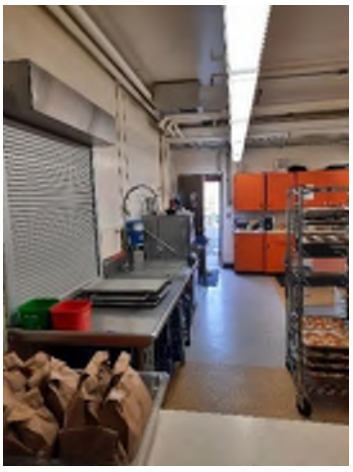
The Vo-Ag teaching area has a welding curriculum, but the space is not equipped with a welding ventilation/exhaust system.

The most recent addition utilizes ceiling mounted fan coils to condition the rooms and provide ventilation. The units are located in the ceiling cavity and were found in good working order.

The gymnasium space is equipped with air handling units suspended within the space. The units are original to the building and due to noise are operated sporadically to provide space heat.

A significant number of roof mounted fans have operational issues (10-15%). All fans show evidence of age and damage from several hail events.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.



Air Conditioning: The central office area is equipped with older evaporative cooling units and (2) classrooms on the upper level of the new addition have dedicated dx cooling. No other area within the building is equipped with mechanical equipment.

Recommendations

Heating: Update the boiler plant around the new boiler equipment or if the district standardizes on a boiler style and manufacturer update to the new standard. The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator) and remove the abandoned equipment to create maintenance or additional building storage space.

Ventilation: Replace classroom unit ventilators with new equipment to insure proper space ventilation.

All air handling equipment within the building should be replaced. Interior ductwork space ductwork systems should be reviewed to verify that ductwork layout matches space function. Significant interior remodel has been completed on the lower level without duct revisions.

Replace the gymnasium air handling units with new equipment.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Replace all roof mounted fans.

Controls

Existing Conditions

The boiler room equipment is controlled by an obsolete Electro Controls Direct Digital Control System. The system frontend is obsolete and needs to be updated. Most of the classroom equipment utilizes pneumatic controls.

Recommendations

The boiler room DDC control system should be upgraded to district standards and extend the system to rest of the building.

Fire Suppression

Existing Conditions

The building is fully protected with fire suppression system. The building is served with two separate systems, but the facility is fully covered.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV primary distribution line on a riser pole located on the south east side of the school, adjacent to Cleveland Street (Figure 1). The primary line crosses under the parking lot and terminates in a 300 kVA pad mounted transformer near Entry 5 on the east side of the building (Figure 2). The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 800 amp rating. The secondary conductors exit the transformer underground then rise up on the exterior of an old transformer vault and into the meter enclosure (Figure 3). The meter and the main disconnect are adjacent. There is a separate overhead service drop to two Modular Classrooms located north of the main electrical service. They have their own meter/main at 120/240 volt, single phase.

Figure 1 – Primary Electrical Service

Figure 2 – Pad Mounted Transformer

The highest recorded demand over the last two years from Northwestern Energy was 182.4 KW in January, 2020. There are several other demand readings in the 180 KW range as well. Based on this reading, the calculated demand is about 792 amps, indicating that the service is at, or near, full capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

Distribution: The Main Switchboard (MSBD) is located in a basement Electrical Room and consists of two sections (Figures 4 & 5). The nameplate rating of the switchboard is 2000 amps. Section 1 contains two 600A-3P and one 400A-3P "sub" main circuit breakers. Although neither are labeled as such, one of the 600 amp breakers appear to serve Section 2 of MSBD and the other 600 amp breaker may feed Panel SDP2. The 400 amp breaker is labeled "Panel SDP". Section 2 of MSBD contains six 200 amp distribution breakers for Branch Panels A, A2, B, C, D and F, and six 100 amp breakers for Panels E, G, H, J, K and P.

Figure 3 – Metering Enclosure, Meter and Main Disconnect Switch

Panel SDP is located adjacent to MSBD in the Electrical Room. SDP contains one 225A-3P, three 100A-3P and two 20A-1P breakers (Figure 6). The two 20 amp breakers are identified as "Sign Message Board" and one of the 100 amp breakers is labeled "Panel P2". The other breakers are not labeled but they may be for the feeders to Branch Panels L, M and P. Panel SDP2 is located in the wood shop. It contains two 150 amp breakers for Panels B1 and D1; one 175 amp breaker for Panel A1; and three 200 amp breakers for Panels C1, R and T (Figure 7). It is obvious that identification and labeling of the distribution breakers is of concern, not just for maintenance but for safety as well.

Figure 4 – MSBD Section 1

Figure 5 – MSBD Section 2

Figure 6 – Panel SDP

The majority of the branch panelboards in the building are Square D NQO style (Figure 8), with the exception of the General Electric panelboards (Figure 9) that were added with SDP2 in the late 90's and a few Cutler Hammer panelboards (Figure 10) that replaced some of the originals.

The branch panelboards appear to be in good conditions and there are some spare circuit breakers available.

Figure 7 – Panel SDP2

Figure 8 – Square D NQO Panelboard

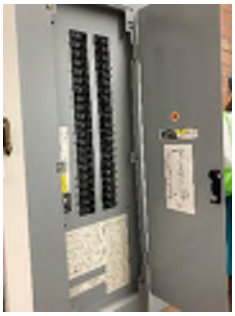


Figure 9 – General Electric Panelboard

Figure 10 – Cutler Hammer Panelboard

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Most classrooms have four to eight receptacles but there are not enough in locations where they are needed, i.e. near the teacher's desk, PC workstations or over work counters (Figure 11).

Figure 11 – Classroom Workstations

Lighting: A few new LED downlight fixtures were installed in the Reception areas in the recent Safety-Security Upgrades, but the bulk of the lighting in the school consist of four foot long surface or suspended mounted fluorescent fixtures (Figure 12). The fixtures in the corridors and in the north addition to the school are 2x4 fluorescent troffers with acrylic lenses (Figure 13). The building has been equipped with occupancy sensors.

Figure 12 – Typical Classroom Lighting

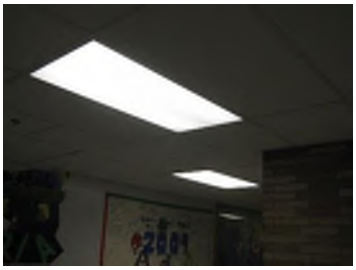


Figure 13 – Typical Corridor Lighting

Figure 14 – Old Gymnasium Lighting

The Old Gymnasium lighting consists of suspended 4 foot tandem T-8 fluorescent fixtures with wire guards (Figure 14). The lighting in the New Gymnasium in the North Addition Metal Halide.

Most of the exit signs in the building are steel housings with stencil faces that have been converted to LED. Emergency egress lighting units are located on corridor and egress pathway walls throughout the facility.

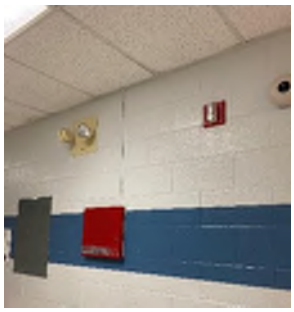


Figure 15 – Wall Mounted Emergency Lighting Unit, Fire Alarm Power Extender and Horn/Strobe

Recommendations

Electrical Service: The existing 800 amp electrical service and main disconnect have little spare capacity. The service conductors and the main disconnect should be increased to at least 1200 amps, or possibly larger if air conditioning is added. A disconnect this large will probably require a 2-section outdoor enclosure, either free-standing or against the exterior building wall.

Electrical Distribution: A new electrical service will also require an upgrade to the MSBD. Careful consideration must be given to where the new MSBD is located so that the installation is compliant with the access and working clearance requirement of current Codes, which requires a minimum of two exits from the room. It is also recommended that at least one additional branch circuit panel be added to each floor on the west side of the building, near the classrooms to allow for additional receptacle circuits.

Branch Circuiting: Additional receptacles and circuits are needed in the classrooms. There may be adequate spare capacity in some of the existing panelboards to accommodate the new circuits, and if not, the existing panelboards could be replaced. Circuiting will be increased to a minimum of two dedicated circuits per classroom. Wiring can be run above lay-in ceilings in the corridors, then into the classrooms, where it will be surface mounted in Wiremold or exposed conduit.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls in classrooms, corridors, gymnasium and other areas is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The fixtures in the Modular Classrooms will be included. The North Addition and the corridors will have recessed 2x4 LED flat panels. The surface and suspended wraparound fixtures in the cafeteria and classrooms will be replaced with similar style fixtures with onboard LED's. The existing exit signs may be reusable, but it may be more advantageous to replace them with combination exit signs with emergency egress heads. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. The internet provider is Vision Net. The Main Data Rack is three sections with room for significant expansion. It is located in an old Transformer Vault adjacent to the Electrical Room. The door access equipment is also located in this room, on the north wall of the vault.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known issues either with quantities or deficiencies.

Surveillance cameras were provided in the Safety-Security Upgrades at the exterior entry doors and main lobby. The cameras are powered over the ethernet wiring from the data switches in the main IT rack. UPS backup power has been recently added to provide continuous power for up to a 2-hour power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system, although there are some smoke and heat detectors in storage rooms and the elevator shaft. The building does have a fire sprinkler system and it is supervised by the Fire Alarm Control Unit.

Figure 16 – Fire Alarm Control Unit

The Control Unit(s) is located on the north wall of a storage room in the Reception Office. It is a Silent Knight Model IFP-1000 (Figure 16). There is a remote annunciator station at Entry 19 on the north end of the west classroom wing. There are manual pull stations at exit pathways, horn/strobes in the corridors (Figure 15), common areas, the Gyms, Cafeteria and Classrooms. Only a few of the classrooms in the school have horn/strobes, which is not in compliance with the current Fire Codes which require notification in every habitable room. There are a few smoke detectors in the corridors for release of magnetic door holders and the coiling doors at the Reception windows, plus the elevator lobby, certain air handlers and storage rooms.

Recommendations

The fire alarm system appears to be functioning correctly at the present. However, it should be upgraded in the next few years to a new addressable voice evacuation system with speakers and strobes added to every habitable room to comply with current Fire Codes. Usually any failure of the existing equipment will require the system to be upgraded to meet current codes anyway, although sometimes the AHJ will allow temporary exceptions.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** The staff reports that there are no known serious issues with the system.

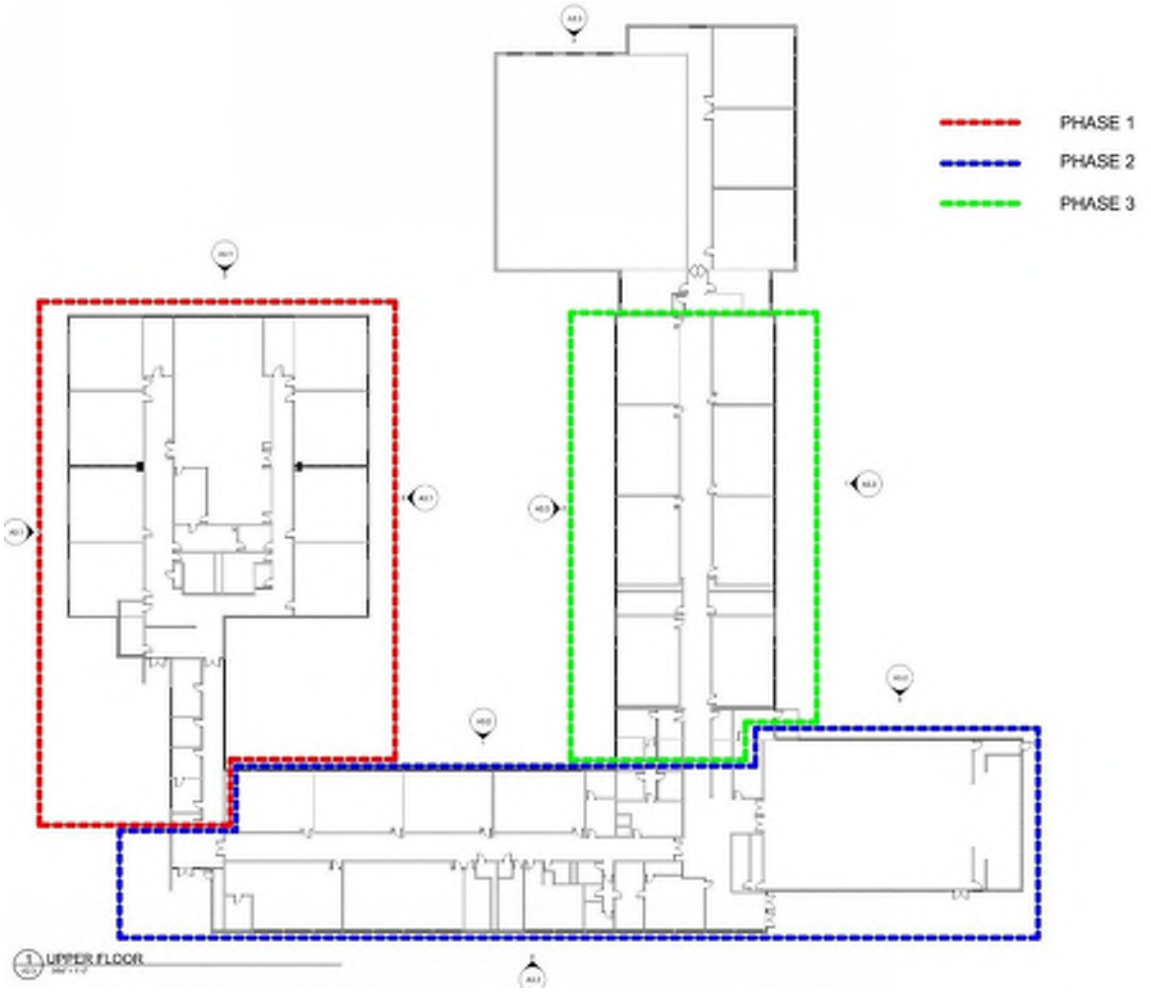
Recommendations

None

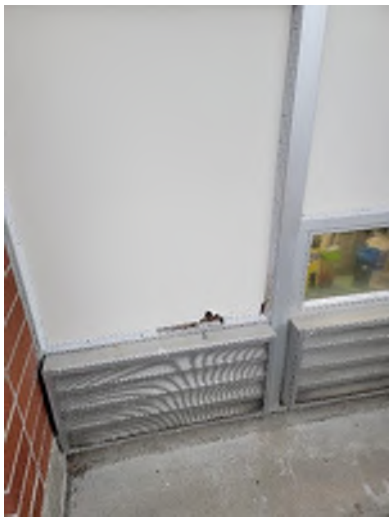
Windows

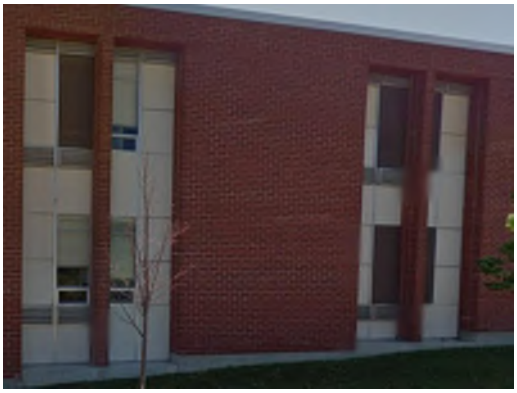
Existing Conditions

Aluminum Single Pane: There are a lot of Single Pane non-thermally broken Aluminum windows at CR Anderson. Many of these windows are a curtain wall system and are not just punched openings. As such there is addition work that will be required to replace these windows. All of these windows should eventually be replaced. In fact, we had been working with the School District on a previous project to develop plans and cost estimate for the use of attaining Grants to help the district with money to replace these windows. We split them up into three. I believe this grant was submitted in early 2021.










Aluminum Double Pane: The addition of the multipurpose room and (6) classrooms on the north side of the building was constructed with Thermally Broken Double Pane windows. These are in good working condition and do not need to be replaced at this time.

Recommendations

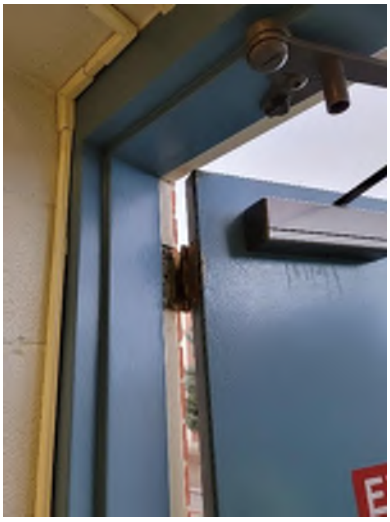
Aluminum Single Pane: Replace all the single pane windows with new thermally broken frames and double pane low-e glazing (Each phase as shown is approximately 1/3 of this total). **(High Cost, Medium Priority)**

Doors

Existing Conditions

Interior Doors: The interior doors are in good shape and currently do not require a large amount of maintenance. They are still within their useful life and are not currently in need of replacement. The exception to this is the three interior doors accessing the elevator vestibules are getting damaged frequently and need repaired.

Exterior Doors: There are seven exterior man doors that are rusting out at the door bases, The hardware is also well passed the useful life and constantly needing maintenance.



Recommendations

Interior Doors: Replace the three interior doors accessing the elevator vestibules are getting. (**Low Cost, High Priority)**

Exterior Doors: Replace the seven (7) man doors with new hollow metal insulated doors. Make sure the frames are fully grouted as they are heavily used by students and staff. **(Medium Cost, High Priority)**

Exterior Cladding

Existing Conditions

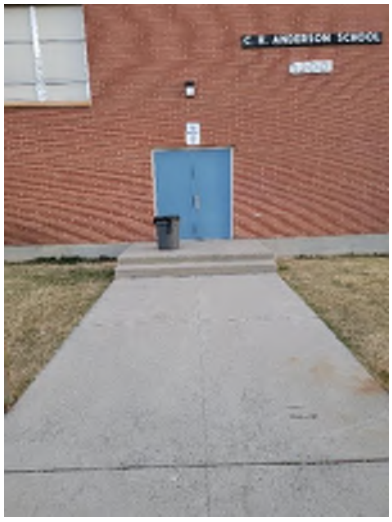
Masonry: Most of the exterior cladding on the CR Anderson School is a face brick masonry. While most of the brick is in good shape there are a few locations that need some maintenance. In addition, all the control joints need to be re-sealed.





Louvers: There are a few louvers north of the library that could use being replaced. This might be an aesthetic item and does not need to be a high priority.

Stair Railing: There are three locations around the exterior that need hand/guard railings added or renovated. There are two stairs that have over the 6" change in elevation, but do not currently have handrails. And one stair north of the multi-purpose room that easily has an 8 foot fall hazard and does not have acceptable guard railing. This location will also require some concrete patching to bring it up to code.



Entrance Roof/Fascia: On the southwest entrance there was a roof rebuilt over an exit stair that was not built using quality construction methods and has painted plywood as the exterior siding. This should be replaced with a better exterior cladding.

Fascia and Soffits: The fascia and soffits all look in good condition.

Outbuildings: There are two small modular outbuildings that set on the east side of the school. These appear to be past their useful life without some upgrades or replacement. This list includes installing new insulation, siding, windows, doors, skirting, exterior ADA ramps, and most likely mechanical would the recommended items needing to be updated.

Recommendations

Masonry: Fix all of the damage masonry and repoint all the control joints. **(Low Cost, High Priority)**

Louvers: Replace the damage louvers. **(Low Cost, Low Priority)**

Stair Railing: Add handrailing to the two steps. Add a guard railing and repair the concrete in the back at entry No. 6. **(Medium Cost, High Priority)**

West Entrance Roof/Fascia: Rebuild the fascia with a more durable material. **(Low Cost, Medium Priority)**

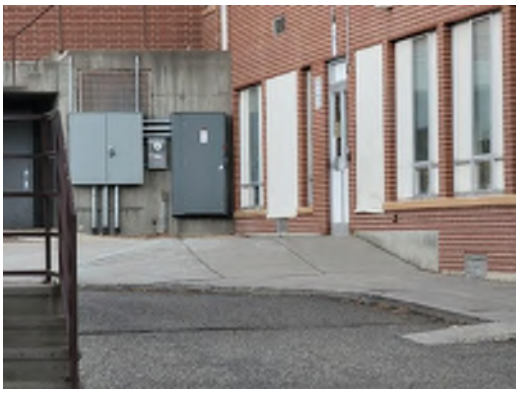
Outbuildings: Install new insulation, siding, windows, doors, skirting, exterior ADA ramps, and most likely mechanical. **(High Cost, Low Priority)**

Accessibility

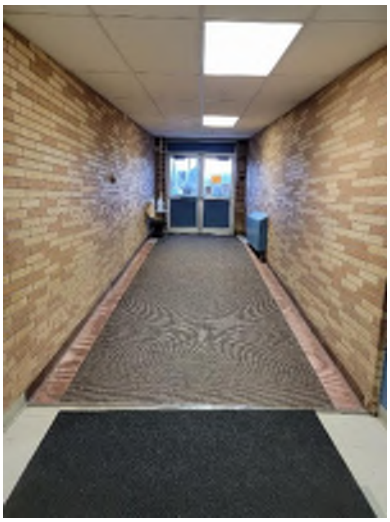
Existing Conditions

Restrooms: There are ADA facilities inside of the school that were renovated last year. While all the remaining restrooms could use some remodeling, no accessible requirements are specifically needed.

Parking and Accessible Route: The ADA parking at CR Anderson is in bad shape. There is some ADA parking on Knight Street that do not meet any code requirements. In addition, when the parking lot on Cleveland was replaced recently two ADA parking spots were installed and do me ADA. However, there is no accessible route into the building from these parking sports. There should be some modifications made to allow for better accessible parking and access.

Interior Accessible Route: There is currently a working elevator inside the building and all the other accessible ramps are close to compliance and no additional work would be recommended at this time.



Recommendations

Parking and Accessible Route: Rebuild ADA Access to the building, both on the front and from the new parking lot on the north. **(High Cost, High Priority)**

Roofing

Existing Conditions

The building roofing system in poor / good condition. There is a mix of thermoplastic single ply roofing materials and EPDM rubber.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof section C, E, F, G, H are over classroom and gym space. These roofs are built up roofing and single ply roofing materials– **(High Cost – High Priority)**

Reroof roof section I, J are small roofs over storage. Both roof sections have EPDM rubber roofing installed. – **(Low Cost – Medium Priority)**

Reroof roof section A is a large roof over classroom space. The roof section has EPDM rubber roofing installed. – **(High Cost – Low Priority)**

Helena Middle School

Overview

Address:

1025 North Rodney Street

Helena, MT 59601

Year Built:

1938

Building Area:

162,180 SF

Parking, Sidewalks and Site

Recommendations

Entry 28 and surrounding surfaces - Replace asphalt and Install onsite retainage and storm drain to code. Playground retaining walls and asphalt.

Parking Lot - Repair cracks, repair potholes and sealcoat entire area.

Auditorium Steps and entry - Replace steps, sidewalk and hand rails.

HVAC

Existing Conditions

Heating System: The building heating system is one of two steam systems in the district. The boilers themselves were replaced in 2016 with new Weil McLain Model 1288 cast iron sectional boilers. As a portion of the remodel the boilers, boiler feed unit and steam-water heat exchanger condensate pump were replaced. The boiler room combustion air system was upgraded to meet current code, however, the system remained steam.

(2) areas in the building utilize hot water. The heating water is created via steam-water heat exchangers. This water is distributed to various air handlers in the building. The circulation pumps for these systems are original from the initial installation.

Plumbing: The building domestic water is provided via a single city water supply that has been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building.

The building sanitary sewer system is cast iron. The exposed piping is starting to show indication of age and wear. No issues were reported currently but review of the system indicates that several sections of the system have been replaced due to age and fatigue.

The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut off to allow service.

Domestic hot water for the building is generated with single high efficiency AO Smith water heater located in the equipment room. The domestic hot water system is not equipped with a tempering valve as required by code. The water heater is connected to a storage tank to expand system capacity. Both the tank and heater were replaced as a portion of the boiler upgrade project. The building (1) domestic recirculation loops contain individual circulation pumps. These pumps are original to the building

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

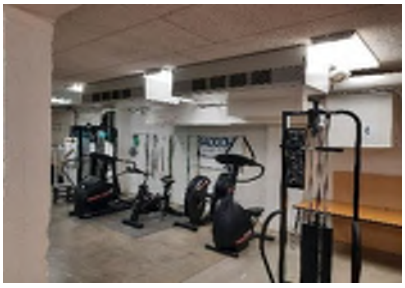
Locker room shower drains do not meet current code. Via current code, drainage from one shower cannot drain through another occupied space.

Ventilation: The building classroom spaces are served with individual classroom unit ventilators. These unit ventilators are steam. There are issues with the operation of the unit fans, steam valves and associated traps. With the different unit issues, space occupants seem to operate the units manually to maintain the individual space temperature to the occupant satisfaction.

The district data hub previously was located on the building third floor. This space was equipped with a dedicated computer room cooling unit. This unit was supplemented with a ductless split system. This equipment was abandoned in place when the IT hub was relocated.

The Vo-Ag teaching area wood shop exhaust system is outdated for the current wood working equipment layout.

The gymnasium space is equipped with (2) air handling units suspended within the space. The units are original to the building and due to noise are operated sporadically to provide space heat.



Lower-level fitness spaces are equipped with new ceiling mounted unit ventilators. These units were found in good working order

District print shop space is served by a dedicated air handling unit suspended within the print shop space. The unit is equipped with economizer cooling. To augment the economizer cooling, ceiling mounted ductless dx cooling has been added to the space.

The auditorium air handler is located adjacent to the Print Shop in an equipment cubby. The unit is original to the building and in poor condition.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

Recommendations

Heating: Convert the building heating system from steam to hot water. Remove all associated steam piping within the building and replace with a new hydronic distribution system. The existing boilers are capable of being converted to hot water, but they are of a lower efficiency design. Consideration should be given to replacing them to the district boiler style and manufacturer. The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator) and removal of the abandoned equipment to create maintenance or additional building storage space.

Ventilation: Replace classroom unit ventilators with new equipment to insure proper space ventilation. The new units should be hot water. Consideration should be given to upsizing the units and piping to allow distribution of chilled water during cooling season to condition the spaces in warmer weather to improve the teaching environment.

All air handling equipment within the building should be replaced. Existing ductwork replaced or at minimum cleaned due to age.

Replace the gymnasium air handling units with new equipment.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Replace all roof mounted fans.

Controls

Existing Conditions

The boiler room equipment is controlled by a manufacturer boiler staging panel versus utilizing DDC controls. Classroom equipment utilizes pneumatic controls.

Recommendations

The boiler room and classroom space should be equipped with DDC controls to improve system efficiency and improve space temperature control.

Fire Suppression

Existing Conditions

The building is NOT equipped with a fire suppression system.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: Since As-Built Electrical drawings could not be found, the discussion that follows is based on casual field observations and photos. The building service is derived from a 12.47 kV overhead primary distribution line, dropping to underground at a riser pole located to the northeast of the building, adjacent to Idaho Avenue (Figure 1). The primary line crosses under a parking lot and terminates in a primary junction can near the building wall, and then continues to a (estimated) 500 kVA pad mounted transformer on an elevated concrete pad near Entry 16 (Figure 2). The secondary service characteristics are 277/480 volts, three phase, four wire with a nominal 1600 amp rating, based on the size of the main disconnect switch inside the building. The secondary conductors exit the transformer underground then rise on the exterior wall of the building into the meter enclosure (Figure 3). The meter is adjacent. The primary junction can and an abandoned metering enclosure are located to the south.

Figure 1 – Primary Electrical Service

The highest recorded demand over the last two years from Northwestern Energy was 130.6 KW in November 2019. The demand averages 110 to 120 KW during the heating months. Based on this reading, the calculated demand is about 246 amps, after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. It is not known why the service is sized so much larger than the demand; As-Built drawings were not available.

Figure 2 – Pad Mounted Transformer

Figure 3 – Metering Enclosures, Meter and Primary Junction Can (far left)

<u>Distribution:</u> The electrical distribution system in the building is very robust and apparently over-sized. Most of the equipment appears to have been installed in 1993. The Main Switchboard (MSWB) is located in the lower-level Mechanical Room. MSWB consists of four sections (Figures 4). The nameplate rating of the switchboard is 277/490 volts, 3-phase, 4-wire, 1600 amps. It is a Square D QED style board. Section 1 contains incoming lugs for the service conductors, customer metering and a 1600A-3P bolted pressure switch with ground fault protection (Figure 5). Sections 2, 3 and 4 are distribution sections and contain fusible switches for step down transformers and 480 volt panelboards. Section 2 contains (2) 100 amp switches for Panels BH and CH, a 200 amp provision, a 200 amp spare, a 400 amp switch for transformer A and a 600

Figure 5 – MSWB Section 1 Service Disconnect (Bolted Pressure Switch)

amp switch for “open delta” transformers and Switchboard MSB2. Section 3 contains a 100 amp spare switch, a 100 amp switch for Panel DH, (2) 200 amp provisions, a 200 amp switch for Panel AH, a 200 amp switch for the Auditorium and a 400 amp switch for transformer B. Section 4 contains (2) 100 amp spare switches, (3) 200 amp provisions, a 200 amp spare switch and a 400 amp switch for Panel AH1.

MSWB appears to be in good condition, although the bolted pressure switch (service disconnect) is a concern. A similar style switch failed in June, 2021 at Capital High School. Without regular *certified* maintenance, these switches can be prone to failure to close after being opened resulting in an extended power outage until a work around is found. Sometimes the contacts leave a gap which can cause an arc, a short circuit and possibly fire.

Transformer A is located near MSWB. It is a 480-120/208 volt, 3-phase, 300 KVA dry type transformer (Figure 6). It serves adjacent Distribution Board MDBL (Figure 7). Current Codes require a transformer of this size to be installed in a one-hour fire rated room. It is not clear if the entire Mechanical Room meets the requirements.

MDBL is a Square D I-Line style panelboard with a 1000 amp main breaker, It contains a 100 amp breaker for Panel Q, (7) 150 amp breakers for Panels CL, CL1, CL2, DL, DL1 and DL2, and a 200 amp breaker for Kitchen Panel B, and spaces for several additional 3-pole circuit breakers.

Figure 7 – Transformer A

Figure 8 – MDBL

Dry type Transformers MSA and MSB are also located in the Mechanical Room, near Transformer A (Figure 9). MSA is 480-120/240 volt, 1-phase, 167 KVA and MSB is 480-120/240, 1-phase 50 KVA. They are connected in a 120/240 volt, 3-phase Delta configuration, with the secondary serving nearby Switchboard MSB2 (Figures 10, 11, 12). MSB2 is a 3-section, Square D QMB fusible switchboard with the incoming section in the center of the line-up. The incoming section of MSB2 contains a 1000 amp, bolted pressure switch (Figure 10). Obviously, MSB2 was once the Main Switchboard for the entire building and was probably fed from the abandoned metering cabinet in Figure 2. Apparently in the early 1990's, the original 120/240 volt, 3-phase delta service was removed and replaced with a new 277/480 volt 3-phase service.

Figure 9 – Transformers MSA & MSB

Figure 10 – MSB2
Bolted Pressure Switch

Figure 11 – MSB2
(Section 1 of 3)

Figure 12 – MSB2
(Section 3 of 3)

Because the original distribution system was 120/240 volt, with several single phase panelboards, it may have been more cost effective to maintain the older equipment, hence the reason that there are three different voltage systems in the building; 120/208 volt, 3—phase wye, 120/240 volt, 3-phase delta and 277/480 volt, 3-phase wye. This type of arrangement with so many different voltages is not often seen, except in industrial facilities, and could lead to problems if labeling and proper conductor color coding is not followed. Sections 1 and 3 (Figures 11 & 12) of MSB2 contain fusible switches for the original panelboards and motor loads in the building.

Distribution panel AH1, Dry type Transformer B and Panel MDBL1 are located in the Electrical room on the main level. Both panels are Square D I-line style. AH1 (Figure 13) contains (2) 20A-

1P breakers for emergency lights, a 60A-3P for a battery charger, (2) 100-amp breakers for Panels EH and FH, and a 200-amp breaker for Panel GH. Transformer B (Figure 14) is adjacent, and its feeder is tapped, from AH1. The characteristics are 480-120/208 volts, 3-phase, 225 KVA. It's not clear if the Electrical room that transformer B is located in has a 1-hour fire rating. Panel MDBL1 is fed from Transformer B. MDBL1 (Figure 15) has an 800-amp main breaker, (2) 225-amp breakers for Panels AA and AB, (2) 200 amp breakers for Panels EL, FL. There is also a 100-amp breaker and a 225-amp breaker that are in the "on" position and are connected to loads but not labeled and there is no panel directory. There are several spaces for additional circuit breakers in both AH1 and MDBL1.

Figure 13 – Panel AH1

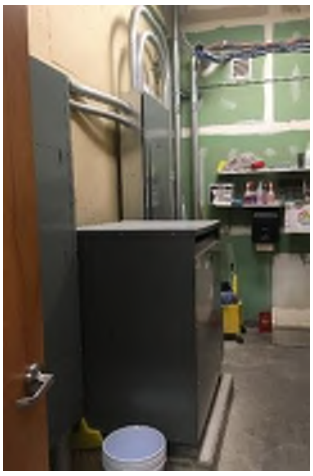


Figure 14 – Transformer B

Fig

Figure 18 – Auditorium Load Centers

There is a 480-120/208 volt, 3-phase, 150 KVA dry-type transformer, located in the lower level that is labeled "Auditorium" (Figure 16). This transformer feeds a 600-amp Square D I-Line style distribution panel on the Auditorium stage (Figure 17). This Distribution Panel provides power for adjacent load centers (Figure 18), disconnects, lighting and floor boxes associated with the stage.

Figure 16 – Auditorium Transformer

F

Figure 20 – Un-labeled Distribution Panel

Figure 21 – Panels 3A & 3B

In the lower level towards the southwest end of the building, there are two dry type transformers. Transformer C is 480-120/208 volt, 3-phase, 75 KVA. There is a 50 KVA transformer adjacent that is not labeled. The voltage is 480-120/240 volt, 1-phase (Figure 19). The unlabeled 50 KVA transformer feeds a distribution panel on the main level above (Figure 20). The cabinet was locked, and a key was not available at the time of the visit. The distribution panel appears to be original to the building and apparently feeds all of the old single phase 120/240-volt panelboards at the southwest end of the building. Transformer C appears to feed Panels 3A and 3B that are located on the 3rd floor in the School District's former main server room (Figure 21).

Figure 19 – Transformer C & Un-labeled Transformer

Most of the branch panelboards in the building are in good condition. But there are a few that are original vintage with obsolete breakers (Figure 22).

Figure 22 – Obsolete Panel

Figure 23 – Power Cord Run Over Work Counter Sink

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Many of the classrooms have four to eight receptacles but there are not enough in locations where they are needed, i.e., near the teacher's desk, PC workstations or over work counters (Figure 23).

Lighting: A few new LED downlight fixtures were installed in the Entries in the recent Safety-Security Upgrades, but the rest of the lighting in the school consist mainly of four foot long fluorescent lamped, surface wraparound acrylic lens or recessed 2x4 parabolic troffers (Figures 24 & 25). The building has been equipped with occupancy sensors.
The Gymnasium lighting consists of suspended 4 foot T-5 fluorescent fixtures with wire guards (Figure 14). Most of the exit signs in the building are steel housings with stencil faces that have been converted to LED. Emergency egress lighting units are located on corridor and egress pathway walls throughout the facility.

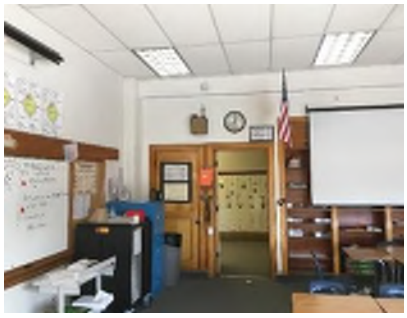


Figure 24 – Classroom Lighting

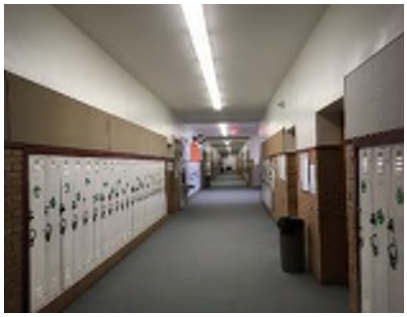


Figure 25 – Corridor Lighting

Recommendations

Electrical Service: The existing electrical service and main switchboard are in excellent condition and should be capable of continued service for many years to come. The only caution would be that it is very important that the Main Service Disconnect, the bolted pressure switch, be inspected and serviced periodically in accordance with the manufacturer's recommendations.

Electrical Distribution: The existing 120/240 volt, 3-phase open delta switchboard should be removed and replaced with a new 120/208 volt, 3-phase switchboard. This will require replacing the existing single-phase panelboards in the school with 3-phase. Most of the existing 240 volt equipment in the building should be able to operate at 208 volts, and if not, it may need to be replaced anyway, due to age, or buck-boost transformers can be provided if it cannot be replaced.

Branch Circuiting: Any of the original wiring must be replaced with new. Additional receptacles and circuits are needed in the classrooms. There may be adequate spare capacity in some of the existing panelboards to accommodate the new circuits but replacing the existing single-phase panelboards with new three-phase will certainly provide the necessary capacity. Circuiting will be increased to a minimum of two dedicated circuits per classroom. Wiring can be run above lay-in ceilings in most rooms, then concealed inside the wall cavities or surface mounted in Wiremold or conduit.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls in classrooms, corridors, gymnasium, cafeteria and other areas is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The surface wraparound fixtures will be replaced with similar style fixtures with onboard LED's. The 2x4 parabolic troffers will be replaced with new LED flat panel fixtures. The existing exit signs may be reusable, but it may be more advantageous to replace them with combination exit signs with emergency egress heads. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The IT System for the building was recently upgraded as part of the Safety-Security Upgrades. A new data room was constructed in the lower-level crawlspace just west of the Print Shop Storage Room. The Main Data Rack is two sections and there is a 4 KVA UPS for 2 hours of backup.

Most classrooms and workrooms are provided with two or more data outlets, and another was added to the ceiling for the integrated A/V controller in the Safety-Security Upgrade. The school is also equipped with exterior PA speakers, clock/program/message boards and wireless access points. There are no known issues either with quantities or deficiencies.

Surveillance cameras were provided in the Safety-Security Upgrades at the exterior entry doors and main lobby. The cameras are powered over the ethernet wiring from the data switches in the main IT rack. UPS backup power has been recently added to provide continuous power for up to a 2-hour power outage.

Recommendations

None.

Fire Alarm

Existing Conditions

The Fire Alarm System, as classified in the International Fire Code, is a manual detection system. There are there are some smoke and heat detectors in storage rooms and the elevator shaft. The Control Unit(s) is located on the north wall of a storage room in the Reception Office. It is a Simplex Model 4002 (Figure 26). There is a remote annunciator in the Entry area. There are manual pull stations at exit pathways, horns in the corridors, common areas, the Gyms, Cafeteria and Classrooms. There are a few smoke detectors in the corridors for release of magnetic door holders, certain air handlers and storage rooms.

Figure 26 – Fire Alarm Control Unit

Recommendations

The fire alarm system appears to be barely functional. The staff reports that fire alarms cannot be heard at the far ends of the building. Replacement with a new addressable voice evacuation system with speakers and strobes throughout should be given high priority.

Public Address Systems

Existing Conditions

The PA system is now part of the new IP-based clock/program and messaging system that was installed in the recent Safety-Security Upgrade**.** The staff reports that there are no known serious issues with the system.

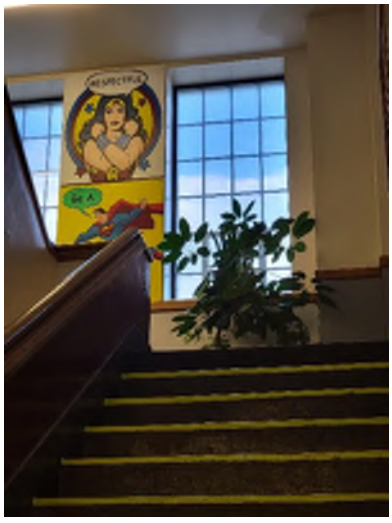
Recommendations

None

Windows

Existing Conditions

Old Single Pane Windows: There are only a handful of older single pane windows at Helena Middle School (HMS). These windows are all in circulation areas or in the gymnasium. It would be recommended to update these windows.



Double Pane Windows: The rest of the buildings windows were upgraded with new Double Pane Aluminum framed systems. This are all in good shape and do not need updates currently.

Recommendations

Old Single Pane Windows: Replace the single pane windows with thermally broken aluminum framed double pane low-e glazed windows. **(High Cost, Medium Priority)**

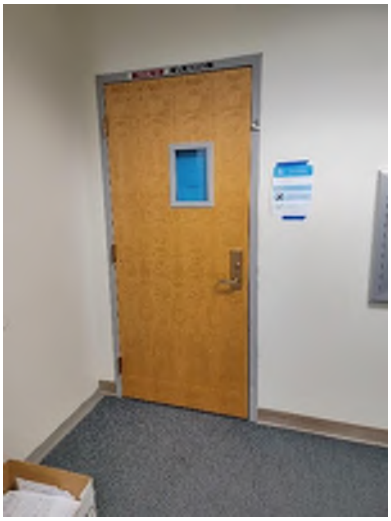
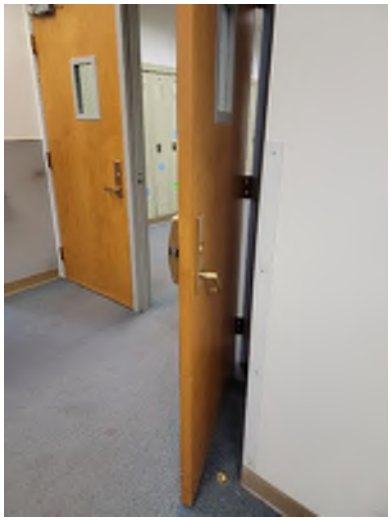
Doors

Existing Conditions

Old Interior Doors: While most of the doors are original to the school and really great, they also all have knobs instead of lever handles. This is a life safety and even accessible item that should be addressed. It would be recommended to have updated lever handle installed.



New Interior Doors: The newer doors that have been build both on the north west addition and any renovation work to have been completed are in good condition and do not need modifications.


Exterior doors: While some of the exterior doors have been upgraded overtime there are still 24 exterior doors that are in constant need of maintenance and should be replaced. This includes two overhead sectional doors in the basement.

Recommendations

Old Interior Doors: Add new interior door lever set to the older interior doors. **(High Cost, Medium Priority)**

Exterior doors: Replace the 24 older exterior doors with either aluminum insulated doors or hollow metal insulated doors. **(High Cost, Medium Priority)**

Exterior Cladding

Existing Conditions

Painted Concrete: The majority of the school is a painted concrete system. It is still functioning well but needs a new paint coating. While this isn't high priority and mostly aesthetical, it should be a part of the maintenance.

Stair Railing: There is one exterior stair close to the stadium that does not have acceptable guard railing. This needs to be address as it is a fall hazard for the public during events.

Northeast EIFS Addition: The Northeast Addition is an EIFS system and has become a nesting ground for birds. This needs to be maintained constantly to reduce the intrusion of water. It is recommended to replace this exterior system.

Recommendations

Painted Concrete: Paint the entire exterior concrete finish. **(Medium Cost, Low Priority)**

Stair Railing: Rebuild the railing to verify 42" height and a sphere not more than 4" can pass thru the sides. **(Low Cost, High Priority)**

Northeast EIFS Addition: Replace all EIFS with a more durable finish system. Because of the architectural style we would recommend a fiber cement panel system be used. Keep patching holes until the EIFS can be replaced. **(High Cost, Medium Priority)**

Accessibility

Existing Conditions

The accessibility at Helena Middle School is in relatively good shape.

Recommendations

Currently no recommendations.

Roofing

Existing Conditions

The building roofing system in fair / good condition. There is a mix of thermoplastic single ply roofing materials.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof section B, C, K, N, O, P, Q, R, S, T are over classroom and gym space. These roofs are Single ply roofing materials– **(High Cost – High Priority)**

Reroof roof section D is a small roof adjacent to the gym. The roof section is a single ply roofing system. – **(Low Cost – Low Priority)**

High Schools

Capital High School

Helena High School

PAL

Capital High School

Overview

Address:

1300 Billings Avenue

Helena, MT 59601

Year Built:

1965

Building Area:

243,400 SF

Parking, Sidewalks and Site

Recommendations

Student Parking Lot including Staff parking lot - Replace Parking Lot and Install onsite retainage and storm drain to code.

Parking Lot in front and east of school - Repair cracks, repair potholes and sealcoat entire area.

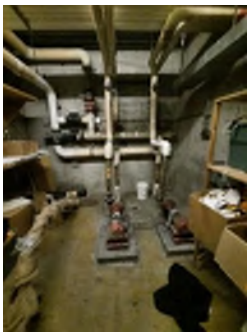
Paving and parking between School and Vo Tech building - Replace Parking Lot and Install onsite retainage and storm drain to code.

HVAC

Existing Conditions – Main Building

Heating System: The building heating system is hot water, utilizing (2) Kewanee Model KGP 85 FG w/Power Flame Burners Model C5-G-30. Boilers rated for 8,370 MBH. These boilers are original to the building. These units are estimated to have an operational efficiency of 50-55%. The boiler plant has had sufficient capacity to expand with the building. The boilers originally generated domestic hot water for the building via a ceiling mounted storage tank with integral hot water coil. This tank and coil have been abandoned in place.

In the old Catholic Central portion of the building, an obsolete American Standard cast iron sectional boiler still operates. The boiler serves a small portion of the original building.



The primary heating distribution pumps are located within the building boiler room. However, as the building has expanded several additional pumping systems have been added to the building system. These systems are in various storage and equipment spaces in the building. All the pumping systems are original to their installation date.

Plumbing: The building domestic water is provided via a single city water supply that has not been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building.

The building sanitary sewer system is cast iron. The exposed piping is starting to show indication of age and wear. No issues were reported currently, but review of the system indicates that several sections of the system have been replaced due to age and fatigue.

The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut off to allow service.

Domestic hot water for the building is generated with two Bradford White water heaters located in the equipment room. The domestic hot water system is not equipped with a tempering valve as required by code. The water heater is connected to a storage tank to expand system capacity. Both the tank and heater were replaced as a portion of the boiler upgrade project. The building domestic recirculation loops contain individual circulation pumps. These pumps are original to the building.

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: The building has a variety of ventilation systems; floor mounted unit ventilators in classrooms, variable air volume systems in the new science classroom expansion, multi-zone air handlers in the lower interior spaces, ceiling mounted units in the gymnasium space, horizontal unit ventilators mounted vertically in the music room spaces, standard commercial rooftop equipment, gas fired make-up air units for shop spaces, and roof mounted air handlers.







The building exhaust system is a combination of in-line utility set fans in building equipment rooms, roof mounted mushroom fans, and roof mounted utility set units. The fans were reported to have sever operational issues. Several units have been abandoned in place.


The classroom unit ventilators are operated manually by the space occupant to maintain space comfort to prevent overheating and reduce classroom background noise.

The gymnasium space is equipped with (4) air handling units suspended within the space. The units are original to the building and due to noise are operated sporadically to provide space heat.

Lower-level fitness spaces are equipped with new ceiling mounted unit ventilators. These units were found in good working order.

The auditorium air handler is located in an attic space. The unit is original to the building and in poor condition.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

Existing Conditions – Vo-Ag

Heating System: The building heating system is a hot water system located in a single boiler room. The boiler room is equipped with (3) Weil McLain Model LGB-7 boilers 780 MBH cast iron sectional boilers.

The pumps are original to the building and need replacement.

Plumbing: The building domestic water is provided via a single city water supply that has not been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building. Several semi-circular wash fountains remain in the building and their operational status is marginal at best.

The building sanitary sewer system is concealed with no issues reported.

The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut off to allow service.

Domestic hot water for the building is generated with two separate gas fired water heaters. The domestic hot water system is not equipped with a tempering valve as required by code. The building domestic recirculation loops contain individual circulation pumps. These pumps are original to the building

The floor drain system in the shop area are evaporative style meaning they are not connected to the city sanitary sewer system.

Ventilation: The building ventilation system in the original building is (2) air handling units each connected to two shop spaces. The air handlers are Tjerlund gas fired units that have been converted to hot water when the gas heating sections failed. Each shop temperature control is derived via a duct mounted reheat coil. In the addition the shop has a dedicated ventilation unit with unit heaters and the classroom spaces are equipped with unit ventilators and ceiling mounted fan coils.

The shop exhaust systems are in-line utility set fans. The fans are original to the building.

The equipment in the welding and wood shop spaces no longer matches the space exhaust system. One wood shop utilizes suspended electro-static filtration units versus dedicated exhaust connected to the equipment.

The wood shop dust collector is original to the building.

Air Conditioning: No portion of the building is equipped with mechanical cooling.

Recommendations

Heating: Replace the boiler equipment with a modular high efficiency boiler system. The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator) and remove the abandoned equipment to create maintenance or additional building storage space.

Ventilation: Replace classroom unit ventilators with new equipment to insure proper space ventilation. The new units should be hot water. Consideration should be given to upsizing the units and piping to allow distribution of chilled water during cooling season to condition the spaces in warmer weather to improve the teaching environment.

All air handling equipment within the building should be replaced. Existing ductwork replaced or at minimum cleaned due to age.

Replace the gymnasium air handling units with new equipment.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Replace all roof mounted fans.

Recommendations – Vo-Ag Building

Heating: Replace the building cast iron sectional boilers with high efficiency condensing units. The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator).

Ventilation: Replace shop air handlers with new equipment sized to provide required space make-up air. The new system should modulate to meet space occupancy and function.

Replace classroom unit ventilators and fan coils with a central air handler equipped with economizer and/or mechanical cooling.

Building welding shops should be replaced to meet current equipment needs and layout.

Replace dust collector and extend dust collection ductwork to fixed dust generating equipment. If electrostatic dust collectors are desired install units in addition to the fixed equipment exhaust system not in place of.

Create a varnish or finishing exhaust area in the wood shop to remove VOCs from the space.

Plumbing: Review of the building domestic water distribution system and remove non-operable isolation valves and install new valves for service.

Controls

Existing Conditions

The science room expansion equipment is controlled by an older Johnson Controls DDC system. The system is obsolete and in need of replacement. Located in the boiler room is a 1980 vintage Honeywell Control Panel. The panel was best available when installed but has not been supported since the early 1990's.

The air handling equipment installed as a portion of the Science Classroom expansion project are equipped with variable frequency drives. These drives are obsolete and are no longer supported. Due to the condition most equipment is operated at constant speed rather than modulating as intended to ensure equipment remains operational.

Classroom equipment and most building air handlers utilize pneumatic controls.

Recommendations

The boiler room and classroom space should be equipped with DDC controls to improve system efficiency and improve space temperature control.

Fire Suppression

Existing Conditions

The building lower level is equipped with a fire suppression system.

Recommendations

The fire suppression system should be expanded to serve the entire building.

Electrical

Existing Conditions

Electrical Service:

The main building and Vo-Tech services are derived from a 12.47 kV underground primary distribution line west of the property adjacent to Hope of Peace Cemetery. From a primary junction can at the southeast corner of the cemetery property, one underground feeder runs toward the west side of the High School (Figure 1) and the other towards the Vo-Tech (Figure 2). The primary lines are new. Each of the primary cables terminates at a new pad mounted transformer. The secondary characteristics are 277/480 volt, 3-phase, grounded wye. New main disconnects switches, metering cabinets and meters were installed at both buildings.

Figure 1 – Underground Primary Electrical Service, New Pad Mounted Transformer, Metering and Main Disconnect

Both services were installed as an emergency repair after one of the cables was damaged. During the emergency, the main disconnect switches in both buildings had to be shut down until the cable fault was cleared. The disconnects are a bolted pressure type. When the fault was cleared and power could be restored, the switch in the Vo-Tech could not be reset. Fortunately, a work around was found and both buildings were re-energized. The new services were recently energized. The Vo-Tech service is considered to be a permanent upgrade, but the Main Building service was intended to be a temporary solution until more work is done to replace the switchboards inside. Records for the new meters are not yet available, but the highest recorded demand for the main building over the last two years from Northwestern Energy was 400 KW in January 2020. That reading included the Vo-Tech. The demand is very consistent during the heating season, averaging 390 KW. Based on this reading, the calculated demand is about 750 amps, after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. The new main disconnect is rated at 800 amps. Based on the calculated reading, the service is at approximately 90% of a maximum capacity, but once the new demand readings are observed, the demand should drop down towards 300 KW, and probably around 70%.

Figure 2–New Pad Mounted Transformer, Metering and Main Disconnect at Vo-Tech

The existing underground service feeders for the main switchboard had to be reused so that the building could remain in use. When the new main disconnect was installed outdoors, the feeders were merely intercepted and reconnected. This was intended only as a temporary solution.

Figure 3 – 600 Amp Original Main Switch Board with Service Disconnect #1.

Distribution – Main Building:

A 600-amp switchboard (Figure 3) was installed originally in 1964 in an electrical room in the lower level. In 1973, a new 1200-amp switchboard was installed, directly across from the original. A tap was made in the 1200-amp switchboard to maintain the original.

The 1200-amp main switchboard is 3-sections (Figure 4). The first section contains the incoming lugs and a 1200-amp bolted pressure switch, identified as "Main Disconnect #2". Section 2 of the switchboard houses a 600-amp fusible switch for Sub-Distribution Panel E, a 200-amp fusible switch for Panel DHA, four 60-amp switches for Transformers ALC, BLE, Panels AHD and a 1-phase kiln, and two 30-amp switches, one of which is for a 3-phase kiln. There are no available provisions for additional switches in Section 2.

Section 3 of the 1200-amp switchboard is new. It was apparently added some time in the 1990's. It feeds a transformer for a distribution board and two panelboards in the Tech Area. Recently a UPS was installed and connected to a 60-amp spare switch, and a new rooftop AC unit was connected to a spare 100-amp switch. There are several provisions for additional switches.

The original 600-amp switchboard is 2-sections. The first section contains the incoming lugs and a 600-amp bolted pressure switch, identified as "Main Disconnect #1".

Section 2 of the 600-amp switchboard contains four 200-amp fusible switches for Transformers B and C, Panels DHG and DH2. There are four 100-amp switches for Panels AHA, BHA, CHA and a Motor Control Center in the Lower Level Mechanical Room

Figure 4 – 1200 Amp Main Switch Board with Service Disconnect #2

During the 1973 addition, two 277/480 volt, 3-phase, sub-distribution boards were added along with the 1200-amp main switchboard. They are Sub-Distribution Panel E at 500 amps and Panel DHA at 200 amps. Sub-Distribution Panel E is located towards the northeast portion of the building on the 2nd floor adjacent to the Gymnasium. It serves Panels FHG and FH2, two 30 KVA dry type transformers, one for Sub-Distribution Panel E; one for Panel FLG and a 45 KVA dry type transformer for Panel FL1. Panel DHA (Figure 5) is located in a storage room in the north 1997 addition, Area A. It serves four dry type transformers and panels; DLB, DLC, DLD and DLE.

Figure 5 – Panels DHA, DLA and Recessed Dry Type Transformer

There are several small distribution panels and dry type transformers that are still in service from the original 1964 construction (Figures 6, 7 and 8). Most are obsolete but are still serviceable with parts obtained from re-sellers. Unfortunately, much of the original equipment is located in small rooms, i.e. Janitor Closets, that have very restricted clearances that are not safe or in compliance with the NEC. The transformer installation in Figure 7 is a typical situation.

Figure 6 – Panels BHA, Sub-Distribution, BLA and Dry Type Transformer

Figure 7 – Panel CHA and Type Transformer in Closet. Working Clearances are Non-Compliant

Figure 8 – Panels BHB and BLB in Closet. Working Clearances are Non-Compliant

There is a 4-section motor control center located in the Boiler Room (Figure 9). It contains 24 combination switch and motor starters for building exhaust fans. It is part of the original building electrical equipment. The control center is obsolete, but again is serviceable with parts obtained from re-sellers.

Figure 9 – Boiler Room Motor Control Center

Figure 10 – Tech Center Distribution Board and Transformer

A dry type transformer and a 120/208 Volt distribution board were installed, probably in the 1990's, in the Tech Area of the high school (Figure 10). This distribution board has a lot of spare capacity. It feeds panels A & B adjacent. Both have an ample amount of spare circuit breakers.
The 1981 West Classroom Addition to the High School resulted in the installation of four new branch panelboards. Two of these are AHD and ALG, that are located in the first-floor corridor (Figure 11). Another is located in an office behind a door. While these locations are not a direct Code violation, per se, they are certainly not desirable for troubleshooting or maintenance.

Figure 11 – Panels AHD & ALG Installed in the 1981 West Classroom Addition

Figure 12 – Vo-Tech Main Switchboard. New Service Conductors Awaiting Final Connection

Distribution - Vo-Tech: The Main Switchboard in the Vo-Tech Building is 5-sections (Figure 12). Sections 1 through 4 are 277/480 volt, 3-phase, Section 5 is 120/208 volt, 3-phase. As previously mentioned, the bolted pressure, main disconnect switch failed and had to be bypassed. The fusible switches in the board are obsolete, but there are OEM switches that can be adapted for use if needed.

Section 3 of the switchboard contains six 30-amp fusible switches, four magnetic starters and two 400-amp fusible switches. Two of the 30-amp switches are for Air Handler Supply Fans 1 and 2. Four of the 30-amp switches and magnetic starters are for exhaust fans. The two 400-amp switches are dry-type transformers. There is a 480-120/208 volt, 225 KVA transformer outside the building that provides power for Section 5, and another 112-1/2 KVA tranformer adjacent to Section 1 that feeds a plug-in bus duct system for welders.

Figure 13 – Plug-in Bus Duct System

Section 4 contains six fusible switches and two magnetic starters. Two of the switches are 60-amp, serving a compressor and a Tig welder; two are 30 amp for a unit heater and an exhaust fan that utilizes one starter; two appear to be spare 100-amp switches.

Section 5 contains fourteen fusible switches. Two of the switches are 30-amp spares. The remaining switches are 100 amp, 2 and 3 poles. They serve six plug-in bus ducts (Figure 13) in the shop areas, Panels A through D and M, a lathe and one spare.

Most of the branch panelboards in the Vo-Tech Building are at capacity, with few spaces or spare breakers (Figure 14). One panelboard (M) was added in the 2000's for receptacles in the welding booths.

Figure 14 – Panel C

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Many of the classrooms have four to eight receptacles but there are not enough in locations where they are needed, i.e., near the teacher's desk, PC workstations or over work counters. Receptacles in the shop areas appear to be adequate, but there may be locations that should be provided with GFCI type that are not.

Lighting: Most of the lighting in the post 1980 portions of the main building consists of two and four-lamp, T8, 2x4 fluorescent troffers (Figure 15). In the original school and the early additions, much of the lighting is a surface wraparound type with acrylic lenses (Figure 13) or recessed 1x4 troffers. The building has been equipped with occupancy sensors. The Administration Area was recently remodeled and upgraded LED troffers with dimming.

The Gymnasium lighting consists of suspended 4-foot T-5 fluorescent fixtures with wire guards (Figure 17). Most of the exit signs in the building are steel housings with stencil faces that have been converted to LED. Emergency egress lighting units are located on corridor and egress pathway walls throughout the facility.

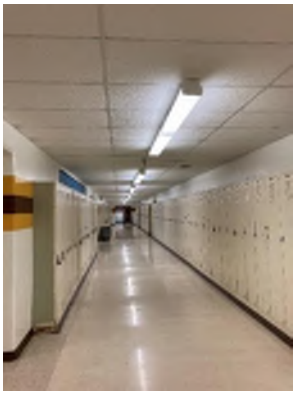


Figure 16 – Corridor Lighting

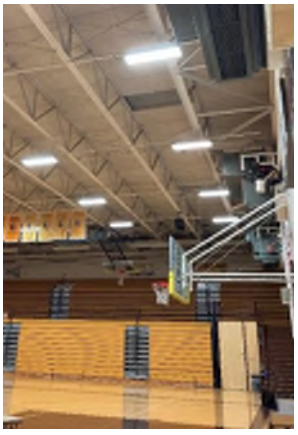


Figure 17 – Gymnasium Lighting

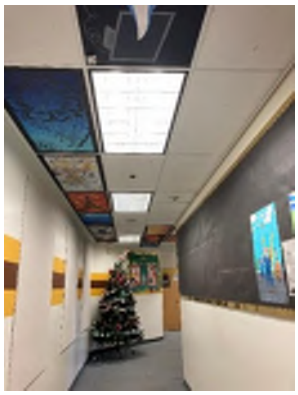


Figure 15 – 2x4 Troffers in Post 1980 Areas

The lighting in the Vo-Tech shop areas consists of four-foot-long, suspended T5 HO industrial fluorescent with wire guards and integral motion sensors (Figure 18)

Figure 18 – Vo-Tech Shop Lighting

Recommendations

Electrical Services: The electrical service at the Vo-Tech Building that was installed in 2021 is intended to be permanent. However the 800 amp service installed for the Main Building is only intended as a temporary solution until the main switchboards are replaced and new service conductors are run into the building. It may be an option to install a second main disconnect outside, if needed for a new Central Cooling Plant, but replacement of the existing switchboards and feeders is still needed.

Electrical Distribution – Main Building: The existing 277/480 volt, 3-phase 1200-amp and 600-amp (original) switchboards should be removed and replaced with a new switchboard. Section 3 of the 1200-amp switchboard could be reused but the rest should be replaced with new circuit breaker sections. This would also include replacement of all sub-distribution boards and branch panelboards in the original 1964-73 school areas. Safer, Code compliant locations must be found for the new panels. This may require modifications to the walls of existing Janitor rooms or closets to ensure adequate clearances. The new panelboards will be sized with at least 25% spare capacity and will accommodate the extra circuits required for additional classroom receptacles. This will also require new feeders and conduits.

Electrical Distribution – Vo-Tech: The existing 277/480 volt, 3-phase 800-amp rated switchboard should be adequate for continued service. There are only a few spare switches in the distribution sections of the board, but unless there are major additions to the shops, additional devices should not be necessary. However, it is recommended that the four original branch panelboards be replaced with larger capacity panelboards, i.e. 66 circuits. This will allow for any future equipment needs.

Branch Circuiting: All of the original wiring in the 1964-73 portions of main building should be replaced with new. Additional receptacles and circuits will be added to the classrooms, mainly in the original building areas. Circuiting will be increased to a minimum of two dedicated circuits per classroom. Wiring can be run above lay-in ceilings in most rooms, then concealed inside the wall cavities or surface mounted in Wiremold or conduit.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls in classrooms, corridors, gymnasiums, cafeteria, Vo-Tech and other areas is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The surface wraparound fixtures will be replaced with similar style fixtures with onboard LED's. The 2x4 fluorescent troffers could be replaced with new LED flat panel or direct/indirect fixtures. The existing exit signs may be reusable, but it may be more advantageous to replace them with combination exit signs with emergency egress heads. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The main rack is located in a storage room adjacent to the Administration Area. The IT System for the building was partially upgraded as part of a partial Safety-Security Upgrade and a 4 KVA (expandable to 8) UPS was installed to back up the cameras. As more cameras are added to the IT system, expansion of the UPS will be necessary in order to provide a minimum 2-hours of backup.

Safety and Security

Existing Conditions

A few new surveillance cameras were provided in the Safety-Security Upgrades at four exterior entry doors and main lobby. The cameras are powered over the ethernet wiring from the data switches in the main IT rack. Most of the remaining entries have cameras, but they are an older generation that the district has been replacing.

Electronic door access, monitoring and locks have been provided at the four entries, but none of the other doors are monitored. The door access control equipment is located in the Admin Area Storage Room with the Data Rack.

Recommendations

Extending the electronic access and monitoring to every entry in the facility is a high priority. New IP-based, power-over-ethernet cameras matching those used at the elementary and middle schools is recommended.

Fire Alarm

Existing Conditions

The Fire Alarm System in the main building is a Silent Knight Model 5820XL (Figure 19). The Control Unit(s) is located in the Electrical Room. It is fairly new; probably not more than 10 years in service. There are several smoke detectors in the building, mostly in the corridors and for release of magnetic door holders (Figure 21), elevator return and equipment protection. Several HVAC fans have integral mounted duct type smoke detectors and are wired for shutdown. There are manual pull stations at exit pathways, horn/strobes in virtually every occupied room.

The Fire Alarm System in the Vo-Tech building is a Silent Knight Model SK-5208 (Figure 20). It is also a newer Control Unit. There are several heat detectors placed in the shops (Figure 18 left of the lighting fixture) and lower ceiling areas, manual pull stations at each exit and horn/strobes in all occupied rooms.

Figure 19 – Fire Alarm Control Unit in Main Building

Figure 20 – Fire Alarm Control Unit in Vo-Tech Building

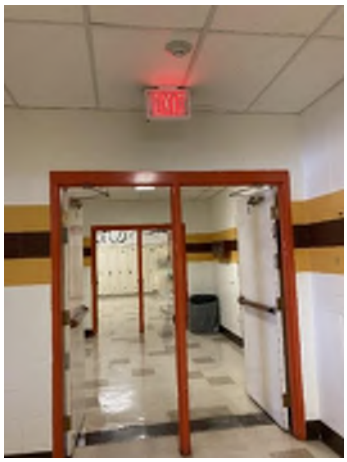


Figure 21 – Smoke Detector for Door Release

Recommendations

The International Fire Code requires a manual detection system with voice evacuation for this type of facility. It may be possible to add voice evacuation, but usually it is not cost effective. Upgrading to a new fire alarm system with voice evacuation, speakers and strobes in both buildings is recommended. The Vo-Tech building may require additional speaker/strobes because of the higher ambient noise levels.

Public Address Systems

Existing Conditions

It is not known if the PA system is functional. However, it is an older analog system with traditional speakers and amplifiers. It appears that the staff is using the phone system for most communications. The original clock system does not appear to be functional, as many battery powered clocks were seen in use. The program bell system was observed to be working.

Recommendations

A new IP-based Clock/Program/PA and Messaging system matching what was installed in the recent Safety-Security Upgrades in the elementary schools is recommended and should be considered a high priority. They system will improve communications and safety.

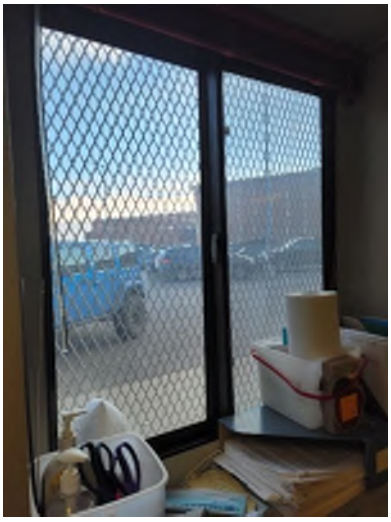
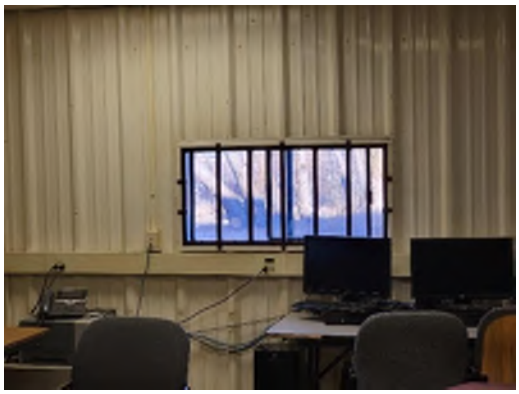
Windows

Existing Conditions

Aluminum Single Pane: The main building was constructed with non-thermally broken aluminum frame windows with single pane glazing. These windows should be replaced with a better window system.

Aluminum Double Pane: There were three classroom additions, and all these windows have newer thermally broken frames and double pane glazing. These windows are still in good working condition.


Shop Windows: The shop windows appear to be double paned but with the protective caging in front are hard to fully inspect. These windows should be replaced but are not a high priority.


Recommendations

Aluminum Single Pane: All the single pane non-thermally broken aluminum windows should be replaced with thermally broken frames and double pane low-e glazing. **(High Cost, Medium Priority)**

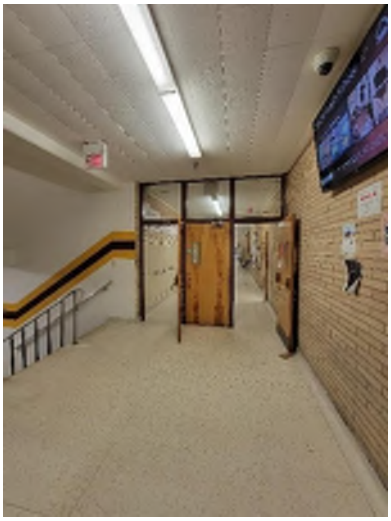
Shop Windows: Replace all shop windows with thermally broken frames and double pane low-e glazing. **(Low Cost, Low Priority)**

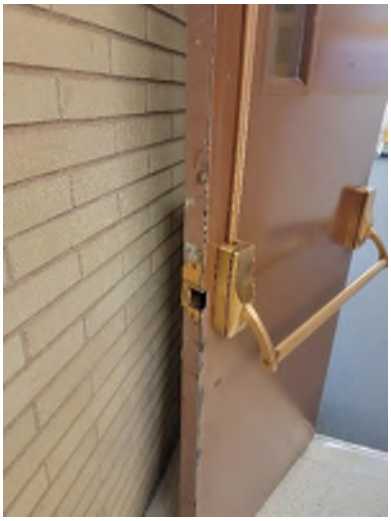
Doors

Existing Conditions

Interior Doors: Most of the interior doors are in good shape. However, on the north classroom stair tower there are fire doors on each of the three levels that have been beaten up, the hardware has broken or been removed. All five of the doors at each landing needs to be

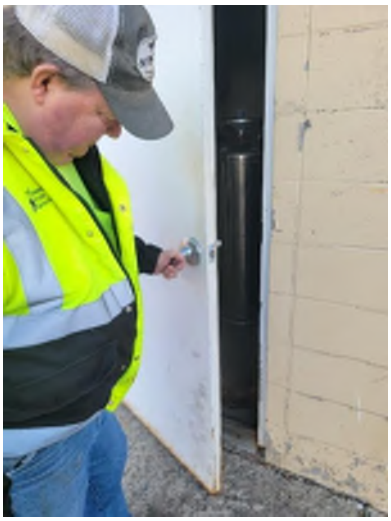
replaced but the triple door set is also interfering by swinging into the exit path of the stair. These doors need to be rebuilt and set further back to create a door niche.

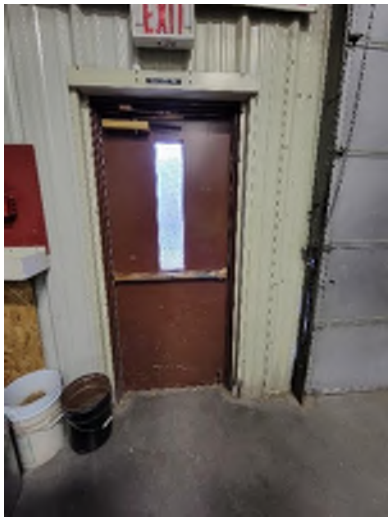


Exterior Doors: There are a few exterior doors that are heavily used and take a beating from the students. These doors are always getting maintained and should be looked having a Level 4 Maximum Duty doors and frames installed.

Shop Doors: All of the shop doors are well beyond their useful life this includes all the overhead doors, exterior man doors, and interior doors.



Recommendations

Interior Doors: Replace all the doors at the stair landing and install with mag holds. The triple doors need to be rebuilt further back to verify they don't encroach on the stair exit width. **(Medium Cost, High Priority)**

Exterior Doors: Replace all exterior main entrance doors with a maximum duty Level-4 door system. **(Medium Cost, High Priority)**

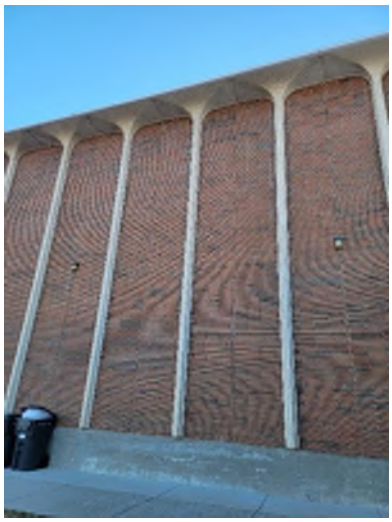
Shop Doors: Replace all shop doors including hollow metal insulated level 4 exterior doors, Insulated sectional overhead doors and hollow metal level 4 interior doors. **(High Cost, High Priority)**

Exterior Cladding

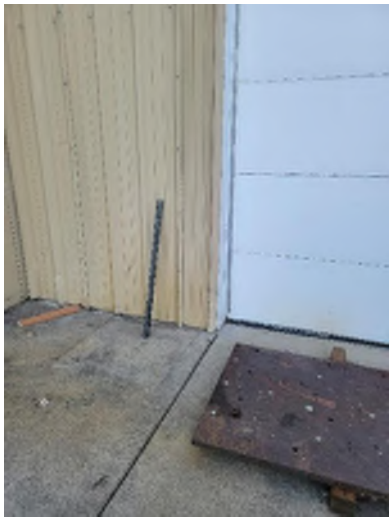
Existing Conditions

Main Building Cladding: The main buildings exterior finishes are all Brick and Precast Concrete. They are all in good shape and do not require maintenance currently.





Shop Building: The shop building is a metal building system. There has been a lot of damage to the metal panels around the overhead doors. This should renovated in the future.



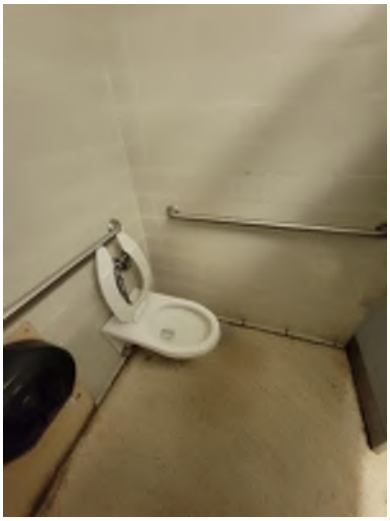

Recommendations

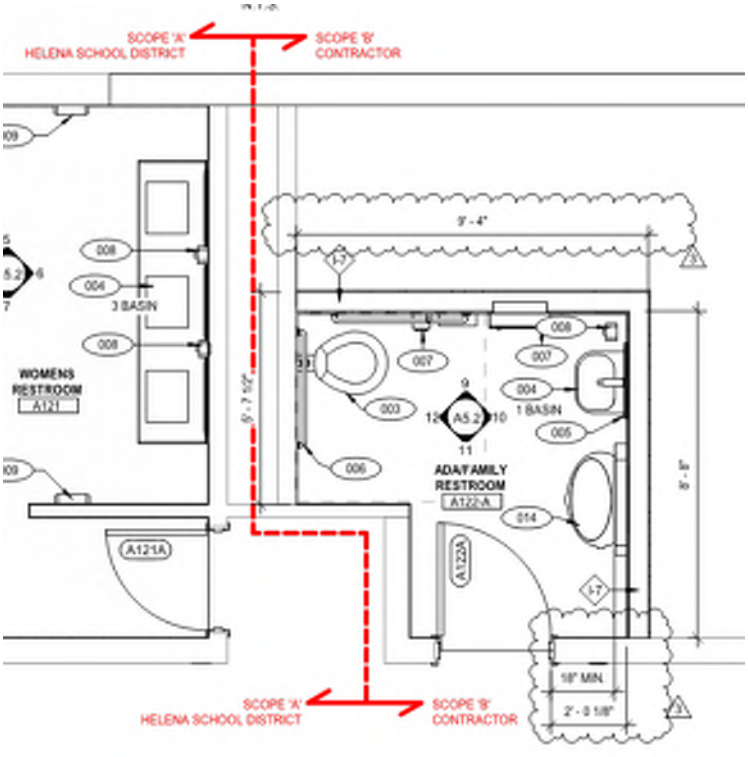
Shop Building: Replace the damaged metal wall panels at the shop and repaint all exterior cladding including CMU. **(Medium Cost, Low Priority)**

Accessibility

Existing Conditions

Main Building: There are ADA accessible restrooms, routes, and parking at CHS. While additional facilities could be renovated to create more accessibility, at the present the ADA requirements appear to be met.





Shop Building: There is currently no ADA restrooms located in the shop building. At some point accessible facilities in this building should be added.


Recommendations

Shop Building: Make a men's and women's restroom facility accessible in the shop building. **(Medium Cost, Medium Priority)**

Roofing

Existing Conditions

The building roofing system in Fair / good condition. There is a mix of thermoplastic single ply roofing materials.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof sections J, K, M, R, S, T, U, V are over classroom and common space. These roofs are built up roofing and single ply roofing materials– **(High Cost – High Priority)**

Reroof roof sections N, O, Q, W roofs over common areas. The roof sections have single ply roofing installed. – **(High Cost – Medium Priority)**

Reroof roof sections A, D, E, F, H, I, L is a large roof over classroom space. The roof sections have thermoplastic roofing installed. – **(High Cost – Low Priority)**

Helena High School

Overview

Address:

100 Valley Drive

Helena, MT 59601

Year Built:

1955

Building Area:

237,550 SF

Parking, Sidewalks and Site

Recommendations

Steps and sidewalks to the front door of the School - Remove and replace steps and install new handrail.

Parking Lot - Repair cracks, repair potholes and sealcoat entire area.

HVAC

Existing Conditions – Main Building

Heating System: The building heating system is (1) of (2) steam systems in the district. The boiler plant consists of (3) National Steel Boiler Model AC-6615 w/IC Power Burners. Boilers rated for 6,250 lbs./hr. At time of the inspection, (2) of the (3) boilers were operational. These units are estimated to have an operational efficiency of 45-55%. The boiler plant has had sufficient capacity to expand with the building. The boilers originally generated domestic hot water for the building via a ceiling mounted storage tank with integral hot water coil. This tank and coil have been abandoned in place. The boiler room combustion air system does not meet current code.

Steam and condensate pipi em are distributed throughout the building via a perimeter tun starting to fail, primarily the

condensate piping but also sections of the steam. Steam traps in the system are being replaced on an as-needed basis however, at several condensate receivers, steam was venting from the unit vents indicating non-operational traps.

Seven different condensate receivers return water back to the boiler feed system located in the boiler room. The receivers are older and with only one noted exception, original to the building. Several associated pumps have been replaced. Replacement pumps are becoming hard to obtain due to age.

In the recent two building expansions the HVAC systems in these areas utilized hot water, not steam, for space heating. The hot water is created by (2) steam-water heat exchangers located adjacent to the building additions. Adjacent to the heat exchangers are distribution. These systems are in various storage and equipment spaces in the building.

Plumbing: The building domestic water is provided via a single city water supply that has not been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building.

The building sanitary sewer system is cast iron and is failing. The exposed piping in the crawlspace shows indication of age and wear. In various areas both the cast iron and the associated pipe hanger system have failed.

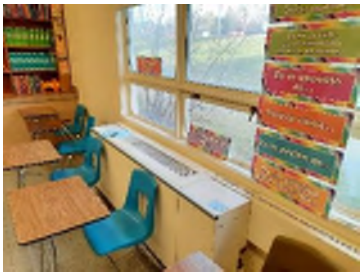
The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous

repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut off to allow service.

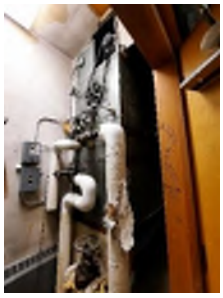
Domestic hot water for the building is generated with two Bradford White water heaters located in the equipment room. The domestic hot water system is not equipped with a tempering valve as required by code. The building domestic recirculation loops contain individual circulation pumps. These pumps are original to the building

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: The building has a variety of ventilation systems; floor mounted unit ventilators in classrooms, variable air volume systems in the new science classroom expansion, multi-zone air handlers in the lower interior spaces, ceiling mounted units in the gymnasium space, small ceiling mounted air handlers in the music rooms and auditoriums, and roof mounted air handlers.



The building exhaust system is a combination of in-line utility set fans in building equipment rooms, roof mounted mushroom fans, and roof mounted utility set units. The fans were reported to have several operational issues. Several units have been abandoned in place.



The classroom unit ventilators are operated manually by the space occupant to maintain space comfort to prevent overheating and reduce classroom background noise.

The gymnasium space is equipped with (16) air handling units suspended within the space. The units are original to the building and due to noise are operated sporadically to provide space heat.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.

Existing Conditions – Vo-Ag

Heating System: The building heating system is a hot water system. The building is equipped with (2) separate boiler rooms. Both boiler rooms are equipped with two cast iron sectional boilers.



Each boiler room is equipped with two distribution pumps that distribute the heating water in the associated building area. The pumps are original to the building and need replacement.

Plumbing: The building domestic water is provided via a single city water supply that has not been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building. Several semi-circular wash fountains remain in the building and their operational status is marginal at best.

The building sanitary sewer system is concealed with no issues reported.

The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut-off to allow service.

Domestic hot water for the building is generated with two separate gas fired water heaters. The domestic hot water system is not equipped with a tempering valve as required by code. The building domestic recirculation loops contain individual circulation pumps. These pumps are original to the building.

The floor drain system in the shop area is evaporative style, meaning it is not connected to the city sanitary sewer system.

Ventilation: The building ventilation system in the original building is (2) air handling units each connected to two shop spaces. The air handlers are Tjerlund gas fired units that have been converted to hot water when the gas heating sections failed.

Each shop temperature control is derived via a duct mounted reheat coil. In the addition the shop has a dedicated ventilation unit with unit heaters and the classroom spaces are equipped with unit ventilators and ceiling mounted fan coils.

The shop exhaust systems are in-line utility set fans. The fans are original to the building.

The equipment in the welding and wood shop spaces no longer matches the space exhaust system. One wood shop utilizes suspended electro-static filtration units versus dedicated exhaust connected to the equipment.

The wood shop dust collector is original to the building.

Air Conditioning: No portion of the building is equipped with mechanical cooling.

Recommendations – Main Building

Heating: Convert the building heating system from steam to hot water. Remove all associated steam piping within the building and replace with a new hydronic distribution system. The boilers should be replaced with a modular high efficiency boiler plant utilizing high efficiency condensing boilers that meet the districts standards. The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator) and remove the abandoned equipment to create maintenance or additional building storage space.

Ventilation: Replace classroom unit ventilators with new equipment to ensure proper space ventilation. The new units should be hot water. Consideration should be given to upsizing the units and piping to allow distribution of chilled water during cooling season to condition the spaces in warmer weather to improve the teaching environment.

All air handling equipment within the building should be replaced. Existing ductwork replaced or at minimum cleaned due to age.

Replace the gymnasium air handling units with new equipment.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Replace all roof mounted fans.

Plumbing: All accessible cast iron sanitary sewer piping should be replaced.

Review of the building domestic water distribution system and remove non-operable isolation valves and install new valves for service.

Replace all building flush valves with new either manual or electronic flush valves. This will improve hygiene and reduce water consumption.

Recommendations – Vo-Ag Building

Heating: Replace the building cast iron sectional boilers with a single modular boiler plant utilizing high efficiency condensing units. The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator).

Ventilation: Replace shop air handlers with new equipment sized to provide required space make-up air. The new system should modulate to meet space occupancy and function.

Replace classroom unit ventilators and fan coils with a central air handler equipped with economizer and/or mechanical cooling.

Building welding shops should be replaced to meet current equipment needs and layout.

Replace dust collector and extend dust collection ductwork to fixed dust generating equipment. If electrostatic dust collectors are desired, install units in addition to the fixed equipment exhaust system, not in place of.

Create a varnish or finishing exhaust area in the wood shop to remove VOCs from the space.

Plumbing: All accessible cast iron sanitary sewer piping should be replaced.

Review of the building domestic water distribution system and remove non-operable isolation valves and install new valves for service.

Controls

Existing Conditions

The science room expansion equipment and the locker room expansion are controlled by an older Johnson Controls DDC system. The system is obsolete and in need of replacement.

The air handling equipment installed as a portion of the Science Classroom expansion project are equipped with variable frequency drives. These drives are obsolete and are no longer supported. Due to the condition, most equipment is operated at constant speed rather than modulating as intended to ensure equipment remains operational.

Classroom equipment and most building air handlers utilizes pneumatic controls.

Recommendations

The boiler room and classroom space should be equipped with DDC controls to improve system efficiency and improve space temperature control.

Fire Suppression

Existing Conditions

The Science Room and Locker Room expansion areas are equipped with a fire suppression system in the lower levels. The water service entrance for this system has been noted to freeze in cold weather.

Recommendations

The fire suppression system should be expanded to serve the entire building. The service entrance space should have heat added to protect the entrance from freezing.

Electrical

Existing Conditions

Main Building Electrical Service:
The main building service appears to be derived from a 12.47 kV overhead primary distribution line across Roberts Street to the northeast of the parking lot, dropping to underground at a riser pole (Figure 1). The primary line crosses under a parking lot and terminates in a 500 kVA pad mounted transformer on a concrete pad near Entry 26 (Figure 2). The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 1600-amp rating, based on the size of the main disconnect switch inside the building and As-Built Electrical Drawings for a 1997 renovation. The secondary conductors exit the transformer underground then terminate in a metering enclosure inside an abandoned underground transformer vault. The meter is on the exterior wall above, next to Entry Door 26 (Figure 3).

Figure 1 – Primary Electrical Service

The highest recorded demand over the last two years from Northwestern Energy was 260 KW in November 2019. The demand averages 220 to 250 KW during the heating months. Based on this reading, the calculated demand is about 1128 amps, after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. Based on the calculated reading, the service is at approximately 75% to 85% of a maximum 1600 amp capacity.

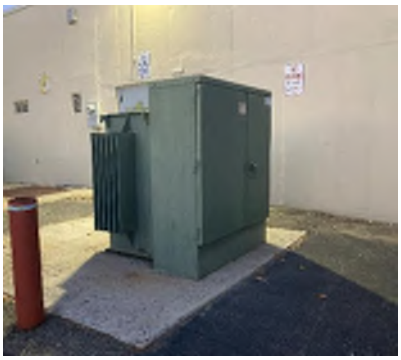


Figure 2 – Pad Mounted Transformer

Figure 3 – Meter

Figure 4 – Vo-Tech Electrical Service

Vo-Tech Building Electrical Service

The service for the Vo-Tech building is derived from a 12.47 kV overhead distribution line in an alley north of the building and east of N. Cooke St (Figure 4). The pole has (3) oil filled transformers connected in a 120/208V 3-phase bank. The secondary service conductors drop down the pole in a 4" conduit and continue underground to the building, before rising to an incoming section of a 4-section switchboard. The incoming section contains the utility company metering equipment. The meter is mounted on the side. The peak recorded demand for the Vo-Tech Building over the last two years is 78.4 KW in April 2020. The calculated demand for it is about 340 amps, which is about 40% of a maximum 1000-amp capacity.

Main Building Distribution:

A new Main Switchboard (MSWB) was installed for the 1997 Science Wing addition project (Figures 5). It is located on the main level in the Electrical Room in the north wing, south of the cafeteria, and is near the pad mounted transformer, meter and old transformer vault. MSWB is rated at 120/208 volts, 3-phase, 4-wire, 1600 amps. It contains consists of four main service disconnects (circuit breakers).

Figure 5 – Old Main Switch Board (OMSB)

Main Disconnect #1 (1200A breaker) feeds the old (original) Main Switchboard OSBD in the Electrical Room. Main Disconnect #2 (225A breaker) feeds Distribution Panel SL in the Science Wing. Main Disconnect #3 (125A breaker) feeds Panel PE in the Gymnasium Addition. Main Disconnect #4 (60A breaker) is for a surge suppressor adjacent.

Beginning with the Old Main Switchboard (Figure 6), much of the original 1950's vintage electrical distribution equipment in the school is still in use and much of it is

obsolete. Breakers from this era are not always reliable and on occasion fail to trip or are impossible to reset if they are tripped. It may be possible to obtain replacement parts from specialty manufacturers that rebuild components, but comes without a UL Label, can be expensive and possibly unreliable.

OMSB is 2-sections. Each contains a 600-amp circuit breaker at the top for bus duct feeders to the Distribution Panel #1 and Gymnasium. There are (2) 225-amp breakers, (1) 200 amp, (3) 150 amp and (9) 100 amp for the elevator and branch panelboards throughout the original 1954 and 1962 addition areas. There are (2) 225-amp spaces and (2) 100 amp.

The sub-distribution boards in the original building areas are of the same vintage as OMSB. They are Distribution Board #1 (Figure 11), #3 (Figure 8), and the Gymnasium (Figure 7). One of the distribution boards, #3, has had recent issues where replacement parts were difficult to obtain. Continued use of this equipment could result in the need for an emergency replacement the next time there is a problem with a breaker.
Distribution Board SL (Figure 8) is located in the Science Wing Addition. It is 2-sections and contains (24) 100-amp frame breakers, (2) 100-amp spaces, (3) 225-amp frame breakers and (1) 225 amp space. The (3) 225-amp breakers feed panelboards for the Science Wing. The remaining breakers feed mostly mechanical equipment loads. The distribution board is in good condition, but I.D. labeling is very poor, and many loads are not identified at all.

Figure 7 – Gymnasium Distribution Board

Figure 8 – Distribution Board #3

Figure 9 – Distribution Board SL

Panel PE (Figure 10) is a newer 125-amp branch panelboard that was installed in the 1997 PE addition. There is a transient voltage surge suppressor adjacent. It is a 42-circuit panelboard that serves mostly convenience receptacles, small mechanical, equipment loads and lights. There are only a few spare breakers. There are smaller distribution boards in the original building area, such as Panel BP in the Boiler Room (Figure 12), that are at the end of their useful

life, with the same issues addressed earlier; and an estimated (9) original branch panelboards in similar condition. None of this equipment should be relied upon for much longer, as it will be more difficult to maintain and to protect equipment safely.

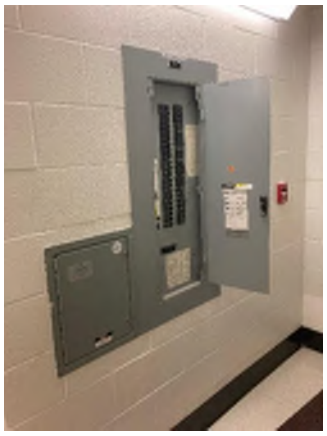


Figure 10 – Panel PE

Figure 11 –Distribution Board #1

Figure 12 – Boiler Distribution Board BP

Vo-Tech Distribution:

The Main Switchboard is located in the northwest corner of the building. (Figure 13). It consists of 4-sections and is rated at 1200 amps, 120/208 volts, 3-phase. Section 1 contains the incoming lugs and metering equipment. Section 2 houses the main disconnect switch, which is a Bolted pressure style. These types of switches used to be common and have gradually been replaced with electronic trip style circuit breakers. Bolted pressure switches contain a threaded shaft that rotates after the switch blades close. A 3-phase switch has six clamped hinged joints at the contact points. The switches remain closed during most of their existence. A factory applied lubricant in the mechanism becomes glue-like over time causing an incomplete movement of the switch blades and then arcing. Regular maintenance and exercise can help extend the life of the switch and ensure that it will operate properly. Bolted pressure switch manufacturers recommend that a maintenance program be established with an accredited service provider. Unfortunately, there are very few service providers in the area.

Section 3 (Figure 14) contains several Square D QMB Saflex fusible switches. They are obsolete, but replacement switches may be available, depending on the type of bus bars in the switchboard. There are three twin 30-amp switches for exhaust fans and mechanical equipment and motor starters, one twin combination 60-amp switch and motor starters for a dust collector and unit heater, one twin combination 100-amp switch and motor starters for air compressors and a 400 amp switch for bus duct service to welders. Section 4 (also Figure 14), contains 14, 100 amp fusible disconnect switches for branch panelboards and plug-in bus ducts. There are two spare disconnects and two available spaces.

Figure 13 – Vo-Tech
Switchboard Sections 1 & 2

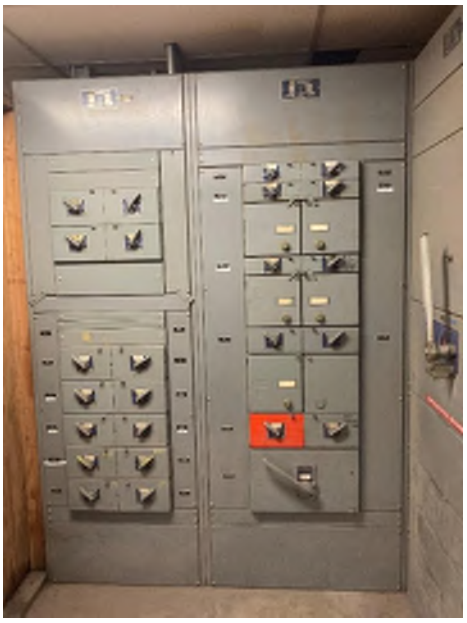


Figure 14 – Vo-Tech
Switchboard Sections 3 & 4

There appear to be five branch panelboards in the Vo-Tech. None of them appear to be obsolete. There are space and spare capacity in most.

Branch Circuiting: Classrooms are not adequately provided with sufficient quantities of convenience receptacles and circuiting to meet current needs. Many of the classrooms have four to eight receptacles but there are not enough in locations where they are needed, i.e., near the teacher's desk, PC workstations or over work counters.

In the Vo-Tech Auto-shop, it appears that many of the receptacles along the shop walls are not GFCI style. There are a few GFCI breakers in the panelboard but they do not appear to protect all of the receptacles in the shop area as normally required by the National Electrical Code.

Lighting: Most of the lighting in the school consists of four-lamp, four-foot long, fluorescent troffers with T8 lamps (Figure 12), surface wraparounds with acrylic lenses or recessed 2x4 parabolic troffers. The building has been equipped with occupancy sensors.

The Gymnasium lighting consists of suspended 4 foot T-5 fluorescent fixtures with wire guards. Most of the exit signs in the building are steel housings with stencil faces that have been converted to LED. Emergency egress lighting units are located on corridor and egress pathway walls throughout the facility. The fixtures in the Science Wing Addition are connected to an emergency battery inverter.

Figure 15 – 2x4 Troffer with T8 Lamps

Figure 16 – Emergency Egress Lighting Head in Science Wing

Figure 17 – Emergency Egress Lighting Unit in Vo-Tech Auto Shop

The shop lighting in the Vo-Tech building consists of suspended T5 fluorescent with wire guards and integral motion sensors (Figure 18).

Figure 18 – Vo-Tech Shop Lighting

Recommendations

Main Building Electrical Service: The existing electrical service and (new) main switchboard are in good condition. There is some spare capacity, but not enough if building wide air conditioning is added. It may be an option to install another (480 volt) electrical service for a Central Cooling Plant, which would allow the existing electrical service to remain.

Vo-Tech Building Electrical Service: Strong consideration should be given to replacing at least Sections 1 and 2 of the main switchboard, and Sections 3 and 4 if the bus bars are not compatible with replacement switches. The bolted pressure switch is a liability due to it's age and uncertain condition. It would be best to install a new 1000 amp main, metering enclosure

and meter on the building exterior and then reconnect Sections 3 and 4 (if reused) to the new main disconnect.

Main Building Electrical Distribution: The original 1200 amp, 120/208 volt, 3-phase switchboard should be removed and replaced with a new switchboard. This would also include replacement of all sub-distribution boards and branch panelboards in the original school areas. The new panelboards will be sized with at least 25% spare capacity and will accommodate the extra circuits required for additional classroom receptacles.

Branch Circuiting: All of the original wiring will be replaced with new. Additional receptacles and circuits will be added to the classrooms, mainly in the original building areas. Circuiting will be increased to a minimum of two dedicated circuits per classroom. Wiring can be run above lay-in ceilings in most rooms, then concealed inside the wall cavities or surface mounted in Wiremold or conduit.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls in classrooms, corridors, gymnasium, cafeteria and other areas is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. The surface wraparound fixtures will be replaced with similar style fixtures with onboard LED's. The 2x4 fluorescent troffers will be replaced with new LED flat panel fixtures. The existing exit signs may be reusable, but it may be more advantageous to replace them with combination exit signs with emergency egress heads. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Low Voltage

Existing Conditions

The main rack is located in a storage room adjacent to the Library in a secure, fenced, location. The IT System for the building was partially upgraded as part of a partial Safety-Security Upgrade. The old coaxial-based CATV equipment was recently removed, allowing for more expansion. The data rack does not have a UPS that is adequately sized to provide the district's minimum 2 hours of backup for video and communications.

Safety and Security

Existing Conditions

A few new surveillance cameras were provided in the Safety-Security Upgrades at three exterior entry doors and main lobby. The cameras are powered over the ethernet wiring from the data switches in the main IT rack. Most of the remaining entries have cameras, but they are an older generation that the district has been replacing. UPS backup power has been recently added to provide continuous power for up to a 2-hour power outage.

Electronic door access, monitoring and locks have been provided at the three entries, but none of the other doors are monitored. The door access control equipment is located in the fenced enclosure with the Data Rack.

Recommendations

Expanding the electronic access and monitoring to every entry in the facility is a high priority. New IP-based, power-over-ethernet cameras matching those used at the elementary and middle schools is recommended. An 8 KVA UPS (expandable to 16) is recommended as a minimum to provide 2-hour backup for the cameras and phones.

Fire Alarm

Existing Conditions

The Fire Alarm System in the main building is a Bosch FPD-7024. The Control Unit(s) is located in the Electrical Room. It is fairly new; probably not more than 10 to 12 years in service. There are there are some smoke in the building for release of magnetic door holders, some in the elevator lobby and shaft. Several HVAC fans have integral mounted duct type smoke detectors (in the Science Wing) and are wired for shutdown. There are manual pull stations at exit pathways, horn/strobes in virtually every occupied room.

Figure 14 – Fire Alarm Control Unit

Recommendations

The International Fire Code requires a manual detection system with voice evacuation for this type of facility. It may be possible to add voice evacuation, but usually it is not cost effective. Upgrading to a new fire alarm system with voice evacuation, speakers and strobes is recommended.

Public Address Systems

Existing Conditions

The PA system appears to be functional. It is an older analog system with traditional speakers and amplifiers. It appears that the staff is using the phone system for most communications. The original clock system does not appear to be functional, as many battery powered clocks were seen in use. The program bell system was observed to be working.

Recommendations

A new IP-based Clock/Program/PA and Messaging system matching what was installed in the recent Safety-Security Upgrades in the elementary schools is recommended and should be considered a high priority. They system will improve communications and safety.

Windows

Existing Conditions

Exterior Wood Frames Windows: The vast majority of the windows in HHS are old wood Framed windows with single pane glazing. These windows are all well past their useable life and need replacement.





Exterior Aluminum Windows: The new science wing does have aluminum framed double paned windows. The section of these that are operable are allowing water to enter the building during a rain.


Recommendations

Exterior Wood Frames Windows: These windows should all be replaced with thermally broken aluminum windows with double paned low-e glazing. **(High Cost, High Priority)**

Exterior Aluminum Windows: The leaking operable windows should have their seals replaced and if this doesn't fix the issue new systems should be installed. **(High Cost, High Priority)**

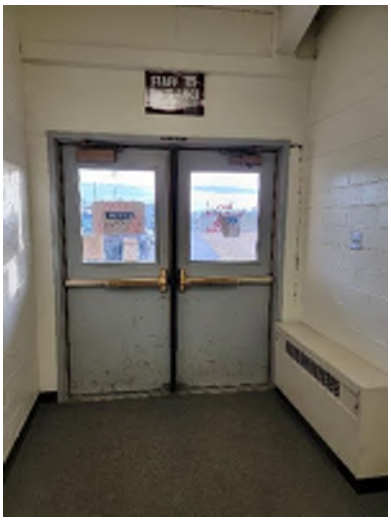
Doors

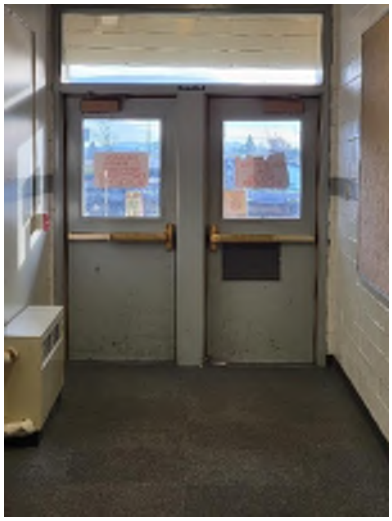
Existing Conditions

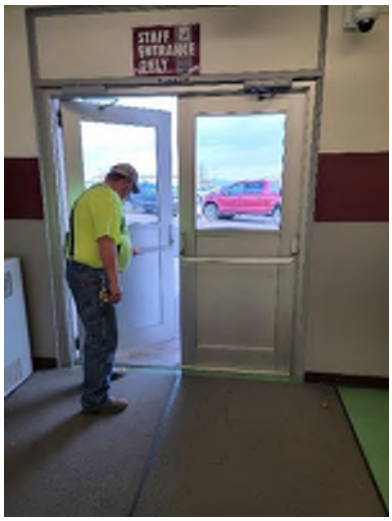
Main Building Exterior Doors: All but a few of the exterior door that were recently replaced during the safety and security project are beyond their useful life and are requiring a lot of maintenance to keep them operational. It is recommended that all these doors should be replaced.


ENTRY
23

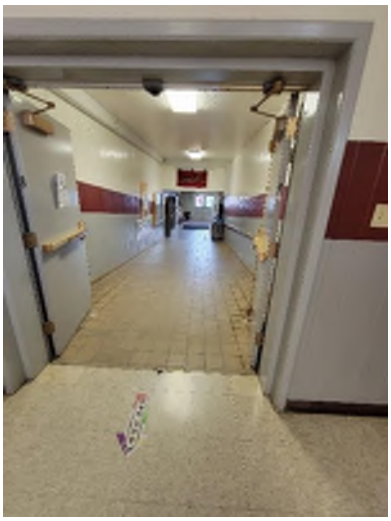

ENTRY
2







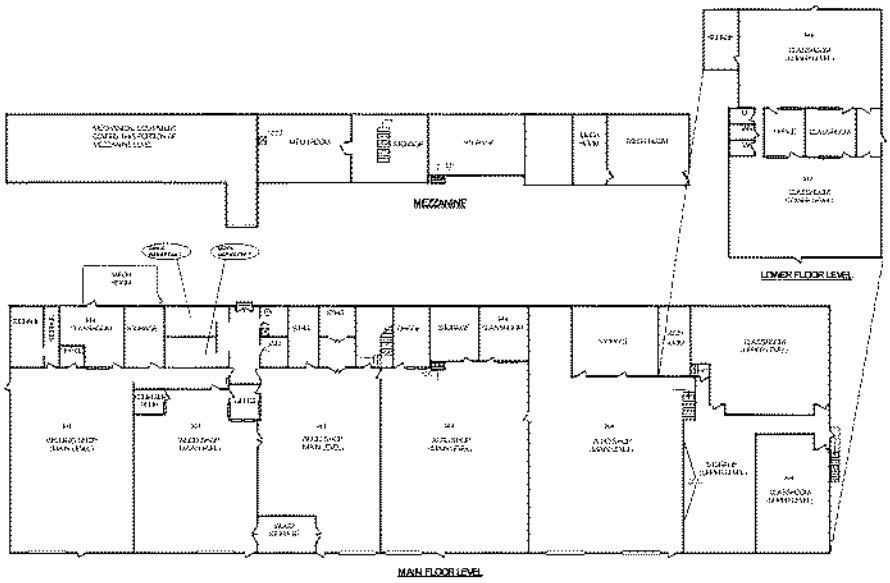
Main Building Interior Doors: Except for in the science wing and where the renovations work was conducted after the fire, the rest of the interior doors, frames, and hardware need being replaced.



Shop Outbuilding Section Doors: The (6) sectional doors are past their useful life, the seals are broken and is sounds like the district has to do some maintenance on them regularly. These should be replaced.

Shop Outbuilding Exterior Man Doors: The exterior man doors have deteriorated past their usefulness and need to be replaced.

Shop Outbuilding Interior Doors: The interior shop doors are also in need of being replaced.



Recommendations

Main Building Exterior Doors: The old exterior doors should be replaced with thermally broken Aluminum Framed System. **(High Cost, Medium Priority)**

Main Building Interior Doors: The old interior doors should be replaced with hollow metal doors and frames. **(High Cost, Low Priority)**

Shop Outbuilding Section Doors: New insulated sectional doors with all new seals should be installed. **(High Cost, Low Priority)**

Shop Outbuilding Exterior Man Doors: New galvanized hollow metal doors and frames should be installed in place of the old doors. **(Medium Cost, Low Priority)**

Shop Outbuilding Interior Doors: Because of the shop nature of these space, it would be recommended that new Galvanized Hollow Metal Doors and Frames be installed in place of the old doors. **(High Cost, Low Priority)**

Exterior Cladding

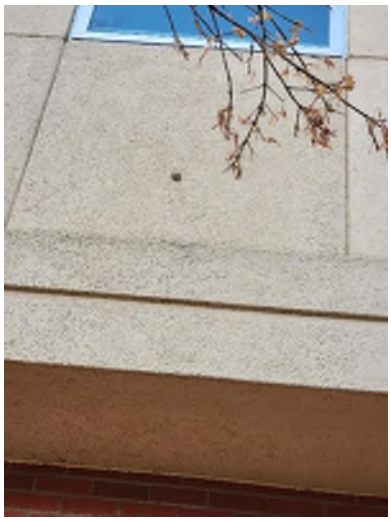
Existing Conditions

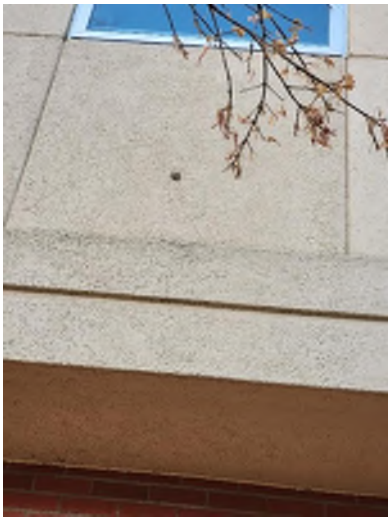
Masonry: The masonry on the exterior of the building is in good shape, but there us about 5 to 10% of the mortar joints that need to be repointed.



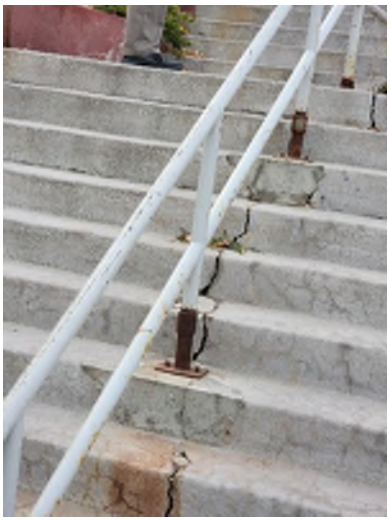


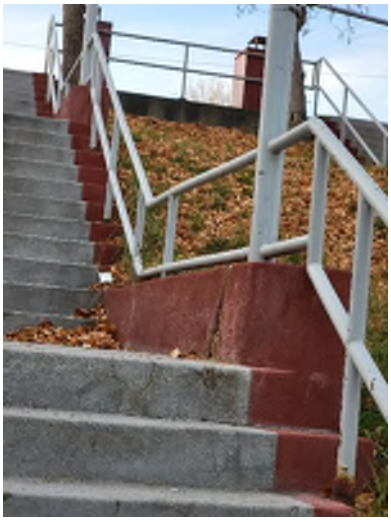
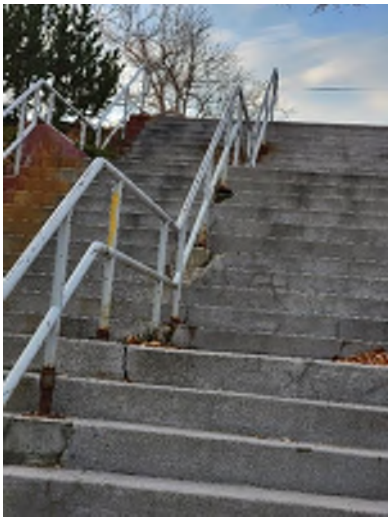
EIFS: The External Insulation and Finish System that was used on the Science Addition has a lot of birds making their nests in the walls. These need to be patch as maintenance, but the best way to fix the issue is to replace the exterior system with either a metal lath-based stucco system or some other cladding system.

Exterior Concrete Stairs: The Main entry stairs are in dire need of being relaces, from the sidewalk on Billings Avenue all the way to the school doors, this stair and sidewalk system needs being replaced.

Soffit and Fascia on Gym: The Fascia and the soffit on the low roof at the gym locker rooms needs being refinished.


Metal Stair from Gym Second Floor: The metal stairs coming out of the Gyms second floor is rusting and needs to be repainted. In addition, the guardrails do not meet the current code and it would be recommended that these get rebuilt for better fall protection.

Concrete Stoop, Steps, and Railing: There are three (3) locations on the north side of the lunchroom that need to be rebuilt with code compliant steps and railing. There is also one (1) man door on the north classroom that needs a stoop.

Recommendations

Masonry: Repoint the mortar joints that have deteriorated. **(Medium Cost, High Priority)**

EIFS: It will be ok to patch the holes of from the birds as they are made. However, the permanent fix is to replace the EIFS system with a better-quality cladding system. **(High Cost, Medium Priority)**

Exterior Concrete Stairs: Repour the concrete stairs and sidewalk. Build new Metal Handrailing. **(High Cost, High Priority)**

Soffit and Fascia on Gym: Refinish the wood fascia and Soffit with break metal and metal panels. **(Medium Cost, Medium Priority)**

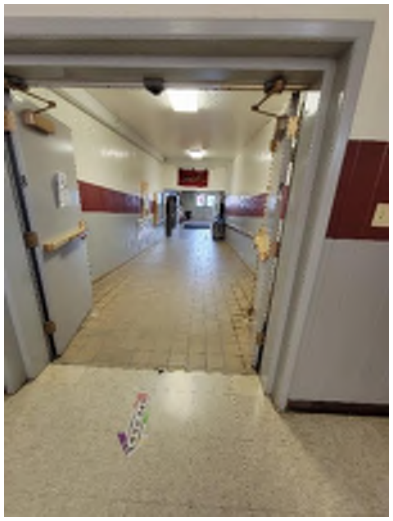
Metal Stair from Gym Second Floor: Refinish the stairs and build a new guard railing. **(Medium Cost, Medium Priority)**

Concrete Stoop, Steps, and Railing: Replace Concrete and railing at all these locations. **(Low Cost, High Priority)**

Accessibility

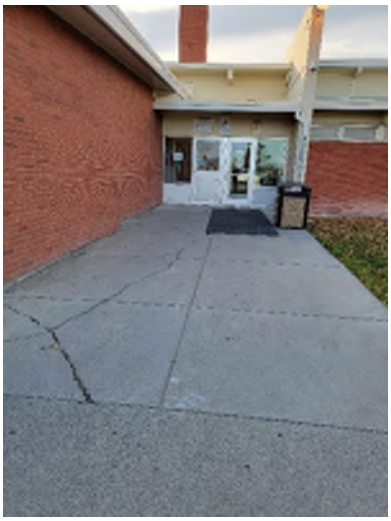
Existing Conditions

Interior Ramps: There are five (5) interior ramps that are way too steep to meet the ADA requirements. They are also missing the necessary handrails. Because of the existing conditions only three (3) of these ramps can easily be extended to reduce the slope of these and get them closer to the 1:12 slope. We would also recommend installing new handrails on all the ramps.



Restrooms: While not all restroom facilities are accessible there are a few ADA facilities available.

ADA Parking: The cross slope of the ADA parking spot is over the 2% and there are a few panels that have a larger than ¼" step creating a tripping hazard. These should eventually be fixed.

Recommendations

Interior Ramps: Add handrailing to all 5 ramps. Extend the 3 ramps that can be. **(High Cost, Low Priority)**

ADA Parking: The cross slope of the ADA parking spot is over the 2% and there are a few panels that have a larger than ¼" step creating a tripping hazard. These should eventually be fixed. **(Medium Cost, Low Priority)**

Roofing

Existing Conditions

The building roofing system in Fair / good condition. There is a mix of thermoplastic single ply roofing materials.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report. The medium Priority roof section should be reinspected every two years. Along with yearly roof maintenance these roof could be pushed out several more years before replacement needs to be performed.

Reroofing roof sections J, K, L, R, W, X, Z, G1 are over classroom and common space. These roofs are built up roofing and single ply roofing materials– **(High Cost – High Priority)**

Reroof roof sections A, B, C, D, E, F, G, H, I, N, O, S, T, A1, B1, C1, F1, H1, I1 roofs over common areas. The roof sections have single ply roofing installed. – **(High Cost – Medium Priority)**

Reroof roof sections P, Q are small roofs over common space. The roof sections have thermoplastic roofing installed. – **(Low Cost – Low Priority)**

PAL

Overview

Address:

815 Front Street

Helena, MT 59601

Year Built:

1957

Building Area:

15,500 SF

Parking, Sidewalks and Site

Recommendations

Parking Lot - Repair cracks, repair potholes and sealcoat entire area.

Needs proper drainage that will add costs

HVAC

Existing Conditions

Heating: The building is a hot water heating system. The heating water is generated in the upper-level equipment room which is equipped with (3) Weil McLain Model VHE-6 Cast Iron Boilers. The boiler room is equipped with wall mounted combustion air. The system has (2) Taco in-line circulation pumps to distribute the heating water to the perimeter wall mounted fintube radiation and (2) roof mounted air handling units. The circulation pumps for these systems were installed with the boilers.

Plumbing: The building domestic water is provided via a single city water supply that has NOT been upgraded to meet current entry service requirements.

Building plumbing fixtures are older with various chips and stains but are still operational. HPS staff has replaced some fixtures as needed in the building and is in the process of replacing the building flush valves.

The building sanitary sewer system is functional and concealed. No issues were reported.

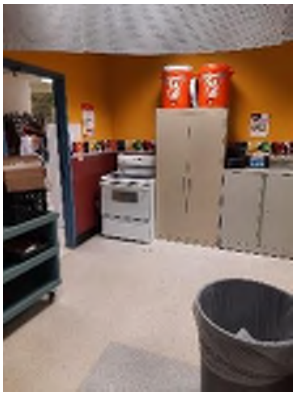
The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut-off to allow service.

Domestic hot water for the building is generated with single 50-gallon Bradford White water heater located in the equipment room. The domestic hot water system is not equipped with a tempering valve as required by code. The building (1) domestic recirculation loops contain individual circulation pumps. These pumps are original to the building

Kitchen sanitary sewer system is not equipped with a means of removing grease from the waste stream prior to exiting the building. The required grease interceptor protects the building waste piping from kitchen waste and grease. The device is required on all three compartment sinks.

Ventilation: The building classroom spaces are served with (2) roof mounted air handling units. One of the units is a Temtrol exterior air handler, the other unit is a Lennox light commercial unitary rooftop unit. In addition to these two units there is a ceiling mounted fan coil.

Kitchen equipment (ranges, ovens, and dishwashers) are not equipped with required hoods.



Air Conditioning: All ventilation equipment is equipped with mechanical cooling. The Temtrol Air handler and ceiling mounted fan coil are connected to roof mounted residential condensing unit. The Lennox rooftop is a self-contained single unit.

Recommendations

Heating: The boiler room upgrade should include updated distribution pumps, air management devices (air vents and system air separator), and boilers replaced to the district standard.

Ventilation: Replace all room mounted equipment. The installed equipment has met its service life.

Kitchen equipment hoods should be installed in the kitchen to remove steam, odors and smoke created during kitchen operation as required by code.

Replace all roof mounted fans.

Controls

Existing Conditions

The boiler room equipment is controlled by a manufacturer boiler staging panel versus utilizing DDC controls.

Classroom and office perimeter heating systems utilizes pneumatic controls.

Ventilation equipment is controlled with wall mounted residential seven-day programmable thermostats.

The boiler room, ventilation equipment and perimeter space heat should be equipped with DDC controls to improve system efficiency and improve space temperature control.

Fire Suppression

Existing Conditions

The building is NOT equipped with a fire suppression system.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV three phase overhead primary distribution line on a utility pole located in the alley between Front Street and N. Last Chance Gulch. The primary drops from the riser pole to underground and terminates in a pad mounted transformer on the southeast side of the building (Figure 1). The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 400-amp rating. The service continues underground to the center of the building where they rise into a metering enclosure (Figure 2).

Figure 1 – Pad Mounted Transformer, Main Disconnect and Metering

Figure 2 – Utility Co. Metering Enclosure, Meter and Main Disconnect

The service conductors exit the metering enclosure into a wireway and terminate in a 400-amp main disconnect switch on the adjacent wall. The highest recorded demand over the last two years from Northwestern Energy was 50.4 KW in September 2020. The demand readings are consistently in the low to mid 40's KW range during the cooling months and mid 30's KW in the heating months. Based on the peak reading, the calculated demand is about 218 amps, leaving approximately 45-50% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. The building is air conditioned, so the likelihood of the need for a service upgrade is remote.

Distribution: The main distribution board (MDP) is located in a Mezzanine Mechanical & Electrical Room (Figure 3). It is rated at 120/208 volts, 3-phase, 600 amps with four 200-amp and two 100-amp circuit breakers. There are four Siemens CDP-7 style panelboards in the building that appear to have been installed in the 1990's and a General Electric outdoor load center of about the same vintage. The outdoor panel is not labeled, but the indoor panels are labeled as "B through E". The service conductors rise up the wall from the main disconnect switch and then penetrate the exterior wall into the MDP. One of the 100-amp breakers is labeled "North HVAC Unit". The other 100-amp breaker is not label but it is presumably for the outdoor load center. Two of the 200-amp breakers are for Panels C and D, which are adjacent to MDP. The remaining 200-amp breakers are for Panels B and E. These are assumptions however, since the breakers in MDP are not labeled.


Figure 3 – MDP

Panel C has five spaces available for future circuit breakers and Panel D has 32 (Figure 4). Panel E is located in the main open classroom area towards the front of the building and appears to have 10 spaces and three spares available (Figure 5). Panel B is located back in an office has doesn't appear to have any space for future breakers or spares (Figure 6).


Figure 4 – Panel D


Figure 5 – Panel E


Figure 6 – Panel B

Branch Circuiting: The existing circuiting and quantities of receptacles seem to be plentiful. Many of the offices have dedicated receptacle circuits; some multiple.

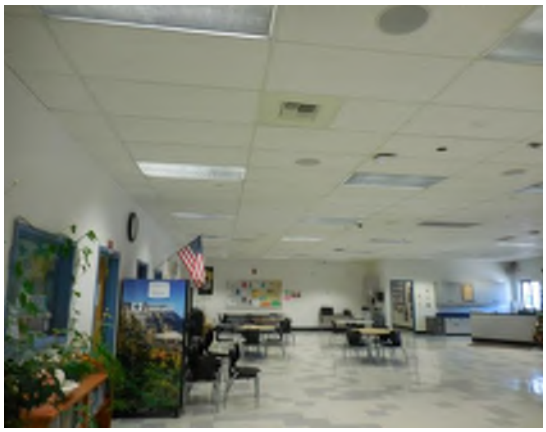


Figure 7 – Open Classroom Area Lighting

Lighting: Most of the lighting in the building consists of 2x4 fluorescent troffers with miniature "egg crate" louvers (Figure 7). Storage rooms and mechanical rooms have four-foot long, surface mounted fluorescent fixtures with acrylic wraparound lenses. The fixtures appear to be in good shape.

Figure 8 – Combination Lighting & Exit Sign

Exit and Egress Lighting: Exit signs are LED with emergency battery packs. Some are combined with emergency lighting heads (Figure 8). It appears that the quantities and locations are in compliance with Codes.

Recommendations

Electrical Service: As long as the building continues to be used in its current configuration and function, the existing service should be adequate. The building is already air conditioned, and additional capacity exists if more equipment is needed.

Electrical Distribution: Panels B is full, but there is sufficient capacity available in Panel D for adding more circuits, or sub-feeding another load center on the main level.

Branch Circuiting: Additional receptacles and circuits do not appear to be needed in the building, unless rooms are remodeled to accommodate more classrooms.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is

substantial. There is an added benefit of increased life, which will help reduce maintenance costs. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Exit and Egress Lighting: The existing LED exit signs appear to be adequate.

Low Voltage

Existing Conditions

The Main Data Rack for the building is located in the Mezzanine. Access requires climbing an exterior metal stair. The door access equipment is located adjacent to the data rack. Most offices and workrooms are provided with two or more data outlets, and there are some ceiling and wall mounted for the wireless access points.

The building contains a few security cameras but does not have the District standard IP based door security system that has been installed over the last four years in the Safety-Security Upgrades.

Recommendations

Add data outlets for additional cameras.

Safety and Security

Existing Conditions

New surveillance cameras were provided in the Safety-Security Upgrades at the main exterior entry door and lobby. The cameras are powered over the ethernet wiring from the data switches in the main IT rack. Most of the remaining entries have cameras, but they are an older generation that the district has been replacing.

Electronic door access, monitoring and locks have been provided at the main entry, but none of the other doors are monitored. The door access control equipment is located in the mezzanine next to the Data Rack.

Recommendations

Extending the electronic access and monitoring to every entry in the facility is a high priority. New IP-based, power-over-ethernet cameras matching those used at the elementary and middle schools is recommended.

Fire Alarm

Existing Conditions

The building Simplex 4001 control panel and a Silent Knight Model 5104, 4-zone alarm communicator. There are manual pull stations at all exit pathways and horn/strobes throughout. The building is sprinklered and the flow switch is monitored. The sprinkler system valve is chained and locked but not monitored.

Figure 9 – Fire Alarm Control Unit

Recommendations

Current Codes require a voice-evacuation fire alarm system for K-12 Educational Occupancies. The Simplex 4001 control unit is obsolete and consideration should be given to replacement with a new control unit which would then add the voice evacuation features. The main sprinkler system valve(s) should be monitored since they have that capability and the system is in place.

Public Address Systems

Existing Conditions

The building does not have a clock system. Clocks are battery powered. The building does have a functional paging/sound system.

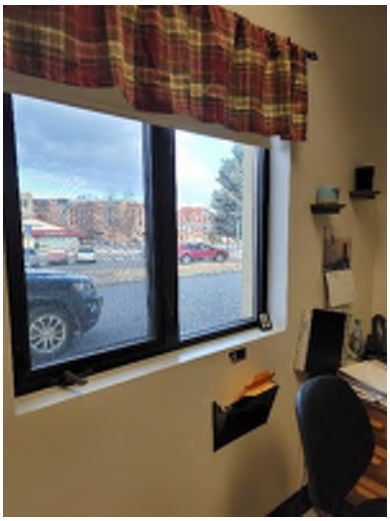
Recommendations

A new IP-based Clock/Program/PA and Messaging system matching what was installed in the recent Safety-Security Upgrades in the elementary schools is recommended and should be considered a high priority. They system will improve communications and safety.

Windows

Existing Conditions

The windows are all thermally broken aluminum frames and double pane glazing. They are in good shape and there is currently no work required at this time.



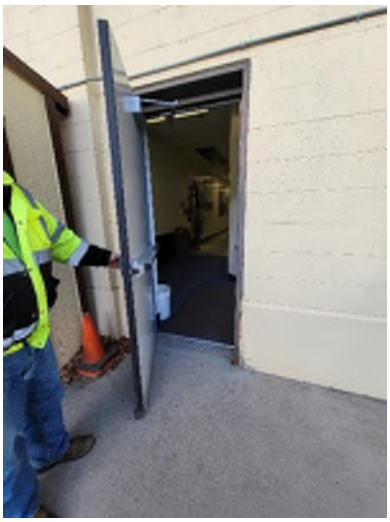
Recommendations

Currently no work required.

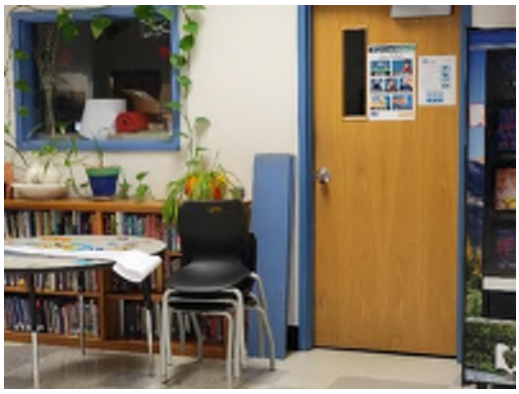
Doors

Existing Conditions

Exterior Doors: The Exterior doors are all in need of being replaced. The doors and frames were not galvanized, and the bottoms are rusting out and the hardware is requiring maintenance constantly to keep them functioning.



Interior Doors: Most of the interior doors have knobs. This is a life safety and ADA accessibility issue that should be updated.



Recommendations

Exterior Doors: Replace all exterior doors and frames with new galvanized hollow metal frames and galvanized hollow metal insulated level 4 doors. **(Medium Cost, Medium Priority)**

Interior Doors: Replace all interior doorknobs with lever sets. **(Medium Cost, High Priority)**

Exterior Cladding

Existing Conditions

Parapet/Fascia: The Parapet/Fascia is metal and is in good shape no additional work is required currently.

Masonry: The exterior of the PAL building is concrete masonry units. The CMU itself is in really good shape. The painting could use a new coat to help ensure it is weather tight.

Exterior Stair: There is an exterior metal stair that accesses the mechanical space up above. The railing on this stair is not an approved Guard Railing and should be updated to have better fall protection.

Recommendations

Masonry: Repaint the exterior CMU. **(Medium Cost, Low Priority)**

Exterior Stair: Replace the metal railing to a guard railing 42" tall and to not allow a sphere larger than 4" from being able to pass through it. **(Medium Cost, High Priority)**

Accessibility

Existing Conditions

Parking: The parking spot at PAL does not conform to the ADA slope requirements. The site should be regarded and built to meet the necessary accessible accesses into the building.

Restrooms: There is not currently a compliance ADA accessible restroom in the building. It would be recommended to take one men's and one women's restroom and renovate them to meet the accessible clearances.

Recommendations

Parking: To meet the necessary slope and grade from the parking to the building, there will need to be some regrading, and the ADA parking spot sill need to be raised by at least one foot. **(High Cost, Medium Priority)**

Restrooms: Renovate one men's and one women's restroom and renovate them to meet the accessible clearances. This will require that one fixture is removed from each and the partitions get rebuilt. **(Medium Cost, High Priority)**

Roofing

Existing Conditions

The building roofing system in good condition. The roofs are comprised of EPDM rubber roofing material.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof sections A, B, C are over classroom and common space. These roofs are all EPDM roofing materials– **(High Cost – High Priority)**

District Support Buildings

May Butler Center

Maintenance Building

Lincoln

7th Avenue Gym

Vigilante Stadium

May Butler Center

Overview

Address:

55 South Rodney Street

Helena, MT 59601

Year Built:

1942

Building Area:

9800 SF

Parking, Sidewalks and Site

Recommendations

Parking Lot - Replace Parking Lot and Install onsite retainage and storm drain to code 13,200 sq ft.

Wooden Retaining Wall - Replace with concrete retaining wall.

HVAC

Existing Conditions

Heating System: A (2) boiler system provides hot water for the building from a central boiler room located in the building basement. Weil McLain Boilers Model MG5 installed in 1983.

Plumbing: Fixtures are older but functional with no operational issues reported regarding the building piping systems.

The water heater is a single gas fired unit in the boiler room. The building domestic system is not equipped with a required water tempering valve. Device is required by code. The devices maintain the temperature of domestic water discharge from the water heater to a code designated range.

Ventilation: Building ventilation is served by a single air handling unit located in the attic. The unit distributes tempered ventilation air and individual space temperature control is via wall mounted perimeter radiation. The air handler is a Temtrol unit equipped with a variable frequency drive for system modulation.

Air Conditioning: The building air handler is equipped with mechanical cooling. (4) residential 4-ton air cooled condensing units create staging for the unit.

Recommendations

Ventilation: Replace the air-cooled condensing unit with a single multi-stage condensing unit.

Controls

Existing Conditions

Direct Digital Controls (DDC) provide control of the air handling unit. Boiler staging is via a manufacturer boiler staging panel.

Recommendations

Replace the air handler variable frequency drive and replace space comfort pneumatic thermostats and control valves with new DDC thermostat

Fire Suppression

Existing Conditions

The building is not equipped with a fire suppression system.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 7.2 kV single phase primary distribution line on a utility pole located on Spencer Street just off the northeast corner of the building. There is a 50 kVA (estimated) utility company oil filled transformer on the pole (Figure 1). The secondary service characteristics are 120/240 volts, single phase, three wire with a nominal 320 amp rating. The service conductors have a nominal rating of 400 amps, drop down the pole in a 3-inch conduit and continue underground to the center of the building where they rise into a metering enclosure (Figure 2).

Figure 1 – 50 KVA Pole Mounted Transformer

Figure 2 – Utility Co. Metering Enclosure, Meter and Main Disconnect

The service conductors exit the metering enclosure into a wireway and terminate in a 400 amp main disconnect switch on the adjacent wall. The highest recorded demand over the last two years from Northwestern Energy was 28.8 KW in January, 2020. The demand readings are consistently in the low to mid 20's KW range during the heating months. Based on the peak reading, the calculated demand is about 188 amps, leaving approximately 45-50% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. The building is air conditioned, so the likelihood of the need for a service upgrade is remote.

Distribution: There are three Square D NQO style panelboards in the building that appear to have been installed in 1992. They are labeled as "A, B and C". The service conductors drop down from the main disconnect switch into a wireway located in the lower-level Mechanical Room (Figure 3). There are taps in the wireway for Panel A and a sub-feed breaker for Panel B. Panel C is fed from Panel B. Panel A serves loads in the boiler room pumps, lower-level lighting and receptacle loads, an air handler unit in the attic and an elevator. Panel A doesn't appear to have any space for future breakers. Panel B serves the AC condensing units, upper-level lighting and receptacle loads, and some electric heat. Panel B has six spare spaces for future breakers. Panel C provides power for

Figure 3 – Wireway, Panel A and Panel B Sub-Feed Breaker

the Data Rack and UPS in the attic, and for receptacles on both the upper and lower levels. There are three spaces available in Panel C.

Branch Circuiting: The existing circuiting and quantities of receptacles seem to be plentiful. Many of the offices have dedicated receptacle circuits; some multiple.

Figure 4 – Panels B & C

Lighting: Most of the lighting in the building consists of 2x4 fluorescent troffers with acrylic lenses (Figure 5). Storage rooms and mechanical rooms have four foot long, surface mounted fluorescent fixtures with acrylic wraparound lenses. The fixtures appear to be in good shape.

Figure 5 – Lower-Level Lighting & LED Exit Sign

Exit and Egress Lighting: Exit signs are LED with emergency battery packs. It appears that the quantities and locations are in compliance with Codes. There were no emergency lighting units seen on the walls or ceilings, although some of the fluorescent troffers may have integral emergency battery backup. None were noted however.

Recommendations

Electrical Service: As long as the building continues to be used as an office building, the existing service should be adequate. The building is already air conditioned, and additional capacity exists if more (single phase) equipment is needed.

Electrical Distribution: Panels B and C have some spaces for additional circuit breakers, but Panel A does not. Another panel could easily be added in the lower-level and fed from Panel A if additional circuits are needed.

Branch Circuiting: Additional receptacles and circuits do not appear to be needed in the building, unless rooms are remodeled to accommodate more offices.

Lighting: Replacement of fluorescent fixtures with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Exit and Egress Lighting: The existing LED exit signs appear to be adequate. New emergency egress lighting units are needed in the corridors of both levels and in the conference room to ensure compliance with the Life Safety Code.

Low Voltage

Existing Conditions

The Main Data Rack for the building is located in the attic. Access requires climbing a ladder in a storage room or a fold down stair in the main reception area. The telephone system is also located in the rack and appears to be an older system that HSD has replaced in most of the facilities. The door access equipment is also located in the fenced area, on the east wall. Most offices and workrooms are provided with two or more data outlets, and there are some ceiling and wall mounted for the wireless access points.

The building contains a few security cameras but does not have the District standard IP based door security system that has been installed over the last four years in the Safety-Security Upgrades.

Recommendations

Add data outlets for voice may be needed in the offices if the telephone system is upgraded to the HSD Cisco standard.

Fire Alarm

Existing Conditions

The building does not have a fire alarm system and it is not required for a Type B Occupancy.

Recommendations

None

Public Address Systems

Existing Conditions

The building does not have a clock/PA/messaging system per the District standard and there is not a Code requirement for such.

Recommendations

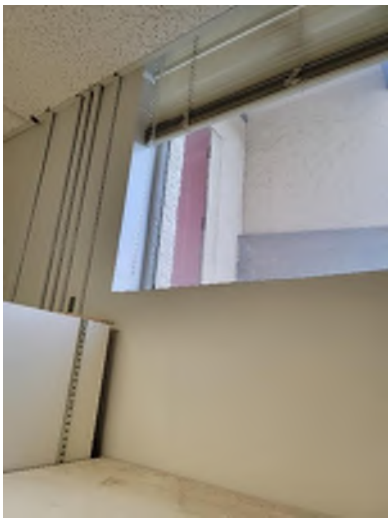
HSD may want to review the need for the system in this building.

Windows

Existing Conditions

Metal Windows: All but two of the existing windows are old steel frames with single pane glazing. These are very old not efficient window systems and all should be replaced.





Vinyl Windows: Two of the windows in the basement were replaced with Vinyl windows. This are in good shape and will not require work at this time.

Recommendations

Metal Windows: These windows should all be replaced with thermally broken aluminum windows with double paned low-e glazing. **(High Cost, High Priority)**

Doors

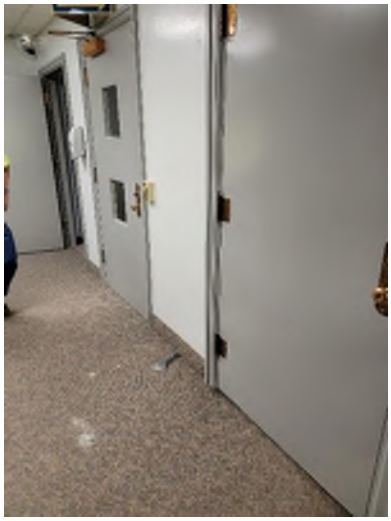
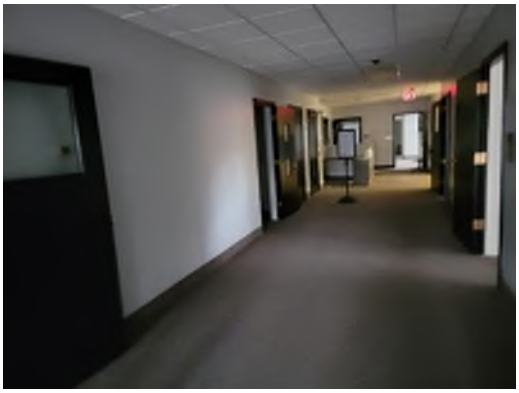
Existing Conditions

Exterior Doors: There are three different types of Exterior doors; There is an old wood door into the basement and needs being replaced. Four hollow metal doors that are also beyond their

useful life and appear to be rusting at the base. There is also a newer set of aluminum double doors installed off the parking lot that is in good shape.



Interior Doors: The corridor doors have been replaced with newer doors and hardware. However, most of the interior office doors are older and have knobs that should be replaced with lever sets to meet current life safety and ADA requirements.

Recommendations

Exterior Doors: The wood doors should be replaced with new insulated hollow metal door and hollow metal frame. The entrance and stair Hollow Metal doors should be replaced with aluminum glass storefronts. **(Medium Cost, Medium Priority)**

Interior Doors: Replace all the interior doorknobs with new lever sets. **(Medium Cost, Medium Priority)**

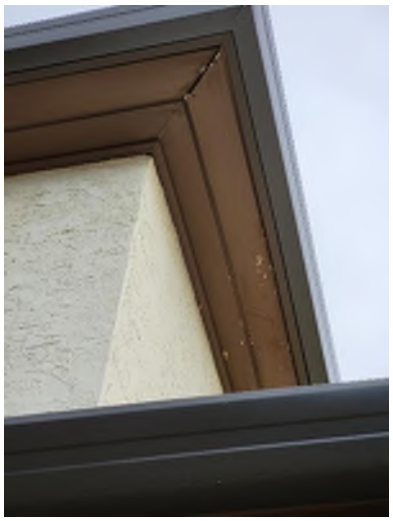
Exterior Cladding

Existing Conditions

Stucco: The exterior finish of this building is a cement stucco finish. There are a few areas that could be patched, but overall the finish is in good condition and does not need maintenance currently.

Fascia: The Fascia appears to be brake metal and is in good shape.

Soffits: The soffits are wood and need to be replaced in many locations. We are recommending they get replaced with a vented metal soffit.



Recommendations

Soffits: The soffit should be replaced with a vented metal soffit. **(Low Cost, Medium Priority)**

Accessibility

Existing Conditions

Parking: The parking spot does have the necessary slope to meet ADA requirements, however, the surface is more gravel at this point then a hard surface. This should be replaced with a better concrete pad that ties into the entrance ramp.

Elevator: There is a lift that accesses the two levels and appears to be in good working condition.

Restrooms: There are not currently Accessible restrooms that meet currant clearances. These should be renovated to make sure they have accessible facilities.

Recommendations

Parking: Pour a new concrete parking pad for the ADA spot. **(Medium Cost, Low Priority)**

Restrooms: Renovate one men's and one women's restroom and renovate them to meet the accessible clearances. This will require that one fixture is removed from each and the partitions get rebuilt. **(Medium Cost, Medium Priority)**

Roofing

Existing Conditions

The building roofing system in good condition. There is a mix of roof coating material and shingle material.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Reroofing roof sections B, C are over small attached hallway & storage space. These roofs are of elastomeric coating material– **(Low Cost – High Priority)**

Maintenance Building

Overview

Address:

1201 Boulder Avenue

Helena, MT 59601

Year Built:

2019

Building Area:

12,490 SF

Parking, Sidewalks and Site

Existing Conditions

The area behind the maintenance shop that is used for overflow parking and outside work area is currently gravel, not graded for proper drainage, and not connected to the city storm sewer.

Recommendations

Design the approximately 19,000 square feet area to current code and connect to city storm sewer. Layout, pave and paint parking spots as appropriate. $115,000

HVAC

Existing Conditions

Heating System: The office area heating system was recently upgraded with (2) gas fired horizontal furnaces located in an equipment loft.

Building shop area is heated with gas fired infrared tube heaters.

Plumbing: Building plumbing fixtures were upgraded during the building renovation.

Domestic hot water for the building is generated with a 30-gallon electric water heater.

Ventilation: Shop area exhaust systems are coupled with gas fired make-up air systems which maintain the proper space ventilation rates.

Air Conditioning: The building is not equipped with mechanical cooling.

Recommendations

Ventilation: The hood installed over the welding area in the shop should be revised to prevent roll-out.

The cabinet shop dust collector is a relocated unit. The unit should be scheduled for replacement.

Controls

Existing Conditions

Equipment is controlled with electric seven-day programmable thermostats.

Recommendations

None

Fire Suppression

Existing Conditions

The building is not equipped with a fire suppression system.

Recommendations

None

Electrical

Recommendations

There is currently no work required.

Low Voltage

Recommendations

There is currently no work required.

Public Address Systems

Recommendations

There is currently no work required.

Windows

Existing Conditions

All the windows were recently replaced in 2018 remodel with Thermally broken double pane low-e glazing and are in good condition.

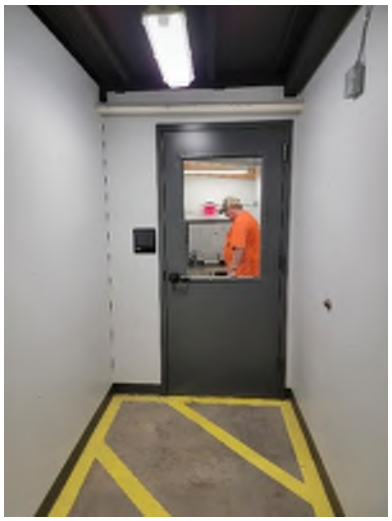
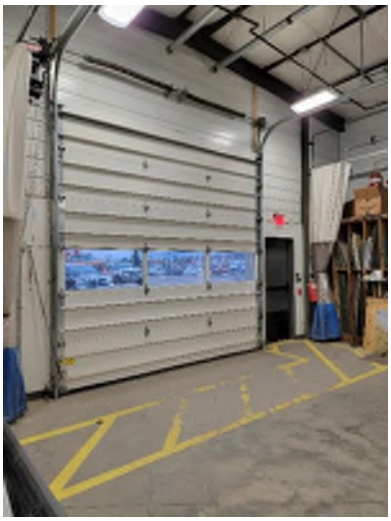
Recommendations

There is currently no work required.

Doors

Existing Conditions

All of the doors were replaced in the 2018 remodel and are in good working condition.

Recommendations

There is currently no work required.

Exterior Cladding

Existing Conditions

Main Buildings: The exterior is a stucco system and all the cracked finished was replaced in the 2018 remodel and is in good shape. In addition, new metal panels were installed where large patches would have been required.


Out Buildings: There are two cold storage outbuildings that while in bad conditions are probably not worth putting a lot of money into renovations but will eventually need to be replaced.

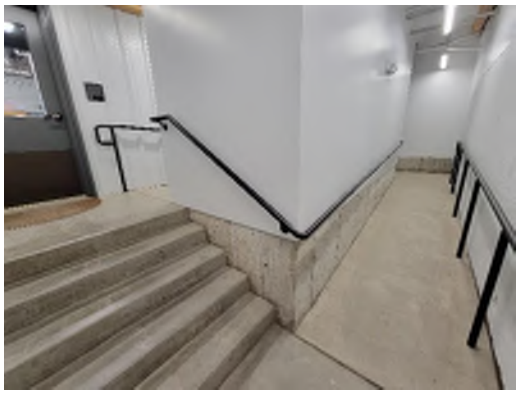
Recommendations

There is currently no work required.

Accessibility

Existing Conditions

Main Buildings: All of the accessible features were brought up to current ADA requirements during the 2018 renovation. This included Parking, Restrooms, Accessible routes.



Out Buildings: The two outbuildings are not accessible, but no public access is required and they are used for storage. At this time no additional renovations are recommended.

Recommendations

There is currently no work required.

Roofing

Existing Conditions

The building roofing system in excellent condition.

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

Lincoln

Overview

Address:

1325 Poplar Street

Helena, MT 59601

Year Built:

1946

Building Area:

18,780 SF

Parking, Sidewalks and Site

Existing Conditions

The main existing parking lot is currently gravel, not graded for proper drainage, and not connected to the city storm sewer.

Recommendations

Design the approximately 19,000 square feet area to current code and connect to city storm sewer. Layout, pave and paint parking spots as appropriate. $115,000

HVAC

Existing Conditions

The facility is currently being renovated by HPS staff.

Recommendations

None

Controls

Existing Conditions

The facility is currently being renovated by HPS staff.

Recommendations

None

Fire Suppression

Existing Conditions

The building is not equipped with a fire suppression system.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 7.2 kV single phase primary distribution line on a utility pole located in the parking lot west of the building off of N. Cooke Street. There is a 167 kVA utility company oil filled transformer on the pole (Figure 1). The secondary service characteristics are 120/240 volts, single phase, three wire with an estimated nominal 600-amp rating. The service conductors drop down the pole in a 4-inch conduit and continue underground to the main building where they rise into a metering enclosure (Figure 2). There is a second drop from the pole to the adjacent Information Technology Building. The conductors appear to be rated for 400-amps. The service terminates in a pedestal mounted metering cabinet with a meter adjacent (Figure 3).

Figure 1 – 167 KVA Pole Mounted Transformer. Modular Building Service Equipment Beyond

Figure 2 – Main Building Utility Co. Metering Enclosure, Meter and Main Disconnects

The service conductors for the school exit the metering enclosure and terminate in a wireway with two 400-amp main disconnect switches on the adjacent wall. The highest recorded demand over the last two years from Northwestern Energy was 33.4 KW in December 2020. The demand readings are

consistently in the 20 to 30 KW range during the heating months, and around 15 KW in the cooling months. This might change however, since the building usage is changing to an office. Based on the peak reading, the calculated demand is about 218 amps, leaving approximately 45-50% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

The service conductors for the Information Technology Building exit the back of the metering enclosure into a wireway with three 200-amp main breakers and one 100-amp mounted on the back side of the metering cabinet (Figure 4). The highest recorded demand over the last two years from Northwestern Energy is 43 KW in November 2019. Based on this value, the calculated demand is about 280 amps, leaving approximately 35-40% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

Figure 3 – Metering Cabinet and Meter for Information Technology Building

Figure 4 – Main Disconnects for Info Tech Bldg Panels A, B, C & D

Figure 5 – Wireway in Basement with Disconnects for Panels A, B, C, D, G & N

Distribution: There are eight branch panelboards in the main building and four on the exterior walls of the Information Technology Building. None of the panelboards are obsolete. However, the main building does not have a main distribution board. Instead there is a wireway in the basement boiler room (Figure 5) with multiple conductor taps for panels A, B, C, D, G and N. All are fed from one of the 400-amp main disconnects on the building exterior. This type of arrangement is difficult to service, maintain, isolate problems or add equipment. The remaining panels in the building, E and F (Figure 6) are located in a storage room near the gymnasium and once served loads in a kitchen. They are fed from the other main disconnect of the building exterior. The Information Tech building has only the outdoor panelboards. Each of the four building modules is served by one of the panels. There are no known maintenance issues with this arrangement.

In the main building many of the panelboards are full and a new 42 circuit panelboard (G) was recently installed in the Basement Boiler Room. About half of the circuit breakers appear to be spares. One of the panelboards, B (Figure 7), is located in a storage closet near the east end of the building. Access is blocked due to boxes being stored in the closet.

Figure 6 – Panels E & F

Branch Circuiting: The existing circuiting and quantities of receptacles seem adequate for the current function of the building. Many of the offices have dedicated receptacle circuits; some multiple.

Lighting: Most of the lighting in the building consists of four-foot-long volumetric curved lens surface mounted LED fixtures which were recently installed. The Gymnasium lighting appears to be T8 or T5 surface mounted fluorescent. There is a small modular classroom that was being remodeled at the time of the site visit that had 4-foot long T8 fluorescent surface wraparound fixtures.

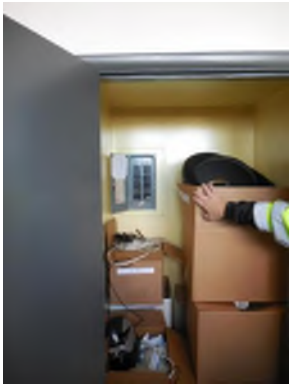


Figure 7 – Panel B

Exit and Egress Lighting: Exit signs are LED with emergency battery packs. It appears that the quantities and locations are in compliance with Codes.

Recommendations

Electrical Service: The two existing main service disconnects should be replaced with a new single main disconnect. The service does not necessarily need to be upgraded to 3-phase, but if central AC is installed later, then 3-phase will become necessary. A 600-amp electrical service would be sufficient.

Electrical Distribution: Replacement of the wireway and tapped disconnects in the basement with a 600-amp distribution board is recommended. The board could include capacity for future air conditioning. All of the existing 1-phase panels will be reconnected to the new distribution board with individual circuit breakers. If the service is upgraded to 3-phase, then the single-phase panel feeders will be connected in a staggered phase configuration so as to prevent phase imbalances. Panel B should be removed and replaced with a new panelboard in a location that is more amenable for maintenance and troubleshooting.

Branch Circuiting: Additional receptacles and circuits do not appear to be needed in the building, unless rooms are remodeled to accommodate more offices.

Lighting: Replacement of any remaining fluorescent fixtures in the gymnasium or the small modular with LED fixtures and controls is recommended. The energy savings combined with improved occupancy sensors and dimming controls is substantial. There is an added benefit of increased life, which will help reduce maintenance costs. Rebates are available from Northwestern Energy and NCAT to help offset the cost of replacement.

Exit and Egress Lighting: The existing LED exit signs appear to be adequate. A few more emergency egress lighting units may be needed in the corridors, gymnasium and in the conference room to ensure compliance with the Life Safety Code.

Low Voltage

Existing Conditions

The Main Data Rack for the building is located in the basement in a separate room. Most offices and workrooms are provided with two or more data outlets, and there are some ceiling and wall mounted for the wireless access points.

The building is currently being upgraded, adding several security cameras and the District standard IP based door security system also currently being installed.

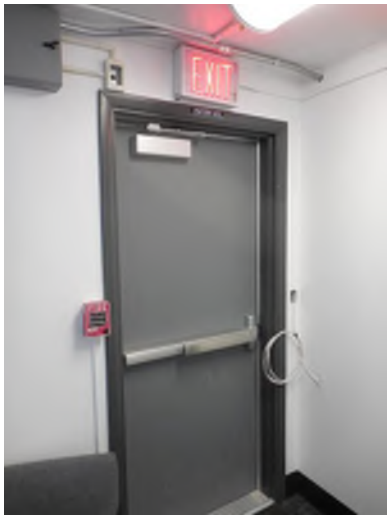


Figure 8 – Exit Lighting, Pull Station & Door Security Rough-in

Recommendations

None

Fire Alarm

Existing Conditions

The building has a Silent Knight SK-5208 fire alarm control unit (Figure 9) with manual pull stations at the exit doors. Some of the former classroom spaces have smoke detectors and all spaces are equipped with combination horn/strobes.

Figure 9 – Fire Alarm Control Unit

Recommendations

None

Public Address Systems

Existing Conditions

The building has been upgraded with an IP-based clock/PA/messaging system per the District standard.

Recommendations

None

Windows

Existing Conditions

Main Building Windows: The windows in the main school building appear to be aluminum clad wood windows with single pane glazing. These are well past their useful life and needs to be replaced.

IT Outbuilding Windows: The IT modular outbuilding windows are Vinyl Double pane windows and appear to be in good shape with no need for current work.

Small Outbuilding Windows: The small outbuildings windows are Single Pane glazed and aluminum windows. These windows need replacement.

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Recommendations

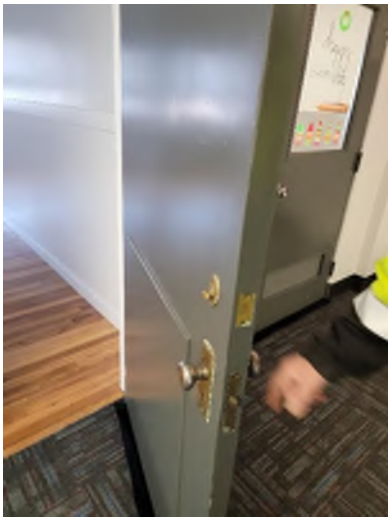
Main Building Windows: Replace all the existing aluminum clad wood windows with single pane glazing. The new system should be thermally broken aluminum framed windows with double pane low-e glazing. **(High Cost, Medium Priority)**

Small Outbuilding Windows: Replace the Single Pane glazed and aluminum windows with new thermally broken aluminum framed windows with double pane low-e glazing. **(Low Cost, Low Priority)**

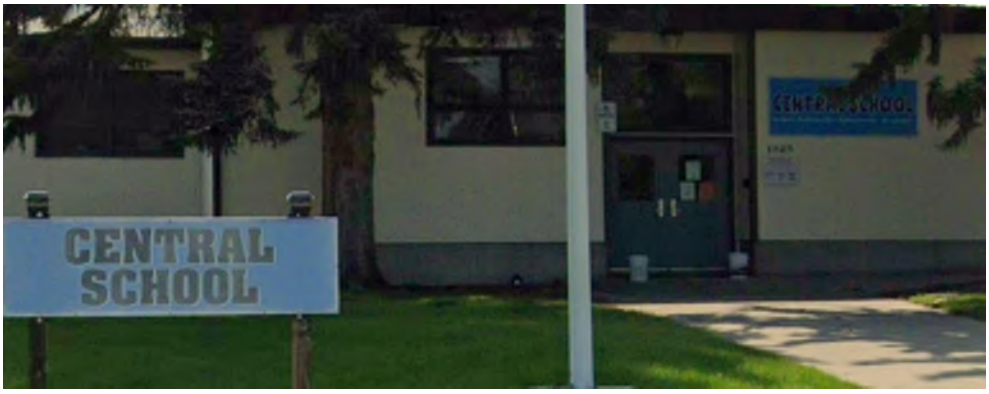
Doors

Existing Conditions

Main Building Interior Doors: During the 2021 remodel the new doors that were installed are in good shape. However, the original Interior Doors are still Knobs and should be replaced with lever sets to meet life safety and accessibility requirements.



Main Building Exterior Doors: The exterior doors at Lincoln are older Hollow Metal Doors and are also in need of being replaced.



IT Outbuilding Doors: The doors on the IT outbuilding are in good shape for the time being. While there is currently no work required at this time.

Small Outbuilding: The small outbuildings exterior doors have recently been replaced and appear to be in good condition.

Recommendations

Main Building Interior Doors: Replace all door hardware from knobs to lever sets. **(Medium Cost, High Priority)**

Main Building Exterior Doors: Replace the five exterior man doors with new galvanized insulated Hollow metal doors and frames. **(Medium Cost, Low Priority)**

Exterior Cladding

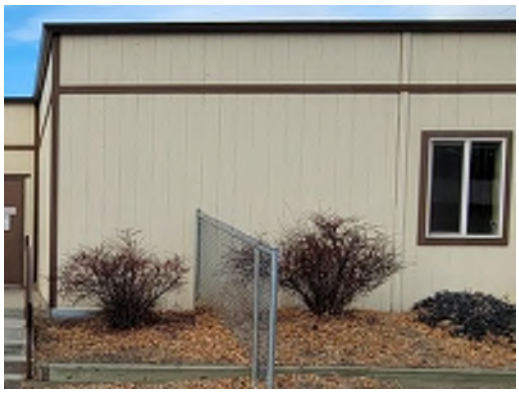
Existing Conditions

Main Building Cladding: The exterior on the Lincoln Building is a prefinished panel and is in dire need of being replaced.



Main Building Soffits and Fascia: The soffit and fascia of the main building are all metal and they appear to be in good shape.

IT Outbuilding Siding: The IT outbuildings siding is modular T111 and while not a great material for durability, its condition is still in good shape and not in need of maintenance currently.



Small Outbuilding Siding: The small outbuilding modular is also T111 however this siding on the older building is in worse space and should eventually be replaced.

Recommendations

Main Building Cladding: Replace all prefinished paneling with a more durable fiber panel or metal paneling. **(High Cost, Medium Priority)**

Small Outbuilding Siding: The small outbuilding modular is also T111 however this siding on the older building is in worse space and should eventually be replaced. **(Medium Cost, Low Priority)**

Accessibility

Existing Conditions

ADA Restrooms: The two main restrooms were refinished this last year and are close to being accessible, but there is a need to remove the main door into the restroom and add vertical grab bars.

ADA Parking: There is no ADA parking that has good access to any of the buildings. With the large public use this building has, this will need to be fixed.

Small Outbuilding Ramp and Stair: The ramp and stair on the small outbuilding is beyond repairable and is a hazard. These systems need to be replaced.

Recommendations

Main Building ADA Restrooms: Remove the Door so the door access meets ADA clearances into the main restrooms. Add vertical Grab Bars. **(Low Cost, High Priority)**

ADA Parking: Pour new concrete ADA parking spots with all slope and cross slopes meeting requirements to all three buildings. **(Medium Cost, High Priority)**

Small Outbuilding Ramp and Stair: Replace the ramp and stair system on the small outbuilding. **(Medium Cost, High Priority)**

Roofing

Existing Conditions

The building roofing system in excellent condition. There is a mix of thermoplastic single ply and shingle roofing materials. The entire building is slated to be reroofed in summer of 2022

Recommendations

Perform annual roof maintenance. Roof sections are defined by material locations. Roof overview drawings are available in the Roof Assessment Report.

7th Avenue Gym

Overview

Address:

357 Cruse Avenue

Helena, MT 59601

Year Built:

1908

Building Area:

9,800 SF

Parking, Sidewalks and Site

Recommendations

There is currently no work required.

HVAC

Existing Conditions

Heating: The building utilizes (3) Burnham cast iron sectional boilers Model 810B-WI to generate heated water for the building. Theses boilers were installed to replace the (2) locomotive engine heating boilers that are abandoned in the equipment room. At the time of the inspection only 2 of 3 boilers were operational.

Two Taco base mounted pumps distribute heated water throughout the building.

The gymnasium space is presently heated with hydronic unit heaters.

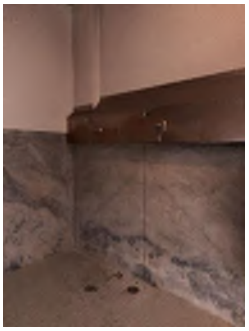
Ventilation: The building is equipped with a ventilation air handler, Temtrol. The unit is in operational condition but not operating. The unit has been switched off with the reduced function of the building.

The building exhaust systems are operated with older in-line exhaust fans. The fans have been switched off but operational. The fans were found in fair to poor condition.

Plumbing: The domestic water system is insulated copper piping. Isolation valves in the system are indicating their age with leaking valve packing and sections of insulation missing due to previous repairs. Isolation valve operational status was indicated as a problem (valves don't work). When repair work is required on the domestic water system the entire building service needs to be shut-off to allow service.

Domestic hot water for the building is generated with single Lochinvar water heater located in the equipment room. The domestic hot water system is not equipped with a tempering valve as required by code. The building (1) domestic recirculation loops contain individual circulation pumps. These pumps are original to the building

Locker room shower drains do not meet current code. Via current code, drainage from one shower cannot drain through another occupied space.



Recommendations

Heating: Replace the cast iron sectional boilers if the building is going to be restored to occupied status. If the building is going to remain as a storage facility consideration should be given to continuing to use the existing hydronic heating system or adding gas fired unit heaters to the gymnasium space to provide reduced temperature space heat.

Replace all exhaust fans.

Controls

Existing Conditions

The boiler room equipment is controlled by a manufacturer boiler staging panel. Space temperature controls were found as a mixture of electric and pneumatic controls

Recommendations

If the building is restored beyond a storage facility, building equipment should be connected to the district DDC control system

Fire Suppression

Existing Conditions

The building is NOT equipped with a fire suppression system.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: The building service is derived from a 12.47 kV three phase primary distribution line on a utility riser pole located on 7th Avenue southeast of the building (Figure 1). The primary runs underground and then up into a pad mounted transformer located off the northeast corner of the building. The secondary service characteristics are 120/208 volts, three phase, four wire with a nominal 320 amp rating. The service conductors are in a 3-inch conduit underground from the transformer and up to a meter/main (Figure 2).

Figure 1 – Primary Electrical Service

Figure 2 – Utility Co. Meter/Main, Meter and Main Disconnects

The service conductors exit the meter/main and terminate in two 200 amp main disconnects adjacent. Each of the disconnects feeds a branch panelboard in the building. The highest recorded demand over the last two years from Northwestern Energy was 10.6 KW in January, 2020. The demand readings are extremely low, and almost meaningless, since the building is used mainly for storage and is not normally occupied. Based on the peak reading, the calculated demand is about 46 amps, leaving approximately 80% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87.

Distribution: There are two Square D NQO style panelboards. They are labeled as "A and B". Disconnect A feeds Panel A located on the main level. Panel A could not be accessed due to it being blocked by furniture. Panel B is located in the basement boiler room and services mainly mechanical equipment. It has very little space for future circuit breakers.

Figure 3 – Panel B

Branch Circuiting: The existing circuiting and quantities of receptacles are adequate for the current use of the building as a storage facility but would not be nearly enough if the occupancy of the building were to change.

Lighting: The lighting in the building is mostly four foot long, surface or suspended fluorescent fixtures with acrylic wraparound lenses or louvers.

Exit and Egress Lighting: Exit signs are LED with emergency battery packs. It appears that the quantities and locations are in compliance with Codes. There are emergency egress lighting units seen on the walls but it is doubtful that their batteries are still functional.

Recommendations

Electrical Service: As long as the building continues to be used for storage, no upgrade to the service is necessary. If in the future, the building will be converted back into an occupied space, either as a gym, classrooms or offices, a new electrical service will be required.

Electrical Distribution: The current building needs are being met by the existing panelboards. Future conversion to occupied space will require a new 600 amp to possibly 800 amp main distribution board if air conditioning is needed.

Branch Circuiting: Additional receptacles and circuits are needed if the building is converted.

Lighting: No lighting upgrade is needed unless the building occupancy is changed. At that point, replacement of all the existing lighting with LED fixtures and controls is recommended.

Exit and Egress Lighting: The existing LED exit signs appear to be adequate but would be replaced with new should the building be upgraded. New emergency egress lighting units should be installed to replace the existing and ensure that adequate emergency illumination is provided in the basement level and in the corridors and exit pathways on the main level.

Low Voltage

Existing Conditions

It does not appear that there is much useable equipment in the building.

Recommendations

HSD may want to consider placing a few surveillance cameras in and around the building. Obviously, any change to the occupancy where the building would be used for educational needs will require complete IT systems for phone, data, security, etc.

Fire Alarm

Existing Conditions

The building does not have a working fire alarm system and it is not required for a storage building.

Recommendations

Any upgrades to the building that would result in K through 12 educational use will require a new fire alarm system with voice evacuation.

Public Address Systems

Existing Conditions

The building does not have a functional clock/PA/messaging system.

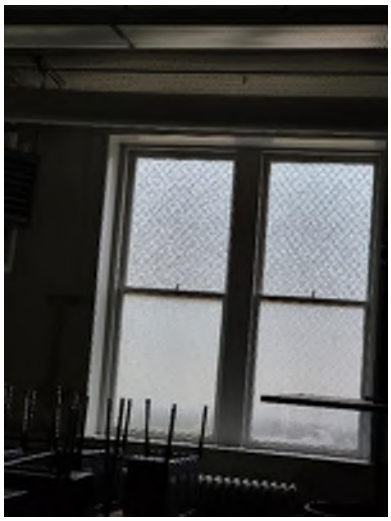
Recommendations

This system will be needed if the building is converted to K-12 use or possibly district offices.

Windows

Existing Conditions

Original Wood Windows: All of the windows on the 7th Avenue Gym are old single pane framed windows. Because of the location of the building and the fact that it is no longer actively used a lot of the windows were boarded up.

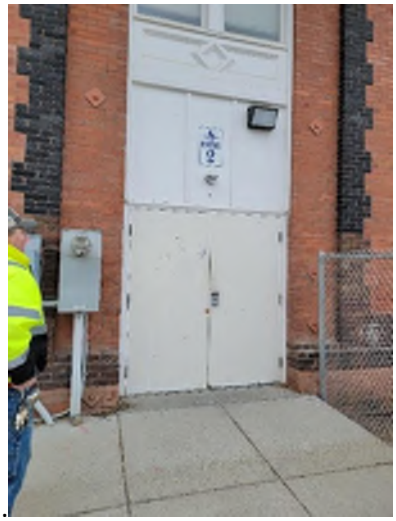

Recommendations

Original Wood Windows: These windows need being replaced, but the building is on the Historic Registry and will require historically accurate custom replacement windows. I would recommend an aluminum clad wood window with double pane low-e glazing. **(High Cost, High Priority)**

Doors

Existing Conditions

Exterior Doors: While the doors are not original to the building, all appear needing to be replaced, as they are well beyond their useful life.


Interior Doors: The interior doors are original to the building, and all have knobs and the hardware needs to be updated.

Recommendations

Exterior Doors: It would be recommended to replace the doors with a more historically accurate exterior door and hardware system. **(Medium Cost, Medium Priority)**

Interior Doors: Replace the interior doors with historically accurate wood panel doors have lever sets in place of the knobs. **(Medium Cost, Low Priority)**

Exterior Cladding

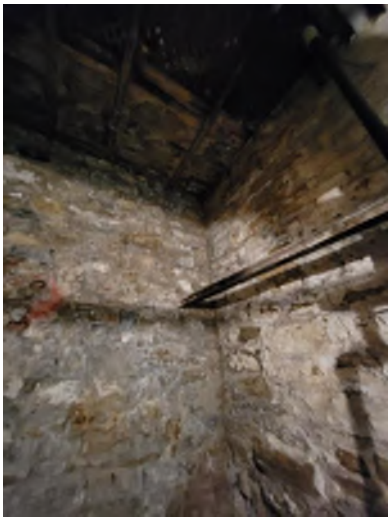
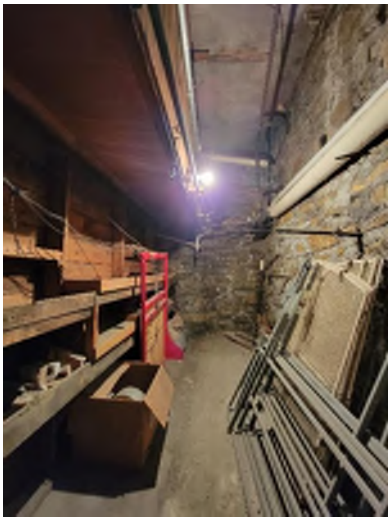
Existing Conditions

Masonry: The masonry on the 7th Avenue Gym, while beautiful, needs maintenance. All the mortar joints are cracked and need updated. It appears that reinforcing plates were added to the exterior at some point and it is questionable if they meet seismic requirements. The stack on the building will most likely need substantial seismic renovation.


Cornice, Fascia, Soffit: The cornice, fascia and soffit work on the 7th avenue gym is also beautiful and worth preservice, but it is all wood and in need of restoration.

Second Floor Track: The second-floor track has been condemned and is unsafe. This system will need structural retrofits if it is going to be made functional again.

Rubble Foundation: The foundation work on the 7th Avenue Gym is a rubble stone foundation system and needs to be restored and reinforced to meet seismic and strength requirement.


Recommendations

Masonry: Restoration of the masonry will require repointing all the mortar joints and require seismic upgrades be made to the building. It is extremely hard to estimate the cost for this work, but it will be high. **(High Cost, High Priority)**

Cornice, Fascia, Soffit: Restore the cornice, fascia, and soffit on the roof. **(Medium Cost, Low Priority)**

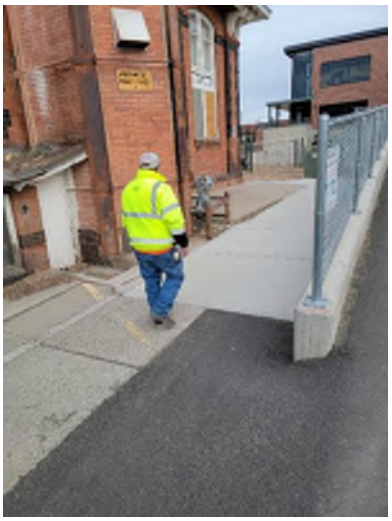
Second Floor Track: Structurally renovate the second-floor track to allow for future us. It is extremely hard to estimate the cost for this work, but it will be high. **(High Cost, High Priority)**

Rubble Foundation: Restore and reinforce the rubble stone foundation and walls. This will likely require structural seismic Reinforcement. **(High Cost, High Priority)**

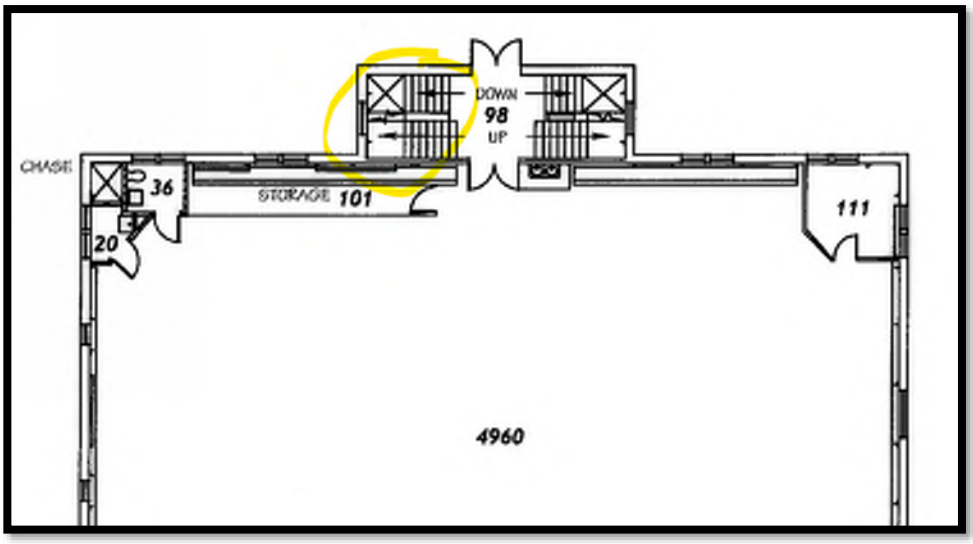
Accessibility

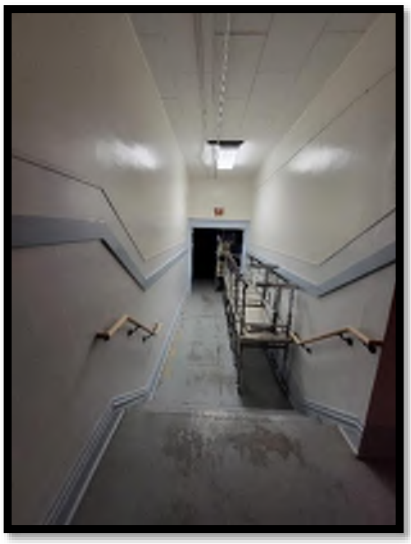
Existing Conditions

Parking: There is what appears to be one Accessible parking spot, but the access is only to the main gym floor. The slopes are outside the code minimums there will be some work required to make the parking accessible.



Accessible Routes: There is only an accessible route to the main gym floor. There is no accessibility to the second level track or the basement. A lift will need to be added and a ramp will be needed to access the basement lower area. It would be possible to remove one of the two main stairs and create access lift to all three levels.





Restrooms: The restroom on the main level will require some minor modifications to bring it into accessible clearances. I would also recommend creating accessible facilities in the basement.

Recommendations

Parking: Replace the parking spot with an ADA accessible one. **(Medium Cost, High Priority)**

Accessible Routes: Providing this accessible route will require a lift to be added and a ramp added to the basement lower area. It would be possible to remove one of the two main stairs and create access to all three levels. **(High Cost, High Priority)**

Restrooms: Renovate the Main floor Gym restroom to allow for accessible clearance and renovate both basement restrooms and Locker Rooms to be accessible. **(Medium Cost Hight Priority)**

Vigilante Stadium

Overview

Address:

1025 North Rodney Street

Helena, MT 59601

Year Built:

1938

Building Area:

2,000 SF

Parking, Sidewalks and Site

Recommendations

Currently there are no recommendations.

HVAC

Existing Conditions

Building is equipped with electric space heating.

Recommendations

None

Controls

Existing Conditions

Self-contained equipment mounted thermostats.

Recommendations

None

Fire Suppression

Existing Conditions

Building NOT equipped with fire suppression system.

Recommendations

None

Electrical

Existing Conditions

Electrical Service: There are three services at Vigilante Stadium. There is a utility company pad mounted transformer on each side of the stadium between the edge of the playing field and the running track, and another underground service drop from a pole on the west end for a Concessions building and two ticket booths (Figure 1). The Concession building service is 120/240 volts, single-phase, three-wire, 200 amps. It is direct metered with no demand meter.

Figure 1 – Utility Lighting Pole with Service Drop to Concessions Building

Figure 2 – Primary Junction Can at Helena Middle School

The service to the transformers is underground but it is not clear where it originates. It may come from the north, since there is a primary junction can near the transformer pad for Helena Middle School, but this is unconfirmed. (Figure 2).

The underground primary terminates in north pad mount transformer, then continues to the transformer on the other side of the field (Figure 3). Adjacent to the transformer on the north side, is a pedestal mounted metering enclosure, a meter, a main distribution board with (2) 200A disconnect switches for the lighting poles, a load center and a 100 amp disconnect switch for the press box and storage room load centers (Figure 4). The secondary service characteristics are 120/240 volts, single phase, three wire with a nominal 400 amp rating. The highest recorded demand over the last two years from Northwestern Energy was 37.8 KW in November, 2020 for the South side meter. The demand readings are consistently in the low to mid 30's KW range during the months when the stadium lighting is used. Based on the peak reading, the calculated demand is about 250 amps, leaving approximately 30-35% of spare capacity after applying a 0.8 power factor and the demand at 125% per NEC Article 230.87. The peak demand for the North side meter could not be obtained, but is believed to be similar.

Figure 3 – Transformer & Pedestal on South Side of Field

Distribution: There are service pedestals at both the North and South sides of the stadium with Main Distribution Boards that have two, 200 amp fusible disconnect switches inside; one for each lighting pole. At the North side, there is a third 100 amp disconnect switch on the opposite side of the Distribution Board (Figure 5) that serves a load center in the Press Box and another in the storage room under the stadium. There is a load center adjacent to the 100 amp disconnect with a 100 amp main breaker. It serves 20 amp receptacles inside of the enclosure and a 50 amp outlet.

The load center in the Press Box serves lights, receptacles and another load center for PA/sound system equipment (Figure 6). There are also limited amounts of small plug-in electric heaters in the press box. There is a storage room below the north stadium bleachers with a small load center. It is fed from the same 100 amp disconnect at the service pedestal that feeds the Press Box load center.

Figure 4 – Service Pedestal with Main Distribution Board, Metering Cabinet, Meter and Utility Co. Pad Mounted Transformer on North Side of Field

Figure 5 – 100A Disconnect and Load Center on North Side

Figure 6 – Load Centers in Press Box

The underground service for the Concessions Building rises to a meter/main breaker assembly on the South end of the building. The Meter/Main feeds a 42 circuit load center in the Concessions Building (Figure 7) and small load centers in the Ticket Booths. The Concessions Building contains fixed electric heat, fluorescent lighting, a small water heater and receptacles for soda refrigerators, a popcorn machine and a few small appliances. There are no grills or cooktops. There are two public restrooms at the south end of the building with similar electric unit heaters and lights. The ticket booths are newly constructed and did not appear to be finished during the time of the site visit. Both contained just a small number of receptacles and a few 4-foot LED strip lights. There did not appear to be provisions for any heating.

Figure 7 – Load Centers in Concessions Building

Recommendations

Electrical Service: The services appear to be sufficient for current needs.

Electrical Distribution: The distribution equipment appears to be sufficient for the Concessions and Ticket Booths. Some consideration should be given to increasing the feeder and load center in the Press Box to 200 amps, if fixed electric heating needs to be added.

Branch Circuiting: The Concessions and Ticket Booth circuiting and receptacles appear to be adequate for current needs. The Press Box does not have a significant quantity of receptacles and additional receptacles would be of benefit to accommodate Smart Phone, laptop and iPad chargers. Adding some fixed electric heating units would allow the removal of the plug-in portable heaters.

Lighting: There isn't a significant amount of lighting in the buildings, but it would still be beneficial if the fluorescent fixtures were replaced with LED fixtures. This could be accomplished in conjunction with a lighting retrofit in Helena Middle School.

Exit and Egress Lighting: Exit signs may not be necessary, if only one exit is required. However, the Concessions Building and the Press Box should have a few emergency egress lighting units for personnel safety, work hazards and safe evacuation of the building.

Low Voltage

Existing Conditions

The Press Box has a small data rack and a few outlets available for communications (Figure 8). Data has also been extended into the new Ticket Booths. No deficiencies have been reported.

Figure 8 – Data Rack Enclosure in Press Box

Recommendations

None

Fire Alarm

Existing Conditions

None of the buildings have a fire alarm system and it is not a Code requirement for the occupancy.

Recommendations

None

Public Address Systems

Existing Conditions

There is a PA system amplifier in the Press Box (Figure 9). The speakers are located on the light poles and on the roof (Figure 10). There are microphone jacks located inside of the service pedestal on the north side of the field.

Recommendations

None

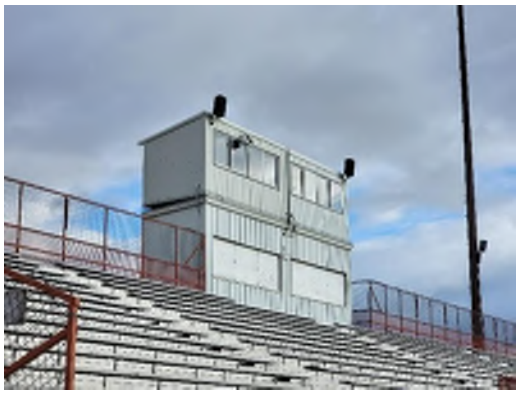
Figure 9 – PA System Amplifier in Press Box

Figure 10 – PA Speakers on the Press Box and Lighting Poles

Windows

Existing Conditions

Grandstand Crow's Nest: The only windows on the Crows Nest appear to be Metal Single Pane Sliders. As this building is only utilized during sporting events and not actively heated it is not recommended to replace them.



Ticket Booths: The ticket booths were just installed in the summer of 2021, and the windows are vinyl and in good shape.

Concessions: The stand does not have any windows and only has wood shutters over the concession openings.

Recommendations

Currently no recommendations

Doors

Existing Conditions

Grandstand: There are only a few doors on the grandstand under the seating and is used for storage. Both the overhead door and man door are heavily used during football and track and have some damage to prove it. They should be replaced in the future as they are being abused.

Ticket Booth: The ticket booths were just installed in the summer of 2021 and have no needed work.

Concessions: The concessions doors are hollow metal and appear to be in good condition.

Recommendations

Grandstand: Replace both the man door and the overhead door on the storage under the grandstand in the future. **(Medium Cost, Low Priority)**

Exterior Cladding

Existing Conditions

Grandstand: There is metal siding on the storage structure which is dented and damaged. If there is a point that moisture begins to enter the building this siding should be replaced.

Crow's Nests: The siding on the crow's nest is Metal Delta Rib and in good condition.

Concession: The concession building is prefinished panels and is on the list of projects to be renovated with fiber cement siding that match the new ticket booths.

Ticket Booths: The ticket booths were constructed in 2021 with fiber cement siding and is in good condition.

Recommendations

Grandstand: Replace the Metal Siding with a more durable material that will not get as damaged in future use. **(High Cost, Low Priority)**

Concession: Replace the prefinished panels with fiber cement siding that match the new ticket booths. **(Medium Cost, Low Priority)**

Accessibility

Existing Conditions

The accessibility to the stadium and seating was just fixed during the 2021 stadium renovations.

Recommendations

Currently no recommendations.