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NLRSD Center of Excellence at Ole Main
North Little Rock, AR
MEP/FP Design Narrative

Mechanical Narrative Outline

1. General HVAC Standards
    a. Ductwork
    b. Piping
    c. Insulation
2. HVAC Systems Description
    a. Hydronic System Design
    b. Rooftop Equipment
3. Special Systems
    a. Chemistry Lab Fume Hood Exhaust
    b. Data/Server Rooms
4. Controls

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1. General HVAC Standards

Ductwork

All ductwork shall be designed per current SMACNA standards. Supply, return, and exhaust low pressure ductwork shall be rated for 2" w.c. All exposed low-pressure ductwork shall be double-wall spiral duct, painted per Architect. Concealed low-pressure ductwork shall be wrapped. Exposed exterior ductwork shall be preinsulated duct system equal to AQC. Fabric duct shall be equal to Ductsox round textile dispersion with internal hoop support to prevent sagging and noise.

Piping

Hydronic piping shall be Type L drawn-temper copper tubing with soldered joints or Schedule 40 steel pipe with threaded joints for pipe diameters 2" and smaller and schedule 40 steel pipe with welded or flanged joints for pipe diameters 2-1/2" and larger.

Refrigerant piping shall be Type "K" copper, soft-drawn. Soft-drawn may be used where bending is required on 1-3/8" O.D. and smaller. All other shall be Type "L" Copper, hard-drawn, marked "ACR". Fittings shall be brazed and materials shall be wrought copper or forged brass. Compression fittings shall not be allowed on refrigerant

Condensate drain piping shall be Schedule 40 PVC.

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Insulation

Concealed duct shall be externally wrapped with 2” insulation. Insulation shall be flexible glass fiber; ASTM C553 and ASTM C1290; commercial grade; 'k' value of 0.25 at 75 degrees F; 1.5 lb/cu ft minimum density; 0.002 inch foil scrim kraft facing.

Internally lined duct insulation shall be 1” and shall be flexible glass fiber; ASTM C1071; Type II, ‘k’ value of 0.23 at 75 degrees F; 3.0 lb/cu ft minimum density; coating air side for maximum 4,000 feet per minute air velocity.

Hydronic pipe insulation shall be 2” Glass-Fiber, Preformed Pipe Insulation: per ASTM C 547, Type I, Grade A with factory applied ASJ-SSL vapor barrier jacket with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I. Exposed piping shall be provided with PVC jacket.

Refrigerant pipe insulation shall be Flexible Elastomeric Pipe Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

Refrigerant pipe exposed to weather shall be provided with an aluminum scrim jacket.

2. HVAC Systems Description

Hydronic System Design

The previously occupied facility utilized three hydronic systems:

- A water source heat pump (WSHP) system including:
  - (2) 1500 MBH boilers with inline 1.5HP circulator pumps
  - (3) 80T fluid coolers (located at grade outdoors)
  - (3) 15HP end suction system pumps
  - Reheat coils at makeup air units (MAUs) providing ventilation
  - Terminal WSHP units providing space heating and cooling

- A heating hot water (HHW) system including
  - (2) 600 MBH boilers with inline 1.5HP circulator pumps
  - (2) 5HP end suction building circulation pumps
  - Preheat coils at MAUs providing ventilation
  - Terminal hydronic unit heaters providing space heat

- Chilled water (CHW) system including
  - (1) 60T modular water-cooled chiller
  - (1) 5HP end suction system pumps
  - Cooling coils at MAUs providing ventilation

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With the exception of the three existing exterior fluid coolers, all system components have exceeded the end of their useful life. Proposed renovation of these systems is as follows:

- WSHP loop replacement
  - Boilers, pumps, and appurtenances shall be replaced in entirety.
  - The existing fluid cooler shall be inspected by an authorized manufacturer's representative prior to startup and integration.
  - Existing distribution piping in utility tunnels shall be reused. Facility piping past the utility tunnels shall be demolished and replaced to suit the renovated facility.
  - Existing console and horizontal WSHP terminal units installed below windows and above ceilings shall be demolished. New vertical 2-stage WSHPs shall be installed in new equipment closets to suit renovated facility layout.
  - Office spaces shall utilize concealed low pressure sheet metal ductwork with ducted return. Classrooms shall utilize fabric duct supply and plenum return.

- Heating hot water system demolition
  - Boilers, pumps, distribution piping, terminal unit heaters, and MAU preheat coils shall be demolished in entirety.
  - Existing unit heaters will be replaced with gas or electric unit heaters as needed.

- Chilled water system demolition
  - Modular chiller, pumps, distribution piping, and MAU cooling coils shall be demolished in entirety.

- MAU demolition / replacement
  - MAUs serving the auditorium and basement classrooms shall be demolished.
  - The MAU serving the kitchen / cafeteria space shall be replaced with a new modular WSHP air handler equal to Addison MI series. Nominal capacity is dependent upon proposed functionality of existing kitchen space.

- Abandoned piping demolition
  - Abandoned steam and condensate return piping in utility tunnels is to be demolished in entirety to facilitate installation of new piping systems.

<u>Rooftop Equipment</u>

Ventilation and exhaust were provided to the previously occupied classroom areas by (4) roof mounted packaged air handlers with direct expansion (DX) cooling, gas heat, and energy recovery.

These systems have been utilized to provide freeze protection while the building was unoccupied but have reached the end of their useful life and are to be replaced with new packaged air handlers equal to Greenheck RVE with approximate 25-ton nominal capacities.

Heating, cooling, and ventilation will be provided to the renovated auditorium and media center spaces by installing new packaged air handling units (AHUs) with DX cooling, gas heat, and energy recovery equal to Greenheck RVE with an approximate nominal capacity as follows:

Equipment Tag	Area Served	Capacity
AHU-01	Auditorium	30 tons
AHU-02	Media Center	10 tons

Classroom toilet exhaust was provided to the previously occupied facility via roof mounted centrifugal downblast exhaust fans. These fans are to be replaced in place with new fans equal to Greenheck G series.

3. Specialty Systems

Chemistry Lab Fume Hood Exhaust

Chemistry lab spaces shall be provided with airfoil bypass fume hood assemblies equal to BMC B-504. Fume hoods and chemical storage areas will be exhausted via roof mounted high-plume laboratory exhaust fans equal to Greenheck Vektor-H.

Kitchen Exhaust Systems

Proposed utilization of the existing kitchen space has not yet been determined. If food is to be prepared offsite and served in the cafeteria, the existing kitchen exhaust hoods shall be demolished. If food is to be prepared onsite, new kitchen hoods and exhaust systems shall be provided as necessitated by renovated kitchen equipment layout.

Data/Server Rooms

Data/Server Rooms shall be conditioned via ductless split systems with wall hung fan coils equal to Carrier Performance, approximate 2-ton nominal capacity.

4. Controls

All HVAC equipment shall be energized and controlled via HVAC temperature and controls system per Arkansas Public Schools Facility Manual Requirements and fully integrated into the existing NLRSD Campus controls network.

All building controls system components shall be manufactured by Alerton to coordinate with existing network; no substitutions or alternates shall be accepted.

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Electrical

Electrical design for the Ole Main building renovation in North Little Rock, AR will be provided as described in the following sections. Design practices will follow all applicable codes and standards including the National Electric Code, Arkansas School Facility Manual, and Arkansas Energy Code.

Electrical Narrative Outline

1. Electrical Demolition
2. Electrical Power System
3. Lighting Systems
    a. Preliminary Lighting Fixture Selections
    b. Lighting Controls
    c. Emergency/Emergency Egress Lighting
4. Communications Systems
    a. Data
    b. Telephone
    c. Cable Television
    d. A/V
5. Security Systems
    a. Access Control
    b. CCTV
6. Intercom System
7. Fire Detection and Alarm System
8. Lightning Protection

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1. Electrical Demolition

All existing electrical devices and fixtures such as light fixtures, receptacles, data outlets, junction boxes, conduit, cables, disconnects, etc. shall be demolished with all circuits being removed back to panel of origin. Reference section Electrical Power System for details on demolition of electrical equipment.

2. Electrical Power System

Electrical service for the building is an existing 480/277V, 3ph, 4W service that feeds a 2000A Main Switchboard. The Main Switchboard is found in the Mechanical Room in the sub-basement where it feeds an MCC for mechanical equipment, a step-down transformer, as well as feeders for 480V panelboards. The transformer in this Mechanical Room steps down to

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208/120V to back-feed existing equipment as well as feed distribution panelboards that serve loads outside of the mechanical room. Due to the required electrical load of the renovation as well as the age of existing equipment, all electrical gear and panelboards will be demolished. The existing MCC may remain and be back fed by new electrical equipment, contingent upon mechanical equipment design.

Preliminary load estimations lead to either a single 4000A electrical service, feeders and switchgear, or (2) separate 2000A electrical services, feeders, and gear. The existing utility transformer will need to be replaced at the same location to serve a 4000A service, or have an additional adjacent transformer to supply an additional 2000A of electrical service. All service feeders and conduit shall be new and routed via existing utility tunnels and stub up at the appropriate location(s).

The renovation will also include a new, dedicated service to feed a new fire pump. The preliminary electrical service would be to feed an 800A fire pump ATS (provided by fire pump package). A new 350kW diesel driven generator will be specified to provide back-up power to the fire pump via the fire pump ATS provided with the fire pump package.

Each floor of the building will have an electrical room that will house a 480/277v panelboard, a step-down transformer, and a 208/120v panelboard for branch circuits.

At this time, it has not been determined if a fire pump is required for the renovation. If required, the electrical contractor shall provide a dedicated feeder from the utility transformer to the fire pump.

All new underground conduit shall be Schedule 40 PVC. All conduit in clean finished space shall be concealed and shall be EMT. All electrical conduits shall be fully concealed. Minimum indoor conduit size shall be a minimum ¾”. All electrical conductors for feeder and branch circuits shall be THHN/THWN. All grounding and bonding shall be per NEC Article 250.

Heavy duty non-fusible disconnects shall be provided at all new mechanical equipment. Convenience receptacles shall be provided within 25’ of mechanical equipment. Outdoor receptacles shall be weatherproof GFCI receptacles.

Seismic bracing shall be required for all pertinent electrical systems as required by building seismic design category.

The facility will be divided into the following sections:

- Classrooms
- Student Dining
- Assembly
- Stage
- Restrooms

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- Offices
- Kitchen
- Corridors
- Vestibule
- Stairwells
- Mech/Elec/IT
- Science Rooms
- Art Room
- Reading Room
- Teacher/Student Lounges

Classrooms:

Wallbox with duplex receptacle and data connections will be installed on teaching for smartboard. A quad receptacle and junction box for A/V connection with be installed at teacher desk. General use receptacles will be located throughout the perimeter of the room. Current design intent is to locate as many new wall devices on the new end walls of the classroom and limit work in the existing exterior or interior walls of the classroom area that are to remain.

Student Dining:

General use receptacles will be located throughout the perimeter of the room.

Assembly:

General use receptacles will be located throughout the perimeter of the room.

Stage:

Stage will have (2) floor boxes each with a duplex receptacle. General use receptacles will also be located along wall.

Restrooms:

Restroom will include GFI receptacle at the vanity location and power for plumbing fixture sensors if required.

Offices:

Offices will have one quad receptacle at each workstation, and one general use duplex receptacle on all other walls.

Kitchen:

Power will be supplied to all kitchen equipment including but not limited to microwaves, ovens,

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serving lines, mixers, refrigerators, freezer, brewers, hot wells, cold wells, drink machines, holding cabinets, kitchen hoods, dish washer and associated booster heater, walk-in cooler, walk-in freezer etc.

In addition to power for kitchen hoods, control interlocks between hoods, fans, controllers, and fire suppression systems will be included. Shunt trip breakers or a dedicated panel with shunt trip main will be provided to interlock and shut-off any equipment under the hood with fire suppression system.

All receptacles in kitchen space shall be GFI per NEC requirements.

Additional GFI receptacles will also be provided above counter tops where appropriate.

Corridors and Vestibule:

General use receptacles will be located throughout the perimeter.

Stairwells:

No special power requirements.

Mech/Elec/IT:

A general use receptacle will be located in each space. IT room will have 2 quads for connection of data equipment.

Science Rooms:

Specialty power will be provided for any science lab equipment specified. This may include but is not limited to exhaust hoods, receptacles at island lab stations, scales, refrigerators, incubators, microscopes, etc. General use receptacles will be located throughout the perimeter. Provisions for 30A circuits will be provided for any future equipment.

Reading Room:

General use receptacles will be located throughout the perimeter of the room.

Teacher/Student Lounge:

Specialty power will be provided to any equipment required. This may include but is not limited to coffee machines, printers, copiers, chargers, etc. General use receptacles will be located throughout the perimeter of the room.

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3. Lighting Systems

Lighting design will be provided to meet Illuminating Engineering Society of North America (IESNA) and Arkansas School Facility Manual required lighting levels. All light fixtures will be LED. Refer to associated cut sheets for additional lighting.

a. Preliminary Lighting Fixture Selections:
   - See attached cutsheets for fixture descriptions

Space Type	Fixture Type
Classrooms	H.E. Williams PT-22
Student Dining	Meteor Lighting RS6N
Assembly	Meteor Lighting RS6N
Stage	Meteor Lighting RS6N
Restrooms	Current LiteFrame LFR-4RD; H.E. Williams MX2WUD; H.E. Williams PX-SLOT
Offices	H.E. Williams PT-22
Kitchen	H.E. Williams 50
Corridors	HE Williams MX2S
Vestibule	TBD
Stairwells	Type 4 (Wall mount stairwell fixture)
Mechanical/Electrical/IT	H.E. Williams 75S
Science Rooms	H.E. Williams PT-22
Reading Room	H.E. Willaims PT-22; Coronet RUSH.REC

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In addition to the areas mentioned above, careful attention will be made to restore historical fixtures in the building and/or replace with fixtures to match original intent. This includes two exterior site pole lights at front of building, pendant fixtures in lobby, and pendant fixtures in auditorium.

The stage/auditorium will include house lighting and light-use theatrical system that are scoped out to allow for events like speakers and school assemblies. High-end drama production will not be done in this space and so an elaborate theatrical and AV system is not required.

b. Lighting Controls

Lighting in classrooms will be controlled by a lighting room controller with occupancy sensors, and switches with dimming capability. Classrooms will have a separate dimmable lighting zone for the teaching wall. Restrooms and reading room will have a room controller with occupancy sensors. Lighting in Mechanical, Electrical, IT, and kitchen will be controlled by line voltage switches without occupancy sensing or dimming control. Lighting in Corridors, stairwells, vestibule, dining, and assembly will be controlled by a lighting control panel via automatic time control and override devices per owner preference. Assembly and Stage lighting shall be dimmable and controlled via local switches. The lighting control system will be configurable to owner preferences of control based on astronomical clock, occupancy sensor input, photosensor input, manual switch, and/or programmable time clock. Small offices and similar spaces will be controlled by wall mounted occupancy switches.

c. Emergency/Emergency Egress Lighting

Emergency egress lighting will be provided as required by the National Electric Code (NEC). All emergency lighting will be powered by integral batteries.

4. Communications Systems

a. Data

Data cabling and equipment will be provided and installed by Genesis Datacom. Electrical contractor will provide infrastructure to facilitate cabling and equipment such as junction boxes, conduits, and rough-ins.

Data boxes in classrooms will follow school standard, with locations provided by owner. A minimum one data box is required per computer workstation. A wall box with data connection will be provided for SmartBoard at the teaching wall.

Offices will have one data outlet.

A 4" conduit routed to lower B tower data room will be installed to facilitate fiber communication between buildings.

b. Audio/Visual

Audio/Visual cabling and equipment will be provided and installed by Genesis Datacom. Electrical contractor will provide infrastructure to facilitate cabling and equipment such as junction boxes, conduits, and rough-ins.

5. Security Systems

a. Access Control

Access control cabling and equipment will be provided and installed by Genesis Datacom. Electrical contractor will provide infrastructure to facilitate cabling and equipment such as junction boxes, conduits, and rough-ins.

b. CCTV

CCTV cabling and equipment will be provided and installed by Genesis Datacom. Electrical contractor will provide infrastructure to facilitate cabling and equipment such as junction boxes, conduits, and rough-ins.

6. Intercom System

A bell/clock/intercom system including cabling and equipment will be provided and installed by Genesis Datacom. This system includes call stations and speakers in each occupied space, speakers in corridors, and weather-proof speakers on the building exterior. Central intercom station quantity and location will be directed by owner. Exterior speakers will be installed near exits and towards student areas. Electrical contractor shall be responsible for all rough-in including conduit pathways and back boxes for intercom system devices.

Fire Detection and Alarm System

Fire alarm cabling and equipment will be provided and installed by school's fire alarm vendor. Electrical contractor will provide infrastructure to facilitate cabling and equipment such as junction boxes, conduits, and rough-ins.

A fully addressable type fire alarm system will be specified to meet all requirements of the Arkansas School Facilities Manual, NFPA 72, and NFPA 101. Fire Alarm system will additionally include an emergency voice evacuation system. Fire Alarm horn/strobes will be

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specified in the corridors per code requirements. The fire alarm system in the renovated building shall be tied to the fire alarm system the new high school.

7. Lightning Protection

A lighting protection system will be specified for the entire building including air terminals on the roof and cable down leads to tie to the grounding system.

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Plumbing

Plumbing design for the Ole Main building renovation in North Little Rock, AR will be provided as described in the following sections. Design practices will follow all applicable codes and standards including Arkansas Plumbing Code, Fuel Gas Code, and Arkansas School Facility Manual.

Plumbing Narrative Outline

1. General
2. Plumbing Fixture Schedules
3. Schematic Plumbing Drawings

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1. General

- Refer to Plumbing Schematic Design Drawings for Demolition and Renovation scope of work, in addition to the materials and scope described herein.
- Domestic hot and cold water shall be Copper type “L” above ground and type “K” below ground inside the building. Existing Domestic Water entrance and backflow preventer shall remain. All domestic water backflow prevention, valving, accessories, etc. shall be lead free.
- Sanitary sewer and Vent piping shall be Cast Iron or Solid Wall PVC. All existing Sanitary Sewer and Vent Piping, except in the Kitchen and Dining Area, shall be replaced.
- Science Labs shall have fire retardant acid waste piping equal to Orion. Point of Use acid traps shall be provided at science sinks to minimize the quantity of acid waste piping required.
- Storm Drain piping shall be Cast Iron or Solid Wall PVC, with insulation on drain systems receiving HVAC condensate.
- Art sinks shall be provided with inline solids interceptors equal to Striem Sidekick.
- Common Area water fountains shall be bi-level with bottle fillers equal to Elkay model LZSTL8WSLK.
- Existing Exterior Hose Bibbs shall remain, except if damaged or non-functional. Damaged or non-functional hose bibbs shall be repaired in place, or replaced with new equal to Zurn Z1321. Interior Hose Bibbs shall be encased, lockable, anti-siphon equal to Zurn Z1350. Hose bibbs shall be provided in each large group restroom.
- Domestic Hot Water for building shall be provided by a new central boiler and storage tank system, with recirculation loops to the main restroom groups on the East and West sides of the building.
- Domestic Hot Water for isolated fixtures shall be provided by point of use electric tankless water heaters equal to Eemax, or point of use tank water heaters equal to Eemax.

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- New Natural Gas piping shall be from the existing gas entrance to serve new or replacement HVAC systems and water heaters. All gas piping shall be schedule 40 steel with threaded or welded fittings. Step-down regulators shall be provided at all gas-fired equipment. All gas piping shall be painted.
- All piping (new and existing to remain) shall be labeled per ANSI 13.1 standards, with directional flow arrows.

NOTE: Existing storm drain system replacement scope requires further evaluation. For pricing purposes, project scope shall include full replacement of all interior storm drain piping.

2. Plumbing Fixtures

Refer to plans and schedules for plumbing fixtures and approximate fixture counts, as well as schematic pipe routing. Replace all existing plumbing fixtures. New plumbing fixtures shall be:

A. Toilets: vitreous china, elongated, siphonic flush, floor mount, with manual flush valves equal to Zurn
B. Urinals: vitreous china, washdown, with manual flush valves equal to Zurn
C. Lavatories: vitreous china, drop-in, oval, with manual wristblade faucets and thermostatic mixing valves. Equal to Zurn.
D. Lavatories: vitreous china, wall-mount, square, with manual wristblade faucets and thermostatic mixing valves. Equal to Zurn.
E. Floor drains: cast-iron body with light duty nickel bronze strainers equal to Zurn.
F. Floor sinks: cast-iron body, 12"x12", with acid resistant coating and nickel bronze frame and grate, equal to Zurn.
G. Mop sinks: terrazzo, floor mount, 24"x24" with service faucet equal to Stern Williams.
H. General use sinks: stainless steel, drop-in, 19"x22", equal to Elkay, with manual faucet or gooseneck manual faucet equal to Zurn.
I. Lab sinks: acid resistant, undermount, by casework vendor, with manual wristblade faucet with vacuum breaker. Ada lab station shall have shallow bowl sink for roll-under access. Science sinks shall have point-of-use acid neutralizer traps equal to Orion.
J. Art sinks: stainless steel, 10” deep, with manual gooseneck faucet with wristblade handles. Solids interceptor equal to Striem sidekick. ADA art stations shall have shallow bowl sink for roll-under access.

3. Schematic Plumbing Drawings

- Refer to Attached Drawings

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Fire Protection Narrative Outline

1. General
2. Service
3. Sprinkler Ping
4. Classification
5. Alarm and Signaling

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1. General

- Provide new wet pipe fire sprinkler system as required to serve the renovated facility.
- The facility will be protected with a wet system as per NFPA 13.
- All sprinkler piping will be schedule 40 steel.
- Quick-response sprinklers will be used through the entirety of the building.

2. Service

The existing facility has a small sprinkler system fed from the adjacent high school. This system will be demolished in entirety.

A new service will be entering the building at the subbasement mechanical room. A remote Fire Department Connection (FDC) and backflow preventer shall be installed in an external hot box at the west exterior to ensure accessibility per local authority having jurisdiction.

A new indoor electric fire pump will be provided in the sub-basement mechanical room to achieve 100 psi at standpipe connections. New distribution piping shall be installed in existing utility tunnels and routed vertically in restroom pipe chases.

3. Sprinkler piping

Sprinkler piping mains will be concealed where possible. Classroom and office areas with lay-in ceilings will be served in the traditional manner. Exposed sprinkler piping may be required in open areas. Seismic piping restraints per ASCE7 Seismic Design Category D will be provided throughout. Standpipes will need to be provided at stairwells.

4. Classification

The facility will be classified as Light Hazard, with the exception of storage areas which will be Ordinary Hazard Group 1.

5. Alarm and Signaling

Refer to electrical design narrative for fire alarm design intent. The fire alarm control panel will be in a centrally located area.