



Primary Engineering, Inc.
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Addendum: **1**
Date: **1/16/2026**
Project: **FWCS 2026 Mechanical PPI Projects**

Comm #: **25777**

The following items shall be incorporated into the specifications and drawings and are considered to be integral to the bid documents for the project. Acknowledgement of receipt of this addendum is required on the bid form.

Item #1: General Clarifications.

- A. See attached approved product data submittal from Gardiner for Daikin Air Handler AHU-1 for Forest Park Elementary.

Item #2: Specification Section 000100 "Table of Contents"

- A. Add Specification Section 230593 "Testing, Adjusting, and Balancing for HVAC." Refer to attached revised specification section.

Item #3: Specification Section 230593 "Testing, Adjusting, and Balancing for HVAC"

- A. Add Specification Section 230593 "Testing, Adjusting, and Balancing for HVAC." Refer to attached specification section.

Item #4: Drawing Sheet FO-M201 "Mechanical Plans"

- A. Revise louver L-1. Revise Air Handler Schedule, Mechanical Plan, and Elevations. Refer to attached drawing revision dated 1/16/26.

Item #5: Drawing Sheet FO-E101 "Electrical Demolition and New Power Plans"

- A. Revise light fixture locations. Refer to attached drawing revision dated 1/16/26.



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Transmittal

To: Rob Segovia **Date:** 01/12/2026
Firm: Gardiner
Project #: 25777
Project Name: Forest Park Elementary Air Handler Equipment Package

Enclosed here within is the following:

| Spec Section | Description |
|--------------|----------------------------|
| 237343 | Outdoor Air-Handling Units |
| | |
| | |
| | |
| | |
| | |
| | |

Notes:

Commission No. 25777

Shop Drawing Review

Spec. Sections:

Review No. 1

- REVIEWED & RELEASED
- REVIEWED & RELEASED WITH CORRECTIONS
- REVISE & RESUBMIT
- REJECTED
- NO ACTION REQUIRED
- SEE TRANSMITTAL FOR NOTES



Reviewing is only for conformance with the design intent of the project and compliance with the information given in the Contract Documents. Corrections or comments made on the shop drawings during this review do not relieve Contractor from compliance with the requirements of the plans and specifications. Acceptance of a specific item shall not include acceptance of an assembly of which the item is a component. Contractor is solely responsible for: dimensions to be confirmed and correlated at the jobsite; information that pertains solely to the fabrication processes or to techniques and procedures of construction; manufacturer's instructions, industry standards, and for coordination of the work with all trades.

Reviewed by:  Date: 01/12/2026

Primary Engineering, Inc

Submittal

2025 Forest Park Elementary Air Handler

Air Handling Unit



Engineer: Primary

Prepared By: Gardiner

Tag(s): AHU-1

Specifications: 237343.19

Date: 12/19/2025



Summary – Equipment Description

| Tag | Qty | Description |
|-------|-----|----------------------------------|
| AHU-1 | 1 | Daikin Outdoor Air Handling Unit |

Complete with:

- 460/60/3 Voltage
- Double Wall Weatherproof Construction – 2” Foam – R-13
 - 18 Gauge Exterior Liner
 - 24 Gauge Interior Liner
- Painted Cabinet
- Horizontal Supply & Return
- 6” Base Rail
- 20” Minimum Access Throughout Unit (not including filter door)
- Mixing Box Section
- Filter Section (filters and filter frames ship separately)
 - Hometown Filter Metal Filter Frames
 - 2” MERV 13 Filter Media
 - Spare Set of Filter Media
- Chilled/Hot Water Coil Section
 - Chilled/Hot Water Coil
 - Stainless Steel Drain Pan
 - Stainless Steel Coil Casing
 - Red Brass Pipe Connections
 - Coil Access
- Supply Fan Section
 - Direct Drive Plenum Fan
 - Motor with Shaft Grounding Kit
 - Spring Vibration Isolation
 - Fan Access
- Five Year Parts Warranty

Items Not Included: 1% leakage at ± 10 ” w.c. static pressure, 16 gauge exterior liner, 20 gauge interior liner, stainless steel liner, washdown construction, thermal break

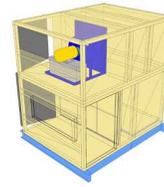
Submitted by:
Gardiner.

Approved By:

Signature: _____

Date:

| Job Information | | Technical Data Sheet | |
|------------------|---|----------------------|--|
| Job Name | 2025 Forest Park Elementary Air Handler | | |
| Date | December 19 2025 | | |
| Submitted By | Rob Segovia | | |
| Software Version | 13.82 | | |
| Unit Tag | AHU-1 | | |



Unit Overview

| Model Number | Supply | | | | | |
|--------------|-------------------|------------------|---------------|---------------------|-------------|--------------|
| | Air Volume cfm | Static Pressure | | External Dimensions | | |
| | | External inWc | Total inWc | Height in | Width in | Length in |
| CAH014GVGM | 4000 | 1.00 | 2.50 | 46* | 64* | 84** |

*Not including base rails, coil connectors, drain connectors and control boxes.

**Total lower deck length.

Unit

| | | | | | |
|---------------------|---|----------------------------|---------------------------------------|--|--|
| Model Number: | CAH014GVGM | | | | |
| Approval: | ETL Listed / ETL Listed to Canadian Safety Standards (ETL Label / ETLc Label) | | | | |
| Outer Panel: | Painted 18 gauge G60 Galvanized Steel (3000 hr. Salt Spray ASTM B-117) | | | | |
| Liner: | 24 gauge Galvanized Steel (unless noted per section) | | | | |
| Insulation: | R-13 Injected Foam | | | | |
| Unit Configuration: | Stacked / vertical | Drive (Handling) Location: | Left | | |
| Base: | 6" formed channel | Wall Thickness: | 2 in | | |
| Altitude: | 0 ft | Parts Warranty: | Additional Four Year, Five Year Total | | |

Plenum Section

| Component: 1 | | Length: 32 in | | Shipping Section: 1 | |
|-------------------|-----------------|---------------|--------|---------------------|--|
| Air Pressure Drop | | | | | |
| 0.01 inWc | | | | | |
| Custom Openings | | | | | |
| Custom Opening | Location | Width | Height | Rainhood w/Screen | |
| 1 | End | 44 in | 16 in | None | |
| 2 | Opp. drive side | 28 in | 42 in | None | |
| Door | | | | | |
| Location | | Width | | Opening | |
| Drive side | | 28 in | | Outward | |

Panel Filter

| Component: 2 | | Length: 16 in | | | Shipping Section: 1 | |
|-------------------|------------|-----------------------|----------------------|----------------------|---------------------|----------------|
| Type | Efficiency | Nominal Face Velocity | Actual Face Velocity | Actual Face Area | Air Volume | Filter Loading |
| Pre Pleat | MERV 13 | 240 ft/min | 256 ft/min | 15.6 ft ² | 4000 cfm | Side |
| Air Pressure Drop | | | | Number of Filters | Height | Width |
| Clean Air | Mean Air | Dirty Air | User Spec | 6 | 20 in | 20 in |
| 0.14 inWc | 0.57 inWc | 1.00 inWc | N/A | | | |
| Door | | | | | | |
| Location | | Width | | Opening | | |
| Drive side | | 8 in | | Outward | | |

| Chilled Water Coil | | Component: 3 | | | Length: 36 in | | Shipping Section: 1 | | |
|---|---|-------------------|-------------------|-----------------|------------------------|------------------------------|---------------------|---------------------------|----------------|
| Coil Model | Total Capacity | Sensible Capacity | Number of Coils | | Number of Rows | Fins per Inch | Tube Diameter | Tube Spacing (Face x Row) | |
| 5WH1006B | 153722 Btu/hr | 108473 Btu/hr | 1 | | 6 | 10 | 0.625 in | 1.50 in x 1.299 in | |
| Air Volume | Air Temperature | | | | Coil Air Pressure Drop | Finned Height | Finned Length | Face Area | Face Velocity |
| | Entering | | Leaving | | | | | | |
| | Dry Bulb | Wet Bulb | Dry Bulb | Wet Bulb | | | | | |
| 4000 cfm | 80.0 °F | 67.0 °F | 55.2 °F | 54.6 °F | 0.71 inWc | 36 in | 33 in | 8.25 ft² | 485 ft/min |
| Water | | | | | | | | | |
| Entering | Leaving | Flow Rate | | Pressure Drop | Velocity | Volume | Weight | | |
| 45.0 °F | 54.9 °F | 30.90 gpm | | 6.10 ftHd | 2.80 ft/s | 7.0 gal | 66.00 lb | | |
| Connection [Data Per Coil] | | | | | Min. Fin Surface Temp. | Min. Tube Wall Surface Temp. | Fouling Factor | | |
| Type | Size | Location | | Material | | | 0.000 | | |
| Threaded | 1.50 in | Drive side | | Red brass pipe | 45.0 °F | 45.0 °F | | | |
| Material | | | | | | Drain Pan | | Drain Side | |
| Fin | Tube | Header | | Case | | | | | |
| Aluminum .0075 in | Copper .020 in | Copper | | Stainless steel | | Stainless steel | | Drive side | |
| Chilled Water Coil rated as Hot Water Coil | | | | | | | | | |
| Total Capacity | Dry Bulb Air Temperature | | Fluid Temperature | | Pressure Drop | | Air Volume | Water Flow Rate | Water Velocity |
| | Entering | Leaving | Entering | Leaving | Air | Fluid | | | |
| 409482 Btu/hr | 40.0 °F | 133.6 °F | 160.0 °F | 122.6 °F | 0.54 inWc | 2.40 ftHd | 4000 cfm | 21.90 gpm | 1.90 ft/s |
| AHRI 410 Certification | | | | | | | | | |
|  | Certified in accordance with the AHRI Forced-Circulation Air-Cooling and Air-Heating Coils Certification Program which is based on AHRI Standard 410 within the Range of Standard Rating Conditions listed in Table 1 of the Standard. Certified units may be found in the AHRI Directory at www.ahridirectory.org | | | | | | | | |
| Door | | | | | | | | | |
| Location | | | Width | | | Opening | | | |
| Drive side | | | 20 in | | | Outward | | | |

| Access Section | | Component: 4 | | | Length: 24 in | | Shipping Section: 2 | | |
|-------------------|--|--------------|-------|--|---------------|---------|---------------------|--|--|
| Air Pressure Drop | | | | | | | | | |
| 0.00 inWc | | | | | | | | | |
| Panel | | | | | | | | | |
| Location | | | Width | | | Opening | | | |
| Removable panels | | | - in | | | Outward | | | |

| Spacer | | Component: 5 | | | Length: 20 in | | Shipping Section: 2 | | |
|------------------|--|--------------|-------|--|---------------|---------|---------------------|--|--|
| Pressure Drop | | | | | | | | | |
| 0.00 inWc | | | | | | | | | |
| Panel | | | | | | | | | |
| Location | | | Width | | | Opening | | | |
| Removable panels | | | - in | | | Outward | | | |

| | | | |
|-------------------|--------------|---------------|---------------------|
| Supply Fan | Component: 6 | Length: 40 in | Shipping Section: 2 |
|-------------------|--------------|---------------|---------------------|

Fan Performance

| Air Volume | Static Pressure | | | Fan Energy Index(FEI) | Total Input Power | Fan Shaft Power | Fan Wheel Speed | | Outlet Velocity |
|------------|-----------------|-----------|-----------|-----------------------|-------------------|-----------------|-----------------|----------|-----------------|
| | External | Total | Cabinet | | | | Operating | Maximum | |
| 4000 cfm | 1.00 inWc | 2.50 inWc | 0.22 inWc | 1.52 | 1.9 kW | 2.29 BHP | 1749 rpm | 3650 rpm | N/A |

Fan Data

| Fan Type | Blade Type / Class | Nominal Fan Size | Quantity of Fans | Wheel Diameter | Material Type | Number of Blades | Discharge | Motor Location |
|----------------------|--------------------|------------------|------------------|----------------|---------------|------------------|---------------------|----------------|
| Centrifugal - Plenum | Airfoil / 2 | DDPL18 | 1 | 18.25 in | Aluminum | 9 | End, single opening | Behind Fan |

Motor Data

| Power | Electrical Supply | Speed | Efficiency | Enclosure | Frame Size | Supplier | Number of Poles | Lock Rotor Current | Full Load Current |
|--------|---------------------|----------|------------|-----------|-------------|----------|-----------------|--------------------|-------------------|
| 5.0 HP | 460/60/3 V/Hz/Phase | 1750 rpm | Premium | ODP | 184 T frame | Generic | 4 | 47.04 A | 6.60 A |

Fan Options

| | | | |
|-----------------------------|----------|-----------------------|--------|
| Shaft Grounding Kit: | Provided | Isolator Type: | Spring |
|-----------------------------|----------|-----------------------|--------|

Door

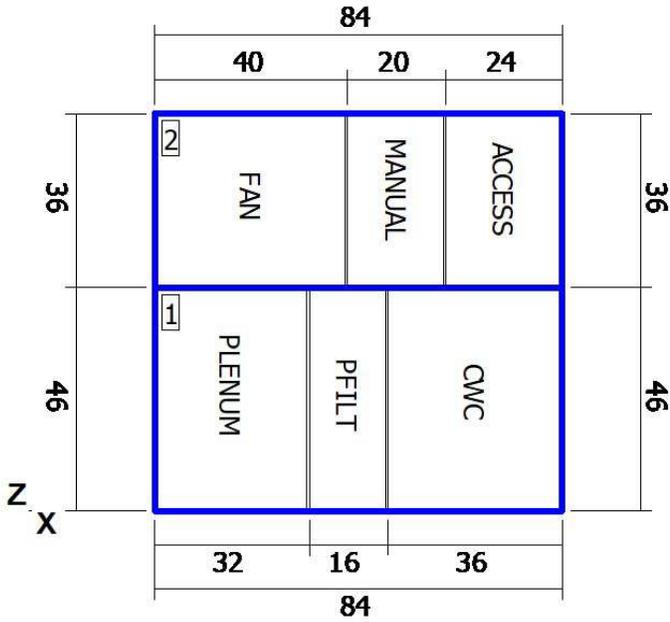
| Location | Width | Opening |
|------------|-------|---------|
| Drive side | 30 in | Outward |

Unit Sound Power (dB)

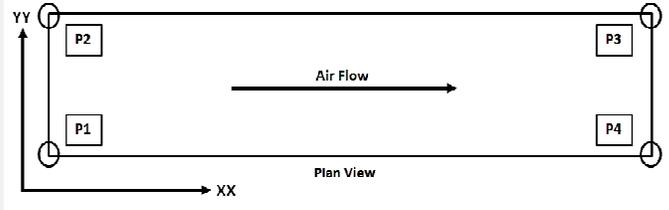
| Type | 63 Hz | 125 Hz | 250 Hz | 500 Hz | 1000 Hz | 2000 Hz | 4000 Hz | 8000 Hz |
|------------------------|-------|--------|--------|--------|---------|---------|---------|---------|
| Radiated: | 65 | 67 | 68 | 58 | 54 | 47 | 46 | 51 |
| Unit Discharge: | 75 | 69 | 81 | 75 | 76 | 75 | 69 | 62 |
| Unit Return: | 67 | 69 | 76 | 69 | 62 | 60 | 52 | 51 |

Shipping Section Details

| Section | Length in | Weight lb | Corner Weights (lb) | | | | Center of Gravity (in) | | |
|---|--------------|--------------|---------------------|-----|-----|-----|------------------------|-----|-----|
| | | | P1 | P2 | P3 | P4 | XX | YY | ZZ |
| 1 | 84 | 1241 | | | | | | | |
| 2 | 84 | 914 | | | | | | | |
| Entire Unit <i>Lower level only</i> | 84 | 1920 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |



Elevation View



NOTE: Special components aren't included in the corner weights and center of gravity data.

NOTE: Shipping weights listed do not include weight of water (listed in coil section(s) above).

Shipping Protection

Stretch Wrap

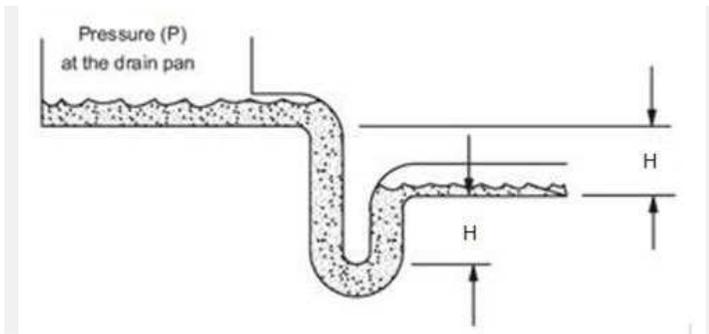
NOTE: Shipping protection is not meant for long term storage.

Supply Static Pressure Drop

| Component | Option | Static Pressure Drop |
|--------------------------------|--------------------|----------------------|
| Plenum Section | Plenum Section | 0.01 insWg |
| Panel Filter | Panel Filter | 0.57 insWg |
| Chilled Water coil | Chilled Water coil | 0.71 insWg |
| Access Section | Access Section | |
| Manual Section | Manual Section | |
| Supply Fan | Cabinet | 0.22 insWg |
| External Static | External Static | 1.00 insWg |
| Total Supply Fan Static | | 2.50 insWg |

Minimum Recommended Drain Pan Trap Dimensions

| Shipping Section | Component | H |
|------------------|--------------------|------|
| 1 | Chilled Water coil | 3.08 |



Dimensions provided as a courtesy and are recommended minimums only. Daikin is not responsible for supplying or designing drain pan traps and is not responsible for any damage caused by incorrect trap heights. The dimensions listed above should be reviewed and approved by a licensed plumbing professional.

AHRI Certification

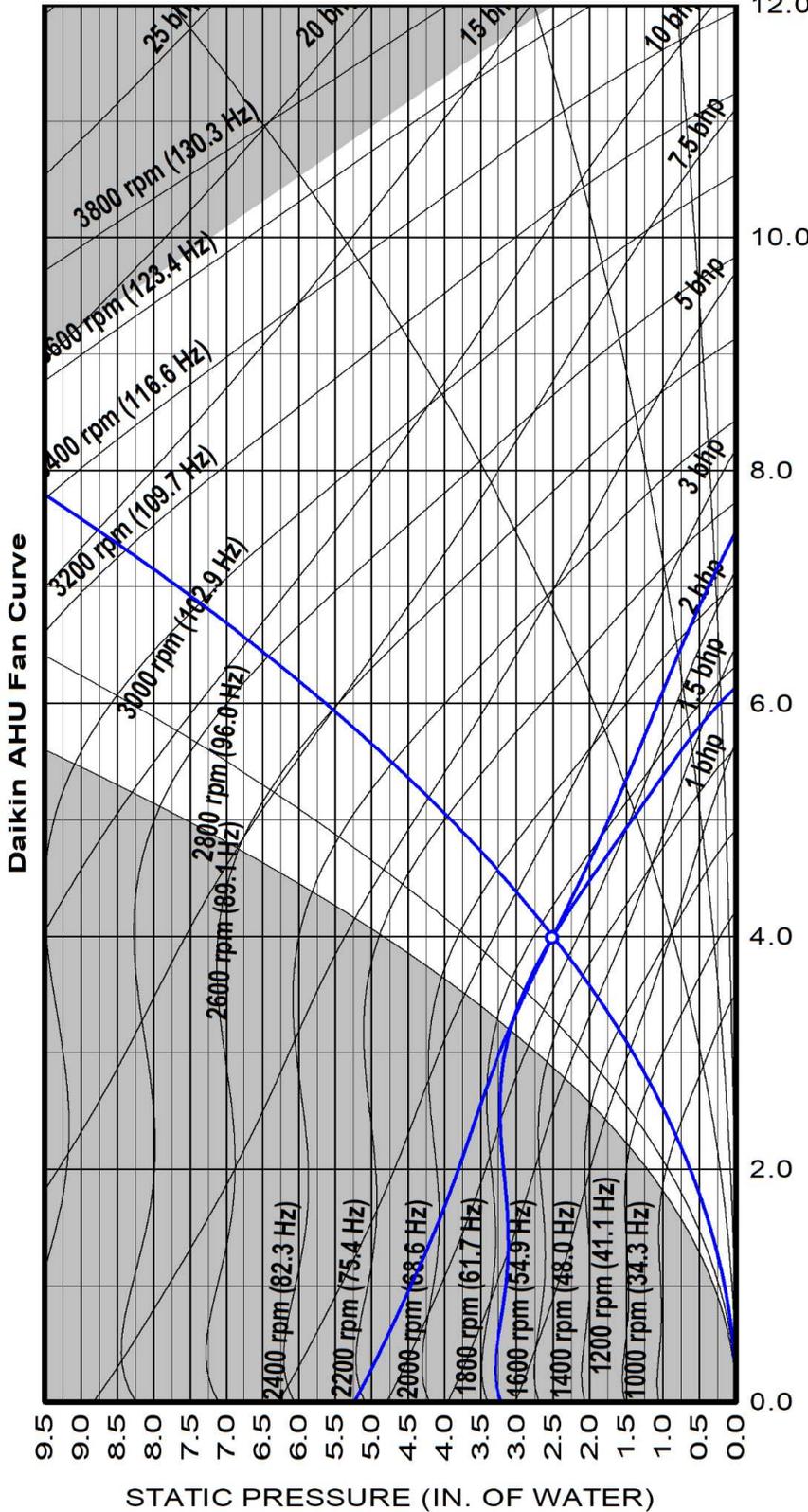


Certified by the AHRI Central Station Air-Handling Unit (AHU) Certification Program, which is based on AHRI Standard 430/431. AHRI certified units are subject to rigorous and continuous testing, have performance ratings independently measured and are third-party verified. Certified units may be found in the AHRI Directory at www.ahridirectory.org.

Notes

Standard

1. As a standalone component, unit meets or exceeds requirements of ASHRAE 90.1 - 2016. The approving authority is responsible for compliance of multi - component building systems.

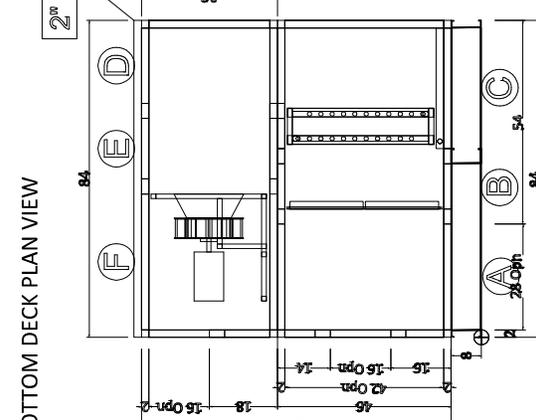
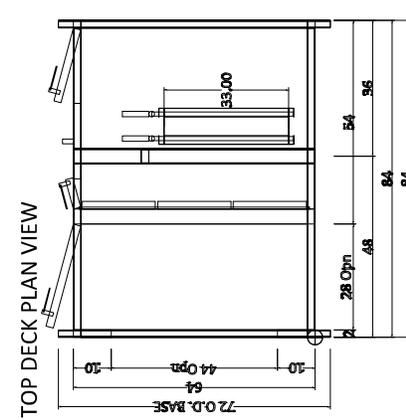
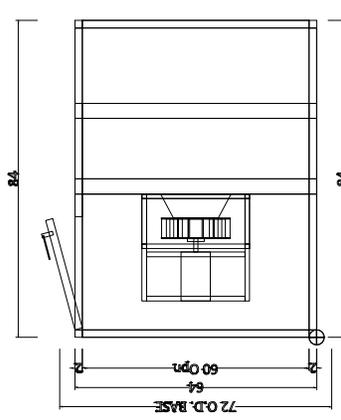


| AF 18 DD PLENUM 9BL (100% Width) 1x1 Supply Fan at Standard Conditions | | | | | |
|--|---|-------|-------------|------------------|-----|
| Air volume | 4000 | cfm | Fan speed | 1749 | rpm |
| Total static | 2.50 | insVg | Max speed | 3650 | rpm |
| Fan Shaft Power | 2.3 | bhp | Efficiency | 68.9 | % |
| Approx VFD Setting | 59.9 | Hz | Motor Speed | 1750 | rpm |
| Fan Energy Index(FEI) | 1.52 | | | | |
| Unit tagging | AHU-1 | | Date | December-19-2025 | |
| Job name | 2025 Forest Park Elementary Air Handler | | Time | 16:31 | |

Supply fan performance is certified in accordance with the Central Station Air-Handling Unit Certification Program, which is based on AHRI Standard 430.



| Component Key | |
|---------------|---|
| (A) | Plenum Section Left Door (WXH): 28 ins x 42 ins |
| (B) | Panel Filter Filter Type: PrePleat (MERV 13) Left Door (WXH): 8 ins x 42 ins |
| (C) | Chilled Water coil Coil Model: 5WH100B6 Total Capacity: 153164.0 Btu/hr Left Door (WXH): 20 ins x 36 ins |
| (D) | Access Section |
| (E) | Manual Section |
| (F) | Supply Fan Fan Type: Centrifugal - Plenum Fan Size (Class): 18 (2) Air Flowrate: 4000.0 cfm T.S.P.: 2.5 ins/Wg Motor Power: 5.0 HP Left Door (WXH): 30 ins x 32 ins |



Product Drawing
 Unit Tag: AHU-1
 Product Name: 2025 Forest Park Elementary Air Handler
 Model: CAH014GVGM
 Dec. 17, 2025 Ver/Rev: Sheet: 1 of 1 Page: 7 of 7
 Sales Office: Daikin Applied Plymouth
 Tolerance: +/-0.25"
 Scale: NTS
 Dwg Units: in



All opening dimensions have a 1" mounting flange along the inner edge. The actual airflow area of the opening is 2" smaller in each dimension.



We Are Your Schools

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Section 23 0593 - Testing, Adjusting, And Balancing For Hvac

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Testing, Adjusting, and Balancing of Air Systems:
 - a. Constant-volume air systems.
 - b. Variable-air-volume systems.
 - c. Exhaust systems.
 - 2. Testing, Adjusting, and Balancing of Hydronic Piping Systems:
 - a. Constant-flow hydronic systems.
 - b. Variable-flow hydronic systems.
 - c. Primary-secondary hydronic systems.
 - 3. Testing, adjusting, and balancing of equipment.
 - 4. Testing, adjusting, and balancing of existing HVAC systems and equipment.
 - 5. Procedures for exhaust hoods.
 - 6. HVAC-control system verification.

1.2 DEFINITIONS

- A. AABC: Associated Air Balance Council.
- B. NEBB: National Environmental Balancing Bureau.
- C. TAB: Testing, adjusting, and balancing.
- D. TABB: Testing, Adjusting, and Balancing Bureau.
- E. TAB Specialist: An independent entity meeting qualifications to perform TAB work.
- F. TDH: Total dynamic head.
- G. UFAD: Underfloor air distribution.

1.3 INFORMATIONAL SUBMITTALS

- A. Certified TAB reports.
- B. Sample report forms.

1.4 QUALITY ASSURANCE

- A. TAB Specialists Qualifications, Certified by AABC:
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by AABC.
 - 2. TAB Technician: Employee of the TAB specialist and certified by AABC.
- B. TAB Specialists Qualifications, Certified by NEBB:
 - 1. TAB Field Supervisor: Employee of the TAB specialist and certified by NEBB.
 - 2. TAB Technician: Employee of the TAB specialist and certified by NEBB.

- C. Instrumentation Type, Quantity, Accuracy, and Calibration: Comply with requirements in ASHRAE 111, Section 4, "Instrumentation."
- D. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.7.2.3 - "System Balancing."
- E. Code and AHJ Compliance: TAB is required to comply with governing codes and requirements of authorities having jurisdiction.

1.5 FIELD CONDITIONS

- A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.
- B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 TAB SPECIALISTS

- A. Subject to compliance with requirements, engage one of the following:
 - 1. AABC - Fluid Dynamics, Inc, Fort Wayne, IN, 260-490-8010.
 - 2. NEBB - Mechanical Test and Balance, Crown Point, IN, 219-663-8107.
 - 3. AABC - Synergy Test and Balance, Indianapolis, IN, 317-222-1828.
 - 4. NEBB - Total Balance, Inc., Indianapolis, IN, 317-955-7825.
- B. Firms not listed above may be added upon request. Submit the following materials for prior approval:
 - 1. Biographic history of the firm listing all Owners, date of incorporation, history of ownership.
 - 2. Copies of all certifications from AABC or NEBB.
 - 3. List of all staff that have received certification from AABC or NEBB.
 - 4. List of recently completed projects of similar scale and complexity with project Owner's contact information and mechanical contractor's contact information.
 - 5. A sample test and balance report that is no more than 1 year old for a project of similar scale and complexity.

3.2 EXAMINATION

- A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems designs that may preclude proper TAB of systems and equipment.

- B. Examine installed systems for balancing devices, such as test ports, gauge cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are applicable for intended purpose and are accessible.
- C. Examine the approved submittals for HVAC systems and equipment.
- D. Examine design data, including HVAC system descriptions, statements of design assumptions for environmental conditions and systems output, and statements of philosophies and assumptions about HVAC system and equipment controls.
- E. Examine ceiling plenums and underfloor air plenums used for HVAC to verify that they are properly separated from adjacent areas and sealed.
- F. Examine equipment performance data, including fan and pump curves.
 - 1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - 2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
- G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
- H. Examine test reports specified in individual system and equipment Sections.
- I. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, filters are clean, and equipment with functioning controls is ready for operation.
- J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible, and their controls are connected and functioning.
- K. Examine temporary and permanent strainers. Verify that temporary strainer screens used during system cleaning and flushing have been removed and permanent strainer baskets are installed and clean.
- L. Examine control valves for proper installation for their intended function of isolating, throttling, diverting, or mixing fluid flows.
- M. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
- N. Examine system pumps to ensure absence of entrained air in the suction piping.
- O. Examine operating safety interlocks and controls on HVAC equipment.

- P. Examine control dampers for proper installation for their intended function of isolating, throttling, diverting, or mixing air flows.
- Q. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.3 COMMUNICATION AND COORDINATION

- A. The TAB technician shall coordinate their work with all contractors to verify that installations are complete and ready for testing.
- B. The TAB technician shall review the installation for function. If functional deficiencies are found that will prevent a proper balance, the TAB technician shall contact the design engineer via email or phone to discuss the deficiency and possible approaches to resolve. This should be done prior to issuing a final report in an effort to have field issues resolved in a timely manner.

3.4 PREPARATION

- A. Prepare a TAB plan that includes the following:
 - 1. Equipment and systems to be tested.
 - 2. Strategies and step-by-step procedures for balancing the systems.
 - 3. Instrumentation to be used.
 - 4. Sample forms with specific identification for all equipment.
- B. Perform system-readiness checks of HVAC systems and equipment to verify system readiness for TAB work. Include, at a minimum, the following:
 - 1. Airside:
 - a. Verify that leakage and pressure tests on air distribution systems have been satisfactorily completed.
 - b. Duct systems are complete with terminals installed.
 - c. Volume, smoke, and fire dampers are open and functional.
 - d. Clean filters are installed.
 - e. Fans are operating, free of vibration, and rotating in correct direction.
 - f. Variable-frequency controllers' startup is complete and safeties are verified.
 - g. Automatic temperature-control systems are operational.
 - h. Ceilings are installed.
 - i. Windows and doors are installed.
 - j. Suitable access to balancing devices and equipment is provided.
 - 2. Hydronics:
 - a. Verify leakage and pressure tests on water distribution systems have been satisfactorily completed.
 - b. Piping is complete with terminals installed.
 - c. Water treatment is complete.
 - d. Systems are flushed, filled, and air purged.
 - e. Strainers are pulled and cleaned.
 - f. Control valves are functioning in accordance with the sequence of operation.
 - g. Shutoff and balance valves have been verified to be 100 percent open.
 - h. Pumps are started and proper rotation is verified.

- i. Pump gauge connections are installed directly at pump inlet and outlet flanges or in discharge and suction pipe prior to valves or strainers.
- j. Variable-frequency controllers' startup is complete and safeties are verified.
- k. Suitable access to balancing devices and equipment is provided.

3.5 GENERAL PROCEDURES FOR TESTING AND BALANCING

- A. Perform testing and balancing procedures on each system in accordance with the procedures contained in ASHRAE 111 and in this Section.
- B. Cut insulation, ducts, pipes, and equipment casings for installation of test probes to the minimum extent necessary for TAB procedures.
 1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
 2. After testing and balancing, install test ports and duct access doors that comply with requirements in Section 23 3300 "Air Duct Accessories."
 3. Where holes for probes are required in piping or hydronic equipment, install pressure and temperature test plugs to seal systems.
 4. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish in accordance with Section 23 0713 "Duct Insulation," Section 23 0716 "HVAC Equipment Insulation," and Section 23 0719 "HVAC Piping Insulation."
- C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
- D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.6 TESTING, ADJUSTING, AND BALANCING OF HVAC EQUIPMENT

- A. Test, adjust, and balance HVAC equipment indicated on Drawings, including, but not limited to, the following:
 1. Motors.
 2. Pumps.
 3. Fans and ventilators.
 4. Air curtains.
 5. Terminal units.
 6. Condensing units.
 7. Air-handling units.
 8. Heating and ventilating units.
 9. Dedicated outdoor-air units.
 10. Packaged air conditioners.
 11. Self-contained air conditioners.
 12. Computer-room air conditioners.
 13. Split-system air conditioners.
 14. Variable-refrigerant-flow systems.
 15. Heat pumps.
 16. Coils.
 17. Fan coil units.
 18. Unit ventilators.

19. Radiators.
20. Convectors.
21. Finned-tube radiation heaters.
22. Radiant-heating panels.

3.7 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' Record drawings duct layouts.
- C. For variable-air-volume systems, develop a plan to simulate diversity.
- D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
- E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check condensate drains for proper connections and functioning.
- K. Check for proper sealing of air-handling-unit components.

3.8 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 1. Measure total airflow.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses close to the fan and prior to any outlets, to obtain total airflow.
 - c. Where duct conditions are unsuitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
 2. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.

- c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report artificial loading of filters at the time static pressures are measured.
 3. Review Contractor-prepared shop drawings and Record drawings to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 4. Obtain approval from Engineer for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in HVAC Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 5. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload occurs. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
 1. Measure airflow of submain and branch ducts.
 2. Adjust submain and branch duct volume dampers for specified airflow.
 3. Re-measure each submain and branch duct after all have been adjusted.
- C. Adjust air inlets and outlets for each space to indicated airflows.
 1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
 2. Measure inlets and outlets airflow.
 3. Adjust each inlet and outlet for specified airflow.
 4. Re-measure each inlet and outlet after they have been adjusted.
- D. Verify final system conditions.
 1. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to design if necessary.
 2. Re-measure and confirm that total airflow is within design.
 3. Re-measure all final fan operating data, speed, volts, amps, and static profile.
 4. Mark all final settings.
 5. Test system in economizer mode. Verify proper operation and adjust if necessary.
 6. Measure and record all operating data.
 7. Record final fan-performance data.

3.9 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

- A. Adjust the variable-air-volume systems as follows:
 1. Verify that the system static pressure sensor is located two-thirds of the distance down the duct from the fan discharge.
 2. Verify that the system is under static pressure control.
 3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure, and adjust system static pressure control set point so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.

4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows:
 - a. Adjust controls so that terminal is calling for maximum airflow. Some controllers require starting with minimum airflow. Verify calibration procedure for specific project.
 - b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
 - c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
 - d. Adjust controls so that terminal is calling for minimum airflow.
 - e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
 - f. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.
5. After terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Set outside-air, return-air, and relief-air dampers for proper position that simulates minimum outdoor-air conditions.
 - b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow, so that connected total matches fan selection and simulates actual load in the building.
 - c. Where duct conditions allow, measure airflow by main Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses close to the fan and prior to any outlets, to obtain total airflow.
 - d. Where duct conditions are unsuitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
6. Measure fan static pressures as follows:
 - a. Measure static pressure directly at the fan outlet or through the flexible connection.
 - b. Measure static pressure directly at the fan inlet or through the flexible connection.
 - c. Measure static pressure across each component that makes up the air-handling system.
 - d. Report any artificial loading of filters at the time static pressures are measured.
7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - a. Balance the return-air ducts and inlets.
 - b. Verify that terminal units are meeting design airflow under system maximum flow.
8. Re-measure the inlet static pressure at the most critical terminal unit, and adjust the system static pressure set point to the most energy-efficient set point to maintain the optimum system static pressure. Record set point and give to controls Contractor.
9. Verify final system conditions as follows:
 - a. Re-measure and confirm that minimum outdoor, return, and relief airflows are within design. Readjust to match design if necessary.

- b. Re-measure and confirm that total airflow is within design.
- c. Re-measure final fan operating data, speed, volts, amps, and static profile.
- d. Mark final settings.
- e. Test system in economizer mode. Verify proper operation and adjust if necessary. Measure and record all operating data.
- f. Verify tracking between supply and return fans.

3.10 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

- A. Prepare test reports for pumps, coils, and other equipment. Obtain approved submittals and manufacturer-recommended testing procedures. Crosscheck the summation of required coil and equipment flow rates with pump design flow rate.
- B. Prepare schematic diagrams of systems' Record drawings piping layouts.
- C. In addition to requirements in "Preparation" Article, prepare hydronic systems for testing and balancing as follows:
 1. Check expansion tank for proper setting.
 2. Check highest vent for adequate pressure.
 3. Check flow-control valves for proper position.
 4. Locate start-stop and disconnect switches, electrical interlocks, and motor controllers.
 5. Verify that motor controllers are equipped with properly sized thermal protection.
 6. Check that air has been purged from the system.
- D. Measure and record upstream and downstream pressure of each piece of equipment.
- E. Measure and record upstream and downstream pressure of pressure-reducing valves.
- F. Check settings and operation of automatic temperature-control valves, self-contained control valves, and pressure-reducing valves. Record final settings.
 1. Check settings and operation of each safety valve. Record settings.

3.11 PROCEDURES FOR CONSTANT-FLOW HYDRONIC SYSTEMS

- A. Adjust pumps to deliver total design flow.
 1. Measure total water flow.
 - a. Position valves for full flow through coils.
 - b. Measure flow by main flow meter, if installed.
 - c. If main flow meter is not installed, determine flow by pump TDH or known equipment pressure drop.
 2. Measure pump TDH as follows:
 - a. Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
 - b. Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
 - c. Convert pressure to head and correct for differences in gauge heights.
 - d. Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.

- e. With valves open, read pump TDH. Adjust pump discharge valve until design water flow is achieved. If excessive throttling is required to achieve desired flow, recommend pump impellers be trimmed to reduce excess throttling.
 3. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.
- B. Adjust flow-measuring devices installed in mains and branches to design water flows.
1. Measure flow in main and branch pipes.
 2. Adjust main and branch balance valves for design flow.
 3. Re-measure each main and branch after all have been adjusted.
- C. Adjust flow-measuring devices installed at terminals for each space to design water flows.
1. Measure flow at terminals.
 2. Adjust each terminal to design flow.
 3. Re-measure each terminal after it is adjusted.
 4. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
 5. Perform temperature tests after flows have been balanced.
- D. For systems with pressure-independent valves at terminals:
1. Measure differential pressure and verify that it is within manufacturer's specified range.
 2. Perform temperature tests after flows have been verified.
- E. For systems without pressure-independent valves or flow-measuring devices at terminals:
1. Measure and balance coils by either coil pressure drop or temperature method.
 2. If balanced by coil pressure drop, perform temperature tests after flows have been verified.
- F. Verify final system conditions as follows:
1. Re-measure and confirm that total water flow is within design.
 2. Re-measure final pumps' operating data, TDH, volts, amps, and static profile.
 3. Mark final settings.
- G. Verify that memory stops have been set.

3.12 PROCEDURES FOR VARIABLE-FLOW HYDRONIC SYSTEMS

- A. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals, and proceed as specified above for hydronic systems.
- B. Adjust the variable-flow hydronic system as follows:
1. Verify that the pressure-differential sensor(s) is located as indicated.
 2. Determine whether there is diversity in the system.
- C. For systems with no flow diversity:
1. Adjust pumps to deliver total design flow.

- a. Measure total water flow.
 - 1) Position valves for full flow through coils.
 - 2) Measure flow by main flow meter, if installed.
 - 3) If main flow meter is not installed, determine flow by pump TDH or known equipment pressure drop.
 - b. Measure pump TDH as follows:
 - 1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
 - 2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
 - 3) Convert pressure to head and correct for differences in gauge heights.
 - 4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.
 - 5) With valves open, read pump TDH. Adjust pump discharge valve or speed until design water flow is achieved. If excessive throttling is required to achieve desired flow, recommend pump impellers be trimmed to reduce excess throttling.
 - c. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.
2. Adjust flow-measuring devices installed in mains and branches to design water flows.
 - a. Measure flow in main and branch pipes.
 - b. Adjust main and branch balance valves for design flow.
 - c. Re-measure each main and branch after all have been adjusted.
 3. Adjust flow-measuring devices installed at terminals for each space to design water flows.
 - a. Measure flow at terminals.
 - b. Adjust each terminal to design flow.
 - c. Re-measure each terminal after it is adjusted.
 - d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
 - e. Perform temperature tests after flows have been balanced.
 4. For systems with pressure-independent valves at terminals:
 - a. Measure differential pressure and verify that it is within manufacturer's specified range.
 - b. Perform temperature tests after flows have been verified.
 5. For systems without pressure-independent valves or flow-measuring devices at terminals:
 - a. Measure and balance coils by either coil pressure drop or temperature method.
 - b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.
 6. Prior to verifying final system conditions, determine the system pressure-differential set point(s).
 7. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion, open discharge valve 100 percent, and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
 8. Mark final settings and verify that all memory stops have been set.

9. Verify final system conditions as follows:
 - a. Re-measure and confirm that total flow is within design.
 - b. Re-measure final pumps' operating data, TDH, volts, amps, speed, and static profile.
 - c. Mark final settings.

- D. For systems with flow diversity:
 1. Determine diversity factor.
 2. Simulate system diversity by closing required number of control valves, as approved by Architect.
 3. Adjust pumps to deliver total design flow.
 - a. Measure total water flow.
 - 1) Position valves for full flow through coils.
 - 2) Measure flow by main flow meter, if installed.
 - 3) If main flow meter is not installed, determine flow by pump TDH or known equipment pressure drop.
 - b. Measure pump TDH as follows:
 - 1) Measure discharge pressure directly at the pump outlet flange or in discharge pipe prior to any valves.
 - 2) Measure inlet pressure directly at the pump inlet flange or in suction pipe prior to any valves or strainers.
 - 3) Convert pressure to head and correct for differences in gauge heights.
 - 4) Verify pump impeller size by measuring the TDH with the discharge valve closed. Note the point on manufacturer's pump curve at zero flow, and verify that the pump has the intended impeller size.
 - 5) With valves open, read pump TDH. Adjust pump discharge valve or speed until design water flow is achieved. If excessive throttling is required to achieve desired flow, recommend pump impellers be trimmed to reduce excess throttling.
 - c. Monitor motor performance during procedures, and do not operate motor in an overloaded condition.
 4. Adjust flow-measuring devices installed in mains and branches to design water flows.
 - a. Measure flow in main and branch pipes.
 - b. Adjust main and branch balance valves for design flow.
 - c. Re-measure each main and branch after all have been adjusted.
 5. Adjust flow-measuring devices installed at terminals for each space to design water flows.
 - a. Measure flow at terminals.
 - b. Adjust each terminal to design flow.
 - c. Re-measure each terminal after it is adjusted.
 - d. Position control valves to bypass the coil, and adjust the bypass valve to maintain design flow.
 - e. Perform temperature tests after flows have been balanced.
 6. For systems with pressure-independent valves at terminals:
 - a. Measure differential pressure, and verify that it is within manufacturer's specified range.
 - b. Perform temperature tests after flows have been verified.
 7. For systems without pressure-independent valves or flow-measuring devices at terminals:

- a. Measure and balance coils by either coil pressure drop or temperature method.
- b. If balanced by coil pressure drop, perform temperature tests after flows have been verified.
8. Open control valves that were shut. Close a sufficient number of control valves that were previously open to maintain diversity, and balance terminals that were just opened.
9. Prior to verifying final system conditions, determine system pressure-differential set point(s).
10. If the pump discharge valve was used to set total system flow with variable-frequency controller at 60 Hz, at completion, open discharge valve 100 percent, and allow variable-frequency controller to control system differential-pressure set point. Record pump data under both conditions.
11. Mark final settings and verify that memory stops have been set.
12. Verify final system conditions as follows:
 - a. Re-measure and confirm that total water flow is within design.
 - b. Re-measure final pumps' operating data, TDH, volts, amps, speed, and static profile.
 - c. Mark final settings.

3.13 PROCEDURES FOR MOTORS

- A. Motors 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 1. Manufacturer's name, model number, and serial number.
 2. Motor horsepower rating.
 3. Motor rpm.
 4. Phase and hertz.
 5. Nameplate and measured voltage, each phase.
 6. Nameplate and measured amperage, each phase.
 7. Starter size and thermal-protection-element rating.
 8. Service factor and frame size.
- B. Motors Driven by Variable-Frequency Controllers: Test manual bypass of controller to prove proper operation.

3.14 PROCEDURES FOR AIR-COOLED CONDENSING UNITS

- A. Verify proper rotation of fan(s).
- B. Measure and record entering- and leaving-air temperatures.
- C. Measure and record entering and leaving refrigerant pressures.
- D. Measure and record operating data of compressor(s), fan(s), and motors.

3.15 PROCEDURES FOR AIR-COOLED CONDENSERS

- A. Verify proper rotation of fan(s).
- B. Measure and record entering- and leaving-air temperatures.

- C. Measure and record entering and leaving refrigerant pressures.
- D. Measure and record operating data of fan(s) and motor(s).

3.16 PROCEDURES FOR HEAT-TRANSFER COILS

- A. Measure, adjust, and record the following data for each hydronic coil:
 - 1. Entering- and leaving-water temperature.
 - 2. Water flow rate.
 - 3. Water pressure drop.
 - 4. Dry-bulb temperature of entering and leaving air.
 - 5. Wet-bulb temperature of entering and leaving air for cooling coils.
 - 6. Airflow.
 - 7. Air pressure drop.
- B. Measure, adjust, and record the following data for each electric heating coil:
 - 1. Nameplate data.
 - 2. Airflow.
 - 3. Entering- and leaving-air temperature at full load.
 - 4. Air pressure drop.
 - 5. Voltage and amperage input of each phase at full load.
 - 6. Calculated kilowatt at full load.
 - 7. Fuse or circuit-breaker rating for overload protection.
- C. Measure, adjust, and record the following data for each steam coil:
 - 1. Dry-bulb temperature of entering and leaving air.
 - 2. Airflow.
 - 3. Inlet steam pressure.
- D. Measure, adjust, and record the following data for each refrigerant coil:
 - 1. Dry-bulb temperature of entering and leaving air.
 - 2. Wet-bulb temperature of entering and leaving air.
 - 3. Airflow.
 - 4. Air pressure drop.
 - 5. Entering and leaving refrigerant pressure and temperatures.

3.17 HVAC CONTROLS VERIFICATION

- A. In conjunction with system balancing, perform the following:
 - 1. Verify HVAC control system is operating within the design limitations.
 - 2. Confirm that the sequences of operation are in compliance with Contract Documents.
 - 3. Verify that controllers are calibrated and function as intended.
 - 4. Verify that controller set points are as indicated.
 - 5. Verify the operation of lockout or interlock systems.
 - 6. Verify the operation of valve and damper actuators.
 - 7. Verify that controlled devices are properly installed and connected to correct controller.
 - 8. Verify that controlled devices travel freely and are in position indicated by controller: open, closed, or modulating.

9. Verify location and installation of sensors to ensure that they sense only intended temperature, humidity, or pressure.

- B. Reporting: Include a summary of verifications performed, remaining deficiencies, and variations from indicated conditions.

3.18 PROCEDURES FOR TESTING, ADJUSTING, AND BALANCING EXISTING SYSTEMS

- A. Perform a preconstruction inspection of existing equipment that is to remain and be reused.

1. Measure and record the operating speed, airflow, and static pressure of each fan and equipment with fan(s).
2. Measure and record flows, temperatures, and pressures of each piece of equipment in each hydronic system. Compare the values to design or nameplate information, where information is available.
3. Measure motor voltage and amperage. Compare the values to motor nameplate information.
4. Check the refrigerant charge.
5. Check the condition of filters.
6. Check the condition of coils.
7. Check the operation of the drain pan and condensate-drain trap.
8. Check bearings and other lubricated parts for proper lubrication.
9. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.

- B. TAB After Construction: Before performing testing and balancing of renovated existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished in accordance with renovation scope indicated by Contract Documents. Verify the following:

1. New filters are installed.
2. Coils are clean and fins combed.
3. Drain pans are clean.
4. Fans are clean.
5. Bearings and other parts are properly lubricated.
6. Deficiencies noted in the preconstruction report are corrected.

- C. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.

1. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
2. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
3. If calculations increase or decrease the airflow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
4. Balance each air outlet.

3.19 TOLERANCES

- A. Set HVAC system's airflow rates and water flow rates within the following tolerances:
 - 1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent. If design value is less than 100 cfm, within 10 cfm.
 - 2. Air Outlets and Inlets: Plus or minus 10 percent. If design value is less than 100 cfm, within 10 cfm.
 - 3. Heating-Water Flow Rate: Plus or minus 10 percent. If design value is less than 10 gpm, within 10 percent.
 - 4. Chilled-Water Flow Rate: Plus or minus 10 percent. If design value is less than 10 gpm, within 10 percent.
 - 5. Condenser-Water Flow Rate: Plus or minus 10 percent.
- B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.20 PROGRESS REPORTING

- A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for system-balancing devices. Recommend changes and additions to system-balancing devices, to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance-measuring and -balancing devices.
- B. Status Reports: Prepare biweekly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.21 FINAL REPORT

- A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - 1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - 2. Include a list of instruments used for procedures, along with proof of calibration.
 - 3. Certify validity and accuracy of field data.
- B. Final Report Contents: In addition to certified field-report data, include the following:
 - 1. Pump curves.
 - 2. Fan curves.
 - 3. Manufacturers' test data.
 - 4. Field test reports prepared by system and equipment installers.
 - 5. Other information relative to equipment performance; do not include Shop Drawings and Product Data.
- C. General Report Data: In addition to form titles and entries, include the following data:
 - 1. Title page.
 - 2. Name and address of the TAB specialist.
 - 3. Project name.

4. Project location.
 5. Architect's name and address.
 6. Engineer's name and address.
 7. Contractor's name and address.
 8. Report date.
 9. Signature of TAB supervisor who certifies the report.
 10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
 11. Summary of contents, including the following:
 - a. Indicated versus final performance.
 - b. Notable characteristics of systems.
 - c. Description of system operation sequence if it varies from the Contract Documents.
 12. Nomenclature sheets for each item of equipment.
 13. Data for terminal units, including manufacturer's name, type, size, and fittings.
 14. Notes to explain why certain final data in the body of reports vary from indicated values.
 15. Test conditions for fans performance forms, including the following:
 - a. Settings for outdoor-, return-, and exhaust-air dampers.
 - b. Conditions of filters.
 - c. Cooling coil, wet- and dry-bulb conditions.
 - d. Heating coil, dry-bulb conditions.
 - e. Face and bypass damper settings at coils.
 - f. Fan drive settings, including settings and percentage of maximum pitch diameter.
 - g. Variable-frequency controller settings for variable-air-volume systems.
 - h. Settings for pressure controller(s).
 - i. Other system operating conditions that affect performance.
 16. Test conditions for pump performance forms, including the following:
 - a. Variable-frequency controller settings for variable-flow hydronic systems.
 - b. Settings for pressure controller(s).
 - c. Other system operating conditions that affect performance.
- D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
1. Quantities of outdoor, supply, return, and exhaust airflows.
 2. Water and steam flow rates.
 3. Duct, outlet, and inlet sizes.
 4. Pipe and valve sizes and locations.
 5. Terminal units.
 6. Balancing stations.
 7. Position of balancing devices.
- E. Air-Handling-Unit Test Reports: For air-handling units, include the following:
1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and unit size.
 - e. Manufacturer's serial number.
 - f. Unit arrangement and class.

- g. Discharge arrangement.
 - h. Sheave make, size in inches, and bore.
 - i. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - j. Number, make, and size of belts.
 - k. Number, type, and size of filters.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and speed.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - 3. Test Data (Indicated and Actual Values):
 - a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan speed.
 - d. Inlet and discharge static pressure in inches wg.
 - e. For each filter bank, filter static-pressure differential in inches wg.
 - f. Preheat-coil static-pressure differential in inches wg.
 - g. Cooling-coil static-pressure differential in inches wg.
 - h. Heating-coil static-pressure differential in inches wg.
 - i. List for each internal component with pressure-drop, static-pressure differential in inches wg.
 - j. Outdoor airflow in cfm.
 - k. Return airflow in cfm.
 - l. Outdoor-air damper position.
 - m. Return-air damper position.
- F. Apparatus-Coil Test Reports:
 - 1. Coil Data:
 - a. System identification.
 - b. Location.
 - c. Coil type.
 - d. Number of rows.
 - e. Fin spacing in fins per inch o.c.
 - f. Make and model number.
 - g. Face area in sq. ft..
 - h. Tube size in NPS.
 - i. Tube and fin materials.
 - j. Circuiting arrangement.
 - 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Average face velocity in fpm.
 - c. Air pressure drop in inches wg.
 - d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
 - e. Return-air, wet- and dry-bulb temperatures in deg F.
 - f. Entering-air, wet- and dry-bulb temperatures in deg F.
 - g. Leaving-air, wet- and dry-bulb temperatures in deg F.
 - h. Water flow rate in gpm.

- i. Water pressure differential in feet of head or psig.
 - j. Entering-water temperature in deg F.
 - k. Leaving-water temperature in deg F.
 - l. Refrigerant expansion valve and refrigerant types.
 - m. Refrigerant suction pressure in psig.
 - n. Refrigerant suction temperature in deg F.
 - o. Inlet steam pressure in psig.
- G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
- 1. Unit Data:
 - a. System identification.
 - b. Location.
 - c. Coil identification.
 - d. Capacity in Btu/h.
 - e. Number of stages.
 - f. Connected volts, phase, and hertz.
 - g. Rated amperage.
 - h. Airflow rate in cfm.
 - i. Face area in sq. ft..
 - j. Minimum face velocity in fpm.
 - 2. Test Data (Indicated and Actual Values):
 - a. Heat output in Btu/h.
 - b. Airflow rate in cfm.
 - c. Air velocity in fpm.
 - d. Entering-air temperature in deg F.
 - e. Leaving-air temperature in deg F.
 - f. Voltage at each connection.
 - g. Amperage for each phase.
- H. Fan Test Reports: For supply, return, and exhaust fans, include the following:
- 1. Fan Data:
 - a. System identification.
 - b. Location.
 - c. Make and type.
 - d. Model number and size.
 - e. Manufacturer's serial number.
 - f. Arrangement and class.
 - g. Sheave make, size in inches, and bore.
 - h. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - 2. Motor Data:
 - a. Motor make, and frame type and size.
 - b. Horsepower and speed.
 - c. Volts, phase, and hertz.
 - d. Full-load amperage and service factor.
 - e. Sheave make, size in inches, and bore.
 - f. Center-to-center dimensions of sheave and amount of adjustments in inches.
 - g. Number, make, and size of belts.
 - 3. Test Data (Indicated and Actual Values):

- a. Total airflow rate in cfm.
 - b. Total system static pressure in inches wg.
 - c. Fan speed.
 - d. Discharge static pressure in inches wg.
 - e. Suction static pressure in inches wg.
- I. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
1. Report Data:
 - a. System fan and air-handling-unit number.
 - b. Location and zone.
 - c. Traverse air temperature in deg F.
 - d. Duct static pressure in inches wg.
 - e. Duct size in inches.
 - f. Duct area in sq. ft..
 - g. Indicated airflow rate in cfm.
 - h. Indicated velocity in fpm.
 - i. Actual airflow rate in cfm.
 - j. Actual average velocity in fpm.
 - k. Barometric pressure in psig.
- J. Air-Terminal-Device Reports:
1. Unit Data:
 - a. System and air-handling unit identification.
 - b. Location and zone.
 - c. Apparatus used for test.
 - d. Area served.
 - e. Make.
 - f. Number from system diagram.
 - g. Type and model number.
 - h. Size.
 - i. Effective area in sq. ft..
 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.
 - b. Air velocity in fpm.
 - c. Preliminary airflow rate as needed in cfm.
 - d. Preliminary velocity as needed in fpm.
 - e. Final airflow rate in cfm.
 - f. Final velocity in fpm.
 - g. Space temperature in deg F.
- K. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
1. Unit Data:
 - a. System and air-handling-unit identification.
 - b. Location and zone.
 - c. Room or riser served.
 - d. Coil make and size.
 - e. Flowmeter type.
 2. Test Data (Indicated and Actual Values):
 - a. Airflow rate in cfm.

- b. Entering-water temperature in deg F.
 - c. Leaving-water temperature in deg F.
 - d. Water pressure drop in feet of head or psig.
 - e. Entering-air temperature in deg F.
 - f. Leaving-air temperature in deg F.
- L. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves, and include the following:
- 1. Unit Data:
 - a. Unit identification.
 - b. Location.
 - c. Service.
 - d. Make and size.
 - e. Model number and serial number.
 - f. Water flow rate in gpm.
 - g. Water pressure differential in feet of head or psig.
 - h. Required net positive suction head in feet of head or psig.
 - i. Pump speed.
 - j. Impeller diameter in inches.
 - k. Motor make and frame size.
 - l. Motor horsepower and rpm.
 - m. Voltage at each connection.
 - n. Amperage for each phase.
 - o. Full-load amperage and service factor.
 - p. Seal type.
 - 2. Test Data (Indicated and Actual Values):
 - a. Static head in feet of head or psig.
 - b. Pump shutoff pressure in feet of head or psig.
 - c. Actual impeller size in inches.
 - d. Full-open flow rate in gpm.
 - e. Full-open pressure in feet of head or psig.
 - f. Final discharge pressure in feet of head or psig.
 - g. Final suction pressure in feet of head or psig.
 - h. Final total pressure in feet of head or psig.
 - i. Final water flow rate in gpm.
 - j. Voltage at each connection.
 - k. Amperage for each phase.
- M. Instrument Calibration Reports:
- 1. Report Data:
 - a. Instrument type and make.
 - b. Serial number.
 - c. Application.
 - d. Dates of use.
 - e. Dates of calibration.

3.22 VERIFICATION OF TAB REPORT

- A. The TAB specialist's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.

- B. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to the lesser of either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
- C. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
- D. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the TAB shall be considered incomplete and shall be rejected.
- E. If recheck measurements find the number of failed measurements noncompliant with requirements indicated, proceed as follows:
 - 1. TAB specialists shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection. All changes shall be tracked to show changes made to previous report.
 - 2. If the second final inspection also fails, Owner may pursue others Contract options to complete TAB work.
- F. Prepare test and inspection reports.

3.23 ADDITIONAL TESTS

- A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
- B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 0593

| PLUMBING FIXTURE SCHEDULE | | | | | | | | | | | | | |
|---------------------------|------|-------|-------|-----------|---------------|-------------|------------------------|--------------|--------|--------|------|------|------------|
| TAG | MFR. | MODEL | COLOR | TRIM MFR. | TRIM MODEL | TRIM FINISH | FLOW RATE (GPF OR GPM) | TRIM TYPE | WASTE | VENT | CW | HW | REMARKS |
| SK-1H | | | | CHICAGO | 200-AS17XKBCP | CHROME | 2.2 | LEVER HANDLE | 1-1/4" | 1-1/4" | 1/2" | 1/2" | 1, 2, 3, 4 |

REMARKS:
1. INTEGRAL BOWL EPOXY SINK. REFER TO ARCHITECTURAL DRAWINGS.
2. PROVIDE AND INSTALL WITH 17 GA. CAST BRASS P-TRAP W/ CO. BLACK GRID STRAINER, CHICAGO #1017-CP LOOSE KEY ANGLE STOP, AND SUPPLY RISERS.
3. PROVIDE AND INSTALL WITH CERAMIC CARTRIDGE.
4. PROVIDE AND INSTALL WITH STREAM SIDENOCK SOLIDS INTERCEPTOR.

NOTES:
1. *H* DESIGNATES HANDICAP ACCESSIBLE FIXTURES.

| LOUVER SCHEDULE | | | | | | | | | | | |
|-----------------|-----------|---------|----------------|----------------|---------------|----------------|----------------|--------------------|------------------------|---------|------------|
| TAG | MFR. | MODEL | FACE SIZE (IN) | FREE AREA (SF) | AIRFLOW (CFM) | VELOCITY (FPM) | THICKNESS (IN) | WATER PEN EFF (**) | FINISH | SERVICE | REMARKS |
| L-1 | GREENHECK | EVH-301 | 28x42 | 3.8 | 4000 | 1052 | 3 | 99.4 | 2.0 mil 70% KYNAR PVDF | INTAKE | 1, 2, 3, 4 |

REMARKS:
1. PROVIDE AND INSTALL WITH FLANGED FRAME.
2. STANDARD COLOR SELECTION BY OWNER.
3. PROVIDE AND INSTALL WITH ALUMINUM BIRDSCREEN.
4. VERTICAL BLADE ORIENTATION.
NOTE: PRIOR TO ORDERING ANY LOUVER, CONTRACTOR SHALL FIELD VERIFY ANY EXISTING OPENINGS THAT LOUVERS MUST BE INSTALLED IN.
** WATER PENETRATION EFFECTIVENESS WITH 3 INHR RAINFALL AND 29 MPH WIND.

| CONTROLS POINT LIST SCHEDULE | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------|-------------------------|------------------------|---------------------------|----------------------|------------------------------|------------------------------------|--------------------|---------------------|-------------------|----------|-------------------|------------------|-------------|-------------------|----------------------|----------------------------|---|--------------------------------|-------------------|----------|-----------------|--------------|--------------------------|------------|-------------------------|----------------|------------------|-----------------|------------|-----------------------|------------------------------|---------------------|
| FWCS | HARDWARE | | | | ALARMS | | SOFTWARE | | | | | | | | | | | | | | | | | | | | | | | | | |
| | OUTPUT (O) | | INPUT (I, D, V, C) | | DIGITAL | ANALOG | DIGITAL | ANALOG | BMS FUNCTIONS | | | | | | | | | | | | | | | | | | | | | | | |
| FOREST PARK ELEMENTARY | Control Relay/Contactor | Flashing Point Control | Shunt Trip Valve | Pneumatic Transducer | Electrical Transducer | 4-20 mA or 0-10 VDC | Pressure Switch | Overload Protection | Contact Closure | Photoeye | Auxiliary Contact | KW Meter Contact | Temperature | Relative Humidity | Set Point Adjustment | Carbon Dioxide Level (ppm) | Pressure (in H ₂ O, ft H ₂ O, DP) | Electrical Current Flow (amps) | Position Feedback | Trending | Equipment Alarm | Freeze/Alarm | Maintenance Notification | High Limit | Low Limit (Temperature) | Run Time Alarm | Scheduled On/Off | Time Scheduling | O.A. Reset | BACKUP software point | Lighting Control Integration | Color Graphics Item |
| Point Description | AHU-1 | Supply fan | Supply fan enable/disable | Supply fan speed | Supply fan VSD Alarm contact | 3-way dual temp coil control valve | Outside air damper | Return air damper | Relief air damper | Space | Return air | Discharge air | Mixed air | Low limit sensor | | | | | | | | | | | | | | | | | | |

| VARIABLE SPEED DRIVE SCHEDULE | | | | | | | |
|-------------------------------|------|--------|------------------|-----------------|-------------|-----------|---------------|
| TAG | MFR. | MODEL | EQUIPMENT SERVED | MOTOR SIZE (HP) | ELEC (V/PH) | ENCLOSURE | REMARKS |
| VSD-1 | ABB | ACH580 | AHU-1 | 5 | 480/3 | NEMA 1 | 1, 2, 3, 4, 5 |

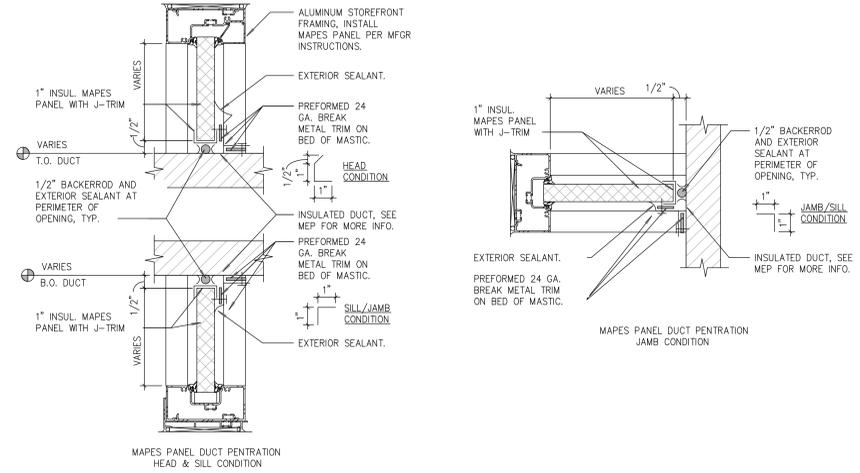
REMARKS:
1. REFER TO SPECIFICATIONS FOR FURTHER REQUIREMENTS AND INFORMATION.
2. COORDINATE EXACT MOTOR DATA WITH EQUIPMENT BEING SERVED BY THIS DRIVE.
3. PROVIDE AND INSTALL WITH MANUAL LOCKABLE DISCONNECT SWITCH INTEGRAL TO DRIVE.
4. PROVIDE AND INSTALL WITH SACKET INTERFACE FOR FULL INTEGRATION INTO BMS.
5. PROVIDE AND INSTALL WITH LONG LENGTH LINE REACTOR.

| DIFFUSER AND GRILLE SCHEDULE | | | | | | | | | | | |
|------------------------------|-------|---------|----------------|----------------|---------------|---------|--------------|------------|--------|----------|---------|
| TAG | MFR. | MODEL | NECK SIZE (IN) | FACE SIZE (IN) | THROW PATTERN | MAX CFM | MAX APD (IN) | THROW (FT) | MAX NC | MATERIAL | REMARKS |
| D-1 | TITUS | 300RLHD | 24x14 | 28x16 | DSL DEFL | 1498 | 0.09 | 50 | 30 | STEEL | 1, 2 |
| RG-1 | TITUS | 33PL | 78x28 | 78x30 | 38 DEG DEFL | 5615 | 0.04 | - | 28 | STEEL | 1, 2 |

REMARKS:
1. COLOR SHALL BE WHITE.
2. PROVIDE AND INSTALL WITH FRAME FOR SURFACE INSTALLATION.

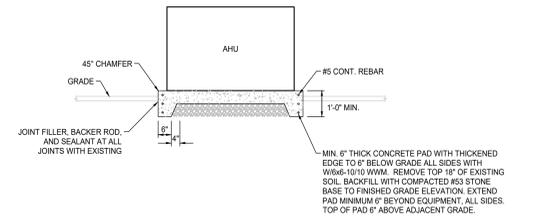
| AIR HANDLER SCHEDULE | |
|-----------------------------|-------------------------------|
| TAG | MANUFACTURER |
| AHU-1 | DAIKIN |
| MODEL | CAHQ14GVGM |
| SPACE SERVED | AUXILIARY GYMNASIUM |
| UNIT DIM (LxWxH) (IN) | 72" W x 85" L x 30" H |
| OPERATING WEIGHT (LBS) | 11920 |
| FILTER AREA (SF) | 16.7 |
| FILTER VELOCITY (FPM) | 256 |
| FILTER DESIGN APD (IN W.C.) | 0.57 |
| FILTER TYPE | 2" MERV 13 PLEATED |
| SUPPLY FAN | |
| AIRFLOW (CFM) | 4000 |
| OUTSIDE AIR (CFM) | 1000 |
| TSP (IN W.C.) | 2.50 |
| ESP (IN W.C.) | 1.0 |
| DESIGN RPM | 1749 |
| QTY. MOTOR POLES | 4 |
| FAN TYPE | PLENUM |
| QTY. FANS | 1 |
| WHEEL DIA (IN) | 18.25 |
| DRIVE TYPE | DIRECT |
| MOTOR (HP) | 5.0 |
| MOTOR (BHP) | 2.3 |
| ELECTRICAL V/PH | 480/3 |
| MODULATION | VSD |
| DUAL TEMPERATURE COIL | |
| FLUID | WATER |
| AIRFLOW (CFM) | 4000 |
| TOTAL CAP (MBH) | 153 |
| SENS CAP (MBH) | 108 |
| EAT DBWB (DEG F) | 80/67 |
| LAT DBWB (DEG F) | 55/55 |
| EWT/LWT (DEG F) | 45/55 |
| COIL FLOW (GPM) | 31 |
| FLUID VELOCITY (FPS) | 2.8 |
| FACE VELOCITY (FPM) | 488 |
| WPD (FT) | 6.1 |
| APD (IN W.C.) | 0.71 |
| ROWS | 8 |
| FINS/FT | 120 |
| TUBE WALL THICK (IN) | 0.02 |
| REMARKS: | 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 |

REMARKS:
1. MINIMUM 8" TALL STRUCTURAL STEEL BASERAIL.
2. CASING SHALL BE 2" THICK DOUBLE WALL INSULATED R-13 MINIMUM.
3. MOTORS SHALL BE BALCOOR SUPER WITH INTEGRAL SHAFT GROUNDING RING.
4. MOTORS SHALL HAVE CLASS F INSULATION FOR USE WITH VARIABLE SPEED DRIVE.
5. CHILLED WATER COIL CASING SHALL BE STAINLESS STEEL.
6. ALL COIL HEADERS SHALL BE RED BRASS.
7. DRAIN PAN SHALL BE 1/4" SLOPE DOUBLE WALL INSULATED STAINLESS STEEL.
8. CONTROLS BY TCC. CONTROL DAMPERS AND VALVE BY TCC. VARIABLE FREQUENCY DRIVE BY TCC.
9. 2" THICK CUSTOM METAL FILTER FRAME FROM HOMETOWN FILTER.
10. AHU-1 FURNISHED BY OWNER, INSTALLED BY CONTRACTOR.

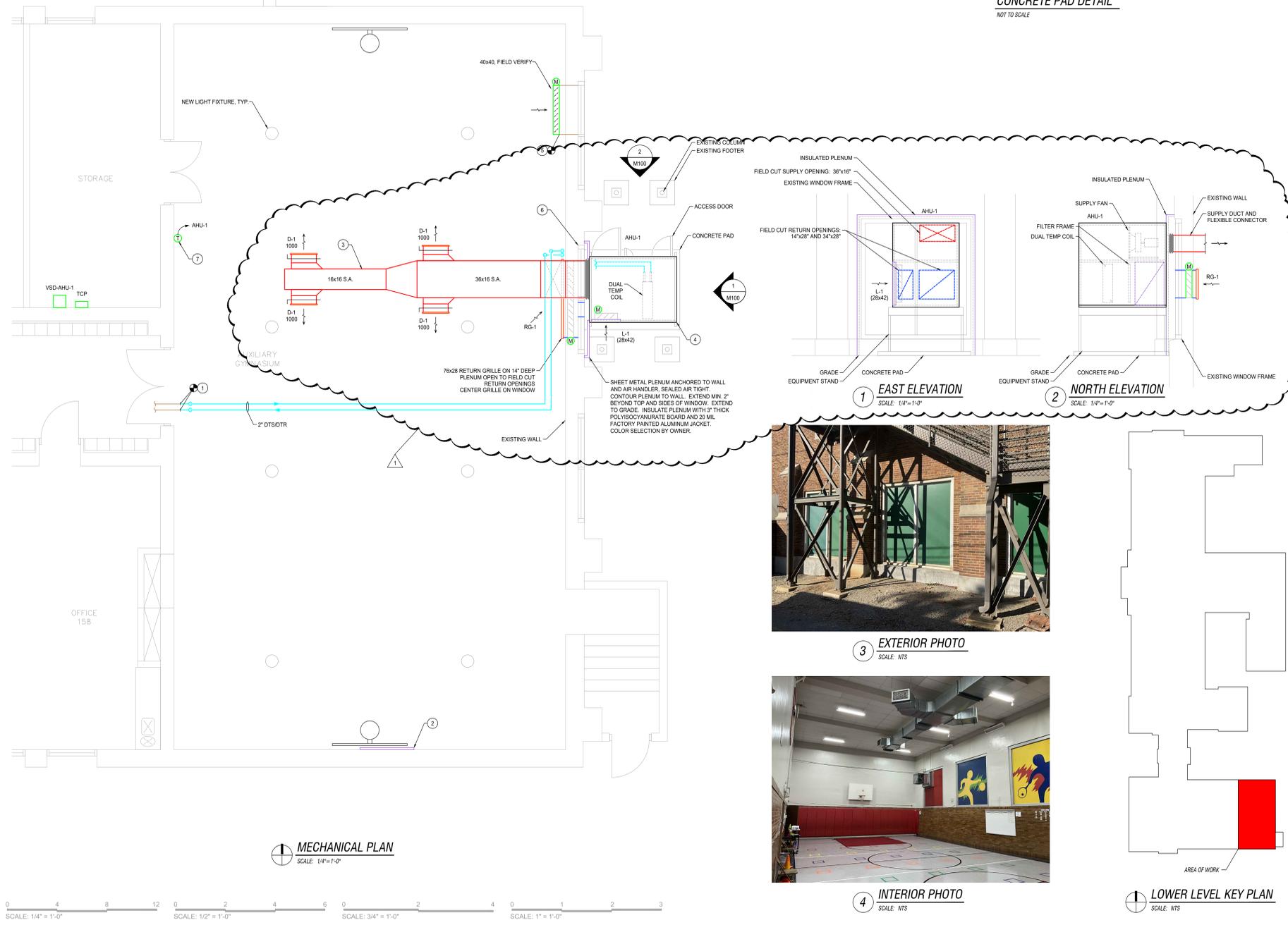


MAPES PANEL DUCT PENETRATION DETAIL
SCALE: 3/4"=1'-0"

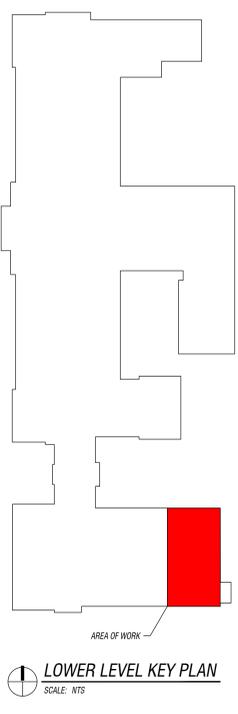
- PLAN NOTES**
- TIE-IN TO EXISTING PIPING. OFFSET TO ROUTE PIPING TIGHT TO EXISTING BULKHEAD ACROSS GYM.
 - CAP AND ABANDON EXISTING LOUVER WITH METAL BLANK-OFF PANEL CONSTRUCTED OF R-8 MINIMUM 2" THICK FIBERGLASS BOARD INSULATION AND 20 GAUGE PAINT GRIP GALVANIZED SHEET METAL ALL SIDES WITH CROSS-BREAKS. FIELD PAINT TO MATCH EXISTING WALL.
 - ROUTE DUCT TIGHT TO CEILING. DUCTWORK SHALL BE DOUBLE WALL PAINT GRIP GALVANIZED WITH INTERSTITIAL INSULATION. FIELD PAINT, COLOR SELECTION BY OWNER.
 - AIR HANDLER FURNISHED BY OWNER. INSTALL AIR HANDLER ON NEW CONCRETE PAD. REFER TO DETAIL.
 - PROVIDE AND INSTALL NEW AUTOMATIC CONTROL DAMPER. RECONNECT TO EXISTING DUCTWORK.
 - REMOVE EXISTING MAPES PANELS. PROVIDE AND INSTALL NEW MAPES PANELS IN EXISTING WINDOW SYSTEM. REFER TO DUCT PENETRATION DETAIL. THIS SHEET FOR MORE INFORMATION. EXISTING MAPES PANEL DIMENSIONS APPROXIMATELY 54" WIDE AND 114" TALL. EACH. FIELD VERIFY EXACT DIMENSIONS AND CONDITIONS.
 - PROVIDE AND INSTALL WIRE GUARD COVER FOR NEW THERMOSTAT.



CONCRETE PAD DETAIL
SCALE: 1/4"=1'-0"



MECHANICAL PLAN
SCALE: 1/4"=1'-0"



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FORT WAYNE COMMUNITY SCHOOLS
2026 PHYSICAL PLANT IMPROVEMENTS
MECHANICAL PPI PROJECTS
FORT WAYNE, INDIANA

CERTIFICATION:

DATE: 12-23-2025
COMM: 25777
FILE: 777FO-M201

SCHOOL: Forest Park Elementary School
2004 Alabama Avenue
Fort Wayne Indiana 46805

MECHANICAL PLANS

SHEET: **FO-M201**



FORT WAYNE COMMUNITY SCHOOLS
2026 PHYSICAL PLANT IMPROVEMENTS
MECHANICAL PPI PROJECTS
 FORT WAYNE, INDIANA

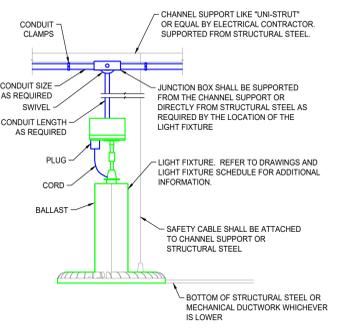
| LIGHT FIXTURE SCHEDULE | | | | | | | | |
|------------------------|---|------------|-----------|-----------------------|------|-----|--|---------|
| TAG | MANUFACTURER'S CATALOG NUMBER | MAX. WATTS | MOUNT | MIN. LUMEN OUTPUT (D) | CCT | CRI | DESCRIPTION | REMARKS |
| PD1 | METALUX #UHBS2-M-18MV-L8C5-U LITHONIA # ILP # | 119.1 | SUSPENDED | 18,567 | 4000 | 80 | 120-277V, 12" DIAMETER ROUND FIXTURE WITH HOOK AND 6 FOOT CORD WITHOUT PLUG WITH 0-10V DIMMING. UL LISTED, DLC OPL LISTED. FURNISH AND INSTALL WITH SAFETY CHAIN. CONTROL WIRING REQUIRED FOR OPERATION OF 0-10V DIMMING. REFER TO DRAWINGS FOR LOCATIONS. | |
| EX1 | SURE LITE #LPXC50 LITHONIA # DUAL LITE # | 2.2 | UNIVERSAL | - | - | - | 120-277V, WHITE POLYCARBONATE EXIT SIGN WITH SELECTABLE COLOR SET TO GREEN LETTERS, EMERGENCY LIGHTS AND NICKEL CADMIUM BATTERY. EXIT SIGN SHALL HAVE SELF DIAGNOSTIC. UL LISTED | |
| REMARKS: | | | | | | | | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |

- DEMOLITION PLAN NOTES**
- REMOVE EXISTING FIXTURE AND ASSOCIATED CONDUCTORS BACK TO J-BOX. PREPARE FOR INSTALLATION OF NEW FIXTURE IN LOCATIONS WHERE NEW FIXTURE IS CALLED TO BE INSTALLED.
 - REMOVE EXIST SIGN. PREPARE FOR INSTALLATION OF NEW FIXTURE.
 - REMOVE OCCUPANCY SENSORS, POWER PACK, SWITCHES AND ASSOCIATED CONDUCTORS BACK TO J-BOX. PREPARE FOR NEW LIGHTING CONTROLS. PROVIDE AND INSTALL BLANK STAINLESS STEEL COVER PLATES IN LOCATIONS WHERE DRAWINGS DO NOT CALL FOR NEW SWITCHES.
 - DISCONNECT AND REMOVE EXISTING MECHANICAL EQUIPMENT. REMOVE ASSOCIATED CONTROLLER, CONDUIT AND CONDUCTORS BACK TO SOURCE.

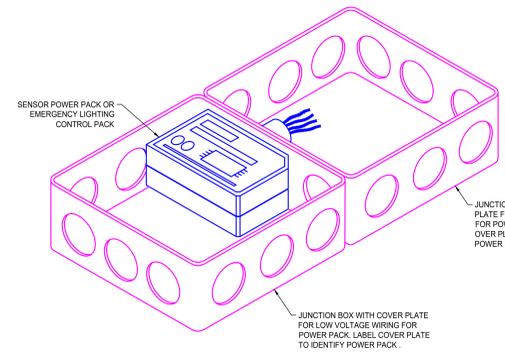
- PLAN NOTES**
- MOUNT AT SAME HEIGHT A/FI AS PREVIOUS FIXTURES SERVING THIS SPACE. FIELD VERIFY PRIOR TO INSTALLATION. FURNISH AND INSTALL NEW SUPPORT AND SAFETY CHAIN FOR FIXTURE. FURNISH AND INSTALL NEMA L7-20 PLUG AND RECEPTACLE PROVIDE AND INSTALL DIMMING CABLING AS REQUIRED FOR ALL NEW FIXTURES. EMPLOY PROPER TRADES TO PAINT NEW CONDUIT TO MATCH EXISTING ADJACENT SURFACES.
 - PROVIDE AND INSTALL NEW EXIT SIGN / EMERGENCY LIGHT FIXTURE. CONNECT TO SAME CIRCUIT SERVING EMERGENCY FIXTURES IN THIS SPACE AHEAD OF ANY SWITCHES, SENSORS OR RELAYS. PROVIDE AND INSTALL STEEL PLATE OVER OPENING IN WALL FOR NEW EXIT SIGN(S) TO MOUNT TO.
 - PROVIDE AND INSTALL 20A DECORA 0-10V DIMMER SWITCH FOR NEW GYM LIGHTING. CONNECT TO EXISTING CIRCUIT(S) PREVIOUSLY SERVING LIGHTING. COORDINATE EXACT LOCATION PRIOR TO INSTALLATION.
 - PROVIDE AND INSTALL NEW 20A DECORA LIGHT SWITCH IN EXISTING DEVICE BOX. EXTEND EXISTING BRANCH CIRCUIT, AS REQUIRED, TO CONNECT TO NEW LIGHTING CONTROL DEVICE. PROVIDE RACEWAY AND SURFACE BOX TO LOWER LIGHT SWITCHES IN LOCATIONS. EXISTING J-BOX DOES NOT MEET ADA REQUIREMENTS.
 - PROVIDE AND INSTALL NEW OCCUPANCY SENSORS AT SAME HEIGHT AS DEMOLISHED SENSORS. CONNECT LIGHTING AND OCCUPANCY (POWER PACK) TO EXISTING LIGHTING CIRCUIT(S) PREVIOUSLY SERVING THIS AREA.
 - COORDINATE LOCATION, ROUGH-IN AND ELECTRICAL REQUIREMENTS WITH CONTRACTOR AND APPROVED SHOP DRAWINGS PRIOR TO ROUGH-IN. CONNECT TO SPARE 60A/3P BUCKET IN PANEL "DP-F", FUSED AT 15A, USING 3/4" CONDUIT AND 3-#12, 14-2 GROUND.
 - CONNECT NEW TCP TO EXISTING SPARE BREAKER IN PANEL RP-K.

| LIGHTING SENSOR SCHEDULE | | | | | |
|--|---|---------------|---------------------------------------|---|---------|
| TAG | MANUFACTURER'S CATALOG NUMBER | INPUT VOLTAGE | MOUNT | REMARKS | REMARKS |
| O1 | WATTSTOPPER #DT-200 SENSOR SWITCH #WV-PDT-16-R GREENGATE #OAWC-DT-120W-R HUBBELL #LO-DT-RP LUTRON #LOS-CDT-2000 | 24V | WALL | DUAL TECHNOLOGY WALL SENSOR WITH A COMBINATION OF ULTRASONIC AND PASSIVE INFRARED. SENSOR TO BE EQUIPPED WITH SELF ADJUSTING TECHNOLOGY AND ISOLATED RELAY OUTPUTS. SENSOR SHALL OPERATE AS AUTOMATIC 'ON' AND AUTOMATIC 'OFF' WITH A 15 MINUTE TIME DELAY. | 1 |
| PP | WATTSTOPPER #BZ150 SENSOR SWITCH #PP20 GREENGATE #SP20-MV HUBBELL | 120/277V | 4 SQUARE BOX ABOVE ACCESSIBLE CEILING | POWER PACK TO OPERATE LOW VOLTAGE (24VDC) OCCUPANCY SENSORS. RELAY TO BE 20A RATED. | |
| REMARKS: | | | | | |
| 1. PROVIDE POWER PACKS AND EMERGENCY LIGHTING CONTROL UNITS AS REQUIRED TO OPERATE LIGHTING AS SHOWN ON FLOOR PLANS | | | | | |
| 2. 120/277V WIRING IN UELI OF POWER PACK IS ACCEPTABLE. | | | | | |
| GENERAL NOTES: | | | | | |
| 1. CEILING MOUNTED OCCUPANCY SENSORS SHALL BE INSTALLED 6'-0" AWAY FROM ANY SUPPLY DIFFUSERS. COORDINATE WITH MECHANICAL CONTRACTOR. | | | | | |

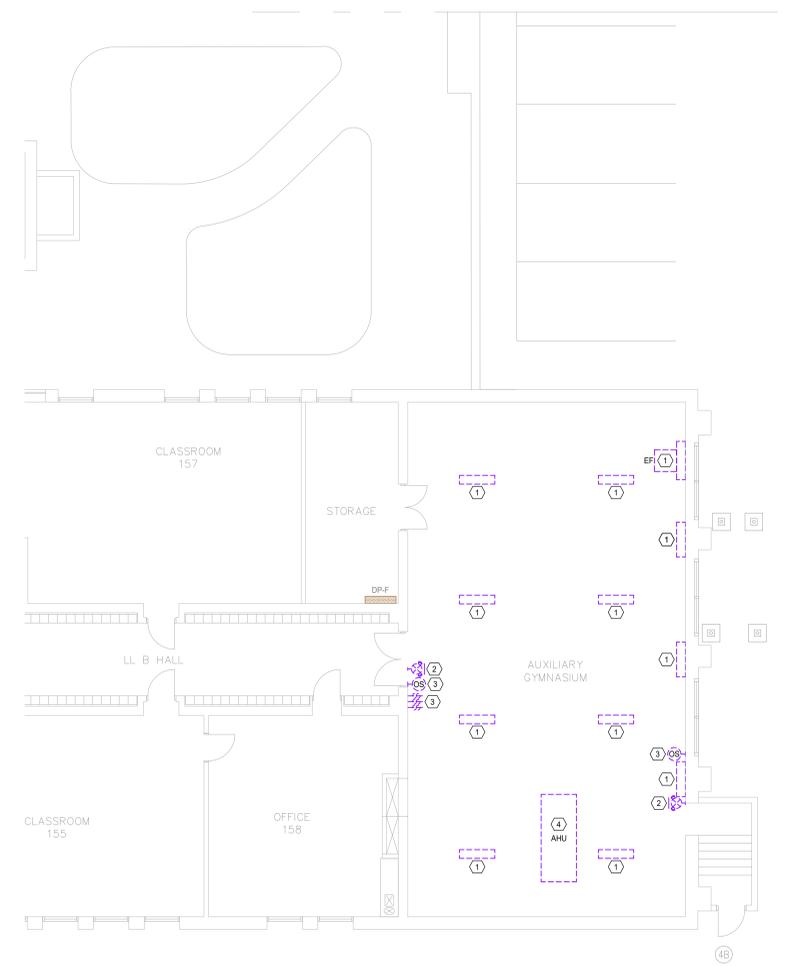
- PROVIDE AND INSTALL TEMPORARY FLOOR PROTECTION DURING DEMOLITION AND CONSTRUCTION AS REQUIRED TO PROTECT EXISTING GYMNASIUM VCT FLOORS FROM DAMAGE.
- E.C. SHALL VERIFY ALL EXISTING CIRCUITS IN PANELS WHERE CHANGES ARE MADE. PROVIDE NEW, TYPED, UPDATED DIRECTORY.
- PATCH ALL SURFACES PREVIOUSLY COVERED BY SURFACE RACEWAY, WITH MATCHING MATERIAL, AS REQUIRED TO MATCH EXISTING WALL. PAINT BY OWNER.
- E.C. SHALL HAND OVER ALL FABRICATED COVER PLATES TO OWNER TO BE PAINTED PRIOR TO INSTALLATION, AS REQUIRED.
- COORDINATE ALL WORK WITH OTHER TRADES ONSITE.



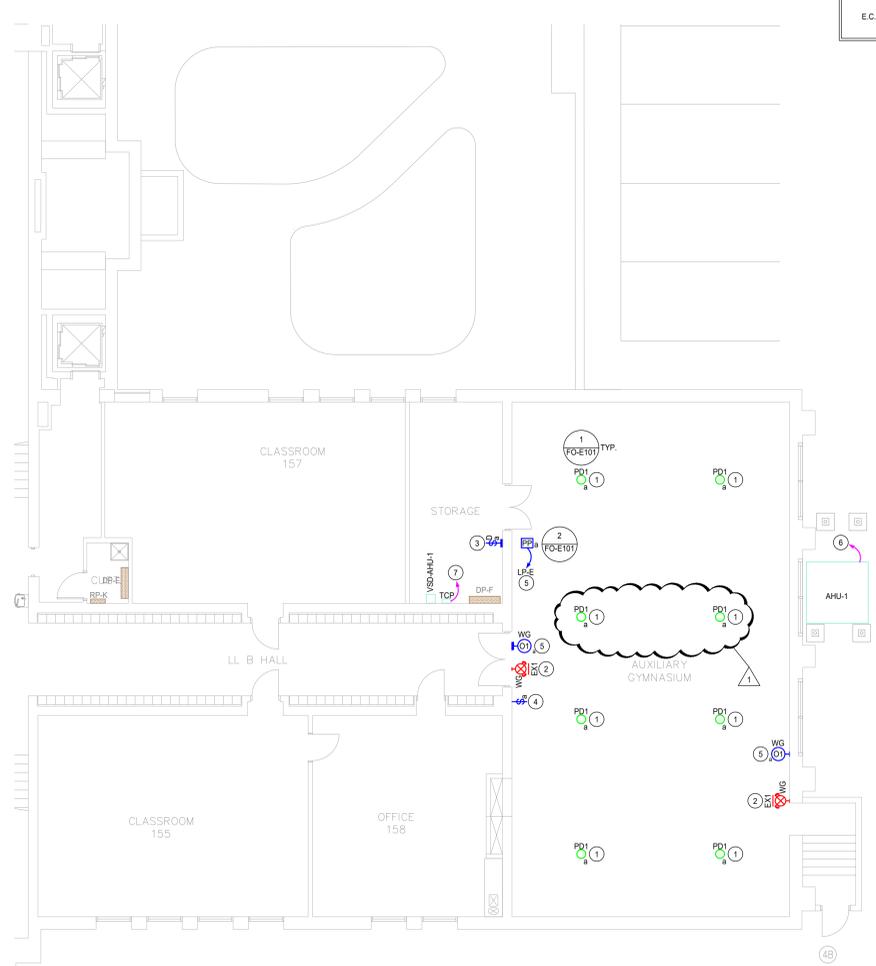
1 HI-BAY FIXTURE MOUNTING (LED)
 NOT TO SCALE



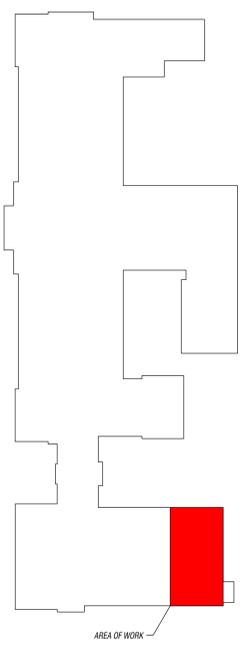
2 POWER PACK MOUNTING DETAIL
 NOT TO SCALE



ELECTRICAL DEMOLITION PLAN
 SCALE: 1/8" = 1'-0"



NEW ELECTRICAL PLAN
 SCALE: 1/8" = 1'-0"



LOWER LEVEL KEY PLAN
 SCALE: NTS



SCALE: 1/16" = 1'-0" SCALE: 3/32" = 1'-0" SCALE: 1/8" = 1'-0" SCALE: 1/4" = 1'-0" SCALE: 1/2" = 1'-0" SCALE: 3/4" = 1'-0" SCALE: 1" = 1'-0"

CERTIFICATION:

Michael E. Lutz

| NO. | DATE | DESCRIPTION |
|-----|---------|-------------|
| 1 | 1/16/26 | ADDENDUM #1 |

DATE: 12-23-2025
 COMM: 25777
 FILE: 777FO-E101
 SCHOOL: Forest Park Elementary School
 2004 Alabama Ave.
 Fort Wayne Indiana 46805

TITLE:
ELECTRICAL DEMOLITION AND NEW POWER PLANS

SHEET:
FO-E101