Charles City CSD High School

Mechanical and Electrical
Building Assessment Summary

Charles City CSD High School

1 Comet Drive

Charles City, IA 50616

FINAL DRAFT

February 19, 2026

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Mechanical & Electrical Systems Analysis

HVAC Systems

Existing

The building heating, ventilation and air conditioning (HVAC) systems consist of a few window air conditioners, perimeter wall steam heaters and indoor air handling units with steam heat. The HVAC system is outdated and needs revamping to better serve the building's needs and energy efficiency concerns. There is no air conditioning in the Gym, Locker Rooms, Shop Areas, Kitchen, Cafeteria, Offices, or Circle Buildings.

There are two 150 hp Burnham Scotch Marine steam boilers in the basement boiler room with efficiencies around 70% or less. The boilers appear to be in good condition and operating as designed. Steam is distributed through the tunnel system under the buildings serving perimeter heaters and above the ceilings to ceiling heaters in some areas. The condensate return piping runs down through the tunnels back to the condensate return system in the lower portion of the boiler room. The steam traps and heater controls do not appear to be working properly as the rooms are over heating and not under control.

The Science Building no longer utilizes heating water piping from the shell and tube steam-to-hot water heat exchanger in the basement boiler room supplied by 3 hp, based mounted pumps. The insulated piping appears to be in good condition except for the Circle Buildings where the grooved pipe joints do not seal properly and leak.

The existing building automation system (BAS) is pneumatic controls in the offices and to the south while the control valves were upgraded to electronic controls in the Circle buildings and to the north. The BAS is managed by FM Controls out of Ft. Dodge. The pneumatic system is leaky, and not all devices function correctly. A full control changeover from pneumatics to DDC is needed.

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CTE Area [Phase 1]

Existing

The Career Training Education wing has existing Unit Ventilators with steam heat hung above the ceiling of each Classroom and Shop area. These units provide ventilation and heating to the spaces without cooling or dehumidification. There are steam heaters along the perimeter of the rooms as well as steam unit heaters in the Welding Shop.

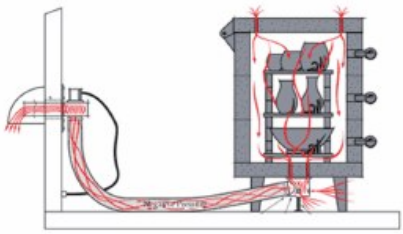
Proposed

To have cooling, ventilation, heating, and dehumidification in the CTE Areas, it's recommended to provide multiple single zone rooftop units above each Classroom space with room thermostat control. There would be some exposed spiral ductwork which may require some lighting revisions. It's recommended not to add cooling in the shop areas. The recommendation would be to replace the steam heaters with electric or gas fire unit heaters hung in the Shops coupled with industrial style ceiling fans to provide comfort cooling as desired.

Art Room [Phase 1]

Art Classroom Sinks do not have clay traps to meet the intent of a trap to limit clay and sediment into the sanitary sewer system. These are recommended to be replaced with proper traps and accessibility.

The kiln exhaust fan ductwork appears too small and needs upgraded. An exhaust hood above kiln is also recommended but not required. When the kiln lid is opened, the heat and humidity goes in to the Art Classroom. A hood would capture the heat and humidity and extract from building to exterior.



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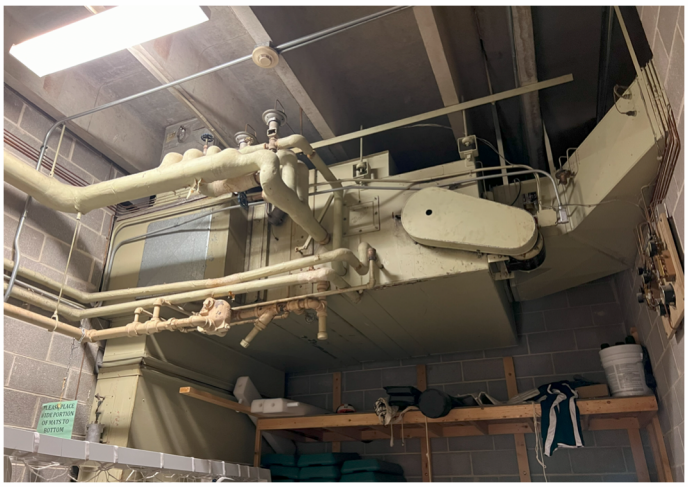
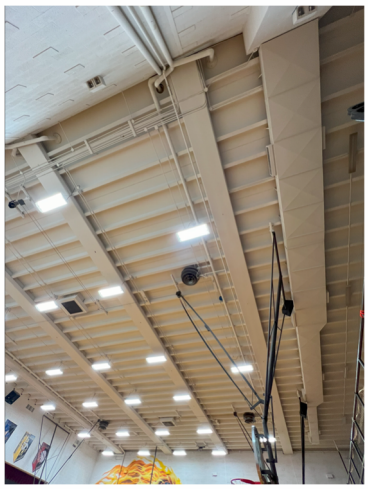
Fire Alarm System [Phase 1]
The existing building has a standard Notifier Fire Alarm System that needs to be upgraded to a Voice Evacuation Fire Alarm System.

Bidirectional Amplifier System (First Responder Communications) [Phase 1]
Most jurisdictions require buildings to provide reliable in-building radio coverage for first responders. Properties that do not meet NFPA, IFC, or local AHJ standards are required to install an Emergency Responder Communication Enhancement System (ERCES) to achieve compliance and maintain their Certificate of Occupancy. Radio coverage will need to be tested by the local Fire Department.

Exit Lighting [Phase 1]
The existing building may require some exit lights to be upgraded to meet code in some areas.

Gymnasium [Phase 2]
Existing
There is a heating only indoor air handling unit located in an adjacent Mechanical Room serving the Gymnasium area. This unit has steam heat with pneumatic controls. The gymnasium air is supplied through a rigid duct main with supply grilles on either side to serve the upper and lower areas of the gym. There are four steam heaters hanging in the ceiling and two exhaust fans that run during economizer season. All equipment in this area has pneumatic controls and at end-of-life.





Proposed
To add cooling to the gymnasium, it's recommended to provide a roof mounted single zone VAV unit with gas fired heat and DX cooling. This unit would supply the ventilation air required as well as the heating, cooling, and dehumidification needs for the space. The ventilation airflow damper of the unit to be set to minimum and controlled by carbon dioxide during occupied hours. The existing exhaust fans will be replaced with new controls to control room pressure during economizer mode. This unit would

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also control space temperature and humidity by an electronic wall mounted thermostat supplied by the Building Automation System. The steam heaters and associated piping and accessories will be removed.

Middle School Wrestling Room [Phase 2]
Existing
The Wrestling Room has a window AC unit, a steam heater, and two portable dehumidifiers.

Proposed
Replace the existing steam heater with an electric heater. It's recommended to not invest in active cooling for the limited room usage in the summer and to install a heating only makeup air unit tied to a room exhaust fan to provide ventilation and heating. This system requires new power and controls. An industrial ceiling fan is recommended for passive cooling.

Cafeteria [Phase 2]
Existing
The cafeteria does not have active air conditioning beyond the six residential style ceiling fans. Ventilation air is supplied through a roof mounted gooseneck through a steam cabinet unit heater. It is unknown if the outside air damper is still operational as the cafeteria was warm and humid during the visit. There are steam heaters along the perimeter wall under the windows. All equipment in this area appears to have pneumatic controls.

Proposed
To add cooling to the cafeteria, it's recommended to provide a roof mounted single zone VAV unit with gas fired heat and DX cooling. This RTU would supply the ventilation air required to the cafeteria which would transfer into the kitchen for the hood makeup air through the large wall openings. The ventilation airflow damper of the unit to be set to minimum and controlled by carbon dioxide and kitchen hood operation during occupied hours. This unit would control space temperature and humidity through a wall thermostat/humidity sensor supplied by the Building Automation System.

The steam unit heaters along the perimeter could be replaced with electric baseboard heaters for thermal comfort. The existing ceiling fans would remain to circulate the room airflow or removed if desired.

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Kitchen [Phase 2]

Existing

The grease hood has an updated Ansul system and associated exhaust fan and makeup air system. The condensate hood has also been updated along with the associated exhaust fan. There is no active mechanical cooling in the kitchen beyond the two ceiling fans on either side of the hood. There are steam cabinet unit heaters in the kitchen and adjacent areas. All equipment in this area appears to have pneumatic controls and at the end-of-life expectancy.

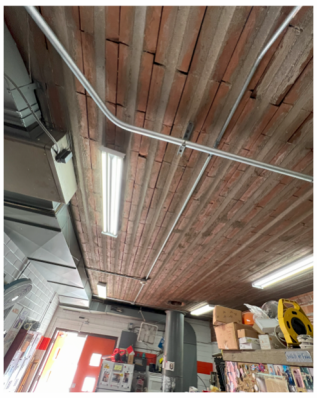
Proposed

The existing steam heaters will be replaced with electric heaters and associated controls. Install wall mounted mini-split units to provide some cooling for thermal comfort.

Admin Offices [Phase 2]

Existing

The office area has a small, abandoned heating unit located above the ceiling served by a roof mounted gooseneck. This unit is at the end of its life and does not operate due to high humidity issues when on. There are steam heaters along the perimeter walls and in the ceiling of some areas. All equipment in this area has pneumatic controls. There are window air conditioning units serving the offices. The structure in the office area appears to be made of bricks which would not be structurally sound for any new roof equipment.



Proposed

Due to the apparent roof construction, it is recommended to replace the existing ERV with new furnaces that can heat and cool the Admin and Guidance Offices. The north Admin area would be treated as a single thermal zone and the south Offices would be treated as a single thermal zone. Ventilation air would be tied in directly to the associated furnace with a backpack style ERV. The restroom exhaust fans will be replaced.

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Circle Buildings [Phase 2]

Existing

The Circle Buildings are all served by an indoor steam air handling unit hanging in the associated Mechanical Room with pneumatic controls. These units are at the end of their life but are operational. There are ductwork systems routed through the corridors and smaller rooms to wall mounted supply grilles serving the Classrooms. The ducts are textured to match the adjacent ceilings. There are perimeter heaters under the windows throughout the buildings. The pipes supplying these heaters route through the tunnel around the building and leak causing maintenance and humidity issues. Return grilles are on the floor under the heaters routed through the tunnel back up into the indoor air handling unit. There are window air conditioning units scattered throughout the large spaces to provide some cooling in the summer.

Proposed

It is recommended to replace the existing indoor AHUs with new roof top units located on grade that can heat, cool, and dehumidify the Classrooms in the 400, 500, 600 Circles. The RTUs would be ducted to connect to the existing supply and return ductwork systems where possible. Electric reheat coils could be installed in an accessible location for additional thermal zone control. All equipment will have new electronic controls connected to the FM Controls DDC system.

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Electrical Systems [Phase 2]

Existing

The buildings are supplied with three utility transformers on site, two transformers are 208-volt, 3-phase and serve the senior high. The other transformer is 480-volt, 3-phase and serves the middle school.

The electric service that enters the shop space connects to 'SB-1' a main distribution panel (MDP) installed in 2003. This MDP serves a 2500A bus duct that back feeds the building's original service entrance, located in the Boiler Room. The original distribution board was replaced with a new switchboard 'SB-2', also in 2003. Both distribution boards serve multiple panels throughout the building.

Panel 'AC' in the boiler room, Panel 'LP2A' in the gymnasium, panels in the Janitor's closet (near cafeteria/commons), Panel 'LP4' in orchestra (Circle 400), Panels 'LP5A' & 'LP5B' in Circle 500, and 'Panels 'LP6A' & 'LP6B' in center of Circle 600 are original and are at end of life for their vintage. Breakers are harder to find for these manufacturers and age of panel(s). Conduits routed below ground are collapsing in some areas and are in need of being replaced with above ground/surface mounted conduits to keep continuity and circuits active.

The other electric service enters near the science classrooms/media center. This connects to a 2000A distribution board. A 600A sub-panel was added to serve the science wing addition. Aside from the panels added during the science project, the others appear to be original and end of life. With no work proposed in this area, no recommendation is needed at this time.

Proposed – Electrical associated with HVAC scope

In the 400 circle (music wing), a new RTU and electric reheat coils are proposed to replace the existing HVAC system in that area. To serve the new electric reheat coils, a new panel is recommended to be installed within the area. The panel would be fed from the existing 225-amp spare within 'SB-2' (switchboard in boiler room). The RTU shall be served from the remaining 125-amp space within 'SB-2'. Conduits serving the new panel and the RTU would be routed above ceiling from the music wing to the corridor near admin before routing down to the lower level, boiler room area.

In the 500 and 600 circle (classroom wings), air conditioning is proposed to be added. New panelboards were installed in both areas in 2008. Panel 'LP51' is in the 500 circle, it is a 225-amp panel but fed with a 125-amp breaker from 'SB-2'. Panel 'LP61' is in the 600 circle, it is a 225-amp panel and is fed from 'SB-2' via a 225-amp breaker. Both panels have breaker space for future circuits.

It is recommended that the new mechanical equipment is sized appropriately to feed new circuits from these panels to keep costs down and to limit additional work on 'SB-2', due to limited space. The feeder and breaker serving 'LP51' may need to be upsized to meet the electrical load, pending final selections on HVAC equipment.

Switchboard 'SB-1' in the shop space has one 200-amp spare breaker and one 400-amp space remaining. It is limited on what can be added for air conditioning and HVAC considerations. For the cafeteria, kitchen, gymnasium, locker rooms, administration, and other areas, it is recommended to

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increase the electrical service and replace the switchboard to accommodate any proposed future circuits serving HVAC equipment.

Project Scope and Cost Opinion [Phase 1]

Bids late Spring 2026 with Construction Summer 2026

Recommended Mechanical/Electrical Systems:
Repairs on architectural elements are included in the costs though not specifically called out in descriptions noted below.

1. CTE Area Upgrade
    a. Add Air Conditioning for each Classroom
    b. Remove steam heaters
    c. Add industrial ceiling fan for cooling
    d. Replace pneumatic controls to DDC controls
2. Art Sink Traps
    a. Replace traps with solids interceptor system
3. Kiln Exhaust
    a. Replace kiln exhaust fan
    b. Add kiln hood and exhaust fan
4. Fire Alarm System Upgrade
    a. Upgrade to Voice Evacuation System
5. Bidirectional Amplifier System (First Responder Communications)
    a. Needs tested to know if system is required
6. Exit Lighting Upgrade
    a. Upgrade Exit Lights to meet code requirements

PHASE 1: BIDS SPRING 2026 CONSTRUCTION SUMMER 2026	
AREA	**COST OPINION**
CTE AREA	$ 363,000
ART SINKS	$ 2,000
KILN	$ 17,250
FIRE ALARM SYSTEM	$ 275,000
BDA SYSTEM	$ 100,000
EXIT LIGHTS	$ 55,000
SUBTOTAL	$ 812,250
DESIGN CONTINGENCY	$ 81,225
SOFT COSTS	$ 67,011
TOTAL	$ 960,486

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Project Scope and Cost Opinion [Phase 2]

Bids Fall 2026 with Construction 2027

Recommended Mechanical/Electrical Systems:
Repairs to architectural elements related to each scope item are included in the costs though not specifically called out in descriptions noted below.

1. 400 Circle HVAC Upgrade
    a. Add Air Conditioning with RTU
    b. Remove steam heaters
    c. Replace pneumatic controls to DDC controls
    d. Add new 225-amp panel for electric heaters, served from 'SB-2'
    e. Add new 100-amp breaker for RTU, served from 'SB-2'
2. 500 Circle HVAC Upgrade
    a. Add Air Conditioning with RTU
    b. Remove steam heaters
    c. Replace pneumatic controls to DDC controls
    d. Replace existing feeders and breaker on 'LP51'
    e. Feed electrical from existing panel 'LP51' for proposed mechanical equipment
3. 600 Circle HVAC Upgrade
    a. Add Air Conditioning with RTU
    b. Remove steam heaters
    c. Replace pneumatic controls to DDC controls
    d. Feed electrical from existing panel 'LP61' for proposed mechanical equipment
4. Admin Offices HVAC Upgrade
    a. Add Air Conditioning with Furnaces
    b. Update ventilation to meet code requirements
    c. Replace pneumatic controls to DDC controls
5. Gymnasium & Locker Rooms HVAC Upgrade
    a. Add Air Conditioning with RTU's
    b. Remove steam heaters
    c. Provide code compliant ventilation
    d. Replace pneumatic controls to DDC controls
6. Cafeteria HVAC Upgrade
    a. Add Air Conditioning with RTU
    b. Remove steam heaters
    c. Replace pneumatic controls to DDC controls
7. Kitchen HVAC Upgrade
    a. Add air conditioning with mini-split units
    b. Replace steam heaters with electric heaters
    c. Replace pneumatic controls to DDC controls

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8. Middle School Wrestling Room Upgrade (Fall/Winter Occupancy)
    a. Add electric heating, ventilation, exhaust fan
    b. Remove steam heater
9. Upgrade electrical service for proposed mechanical equipment
    a. Upgrade utility transformer
    b. Replace existing 'SB-1' with new switchboard, higher ampacity rating and additional breaker space (OR) consider 480V utility service and back feed existing 'SB-1' from new step-down transformer

PHASE 2: BIDS FALL 2026 CONSTRUCTION 2027	
AREA	**COST OPINION**
400 CIRCLE	$ 393,750
500 CIRCLE	$ 472,500
600 CIRCLE	$ 420,000
ADMIN OFFICES	$ 258,750
GYMNASIUM & LOCKER ROOMS	$ 420,000
CAFETERIA	$ 300,000
KITCHEN	$ 52,500
MS WRESTLING ROOM	$ 78,750
ELECTRICAL SERVICE UPGRADE	$ 315,000
SUBTOTAL	$ 2,711,250
DESIGN CONTINGENCY	$ 271,125
SOFT COSTS	$ 223,678
TOTAL	$ 3,206,053

Appendix – Observational & Supporting Documents

Building Site Map

Mechanical & Electrical Equipment Site Maps

Boiler Room Layout

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