Department of Public Works
Engineering Division
James M. Wolfe, P.E., City Engineer

City-County Building, Room 115
210 Martin Luther King, Jr. Boulevard
Madison, Wisconsin 53703
Phone: (608) 266-4751
Fax: (608) 264-9275
engineering@cityofmadison.com
www.cityofmadison.com/engineering

Assistant City Engineer
Bryan Cooper, AIA
Gregory T. Fries, P.E.
Chris Petykowski, P.E.

Deputy Division Manager
Kathleen M. Cryan

Principal Engineer 2
John S. Fahrney, P.E.
Janet Schmidt, P.E.

Principal Engineer 1
Mark D. Moder, P.E.
Andy Zwieg, P.E.

Financial Manager
Steven B. Danner-Rivers

March 24, 2023

NOTICE OF ADDENDUM
ADDENDUM NO. 2

CONTRACT NO. 9226, PROJECT NO. 12393
Phase 2 CCB City Office Remodels, First and Fifth Floors

This addendum is issued to modify, explain or correct the original Drawings, Specifications, or Contract Documents marked as ***Phase 2 CCB City Office Remodels, First and Fifth Floors, City of Madison Project 12393, Contract #9226, as issued on January 9, 2023 and Addendum #1 as issued on February 20, 2023***. This addendum is hereby made a part of the contract documents, represents clarifications of the previously released documents, consists of two (2) pages, and the referenced exhibits.

This addendum does not include a change to the bid due date.

Please acknowledge this addendum on page E1 of the contract documents and/or in Section E: Bidder's Acknowledgement on Bid Express.

An electronic version of these documents can be found on the Bid Express web site at:
http://www.bidexpress.com

If you are unable to download plan revisions associated with the addendum, please contact the Engineering office at 608-266-4751 receive the material by another route.

For questions regarding this bid, contact:

Randy Wiesner
City of Madison Engineering
Phone: 608-267-8679
Fax: 608-264-9275
Email: RWiesner@cityofmadison.com

Mike Schuchardt
City of Madison Engineering
Phone: 608-261-9249
Fax: 608-264-9275
Email: MSchuchardt@cityofmadison.com

Sincerely,

Bryan Cooper For:
James M. Wolfe, P.E., City Engineer

Cc: Greg Fries
Bryan Cooper

1. **GENERAL CONTRACT CONDITIONS**
   No additional changes to General Contract Conditions or Section D Special Provisions.

2. **GENERAL QUESTIONS/ANSWERS and CLARIFICATIONS**
   There have been no general questions or document clarifications requested.

3. **ACCEPTABLE EQUIVALENTS**
   A. Wood Panel Ceilings (LW-1). Please add the following information to Specification 09 50 00, Section 2.1 Manufacturers.
      1. 9Wood-Linear Wood Ceiling Systems, 2300 Series, Greg Schroeder, gregschro@aol.com, Ph: 262-628-9800.

4. **SPECIFICATIONS (consolidated into Exhibit F - Revised Specifications-Addendum 2)**
   A. 23 09 23 Direct Digital Control System for HVAC – Revised the scope on page 1 of the section.
   B. 27 41 00, Replace Specification 27 41 00 Professional Audio-Visual System dated 12/22/22 from Exhibit B with this revised Specification 27 41 00 dated 03/22/23 from Exhibit G. The updated specification has been reprinted in its entirety.

5. **DRAWINGS (consolidated into Exhibit G - Revised Plan Sheets-Addendum 2)**
   A. The following sheets have been modified. Clouds and notes identify the changes on each sheet.
      1. Sheet M301N – Revised the existing air handler ID number.
      2. Sheet M302N – Revised the existing air handler ID number.
      3. Sheet M501N – Revise keyed note 1 as shown. Existing pump housing and impeller to be removed.
      4. Sheet M502N – Revise keyed note 1 as shown. Provide new pump housing and impeller. Existing pump motor to be reused.
      5. Sheet M801 – Pump Schedule: Updated pump schedule to reflect replacement of both the housings and impellers on existing pumps P-1 and P-2. VAV Terminal Unit with Reheat Schedule: Updated the existing air handler system number associated with each VAV terminal Unit. Control Damper Schedule: Updated the existing air handler system number associated with each new control damper/AFMS.
      6. Sheet E201N – Revise the switching of all type C6, C6E, C8, and C8E fixtures as shown. Add additional dimmers accordingly as shown. Modify certain touchpads as shown. Modify certain type C8 fixtures to type C4 fixtures as shown. Amend keyed note L1 as shown.
      7. Sheet E202N – Revise the switching of all type C6, C6E, C8, and C8E fixtures as shown. Revise the switching of certain type D4E and D6 fixtures as shown. Add additional dimmers accordingly as shown. Modify certain touchpads as shown. Modify certain type C8 fixtures to type C4 fixtures as shown. Amend keyed notes L3 and L4 as shown.
      8. Sheet E204N – Revise the switching of all type C6, C6E, C8, and C8E fixtures as shown. Revise the switching of certain type D6 fixtures as shown. Add additional dimmers accordingly as shown. Modify certain type C6 and C6E fixtures to type C3 and C3E fixtures as shown.
      9. Sheet E801N – Luminaire Schedule – Add fixture types C3, C3E, and C4 as shown. Modify the model numbers for fixture types A2E, A4E, C4E, C6E, C8E, D4, D4E, D6, and H as shown. Modify the notes for fixture types AD, ADE, DB, and DBE as shown. Add notes #5 and #6 as shown.
      10. Sheet T00N - Replace sheet T00N dated 12/22/22 with Sheet T00N dated 03/22/23.
      11. Sheet T101N - Replace sheet T101N dated 12/22/22 with Sheet T101N dated 03/22/23.
      12. Sheet T203N - Replace sheet T203N dated 12/22/22 with Sheet T00N dated 03/22/23.
      13. Sheet T204N - Replace sheet T204N dated 12/22/22 with Sheet T00N dated 03/22/23.
      14. Sheet T205N - Replace sheet T205N dated 12/22/22 with Sheet T00N dated 03/22/23.
      15. Sheet T300N - Replace sheet T300N dated 12/22/22 with Sheet T00N dated 03/22/23.
      16. Sheet T500N - Replace sheet T500N dated 12/22/22 with Sheet T00N dated 03/22/23.
      17. Sheet T501N - Replace sheet T501N dated 12/22/22 with Sheet T00N dated 03/22/23.
      18. Sheet T600N - Replace sheet T600N dated 12/22/22 with Sheet T00N dated 03/22/23.

6. **PROPOSAL**
   There are no changes to the proposal page.

End of Contract 9226 Addendum 2.

SECTION 23 09 23
DIRECT DIGITAL CONTROL SYSTEM FOR HVAC

P A R T 1 - G E N E R A L

SCOPE

The existing building utilizes a Niagara direct digital control (DDC) system with Distech field devices. This scope of this project will include the following:

- First Floor
  - Add (20) new air terminal units and (13) sections of steam convector with DDC control that will be integrated into the existing building Niagara DDC system.
  - Add (1) new exhaust air fan with DDC control that will be integrated into the existing building Niagara DDC system.
  - Add (1) new transfer air fan with DDC control that will be integrated into the existing building Niagara DDC system.
  - Add (1) new ductless split heat pump system with DDC control that will be integrated into the existing building Niagara DDC system.
- Fifth Floor
  - Add (11) new air terminal units and (9) sections of steam convector with DDC control that will be integrated into the existing building Niagara DDC system.
- Ground Floor Air Handler – AHU-3
  - Remove existing DDC controlled and pneumatically operated minimum outside air damper and replace with new DDC controlled and electronically operated minimum outside air damper with integral airflow monitoring station. Integrate new damper and AFMS into existing Allerton Control system. Provide new updated air handler graphics, points, sequence and alarms for damper and AFMS.
- Fourth Floor Air Handler – AHU-4
  - Remove existing DDC controlled and electronically operated outside air damper and replace with new DDC controlled and electronically operated outside air damper with integral airflow monitoring station. Integrate new damper and AFMS into existing Niagara Control system. Provide new updated air handler graphics, points, sequence and alarms for damper and AFMS.

Additionally, this project shall provide:

- New Distech ECB-VAV controllers required to integrate all new VAV air terminals and associated steam convectors into the existing building automation system.
- New Distech controllers required to integrate all other devices into the existing building automation system.
- Any required module expansion devices for integration of new outside air dampers with integral AFMS into existing DDC control systems.
- New hot water reheat DDC temperature control valves for new VAV air terminals.
- New steam DDC temperature control valves for existing steam convectors.
- New Distech space temperature sensors associated with each VAV air terminal.
- New Distech space temperature sensors associated with transfer fans TF-1 and TF-2.
- New Distech space temperature sensors associated with each new ductless heat pump system.
- New CO2 sensors associated with select VAV air terminals / zones.
- All control wiring (low and line voltage) for a complete operating system.

Addendum 2

- *Update of the existing 1st and 5th floor City County Building automation graphics to include new air terminals, sensors, convectors, outside air dampers, AFMS, etc. associated with this project.*
- *Additional Information - 1st Floor*
  - *New controllers shall be integrated directly into the N4 supervisor via MSTP to IP BACnet router.*
  - *Provide all required MSTP to IP BACnet routers.*
  - *Provide cabling from new routers to County Network.*
- *Additional Information - 5th Floor:*
  - *Route new 5th floor air terminal and convector control to the existing JACE located on 5th floor.*
  - *Update the software on the existing 5th floor JACE from AX to N4.*
- *New Niagara N4 supervisor(s) as required to integrate new DDC controls on 1st and 5th floors into the existing Niagara DDC system.*

All new air terminals and air terminal controls shall be integrated into the Niagara DDC system.

All new controllers, control wiring and temperature control valves shall follow new City County Building Basis of Design protocols to provide building continuity in regards to controllers, wiring and equipment.

Work in this section includes Direct Digital Control (DDC) panels, main communication trunk, software programming, and other equipment and accessories necessary to constitute a complete Direct Digital Control (DDC) system.

PART 1 - GENERAL
- Scope
- Related Work
- Reference
- Reference Standards
- Commissioning
- LEED Certification
- Quality Assurance
- Submittals
- Operation and Maintenance Data
- Material Delivery and Storage

PART 2 - PRODUCTS
- General
- VAV Controllers (Application Specific Controllers)
- Control Valves
- Thermostats
- Carbon Dioxide Sensors and Transmitters
- Control Dampers with Integral Airflow Monitoring

PART 3 - EXECUTION
- General
- Installation
- Control Dampers with Integral Airflow Monitoring
- Commissioning, Verification and Closeout
- Sequence of Operation
- Owner Training
- Points List

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

FCC Part 15, Subpart J, Class A - Digital Electronic Equipment to Radio Communication Interference

COMMISSIONING

The systems will be commissioned by an independent third party in accordance with USGBC LEED Energy and Atmosphere Credit C3 – Enhanced Commissioning. Refer to Sections 01 91 02 – Commissioning Process, for additional requirements.

LEED CERTIFICATION

The project will be LEED Certified thru the United States Green Building Council's (USGBC) Leadership in Energy and Environmental Design (LEED) program. Refer to Section 01 81 13 – Sustainable Design Requirements for additional requirements.

QUALITY ASSURANCE

APPROVED MANUFACTURER:

Niagra.

INSTALLER:

The installer shall be specialized and experienced in Niagra DDC control systems and installation for not less than 5 years. All engineering work shall be done by qualified employees of Niagra, or qualified employees of an Niagra Authorized Representative that provides engineering and commissioning of Alerton control equipment. Where installing contractor is an authorized representative of Niagra, submit written confirmation of such authorization. Indicate in letter of authorization that the installing contractor has successfully completed all necessary training required for the engineering, installation, and commissioning of equipment and systems to be provided for the

project and that such authorization has been in effect for a period of not less than three years. The letter of authorization should also indicate that the installing contractor is authorized to install Niagra DDC equipment at the project location at the time the project is bid. Installation of the equipment shall be done by qualified mechanics and/or electricians in the direct employ or be directly subcontracted and under the supervision of Niagra or Authorized Niagra Representative. The contractor providing and installing the equipment under this specification section shall be the same contractor providing and installing equipment under the 23 09 14 specification section.

RESPONSE TIME:
During warrantee period, three (3) hours or less, 24-hours/day, 7 days/week.

ELECTRICAL STANDARDS:
Provide electrical products, which have been tested, listed and labeled by Underwriters' Laboratories (UL) and comply with NEMA standards.

DDC Standards: DDC manufacturer shall provide written proof with shop drawings that the equipment being provided is in compliance with F.C.C. rules governing the control of interference caused by Digital Electronic Equipment to Radio Communications (Part 15, Subpart J, Class A).

SUBMITTALS
Provide submittals on all DDC control work.

Details of construction, layout, and location of each temperature control panel within the building, including instruments location in panel and labeling. Indicate which piece of mechanical equipment is associated with each controller and what area within the building is being served by that equipment. For terminal unit control, provide a room schedule that would list mechanical equipment tag, room number of space served, address of DDC controller, and any other pertinent information required for service.

A complete description of each control sequence for equipment that is not controlled by direct digital controls. Direct digital controlled equipment control sequences will be provided by the DDC control contractor.

PRODUCT DATA
Submit manufacturer's specifications for each control device furnished, including installation instructions and start-up instructions. General catalog sheets showing a series of the same device is not acceptable unless the specific model is clearly marked. Annotated software program documentation shall be submitted for system sequences, along with descriptive narratives of the sequence of operation of the entire system involved. Submit wiring diagram for each electrical control device along with other details required to demonstrate that the system has been coordinated and will function as a system.

MAINTENANCE DATA
Submit maintenance data and spare parts lists for each control device. Include this data in maintenance manual.

RECORD DRAWINGS
Provide as-built record control drawings, including sequences, for the installation of all DDC controls.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under Section 23 05 00 and Division 1, General Requirements, Closeout Procedures.

MATERIAL DELIVERY AND STORAGE
Provide factory shipping cartons for each piece of equipment and control device. This contractor is responsible for storage of equipment and materials inside and protected from the weather.

P A R T 2 - P R O D U C T S

GENERAL
Provide DDC control and actuation to accomplish Sequence of Operation (indicated below) and DDC Points list. Provide all controllers, temperature control panels, wiring, etc. for a complete installation.

Controls installed as part of this project shall be fully compatible with existing DDC controls located within the facility.

Provide updated DDC/BAS graphics reflecting new work and sequences of control.

Provide all required installation, termination, wiring, power, graphics and programming for a complete operating system.

VAV CONTROLLERS (APPLICATION SPECIFIC CONTROLLERS)

VAV controllers (ECB-VAV) shall be by Distech. No others will be allowed.

Provide minimum of 12-point VAV controller.

Each supervisory controller shall be able to extend its monitoring and control through the use of stand-alone application specific controllers (ASC's).

Each ASC shall operate as a stand-alone controller capable of performing its specified control responsibilities independently of other controllers in the network. Each ASC shall be a microprocessor based, multi-tasking, real-time digital control processor.

Each ASC shall have sufficient memory to support its own operating system and databases including: Control Processes, Energy Management Applications and Operator I/O (Portable Service Terminal).

The operator interface to any ASC point or program shall be through the supervisory controller connection to any ASC on the network.

ASC's shall directly support the temporary use of a portable service terminal that can be connected to the ASC via zone temperature or directly at the controller. The capabilities of the portable service terminal shall include, but not be limited to, the following information for the:

- Display temperatures
- Display status
- Display setpoints
- Display control parameters
- Override binary output control
- Override analog output control
- Override analog setpoints
- Modification of gain and offset constants

All system setpoints, proportional bands, control algorithms, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

ASC’s shall support, but not be limited to, the following configurations of systems to address current requirements as described in Sections 23 09 14 and 23 09 93 portions of this specification, and for future expansion of air handling units:

- Variable Air Volume Terminals
- Reheat Terminals

For butterfly type Variable Air Volume (VAV) Terminals, provide differential pressure transducers and damper actuators for flow measurement and actuation of the VAV terminal damper. Pressure transducers for VAV box flow applications do not need to have adjustable pressure ranges or integral display. Provide filter on high side of flow pickups if flow measurement device requires airflow through the device. All differential pressure transducer inputs for airflow measurement shall have a method to compensate for sensor drift to calibrate the zero point of the input. The differential pressure transducers and damper actuators can be integrated into the terminal unit controller or be discrete devices.

Provide a method to view and print a summary of current K-factors for flow correction for each VAV terminal through the DDC system. The summary shall have a minimum of 50 K-factors per group of VAV terminals.

All system setpoints, proportional bands, control algorithms, calibration constants, and any other programmable parameters shall be stored such that a power failure of any duration does not necessitate reprogramming the ASC.

All application specific controllers shall be fully programmable. Question and answer or template programming is not acceptable unless this is used to generate the initial application program and the result is able to be freely modified without restriction. Control sequences for terminal unit control that utilize devices wired directly to the terminal unit application controller shall be programmed in the application specific controller and shall be stand-alone in function, i.e. occupancy sensing, temperature setpoint setback, etc. Supervisory controllers shall not be involved in the control sequence logic unless it involves sharing data between or from individual terminal unit controllers to be utilized in a global sequence, i.e. trim and respond strategies, terminal unit grouping, etc.

SUPERVISORY CONTROLLERS

The existing JACE8 controller located on the 5th floor of the City County Building shall be used as the supervisory controller for this project.

SOFTWARE LICENSE AGREEMENT

For Niagara based systems, it is the express goal of this specification to implement an open system that will allow products from various suppliers to be integrated into a unified system in order to provide flexibility for expansion, maintenance, and service of the system. The user Agency shall be the named license holder of all software associated with any and all incremental work on the project(s). All Niagara software licenses shall have the "accept.station.in=*"; "accept.station.out=*" and "accept.wb.in=*" and "accept.wb.out=*" section of the software licenses. The intent is to ensure that the installed Niagara products may be completely open for integrations. The user Agency shall be free to direct the modification of the any software license, regardless of supplier. In addition, the user Agency shall receive ownership of all job specific software configuration documentation, data files, and application-level software developed for the project. This shall include all custom, job specific software code and documentation for all configuration and programming that is generated for a given project and /or configured for use within Niagara Framework (Niagara) based controllers and/or servers and any related LAN / WAN / Intranet and Internet connected routers and devices. Any and all required Ids and passwords for access to any component or software program shall be provided to the user Agency. Provide all software necessary for developing software algorithms in all supervisory, programmable, and application specific direct digital controllers which is licensed to the owner.

Programming tools for programmable and application specific controllers that utilize the Niagara Framework shall not be restricted to any specific brand of Jace. Tools and controllers shall be able to connect to any brand of Jace that are provided under this specification Section.

OPERATOR INTERFACE REQUIREMENTS

The existing web-based browser interface and graphic-based display shall be used, expanded and modified to reflect the floor plan and direct digital control modifications and expansions as required as part of this project.

CONTROL VALVES

Manufacturer: Belimo (Valve and Actuator) only.

Provide all control valves as shown on the plans/details and as required to perform functions specified. Spring ranges must be selected to prevent overlap of operation and simultaneous heating and cooling.

Size operators to allow smooth and positive operation of devices served and to provide sufficient torque capacity for tight shutoff against system temperatures and pressure encountered. Use fully proportional actuators with 0-10VDC inputs and zero and span adjustments unless specified otherwise. If TriState with feedback is specified, valve position shall be fed back to the controller and controller shall position valve based on this feedback. Electric actuators, for applications other than terminal units, shall be provided with a manual override capability. All electric actuators shall be provided with a visible position indicator.

All power required for electric actuation shall be provided by this contractor if it is not able to be directly provided from the DDC controller.

Provide operators that are full proportioning or two-position, as required for specified sequence of operation.

Provide operators with linkages and brackets for mounting on device served.

All valves unless specifically noted on the plans or indicated below shall be ball style valves.

VALVE SERVING	TYPE	SIGNAL	SPRING RETURN	FAIL POSITION
Reheat Coil	Ball	0-10 VDC	No	Last Position
Perimeter Radiation	Valve - Belimo – B215HT186 (1/2", Cv=1.86) Actuator – Belimo – TR24-SR US			

Use equal percentage valves for two-way control valves; size for a pressure drop not less than 4 psi or more than 6 psi. Note: For low flows, the required minimum Cv size will result in lower pressure drop than 4 psi.

Globe valves 2" and smaller: Cast bronze or forged brass body, brass plug and brass or stainless steel seat, stainless steel stem, screwed ends, suitable for use on water systems at 150 psig and 240° F. Seat leakage with actuator supplied will meet ANSI class IV leakage (0.01%). For globe valves that are specified to fail in place, valves shall be

open when the stem is up. Only the following globe valve body styles will be acceptable for terminal unit control. Valves and actuators shall be by Belimo.

THERMOSTATS

Thermostats shall be by Distech.

Thermostats shall match existing thermostat functionality located in adjacent areas of the City County Building.

Terminal unit space sensors shall be provided with digital displays with setpoint adjustments and manual occupancy override and indication of occupancy status. Provide information to the AE on sensor colors offered by the manufacturer and obtain approval on what color should be provided on the project. Provide setpoint adjustment as specified in the DDC Input/Output Summary Table and sequence of operation

CARBON DIOXIDE SENSORS AND TRANSMITTERS

Subject to compliance with requirements, provide products by one of the following: Building Automation Products Inc.; BAPI; Telaire; a brand of Amphenol Thermometrics Inc; Vaisala, Veris Industries or Approved Equal.

Description:

NDIR technology or equivalent technology providing long-term stability and reliability. Two-wire, 4-20 mA output signal, linearized to carbon-dioxide concentration in PPM.

Construction:

House electronics in an ABS plastic enclosure. Provide equivalent of NEMA 250, Type 1 enclosure for wall-mounted space applications and NEMA 250, Type 4 for duct-mounted applications.

Equip with digital display for continuous indication of carbon-dioxide concentration.

Performance:

Measurement Range: Zero to 2000 ppm.
Accuracy within 2 percent of reading, plus or minus 30 ppm.
Repeatability within 1 percent of full scale.
Temperature Dependence within 0.05 percent of full scale over an operating range of 25 to 110 deg F.
Long-Term Stability within 5 percent of full scale after more than five years.
Response Time within 60 seconds.
Warm-up Time within five minutes.
Provide calibration kit. Turn over to Owner at start of warranty period.

CONTROL DAMPERS WITH INTEGRAL AIRFLOW MONITORING

Manufacturer: Ebtron or prior approved equal only.

Provide integral airflow measuring device as follows:

- Provide one thermal dispersion airflow/temperature measuring device (ATMD) for each location.
- Each ATMD shall consist of one or more sensor probes and a single, remote mounted transmitter.
- Each sensor node shall consist of two hermetically sealed bead-in-glass thermistors.
- Thermistors shall be potted in an engineering thermoplastic assembly using water-proof, marine epoxy and shall not be damaged by moisture, direct contact with water or exposure to atmospheric acids.
- Each sensing node shall be individually wind tunnel calibrated at 16 points to NIST traceable airflow standards.
- Each sensor probe shall be provided with a UL listed, FEP jacketed, plenum rated cable(s) between sensor probes and the remote transmitter.
- The ATMD shall be capable of measuring airflow rates over the full range of 0 to 5,000 FPM between -20 °F and 160 °F.
- Each sensing node shall have a temperature accuracy of +/- 0.15 °F.
- Each sensing node shall have a calibrated airflow accuracy of +/- 2% of reading.
- The transmitter shall be microprocessor-based and powered by 24 VAC/DC, be over-voltage and over-current protected, and have a watchdog circuit to provide continuous operation after power failures and/or brown-outs.
- The power requirement for the ATMD shall not exceed 22 V-A.
- The transmitter shall determine the average airflow rate and temperature of each sensor node.
- Provide with two analog outputs and one RS-485 BACnet/Modbus network connection
- All analog output signals and network connections shall be isolated.
- Provide a Bluetooth, low-energy interface card, to interface with Android or iOS devices.

- Provide free Android® or iOS® software that allows real-time airflow and temperature monitoring and airflow and temperature traverses. Software shall capture, save or e-mail airflow/temperature data, transmitter settings and diagnostics information.
- BACnet® shall be BTL® listed.
- The ATMD shall be UL/cUL873 listed.
- The ATMD shall be FCC Part 15 listed.

Transmitter

- 0-10vDC or 4-20mA in FPM and temperature
- Provide with remote mounted electronics box/transmitter with minimum 25 foot cable from probes to transmitter.
- BACnet MS/TP compatible.

Provide an aluminum extruded Control Damper Assembly as follows:

- Control dampers shall be custom made to required size, with blade stops not exceeding 1¼" in height.
- Control Dampers shall be AMCA rated for Leakage Class 1A at 1 in w.g. [0.25 kPa] static pressure differential. Standard air leakage data to be certified under the AMCA Certified Ratings Program.
- Provide either opposed blade action or parallel blade action.
- Provide an extruded aluminum (6063T5) sleeve, not less than .080" thick, for factory mounting of the specified duct and plenum AMD.
- Provide an aluminum radiused entry flare not less than .060" thick.
- Provide extruded aluminum (6063T5) damper frames, not less than .080" thick and 4" deep. Frame to be assembled using mounting fasteners. Welded frames are not acceptable.
- Provide extruded aluminum (6063T5) damper blade profiles.
- Blade and frame seals shall be extruded silicone. Seals shall be mechanically fastened.
- Provide a dual bearing systemfixed around a 7/16" aluminum hexagon blade pivot pins, rotating within a polycarbonate outer bearing inserted in the frame.
- Provide a hexagonal, adjustable length, 7/16" control shaft that is an integral part of the blade axle.
- Linkage hardware shall be installed in the frame side, complete with stainless steel trunnions and cup-point trunnion screws for a slip-proof grip.
- Dampers shall be designed for operation in temperatures ranging between -72 °F and 212 °F.

PART 3 - EXECUTION

GENERAL

All electronic work required as an integral part of the Direct Digital Control system work is the responsibility of this contractor.

This contractor shall provide all labor, materials, engineering, software, permits, tools, checkout and certificates required to install a complete Direct Digital Control system as herein specified.
This Direct Digital Control system as herein specified shall be fully integrated and completely installed by this section. It shall include all required computer CPU software and hardware. Include the engineering, installation, supervision, calibration, software programming, and checkout necessary for a fully operational system.

INSTALLATION

All work and materials are to conform in every detail to the rules and requirements of the National Electrical Code and present manufacturing standards. All material shall be UL approved.

Install system and materials in accordance with manufacturer's instructions, rough-in drawings and details on drawings.

Any line voltage wiring to be by this contractor.

Label all control devices with the exception of dampers, valves, and terminal unit devices with permanent printed labels that correspond to control drawings. Temperature control junction and pullboxes shall be identified utilizing spray painted green covers. Other electrical system identification shall follow the 26 05 53 specification.

All control devices and electrical boxes mounted on insulated ductwork shall be mounted over the insulation. Provide mounting stand-offs where necessary for adequate support. Cutting and removal of insulation to mount devices directly on ductwork is not acceptable. This contractor shall coordinate with the insulation contractor to provide for continuous insulation of ductwork.

Provide all electrical relays and wiring, line and low voltage, for control systems, devices and components. Install all high voltage and low voltage wiring (includes low voltage cable) in rigid metal conduit. All conduit must be installed in accordance with electrical sections (Division 26) of this specification and the National Electrical code.

Conduit shall be a minimum of 1/2 " for low voltage control provided the pipe fill does not exceed 40%.

Minimum low voltage wiring gauge to be 18 AWG for outputs and 20 AWG for inputs. All low voltage wiring to be stranded.

Low voltage wiring can be run without conduit above accessible lay-in tile ceilings. All wiring in mechanical rooms, above inaccessible hard ceilings, exterior locations, and in any exposed areas, and in all other locations should be in conduit. Wire for wall sensors must be run in conduit. Wiring for radiation valves shall be run in conduit where routed through walls.

Where wiring is installed free-air, installation shall consider the following:

- Wiring shall utilize the cable tray wherever possible.
- Wiring shall run at right angles and be kept clear of other trades work.
- Wiring shall be supported utilizing "J" or "Bridal-type" steel mounting rings anchored to ceiling concrete, piping supports, walls above ceiling or structural steel beams. Mounting rings shall be of open design (not a closed loop) to allow additional wire to be strung without being threaded through the ring. For mounting rings that do not completely surround the wire, attach the wire to the mounting ring with a strap.
- Supports shall be spaced at a maximum 4-foot interval unless limited by building construction. If wiring "sag" at mid-span exceeds 6-inches; another support shall be used.
- Wiring shall never be laid directly on the ceiling grid or attached in any manner to the ceiling grid wires.
- Wall penetrations shall be sleeved.

Wiring shall not be attached to existing cabling, existing tubing, plumbing or steam piping, ductwork, ceiling supports or electrical or communications conduit.

Mount control panels adjacent to associated equipment on vibration-free walls or free-standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and on cabinet face.

Provide as-built control drawings of all systems served by each local panel in a location adjacent to or inside of panel cover. Provide a protective cover or envelope for drawings.

Provide all necessary routers and or repeaters to accomplish connection to the BAN via the panel-mounted port provided.

All tubing, cable and individual wiring is to be permanently tagged, with numbers corresponding with "Record Drawings", spares are to be labelled as "Spare".

Provide technician to work with air balancing contractor and/or provide balancing contractor with necessary hardware to over-ride DDC controllers for air balancing.

Provide documentation to demonstrate that all points, input and output, have been checked out and verified operational, note any points not operating properly with notation of reason.

CONTROL DAMPERS WITH INTEGRAL AIRFLOW MONITORING

Install units in accordance with manufacturers recommendations and requirements.

COMMISSIONING, VERIFICATION AND CLOSEOUT

The controls contractor shall participate in all aspects of building commissioning as required in Sections 01 91 00 – Commissioning and 01 95 01 – Monitoring-Based Commissioning.

SEQUENCE OF OPERATION

VARIABLE AIR VOLUME TERMINALS WITH HOT WATER REHEAT

Systems consist of:

- Variable air volume terminal
- DDC VAV unit controller.
- Discharge air temperature sensor.
- Hot water reheat coil with modulating 2-way or 3-way temperature control valve.
- DDC space sensor.
- DDC CO2 space monitor (select locations)
- Lighting occupancy sensor and relay (provided and installed by Division 26).

Provide all line and low voltage wiring for a complete operating system.

Mount discharge air temperature sensor a minimum of 3 duct diameters downstream of reheat coil.

Provide all control wiring between occupancy sensor and VAV controller.

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal damper is at its minimum flow, the hot water valve shall modulate open to maintain space temperature. If the air terminal has a heating airflow, the hot water control valve and air terminal shall open in parallel.

The reverse shall occur when space temperature is below setpoint. The heating coil valve shall be commanded closed whenever the associated AHU is off. Provide a discharge air temperature sensor for monitoring purposes.

Each space temperature sensor shall have a manual override button that shall index the space to the occupied mode for a period of two hours (adj.). If an occupancy sensor is specified, it shall index the terminal unit DDC controller to occupied mode for a minimum of 30 minutes (adj.).

Provide separate adjustable cooling and heating setpoints for both the occupied and unoccupied modes. When the space temperature is between the heating and cooling setpoints, the heating valve shall be closed and the airflow at heating and cooling minimum flow.

Occupancy sensors will be provided by the Division 26 contractor. Provide wiring from all occupancy sensor contacts to building automation system for space occupied/unoccupied control. When the occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied heating and cooling setpoints as defined by the weekly schedule (grouped or individually). When the occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled and the occupied heating and cooling temperature setpoints shall be maintained regardless of the weekly schedule. All programming for the above sequence shall reside in the terminal unit controller and a supervisory controller shall not be required to reset any flow or temperature setpoints based on the occupancy sensor.

Where there are multiple occupancy sensors associated with a VAV zone that serves multiple spaces, all occupancy sensors must be “unoccupied” for the air terminal to move to zero airflow setpoint.

VARIABLE AIR VOLUME TERMINALS WITH HOT WATER REHEAT AND PERIMETER STEAM RADIATION

Systems consist of:

- Variable air volume terminal
- DDC VAV unit controller.
- Discharge air temperature sensor.
- Hot water reheat coil with 2-way temperature control valve.
- Existing steam convector(s) with new DDC modulating steam control valve and actuator
- DDC discharge air sensor.
- DDC space sensor.
- DDC CO2 space monitor (select locations)

Provide all line and low voltage wiring for a complete operating system.

Mount discharge air temperature sensor a minimum of 3 duct diameters downstream of reheat coil.

Provide all control wiring between occupancy sensor and VAV controller.

Provide a DDC space temperature sensor to control, in sequence, a modulating electronic control valve for the hot water reheat coil and actuator for terminal air flow. When space temperature is below setpoint, the air terminal damper shall modulate toward the cooling minimum flow position. After the air terminal damper is at its minimum flow, the hot water reheat valve and perimeter steam radiation valve(s) shall modulate open in parallel to maintain space temperature.

Where multiple steam radiation convectors (each with a temperature control valve) are located within the same VAV zone, the convectors shall each have a control valve and be controlled in unison.

The reverse shall occur when space temperature is below setpoint.

The heating coil valves shall be commanded closed whenever the associated AHU is off. Provide a discharge air temperature sensor for monitoring purposes.

Each space temperature sensor shall have a manual override button that shall index the space to the occupied mode for a period of two hours (adj.). If an occupancy sensor is specified, it shall index the terminal unit DDC controller to occupied mode for a minimum of 30 minutes (adj.).

Provide separate adjustable cooling and heating setpoints for both the occupied and unoccupied modes. When the space temperature is between the heating and cooling setpoints, the heating valve shall be closed and the airflow at heating and cooling minimum flow.

When the building is in the unoccupied mode and there is a call for heat in any perimeter zone, the perimeter steam radiation shall be used from setback heating. The VAV terminal heating coil control valve shall remain closed and air handler remain off.

Occupancy sensors will be provided by the Division 26 contractor. Provide wiring from all occupancy sensor contacts to building automation system for space occupied/unoccupied control. When the occupancy sensor signals the zone is unoccupied, the minimum flow setpoint shall be zero CFM (adj.) and the heating and cooling temperature setpoints will be maintained at either the occupied or unoccupied heating and cooling setpoints as defined by the weekly schedule (grouped or individually). When the occupancy sensor signals the zone is occupied, the occupied minimum flow setpoint shall be as scheduled and the occupied heating and cooling temperature setpoints shall be maintained regardless of the weekly schedule. All programming for the above sequence shall reside in the terminal unit controller and a supervisory controller shall not be required to reset any flow or temperature setpoints based on the occupancy sensor.

On a CO2 level of 750 PPM (adjustable) or above with the space occupied, the terminal shall enter CO2 mode. The terminal damper shall modulate open and the reheat coil shall remain in control to maintain space temperature setpoint. The terminal damper shall be allowed to modulate to its maximum position in a timed fashion. Upon a drop in space CO2 level below 750 FPM, the terminal shall leave CO2 mode and return to normal operation. If the space CO2 level does not fall below 750 PPM (adjustable), with the terminal damper in its maximum position, the associated air handler outside air damper shall modulate open. See air handler sequence for additional information.

<u>TRANSFER AIR FAN (EF-1)</u>

Systems consist of:

- Ceiling mounted exhaust fan.

Fan shall operate whenever the air handler is in the occupied mode.

When the air handler is in the unoccupied mode, the exhaust fan shall be off.

TRANSFER AIR FAN (TF-1)

Systems consist of:

- Ceiling mounted transfer air fan with ECM motor.
- DDC space sensor.

On a rise in space temperature above setpoint, the fan shall cycle on.

On a drop in space temperature below setpoint, the fan shall cycle off.

DUCTLESS SPLIT HEAT PUMP

Systems consist of:

- Ductless split high wall mounted evaporator (indoor unit)
- Ductless split heat pump (outdoor unit).
- Integral ductless split controls
- DDC space sensor.

The ductless split system shall be controlled via its own integral stand-alone control system.
The DDC space temperature sensor shall be for monitoring and alarming thru the BAS.

AHU-3 – Minimum Outside Air Damper

Outside Air Damper Modifications consist of:

- Removal of existing minimum outside air damper and actuator.
- New outside air damper and motorized actuator with integral airflow monitoring.

Integrate outside airflow monitoring into the BAS system and BAS air handler graphic for monitoring and alarming purposes. Integrate the following outside air damper sequence:

Outside Air Damper
When the building and system is in the unoccupied mode, the outside air damper shall be closed.

When the building and system are in morning warm-up or cool-down, the outside air damper shall be closed.

When the building and system are in the occupied mode, the damper shall be open to its minimum position.

If there is a zone CO2 alarm, with the associate zone air terminal unit damper in its maximum position, the air handler outside air damper shall further modulate open from its minimum position in a stepped fashion.

Upon release of the zone CO2 alarm, the outside air damper shall return to its minimum position.

AHU-4 – Outside Air Damper

Outside Air Damper Modifications consist of:

- Removal of existing minimum outside air damper and actuator.
- New outside air damper and motorized actuator with integral airflow monitoring.

Integrate outside airflow monitoring into the BAS system and BAS air handler graphic for monitoring and alarming purposes. Integrate the following outside air damper sequence:

Outside Air Damper
When the building and system is in the unoccupied mode, the outside air damper shall be closed.

When the building and system are in morning warm-up or cool-down, the outside air damper shall be closed.

When the building and system are in the occupied mode, the damper shall be open to its minimum position (if in economizer mode the outside air damper shall be controlled by the economizer sequence).

If there is a zone CO2 alarm, with the associate zone air terminal unit damper in its maximum position, the air handler outside air damper shall further modulate open from its minimum position in a stepped fashion.

Upon release of the zone CO2 alarm, the outside air damper shall return to its minimum position.

OWNER TRAINING

Provide factory authorized representative and/or field personnel knowledgeable with the operations, maintenance and troubleshooting of the system and/or components defined within this section for a minimum period of 2 hours. Provide two follow-up visits for troubleshooting and instruction, one six months after substantial completion and the other at the end of the warranty period. Length of each visit to be not less than 8 hours or the time necessary to provide required information and complete troubleshooting and inspection activity for all controls.

END OF SECTION

SECTION 274100 - PROFESSIONAL AUDIO/VIDEO SYSTEM

PART 1 - GENERAL

1.1 This specification is for informational purposes only. The scope of work outlined in this specification shall be provided in a separate contract with the Owner.

1.2 SECTION INCLUDES

A. System Components
B. Audio Connectors
C. Audio Cabling
D. Video Connectors
E. Digital Video Cabling
F. Transmission Connectors
G. Transmission Cabling
H. Control Cabling
I. Horizontal Copper and Fiber Cabling and Connectors

1.3 RELATED WORK

A. Section 270500 - Basic Communications Requirements
B. Section 270526 - Communications Bonding
C. Section 271100 - Communication Equipment Rooms
D. Section 270528 - Interior Communications Pathway
E. Section 271500 - Horizontal Cabling Requirements

1.4 QUALITY ASSURANCE

A. Manufacturer: The manufacturer of equipment shall have a complete service organization for all products in the manufacturer's line.

B. Integrator/Dealer: The Contractor shall be a factory-authorized and certified integrator/dealer specializing in each selected manufacturer's products, with demonstrated prior experience with the selected manufacturer's system installation and programming.

C. The following qualifications have been endorsed by the AudioVisual and Integrated Experience Association (AVIXA), which is formerly known as InfoComm International.

1. The Contractor shall have the services of a Certified Technology Specialist on staff and supervising the project. This service shall not be subcontracted. In addition to supervising the project, the CTS-I shall perform the following tasks on the project:

a. Review submittals and provide a letter stating the submittals are in compliance with the contract documents.
b. Provide written and dated confirmation of an observation of the contractor's installation activities no less than every 2 weeks month during the construction period.
c. Provide a final written and dated confirmation of a final construction review prior to testing.
d. Review final testing and calibration of the systems and provide a letter with the documented results or transmittal of the results stating the test results and calibration compliance with the contract documents.

D. A certification of CCENT or CCNA from CISCO. CCNP certification satisfies either of these requirements.

E. The Contractor shall have in-house services of a Microsoft Certified Systems Engineer (MCSE) or equivalent technician for the purposes of server deployment, software configuration, and system integration for those systems that reside in a Microsoft environment.

F. Control System Dealer: The media control system shall be provided, terminated, installed, and programmed by a factory-authorized and certified dealer and integrator in good standing with the manufacturer. The dealer shall have direct purchasing and support authority. These services shall not be subcontracted.

G. Control System Programmer: The media control system shall be programmed by a factory-trained and certified programmer.

1. The Contractor shall have all certifications required by the manufacturer(s) for the installed system components on staff for the appropriate duties and responsibilities required by the manufacturer.

a. The control system programmer shall have all refresher courses completed for the latest features of the control platform prior to bidding the project to ensure that the Contractor is up to date with the latest software features.
b. The control system programmer shall have achieved the highest programmer level obtainable by the installed control manufacturer (e.g., master programmer).

2. The Contractor shall be fluent in the control systems preferred language (e.g., Python, C#, Java, JavaScript, SQL, PHP, etc.) required to complete the programing requirements of the AV system.

H. Audio System Programmer: All digital sound processing equipment (DSP) used on the project shall be setup, programmed and calibrated by a factory-trained and certified technician. All audio signals shall be delivered via Dante. Programmer shall provide the Owner with an auto-mixed program output as well as pre-fade signals from each source/input.

1. The audio system programmer shall have the following complementary certifications:
a. Associated manufacturer certifications
b. Dante Level III

I. Video System Programmer: All video distribution and processing used on the project shall be setup, programmed and calibrated by a factory-trained and certified technician.

J. The Contractor shall have acquired and maintained all certifications for a minimum of one (1) month prior to the posted bid date of this project.

K. Servicing Contractor: The installer must be factory certified to provide service on the installed manufacturer's equipment and must have local service representatives within a 100 mile radius of the project site.

1.5 REFERENCES

A. ADA - Americans with Disabilities Act
B. ADAAG - Americans with Disability Accessibility Guidelines
C. ANSI - American National Standards Institute
D. AVIXA - Audiovisual and Integrated Experience Association (Formerly InfoComm)
E. ANSI/InfoComm A102.01:2017 - Audio Coverage Uniformity
F. ANSI/InfoComm 2M-2010 - Standard Guide for Audiovisual Systems Design and Coordination Processes
G. ANSI/InfoComm F501.01:2015 - Cable Labeling for Audiovisual Systems
H. ANSI/InfoComm 10:2013 - Audiovisual Systems Performance Verification
I. ANSI/AVIXA V202.01:2016 - Display Image Size for 2D Content in Audiovisual Systems
J. ANSI/InfoComm 3M-2011 - Projected Image System Contrast Ratio
K. IBC - International Building Code
L. IEC - International Electrotechnical Commission
M. NFPA 70 - National Electrical Code (NEC)

N. UL 813 - Commercial Audio Equipment
O. UL 1419 - Professional Video and Audio Equipment
P. UL 1480 - Speakers for Fire Alarm, Emergency, and Commercial and Professional Use
Q. UL 1492 - Audio/Video Products and Accessories

1.6 SUBMITTALS

A. Submit shop drawings and product data under provisions of Section 270500.

B. General Requirements:

1. Submittals will be submitted in multiple passes over the course of construction. Each pass will be a dedicated single submission for review as outlined in the general submittal requirements outlined in section 270500.
2. Should the Contractor not provide shop drawings in a timely fashion, not complete requirements, or extend the time of any resubmittals so as to jeopardize schedules, cause delay, or limit access for field work, the Contractor bears responsibility for impact and delay that may occur. This includes access or lift to overhead positions and associated protection of work already in place.

C. First Pass Submittals: To be submitted after the project is awarded but before equipment is submitted, purchased and installed.

1. Contractor(s) resume of qualifications.
2. All certifications shall be current and valid. Any certificate with expired dates will not be accepted.
3. All applicable AudioVisual and Integrated Experience Association (AVIXA) certifications. Qualifications from InfoComm that have not expired will be accepted.
4. All certifications outlined in the qualifications shall be included in this submittal. Refer to the qualifications section for additional information. Certifications include, but are not limited to:

    a. All installed manufacturer certifications required by the manufacturer.
    b. Control system authorized dealer certification.
    c. Control system certified programmer certification(s).
    d. Audio system DSP dealer certification.
    e. Audio system DSP programmer certification.
    f. Video system dealer certification(s).
    g. All other applicable dealer, installation and programming certifications.
    h. All applicable Microsoft certifications.
    i. All applicable networking certifications.

5. Audio and video calibration equipment certifications.
6. Audio and video testing and calibration equipment and software procedures and manufacturer-specific equipment calibration certificates.

D. Second Pass Submittals: To be submitted after all initial submittals have been approved but before equipment is purchased, installed, configured, and programmed. This can be submitted with the first pass submittal but will require to be submitted as a separate document.

1. Product Data: Provide manufacturer's technical product specification sheet for each individual component type. Submitted data shall show the following:

    a. Compliance with each requirement of these documents.
    b. All component options and accessories specific to this project.
    c. Electrical power consumption rating and voltage.
    d. Wiring requirements.
    e. Pre-terminated cable distances and requirements identified by each room where required.
    f. Product manuals are not an acceptable format and will be rejected.

E. Final Pass Submittals: To be submitted after all initial submittals have been approved but before the equipment is installed, configured and programmed. These should not be submitted until after the pre-installation meeting outlined in Part 3.

1. System Drawings: Project-specific system drawings shall be provided as follows:

a. Provide a system block diagram noting system components and interconnection between components. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (e.g., multiple identical controllers), the diagram may show one device and refer to the others as "typical" of the device shown.

b. Submittals shall contain shop drawings indicating physical plan locations and placement of installed devices and accessories with associated scope or field conditions for review and coordination. Provide mounting details, suspensions, and rough-in notes with trade demarcations.

1) Identify any non-standard back boxes or mounting assembly required by product or specifications and elaborate contractor means and methods for mounting.

2) Provide rack drawing(s) showing the mounting of equipment in each rack or cabinet on the project.

3) All display mounts shall be coordinated with the Architect to verify the exact vertical and horizontal positioning of the display. Coordinate in-wall stud locations for installation of recessed display mounts to install in the exact location as coordinated with the architectural drawings.

4) Projector mounts shall be coordinated with other utilities on the ceiling and wall to minimize any potential obstructions for the visual beam of the projector prior to installation of the projector mount.

5) Projector mounts, projector screens, recessed ceiling speakers, in-ceiling microphones, and all other above ceiling devices shall be coordinated with other trades in the field (e.g., mechanical ductwork, lights, diffusers, etc.) to minimize changes that will impact the performance of the system design.

c. Submit wiring and cable path requirements, including field wiring, path verification, signal separation, and outside diameter of cables for conduit sizing and verification that can be used for field installation and electrical coordination.

d. Reproduction of contract documents is not acceptable for submittals. Wire CAD type drawings and cable tag lists or schedules, or typical manufacturer's abbreviated single lines alone, are not complete.

2. The Contractor shall submit graphic or emulated representations of the control system touch panels for each unique space and layout prior to purchase, installation and programming for review and comment by the Architect/Engineer and Owner. These shall show and describe the intended programming/macro control features and functions of each button/icon for all pages.

3. The Contractor shall submit graphic or emulated representations of the control system keypads for each unique space and layout prior to purchase, installation and programming for review and comment by the Architect/Engineer and Owner. These shall show and describe the intended programming/macro control features and functions of each button/knob.

4. The Contractor shall submit the actual DSP audio processor files or single line audio path file diagram prior to installation for review and comment by the Architect/Engineer. Provide preliminary settings with processor blocks identified and note resources allocated.

5. The Contractor shall submit the number of IP addresses, VLANS, and subnetworks that will be required from the Owner's Information Systems Department.

6. Submit meeting agenda for planning/programming meetings as required in Part 3 of this specification.

7. Submit detailed description of Owner training to be conducted at project end, including specific training times and typical attendees expected.

8. Provide rack drawing(s) showing the mounting of equipment in each rack or cabinet on the project. Rack drawings shall include the following:

a. Equipment placement including mounting on the front or rear of the rack.

b. Spacing separation as required by equipment for adequate airflow and heat dissipation.
c. Signal separation based on AVIXA standards as required by the design.
d. Heating/cooling load requirements for submitted equipment to verify the heating/cooling load of the rack. This shall include Owner-provided equipment coordinated with the Owner.
e. Power requirements for each rack including plug type and loads based on the final approved products.

F. Discontinued Products and New Model Releases:

1. For each product, the Contractor shall submit (in addition to the specified product) a product cut sheet if the specified product has been replaced, improved upon, phased out or otherwise upgraded at the time of shop drawing submittal.

a. The intent of this requirement is for the Contractor to submit only direct replacements for the specified products. A direct replacement shall be defined as a product of newer release that has equal or greater capabilities, which is available for not more than a 10% premium over the specified product's bid unit cost. The Contractor shall submit a letter from the manufacturer with a direct replacement that includes both model numbers to clarify the replacement.
b. It is not the intent of this requirement for the Contractor to submit new products or other product options that significantly differ in capability and/or cost from the specified product.

G. Coordination Drawings:

1. Include all ceiling-mounted devices in composite electronic coordination files. Refer to Section 270500 for coordination drawing requirements.

1.7 SYSTEM DESCRIPTION

A. This specification section describes the furnishing, installation, commissioning and programming of audio/video components and systems.

B. Performance Statement: This specification section and the accompanying Contract Documents are performance based, describing the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed, every equipment connection that must be made and every feature and function that must be programmed and configured. Based on the equipment constraints described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

C. This document describes the major components of the system. All additional hardware, subassemblies, supporting equipment and other miscellaneous equipment required for proper system installation and operation shall be provided by the Contractor.

D. This document describes the major programming features and functions of the system. All additional programming, configuration and integration required for proper system installation and operation shall be provided by the Contractor.

E. When a specific manufacturer is not provided in this document for minor pieces of equipment, the Contractor shall provide only those materials considered to be of the same industry commercial and professional quality level as the major equipment manufacturers.

F. General System Description:

1. The purpose of this section is to define the overall AV system requirements for each space identified on the project drawings. This is to represent the end-user needs, applications, tasks and Functions and features for each space to assist with identifying programing requirements for each space.

2. For integrated audio visual systems where public events will be held: PTZ cameras, Dante-enabled audio components that are compatible with Dante Domain Manager, equipment to convert presentation content to SDI, and SDI-over-fiber transport equipment be installed to allow for the City of Madison IT Media Team to record, stream, and broadcast.

    a. Conference SCR01
    b. Conference/Hearing DCR22

1.8 LICENSING REQUIREMENTS

A. All user licenses required for system operation shall be included in the Contractor's bid. User licenses shall include, but not be limited to, server and workstation software and any other licensing that is required by the manufacturer for operation of any system component.

1. Licenses shall be provided on a one-to-one basis. One license shall be provided for each server, workstation, and device requiring a license. In the event the manufacturer requires the purchase of a block of licenses, the minimum standard licensing package to support all devices shall be provided.

1.9 INTELLECTUAL PROPERTY OWNERSHIP

A. All supporting documentation, programming, uncompiled source code, graphic files, DSP code and diagrams, written and electronic files, including all latest versions of the documentation and software necessary to edit and adapt the system(s), shall be provided to the City of Madison for all spaces and all systems. The integrator and/or programmer shall also maintain a current copy to be provided at the Owner's request.

1. Vendor may request source code from existing City of Madison systems.
2. The City of Madison shall have the right to modify the intellectual property directly, or to have the intellectual property modified by any party of the Owner's choosing.

1.10 PROJECT RECORD DOCUMENTS

A. Submit documents under the provisions of Section 270500.

B. Provide all applicable certifications.

C. Provide statement that system checkout test, as outlined in the shop drawing submittal, is complete and satisfactory.

D. Provide schedules documenting all terminal block wiring, including cable numbers.

E. Warranty: Submit written warranty and complete all Owner registration forms.

F. Complete all operation and maintenance manuals as described below.

G. The Contractor shall include all factory-provided test results for equipment installed on the project.

H. The Contractor shall include all test results from system demonstration and performance testing specified in this document.

I. Record Drawings shall minimally include:

1. All revisions to, or deviations from the original drawings, as well as final dimensions, cable routes, connector panel drawings, cable numbering charts, and control system programming documentation. A complete as-installed equipment list, listed by room, and with manufacturers' names, model numbers, serial numbers, and quantities of each item.

2. A complete and correct system schematic, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and programming code.
3. Complete equipment rack layouts showing locations of all rack-mounted equipment items.
4. Additional information, diagrams or explanations as designated under respective equipment or systems specification section.

J. Within each equipment room, the appropriate floor plan for which that equipment room serves shall be laminated and mounted for use by the Owner. Functional drawings shall be posted at each AV closet or included at every AV rack within a room.

K. Upon completion and final acceptance of the project, the Contractor shall provide the Owner a copy of the programming code for any and all AV systems and devices programmed by the Contractor.

1. For any subsequent modifications to the programming code, an updated copy of the code shall be provided to the Owner.

1.11 OPERATION AND MAINTENANCE DATA

A. Submit documents under the provisions of Section 270500.

B. Manuals: Final copies of the manuals shall be delivered after completing the installation. Each manual's contents shall be identified on the cover. The manual shall include names, addresses, and telephone numbers of the Contractor responsible for the installation and maintenance of the system and the factory representatives for each item of equipment for each system. The manuals shall have a table of contents and labeled sections. The final copies delivered after completion of the installation shall include all modifications made during installation, checkout, and acceptance. Manuals shall be submitted in electronic format. The manuals shall consist of the following:

1. Functional Design Manual: The functional design manual shall identify the operational requirements for the system and explain the theory of operation, design philosophy, and specific functions. A description of hardware and software functions, interfaces, and requirements shall be included.
2. Hardware Manual: The manual shall describe all equipment furnished including:

    a. General description and specifications.
    b. Installation and checkout procedures.
    c. Equipment layout and electrical schematics to the component level.
    d. System layout drawings and schematics.
    e. Alignment and calibration procedures.
    f. Manufacturers repair parts list indicating sources of supply.

3. Software Manual: The software manual shall describe the functions of all software and shall include all other information necessary to enable proper loading, testing, and operation. The manual shall include:

    a. Definition of terms and functions.
    b. System use and application software.
    c. Initializations, startup, and shutdown.
    d. Reports generation.
    e. Details on forms customization and field parameters.

4. Operator's Manual: The operator's manual shall fully explain all procedures and instructions for the operation of the system including:

    a. Computers and peripherals.
    b. System startup and shutdown procedures.
    c. Use of system, command, and applications software.
    d. Recovery and restart procedures.

e. Use of report generator and generation of reports.
f. Data entry.
g. Operator commands.
h. Alarm messages and reprinting formats.
i. System permissions functions and requirements.

5. Maintenance Manual: The maintenance manual shall include descriptions of maintenance for all equipment including inspection, periodic preventive maintenance, fault diagnosis, and repair or replacement of defective components.

C. Audio Calibration Data: Provide documentation on all EQ settings, crossover points, limiter settings, gate settings and all other applicable settings.

D. Intellectual Property Ownership: Provide all uncompiled source code and DSP programming for all systems and spaces as described in Part 3 of this specification section.

1.12 WARRANTY

A. Unless otherwise noted, provide warranty for one (1) year after Date of Substantial Completion for all materials and labor.

B. Onsite Work During Warranty Period: This work shall be included in the Contractor's bid and performed during regular working hours, Monday through Friday.

1. Inspections: The Contractor shall perform two (2) minor inspections at even intervals (or more often if required by the manufacturer), and two (2) major inspections offset equally between the minor inspections.
2. Minor Inspections: These inspections shall include:

a. Visual checks and operational tests of all equipment, field hardware, and electrical and mechanical controls.
b. Mechanical adjustments if required on any mechanical or electromechanical devices.

3. Major Inspections: These inspections shall include all work described under paragraph Minor Inspections and the following work:

a. Clean all equipment, including filters, interior and exterior surfaces.
b. Perform diagnostics on all equipment.
c. Check, test, and calibrate (if required) any sensors or other equipment that contain settings.
d. Check zoom and focus of all projectors.
e. Run all system software diagnostics and correct all diagnosed problems.

C. Operation: Upon the performance of any scheduled adjustments or repairs, Contractor shall verify operation of the systems.

D. Emergency Service: The Owner will initiate service calls when the systems are not functioning properly. Qualified personnel shall be available to provide service within the distance defined within this specification section. The Owner shall be furnished with telephone number(s) where service personnel can be reached 24/7/365. Service personnel shall be at site within 24 hours after receiving a request for service.

E. Records and Logs: The Contractor shall keep records and logs of each task completed under warranty. The log shall contain all initial settings at substantial completion. Complete logs shall be kept and shall be available for review on site, demonstrating that planned and systematic adjustments and repairs have been accomplished for the systems.

F. Work Requests: The Contractor shall separately record each service call request on a service request form. The form shall include the model and serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing what must be done, the amount and nature of the materials used, the time and date work started, and the time and date of completion. The Contractor shall deliver a record of the work performed within five (5) business days after work is accomplished.

G. System Modifications: The Contractor shall make any recommendations for system modification in writing to the Owner. No system modifications shall be made without prior approval of the Owner. Any modifications made to the system shall be incorporated into the operations and maintenance manuals, and other documentation affected. To the fullest extent possible, the Owner shall be provided with electronic restorable versions of all configurations prior to the modifications being made.

H. Software: The Contractor shall provide all software and firmware updates during the period of the warranty and verify operation of the system upon installation. These updates shall be accomplished in a timely manner, fully coordinated with system operators, shall include training for the new changes/features, and shall be incorporated into the operations and maintenance manuals, and software documentation.

I. Refer to the individual product sections for further warranty requirements of individual system components.

1.13 ANNUAL SERVICE CONTRACT

A. Provide annual cost for extended service and maintenance warranty after the first year for the audio/video systems according to the following terms:

1. The term of the warranty shall begin on the system acceptance date and shall continue for one (1) year. The extended service and maintenance warranty may begin following this first year if accepted by the Owner. The term may be automatically renewed for successive one-year periods unless canceled by the Owner. The service and maintenance agreement shall include the following basic services to the Owner, including all necessary parts, labor and service equipment:

    a. Repair or replace any equipment item that fails to perform as initially installed, as specified, or as determined per the manufacturer's performance criteria.
    b. Perform semi-annual preventive maintenance on the equipment. This preventive maintenance shall include, but is not limited to, cleaning, realignment, bulb replacement, filter cleaning and replacement, inspection, re-calibration, and testing of devices. The Owner shall receive a written report of these inspections that identifies the device's status and, if required, a list of all necessary repairs or replacements.
    c. Provide software and firmware maintenance on the system. Contractor shall install and configure any software and firmware updates that the manufacturer provides at no cost. Any additional software or firmware options, updates, or enhancements purchased by the Owner shall be installed. The Contractor shall not be responsible for the purchase of additional software packages or the maintenance of Owner data.

2. The Contractor shall be compensated for any repairs or maintenance provided as a result of Owner abuse, misuse, intentional damage, accidental damage, or power fluctuations exceeding specified equipment tolerances.
3. System defects or failures shall be corrected within four (4) hours on the same business day if the Owner makes a service request before 11:00 am, or before 12:00 noon the next business day if the Owner makes the request after 11:00 am. If requested by the Owner, the Contractor shall respond or remain at the site after normal business hours, and the Owner shall reimburse the Contractor for the incremental cost difference between premium labor rates and standard labor rates. This reimbursement applies to premium labor rates that do not exceed time-and-one-half rates after normal business hours and double-time rates for Sundays and holidays. The Contractor's services shall be performed in a good and workmanlike manner and remain free from defects for a period of one (1) year.

B. Provide complete terms and conditions of warranty and service.

C. The Owner will enter into a contract directly with the vendor. This specification is not a contract between the Owner and the vendor to perform these services.

PART 2 - PRODUCTS

2.1 SYSTEM COMPONENTS

A. Refer to the project drawings for basis of design system components. Equivalent products shall meet or exceed all requirements defined on the project drawings. The following product information represents the minimum additional requirements for equivalent products:

B. Audio/Video GUI Control Systems:

1. Contractor shall furnish a programmable software-based audio/video control system. The system shall be field configurable and programmable by the factory and/or a factory-trained programmer.
2. The control system shall be TCP/IP based allowing direct connection of the system processors to a 10/100BaseT compatible Ethernet network.
3. Vendor shall configure and program all Crestron components so that they can be monitored and controlled by Crestron Fusion. Vendor shall provide X-Panels of all touch panels that can be accessed by Crestron Fusion.

C. Microphone Systems:

1. Wireless Microphones:

a. Wireless microphones shall not operate in the 516 to 865 MHz band (channels 38 to 69).
b. Features:

1) Dual antenna reception with true diversity reception.

c. Microphone systems that are common (shared) by multiple spaces or when the receivers are in a remote area shall include a compatible wireless antenna distribution system by the same manufacturer as the wireless microphone system.

D. Audio Amplifiers:

1. Power Amplifier(s), 25, 70.7 and 100 Volt:

a. Power: The following calculation shall be used to determine the minimum required output of the amplifier(s):

1) Calculate the total power tap value of each transformer with insertion loss using the following equation:

a) Tap wattage x 10^(xdB/10) where x = the rated insertion loss at 1,000Hz.

2) Calculate the total wattage loss based on cable distance, cable gauge and cable resistance.
3) Add together all the speaker taps' total power values that will be on a single channel of the amplifier. Multiply that total by 1.2, which will allow for a 20% future expansion. Multiply that number by 1.25 to ensure the amplifier never exceeds 75% of its total output. Utilize the final number to determine the minimum amplifier power requirements.

E. Assisted Listening Systems (ALS):

1. Assisted listening requirements for this project shall follow the local jurisdiction's requirements to quantify the number of devices for use on this project.

2. All spaces with amplified audible communications require an ALS. The Contractor shall refer to the ADA and ADAAG guidelines, as well as IBC Section 1108.2.7 for ALS rules, regulations and guidelines. Refer to the table below for the required number of receivers to be provided for each space (Source: IBC, Table 1108.2.7.1). Alternatively, if the building is managed by a single entity and all systems are fully compatible and interoperable, the total number of seats for all areas can be used in accordance with the table below.

Capacity of Seating in Assemble Areas	Minimum Required Number of Receivers	Minimum Number of Receivers to be Hearing-aid (T-coil) Compatible
50 or less	2	2
51 to 200	2, plus 1 per 25 seats over 50 seats	2
201 to 500	2, plus 1 per 25 seats over 50 seats	1 per 4 receivers
501 to 1,000	20, plus 1 per 33 seats over 500 seats	1 per 4 receivers
1,101 to 2,000	35, plus 1 per 50 seats over 1,000 seats	1 per 4 receivers
Over 2,000	55, plus 1 per 100 seats over 2,000 seats	1 per 4 receivers

3. Receivers required to be hearing-aid compatible shall interface with telecoils in hearing aids through the provision of neckloops and shall be over-the-ear type headphones. Earbuds are not acceptable for this use.
4. Receivers shall include a 1/8" (3.2mm) standard mono output jack.
5. Refer to the Access Board Research "Large Area Assistive Listening Systems: Review and Recommendations" ALS report for additional recommendations.

F. Power Conditioning and Surge Protective Devices:

1. All equipment shall be plugged in through a power conditioning surge arrestor.
2. Provide a minimum of 50 dB noise attenuation.
3. Provide a minimum of 1,500 joules of surge protection.
4. UL 1449 Standard for Safety for Surge Protective Devices listed to 330 volt clamping voltage.
5. Refer to the project drawings for additional information.

G. Digital Video Signal Equalizers and Regenerators:

1. For any cable run that exceeds the manufacturer-recommended distances or fails to transmit video or audio due to cable length, the Contractor shall provide and install a signal equalizer at the far end (sink) with the following minimum features:

    a. HDMI/DVI equalizers shall be HDCP compliant and support actively buffered DDC transmission.
    b. Display port equalizers shall be HDCP and DPCP compliant, support actively buffered DDC transmission, and be DP+ compatible.
    c. Provide automatic equalization.
    d. Pass all embedded audio and metadata.
    e. Have an auxiliary power input when adequate power is not available on the cable.
    f. Provide output reclocking and jitter reduction for multi-rate SDI signals.

2. For any cable run that that fails to transmit video or audio due to a weak source signal, the Contractor shall provide and install a signal regenerator at the near end (source) with the following minimum features:

    a. HDMI/DVI regenerators shall be HDCP compliant and support actively buffered DDC.
    b. Display port regenerators shall be HDCP and DPCP compliant, support DDC transmission, and be DP+ compatible.
    c. Provide automatic output reclocking and jitter reduction.
    d. Pass all embedded audio and metadata.
    e. Have an auxiliary power input when adequate power is not available on the cable.

H. Extended Display Identification Data (EDID) Emulators:

1. If any source or Owner-furnished equipment (OFE) is not outputting video properly, the Contractor shall provide and install an EDID Emulator and set it to the highest common EDID table of the displays (sinks) being outputted to, with the following minimum features:

a. EDID capture mode from a display.
b. Have an auxiliary power input when adequate power is not available on the cable.

I. Audio Unbalanced to Balanced Converters, Balanced to Unbalanced Converters, Combiners, Dividers, Isolation Transformers, and Line Drivers Minimum Requirements:

1. Unbalanced to Balanced Active Converter:

a. Provide signal isolation from the audio signals of differing channels.
b. Provide output trim gain and set to optimal output level while preventing over amplification and clipping of the signal.
c. Minimum frequency response of 20 Hz to 20 kHz (± 0.5dB).
d. Provide with appropriate power supply and mounting kit for rack or wall use.
e. Provide appropriate converter for mono to mono, mono to stereo, stereo to stereo, or stereo to mono to match the input of the equipment to which it is being connected.

2. Balanced to Unbalanced Passive Converter:

a. Provide transformer isolation from the input to output.
b. Provide output trim attenuation and set to optimal output level while preventing over-amplification and clipping of the signal.
c. Minimum frequency response of 20 Hz to 20 kHz (± 0.5dB).
d. Provide with appropriate mounting kit for rack or wall use.
e. Provide appropriate converter for mono to mono, mono to stereo, stereo to stereo, or stereo to mono to match the input of the equipment to which it is being connected.

J. Refer to project drawings for all other equipment not listed.

2.2 AUDIO CONNECTORS

A. This article includes minimum requirements for all connectors that are acceptable on this project. Should the Contractor request an alternative connector, it shall be submitted with the product submittals and clearly identified with which connector it will be replaced.

B. XLR Jack:

1. Panel Mount: Professional grade, crimped insert for vibration control, nickel shell, silver pins, pin quantity as required for application.
2. Manufacturers:

a. Switchcraft
b. Neutrik
c. Mogami

C. XLR Plug:

1. Professional grade, 360°° strain relief, nickel shell, silver pins. Provide colored boot.
2. Manufacturers:

a. Switchcraft
b. Neutrik
c. Mogami

D. Loudspeaker Connector:

1. Panel Mount: Twist-lock type, 4-conductor.
2. Manufacturers:

a. Neutrik
b. Speakon

2.3 AUDIO CABLING

A. Refer to Section 270500 for cable rating requirements.

B. Microphone Level Audio Cabling:

1. For patch cables less than or equal to 25 feet:

a. 24 AWG 2-conductor, twisted, stranded (19x36) tinned bare copper.
b. Single Layer Shield:

1) Shield: 100% aluminum foil shield

c. Nominal Capacitance: 30.0 pF/Ft

1) Belden
2) West Penn
3) Liberty

2. For cable runs greater than or equal to 25 feet:

a. 22 AWG 2-conductor, twisted, stranded (16x34) tinned bare copper.
b. Dual Layer Shield:

1) Shield: 85% total tinned copper braid shield

c. Nominal Capacitance: 18.0 pF/Ft
d. Manufacturers:

1) Belden
2) West Penn
3) Liberty

C. Line Level Audio Cabling:

1. For patch cables less than or equal to 25 feet:

a. 22 AWG 2-conductor, twisted, stranded (7x30) tinned bare copper.
b. Single Layer Shield:

1) Shield: 100% aluminum foil shield

c. Nominal Capacitance for non-plenum cable: 24.0pF/Ft
d. Nominal Capacitance for plenum cable: 35.0 pF/Ft
e. Manufacturers:

1) Belden
2) West Penn
3) Liberty

2. For cable runs greater than or equal to 25 feet:

a. 18 AWG 2-conductor, twisted, stranded (16x30) tinned bare copper.
b. Single Layer Shield:

1) Shield: 100% aluminum foil shield

c. Manufacturers:

1) Belden
2) West Penn
3) Liberty

D. Constant Voltage Speaker Cabling:

1. Class 2, stranded, twisted, 2-conductor, minimum of 16-gauge wire for all 25/70.7/100-volt applications unless noted otherwise.
2. The Contractor shall size cabling as required for distance power and shall provide larger gauge cable as required.
3. Manufacturers:

a. Belden
b. Liberty
c. Or pre-approved equal

2.4 DIGITAL VIDEO CABLING

A. All digital video cabling shall be pre-assembled and tested in a factory and not field terminated. The contractor shall field verify the cable distance and provide the proper cable type and length.

B. High Definition Multi-Media Interface (HDMI) "High Speed" Cable:

1. For any cable run that exceeds the manufacturer-recommended distances or fails to transmit video or audio due to cable length, the Contractor shall provide and install an HDCP-compliant signal equalizer at the far end (sink).
2. Provide HDMI cabling meeting HDMI 2.0 standards or greater:

a. HDCP compliant.
b. Manufacturers:

1) Belden
2) Or pre-approved equal

C. Display Port Cable:

1. For any cable run that exceeds the manufacturer-recommended distances, the Contractor shall provide and install an HDCP and DPCP compliant signal equalizer at the far end (sink).
2. Supports a maximum digital data rate of 8.64 Gbit/s.
3. Supports HDCP and DPCP.
4. Manufacturers:

a. Blue Jeans Cable
b. Or pre-approved equal

D. High Definition Serial Digital Interface (HD-SDI) Cabling:

1. For patch cables less than or equal to 25 feet:

a. RG-59, center conductor: 22 AWG stranded (7x29) bare copper, 0.023" OD (nominal), polyethylene dielectric.
b. Single Layer Shield:

1) Outer Shield: 98% tinned copper braid

c. Nominal Impedance: 75 ohms
d. Nominal Capacitance: 21.0 pF/Ft
e. Velocity of Propagation: 66%
f. Maximum Attenuation (per 100 feet):

1) at 1-MHz: 0.3 dB
2) at 71.5-MHz: 2.5 dB
3) at 360-MHz: 6.0 dB
4) at 750-MHz: 8.9 dB
5) at 1000-MHz: 10.5 dB

g. Manufacturers:

1) Belden
2) CommScope
3) Liberty
4) Extron

2. For horizontal cable runs less than or equal to 100 feet:

a. RG-59, center conductor: 20 AWG solid bare copper, 0.031" OD (nominal), FEP insulation.
b. Double Layer Shield:

1) Outer Shield: 95% tinned copper braid outside and bonded foil inside.

c. Nominal Impedance: 75 ohms
d. Nominal Capacitance: 16.1 pF/Ft
e. Velocity of Propagation: 83%
f. Maximum insertion loss (per 100 feet):

1) at 1-MHz: 0.3 dB
2) at 71.5-MHz: 2.1 dB
3) at 360-MHz: 4.4 dB
4) at 750-MHz: 6.5 dB
5) at 1000-MHz: 7.6 dB

g. Manufacturers:

1) Belden non-plenum or plenum
2) CommScope
3) Liberty
4) Extron

3. For horizontal cable runs greater than or equal to 100 feet:

a. For any cable run that exceeds the manufacturer-recommended distances or fails to transmit video or audio due to cable length, the Contractor shall provide and install a signal equalizer at the far end (sink).
b. RG-6, center conductor: 18 AWG solid bare copper, 0.274" OD (nominal),.
c. Double Layer Shield:

1) Inner Shield: 100% non-bonded aluminum foil tape
2) Outer Shield: 95% tinned copper braid

d. Nominal Impedance: 75 ohms
e. Nominal Capacitance: 15.9 pF/Ft
f. Velocity of Propagation: 84.5%
g. Maximum attenuation for non-plenum cable (per 100 feet):

1) at 1-MHz: 0.2 dB
2) at 71.5-MHz: 1.6 dB
3) at 360-MHz: 3.5 dB
4) at 750-MHz: 5.1 dB
5) at 1000-MHz: 5.9 dB

h. Manufacturers:

1) Belden
2) CommScope
3) Liberty
4) Extron

2.5 TRANSMISSION CABLING

A. For patch cables less than or equal to 25 feet:

1. RG-174, center conductor: 26 AWG stranded (7x34) copper-covered steel; 0.019" OD (nominal); polyethylene insulation.
2. Single Layer Shield:

a. Outer Shield: 90% tinned copper braid shield

3. Nominal Impedance: 50 ohms
4. Nominal Capacitance: 30.8 pF/Ft
5. Velocity of Propagation: 66%
6. Maximum Attenuation (per 100 feet):

a. at 1-MHz: 1.9 dB
b. at 50-MHz: 5.8 dB
c. at 400-MHz: 19.0 dB
d. at 700-MHz: 27.0 dB
e. at 1000-MHz: 34.0 dB

7. Cable shall be installed in conduit within plenum areas.
8. Manufacturers:

a. Belden
b. CommScope
c. Liberty
d. Times Fiber

B. For horizontal cables less than or equal to 50 feet:

1. RG-58, center conductor: 20 AWG bare solid copper; 0.037" OD (nominal); polyethylene insulation for non-plenum and FEP Teflon dielectric for plenum.
2. Single Layer Shield:
    a. Outer Shield: 95% tinned copper braid shield
3. Nominal Impedance: 50 ohms
4. Nominal Capacitance for non-plenum cable: 28.5 pF/Ft
5. Nominal Capacitance for plenum cable: 26.4 pF/Ft
6. Velocity of Propagation for non-plenum cable: 66%
7. Velocity of Propagation for plenum cable: 69.5%
8. Maximum attenuation for non-plenum cable (per 100 feet):
    a. at 1-MHz: 0.3 dB
    b. at 50-MHz: 2.5 dB
    c. at 400-MHz: 8.4 dB
    d. at 700-MHz: 11.7 dB
    e. at 1000-MHz: 14.5 dB
9. Maximum attenuation for plenum cable (per 100 feet):
    a. at 1-MHz: 0.5 dB
    b. at 50-MHz: 3.0 dB
    c. at 400-MHz: 9.7 dB
    d. at 700-MHz: 13.7 dB
    e. at 1000-MHz: 17.3 dB
10. Manufacturers:
    a. Belden plenum
    b. CommScope
    c. Liberty
    d. Times Fiber

C. For horizontal cables greater than or equal to 50 feet:

1. RG-8 center conductor: 10 AWG bare solid copper; 0.108" OD (nominal); foam HDPE insulation for non-plenum and foam FEP dielectric for plenum.
2. Two Layer Shield:
    a. Inner Shield: non-bonded aluminum foil tape
    b. Outer Shield: 90% tinned copper braid shield
3. Nominal Impedance: 50 ohms
4. Nominal Capacitance for non-plenum cable: 24.8 pF/Ft
5. Nominal Capacitance for plenum cable: 24.2 pF/Ft
6. Velocity of Propagation for non-plenum cable: 82%
7. Velocity of Propagation for plenum cable: 84%
8. Maximum attenuation for non-plenum cable (per 100 feet):
    a. at 1-MHz: 0.4 dB
    b. at 50-MHz: 1.0 dB
    c. at 400-MHz: 2.6 dB
    d. at 700-MHz: 3.6 dB
    e. at 1000-MHz: 4.4 dB
    f. at 4000-MHz: 9.9 dB

9. Maximum attenuation for plenum cable (per 100 feet):

    a. at 1-MHz: 0.1 dB
    b. at 50-MHz: 1.1 dB
    c. at 400-MHz: 3.2 dB
    d. at 700-MHz: 4.5 dB
    e. at 1000-MHz: 5.9 dB
    f. at 4000-MHz: 14.1 dB

10. Manufacturers:

    a. Belden non-plenum or plenum
    b. CommScope
    c. Liberty
    d. Times Fiber

2.6 CONTROL CABLING

A. Control:

1. For Bidding Purposes: Two-pair, twisted, shielded, one (1) #18 AWG pair and one (1) #22 AWG pair. Provide with plenum-rated jacket where used in a plenum space without conduit.
2. Size conductors as required for distance and voltage drop.
3. Coordinate exact requirements with selected manufacturer and system prior to submitting bid.

B. Other Control Circuits:

1. #20 AWG, stranded, shielded cable, number of conductors as required for the applications. Provide with plenum-rated jacket where used in a plenum space without conduit. Provide PVC jacket where installed in conduit or non-plenum areas.
2. Coordinate exact requirements with selected manufacturers prior to submitting bid.

2.7 HORIZONTAL COPPER DATA AND FIBER CABLING AND CONNECTORS

A. Refer to Section 271500 - Horizontal Cabling Requirements, for telecommunications cabling and connector requirements including fiber optics being utilized for A/V systems.

B. Refer to Section 271710 - Testing, for telecommunications cabling testing requirements including fiber optics being utilized for A/V systems.

C. All category-rated copper data cabling and fiber optic cabling shall be installed, terminated, tested and certified by the Division 27 Telecommunications contractor certified by the selected manufacturers for the copper and fiber optic cabling plant. The Contractor shall submit all cabling and certifications to the Architect/Engineer for approval in the shop drawings.

D. The A/V contractor shall coordinate purchase, installation, testing and certification with the telecommunications contractor for all required category-rated copper data cabling and fiber optic cabling required for A/V system operation prior to bid.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work.

B. Verify field dimensions and coordinate physical size of all equipment with the architectural requirements of the spaces into which they are to be installed. Allow space for adequate ventilation and circulation of air.

C. Verify that required utilities are available, in proper location, and ready for use.

D. Beginning of installation means installer accepts existing conditions.

3.2 PRE-INSTALLATION

A. A pre-installation meeting shall be held after the project has been awarded but before any submittals or work has been conducted. The purpose of this meeting is to review the drawings and specifications to assist with the construction and installation process that will occur during construction. The meeting will include the Engineer, Architect, Owner, and all relevant installing contractors for this system. The meeting will be chaired by the project manager for the AV contract and will include the following topics:

B. The Contractor shall be responsible for submitting all requested submittals and holding the pre-installation meeting prior to any purchasing, installation, programming, and construction coordination. Any delays or changes to the project as a result of meeting this requirement will be at the Contractor's expense.

3.3 INSTALLATION

A. Comply with the manufacturer's instructions and recommendations for installation of all products.

B. Provide all system wiring between all components as directed by the manufacturer or required for proper system operation.

C. Mount all touch screen and keypad devices where shown on plans in accordance with Americans with Disabilities Act (ADA) requirements for both side reach and front reach.

D. Cabling Requirements:

1. Non-plenum rated cabling may be used instead of plenum when installed with-in conduit in plenum rated areas.
2. All cabling shall be routed according to function. Cabling shall be grouped and bundled by groups, such as: microphone and line level audio, control, video and speaker. In no case shall cabling from different functional groups be intermixed. No cabling shall be routed parallel to 120 VAC or higher power circuits unless separated by a minimum of 6" and the 120 VAC or higher power is installed in conduit.
3. When cabling is installed in conduit, a separate conduit shall be provided for each cabling functional type.
4. Cable bundles shall be loosely bundled to allow the visual following of individual cables within the bundle and to permit the easy removal and addition of cables as necessary.
5. Horizontal cabling installed as open cable or in cable tray shall be bundled at not less than 10' intervals with hook-and-loop tie wraps. The use of plastic cable zip ties is strictly prohibited in any situation.
6. Cabling shall not be spliced under any circumstances.
7. Each cable shall be appropriately identified (as defined on the record documents) at each end's termination point using pressure sensitive label strips.
8. Audio Cabling:

    a. All amplified audio cabling shall not be in the same enclosed pathway as any other type of cabling as required by the NEC. Refer to the NEC for definitions and additional requirements.
    b. The polarity of all cabling shall remain consistent throughout the project, on all equipment. Red conductors shall be used for the positive "+" side, and black used for the negative "-" side.
    c. Cable shield length shall be equal to the cable's conductor length.
    d. All shielded cables drain wire SHALL be grounded and continuous throughout the entire length of the system, including splices where speakers are installed.
    e. Balanced audio connections shall be used whenever the mating equipment allows.
    f. Do not run unbalanced cables longer than 3m. For interconnecting of unbalanced equipment in lengths longer than 3m, the Contractor shall provide a line driver located at the source.

9. Video Cabling:

   a. All video cabling, unless otherwise noted, shall be provided with BNC connectors of the two-piece compression type. Twist-on BNC connectors are not permitted.
   b. Provide BNC 75-ohm terminators where required for all open BNC connectors.
   c. All coaxial video cables used for S-video, component/RGB and RGBHV shall be the same length to minimize skew.

10. Twisted Pair Cabling for All Applications:

   a. The Contractor shall ensure that the twists in each cable pair are preserved to within 0.5 inch of the termination. The cable jacket shall be removed only to the extent required to make the termination.
   b. The Contractor shall ensure that the cable shields are continuous throughout, terminated, and grounded according to the manufacturer's recommendations.

E. Grounding Requirements:

1. Provide a minimum of #6 AWG conductor from the nearest electrical service ground bus or nearest telecommunications room ground bus bar to the A/V equipment racks and cabinets regardless of location. Size cable as required by the NEC.
2. Cables containing shields shall not have the shields grounded at conduits, boxes, racks, etc. Ground the shield only at the equipment end.
3. Audio cable shields for line-level signals shall be connected to the metal equipment chassis at both ends of the cable.
4. Audio cables connected to transformers shall have the cable shield connected to the transformer shield and transformer case ground.
5. The Contractor shall not connect cable shields together from differing cables.
6. XLR cable shields shall be connected to chassis ground.
7. Signal-grounded balanced shields are not acceptable and shall not be installed. All balanced shields shall be chassis grounded.

F. Rack and Cabinet Requirements:

1. Ground equipment racks/cabinets as noted within this specification section and Section 270526 - Communications Grounding.
2. Provide one (1) RU of space between adjacent pieces of equipment with top and/or bottom vents, above the topmost piece of equipment, and below the bottommost piece of equipment. Provide a vented cover panel covering each rack space.
3. Terminate all speaker cabling on individual barrier strips for positive "+", negative "-", and shield. The shield barrier strip shall be grounded.
4. Provide a power conditioning surge arrestor in the rack for distribution of AC power from the wall receptacles indicated on the plans. The quantity of plugs shall be adequate so that no equipment in the rack shall require plugging into an AC source outside the rack.
5. Power sequencing shall be provided in the racks where shown on the drawings. All amplifiers located in the racks shall be sequenced "last on – first off". Power sequencers shall provide power conditioning and surge protection.

G. Video System Installation Requirements:

1. Video display image shall fill screen area with native aspect ratio

H. Audio System Installation Requirements:

1. The Contractor shall perform calculations for the optimal speaker tap settings to reach the desired SPL level and coverage without overloading the amplifier(s).

a. At a minimum, the following calculations shall be used:

1) Add together all speaker taps that will be on a single channel of the amplifier. Multiply that total by 1.2, which will allow for a 20% future expansion. Multiply that number by 1.25 to ensure the amplifier never exceeds 75% of its total output. Utilize the final number to determine the minimum amplifier power requirements.
2) For direct coupled systems (low impedance), allow a minimum of 10 dB headroom before any distortion occurs at the amplifier input indicator when beginning gain stage tests are set up. Increase headroom as appropriate for high impact and clarity needs, typically exceeding 12 to 15 dB during continuous operation.

2. Connections of balanced to unbalanced equipment shall only be done through an active converter at the unbalanced side.
3. Connections of unbalanced to balanced equipment shall only be done through an active converter at the unbalanced side.
4. Connections from stereo balanced or unbalanced equipment to mono equipment of the same signal type shall only be done through a passive combiner.
5. Connections from mono balanced or unbalanced equipment to stereo equipment of the same signal type shall only be done through a passive divider.
6. The Contractor shall provide an isolation transformer for any balanced or unbalanced audio line that exhibits a hum, noise from EMI or RFI, power line noise, or ground loops.
7. The Contractor shall provide an active audio line driver for all balanced and unbalanced signals that exceed the distance limitations of the cabling.

I. Control System Installation Requirements:

1. The Contractor shall perform calculations for the required wire AWG size based on distance for system power for touch panels, keypads and other devices being powered. A minimum of a 15% overhead is required.

3.4 VIDEO SYSTEM TESTING AND CALIBRATION

A. All video equipment shall receive proper testing and configuration.

B. Color Space Optimization:

1. The Contractor shall set the color space of each source and display device to a uniform color space to optimize the switching speed and compatibility of a digital video system. Each device shall be set to an RGB or YCbCr color space depending on the systems primary function and compatibility of the devices.
2. If the primary function of the space is video and other digital media, the color space of each device shall be set to a YCbCr color space. If the primary function of the space is computer-based graphics and presentations, the color space of each device shall be set to an RGB color space.
3. Chroma subsampling shall be set to a consistent 4:4:4 or 4:2:2 across all devices. Set to 4:4:4 when all equipment is capable.
4. If all devices are not capable of displaying a certain color space, all devices shall be set to a common shared color space.

C. Extended Display Identification Data (EDID) Management:

1. The Contractor shall set the EDID management tables in capable equipment so all sources output the highest common EDID table of the displays (sinks).
2. For systems with capable matrix switches, the matrix shall dynamically adjust its EDID tables so any source will output the highest common EDID table of the displays (sinks) being outputted to.
3. If any source or Owner-furnished equipment (OFE) is not outputting properly, the Contractor shall provide and install an EDID Emulator and set it to the highest common EDID table of the displays (sinks) being outputted to.

D. Projectors, monitors and receivers shall be tested and adjusted for proper signal sync, convergence, brightness, contrast, and color level. The Contractor shall adjust all other parameters necessary to achieve a proper video image.

E. All video source selections shall be tested and verified.

F. All projectors and displays shall have a minimum burn-in time of 96 hours prior to any adjustments are made and the completion of the project

G. All projectors and displays shall have their hue/tint and color/saturation calibrated with a video signal test generator and blue lens filter after a minimum warmup time of 20 minutes. Provide all calibrated settings results for each projector and display in the final documentation.

H. All projectors and displays shall have their brightness, contrast and sharpness calibrated with a video signal test generator after a minimum warmup time of 20 minutes. Provide all calibrated settings results for each projector and display in the final documentation.

I. All dynamic contrast functions shall be turned off.

J. Full video calibration for all projectors and displays shall be provided with the following minimum requirements:

1. The Contractor shall utilize non-contact professional video calibration tools such as Sencore OTC1000-CM ColorPro Optical Tri-stimulus Colorimeter or Klein K-10 Tri-stimulus CIE Colorimeter, Sencore or Extron Video Generator and the latest version of ColorPro by CalMan software or pre-approved equal.
2. The projector or display shall have a minimum burn-in time of 96 hours prior to calibration.
3. The projector or display shall have a minimum warmup time of 20 minutes before calibration begins. All efforts shall be taken to allow the display to warm up for a minimum of 60 minutes to allow the luminance to fully stabilize.
4. The space shall be as dark as possible. The colorimeter's ambient light sensor filter shall be recalibrated every 30 minutes when outside ambient light is present to account for the changes in daylight levels.
5. All inputs utilized on the projector or display shall be calibrated using the appropriate video signal, aspect ratio and resolution. Submit results for each input as a separate report.
6. The projector or display shall be calibrated to the Rec. 709 HDTV color standard. White balance shall be calibrated as close as possible to the D65 point for both high IRE and low IRE levels.
7. The projector or display shall have its 3D Color Management calibrated.
8. The projector or display shall have its brightness and contrast adjusted both before and after the gamma is calibrated.
9. Gamma shall be calibrated to an average of 2.2. Gamma shall be verified after the calibration is completed and readjusted as necessary.
10. The projector or display shall have its hue/tint and color/saturation calibrated with a blue lens filter.
11. For calibrating 3D projectors and displays, the matching 3D glasses shall be secured to the front of the Colorimeter "looking" through the glasses for the 3D mode calibration only.
12. Record the full on/full off contrast ratio both before and after calibration. Provide these results in the final documentation.
13. The Contractor shall submit the final calibration results to the Architect/Engineer for approval and include the approved results in final documentation submitted to the Owner.
14. Calibration by eye is not acceptable.
15. Any setting that cannot be calibrated because the projector or display lacks the functions shall be noted in the final documentation.
16. For video wall applications, or where multiple projectors or displays that will share content are being used within a single space, all displays after calibration shall be adjusted to match the lowest performing projector or display so all projectors or displays are uniform. If a projector or display differs greatly from the other displays, that projector or display shall be replaced at no cost to the Owner and recalibrated.

3.5 AUDIO SYSTEM TESTING AND CALIBRATION:

A. This Contractor shall field adjust any surface-mounted or flown loudspeaker orientation to achieve the necessary coverage pattern to the intended listening plane. Loudspeakers always face listeners and minimize coverage on walls. The contractor shall be familiar with the named and specified nominal coverage angle of all speakers above its crossover point or for speech range, (500-4,000 Hz).

B. All speakers shall be tested for polarity prior to high work and a table of test results shall be included for A/E inspection. All loudspeakers shall be connected with uniform polarity, where a positive pressure pulse at the input corresponds to a positive driver excursion, and all drivers are uniform always moving in the same direction. Main speakers shall not be lifted or hoisted into high access areas without polarity testing.

C. The Contractor shall make incremental adjustments on the equipment output and input tolerances to achieve matching signal levels while preserving +10 dB minimum headroom and also unity gain. Insert all broadband or high pass filters first for system protection after review of manufacturers specifications for power and bandpass.

D. Provide high quality media with full bandpass program material for critical listening. MP3 or streaming audio is not acceptable. Testing shall illustrate WAV file quality playback for impact and clarity.

E. The Contractor shall provide graphic plots of the reference ambient noise for each space at the time of the calibration and submit with the calibration results. Test signal shall be 10dB minimum above ambient noise levels during testing.

F. The Contractor shall use a listener sitting height of four (4) feet ± 1" for rooms where the primary function will be sitting. The Contractor shall use a listener standing height of five feet three inches (5.25') ± 1" for rooms where the primary function will be standing

3.6 ASSISTED LISTENING SYSTEM (ALS) PERFORMANCE REQUIREMENTS

A. The Contractor shall verify that the ALS system(s) meets the following minimum performance requirements at the earphone or headset:

1. Reach a minimum total SPL of 75 dBA and no greater than 95 dBA, with a minimum of a 50dB dynamic range volume control.
2. Achieve a minimum signal-to-noise (S/N) ratio of 18dB. It is recommended to achieve a minimum signal-to-noise (S/N) ratio of 25dB to accommodate children.
3. Ensure the peak clipping levels do not exceed 18dB down from the peak input signal level.

B. FM-based systems shall operate within the FCC-reserved assisted listening frequencies of 72 to 76 MHz or the 216 to 217 MHz (preferred) range and comply with the FCC transmitter power requirements.

3.7 DSP-BASED AUDIO PROCESSOR PROGRAMMING

A. Full system programming shall be provided for the system. Programming shall be performed by a factory trained and certified programmer or an employee of the equipment manufacturer.

B. DSP pathfile with initial settings shall be provided by the Contractor for review by the Architect/Engineer before installation.

C. The IP-based audio (IEEE AVB, Dante, etc.) and components shall be on a dedicated Virtual LAN (VLAN) for the A/V systems. These components shall be on a dedicated subnetwork of the VLAN. The Contractor shall coordinate these requirements with the Owner prior to installation.

D. A parametric EQ shall be provided after each crossover point or as approved in the DSP pathfile during shop submittal review. These shall be utilized to set the speaker output as defined in the Audio System Calibration section within this specification. These equalizers should not be made available to the user to adjust.

E. Levelers, compressor/limiters, duckers, gates and delays shall be preset during testing and commissioning and are not available for user adjustment following commissioning.

1. Adjust delays for time of flight plus 8 to 10 ms, typical.

F. Provide each microphone input with high-pass filter, 5-band parametric EQ, auto-leveler and volume module. Provide line level inputs with high-pass filter, 3-band parametric EQ, compressor/limiter, and volume module.

G. Acoustic Echo Cancelation (AEC) shall be provided for each conference microphone input.

H. A broadband pink noise generator shall be provided with a selectable on/off control button within the DSP pathfile. The noise shall be routable through all processing EQs and speaker outputs during testing.

I. Provide volume meters with labeling for each input and each output.

J. The Contractor shall utilize the latest version of the programming software.

K. The Contractor shall ensure that all components are updated to the latest firmware at the completion of the project.

3.8 DSP-BASED AUDIO PROCESSOR CONTROL SOFTWARE PROGRAMMING

A. Full system software programming shall be provided for the system. Programming shall be performed by a factory-trained and certified programmer or an employee of the equipment manufacturer.

B. The Contractor shall schedule a series of meetings with the Owner and Architect/Engineer to define and determine the exact page layout requirements prior to the final configuration of the audio system. An Owner sign-off of the final layouts shall be required.

C. The Contractor shall use the latest version of the software.

D. At a minimum, there shall be password-protected pages for zone combining, input/output volume control with meters, speaker output volume control with meters, signal routing, signal processing (EQ's, feedback suppression, etc.), and supervision/maintenance for all spaces and combined zones.

3.9 MULTIMEDIA CONTROL SYSTEM INTEGRATION AND PROGRAMMING

A. Programming and Integration for Control Systems:

1. Full system programming shall be provided for the system. Programming shall be performed by a factory trained and certified programmer or an employee of the equipment manufacturer.
2. The Contractor shall schedule a series of meetings with the Owner and Architect/Engineer to define and determine the exact integration requirements of the control system prior to the installation of the control system and components. An Owner sign-off of the final configuration shall be required.
3. This section only defines the minimum requirements. The programmer shall provide complete programming for a fully functional system.
4. The Contractor shall utilize the latest version of the programming software.
5. The Contractor shall ensure that all components are updated to the latest firmware at the completion of the project.
6. The IP-based control system and controlled components shall be on a dedicated Virtual LAN (VLAN) for the A/V systems. These components shall be on a dedicated subnetwork of the VLAN. The Contractor shall coordinate these requirements with the Owner prior to installation.
7. Integration and programming of the following pieces of equipment shall be provided, with the following minimum features and functions:

    a. All equipment shall include on/off control, except for equipment that must remain active for system functionality.

b. Integration of HDCP (High-bandwidth Digital Content Protection) and DPCP (Display Port Content Protection) protected content and sources:

1) No protected sources or content shall be allowed to be selected to route through non-protected devices and displays. A warning shall be displayed stating this information to the user.

c. Audio Conference Integration:

1) Refer to DSP Audio Processor Integration for requirements.

d. Display Integration:

1) The displays shall be integrated into the A/V control system via bi-directional RS-232 or Ethernet control. Provide with the following minimum functions:

a) On/off control.
b) Display status feedback.
c) Source switching control.
d) Audio volume control with mute.
e) Video mute.

e. Pan/Tilt/Zoom (PTZ) Camera Integration:

1) The Contractor shall provide Ethernet control system connections and programming with the following minimum functions:

a) Provide full pan, tilt and zoom control from Owner's production suite.
b) Provide presets for fixed camera positions, contractor shall coordinate with the Owner for desired preset positions.

B. Programming and Configuration for Touch Panels:

1. This section only defines the minimum requirements. The programmer shall provide complete touch panel layouts and programming for a fully functional system.
2. The Contractor shall schedule a series of meetings with the Owner and Architect/Engineer to define and determine the exact touch panel layout requirements prior to the purchase and installation of the touch panels. An Owner sign-off of the final layouts shall be required.

a. Vendor shall work with City of Madison IT Media Team to ensure that user interfaces on touch panels are similar in function and appearance to those of other City of Madison facilities.

3. Contractor logos are not allowed on the touch panels. The Contractor shall coordinate with the Owner on desired logos to be displayed.
4. All programming for interface and control of all devices shown on the drawings shall be provided. Programming shall be provided for the following minimum functionality:

a. The main screen shall include graphical buttons for the primary room functions.

1) Upon selection of the graphical button, all the required functions shall be displayed on the screen. All required equipment shall turn on.

b. Master System On/Off Control:

1) When the master system off button is selected, all capable components within the system shall be turned off or placed on standby, except for equipment that is required to remain on for the system to function like the control system processor.

c. The main screen shall include graphical buttons for the selection of individual source selections.

1) Upon selection of the graphical button for a source selection, all functional controls for the pieces of equipment, as well as all status indicators, shall be provided in graphical format on the screen.
2) Rooms with multiple independent outputs and displays shall have a source routing matrix to allow any input to be routed to any output.

d. At all times, on all screens, a button shall be provided to return to the main screen, except for modal pop-ups.
e. A master volume control and mute shall be provided at all times on all screens, except for modal pop-ups.
f. A master video mute shall be provided at all times on all screens, except for modal pop-ups and audio-only functions.
g. A modal countdown timer shall be displayed showing the warmup and cooldown time of the projector. All functions shall be locked out while the projector is in cooldown mode.
h. All unused hard buttons shall not be labeled. A blank touch panel bezel shall be provided if no hard buttons are used.

C. Touch Panel Layout Principles, Considerations and Guidelines:

1. Icons and Buttons:

a. Icons shall not be used solely as a button but can be embedded in a button.
b. Icons shall appear to be flat and unpressable.
c. Status bars or text windows for time, date, room number, and similar information shall appear to be slightly depressed into the screen and appear to be unpressable.
d. Buttons shall appear to be pressable by appearing to come off the screen with beveled edges, lighting gradients, and shadows. When pressed, the button shall appear to be depressed into the screen.

1) Buttons that are momentary shall change color when pressed, appear to depress, then pop back up and revert to the original button color and state.
2) Buttons that are not momentary shall change color when pressed, appear to depress, remain depressed, then pop back up, and revert to the original button color and state when pressed again.

e. Buttons and icons shall appear to be lit from the top left corner of the screen.
f. Buttons shall be grouped together according to general function.
g. Button size shall be based on the ratio of Phi (1:1.618) and be sized appropriately based on the screen area and dpi (pixel pitch).
h. Maintain a minimum of 5 to 10 pixels between buttons on small to medium touch panels, and a minimum of 10 to 15 pixels between buttons on medium to large touch panels.
i. Telephone dialer keypads shall be based on the ITU-T E.161/ANSI TI-703 standard telephone layout and include the a-z letters below each appropriate number.
j. TV and radio tuner keypads shall be based on the ITU-T E.161/ANSI TI-703 standard telephone layout, except for the asterisk (*) being replaced by a dot (.) and the pound (#) being replaced with Enter.
k. IP-address keypads shall be based on the standard computer keyboard 10-key numeric keypad typically found on the right side of the keyboard.
l. Buttons such as Power, Play, Stop, Record, Rewind, Previous, Forward, Eject, Return, Next, Up, Down, Left, Right, Plus, Minus, etc. shall use standard industry symbols. Record shall always be a solid red circle.

2. Text and Fonts:

a. The Contractor shall use a standard sans-serif bold Arial or Calibri font style unless the Owner dictates otherwise.

b. Words shall have the first letter capitalized and the rest of the word lower case. No words shall be all capitals or all lower case. Follow standard grammatically correct sentence structure where the first word is capitalized and the rest of the sentence is lower case, followed by the appropriate punctuation mark with accurate syntax and correct verbs.
c. All font size in a single group or cluster shall maintain the same font size. Headers to a group or cluster shall have a slightly enlarged font size. and footers shall have a slightly smaller font size in comparison to the group font size to maintain a visual hierarchy.

3. Color Considerations:

a. Colors shall be selected so that, when converted to monochrome, all text, buttons, icons, groups, clusters, borders, etc. are clearly visible to accommodate all color blind or color-impaired individuals and ADA requirements.
b. Background colors shall be cool low saturation colors such as grey, blue, or green and their analogous colors, and be a gradient from top down or top left to bottom right.
c. Base colors shall be analogous to the background color but be of a higher saturation to stand out more clearly.
d. Button colors shall be analogous to the background color, stand out clearly from the base colors, and be of a higher saturation cool color, gray, or a low saturation black.
e. Icon, symbols, and text color shall be a neutral white or black, or a low saturation grey, and shall clearly stand out from the background or button it is placed on.
f. Buttons for modal acknowledgement, exit or return, or other modal action shall be a warm color such as red or yellow and their analogous colors.
g. Buttons, icons, symbols or text for emergency or urgent notifications shall be bright red.

4. Pages and Background:

a. Groups and clusters shall have clearly defined borders, with spacing between adjacent groups.
b. Modal pop-up windows or pages shall be required when a command requires user input before it is executed or when a button has multiple nested elements to control, such as microphone volumes, zone control, lighting and environment control, advanced system controls, etc.

1) The modal pop-up pages shall dim and grey out the background and buttons, overlay the main page, and have a clear back or exit button to bring the user back into the active page the user was on before the modal pop-up.
2) A model pop-up timer page shall appear when a projector is being turned on or off for the appropriate warmup or cooldown time. No additional commands shall be allowed during this time.
3) Model pop-ups shall not replace or completely overlay the background.

c. Images or pictures shall never be used as backgrounds to any page other than a master start page, if appropriate.

5. Touch Panel Layout Guideline Template:

a. IMAGEClient Logo - Static Window
b. A/V Source Selection - Static Window
c. Display Power, Screen Controls, Light Controls, Shade Controls, and other Environmental Controls - Static Window
d. Controls for Selected Source and Status or Home Page - Dynamic Window
e. Master Volume and Mute, Video Mute, and Microphone Volume - Static Window
f. Home Button - Static Window
g. Date, Time, and Room Number - Static Window
h. Master System Off - Static Window

3.10 FIELD QUALITY CONTROL

A. Where these specifications require a product or assembly without the use of a brand or trade name, provide a product that meets the requirements of the specifications, as supplied and warranted by the system vendor. If the product or assembly is not available from the system vendor, provide product or assembly as recommended by the system vendor.

B. Periodic observations will be performed during construction to verify compliance with the requirements of the specifications. These services do not relieve the Contractor of responsibility for compliance with the Contract Documents.

3.11 FIELD SERVICES

A. The installer shall conduct a planning meeting with the Owner. The purpose of this meeting shall be to determine all equipment settings that are considered preferences (where proper system operation does not depend on the setting).

B. The installer shall include labor for all planning and all programming activities required to implement the Owner's preferences for equipment settings.

C. It shall be the responsibility of the Contractor/installer to provide a complete, functional system as described by the design documents. These responsibilities include:

1. Complete hardware setup, installation and wiring and software configuration.
2. Complete programming of software in accordance with the Owner's desires determined by the planning meeting.
3. Complete system diagnostic verification.
4. Complete system commissioning.

3.12 SYSTEM ACCEPTANCE

A. The Contractor shall submit for review a formal acceptance and system checkout procedure. The system checkout procedures shall include all system components and software. The Contractor shall perform the tests and settings and document all results.

3.13 SYSTEM DOCUMENTATION

A. Complete documentation shall be provided for the system. The documentation shall describe:

1. All operational parameters of the system.
2. Complete documentation of programming and features.
3. Complete operating instructions for all hardware and software.

B. The following sections shall be provided in the system documentation:

1. User Manual: A step-by-step guide and instructions detailing all system user functions.
2. Technical Manual: A comprehensive document providing all system operations, troubleshooting flowcharts, functional system layout, wiring diagrams, block diagrams and schematic diagrams.
3. Maintenance Manual: A comprehensive document on all aspects of physical maintenance of the systems, including cleaning of the displays, bulb changes, filter cleaning, filter changing and UPS maintenance.

3.14 SYSTEM TRAINING

A. All labor and materials required for on-site system training shall be provided. Training shall be conducted at the project site using the project equipment.

1. Provide two week's advanced notice of training to the Owner and Architect/Engineer.

2. The Architect/Engineer shall be presented with the option to attend the training.
3. Provide a training outline agenda describing the subject matter and the recommended audience for each topic.

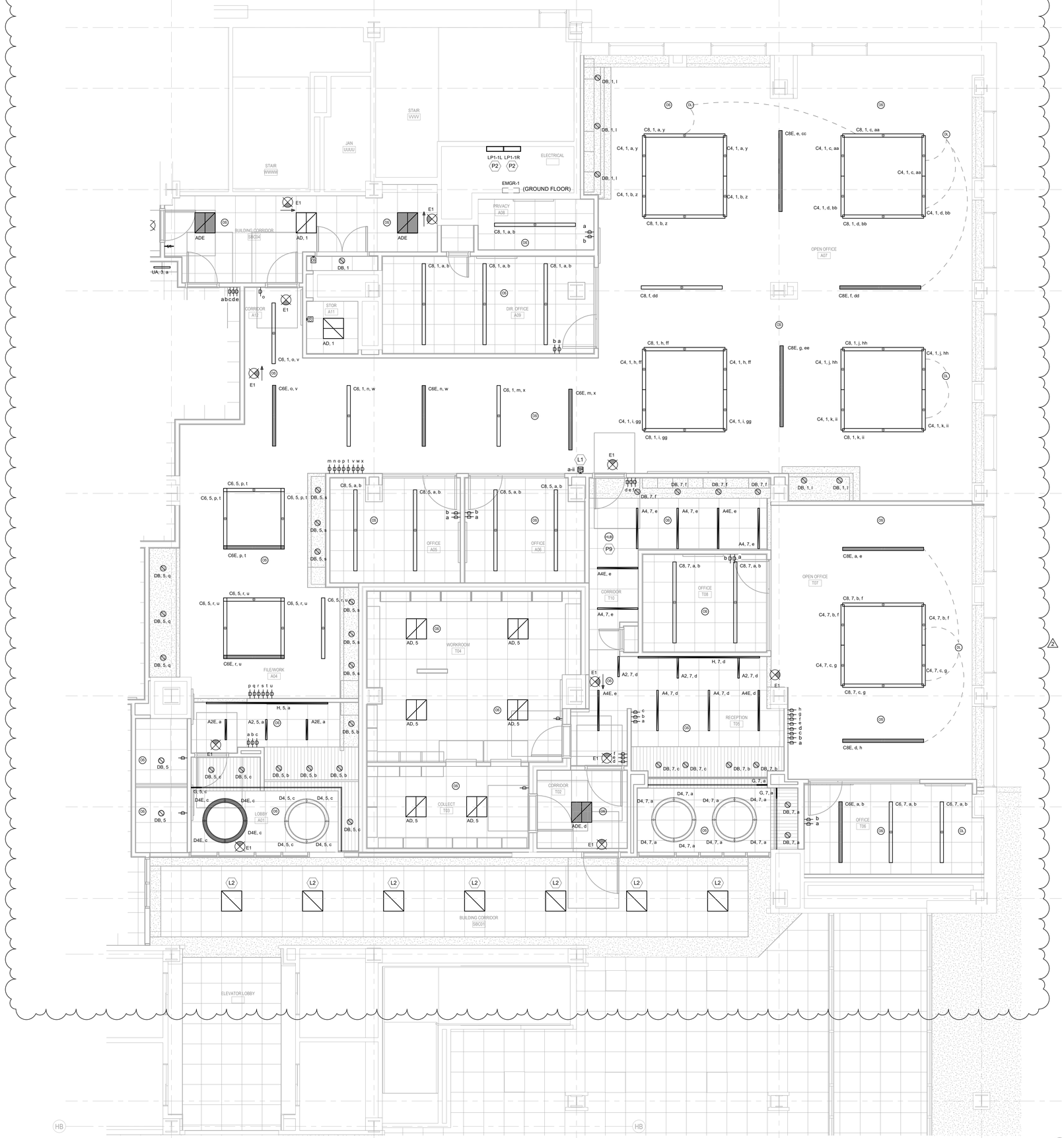
B. At a minimum, the following training shall be conducted:

1. User Manual: A course detailing the system functions and operations that a daily user will encounter.
2. Technical User: Provide configuration training on all aspects of the system(s), including equipment and software.
3. Maintenance User: Provide training on all aspects of physical maintenance of the systems, including cleaning of the displays, bulb changes, filter cleaning and filter changing.

C. Minimum on-site training times shall be:

1. User Manual: One (1) day.
2. Technical user: One (1) day.
3. Maintenance user: Four (4) hours.
4. The Contractor shall include in his/her bid one (1) additional day of training each quarter for the 12-month period of the project warranty. The Contractor shall return to the site for additional follow-up training during this period.

END OF SECTION 274100



2 E201N ENLARGED PLAN - LEVEL 01 - TREASURER AND ASSESSOR - LIGHTING

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

TRUE NORTH

LIGHTING GENERAL NOTES

- REFER TO SHEET E000 FOR ALL SYMBOLS, ABBREVIATIONS, AND DETAILS.
- REFER TO ARCHITECTURAL PLANS, SECTIONS, ELEVATIONS, AND REFLECTED CEILING PLANS FOR EXACT LOCATION AND COORDINATION OF ALL LIGHT FIXTURE AND CONTROLLER INSTALLATIONS.
- VERIFY ALL MOUNTING HEIGHTS OF DEVICES ABOVE MILLWORK WITH ARCHITECTURAL PLANS.
- WIRING SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) AND APPLICABLE LOCAL CODES, INCLUDING PROVISION OF EQUIPMENT GROUNDING AS REQUIRED BY THE NEC.
- VACANCY/OCCUPANCY SENSOR LOCATIONS SHOWN ARE DIAGRAMMATIC ONLY. ACTUAL LOCATION TO BE DETERMINED IN FIELD PER MANUFACTURER'S RECOMMENDATIONS AND LAYOUT. PROVIDE A MINIMUM 4'-0" OF LEX CONDUIT/WIRING SO THAT THE SENSOR CAN BE FIELD ADJUSTED FOR PROPER COVERAGE DURING FINAL COMMISSIONING. THE TRAINED FACTORY PERSONNEL SHALL PERFORM THE FINAL COMMISSIONING.
- POWER CONDUCTORS SHALL BE SIZED PER THE NEC AMPACITY TABLES (ARTICLE 310), INCLUDING ADJUSTMENT FACTOR AND NEUTRAL CONDUCTOR REQUIREMENTS (FEED AND BRANCH NEUTRAL CONDUCTORS MUST BE COUNTED AS CURRENT CARRYING CONDUCTORS). RUN SEPARATE NEUTRAL CONDUCTORS FOR ALL LIGHTING CIRCUITS.
- EXIT SIGNAGE IS INDICATED ON THE PLANS BASED ON ANTICIPATED EGRESS PATHS THROUGHOUT THE BUILDING. ELECTRICAL CONTRACTOR SHALL CONFIRM ALL EGRESS PATHS WITH ARCHITECT/OWNER/GENERAL CONTRACTOR DURING CONSTRUCTION AND SHALL ADD/MODIFY EXIT SIGNAGE AS REQUIRED TO COMPLY WITH PATHWAYS.
- CONNECT ANY/ALL NEW EMERGENCY & EXIT LIGHTING SHOWN (SHADED) TO EXISTING EMERGENCY LIGHTING CIRCUIT(S) ON THE FLOOR, FED FROM PANEL EMRG-1 ON THE GROUND FLOOR.
- CIRCUIT NUMBERING IS FOR GROUPING PURPOSES ONLY. COORDINATE EXACT CIRCUITS AVAILABLE UPON COMPLETION OF DEMOLITION.
- ALL LIGHT FIXTURES SHALL BE PROVIDED WITH QUICK-CONNECT DISCONNECTING MEANS AND A 6'0" (MAXIMUM) FIXTURE WHIP FOR FUTURE MAINTENANCE PURPOSES.
- LIGHT FIXTURES AND OTHER APPARATUS SUPPORTED BY THE ACOUSTICAL CEILING GRID MUST MEET THE REQUIREMENTS OF NEC SECTION 410.16, MEANS OF SUPPORT.

LIGHTING CONTROL NOTES

- ALL LIGHTING CONTROLS SHALL BE LUTRON VIVE SYSTEM DEVICES. PROVIDE CONTROL DEVICES, LOAD CONTROLLERS, HUBS, RELAY MODULES, SOFTWARE, ETC. AS REQUIRED TO ACHIEVE THE CONTROLS SHOWN AND TIMECLOCK SCHEDULING, ENERGY/SYSTEM MONITORING, DEMAND RESPONSE LOAD SHED, AND INTEGRATION THROUGH THE BAS. NEW VIVE SYSTEM COMPONENTS SHALL ALSO BE CAPABLE OF CONNECTING TO ANY/ALL EXISTING LUTRON VIVE SYSTEMS WITHIN THE EXISTING BUILDING. COORDINATE ALL REQUIREMENTS WITH ENGINEERED REPRESENTATION, INC. (ERI).

KEYED NOTES

(KEYED NOTES REFER TO PROJECT NUMBERING SYSTEM)

L1 PROVIDE EXTRON TOUCHPANEL TO PROVIDE CONTROL FOR DIMMING ZONES "a" THRU "i" AS INDICATED ON THE PLANS.

L2 INSTALL EXISTING LIGHT FIXTURES SALVAGED IN DEMOLITION PHASE. EXTEND EXISTING CONDUCTORS TO NEW FIXTURE LOCATIONS.

P2 NEW 280Y/120V, 3-PHASE, 4-WIRE, 200A, 84-CIRCUIT DOUBLE TUB PANELBOARD, "LP1-1". NEW PANEL SHALL BE USED TO FEED CIRCUITS AS SHOWN ON E200 SERIES SHEETS. REFER TO E600 FOR MORE INFORMATION.

P9 PROVIDE 120V/1P CONNECTION TO LUTRON VIVE WIRELESS HUB. PROVIDE CAT6 CABLING FROM HUB TO I.T. RACK "TR-2" LOCATED IN ROOM "IT CLOSET" SIT03. COORDINATE ALL REQUIREMENTS WITH LOW VOLTAGE CONTRACTOR.

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 180
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

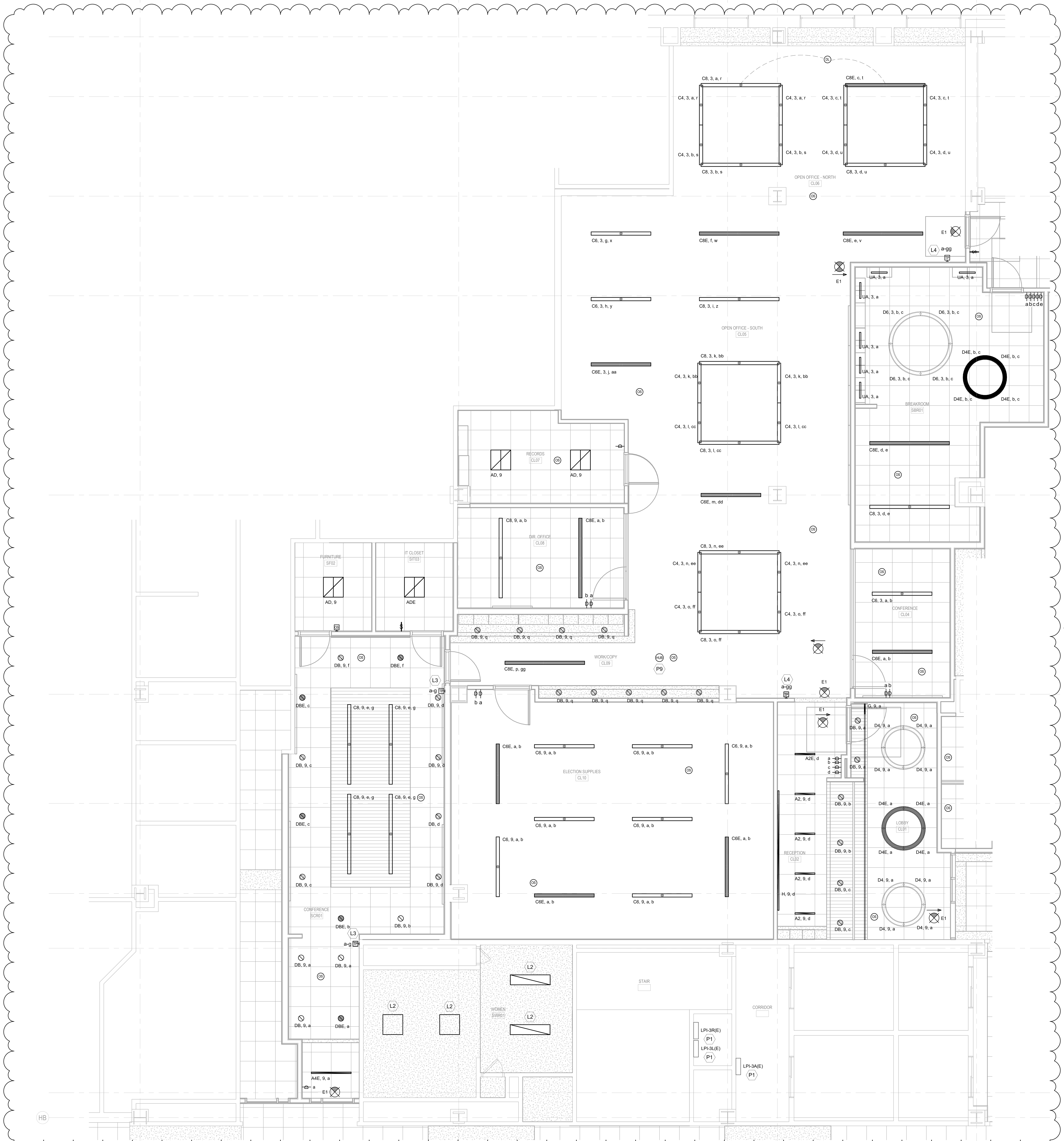
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9026

SHEET TITLE:
ENLARGED PLAN - LEVEL 01 - TREASURER AND ASSESSOR - LIGHTING

REVISIONS:
2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/22
SHEET NUMBER	E201N



1
E202N
ENLARGED PLAN - LEVEL 01- CLERK, SHARED BREAK AND CONFERENCE ROOMS - LIGHTING
SCALE: 1/4" = 1'-0"

TRUE NORTH

LIGHTING GENERAL NOTES

- REFER TO SHEET E000 FOR ALL SYMBOLS, ABBREVIATIONS, AND DETAILS.
- REFER TO ARCHITECTURAL PLANS, SECTIONS, ELEVATIONS, AND REFLECTED CEILING PLANS FOR EXACT LOCATION AND COORDINATION OF ALL LIGHT FIXTURE AND CONTROLLER INSTALLATIONS.
- VERIFY ALL MOUNTING HEIGHTS OF DEVICES ABOVE MILLWORK WITH ARCHITECTURAL PLANS.
- WIRING SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) AND APPLICABLE LOCAL CODES, INCLUDING PROVISION OF EQUIPMENT GROUNDING AS REQUIRED BY THE NEC.
- VACANCY/OCCUPANCY SENSOR LOCATIONS SHOWN ARE DIAGRAMMATIC ONLY. ACTUAL LOCATION TO BE DETERMINED IN FIELD PER MANUFACTURER'S RECOMMENDATIONS AND LAYOUT. PROVIDE A MINIMUM 4'-0" OF LEX CONDUIT/WIRING SO THAT THE SENSOR CAN BE FIELD ADJUSTED FOR PROPER COVERAGE DURING FINAL COMMISSIONING. THE TRAINED FACTORY PERSONNEL SHALL PERFORM THE FINAL COMMISSIONING.
- POWER CONDUCTORS SHALL BE SIZED PER THE NEC AMPACITY TABLES (ARTICLE 310), INCLUDING ADJUSTMENT FACTOR AND NEUTRAL CONDUCTOR REQUIREMENTS (FEED AND BRANCH NEUTRAL CONDUCTORS MUST BE COUNTED AS CURRENT CARRYING CONDUCTORS). RUN SEPARATE NEUTRAL CONDUCTORS FOR ALL LIGHTING CIRCUITS.
- EXIT SIGNAGE IS INDICATED ON THE PLANS BASED ON ANTICIPATED EGRESS PATHS THROUGHOUT THE BUILDING. ELECTRICAL CONTRACTOR SHALL CONFIRM ALL EGRESS PATHS WITH ARCHITECT/OWNER/GENERAL CONTRACTOR DURING CONSTRUCTION AND SHALL ADD/MODIFY EXIT SIGNAGE AS REQUIRED TO COMPLY WITH PATHWAYS.
- CONNECT ANY/ALL NEW EMERGENCY & EXIT LIGHTING SHOWN (SHADED) TO EXISTING EMERGENCY LIGHTING CIRCUIT(S) ON THE FLOOR, FED FROM PANEL EMRG-1 ON THE GROUND FLOOR.
- CIRCUIT NUMBERING IS FOR GROUPING PURPOSES ONLY. COORDINATE EXACT CIRCUITS AVAILABLE UPON COMPLETION OF DEMOLITION.
- ALL LIGHT FIXTURES SHALL BE PROVIDED WITH QUICK-CONNECT DISCONNECTING MEANS AND A 6'0" (MAXIMUM) FIXTURE WHIP FOR FUTURE MAINTENANCE PURPOSES.
- LIGHT FIXTURES AND OTHER APPARATUS SUPPORTED BY THE ACOUSTICAL CEILING GRID MUST MEET THE REQUIREMENTS OF NEC SECTION 410.16, MEANS OF SUPPORT.

LIGHTING CONTROL NOTES

- ALL LIGHTING CONTROLS SHALL BE LUTRON VIVE SYSTEM DEVICES. PROVIDE CONTROL DEVICES, LOAD CONTROLLERS, HUBS, RELAY MODULES, SOFTWARE, ETC. AS REQUIRED TO ACHIEVE THE CONTROLS SHOWN AND TIMECLOCK SCHEDULING, ENERGY/SYSTEM MONITORING, DEMAND RESPONSE LOAD SHED, AND INTEGRATION THROUGH THE BAS. NEW VIVE SYSTEM COMPONENTS SHALL ALSO BE CAPABLE OF CONNECTING TO ANY/ALL EXISTING LUTRON VIVE SYSTEMS WITHIN THE EXISTING BUILDING. COORDINATE ALL REQUIREMENTS WITH ENGINEERED REPRESENTATION, INC. (ERI).

KEYED NOTES

(KEYED NOTES REFER TO PROJECT NUMBERING SYSTEM)

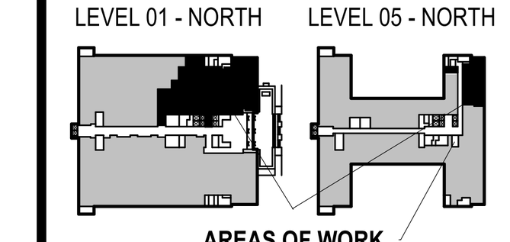
L2 INSTALL EXISTING LIGHT FIXTURES SALVAGED IN DEMOLITION PHASE, EXTEND EXISTING CONDUCTORS TO NEW FIXTURE LOCATIONS.
L3 PROVIDE EXTRON TOUCHPANEL TO PROVIDE CONTROL FOR DIMMING ZONES "a" THRU "g" AS INDICATED ON THE PLANS.
L4 PROVIDE EXTRON TOUCHPANEL TO PROVIDE CONTROL FOR DIMMING ZONES "a" THRU "gg" AS INDICATED ON THE PLANS.
P1 EXISTING 208Y/120V 3P, 4-WIRE DISTRIBUTION TO REMAIN. FEED NEW CIRCUITS FROM EXISTING PANELS AS REQUIRED.
P9 PROVIDE 120V/1P CONNECTION TO LUTRON VIVE WIRELESS HUB. PROVIDE CAT6 CABLING FROM HUB TO I.T. RACK "TR-2" LOCATED IN ROOM "IT CLOSET" SIT03. COORDINATE ALL REQUIREMENTS WITH LOW VOLTAGE CONTRACTOR.

2

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR
ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046
JDR PROJECT NO: 21.0191



PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

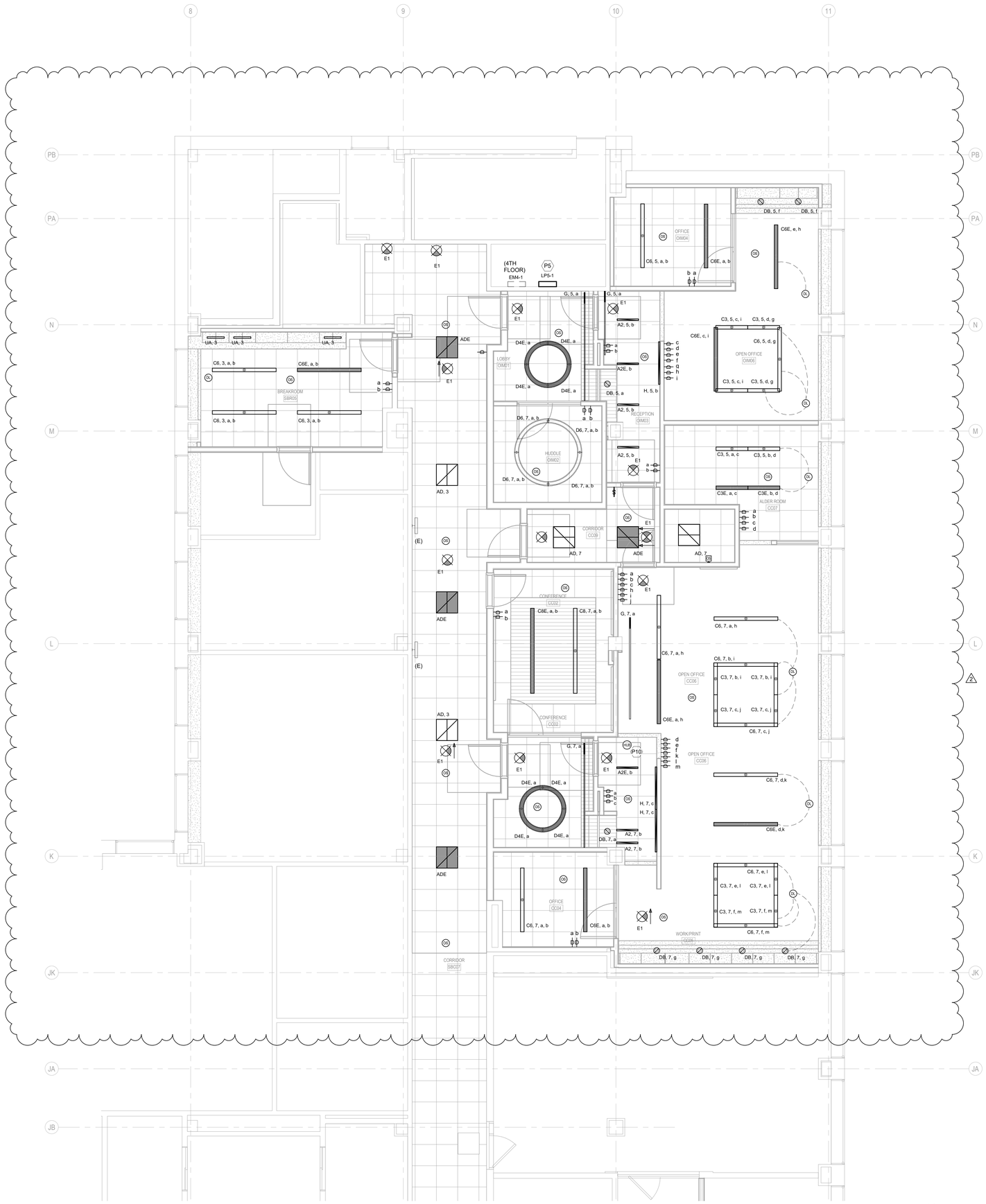
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9226

SHEET TITLE:
ENLARGED PLAN - LEVEL 01- CLERK, SHARED BREAK AND CONFERENCE ROOMS - LIGHTING

REVISIONS:
2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/22
SHEET NUMBER	E202N



LIGHTING GENERAL NOTES

- REFER TO SHEET E000 FOR ALL SYMBOLS, ABBREVIATIONS, AND DETAILS.
- REFER TO ARCHITECTURAL PLANS, SECTIONS, ELEVATIONS, AND REFLECTED CEILING PLANS FOR EXACT LOCATION AND COORDINATION OF ALL LIGHT FIXTURE AND CONTROLLER INSTALLATIONS.
- VERIFY ALL MOUNTING HEIGHTS OF DEVICES ABOVE MILLWORK WITH ARCHITECTURAL PLANS.
- WIRING SHALL CONFORM TO THE NATIONAL ELECTRICAL CODE (NEC) AND APPLICABLE LOCAL CODES, INCLUDING PROVISION OF EQUIPMENT GROUNDING AS REQUIRED BY THE NEC.
- VACANCY/OCCUPANCY SENSOR LOCATIONS SHOWN ARE DIAGRAMMATIC ONLY. ACTUAL LOCATION TO BE DETERMINED IN FIELD PER MANUFACTURER'S RECOMMENDATIONS AND LAYOUT. PROVIDE A MINIMUM 4'-0" OF LEX CONDUIT/WIRING SO THAT THE SENSOR CAN BE FIELD ADJUSTED FOR PROPER COVERAGE DURING FINAL COMMISSIONING. THE TRAINED FACTORY PERSONNEL SHALL PERFORM THE FINAL COMMISSIONING.
- POWER CONDUCTORS SHALL BE SIZED PER THE NEC AMPACITY TABLES (ARTICLE 310), INCLUDING ADJUSTMENT FACTOR AND NEUTRAL CONDUCTOR REQUIREMENTS (FEED AND BRANCH NEUTRAL CONDUCTORS MUST BE COUNTED AS CURRENT CARRYING CONDUCTORS). RUN SEPARATE NEUTRAL CONDUCTORS FOR ALL LIGHTING CIRCUITS.
- EXIT SIGNAGE IS INDICATED ON THE PLANS BASED ON ANTICIPATED EGRESS PATHS THROUGHOUT THE BUILDING. ELECTRICAL CONTRACTOR SHALL CONFIRM ALL EGRESS PATHS WITH ARCHITECT/OWNER/GENERAL CONTRACTOR DURING CONSTRUCTION AND SHALL ADD/MODIFY EXIT SIGNAGE AS REQUIRED TO COMPLY WITH PATHWAYS.
- CONNECT ANY/ALL NEW EMERGENCY & EXIT LIGHTING SHOWN (SHADED) TO EXISTING EMERGENCY LIGHTING CIRCUIT(S) ON THE FLOOR, FED FROM PANEL EM4-1 ON THE 4TH FLOOR.
- CIRCUIT NUMBERING IS FOR GROUPING PURPOSES ONLY. COORDINATE WITH EXISTING LOADS AND FOR PANEL CONNECTIONS.
- ALL LIGHT FIXTURES SHALL BE PROVIDED WITH QUICK-CONNECT DISCONNECTING MEANS AND A 6'0" (MAXIMUM) FIXTURE WHIP FOR FUTURE MAINTENANCE PURPOSES.
- LIGHT FIXTURES AND OTHER APPARATUS SUPPORTED BY THE ACOUSTICAL CEILING GRID MUST MEET THE REQUIREMENTS OF NEC SECTION 410.16, MEANS OF SUPPORT.

LIGHTING CONTROL NOTES

- ALL LIGHTING CONTROLS SHALL BE LUTRON VIVE SYSTEM DEVICES. PROVIDE CONTROL DEVICES, LOAD CONTROLLERS, HUBS, RELAY MODULES, SOFTWARE, ETC. AS REQUIRED TO ACHIEVE THE CONTROLS SHOWN AND TIMECLOCK SCHEDULING, ENERGYSYSTEM MONITORING, DEMAND RESPONSE LOAD SHED, AND INTEGRATION THROUGH THE BAS. NEW VIVE SYSTEM COMPONENTS SHALL ALSO BE CAPABLE OF CONNECTING TO ANY/ALL EXISTING LUTRON VIVE SYSTEMS WITHIN THE EXISTING BUILDING. COORDINATE ALL REQUIREMENTS WITH ENGINEERED REPRESENTATION, INC. (ERI).

KEYED NOTES

(KEYED NOTES REFER TO PROJECT NUMBERING SYSTEM)

P5 NEW 280Y/120V, 3-PHASE, 4-WIRE, 200A, 84-CIRCUIT PANELBOARD, "LP5-1". NEW PANEL SHALL BE USED TO FEED CIRCUITS AS SHOWN ON E200 SERIES SHEETS. REFER TO E600 FOR MORE INFORMATION.

P10 PROVIDE 120V/1P CONNECTION TO LUTRON VIVE WIRELESS HUB. PROVIDE CAT6 CABLING FROM HUB TO I.T. RACK "TR-3". REFER TO SHEET T202N FOR RACK LOCATION. COORDINATE ALL REQUIREMENTS WITH LOW VOLTAGE CONTRACTOR.

1 E204N ENLARGED PLAN -LEVEL 05 -COMMON COUNCIL, OIM, SHARED BREAKROOM - LIGHTING
SCALE: 1/4" = 1'-0"

TRUE NORTH

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 180
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9025

SHEET TITLE: ENLARGED PLAN - LEVEL 05 - COMMON COUNCIL, OIM, SHARED BREAKROOM - LIGHTING

REVISIONS:
2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/22
SHEET NUMBER	E204N

LUMINAIRE SCHEDULE

TAG	DESCRIPTION	NORMAL OPERATION LUMENS	NORMAL OPERATION WATTS	EMERGENCY OPERATION LUMENS	EMERGENCY OPERATION WATTS	LAMP TYPE	VOLTAGE	COLOR TEMP (K)	C.R.I. (Min)	MANUFACTURER	MODEL #	NOTES
				0 lm	0 W	LED	120 V					
A2	2' LINEAR LIGHT FIXTURE - RECESSED	786	7 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-R-D-2-S-840-F-96LG-120-SC-FC10%-FE-SW-VRF	
A2E	2' LINEAR LIGHT FIXTURE - RECESSED	786	7 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-R-D-2-S-840-F-96LG-120-SC-FC10%-FE-SW-VRF-LUT-SHUNT-EM	1
A4	4' LINEAR LIGHT FIXTURE - RECESSED	1,572	14 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-R-D-4-S-840-F-96LG-120-SC-FC10%-FE-SW-VRF	
A4E	4' LINEAR LIGHT FIXTURE - RECESSED	1,572	14 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-R-D-4-S-840-F-96LG-120-SC-FC10%-FE-SW-VRF-LUT-SHUNT-EM	1
AD	2x2 LIGHT FIXTURE - RECESSED	4,000	31 W	0 lm	0 W	LED	120 V	4,000	90	GE CURRENT	LVT-22-B-0-40-MM-T40-LU-LT-WHITE	6
ADE	2x2 LIGHT FIXTURE - RECESSED	4,000	31 W	0 lm	0 W	LED	120 V	4,000	90	GE CURRENT	LVT-22-B-0-40-MM-T40-LU-LT-WHITE	1, 6
C3	LINEAR LIGHT FIXTURE - PENDANT	1,665	14 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-3-S-S-840-WSOTG-F-96LG-120-SC-FC-10%-FA50-C1-FE-SW	
C3E	LINEAR LIGHT FIXTURE - PENDANT	1,665	14 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-3-S-S-840-WSOTG-F-96LG-120-SC-FC-10%-FA50-C1-FE-SW-LUT-SHUNT-EM	1
C4	LINEAR LIGHT FIXTURE - PENDANT	4,995	43 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-4-S-S-840-WSOTG-F-96LG-120-SC-FC-10%-FA50-C1-FE-SW	
C4E	LINEAR LIGHT FIXTURE - PENDANT	4,995	43 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-4-S-S-840-WSOTG-F-96LG-120-DC-FC-10%-FA50-FE-SW-VRF-LUT-SHUNT-EM	1
C6	LINEAR LIGHT FIXTURE - PENDANT	4,995	43 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-6-S-S-840-WSOTG-F-96LG-120-DC-FC-10%-FA50-FE-SW-VRF	
C6E	LINEAR LIGHT FIXTURE - PENDANT	4,995	43 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-6-S-S-840-WSOTG-F-96LG-120-DC-FC-10%-FA50-FE-SW-VRF-LUT-SHUNT-EM	1
C8	LINEAR LIGHT FIXTURE - PENDANT	6,661	57 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-8-S-S-840-WSOTG-F-96LG-120-DC-FC-10%-FA50-FE-SW-VRF	
C8E	LINEAR LIGHT FIXTURE - PENDANT	6,661	57 W	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP4-P-ID-8-S-S-840-WSOTG-F-96LG-120-DC-FC-10%-FA50-FE-SW-VRF-LUT-SHUNT-EM	1
D4	PENDANT DIRECT/INDIRECT LED CIRCLE FIXTURE 4' DIAMETER	10,050	42 W	0 lm	0 W	LED	120 V	4,000	80	FORUM	ARCUD-44-46LED40/46LED40-CFA/WOL-C48-CIR-#-UNV-WH-DALI-LVR	
D4E	PENDANT DIRECT/INDIRECT LED CIRCLE FIXTURE 4' DIAMETER	10,050	42 W	0 lm	0 W	LED	120 V	4,000	80	FORUM	ARCUD-44-46LED40/46LED40-CFA/WOL-C48-CIR-#-UNV-WH-DALI-LVR	1
D6	PENDANT DIRECT/INDIRECT LED CIRCLE FIXTURE 6' DIAMETER	15,080	63 W	0 lm	0 W	LED	120 V	4,000	80	FORUM	ARCUD-44-46LED40/46LED40-CFA/WOL-C48-CIR-#-UNV-WH-DALI-LVR	
DB	DOWNLIGHT FIXTURE - RECESSED	2,000	23 W	0 lm	0 W	LED	120 V	4,000	80	INTENSE LIGHTING	SS6G4DR-L3-408-IC630-HZ-SF-LUT-DFCSJ-OEM-RF	5
DBE	DOWNLIGHT FIXTURE - RECESSED	2,000	23 W	0 lm	0 W	LED	120 V	4,000	80	INTENSE LIGHTING	SS6G4DR-L3-408-IC630-HZ-SF-LUT-DFCSJ-OEM-RF	1, 5
E1	EXIT SIGN - CEILING MOUNTED	0	3 W	0 lm	0 W	LED	120 V	0	0	CHLORIDE	44RLU1RM SERIES	1, 2
G	COVE FIXTURE 40" SECTION	481	13 W	0 lm	0 W	LED	120 V	0	0	COLORKINETICS	523-000027-98	3, 4
H	LINEAR LIGHT FIXTURE - RECESSED	326/FT	6.8W/FT	0 lm	0 W	LED	120 V	4,000	80	FINELITE	HP-2 R-D-XX-S-840-96LG-120-SC-LUT-DALI-FE-DFCSJ-OEM-RF	3
UA	20" UNDER CABINET LUMINAIRE	417	5 W	0 lm	0 W	LED	120 V	4,000	97	COLORKINETICS	523-000027-97	4

2

GENERAL NOTES:

- ALL FIXTURES WITH THE SUFFIX "E" ARE INTENDED TO BE EMERGENCY FIXTURES.

NOTES:

1. CONNECT ANY/ALL NEW EMERGENCY & EXIT LIGHTING SHOWN (SHADED) TO EXISTING EMERGENCY LIGHTING CIRCUIT(S) ON THE FLOOR, FED FROM PANEL EMRG-3 ON THE GROUND FLOOR AND EM4-3 ON THE 4TH FLOOR.
2. REFER TO PLANS FOR NUMBER OF FACES, MOUNTING, ETC.
3. REFER TO PLANS FOR OVERALL FIXTURE LENGTH.
4. PROVIDE LUTRON VIVE COMPATIBLE DRIVER AND WIRELESS CONTROLLER.
5. LUTRON ECOSYSTEM DRIVER SHALL BE INCLUDED/PROVIDED IN FIXTURE BY FIXTURE MANUFACTURER.
6. UL924 BYPASS DEVICE SHALL BE INCLUDED/PROVIDED IN FIXTURE BY FIXTURE MANUFACTURER.

2

ELECTRICAL CONNECTION SCHEDULE

TAG	DESCRIPTION	LOCATION NO	LOCATION NAME	LOAD kVA	F.L.A.	M.C.A.	VOLT	PH	CIRCUITING INFORMATION OCP (Amps)	PANEL	CIRCUIT #	NOTES	FOOT NOTES
D-1	CONTROL DAMPER	GR24	MECHANICAL	0	0	0	120	1	20			PROVIDE 120V/1P CONNECTION FROM LOCAL PANEL TO CONTROL DAMPER. COORDINATE ALL REQUIREMENTS WITH H.C.	
D-2	CONTROL DAMPER	432	MECHANICAL	0	1	1	120	1	20			PROVIDE 120V/1P CONNECTION FROM LOCAL PANEL TO CONTROL DAMPER. COORDINATE ALL REQUIREMENTS WITH H.C.	
DO	PUSHBUTTON DOOR OPENER	-	SEE PLANS	0	2	3	120	1	20			COORDINATE ALL REQUIREMENTS WITH ARCHITECT AND OWNER.	
DR-1	DATA RACK RECEPTACLE	SIT03	IT CLOSET	0	0	0	120	1	20	LP1-1L	38	PROVIDE SURFACE MOUNTED RACEWAY MOUNTED TO LADDER RACK. COORIDINATE ALL REQUIREMENTS WITH LOW VOLTAGE CONTRACTOR AND OWNER.	
DSCU-1	DUCTLESS SPLIT AIR CONDITIONER	SIT03	IT CLOSET	2	9	11	208	1	15	LP1-1L	40,42	COORIDATE WITH HVAC CONTRACTOR FOR EXACT LOCATION.	
DSE-1	SPLIT SYSTEM UNIT	SIT03	IT CLOSET	0	0	0	208	1	20	LP1-1L	40,42	POWERED FROM CONDENSING UNIT. E.C. TO WIRE BETWEEN UNITS.	
S-1	HOT WATER DISPENSER		BREAKROOM	1	11	14	120	1	20			PROVIDE GFCI PROTECTED RECEPTACLE AT UNIT.	
SEC-1	SECURITY CONNECTION	SIT03	IT CLOSET	0	0	0	120	1	20	LP1-1R	51	CORRIDNATE ALL REQUIREMENTS WITH LOW VOLTAGE CONTRACTOR.	
TCP-1	TEMPERATURE CONTROL PANEL	SIT03	IT CLOSET	0	0	0	120	1	20	LP1-1R	43	COORDINATE WITH HVAC CONTRACTOR FOR EXACT LOCATION	

ABBREVIATIONS:

EC	ELECTRICAL CONTRACTOR
GC	GENERAL CONTRACTOR
MC	MECHANICAL CONTRACTOR
MF	MANUFACTURER
TC	TEMPERATURE CONTROL
OT	OTHER CONTRACTOR
OWN	OWNER
F.V.	FIELD VERIFY

GENERAL NOTES:

- ALL CONDUCTORS ARE COPPER. ALUMINIUM CONDUCTORS WILL HAVE A NOTATION OF (AL) NEXT TO WIRE SIZE.

FOOT NOTES:

(1)

MOTOR CONNECTION SCHEDULE

TAG	Description	LOCATION NO	LOCATION NAME	LOAD HP	kVA	F.L.A.	M.C.A.	VOLT	PH	CIRCUITING INFORMATION OCP (Amps)	PANEL	CIRCUIT #	NOTES	FOOT NOTES
EF-1	EXHAUST FAN	SBR01	BREAKROOM	0	0	1	1	120	1	15	LP1-1R	45	PROVIDE MOTOR RATED DISCONNECT AT UNIT.	
GD-1	GARBAGE DISPOSAL	SBR01	BREAKROOM	1	2	16	20	120	1	35	LP1-1R	49	PROVIDE GFCI PROTECTED RECEPTACLE AT UNIT.	
GD-1	GARBAGE DISPOSAL	SBR05	BREAKROOM	1	2	16	20	120	1	35	LP5-1	27	PROVIDE GFCI PROTECTED RECEPTACLE AT UNIT.	
TF-1	TRANSFER FAN	A08	PRIVACY	0	0	1	1	120	1	15	LP1-1L	36	PROVIDE MOTOR RATED DISCONNECT AT UNIT.	

ABBREVIATIONS:

EC	ELECTRICAL CONTRACTOR
GC	GENERAL CONTRACTOR
MC	MECHANICAL CONTRACTOR
MF	MANUFACTURER
TC	TEMPERATURE CONTROL
OT	OTHER CONTRACTOR
OWN	OWNER

GENERAL NOTES:

- ALL CONDUCTORS ARE COPPER. ALUMINIUM CONDUCTORS WILL HAVE A NOTATION OF (AL) NEXT TO WIRE SIZE.

FOOT NOTES:

(1)

LIGHTING & RECEPTACLE CONTROLS SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	MODEL #	NOTES
DL	DAYLIGHT SENSOR	LUTRON	VIVE HJS-2-FM	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
	WIRELESS 2-BUTTON SWITCH	LUTRON	PJ2-2B-GWH-L01	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
DL	WIRELESS DAYLIGHT SENSOR	LUTRON	LRF2-DCRB-WH	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
HTP	WIRELESS DIGITAL TOUCH PAD LIGHTING CONTROL	EXTRON	TLP PRO 725M	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
	WIRELESS DIMMER SWITCH	LUTRON	UPJ2-2BRL-GWH-L01	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
HUB	WIRELESS HUB	LUTRON	VIVE HJS-2-FM	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
	WIRELESS OCCUPANCY CONTROLLED RECEPTACLE	LUTRON	CAR2S-20-DTR-WH	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
OS	WIRELESS OCCUPANCY SENSOR - CEILING MOUNTED	LUTRON	LRF2-OCR2B-P-WH	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.
HOS	WIRELESS OCCUPANCY SENSOR - WALL MOUNTED	LUTRON	MRF2S-8SD010-WH	CONNECT DEVICE TO NEW LUTRON VIVE SYSTEM AND PROGRAM TO MEET OWNER AND LEED REQUIREMENTS.

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR
ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

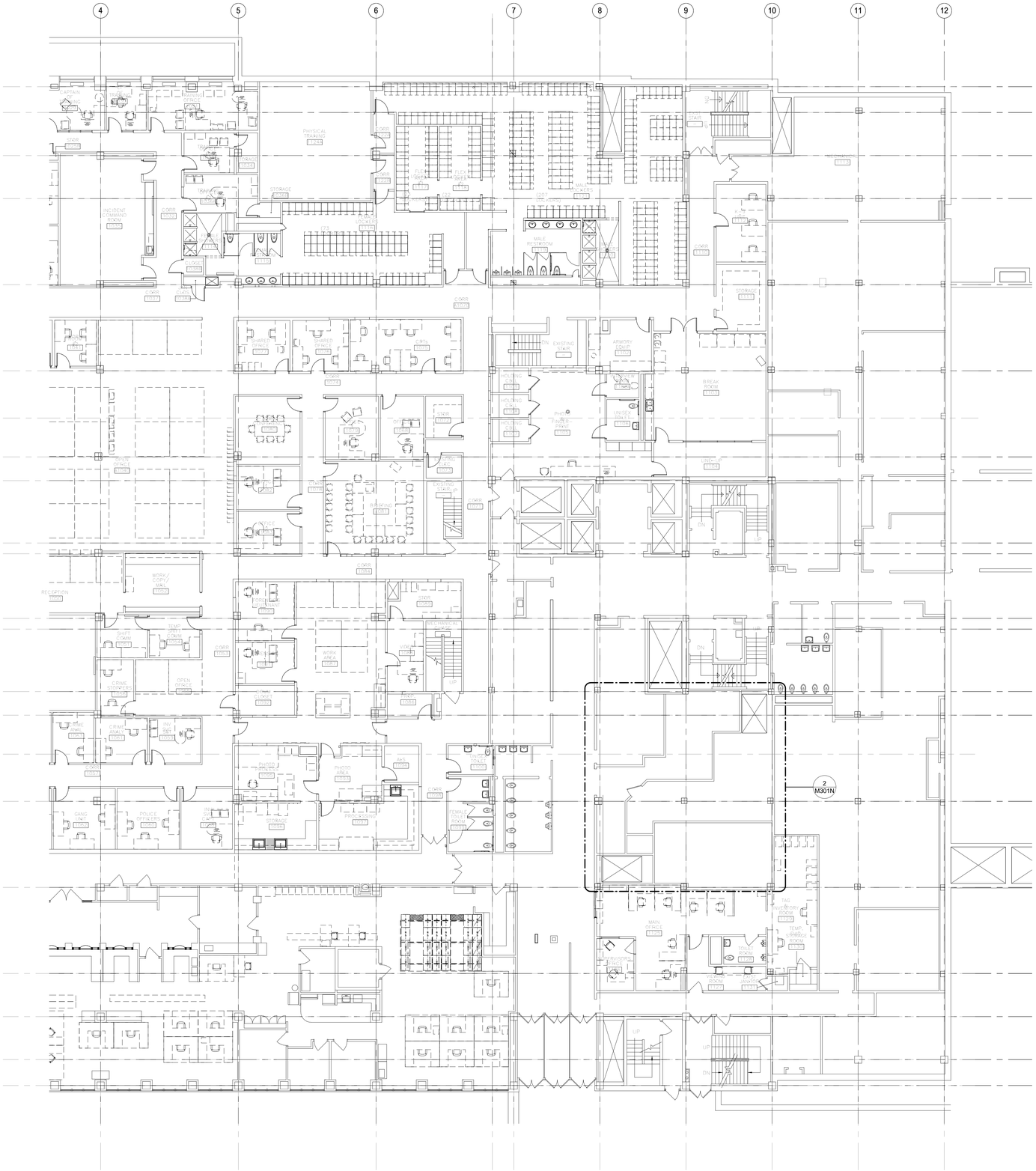
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9226

SHEET TITLE:
SCHEDULES - LIGHTING, DEVICES, AND CONNECTIONS

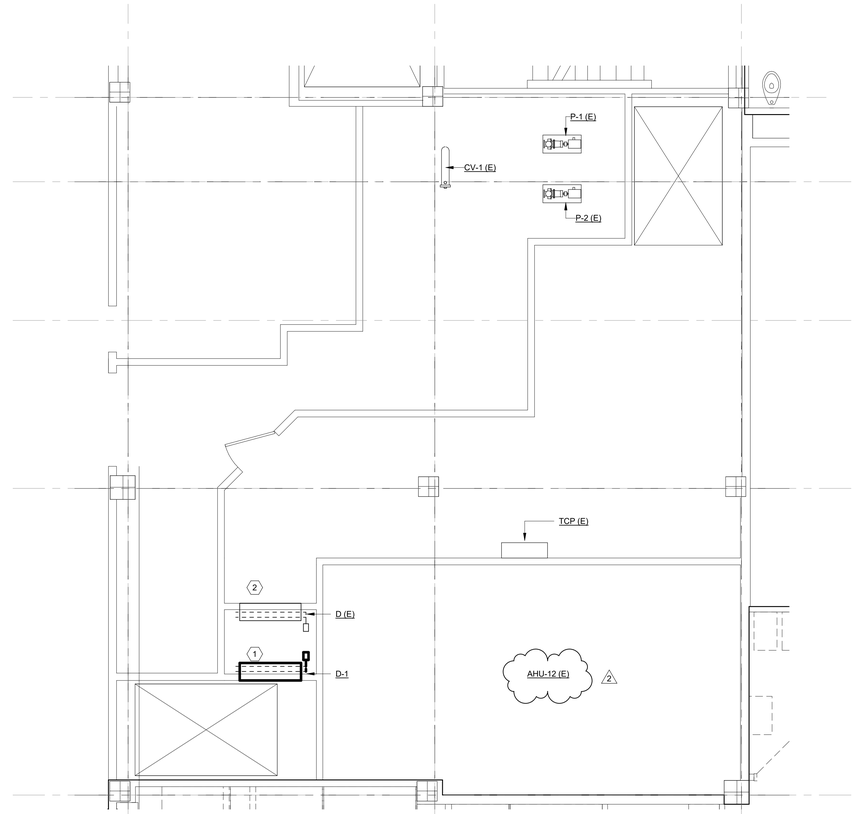
REVISIONS:
2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/22
SHEET NUMBER	E801N



1 M301N NEW WORK PLAN - GROUND FLOOR - HVAC
SCALE: 3/32" = 1'-0"

TRUE NORTH



2 M301N ENLARGED PLAN - GROUND FLOOR MECHANICAL ROOM
SCALE: 1/4" = 1'-0"

TRUE NORTH

GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS BEFORE COMMENCING WORK. REPORT ANY DISCREPANCIES TO THE A/E IMMEDIATELY.
2. THE BUILDING IS TO REMAIN OCCUPIED DURING CONSTRUCTION AND THE AIR HANDLER SERVING THIS AREA WILL CONTINUE TO OPERATE. SUPPLY AND RETURN AIR DUCTWORK SHALL BE PROTECTED FROM THE ENTRANCE OF CONSTRUCTION DUST, DIRT, AND DEBRIS. INSTALL TEMPORARY MERV 7 FILTERS ON RETURN AIR OPENINGS DURING CONSTRUCTION. CHANGE FILTER WEEKLY. SEE ARCHITECTURAL PLANS FOR ANY PHASING SCHEDULES AND/OR AREAS.
3. WHEN PNEUMATIC CONTROLS ARE INDICATED TO BE REMOVED, REMOVE ALL PNEUMATIC CONTROL TUBING BACK TO THE POINT REQUIRED TO BE ACTIVE.
4. PNEUMATIC TUBING LOCATED DIRECTLY IN CONCRETE FLOORS CAN BE ABANDONED IN PLACE, PROVIDED THAT THE TUBING IS REMOVED TO BELOW FLOOR LEVEL (SO THAT NEW FLOORING IS NOT AFFECTED) AND SEALED OR FILLED TIGHT.
5. COORDINATE ALL INTERRUPTIONS WITH DANE COUNTY FACILITIES MANAGEMENT (DCFM) PRIOR TO STARTING WORK.
6. ALL DUCTWORK, PIPING, EQUIPMENT, ETC. NOTED FOR DEMOLITION SHALL BE REMOVED COMPLETE.
7. ALL EXISTING ABANDONED DUCTWORK, PIPING, EQUIPMENT, ETC IN THE CEILING SHALL BE REMOVED COMPLETE.
8. PIPING NOTED FOR DEMOLITION SHALL BE REMOVED BACK TO THE POINT REQUIRED TO REMAIN ACTIVE AND CAPPED.
9. ANY DUCTWORK CONNECTIONS NOT TO BE REUSED SHALL BE SHEETMETAL PATCHED, SEALED, AND INSULATED WITH COMPLETE VAPOR BARRIER.
10. ALL EXISTING TO REMAIN GRILLES, REGISTERS, DIFFUSERS, CONVECTORS, ETC. SHALL BE PROTECTED DURING CONSTRUCTION.
11. SEE REFLECTED CEILING PLANS FOR AREAS WHERE EXISTING CEILINGS WILL BE REMOVED BY THE GC AND NEW CEILING WILL BE INSTALLED (BY GC). THE HC IS RESPONSIBLE FOR REMOVAL AND REINSTALLATION OF ALL OTHER CEILING REQUIRED TO PERFORM HVAC WORK.
12. RUNOUT PIPING TO AIR TERMINAL UNITS TO BE 3/4" UNLESS NOTED OTHERWISE.

KEYED NOTES:

1 REPLACE EXISTING OA DAMPER AND DDC ACTUATOR. RETAIN ACTUATOR. PROVIDE NEW COMBINATION OUTSIDE AIR DAMPER AND AIRFLOW MONITORING STATION. INTEGRATE CONTROL OF NEW OA DAMPER INTO EXISTING AHU AND ADJACENT AHU DDC CONTROLLER. SYSTEM / AHU HAS EXISTING ALERTON CONTROLS.

2 EXISTING RELIEF AIR DAMPER TO REMAIN.

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR
ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

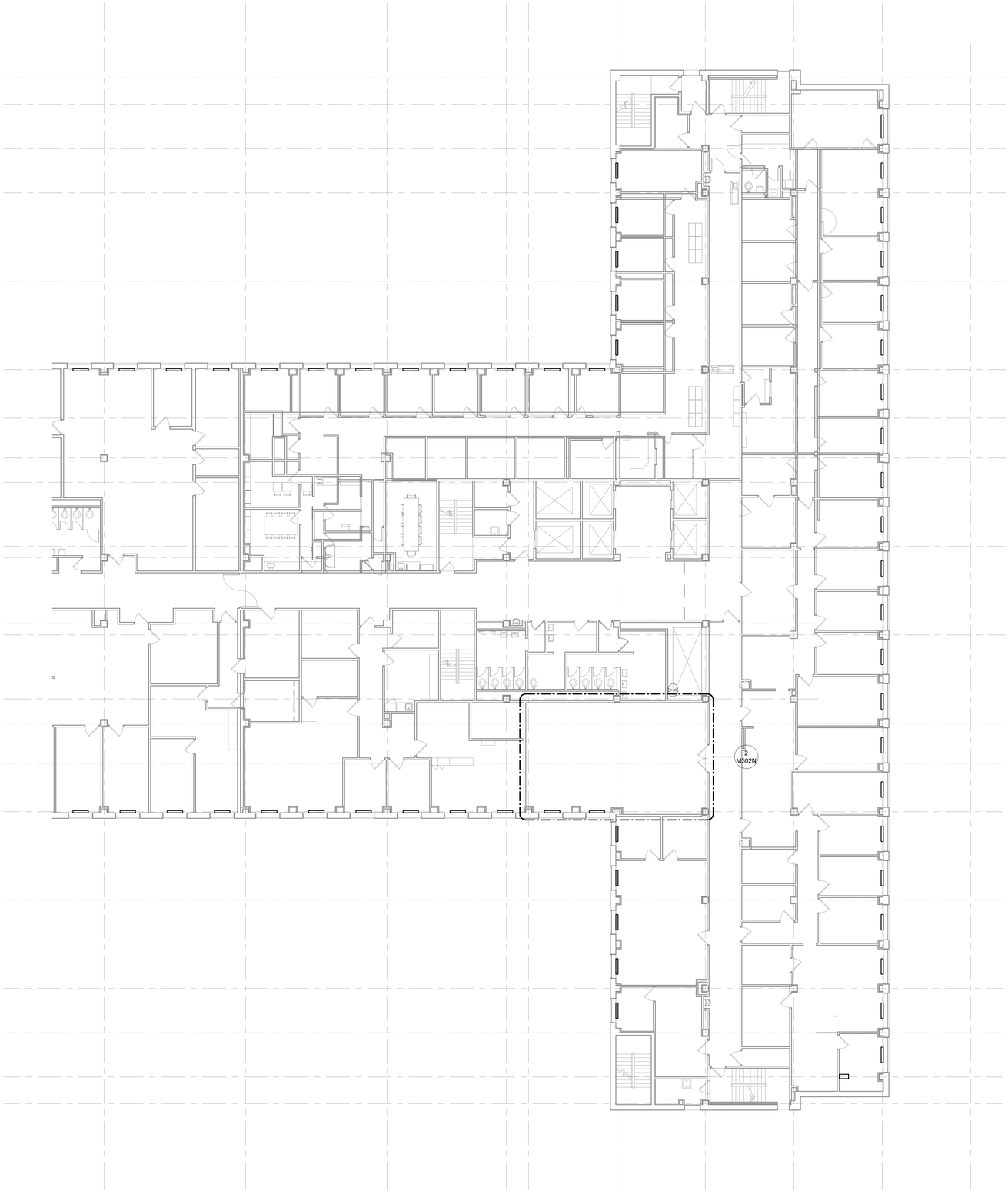
CCB - STAGE 2 REMODEL - PARTIAL 1ST AND 5TH FLOORS
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 8226

SHEET TITLE:
GROUND FLOOR MECHANICAL ROOM

REVISIONS:
2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**M301N**



1 M302N NEW WORK PLAN - LEVEL 04 - HVAC
SCALE: 3/32" = 1'-0"

TRUE NORTH

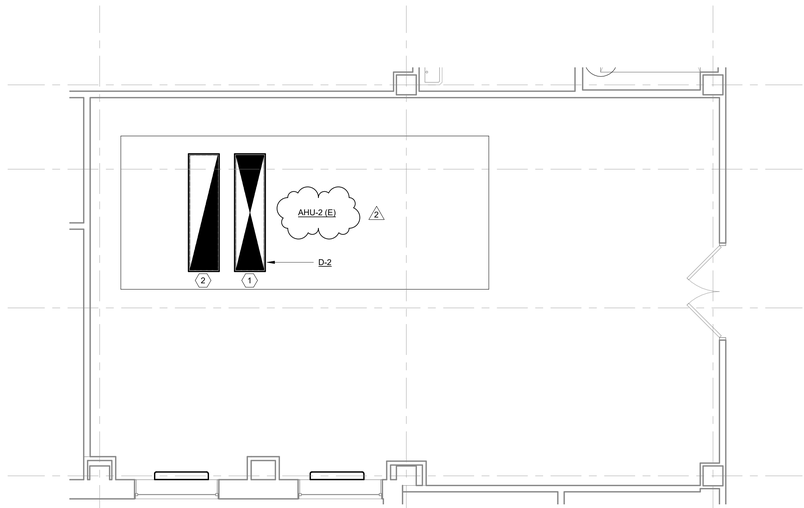
GENERAL NOTES:

1. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING CONDITIONS BEFORE COMMENCING WORK. REPORT ANY DISCREPANCIES TO THE A/E IMMEDIATELY.
2. THE BUILDING IS TO REMAIN OCCUPIED DURING CONSTRUCTION AND THE AIR HANDLER SERVING THIS AREA WILL CONTINUE TO OPERATE. SUPPLY AND RETURN AIR DUCTWORK SHALL BE PROTECTED FROM THE ENTRANCE OF CONSTRUCTION DUST, DIRT, AND DEBRIS. INSTALL TEMPORARY MERV 7 FILTERS ON RETURN AIR OPENINGS DURING CONSTRUCTION. CHANGE FILTER WEEKLY. SEE ARCHITECTURAL PLANS FOR ANY PHASING SCHEDULES AND/OR AREAS.
3. WHEN PNEUMATIC CONTROLS ARE INDICATED TO BE REMOVED, REMOVE ALL PNEUMATIC CONTROL TUBING BACK TO THE POINT REQUIRED TO BE ACTIVE.
4. PNEUMATIC TUBING LOCATED DIRECTLY IN CONCRETE FLOORS CAN BE ABANDONED IN PLACE, PROVIDED THAT THE TUBING IS REMOVED TO BELOW FLOOR LEVEL (SO THAT NEW FLOORING IS NOT AFFECTED) AND SEALED OR FILLED TIGHT.
5. COORDINATE ALL INTERRUPTIONS WITH DANE COUNTY FACILITIES MANAGEMENT (DCFM) PRIOR TO STARTING WORK.
6. ALL DUCTWORK, PIPING, EQUIPMENT, ETC. NOTED FOR DEMOLITION SHALL BE REMOVED COMPLETE.
7. ALL EXISTING ABANDONED DUCTWORK, PIPING, EQUIPMENT, ETC IN THE CEILING SHALL BE REMOVED COMPLETE.
8. PIPING NOTED FOR DEMOLITION SHALL BE REMOVED BACK TO THE POINT REQUIRED TO REMAIN ACTIVE AND CAPPED.
9. ANY DUCTWORK CONNECTIONS NOT TO BE REUSED SHALL BE SHEETMETAL PATCHED, SEALED, AND INSULATED WITH COMPLETE VAPOR BARRIER.
10. ALL EXISTING TO REMAIN GRILLES, REGISTERS, DIFFUSERS, CONVECTORS, ETC. SHALL BE PROTECTED DURING CONSTRUCTION.
11. SEE REFLECTED CEILING PLANS FOR AREAS WHERE EXISTING CEILINGS WILL BE REMOVED BY THE GC AND NEW CEILING WILL BE INSTALLED (BY GC). THE HC IS RESPONSIBLE FOR REMOVAL AND REINSTALLATION OF ALL OTHER CEILING REQUIRED TO PERFORM HVAC WORK.
12. RUNOUT PIPING TO AIR TERMINAL UNITS TO BE 3/4" UNLESS NOTED OTHERWISE.

KEYED NOTES:

1 REPLACE EXISTING OA DAMPER AND DDC ACTUATOR. RETAIN ACTUATOR. PROVIDE NEW COMBINATION OUTSIDE AIR DAMPER AND AIRFLOW MONITORING STATION. INTEGRATE CONTROL OF NEW OA DAMPER INTO EXISTING AHU AND ADJACENT AHU DDC CONTROLLER. SYSTEM / AHU HAS EXISTING ALERTON CONTROLS.

2 EXISTING RELIEF AIR DAMPER TO REMAIN.



2 M302N ENLARGED PLAN - LEVEL 04 - MECHANICAL ROOM
SCALE: 1/4" = 1'-0"

TRUE NORTH

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR
ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

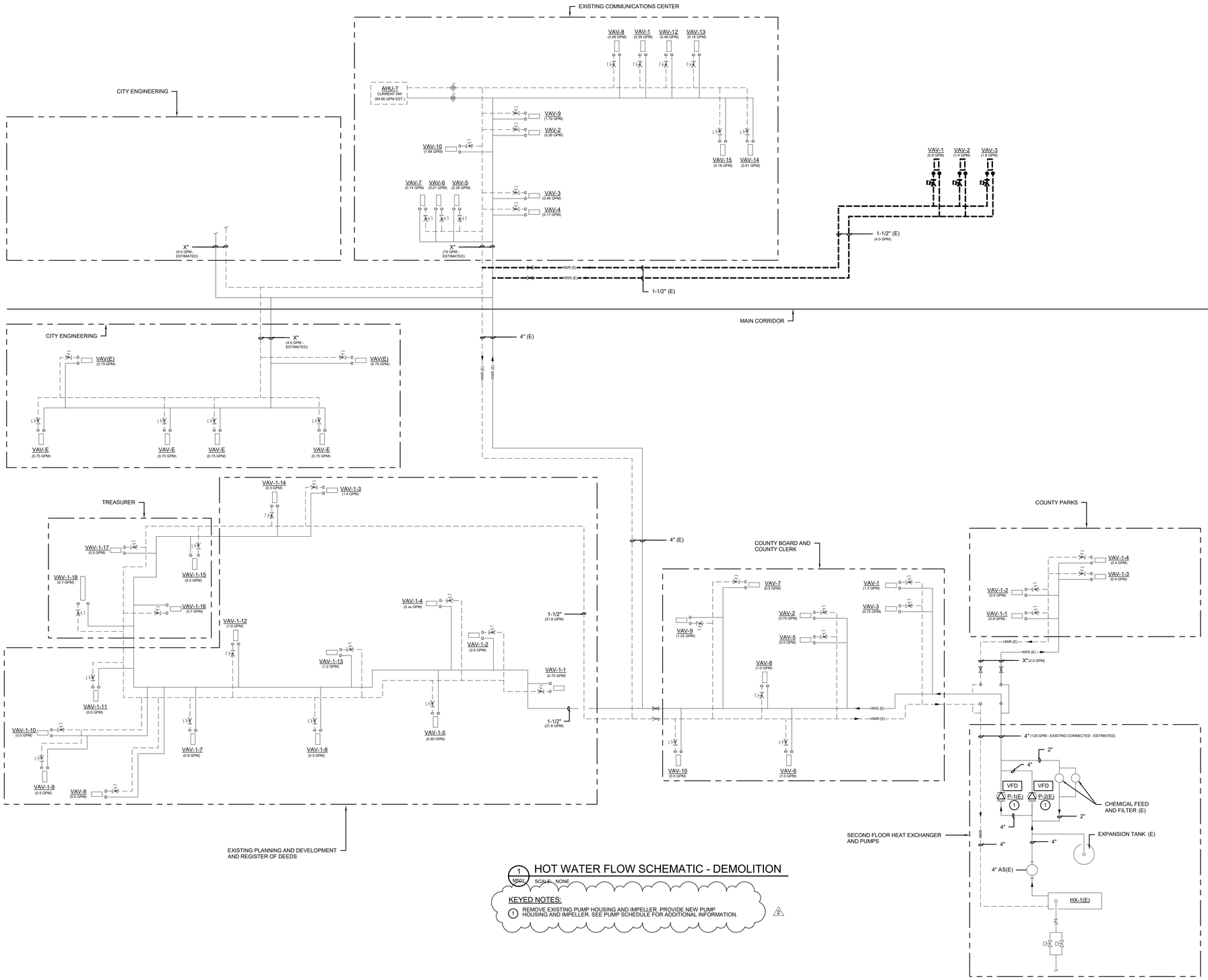
CCB - STAGE 2 REMODEL - PARTIAL 1ST AND 5TH FLOORS
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9026

SHEET TITLE:
FOURTH FLOOR MECHANICAL ROOM

REVISIONS:
2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/2022
SHEET NUMBER	M302N



1 M501 HOT WATER FLOW SCHEMATIC - DEMOLITION

SCALE: NONE

KEYED NOTES:

1 REMOVE EXISTING PUMP HOUSING AND IMPELLER. PROVIDE NEW PUMP HOUSING AND IMPELLER. SEE PUMP SCHEDULE FOR ADDITIONAL INFORMATION. 2

T 414.220.9640
751 North Jefferson St, Suite 200
Milwaukee, WI 53202

CONSULTANTS:

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

CCB - STAGE 2 REMODEL - PARTIAL 1ST AND 5TH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

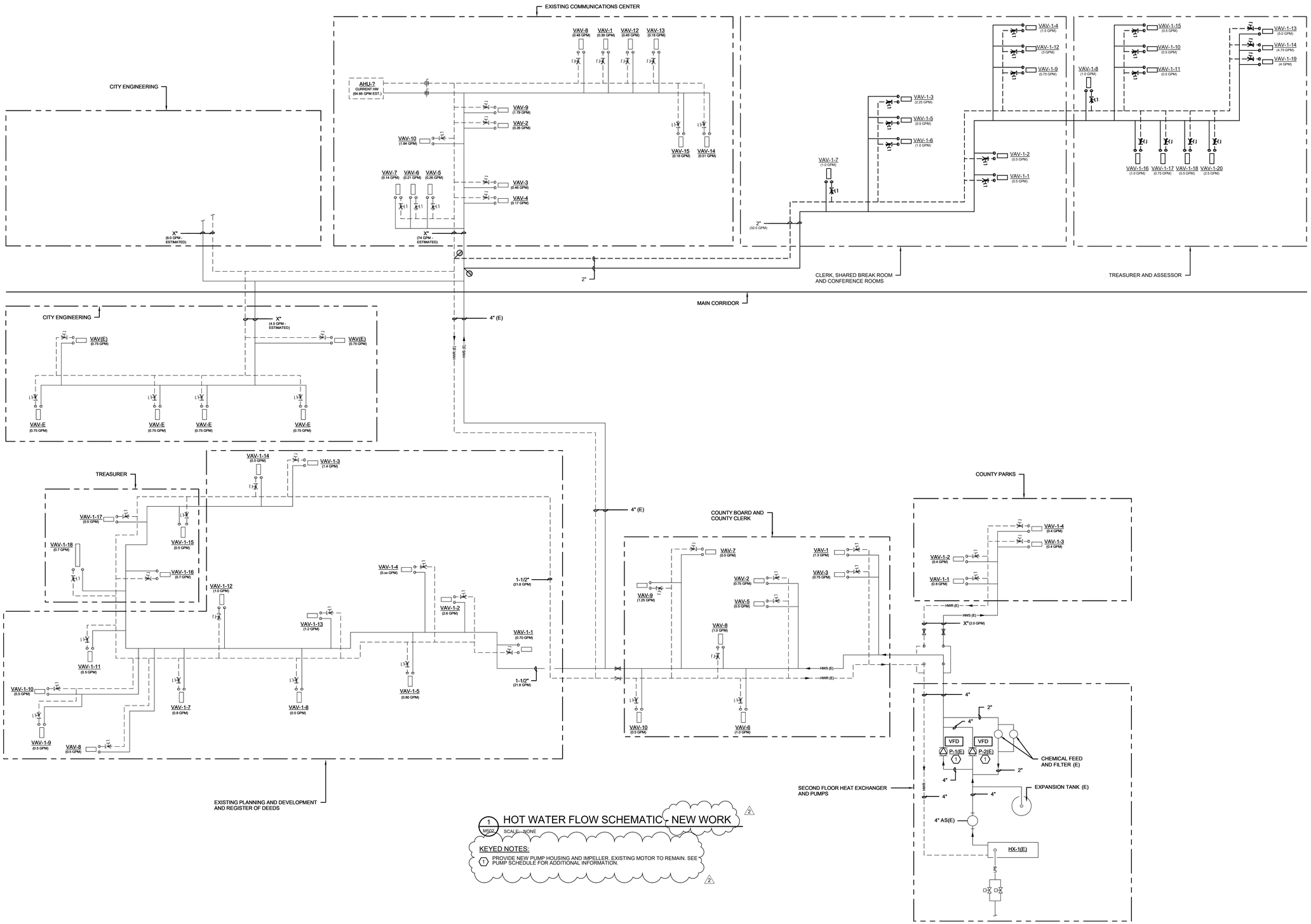
BPW CONTRACT # 9026

SHEET TITLE:
FLOW SCHEMATIC - HOT WATER - DEMOLITION

REVISIONS:

2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**M501N**



1 M502 HOT WATER FLOW SCHEMATIC - NEW WORK

SCALE: NONE

KEYED NOTES:

1. PROVIDE NEW PUMP HOUSING AND IMPELLER. EXISTING MOTOR TO REMAIN. SEE PUMP SCHEDULE FOR ADDITIONAL INFORMATION.

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

CCB - STAGE 2 REMODEL - PARTIAL 1ST AND 5TH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 5026

SHEET TITLE: FLOW SCHEMATIC - HOT WATER - NEW WORK

REVISIONS:

2 03/22/23 Addendum 2

SCALE	
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/2022
SHEET NUMBER	M502N

VAV TERMINAL UNIT WITH REHEAT SCHEDULE

UNIT NO.		VAV-1-1	VAV-1-2	VAV-1-3	VAV-1-4	VAV-1-5	VAV-1-6	VAV-1-7	VAV-1-8	VAV-1-9	VAV-1-10	VAV-1-11	VAV-1-12	VAV-1-13	VAV-1-14	VAV-1-15	VAV-1-16	VAV-1-17	VAV-1-18	VAV-1-19	VAV-1-20
LOCATION		CL01 LOBBY	CL01 LOBBY	CL05 OPEN OFFICE SOUTH	CL06 OPEN OFFICE NORTH	CL09 WORK/COPY	CL10 ELECTION SUPPLIES	SCR01 CONFERENCE	A03 RECEPTION	SBR01 BREAKROOM	A04 WORKROOM	A04 WORKROOM	A12 CORRIDOR	A07 OPEN OFFICE	A07 OPEN OFFICE	A07 OPEN OFFICE	T02 CORRIDOR	T10 CORRIDOR	T05 RECEPTION	T07 OPEN OFFICE	T06 OFFICE
FLOOR		FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST	FIRST
AHU SYSTEM		AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12	AHU-12 2
MANUFACTURER		PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE
MODEL NO.		SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV
INLET SIZE		4	4	10	12	4	4	8	8	8	4	4	10	14	12	4	4	4	4	12	8
OUTLET SIZE		12/8-8"ø	12/8-8"ø	14/13-14"ø	16/15-20/12	12/8-8"ø	12/8-10"ø	12/10-12"ø	12/10-12"ø	12/10-10"ø	12/8-6"ø	12/8-6"ø	14/13-20/8	20/18-22/14	16/15-22/14	12/8-8"ø	12/8-8"ø	12/8-8"ø	12/8-6"ø	16/15-16/14	12/10-12"ø
MAX. AIR PD (WC)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
MIN. INLET SP (IN WG)		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
AIR FLOW (CFM)	MAXIMUM	225	265	900	1560	230	365	580	500	500	110	110	1025	1980	1725	225	265	250	110	1400	555
	MINIMUM	150	265	640	470	230	365	580	500	170	50	50	680	595	520	80	260	205	45	420	555
	HEATING CFM	155	265	640	470	230	365	580	500	170	55	55	800	1500	1450	80	265	205	50	1100	555
HOT WATER REHEAT COIL DATA	FLUID	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	EWT (°F)	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180	180
	LWT (°F)	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150	150
	EAT (°F)	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55	55
	LAT (°F)	100	90	105	100	95	85	95	95	105	100	100	105	100	100	105	100	105	100	105	115
	CAPACITY (MBH)	7.6	10	34.9	23.1	10	11.9	25.2	21.7	9.3	2.7	2.7	43.6	73.6	71.1	4.4	13	11.2	2.5	60	36.3
	GPM	0.5	0.75	2.25	1.5	0.75	1	1.7	1.5	0.75	0.5	0.5	3	5	4.75	0.5	1	0.75	0.5	4	2.5
	MAX WATER PD (FT)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CO2 CONTROL		NO	YES	NO	NO	YES	NO	YES	YES	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES
REMARKS																					

GENERAL NOTES

1 NEITHER RADIATED NOR DISCHARGE SOUND LEVELS SHALL EXCEED 35 NC AT 1.5" STATIC PRESSURE WHEN TESTED PER ARI STANDARD 885-98

2 OCC OA VENT CFM FOR ADJUSTING AHU OA VENT RATE BASED ON OCCUPANCY OF SPACE.

AIR DEVICE SCHEDULE

UNIT NO.	CD-1	CD-2	CD-3	CD-4	CD-5	EG-1	RG-1	RG-2	SD-1	SD-2	SR-1	TG-1	TG-2	TG-3	TG-4
SERVICE	SUPPLY	SUPPLY	SUPPLY	SUPPLY	SUPPLY	EXHAUST	RETURN	RETURN	SUPPLY	SUPPLY	SUPPLY	TRANSFER	TRANSFER	TRANSFER	TRANSFER
MANUFACTURER	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE
MODEL NO.	SPD	SPD	SPD	SPD	SPD	630	630	630	TBDI3	TBDI3	SDGE	630	630	630	630
FACE STYLE	PLAQUE	PLAQUE	PLAQUE	PLAQUE	PLAQUE	LOUVERED	LOUVERED	LOUVERED	PLENUM SLOT	PLENUM SLOT	DUCT GRILLE	LOUVERED	LOUVERED	LOUVERED	LOUVERED
PATTERN	4-WAY	4-WAY	4-WAY	4-WAY	4-WAY	SINGLE DEFL	SINGLE DEFL	SINGLE DEFL	-	-	22.5	SINGLE DEFL	SINGLE DEFL	SINGLE DEFL	SINGLE DEFL
FINISH	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE	WHITE
MATERIAL	STEEL	STEEL	STEEL	STEEL	STEEL	ALUM	ALUM	ALUM	ALUM	ALUM	ALUM	ALUM	ALUM	ALUM	ALUM
SIZE (NECK)	6" DIA	8" DIA	10" DIA	12" DIA	14" DIA	10" DIA	SEE PLANS	SEE PLANS	6" DIA	8" DIA	SEE PLANS	SEE PLANS	22x22	46x22	22x10
SIZE (FACE)	24"x24"	24"x24"	24"x24"	24"x24"	24"x24"	24"x24"	24"x24"	SEE PLANS	0-150	150-300	SEE PLANS	SEE PLANS	24x24	48x24	24x12
CFM RANGE	0 - 125	125 - 225	225 - 400	400 - 600	600 - 750	0 - 225	SEE PLANS	SEE PLANS	450	450	SEE PLANS	SEE PLANS	0 - 1,000	1,001 - 2,000	0 - 140
MOUNTING	LAY-IN	LAY-IN	LAY-IN	LAY-IN	LAY-IN	LAY-IN	LAY-IN	SURFACE	LAY-IN	LAY-IN	DUCT GRILLE	SURFACE	LAY-IN	LAY-IN	LAY-IN
DAMPER	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO	YES	YES	NO	NO	NO
REMARKS									1	1	2				

GENERAL NOTES:

1. CONTRACTOR SHALL VERIFY MOUNTING SURFACE / FRAME REQUIREMENTS.
2. BRANCH DUCT SIZE TO DIFFUSER SHALL BE THE NECK SIZE OF THE DIFFUSER UNLESS NOTED OTHERWISE.
3. SEE SPECIFICATION FOR GRILLE, REGISTER, AND DIFFUSER FINISHES.
4. MAXIMUM STATIC PRESSURE DROP THROUGH GRILLE, REGISTER OR DIFFUSER SHALL NOT EXCEED 0.1".
5. MAXIMUM NC LEVELS FOR GRILLES, REGISTERS OR DIFFUSERS SHALL NOT EXCEED 25.
6. UNLESS THROW IS NOTED OTHERWISE, ALL DIFFUSERS SHALL BE 4-WAY THROW.

REMARKS:

1. 48" LONG DIFFUSER. 3/4" SLOTS. 4 SLOTS.
2. REGISTERS TO BE MOUNTED ON EXPOSED ROUND AND OVAL SUPPLY DUCTS.

VAV TERMINAL UNIT WITH REHEAT SCHEDULE

UNIT NO.		VAV-5-23	VAV-5-24	VAV-5-25	VAV-5-26	VAV-5-27	VAV-5-28	VAV-5-29	VAV-5-30	VAV-5-31	VAV-5-32	VAV-5-33
LOCATION		OIM01 LOBBY	OIM06 OPEN OFFICE	OIM04 OFFICE	OIM02 HUDDLE	SBR05 BREAKROOM	CC02 CONFERENCE		CC04 OFFICE	CC06 OPEN OFFICE	CC04 ALDER ROOM	CC09 CORRIDOR
FLOOR		FIFTH	FIFTH	FIFTH	FIFTH	FIFTH	FIFTH	FIFTH	FIFTH	FIFTH	FIFTH	FIFTH
AHU SYSTEM		AHU-2	AHU-2	AHU-2	AHU-2	AHU-2	AHU-2	AHU-2	AHU-2	AHU-2	AHU-2	AHU-2 2
MANUFACTURER		PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE	PRICE
MODEL NO.		SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV	SDV
INLET SIZE		4	4	8	4	8	4	4	4	10	4	4
OUTLET SIZE		12/8-8"ø	12/8-8"ø	12/10-12"ø	12/8-6"ø	12/10-12"ø	12/8-8"ø	12/8-8"ø	12/8-10"ø	14/13-14"ø	12/8-10"ø	12/8-6"ø
MAX. AIR PD (WC)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
MIN. INLET SP (IN WG)		1	1	1	1	1	1	1	1	1	1	1
AIR FLOW (CFM)	MAXIMUM	200	250	490	140	520	200	100	250	1120	305	140
	MINIMUM	80	75	150	140	520	200	40	75	340	95	45
	HEATING CFM	80	75	150	140	520	200	40	75	340	95	45
HOT WATER REHEAT COIL DATA	FLUID	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
	EWT (°F)	180	180	180	180	180	180	180	180	180	180	180
	LWT (°F)	150	150	150	150	150	150	150	150	150	150	150
	EAT (°F)	55	55	55	55	55	55	55	55	55	55	55
	LAT (°F)	100	100	100	85	90	85	95	85	100	100	100
	CAPACITY (MBH)	3.9	3.7	7.4	4.6	20.5	6.5	1.7	2.5	16.7	4.7	2.2
	GPM	0.5	0.5	0.5	0.5	1.4	0.5	0.5	0.5	1.25	0.5	0.5
	MAX WATER PD (FT)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
CO2 CONTROL		NO	NO	NO	YES	YES	YES	NO	NO	NO	NO	NO
REMARKS												

GENERAL NOTES

1 NEITHER RADIATED NOR DISCHARGE SOUND LEVELS SHALL EXCEED 35 NC AT 1.5" STATIC PRESSURE WHEN TESTED PER ARI STANDARD 885-98

2 OCC OA VENT CFM FOR ADJUSTING AHU OA VENT RATE BASED ON OCCUPANCY OF SPACE.

FAN SCHEDULE

UNIT NO.	EF-1	TF-1	
LOCATION	SBR01	A08	
SERVICE	SBR01	A08	
MANUFACTURER	GREENHECK	GREENHECK	
MODEL NO.	SP-A390-VG	SP-A90-130-VG	
FAN TYPE	CEILING	CEILING	
ARRANGEMENT	-	-	
DESIGN CFM	175	110	
EXT. SP (IN WC)	0.5	0.5	
FAN WHEEL TYPE	-	-	
FAN DIAMETER	-	-	
APPROXIMATE FAN RPM	935	900	
BHP	76 W	46 W	
MOTOR HP	FRAC	FRAC	
ECM MOTOR	YES	YES	
VOLTS/PHASE	120 / 1	120 / 1	
DRIVE	DIRECT	DIRECT	
TWO SPEED	NO	NO	
VFD	NO	NO	
MAX. SONES	3.5	2.5	
MAX FAN INLET AIR SOUND DATA SOUND POWER (OCTAVE BAND (dB)) 1	-	-	
2	-	-	
3	-	-	
4	-	-	
5	-	-	
6	-	-	
7	-	-	
8	-	-	
REMARKS			

PUMP SCHEDULE

UNIT NO	P-1 (E)	P-2 (E)	
SERVICE	HW REHEAT	HW REHEAT	
LOCATION	2ND FLOOR	2ND FLOOR	
MANUFACTURER	TACO (TACO)	TACO	
MODEL NO.	KV2009D (KV2009)	KV2009D (KV2009)	
TYPE	INLINE	INLINE	
CAPACITY (GPM)	170 (115)	170 (115)	
PRESSURE HEAD (FT)	75 (70)	75 (70)	
SHUT-OFF PRESSURE HEAD (FT)	-	-	
MIN. NPSH REQUIRED (FT)	-	-	
INLET / OUTLET (IN)	-	-	
IMPELLER DIAMETER	9.05 (8.8)	9.05 (8.8)	
MIN. EFF. %	71	71	
RPM	1760 (1760)	1760 (1760)	
BHP	4.52	4.52	
HP	5 (5)	5 (5)	
VOLTAGE / PHASE			
VFD	EXISTING	EXISTING	
UNIT WEIGHT (LBS)	-	-	
REMARKS	1, 2, 3, 4	1, 2, 3, 4	

KEYED NOTES:

1. THE EXISTING PUMP IS A TACO MODEL KV2009. THE SCHEDULE SHOWS EXISTING CONDITIONS IN PARENTHESES.

2. PROVIDE A NEW PUMP CASING/HOUSING, IMPELLER AND SEALS. THE EXISTING PUMP MOTORS SHALL BE REUSED. THIS CONTRACTOR OR PUMP MANUFACTURER VENDOR SHALL MAKE THE PUMP MODIFICATIONS. THE SCHEDULE INDICATES NEW CONDITIONS.

3. THE NEW PUMP HOUSING FLANGE TO FLANGE DIMENSIONS SHALL MATCH THE EXISTING PUMP FLANGE TO FLANGE DIMENSIONS.

2

SPLIT SYSTEM AIR CONDITIONER SCHEDULE

UNIT NO.		DSE-1			
LOCATION		SIT03			
MANUFACTURER		MITSUBISHI			
MODEL NO.		PKA-A18HA7			
EVAPORATOR TYPE		HIGH WALL			
SUPPLY (CFM)		420			
OUTSIDE AIR (CFM)		-			
FILTER TYPE		-			
FAN MOTOR	VOLTS	208			
	PHASE	1			
	HP	30 WATT			
	DRIVE	DIRECT			
	NO. OF SPEEDS	3			
AIR COOLED CONDENSING UNIT (OUTDOOR UNIT)					
UNIT NO.		DSCU-1			
LOCATION		GRADE			
MANUFACTURER		MITSUBISHI			
MODEL NO.		PUY-A18NKA7			
NOMINAL COOLING CAPACITY (BTU / HR)		18,000			
SEER		18.5			
COP		-			
UNIT ELECTRICAL DATA	VOLTS	208			
	PHASE	1			
	MCA	11			
	MOCP	15			
SERVES		DSE-1			
REMARKS					

GENERAL NOTES

1 COORDINATE POWER DSE POWERED THRU DSC

2 EC TO WIRE AND CONNECT INDOOR UNIT TO OUTDOOR UNIT.

3 DISCONNECTS BY EC.

4 DSC TO INCLUDE LOW AMBIANT BAFFLES.

CONTROL DAMPER

UNIT NO.	D-1	D-2	
MANUFACTURER (DAMPER)	TAMCO/EBTRON	TAMCO/EBTRON	
MODEL (DAMPER)	AIR - IQ2	AIR - IQ2	
MANUFACTURER (ACTUATOR)	BELIMO	BELIMO	
INSULATED DAMPER	NO	NO	
SERVICE	AHU-12 - MIN OA	AHU-2 - OA	
BLADE TYPE (OPPOSED / PARALLEL)	PARALLEL	PARALLEL 2	
FAIL POSITION (FC / FO)	FC	FC	
SIZE (IN) WxH	48 x 12	90 x 28	
DAMPER TOTAL AIRFLOW (CFM)	8,000	24,000	
DAMPER MINIMUM AIRFLOW (CFM)	8,000	6,000	
MINIMUM AIRFLOW VELOCITY (FPM)	2,000	345	
ACTUATION TYPE (ELEC. / PNEUMATIC)	ELEC / 24V	ELEC / 24V	
INTEGRAL AIRFLOW MEASURING	YES	YES	
REMARKS	1, 2, 3	1, 4, 5	

GENERAL NOTES

1. CONFIRM SIZE WITH ON SITE CONDITIONS PRIOR TO ORDERING.
2. DAMPER AND ACTUATOR PROVIDED BY CONTRACTOR.
3. AHU-12 MINIMUM OUTSIDE AIR IS 8,000 CFM.
4. DAMPER PROVIDED BY CONTRACTOR. ACTUATOR TO BE REUSED.
3. AHU-2 MINIMUM OUTSIDE AIR IS 6,000 CFM.

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

JDR ENGINEERING, INC.
5525 NOBEL DRIVE
SUITE 110
MADISON, WI 53711
PH: 608.277.1728
FAX: 608.271.7046

JDR PROJECT NO: 210191

CCB - STAGE 2 REMODEL - PARTIAL 1ST AND 5TH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 8026

SHEET TITLE:
SCHEDULES - HVAC

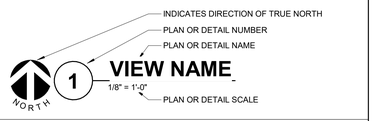
REVISIONS:
1 02/13/23 Addendum 1
2 03/22/23 Addendum 2

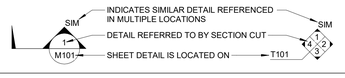
SCALE	
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**M801N**

VIEW KEY

NAME — LEVEL NAME
10'-0" — HEIGHT ABOVE PROJECT 0'-0"

1 — INDICATES NOTE USED TO DESCRIBE ADDITIONAL INFORMATION ABOUT WORK REQUIRED, SPECIFIC TO THE SHEET AND/OR DETAIL





LINE TYPE AND TAG KEY:

NEW WORK BY THIS CONTRACTOR (WIDE LINE)
- NEW
- EXISTING TO BE REMOVED (SHORT DASHED PATTERN)
- NEW UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)

EXISTING TO REMAIN OR WORK BY OTHERS (NARROW LINE)
- EXISTING
- EXISTING TO BE REMOVED BY OTHERS (SHORT DASHED PATTERN)
- EXISTING UNDERFLOOR OR UNDERGROUND (LONG DASHED PATTERN)

HALFTONING DOES NOT MODIFY SCOPE.

'TAG'-E — TAGS WITH DASH 'E' INDICATES THE REFERENCED OBJECT IS EXISTING

TAG — UNDERLINED TAG INDICATES OBJECT IS IN-SCOPE. IF NEW, ADDITIONAL INFORMATION IS AVAILABLE IN A SCHEDULE, MATERIAL LIST, OR SYMBOL LIST

INDICATES AN EXISTING SYSTEM'S POINT OF CONNECTION/REMOVAL

CONTRACTOR ABBREVIATION KEY

ABBR:	DESCRIPTION:
A.V.C.	AUDIO/VISUAL CONTRACTOR
C.M.	CONSTRUCTION MANAGER
E.C.	ELECTRICAL CONTRACTOR
G.C.	GENERAL CONTRACTOR
M.C.	MECHANICAL CONTRACTOR
S.C.	SECURITY CONTRACTOR
T.C.	TECHNOLOGY CONTRACTOR

TECHNOLOGY ABBREVIATION KEY

ABBR:	DESCRIPTION:
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
BFC	BELOW FINISHED CEILING
C	CONDUIT
DPDT	DOUBLE POLE DOUBLE THROW
FOV	FIELD OF VIEW
J-BOX	JUNCTION BOX
POE	POWER OVER ETHERNET
PTZ	PAN TILT ZOOM
SIM	SIMILAR
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
+#	MOUNTING HEIGHT ABOVE FINISHED FLOOR
EF-#	ENTRANCE FACILITY
MC-#	MAIN CROSS-CONNECT
TR-#	TELECOMMUNICATIONS ROOM

TECHNOLOGY SYMBOL LIST

SYMBOL:	EQUIPMENT LIST ABBREV.:	DESCRIPTION:	NOTE:
CSS	N/A	CONTROLLED SECURITY SCHEME SCHEDULE IDENTIFIER	2.
CR1	AC-CR1-W	SECURITY CREDENTIAL READER (WALL) TYPE 1	2.
CR2	AC-CR2-W	SECURITY CREDENTIAL READER (WALL) TYPE 2	2.
RPB	AC-RPB-W	SECURITY REQUEST TO EXIT PUSH BUTTON (WALL)	.
SM#	SM-SMM-C	SOUND MASKING SPEAKER (CEILING)	.
C#	SC-IO-F	TECHNOLOGY FLOOR BOX/POKE THROUGH WITH INFORMATION OUTLET	.
C#	SC-IO-W	INFORMATION OUTLET (WALL)	1.
	N/A	INFORMATION OUTLET (WALL) EXISTING	.
RI	SC-RI-W	INFORMATION OUTLET ROUGH-IN (WALL)	.
C#	SC-IO-C	INFORMATION OUTLET (CEILING)	1.
	N/A	INFORMATION OUTLET (CEILING) EXISTING	.
CM-#	VS-CM-#	VIDEO SURVEILLANCE CAMERA 180° FOV (CEILING/HORIZONTAL SURFACE)	3.
IM1	IC-IM1-W	INTERCOM MASTER STATION (WALL) TYPE 1	.
IS1	IC-IS1-W	INTERCOM STATION (WALL) TYPE 1	.
IS2	IC-IS2-W	INTERCOM STATION (WALL) TYPE 2	.
A	AV-ANT-W	AV ANTENNA (WALL)	.
M	AV-MP1-C/S	AV MICROPHONE (CEILING/SURFACE)	.
SP#	AV-SP#-C	AV PERFORMANCE SPEAKER (CEILING)	.
CAM-#	AV-CAM-#	AV CAMERA (WALL)	.
1	AV-TP1-S	AV TOUCH PANEL (SURFACE)	.
###	AV-###-W	AV WALLPLATE/BACKBOX (WALL)	.
WIDTH X HEIGHT		CABLE TRAY, CHANNEL TRAY, BASKET TRAY	
WIDTH X HEIGHT		LADDER RACK	
DIAMETER⌀ C		CONDUIT	
		CONDUIT DOWN	
		CONDUIT UP OR UP/DOWN	
		CONDUIT SLEEVE	
		CONTINUATION	

GENERAL NOTES:

1. ALL SYMBOLS AND ABBREVIATIONS LISTED MAY NOT BE APPLICABLE TO THIS PROJECT. REFER TO THE TECHNOLOGY EQUIPMENT SCHEDULE FOR MORE COMPLETE DESCRIPTION AND ITEMS.
2. ALL SYMBOLS AND ABBREVIATIONS REFER TO TECHNOLOGY SHEETS ONLY AS DEFINED ON THE SHEET INDEX. REFER TO THE GENERAL TECHNOLOGY NOTES FOR ADDITIONAL INFORMATION.
3. ALL SYMBOLS LISTED ABOVE ARE FOR REFERENCE ONLY. REFER TO PLANS AND LINE TYPE KEY FOR NEW, EXISTING TO REMAIN AND TO BE REMOVED ITEMS FOR ADDITIONAL INFORMATION.
4. REFER TO RISERS ON SHEET(S): T500N, T501N.

TECHNOLOGY SYMBOL NOTES:

1. "C#" INDICATES INFORMATION OUTLET FACEPLATE CONFIGURATION. REFER TO INFORMATION OUTLET SCHEDULE ON T600N FOR ADDITIONAL INFORMATION.
2. REFER TO CONTROLLED SECURITY SCHEME (CSS) TYPE SCHEDULE ON T600N FOR ADDITIONAL INFORMATION. REFER TO 3/T400N FOR ROUGH-IN REQUIREMENTS.
3. "CM-#" ON FLOOR PLANS INDICATES CAMERA TYPE AND IS ASSOCIATED WITH THE CORRESPONDING "VS-CM-#" EQUIPMENT SCHEDULE ABBREVIATION.

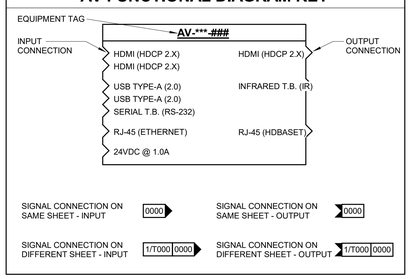
SUGGESTED MATRIX OF RESPONSIBILITY

ITEM:	SHOWN ON:	FURNISHED BY:	INSTALLED BY:	NOTES:
TECHNOLOGY ROUGH-IN, REFER TO TECHNOLOGY EQUIPMENT SCHEDULE AND SPECIFICATIONS FOR DEFINITION	T-SERIES	E.C.	E.C.	3. 4.
INFORMATION OUTLET FACEPLATES, JACKS, AND TERMINATIONS	T-SERIES	T.C.	T.C.	
CONDUIT SLEEVES (WHEN SHOWN ON DRAWINGS)	T-SERIES	E.C.	E.C.	
CONDUIT SLEEVES (NOT SHOWN BUT REQUIRED FOR PROPER INSTALLATION OF SYSTEM)	N/A	T.C.	T.C.	2. 4.
TELECOMMUNICATION SYSTEMS ROUGH-IN	T-SERIES	E.C.	E.C.	1.
TELECOMMUNICATION EQUIPMENT, CABLING, AND TERMINATIONS	T-SERIES	T.C.	T.C.	
CABLE TRAY (INCLUDING WIRE BASKET TRAY) REFER TO SPECIFICATION SECTION 27 05 28 FOR DEFINITION	T-SERIES	E.C.	E.C.	
LADDER RACK	T-SERIES	T.C.	T.C.	5.
GROUNDING LUGS ON TECHNOLOGY EQUIPMENT	T-SERIES	T.C.	E.C.	6.
BONDING SYSTEM FOR TECHNOLOGY SYSTEM, REFER TO SPECIFICATION SECTION 27 05 26 FOR DEFINITION	T-SERIES	E.C.	E.C.	7. 8.
CONNECTION OF TECHNOLOGY BONDING SYSTEM TO THE ELECTRICAL GROUND SYSTEM	T-SERIES	E.C.	E.C.	
LINE VOLTAGE POWER (+120V OR GREATER)	E-SERIES	E.C.	E.C.	
LINE VOLTAGE POWER (NOT SHOWN BUT REQUIRED FOR PROPER INSTALLATION OF SYSTEM)	N/A	T.C.	E.C.	2. 4.
LINE VOLTAGE POWER FOR DOOR HARDWARE POWER SUPPLIES	ARCH SPEC	E.C.	E.C.	
LOW VOLTAGE CABLING FOR TECHNOLOGY SYSTEMS	T-SERIES	T.C.	T.C.	
CABLE HANGERS AND SUPPORTS OR OTHER CABLE ROUTING METHODS (OTHER THAN CONDUIT AND CABLE TRAY)	T-SERIES	T.C.	T.C.	5.
FLOOR BOX (ROUGH-IN)	T & E SERIES	E.C.	E.C.	

SUGGESTED MATRIX OF RESPONSIBILITY NOTES

1. LOCATIONS OF TELECOMMUNICATIONS ROUGH-INS SHALL BE INDICATED BY THE INFORMATION OUTLET SYMBOLS ON THE DRAWINGS. REFER TO THE TECHNOLOGY SYMBOL LIST FOR ADDITIONAL INFORMATION.
2. BASED ON THE INHERENT DIFFERENCES IN PRODUCTS FROM VARIOUS MANUFACTURERS, ALL REQUIRED EQUIPMENT MAY NOT BE SHOWN ON THE DRAWINGS FOR ALL ACCEPTABLE MANUFACTURERS.
3. INCLUDES BACKBOXES AND CONDUIT REQUIRED FOR THE TECHNOLOGY SYSTEMS INSTALLATION. THE E.C. SHALL BASE THE BID ON THE BASIS OF DESIGN SHOWN ON THE CONTRACT DOCUMENTS.
4. ALL CHANGES TO THE SLEEVES, BACKBOXES, CONDUITS, AND POWER REQUIRED BECAUSE OF THE T.C.'S SELECTION OF AN ALTERNATE ACCEPTABLE MANUFACTURER OR FROM SYSTEM CONFIGURATIONS THAT ARE LEFT TO THE CHOICE OF THE CONTRACTOR SHALL BE INCLUDED IN THE T.C.'S BID. THIS BID SHALL INCLUDE INSTALLATION BY A LICENSED ELECTRICIAN.
5. UNLESS TRADE RULES DICTATE OTHERWISE.
6. FURNISHED AS PART OF THE EQUIPMENT WHEN POSSIBLE, OR FURNISHED TO THE E.C. FOR INSTALLATION IN THE FIELD.
7. INCLUDES ALL CONDUCTORS, GROUND BARS, AND TERMINATIONS FOR THE COMPLETE BONDING SYSTEM REQUIRED BY THE SPECIFICATIONS.
8. REFER TO ELECTRICAL DRAWINGS FOR LOCATIONS OF PANELS AND SWITCHBOARDS SHOWN IN THE TECHNOLOGY BONDING RISER DIAGRAM AND TYPICAL TELECOM ROOM BONDING FLOW DIAGRAM.

AV FUNCTIONAL DIAGRAM KEY



TELECOM ROOM REFERENCES

TELECOM ROOM	DETAIL / SHEET REFERENCE	FLOOR PLAN REFERENCE	ARCH ROOM NUMBER
TR-2	1/T300N	T204N	SIT03

TECHNOLOGY SHEET INDEX

GRAND TOTAL: 14

TECHNOLOGY GENERAL NOTES:

1. ##-####-# INDICATES TECHNOLOGY EQUIPMENT SCHEDULE ITEM LABELED AS "EQUIPMENT LIST ABBREVIATION"
2. REFER TO TECHNOLOGY EQUIPMENT SCHEDULE AND SPECIFICATIONS FOR FULL DESCRIPTIONS AND MANUFACTURERS OF ALL DEVICES.

TECHNOLOGY MOUNTING SUBSCRIPT KEY:
- A — MOUNT AT +6" TO CENTERLINE ABOVE COUNTER OR BACKSPLASH
- H — MOUNT ORIENTED HORIZONTALLY
- L — MOUNT IN CASEWORK
- M — MOUNT IN MODULAR FURNITURE
- S — MOUNT IN SURFACE RACEWAY

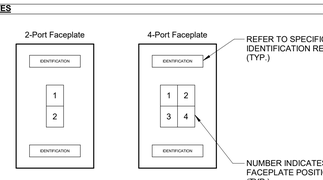
A SLASH IS USED BETWEEN TWO SUBSCRIPTS, E.G., A/H.

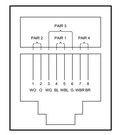
TECHNOLOGY INSTALLATION NOTES:

1. THE COMPLETE INSTALLATION SHALL BE IN ACCORDANCE WITH THE ADA STANDARDS FOR ACCESSIBLE DESIGN. REFER TO THE ADA GUIDELINES FOR ALL CONFIGURATION DETAILS ON THIS PAGE FOR ADDITIONAL INFORMATION.
2. CONCEAL ALL CONDUIT IN WALLS, PARTITIONS, ABOVE CEILING, IN FLOOR SLAB, ETC. UNLESS OTHERWISE INDICATED ON THE PLANS OR IN THE SPECIFICATIONS. CONDUIT IN MECHANICAL ROOMS AND STORAGE ROOMS WITHOUT CEILINGS MAY BE EXPOSED ON BUILDING STRUCTURE.
3. BOXES LOCATED ON OPPOSITE SIDES OF NON-RATED WALLS SHALL BE OFFSET A MINIMUM OF 6" HORIZONTALLY. BOXES ON OPPOSITE SIDES OF FIRE RATED WALLS SHALL BE OFFSET A MINIMUM OF 24" HORIZONTALLY. "THRU-THE-WALL" BOXES SHALL NOT BE ALLOWED WITHOUT PRIOR WRITTEN APPROVAL OF THE ARCHITECT/ENGINEER.
4. VERIFY ALL FURNITURE, MODULAR FURNITURE, AND EQUIPMENT LOCATIONS WITH ARCHITECTURAL PLANS, ELEVATIONS, AND REVIEWED SHOP DRAWINGS. PRIOR TO MAKING THE ACTUAL TELECOMMUNICATIONS INSTALLATION, ADJUST OUTLETS OR CONNECTION LOCATIONS TO ACCOMMODATE FURNITURE AND/OR EQUIPMENT.
5. TELECOMMUNICATIONS EQUIPMENT SHALL BE MOUNTED TO ALLOW ACCESS TO ELECTRICAL AND MECHANICAL EQUIPMENT. ALL MOUNTING OF TELECOMMUNICATION DEVICES ON EQUIPMENT SUPPLIED BY ANOTHER CONTRACTOR SHALL BE APPROVED IN ADVANCE BY THE OTHER CONTRACTOR.
6. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL OPENINGS REQUIRED IN WALLS. ALL OPENINGS SHALL BE REPAIRED TO MATCH EXISTING BY A QUALIFIED CONTRACTOR AT THE EXPENSE OF THIS CONTRACTOR. ALL CONDUITS THROUGH WALLS SHALL BE GROUTED OR SEALED INTO OPENINGS.
7. ALL MATERIALS USED TO SEAL PENETRATIONS OF FIRE RATED WALLS AND FLOORS SHALL BE TESTED AND CERTIFIED AS A SYSTEM PER ASTM E814 STANDARDS FOR FIRE TESTS OF THROUGH-PENETRATION FIRESTOPS. REFER TO DIVISION 7 FOR ADDITIONAL INFORMATION AND REQUIREMENTS SPECIFIC TO FIRESTOPPING.
8. THE TECHNOLOGY CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND REPLACEMENT OF THE CEILINGS, CEILING TILES, AND CEILING GRID ASSOCIATED WITH THE AREAS OF WORK BY ALL CONTRACTORS.
9. ALL LADDER RACK AND CABLE TRAY SIZES ARE AS DEFINED ON THE DRAWINGS. REFER TO SPECIFICATION SECTIONS 27 05 28 AND 27 11 00 FOR APPROVED MANUFACTURERS AND INSTALLATION REQUIREMENTS.
10. EACH CONTRACTOR IS RESPONSIBLE FOR DAMAGE CAUSED BY THEIR ACTIONS TO THE WALLS, FLOORS, CEILINGS, AND ROOFS. THE CONTRACTOR WHOSE WORK CAUSES DAMAGE IS RESPONSIBLE FOR PATCHING TO MATCH ORIGINAL CONSTRUCTION, FIRE RATING, AND FINISH.
11. FLUSH MOUNT ALL TELECOMMUNICATION OUTLETS AT +18" FROM FLOOR (CENTERLINE DIMENSION), EXCEPT WHERE OTHERWISE NOTED. OUTLETS MAY BE SURFACE MOUNTED WHEN CONDUIT IS SPECIFIED EXPOSED.
12. MOUNT BACKBOXES FLUSH WITH WALL. ALL BACKBOX HEIGHTS ARE TO CENTERLINE DIMENSION, UNLESS OTHERWISE NOTED.
13. PROVIDE RACEWAY AND BOXES LISTED FOR THE INSTALLED ENVIRONMENT. SEAL RACEWAY AND BOX FROM WATER AND MOISTURE AT TRANSITION BETWEEN DIFFERENT ENVIRONMENTAL CONDITIONS SUCH AS INTERIOR/EXTERIOR, TEMPERATURE CHANGES, ETC.

INFORMATION OUTLET SCHEDULE

SINGLE GANG WALLPLATES





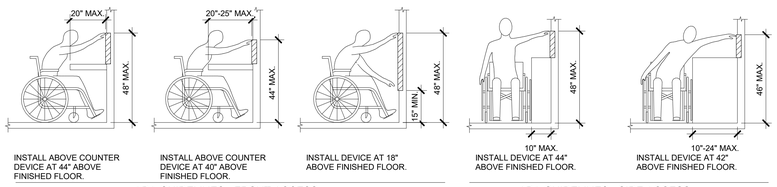
ANSI/TIA/EIA T568B PIN/PAIR ASSIGNMENT

NOTES:
1. PROVIDE REMOVABLE BLANK INSERT(S) FOR ALL UNUSED PORTS.
2. REFER TO SPECIFICATIONS SECTION 27 05 53 FOR ADDITIONAL INFORMATION ON LABELING REQUIREMENTS.

SCHEDULE NOTES:
1. LOCATION OF FUTURE OR OWNER PROVIDED WIRELESS ACCESS POINT. PROVIDE A 20' SLACK COIL AT THE NEAREST CABLE SUPPORT FOR POSSIBLE RELOCATION AFTER WIRELESS SURVEY.
2. PROVIDE HDMI CABLE FROM OUTLET AND DIRECT CONNECT TO DISPLAY.

LEGEND	
DATA	CAT 6 RJ-45
HDMI	HDMI KEYSTONE COUPLER
BLANK	BLANK FILLER MODULE
WAP	CAT 6A RJ-45
PLUG	CAT 6 MODULAR PLUG

CONFIGURATION	FACEPLATE PORTS	FACEPLATE PORT IDENTIFICATION: POSITION 1 JACK TYPE	POSITION 2 JACK TYPE	POSITION 3 JACK TYPE	POSITION 4 JACK TYPE	POSITION 5 JACK TYPE	POSITION 6 JACK TYPE	NOTES
AV1	1	HDMI						2.
C1	1	DATA						
C2	2	DATA	DATA					
C2WAP	N/A	WAP	WAP					1.
C4	4	DATA	DATA	DATA	DATA			
CM	N/A	PLUG						
RB1	4	DATA	DATA	DATA	DATA			



ADA STANDARDS FOR ACCESSIBLE DESIGN

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9026

SHEET TITLE: TECHNOLOGY COVERSHEET

REVISIONS:
2 3/22/23 Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/2022
SHEET NUMBER	T00N

GENERAL NOTES:

1. REMOVE ALL CABLING BACK TO ITS SOURCE. EXISTING TR LOCATIONS INDICATED ON FLOOR PLANS. VERIFICATION OF COMPLETE CABLE REMOUTION IS REQUIRED PRIOR TO NEW WORK.
2. ALL NETWORK AND SECURITY RELATED EQUIPMENT BEING REMOVED AND NOT RENSTALLED SHALL BE CONSOLIDATED AND TURNED OVER TO THE CITY IT DEPARTMENT FOR DISPOSAL. THIS INCLUDES PATCH PANELS, CAMERAS, WIRELESS ACCESS POINTS, AND SIMILAR. COORDINATE WITH CITY PROJECT MANAGER 2 WEEKS PRIOR TO REMOVAL AND CITY IT DEPARTMENT'S RECYCLING VENDOR WILL PROVIDE STORAGE BINS FOR EQUIPMENT.

KEYNOTES:

1. SALVAGE CAMERA FOR REINSTALLATION. REFER TO T203 AND T204 FOR NEW LOCATION.
2. EXISTING ROUGH-IN TO REMAIN FOR CABLING PATHWAY TO NEW OPEN OFFICE FURNITURE. PROVIDE BLANK COVERPLATE FOR UNUSED PATHWAYS.
3. EXISTING WIRELESS ACCESS POINT SHALL BE REMOVED AND TURNED OVER TO CITY IT DEPARTMENT FOR REPURPOSING.

1 DEMOLITION PLAN - LEVEL 01 - TECHNOLOGY - OVERVIEW - NORTH

3/32" = 1'-0"

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #2100/1230.00

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT # 8226

SHEET TITLE:
DEMOLITION PLAN - LEVEL 01 - TECHNOLOGY - OVERVIEW - NORTH

REVISIONS:

2 3/22/23 Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/2022
SHEET NUMBER	T101N

KEYNOTES: #

1. PROVIDE PASS-THROUGH GROMMET COVERPLATE FOR CABLING FEED TO FURNITURE. PROVIDE SPIRAL WRAP OR SIM FOR PROTECTION OF CABLING TRUNK FROM GROMMET TO FURNITURE.
2. REINSTALL CAMERA REMOVED DURING DEMOLITION.
3. FURNITURE CABLING FED FROM E.C. PROVIDED FLOOR BOX. REFER TO ELECTRICAL DRAWINGS FOR MORE INFORMATION.
4. A.V.C. SHALL PROVIDE AND INSTALL SHURE STEM ECOSYSTEM VIDEO CONFERENCING SYSTEM INCLUDING INCLUDING STEM HUB EXPRESS, HUDDLY IQ CAMERA AT DISPLAY, AND STEM TABLE SPEAKERPHONE AT DESK. REFER TO 4/T501N FOR ADDITIONAL INFORMATION.
5. A.V.C. SHALL INSTALL OWNER PROVIDED SFF PC BEHIND DISPLAY, AND WIRELESS KEYBOARD AND MOUSE AT DESK.
6. REMOVE EXISTING 60" DISPLAY FROM CCB ROOM 104 AND REINSTALL AT THIS LOCATION. COORDINATE REMOVAL FROM EXISTING SPACE WITH CITY PROJECT MANAGER.
7. REMOVE EXISTING MOUNT AND 60" DISPLAY FROM CCB ROOM 104 AND REINSTALL AT THIS LOCATION. COORDINATE REMOVAL FROM EXISTING SPACE WITH CITY PROJECT MANAGER.

1 ENLARGED PLAN - LEVEL 01 - TECHNOLOGY - LOBBY, TREASURER, ASSESSOR

1/4" = 1'-0"

NORTH

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

LEVEL 01 - NORTH | LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

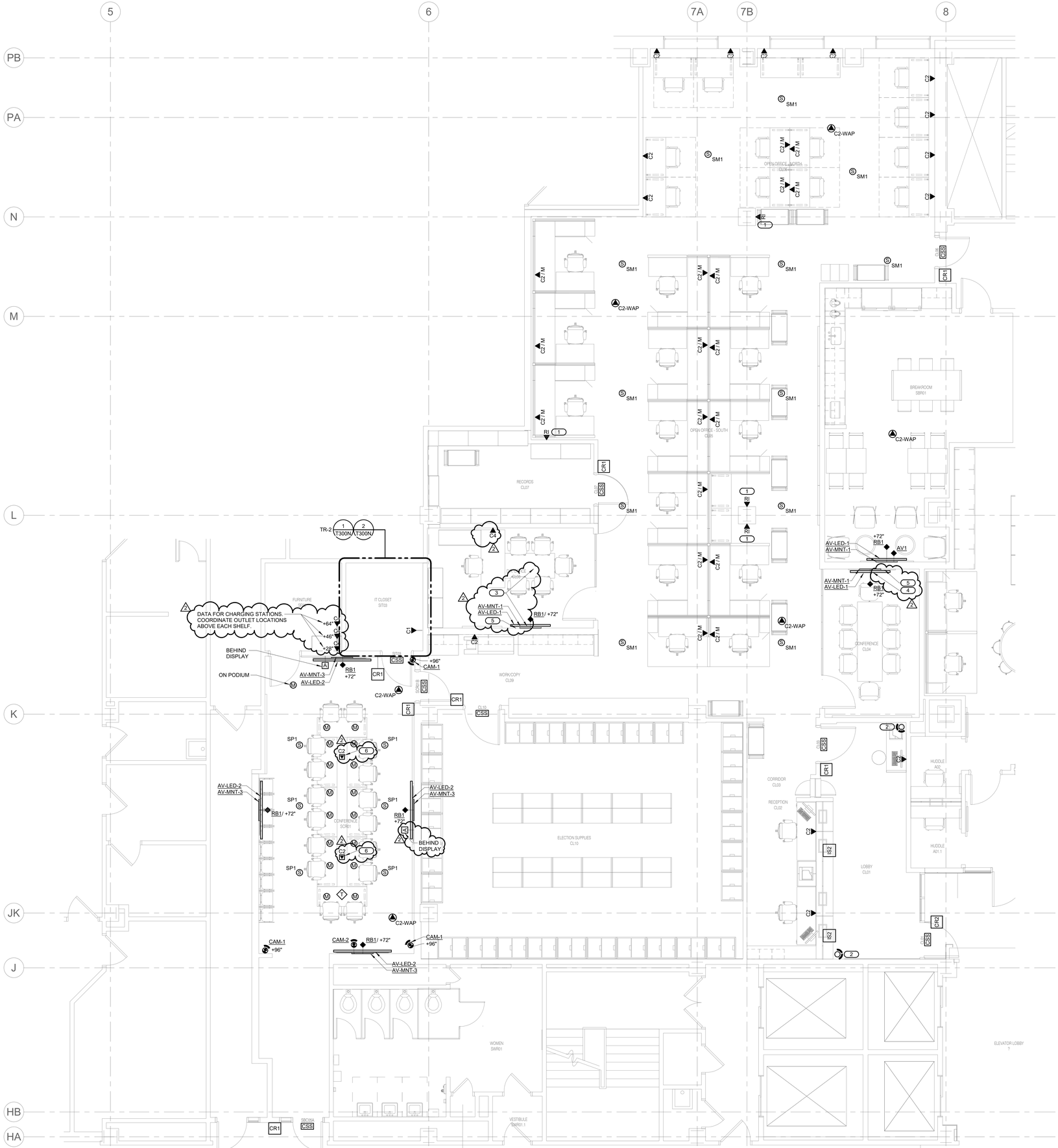
BPW CONTRACT # 8226

SHEET TITLE:
ENLARGED PLAN - LEVEL 01 - TECHNOLOGY - LOBBY, TREASURER, ASSESSOR

REVISIONS:

2 3/22/23 Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**T203N**



KEYNOTES: #

1. PROVIDE PASS-THROUGH GROMMET COVERPLATE FOR CABLING FEED TO FURNITURE. PROVIDE SPIRAL WRAP OR SIM FOR PROTECTION OF CABLING TRUNK FROM GROMMET TO FURNITURE.
2. REMOVE EXISTING CAMERA FROM MMS ROOM 153 AND REINSTALL AT THIS LOCATION. COORDINATE REMOVAL FROM EXISTING SPACE WITH CITY PROJECT MANAGER.
3. A.V.C. SHALL PROVIDE AND INSTALL SHURE STEM ECOSYSTEM VIDEO CONFERENCING SYSTEM INCLUDING INCLUDING STEM HUB EXPRESS, HUDDLY IQ CAMERA AT DISPLAY, AND STEM TABLE SPEAKERPHONE AT DESK. REFER TO 4/T501N FOR ADDITIONAL INFORMATION.
4. A.V.C. SHALL PROVIDE AND INSTALL SHURE STEM ECOSYSTEM VIDEO CONFERENCING SYSTEM INCLUDING STEM HUB, HUDDLY IQ CAMERA, AND STEM WALL SOUND BAR ARRAY UNDER DISPLAY. REFER TO 4/T501N FOR ADDITIONAL INFORMATION.
5. A.V.C. SHALL INSTALL OWNER PROVIDED SFF PC BEHIND DISPLAY, AND WIRELESS KEYBOARD AND MOUSE AT DESK.
6. DATA INSTALLED IN E.C. PROVIDED FLOOR BOX. PROVIDE (1) 1.25" CONDUIT FOR A/V SYSTEM CABLING, AND (1) 1" CONDUIT FOR DATA CABLING. ROUTE CONDUITS FROM FLOOR BOX TO TR-2

1 ENLARGED PLAN - LEVEL 01 - TECHNOLOGY - CLERK, SHARED BREAK + CONFERENCE ROOMS

1/4" = 1'-0"

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

LEVEL 01 - NORTH | LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

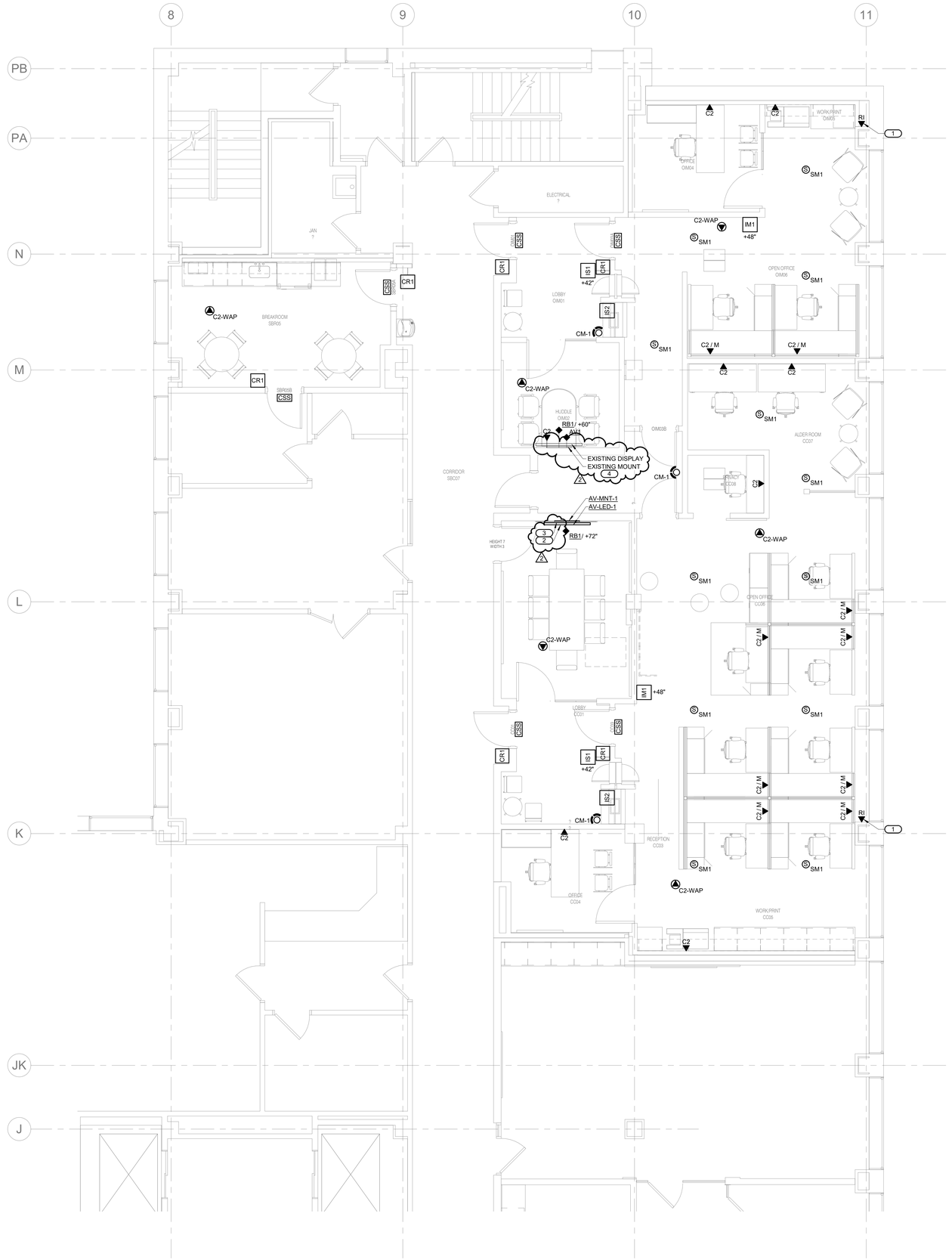
BPW CONTRACT # 8226

SHEET TITLE:
ENLARGED PLAN - LEVEL 01 - TECHNOLOGY - CLERK, SHARED BREAK + CONFERENCE ROOMS

REVISIONS:

2	3/22/23	Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**T204N**



KEYNOTES: #

1. PROVIDE PASS-THROUGH GROMMET COVER PLATE FOR CABLING FEED TO FURNITURE.
2. A.V.C. SHALL PROVIDE AND INSTALL SHURE STEM ECOSYSTEM VIDEO CONFERENCING SYSTEM INCLUDING STEM HUB, HUDDLY IQ CAMERA, AND STEM WALL SOUND BAR ARRAY UNDER DISPLAY.
3. A.V.C. SHALL INSTALL OWNER PROVIDED SFF PC BEHIND DISPLAY, AND WIRELESS KEYBOARD AND MOUSE AT DESK.
4. REMOVE EXISTING MOUNT AND 54" DISPLAY FROM CCB ROOM 104 AND REINSTALL AT THIS LOCATION. COORDINATE REMOVAL FROM EXISTING SPACE WITH CITY PROJECT MANAGER.

1 ENLARGED PLAN - LEVEL 05 - TECHNOLOGY - COMMON COUNCIL, OIM, SHARED BREAK ROOM

1/4" = 1'-0"

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG
1900 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

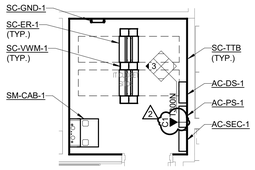
BPW CONTRACT # 9226

SHEET TITLE:
ENLARGED PLAN - LEVEL 05 - TECHNOLOGY - COMMON COUNCIL, OIM, SHARED BREAK ROOM

REVISIONS:

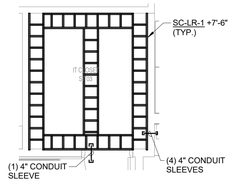
2 3/22/23 Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**T205N**



1 TELECOM ROOM LAYOUT - TR-2 - NORTH

1/4" = 1'-0"

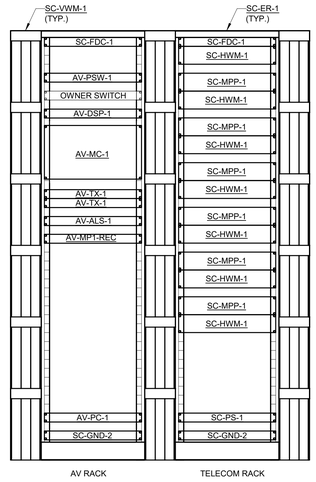


2 TELECOM ROOM PATHWAY - TR-2 - NORTH

1/4" = 1'-0"

NOTES:

1. REFER TO 3/T401N AND 4/T401N FOR SC-LR-1 INSTALLATION DETAILS.



3 EQUIPMENT RACK ELEVATION -TR-2 - NORTH

1" = 1'-0"

NOTES:

1. ALL SC-ER-1 AND SC-VMW-1 PROVIDED IN BASE CONTRACT.
2. TELECOM RACK
   A. ALL RACK MOUNTED EQUIPMENT PROVIDED IN BASE CONTRACT.
3. AV RACK
   A. PROVIDE SC-FDC-1 AND SC-GND-2 IN BASE CONTRACT.
   B. ALL RACK MOUNTED AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER.

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG

1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

LEVEL 01 - NORTH LEVEL 05 - NORTH

AREAS OF WORK

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

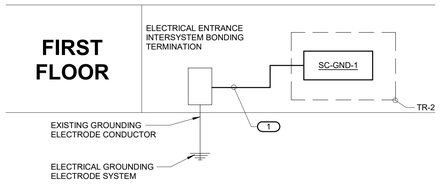
BPW CONTRACT #: 9258

SHEET TITLE:
TECHNOLOGY ROOM ENLARGEMENTS

REVISIONS:

2 3/22/23 Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**T300N**



1 TECHNOLOGY BONDING RISER DIAGRAM

NO SCALE

NOTES:

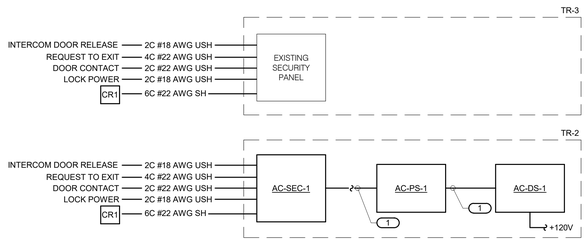
1. THIS RISER IS DIAGRAMMATIC AND MAY NOT SHOW ACTUAL ROUTING OR QUANTITIES OF MATERIALS. THIS RISER IS SHOWN FOR CLARIFICATION OF CONNECTION LOCATIONS AND CONDUCTOR TYPE. ALL CONNECTIONS AND SYSTEM DEVICES SHOWN ARE TYPICAL AND NOT REPRESENTATIVE OF ACTUAL PROJECT QUANTITIES. REFER TO FLOOR PLANS AND ENLARGED FLOOR PLANS FOR ACTUAL QUANTITIES AND LOCATIONS OF DEVICES AND MORE SPECIFIC ROUTING INFORMATION. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. ALL CONDUCTORS IN THE TECHNOLOGY BONDING SYSTEM SHALL BE MINIMUM SIZE OF 3/0 AWG PLENUM RATED COPPER (GREEN OR MARKED WITH A DISTINCTIVE GREEN COLOR) UNLESS CONDUCTOR LENGTH IS LESS THAN 66 FEET. REFER TO BONDING CONDUCTOR SIZING SCHEDULE FOR SIZING CRITERIA FOR CONDUCTORS LESS THAN 66 FEET IN LENGTH. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
3. ALL BONDING CONDUCTORS AND BONDING JUMPERS SHALL BE CONNECTED BY COMPRESSION LUGS, EXOTHERMIC WELDING, OR IRREVERSIBLE COMPRESSION CONNECTORS. SOLDER IS NOT AN ACCEPTABLE MEANS OF CONNECTION. SHEET METAL SCREWS SHALL NOT BE USED TO CONNECT COMMUNICATIONS BONDING CONDUCTORS TO EQUIPMENT. WHERE NECESSARY, REMOVE PAINT AND/OR USE PAINT-PIERCING WASHERS TO PROVIDE PROPER ELECTRICAL BOND AT ALL CONNECTIONS.
4. REFER TO 2/T400N FOR TYPICAL TELECOM ROOM BONDING FLOW DIAGRAM.
5. REFER TO TELECOM ROOM REFERENCES SCHEDULE ON DRAWING T00N FOR TELECOMMUNICATIONS ROOM NUMBER AND LOCATION INFORMATION.

KEYNOTES:

1. BONDING CONDUCTOR FOR TELECOMMUNICATIONS (BCT). BCT SHALL BE THE SAME SIZE AS THE TBB OR LARGER. REFER TO BONDING CONDUCTOR SIZING SCHEDULE FOR SIZING REQUIREMENTS.

BONDING CONDUCTOR SIZING SCHEDULE

CONDUCTOR LENGTH IN FEET	MINIMUM ACCEPTABLE SIZE - AWG
LESS THAN 13'	6
14' - 20'	4
21' - 26'	3
27' - 33'	2
34' - 41'	1
42' - 52'	1/0
53' - 66'	2/0
GREATER THAN 66'	3/0



2 ACCESS CONTROL RISER DIAGRAM

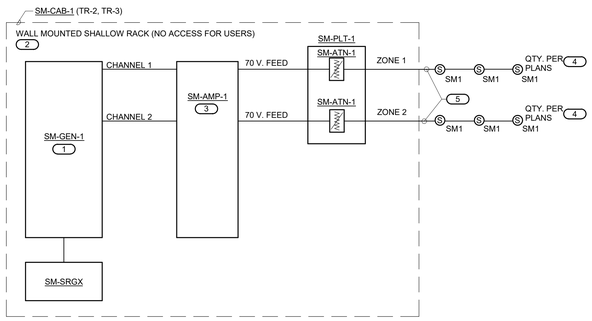
NO SCALE

NOTES:

1. THIS DIAGRAM IS DIAGRAMMATIC AND MAY NOT SHOW ACTUAL DEVICE QUANTITIES OR LOCATIONS. ALL DEVICES SHOWN ARE TYPICAL AND MAY NOT REFLECT EVERY WIRE OR CONNECTION THAT MUST BE MADE. WIRING SHOWN ON THIS DIAGRAM REFLECTS THE REQUIREMENTS FOR THE BASIS OF DESIGN MANUFACTURER. ANY CHANGES REQUIRED DUE TO THE T.C.'S SELECTION OF AN ALTERNATE MANUFACTURER, INCLUDING ANY POWER REQUIRED FOR FIELD LOCATED SECURITY CONTROLLERS, SHALL BE INCLUDED IN THE T.C.'S BID.
2. ALL CONDUCTOR SIZES ARE LISTED A MINIMUM SIZES.
3. ALL WORKSTATIONS AND SERVERS REQUIRE A KEYBOARD AND MOUSE.
4. MULTICONDUCTOR COMPOSITE CABLES ARE ACCEPTABLE.

KEYNOTES: (#)

1. CABLE PER MANUFACTURER'S REQUIREMENTS.

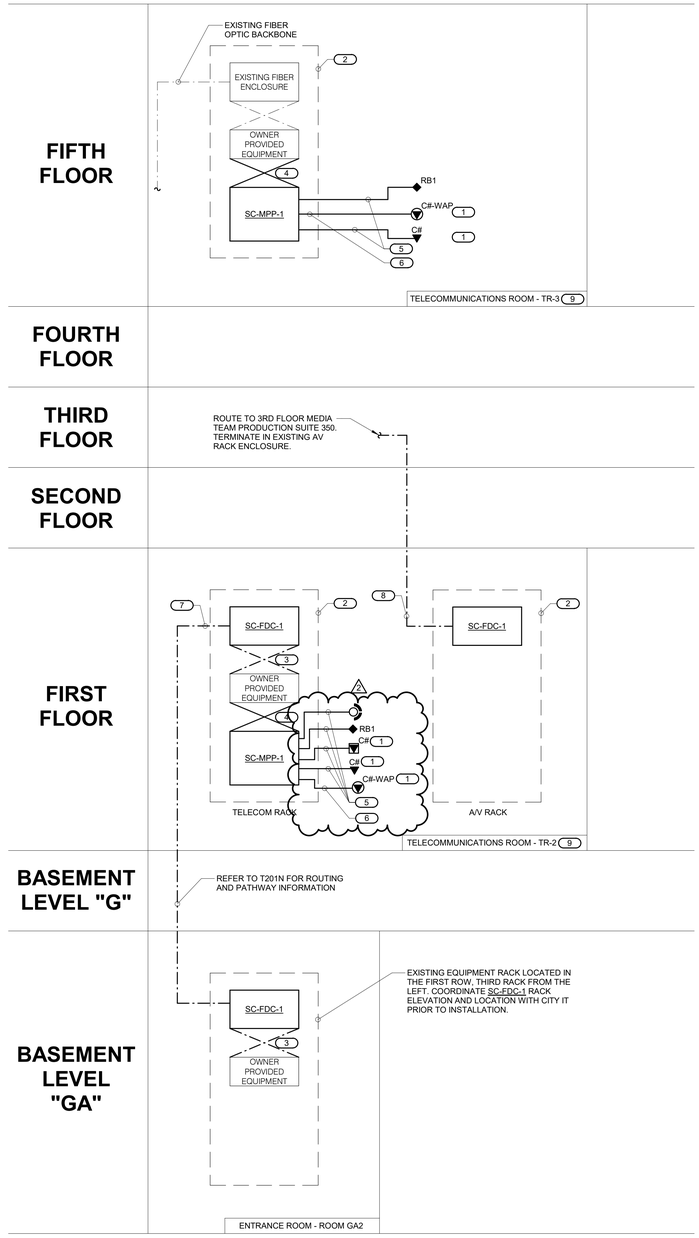


4 MASKING SYSTEM RISER DIAGRAM

NO SCALE

KEYNOTES: (#)

1. GENERATOR WITH SCHEDULE PRESETS OPERATING AND TESTED IN ADVANCE OF COMMISSIONING. SERVICES BY IMEG PER SPECIFICATIONS.
2. A.C. HARDCOUPLED INSIDE RACK (20A). E.C. POWER TO RACK SUPPLIED BY AUDIO MASKING CONTRACTOR AS REQUIRED. PREQUALIFIED MASKING IS REQUIRED WITH ANSI TYPE II TEST MICROPHONE.
3. CONFIGURE H.P.F. AS 100Hz, TYPICAL.
4. VERIFY ZONES WITH ACTUAL FIELD CONDITIONS. SHOULD WALLS, CEILINGS OR MOUNTINGS CHANGE, ADJUST AS REQUIRED FOR LAYOUTS, LOAD, AND SPEAKER TYPE. TRANSITION ZONES IN CORRIDORS ARE 1/2 POWER TAPS RELATIVE TO FINAL TAP SELECTION OF MASKING ZONES. CONFIRM ZONES ARE ONLY "LIKE" ACOUSTICAL AREAS.
5. WEST PENN 25224 2 CONDUCTOR UNTWISTED PAIR PLENUM RATED TYPICAL, IN STUBS AND MANAGED, SECURED, CABLE PATHS WITH TAGS.



3 FIBER AND COPPER RISER DIAGRAM

NO SCALE

NOTES:

1. THIS RISER IS DIAGRAMMATIC AND MAY NOT SHOW ACTUAL ROUTING OR QUANTITIES OF MATERIALS SHOWN. THIS RISER IS SHOWN FOR CLARIFICATION OF CONNECTION(S), LOCATIONS AND CABLE TYPE. ALL INFORMATION OUTLETS ARE TYPICAL OF THE OUTLETS IN THE AREA SHOWN. REFER TO FLOOR PLANS FOR MORE SPECIFIC ROUTING INFORMATION. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
2. REFER TO FLOOR PLANS FOR QUANTITY OF CABLES AND JACKS TO BE INSTALLED AT EACH INFORMATION OUTLET.

KEYNOTES: (#)

1. C# INDICATES VOICE/DATA FACEPLATE CONFIGURATION. REFER TO THE INFORMATION OUTLET SCHEDULE ON T600N FOR ADDITIONAL INFORMATION. REFER TO SPECIFICATIONS SECTION 27 15 00 FOR ADDITIONAL INFORMATION.
2. RACK OR CABINET AS DEFINED ON THE TELECOM ROOM LAYOUT. REFER TO THE TELECOM ROOM REFERENCES MATRIX ON THE COVERPAGE FOR LOCATION.
3. REFER TO SPECIFICATIONS FOR FIBER PATCH CORD REQUIREMENTS.
4. RJ-45 TO RJ45 CATEGORY 6 AND CATEGORY 6A UTP PATCH CORDS. REFER TO SPECIFICATIONS.
5. 4-PAIR, CATEGORY 6, UNSHIELDED TWISTED PAIR CABLE, REFER TO SPECIFICATIONS.
6. 4-PAIR, CATEGORY 6A, UNSHIELDED TWISTED PAIR CABLE, REFER TO SPECIFICATIONS.
7. 24 STRAND SM FIBER OPTIC CABLE, LC CONNECTORS. REFER TO SPECIFICATIONS.
8. 6 STRAND SM FIBER OPTIC CABLE, SC CONNECTORS. REFER TO SPECIFICATIONS.
9. REFER TO COVERPAGE AND FLOOR PLANS FOR TELECOMMUNICATIONS ROOM LOCATIONS.

T 414.220.9640
751 North Jefferson St, Suite 200
Milwaukee, WI 53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

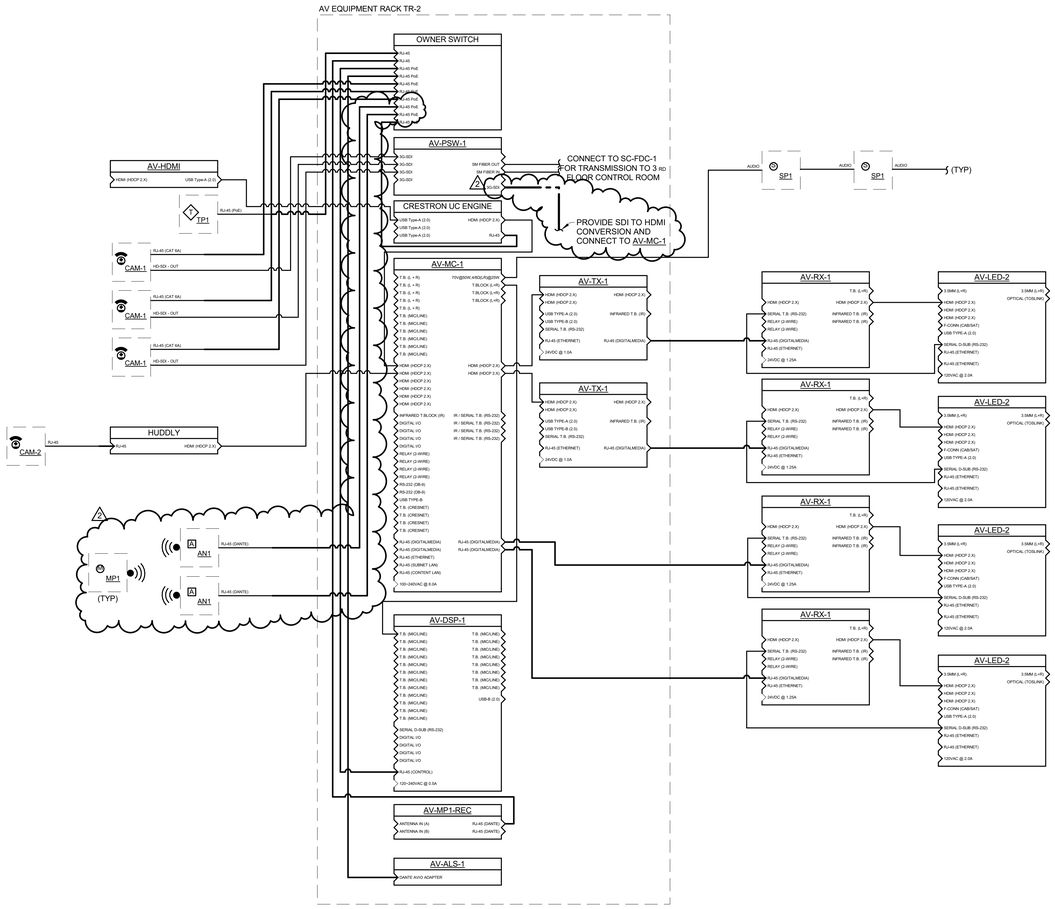
PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9026

SHEET TITLE: TECHNOLOGY DIAGRAMS - NORTH

REVISIONS:
2 3/22/23 Addendum #2

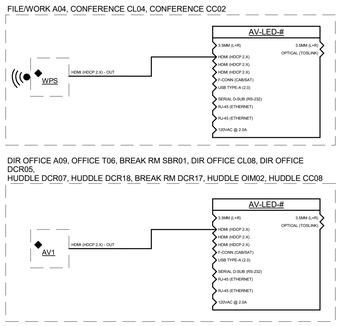
SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/2022
SHEET NUMBER	T500N



1 CONFERENCE SCR01 FUNCTIONAL DIAGRAM

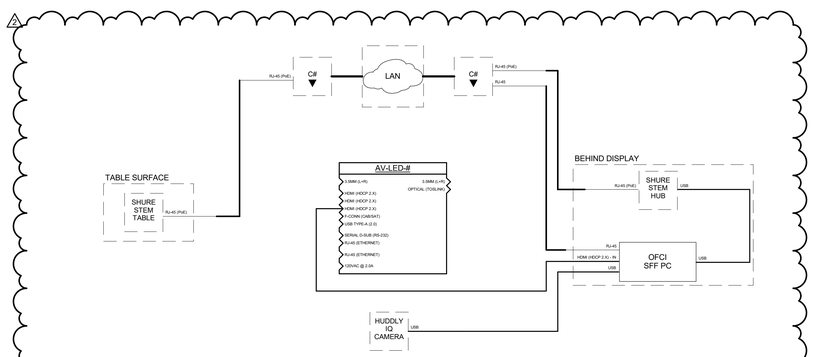
NO SCALE

NOTES:
1. FOR REFERENCE ONLY. AV EQUIPMENT AND CABLING PROVIDED IN SEPARATE CONTRACT WITH OWNER.



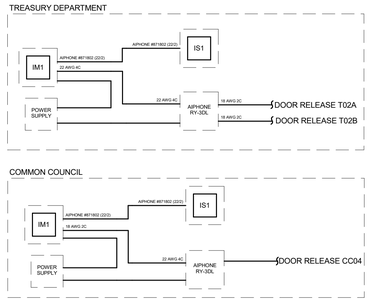
2 PASSIVE AV FUNCTIONAL DIAGRAMS

NO SCALE



4 SHURE STEM SYSTEM DIAGRAM

NO SCALE



3 VIDEO INTERCOM FUNCTIONAL DIAGRAMS

NO SCALE

T 414.220.9640
751 North Jefferson St, Suite 200
Milwaukee, WI 53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS
210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 8926

SHEET TITLE:
TECHNOLOGY DIAGRAMS - NORTH

REVISIONS:

2	3/22/23	Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	**PLAN REVIEW**
DATE ISSUED	**12/22/2022**
SHEET NUMBER	**T501N**

TECHNOLOGY EQUIPMENT SCHEDULE

THE EQUIPMENT LIST ABBREVIATIONS AND THE TECHNOLOGY EQUIPMENT SCHEDULE ARE FOR THE CONVENIENCE OF THE CONTRACTOR. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF QUANTITIES AND SHALL FURNISH ALL MATERIAL REQUIRED, WHETHER SPECIFIED OR NOT, TO PRODUCE A SATISFACTORY WORKING SYSTEM.

CATALOG NUMBERS ARE NOT TO BE CONSIDERED COMPLETE BUT ARE GIVEN ONLY TO AID THE CONTRACTOR IN THE SEARCH FOR MATERIAL. NO MATERIAL SHALL BE ORDERED BY MANUFACTURER AND CATALOG NUMBER ONLY. EACH CONTRACTOR SHALL FIRST READ THE COMPLETE DESCRIPTION OF THE MATERIAL ON THESE DRAWINGS AND SPECIFICATIONS. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN. "STANDARD COLOR" INDICATES FACTORY FINISH AVAILABLE AT NO ADDITIONAL CHARGE.

EQUIPMENT LIST ABBREVIATION	EQUIPMENT LIST DESCRIPTION	MANUFACTURER AND MODEL
AC-CR1-W	CARD READER WITH KEYPAD, WALL MOUNT. PROVIDED AS INTEGRAL PART OF SECURITY MANAGEMENT SYSTEM. REFER TO CONTROLLED SECURITY SCHEME (CSS) TYPE SCHEDULE ON T600 FOR ADDITIONAL INFORMATION. CARD READERS SHOWN ON PLANS TO IDENTIFY INTENDED MOUNTING LOCATION. REFER TO SPECIFICATION SECTION 28 13 00 FOR COMPLETE INFORMATION.	KEYSCAN K-KPR SERIES NO EXCEPTIONS
AC-CR2-W	CARD READER WITH KEYPAD, MULLION MOUNT. PROVIDED AS INTEGRAL PART OF SECURITY MANAGEMENT SYSTEM. REFER TO CONTROLLED SECURITY SCHEME (CSS) TYPE SCHEDULE ON T600 FOR ADDITIONAL INFORMATION. CARD READERS SHOWN ON PLANS TO IDENTIFY INTENDED MOUNTING LOCATION. REFER TO SPECIFICATION SECTION 28 13 00 FOR COMPLETE INFORMATION.	KEYSCAN K-KPR SERIES NO EXCEPTIONS
AC-DS-1	ACCESS CONTROL SYSTEM DISTRIBUTION PANEL. REFER TO SPECIFICATION SECTION 28 13 00 FOR ADDITIONAL INFORMATION.	ALTRONIX AL168175CB NO EXCEPTIONS
AC-PS-1	ACCESS CONTROL SYSTEM POWER SUPPLY PANEL. REFER TO SPECIFICATION SECTION 28 13 00 FOR ADDITIONAL INFORMAION.	ALTRONIX AL600ULACM NO EXCEPTIONS
AC-RPB-W	REQUEST TO EXIT PUSH BUTTON, WALL MOUNT. PROVIDE A SINGLE GANG BACKBOX WITH (1) 3/4" CONDUIT ROUTED TO ABOVE CEILING. PROVIDE 18/4 AWG CABLE FROM PUSH BUTTON TO ACCESS CONTROL PANEL.	SECURITRON EEB
AC-SEC-1	ACCESS CONTROL SYSTEM. REFER TO SPECIFICATION SECTION 28 13 00 FOR COMPLETE INFORMATION.	KEYSCAN ACCESS CONTROL NO EXCEPTIONS
AV-ALS-1	ASSISTIVE LISTENING SYSTEM, FM WIDEBAND TRANSMITTER. FCC PART 15 COMPLIANT. DSP AUDIO PROCESSING, NETWORK CONTROL CAPABILITY, DANTE AUDIO INPUT, DIGITAL AUDIO INPUTS WITH AES. OPERATING FREQUENCY: 72.1-75.9 MHz. TRANSMISSION RANGE: 1000 FT. 19" RACK MOUNTABLE. INCLUDES (1) TRANSMITTER, (4) RECEIVERS, (4) EARPHONES, (2) NECK LOOPS, (1) DANTE 1-CHANNEL XLR ADAPTER, (1) USB CHARGER KIT, (1) ANTENNA KIT, (1) WALL PLAQUE, (1) RACK PANEL KIT, (1) POWER SUPPLY, (1) RCA AUDIO CABLE, (1) POWER CORD.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. LISTEN TECHNOLOGIES LS-31-072-D NO EXCEPTIONS
AV-ANT-W	WIRELESS MICROPHONE ANTENNA, WALL MOUNT. WIDE BAND RF COVERAGE, PROVIDE WITH WALL MOUNT BRACKET.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. SHURE MICROFLEX MXWAPT8 NO EXCEPTIONS
AV-AV1-W	AV WALL PLATE. INSTALL A 5" SQUARE BACKBOX WITH A SINGLE GANG PLASTER RING. INSTALL A 1.25" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING UNLESS OTHERWISE NOTED. TERMINATE WITH NYLON BUSHING.	ROUGH-IN ONLY. AV CABLING PROVIDED IN SEPARATE CONTRACT WITH OWNER. BACKBOX: RANDAL T-55017 HDMI COUPLER FRAME: HUBBELL NS801 SERIES (DÉCOR)
AV-CAM-1	PTZ CAMERA, WALL MOUNT. 4K/60P RESOULUTION, 20X OPTICAL ZOOM. VIDEO OUTPUT: LAN POE++, HDI, 12G-SDI, 3G-SDI, HDMI, USB. FOR WALL MOUNTED APPLICATIONS PROVIDE (1) 4" SQUARE BACKBOXE WITH (1) 1" CONDUIT ROUTED TO NEAREST ACCESSIBLE CEILING. TERMINATE WITH NYLON BUSHING.	ROUGH-IN ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. PANASONIC AW-HE150 NO EXCEPTIONS
AV-CAM-2	VIDEO CONFERENCING CAMERA, SURFACE MOUNT. 1080P/30, 5X DIGITAL ZOOM. INPUTS: (1) RJ45, (1) USB 3.0. INCLUDES USB TO POE ADAPTER WITH USB-C AND USB-A CABLES AND POWER ADAPTER.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. HUDDLY L1 NO EXCEPTIONS
AV-DSP-1	DIGITAL SIGNAL PROCESSOR. 32x32 CHANNELS OF DIGITAL AUDIO NETWORKING VIA DANTE PROTOCOL. AES67 ENABLES DANTE ENDPOINTS. CONNECTIONS: (4) MIC/LINE INPUTS WITH AEC, (4) LINE OUTPUTS. FREQUENCY RESPONSE: 20 Hz to 20 kHz ±4 dB. INPUTS: (1) RJ-45 ETHERNET PORT, (1) RJ-45 SIP VoIP INTERFACE, (1) RJ-45 DANTE, (1) RJ-11 POTS, (1) RS-232 CONTROL. (1) RU 19"RACK MOUNTABLE.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. BIAMP TESIERAFORTE DAN AI NO EXCEPTIONS
AV-HDMI	HDMI TO USB 3.0 CONVERTER. INPUT: (1) HDMI, OUTPUT: (1) USB 3.0. RESULUTION: 1080P/60. INCLUDES (1) 6' HDMI TYPE A CABLE AND (1) 3' UWB 3.0 TYPE-B TO TYPE-A CABLE.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. CRESTRON HD-CONV-USB-200 NO EXCEPTIONS
AV-LED-1	65" LED FLAT PANEL DISPLAY,3840x2160 RESOLUTION, UHD UPSCALING, BUILT-IN Wi-Fi, INPUTS: (2) HDMI, (1) USB, (1) RF IN. OUTPUTS: (1) DIGITAL AUDIO, RS-232 CONTROL, POWER REQUIREMENT: 110-120 VAC, 60 Hz, DIMENSION: DIMENSIONS: 38"H X 63"W X 7" D.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. SAMSUNG QHR SERIES CHRISTIE SHARP
AV-LED-2	85" LED FLAT PANEL DISPLAY, 3840x2160 RESOLUTION, UHD UPSCALING, BUILT-IN Wi-Fi, INPUTS: (2) HDMI, (1) USB, (1) RF IN. OUTPUTS: (1) DIGITAL AUDIO, RS-232 CONTROL, POWER REQUIREMENT: 110-120 VAC, 60 Hz, DIMENSION: DIMENSIONS: 49"H X 83"W X 10" D.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. SAMSUNG QMR SERIES CHRISTIE SHARP
AV-MC-1	SCALING PRESENTATION SWITCHER AND CONTROLLER, 8 INPUTS INCLUDING MINIMUM 2 HDMI, 2 HDBASET, AND ANALOG RCA AUDIO, 2 SWITCHED HDMI AND 2 SWITCHED HDBASET OUTPUTS AND 1 ANALOG AUDIO OUTPUTS WITH INTEGRATED 70V AMPLIFIER, INPUT SCALING TO 1080P AND WUXGA (1920 X 1200) OUTPUT, LAN OR RS232 CONTROL OF AUDIO VIDEO EQUIPMENT, 3 RU HEIGHT.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. CRESTRON DMPS3-4K-350-C NO EXCEPTIONS
AV-MNT-1	TILTING WALL MOUNT, TILTS: +2° TO -12°, FITS SCREEN SIZES 37" TO 65", 17.4 ADJUSTABLE LATERAL SHIFT, MANUAL HEIGHT ADJUSTMENT 1", MAXIMUM WEIGHT: 200 LBS. DIMENSION 18.25" H X 25.75" W X 2" D. PROVIDE WITH CHIEF (FCAV1U) PULL OUT ACCESSORY.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. 2 CHIEF MOUNT: MTM1U PULL OUT ACCESSORY: FCAV1U SLIDING COMPONENT PANEL: CSSLP15X10
AV-MNT-2	ARTICULATING WALL MOUNT, FITS SCREEN SIZES 47" TO 75", 16" ADJUSTABLE LATERAL SHIFT, MANUAL HEIGHT ADJUSTMENT 1", MAXIMUM WEIGHT: 125 LBS. PROVIDE WITH INSTALL HARDWARE KIT.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. CHIEF MOUNT: TS525TU HARDWARE KIT: FHB5034
AV-MNT-3	TILTING WALL MOUNT, TILTS: +2° TO -12°, FITS SCREEN SIZES 37" TO 85", 17.4 ADJUSTABLE LATERAL SHIFT, MANUAL HEIGHT ADJUSTMENT 1", MAXIMUM WEIGHT: 200 LBS. DIMENSION 18.25" H X 25.75" W X 2" D. PROVIDE WITH CHIEF PULL OUT ACCESSORY AND SLIDING COMPONENT PANEL.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. 2 CHIEF MOUNT: LTM1U PULL OUT ACCESSORY: FCAV1U SLIDING COMPONENT PANEL: CSSLP15X10
AV-MP1-REC	WIRELESS MICROPHONE RECEIVER, 1400 TUNABLE UHF FREQUENCIES, 516MHz TO 865MHz RF FREQUENCY RANGE, 32 PRESETS, >115dB(A) SNR, <0.9% THD, INPUT ON XLR CONNECTOR, AUDIO OUTPUT +18 dBU. (2) 5 OHM BNC ANTENNA CONNECTORS. PROVIDE WITH RACK MOUNT AND POWER SUPPLY.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. SHURE MICROFLEX MXWANI8 NO EXCEPTIONS

TECHNOLOGY EQUIPMENT SCHEDULE

THE EQUIPMENT LIST ABBREVIATIONS AND THE TECHNOLOGY EQUIPMENT SCHEDULE ARE FOR THE CONVENIENCE OF THE CONTRACTOR. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF QUANTITIES AND SHALL FURNISH ALL MATERIAL REQUIRED, WHETHER SPECIFIED OR NOT, TO PRODUCE A SATISFACTORY WORKING SYSTEM.

CATALOG NUMBERS ARE NOT TO BE CONSIDERED COMPLETE BUT ARE GIVEN ONLY TO AID THE CONTRACTOR IN THE SEARCH FOR MATERIAL. NO MATERIAL SHALL BE ORDERED BY MANUFACTURER AND CATALOG NUMBER ONLY. EACH CONTRACTOR SHALL FIRST READ THE COMPLETE DESCRIPTION OF THE MATERIAL ON THESE DRAWINGS AND SPECIFICATIONS. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN. "STANDARD COLOR" INDICATES FACTORY FINISH AVAILABLE AT NO ADDITIONAL CHARGE.

EQUIPMENT LIST ABBREVIATION	EQUIPMENT LIST DESCRIPTION	MANUFACTURER AND MODEL
AV-MP1-S	DESKTOP WIRELESS MICROPHONE, 10-20,000 Hz FREQUENCY RANGE, 200 OHMS IMPEDANCE. PRESSURE SENSITIVE, TENSIONLESS LOW-MASS ELECTRET CONDENSER ELEMENT, ENHANCED WITH AN INTEGRATED FET LOW NOISE PREAMPLIFIER, 10'-12' COVERAGE RANGE, 28 dB SPL NOISE LEVEL. PROVIDE WITH NETWORK CHARGING STATIONS WITH PORT QUANTITES APPROPRIATE FOR EACH SPACE.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. SHURE MICROFLEX BASE TRANSMITTER: MXW8 GOOSENECK MICROPHONE: MX410LP/C NETWORKED CHARGING STATION: MXWNCS SERIES NO EXCEPTIONS
AV-PC-1	VOLTAGE REGULATOR POWER CONDITIONER. TOROIDAL TRANSFORMER. ACCEPTS INPUT VOLTAGE BETWEEN 90V-139V AND TRANSFORMERS IT TO A CONSTANT 120V. +5V FROM 97V-137V. NOISE ATTENUATION OF 100dB @ 10kHz, 40dB @ 100kHz AND 50dB @ 500 kHz. 188V PEAK @ 3000 AMPS SPIKE CLAMPING. 6500 AMPS MAXIMUM SURGE. MAXIMUM INPUT CURRENT OF 15 AMPS AND 1800 WATTS, UL LISTED. 10 FEET 14 AWG POWER CORD WITH NEMA 15 PLUG. ONE FRONT PANEL OUTLET, AND 8 REAR PANEL NEMA 5-15 OUTLETS. ISOLATED FILTER BANKS. FRONT DIGITAL VOLTMETER OR AMMETER. WEIGHT: 15 lbs. REQUIRES (1) RU OF SPACE.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. FURMAN P=1800 PF R TRIPPLITE
AV-PSW-1	VIDEO PRODUCTION SWITCH, 1RU RACK MOUNT. PROVIDES CAPACITY FOR (4) SINGLE OR (2) DUAL-SLOT MODULES. DIMENSIONS: 19"(W) x 1.75"(H) x 16"(D). POWER: 110W @ 1.3A.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. EVERTZ CHASSIS FRAME: 7801FR TRANSMITTER MODULE: 7707VT13-8+SC+1RU RECEIVER MODULE: 7707VR-8+SC+3RU NO EXCEPTIONS
AV-RB1-W	RECESSED WALL BOX, 14.25"x14.25"x4". PROVIDE WITH CABLING CONNECTIONS AS SPECIFIED ON THE DRAWINGS, INTERNAL AC BRACKET, AND ROUGH-IN TO SUPPORT AV CABLING AND ELECTRICAL OUTLETS. PROVIDE (1) 1.25" CONDUIT TO ABOCE ACCESSIBLE CEILING FOR AV CABLING, (1) 1" CONDUIT TO ABOVE ACCESSIBLE CEILING FOR DATA CABLING, AND (1) 0.75" CONDUIT FOR POWER. PROVIDE SINGLE GANG BACKBOXES MOUNTED TO WALL BOX FOR TERMINATION OF CONDUITS AND MOUNTING OF COVERPLATES. CABLE COILS AND SURFACE MOUNT BOXES INSIDE OF WALL BOX WILL NOT BE ACCEPTED. REFER TO 4/T400 AND 5/T400 FOR ADDITIONAL INFORMATION.	WALL BOX: FSR PWB-320-ESK AC BRACKET: FSR PWB-320-AC2 JACK: HUBBELL HXJ6 SERIES COVERPLATE: HUBBELL IFP SERIES
AV-RX-1	AV DIGITAL MEDIA RECEIVER, (4096 X 2160) RESOLUTION. CONNECTIONS: (1) DM RJ45 INPUT, (1) COM RS-232, (1) IR, (1) HDMI OUTPUT. FREQUENCY RESPONSE: 20 HZ -20 KHZ @ +0.5DB. POWER SUPPLY: INPUT: 100-240 VAC, 50-60 HZ OUTPUT: 24 VDC, 1.25A.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. CRESTRON DM-RMC-4KZ-SCALER-C
AV-SP1-C	PERFORMANCE AUDIO SPEAKER, CEILING MOUNTED. SOUND REINFORCEMENT, HEMISPHERICAL DISPERSION, FULL RANGE TYPE WITH BASS REFLEX ENCLOSURE. 70V CONTINUOUS POWER HANDLING, SENSITIVITY: 90dB SPL @ 1W/1M, 70Hz-20kHz FREQUENCY RESPONSE. UNITS ARE DAISY CHAINED TOGETHER IN A 70V CONFIGURATION UNLESS OTHERWISE NOTED.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. JBL CONTROL 26CT NO EXCEPTIONS
AV-TP1-S	10" AV TOUCH PANEL, SURFACE MOUNT. UC TRANSMITTER AND UC BRACKET ASSEMBLY KIT FOR VIDEO CONFERENCING AND BYOD INTEGRATION.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. CRESTRON FLEX UC-CX100-Z 2 NO EXCEPTIONS
AV-TX-1	AV DIGITAL MEDIA TRANSMITTER, (4096 X 2160) RESOLUTION. CONNECTIONS: (1) DM RJ45 OUTPUT, (1) HDMI INPUT. FREQUENCY RESPONSE: 20 HZ - 20 KHZ @ +0.5DB. POWER SUPPLY: INPUT: 100-240 VAC, 50-60 HZ OUTPUT: 24 VDC, 1.25A.	FOR REFERENCE ONLY. AV EQUIPMENT PROVIDED IN SEPARATE CONTRACT WITH OWNER. CRESTRON DM-TX-4KZ-302-C
IC-IM1-W	INTERCOM VIDEO PHONE MASTER STATION. SUPPLIED WITH SELECTIVE DOOR RELEASE RELAY (AIPHONE RY-3DL) FOR DOOR RELEASE AND POWER SUPPLY (AIPHONE PS-182OUL). HANDS FREE AUDIO COMMUNICATION, WALL MOUNT, ONE BUTTON ACCESS TO EACH DOOR STATION. DISABLE AUTO-RECORDING FUNCTION. ROUGH IN WITH (1) 1" CONDUIT TO 4" SQUARE BACK BOX WITH SINGLE GANG PLASTER RING. REFER TO 4/T501 FOR CABLING REQUIREMENTS.	AIPHONE JFS-2MED AXIS
IC-IS1-W	VIDEO PHONE INTERCOM DOOR STATION. RECESSED, VANDAL PROOF, CORROSION RESISTANT HOUSING, STAINLESS STEEL FACEPLATE, 99dB ENVIRONMENTALLY SEALED SPEAKER DRIVER, 400-4000 Hz FREQUENCY RESPONSE. FULL DUPLEX TWO WAY COMMUNICATION. ROUGH IN WITH (1) 1" CONDUIT TO 4" SQUARE BACK BOX WITH SINGLE GANG PLASTER RING. MOUNT AT +48" AFF. CABLE STATION FROM BACK BOX TO INTERCOM MASTER STATION.	AIPHONE JF-DVF AXIS
IC-IS2-W	WINDOW TALK-THROUGH UNIT, COUNTER MOUNT. INSTALL INSIDE UNIT AND OUTSIDE UNIT BACK-TO-BACK. CONCEAL CABLE BETWEEN UNITS AND SECURE OUTSIDE UNIT TO COUNTER.	NORCON TTU-3X NO EXCEPTIONS
SC-CT-1	CABLE TRAY, WIRE MESH TYPE, 12" LOADING DEPTH, 4" WIDTH, COMPLETE WITH ALL FITTINGS AND MOUNTING HARDWARE. PROVIDE TRAPEZE SUPPORT WITH PLASTIC RETAINER. CUTTING OF THE MESH CABLE TRAY SHALL BE DONE WITH OFFSET BOLT CUTTERS ONLY. 10' MAXIMUM SUPPORT SPAN. EITHER SPLICE WASHERS OR TERMINAL GROUND SUPPORT AND JUMPER WIRE SHALL BE USED TO ATTAIN GROUNDING CONTINUITY THROUGHOUT. Z-BRACKETS SHALL BE USED FOR WALL MOUNTED APPLICATIONS. REFER TO MANUFACTURERS INSTALLATION INSTRUCTIONS AND SPECIFICATION SECTION 27 05 28 FOR ADDITIONAL INFORMATION.	WBT WBT12X4 CABOLFIL B-LINE CHATSWORTH
SC-ER-1	STANDARD 19" EQUIPMENT RACK, 84"H X 19"W X 15"D, FEATURING PASS-THRU HOLES ON FRONT AND SIDES FOR CABLE MANAGEMENT (HUBBELL VS76H), DURABLE BLACK POWDER COAT FINISH, MEETS EIA-310-E REQUIREMENT AND PROVIDES (45) 19" X 1.75" MOUNTING SPACES. PROVIDE WITH TOP CENTER WATERFALL, TOP CHANNEL PATHWAY FOR LADDER RACK, AND ANY ADDITIONAL HARDWARE FOR COMPLETE INSTALLATION. REFER TO SPECIFICATIONS SECTION 27 11 00 FOR ADDITIONAL INFORMATION.	HUBBELL HPW84RR19 NO EXCEPTIONS
SC-FDC-1	OPTICAL FIBER DISTRIBUTION CABINET, RACK MOUNT. 72 FIBER MAXIMUM CAPACITY, FRONT LOCKING DOOR, SLIDE OUT RAILS TO FACILITATE FRONT ACCESS, JUMPER TROUGHS IN CONNECTOR PANELS TO REDUCE MOUNTING SPACE. REQUIRES (1) 19" X 1.75" RACK MOUNTING SPACES. PROVIDE WITH CLAMP AND GROUNDING KIT, COUPLING PANEL(S), JUMPERS, AND REAR MOUNTED CLOSET HOUSING PANEL(S). REFER TO SPECIFICATIONS SECTION 27 11 00 FOR ADDITIONAL INFORMATION.	HUBBELL FCR1U3SP CORNING
SC-GND-1	GROUNDING BUSBAR, WALL MOUNT. 4" H X 12" L X 1/4" D COPPER, ELECTRICALLY ISOLATED BY INSULATORS INTEGRAL TO MOUNTING BRACKETS. COPPER GROUND BAR IS 1/4" THICK AND STAND OFF 2.75" FROM WALL. THE 12" BUSBAR PROVIDES CONNECTION FOR EIGHTEEN (18) 2-HOLE COMPRESSION LUGS RESPECTIVELY WITH 5/8" OR 1" CENTERS. ANSI/TIA-607 AND BICSI COMPLIANT. UL LISTED. REFER TO GROUND BAR DETAIL ON T400# AND SPECIFICATION SECTION 27 11 00 FOR ADDITIONAL INFORMATION.	CHATSWORTH 40153-012 PANDUIT ERICO HARGER
SC-GND-2	19" RACK-MOUNT HORIZONTAL GROUND BAR. (3/16" x 3/4" X 19") PROVIES CONNECTION FOR (10) 2-HOLE COMPRESSION LUGS RESPECTIVELY WITH 5/8" OR 1" CENTERS. ANSI/TIA-607 AND BICSI COMPLIANT. UL LISTED. REFER TO SPECIFICATION SECTION 27 11 00 FOR ADDITIONAL INFORMATION.	CHATSWORTH 10610-019 NEWTON PANDUIT ERICO
SC-HWM-1	HORIZONTAL WIRE MANAGEMENT, 3" X 3" RIGID FRONT FINGERS WITH FLEXIBLE RETENTION TABS, 2" X 5" FLEXIBLE REAR FINGERS. REMOVABLE FRONT COVER HINGES 180 UP OR DOWN. INTEGRAL BEND RADIUS CONTROL. PASS THROUGH HOLES ALLOW FRONT TO REAR CABLING. REQUIRES (2) 1.75" MOUNTING SPACES.	HUBBELL HC219CE1N NO EXCEPTIONS
SC-IO-C	INFORMATION OUTLET, CEILING MOUNT. REFER TO INFORMATION OUTLET SCHEDULE FOR PIN CONFIGURATION. " # " INDICATES INFORMATION OUTLET FACEPLATE CONFIGURATION AS INDICATED ON THE PLANS. INSTALL INFORMATION OUTLET IN A 2-PORT SURFACE MOUNT BOX WITH SLACK LOOP SUPPORTED BY J-HOOK. REFER TO 2/T401# FOR ADDITIONAL INFORMATION.	HUBBELL COVER PLATE: FCXX SERIES JACK: (CAT6A) HJ6A SERIES NO EXCEPTIONS
SC-IO-W	INFORMATION OUTLET, WALL MOUNT. COVERPLATE AS INDICATED ON DRAWINGS AND INFORMATION OUTLET SCHEDULE. REFER TO INFORMATION OUTLET SCHEDULE FOR PIN CONFIGURATION. " # "INDICATES INFORMATION OUTLET FACEPLATE CONFIGURATION AS INDICATED ON THE DRAWINGS. " W " PROVIDE (1) RJ-45 JACK FOR VOICE AT +48" AFF FOR WALL HUNG PHONE. PROVIDE WITH STAINLESS STEEL FACEPLATE, MATING LUGS. INSTALL INFORMATION OUTLET IN A 4" SQUARE BACKBOX WITH A SINGLE GANG PLASTER RING. INSTALL A 1" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING UNLESS OTHERWISE NOTED. PROVIDE REMOVABLE BLANK INSERTS FOR UNUSED PORTS. REFER TO 1/T401# AND SPECIFICATION SECTION 27 15 00 FOR ADDITIONAL INFORMATION.	HUBBELL COVER PLATE: IFP SERIES JACK: (CAT6) HXJ6 SERIES NO EXCEPTIONS

TECHNOLOGY EQUIPMENT SCHEDULE

THE EQUIPMENT LIST ABBREVIATIONS AND THE TECHNOLOGY EQUIPMENT SCHEDULE ARE FOR THE CONVENIENCE OF THE CONTRACTOR. EACH CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFICATION OF QUANTITIES AND SHALL FURNISH ALL MATERIAL REQUIRED, WHETHER SPECIFIED OR NOT, TO PRODUCE A SATISFACTORY WORKING SYSTEM.

CATALOG NUMBERS ARE NOT TO BE CONSIDERED COMPLETE BUT ARE GIVEN ONLY TO AID THE CONTRACTOR IN THE SEARCH FOR MATERIAL. NO MATERIAL SHALL BE ORDERED BY MANUFACTURER AND CATALOG NUMBER ONLY. EACH CONTRACTOR SHALL FIRST READ THE COMPLETE DESCRIPTION OF THE MATERIAL ON THESE DRAWINGS AND SPECIFICATIONS. THE FIRST MANUFACTURER LISTED IS THE BASIS OF DESIGN. "STANDARD COLOR" INDICATES FACTORY FINISH AVAILABLE AT NO ADDITIONAL CHARGE.

EQUIPMENT LIST ABBREVIATION	EQUIPMENT LIST DESCRIPTION	MANUFACTURER AND MODEL
SC-LR-1	LADDER RACK, (12"W x 1.5"H x 9.71'L) TUBULAR STEEL CONSTRUCTION. RUST RESISTANT ENAMEL FINISH. REMOVE SHARP BURRS FROM LADDER RACK AND REPAINT ALL AREAS THAT HAVE BEEN FIELD MODIFIED, CUT, OR EXPOSED. UL LISTED. PROVIDE WITH ALL NECESSARY MOUNTING BRACKETS, RACK ELEVATION KITS, AND (2) CABLE RADIUS DROPS PER RACK.	CHATSWORTH LADDER RACK: 11275-712 RACK ELEVATION KIT: 10506-706 CABLE RADIUS DROP: 12100-712
SC-MPP-1	MODULAR PATCH PANEL, 48 MODULAR RJ-45 TERMINATIONS, MOUNTS DIRECTLY TO EIA/TIA STANDARD 19" RELAY RACK, PORT IDENTIFICATION NUMBERS, PROVIDED WITH COLOR CODING AND LABEL HOLDER KITS, U.L. LISTED. REQUIRES (2) 1.75" MOUNTING SPACES.	HUBBELL CAT 6: HP648 CAT6A: HP6A 48 UNLOADED: NSPJ48 NO EXCEPTIONS
SC-PS-1	POWER STRIP, HORIZONTALL MOUNTS IN A STANDARD 19" RACK. (10) NEMA 5-15R REAR RECEPTACLES, 120VAC/60Hz, 10' POWER CORD. 15A THERMAL BREAKER, UL LISTED. REQUIRES (1) 1.75" MOUNTING SPACE.	GEIST BR100-10
SC-RI-W	TECHNOLOGY ROUGH-IN, INSTALL A 4" SQUARE BACKBOX WITH A SINGLE GANG PLASTER RING. INSTALL A 1.25" EMT CONDUIT TO NEAREST ACCESSIBLE CEILING UNLESS OTHERWISE NOTED. TERMINATE WITH NYLON BUSHING.	.
SC-TTB	TELECOMMUNICATIONS TERMINAL BOARD, 4'X8'X3/4" A-C GRADE FIRE-RATED PLYWOOD. EXPOSED SIDE SHALL BE SMOOTH. MOUNT VERTICALLY WITH TOP OF PLYWOOD AT 8'-6" AFF. IN THE EVENT THE MANUFACTURER'S RATING STAMP IS NOT VISIBLE ON THE SMOOTH SIDE, THE CONTRACTOR SHALL PROVIDE A LAMINATED LETTER FROM THE MANUFACTURER OR SUPPLIER CERTIFYING THAT THE PLYWOOD IS FIRE-RATED AND ATTACH THE LETTER WITH A PICTURE OF THE RATING STAMP, TO THE PLYWOOD. FIRE RATED PLYWOOD SHALL NOT BE PAINTED OR TREATED WITH ANY TYPE OF SEALANT THAT WOULD LESSEN THE INTEGRITY OF THE FIRE RATING.	.
SC-VWM-1	SINGLE-SIDED VERTICAL WIRE MANAGER, 7'H X 6"W X 12.5"D. REMOVABLE FRONT COVER HINGES ON LEFT OR RIGHT. SPOOLS FOR INTEGRAL BEND RADIUS CONTROL.	HUBBELL VS76H NO EXCEPTIONS
SM-AMP-1	4-CHANNEL POWER AMPLIFIER. DIRECT CONSTANT VOLTAGE (70V/100V) 300 WATTS PER CHANNEL, (140V/200V), LOW IMPENDENCE (2/4/8 OHM) 300 WATTS PER CHANNEL OR 600 WATTS BRIDGED. FULL RATED POWER OPERATION AT 0.35% THD, 2-OHM STABLE. FREQUENCY RESPONSE OF 20HZ - 20KHZ (+/-.25DB). SNR GREATER THAN 108 DB. CONTINUOUSLY VARIABLE SPEED, FRONT TO BACK FORCED AIR FLOW. WEIGHTS 20.1 LBS, REQUIRES 2RU OF RACK SPACE.	CROWN DCI 4-300 QSC LAB.GRUPPEN
SM-ATN-1	MASKING SPEAKER ATTENUATOR. 100W POWER RATING WITH TOTAL ATTENUATION OF 15dB IN 1.5dB PRECISION STEPS. PROVIDE WITH RACK MOUNTING PLATE.	ATLAS E408-100
SM-CAB-1	WALL MOUNTED ENCLOSED CABINET, 33.75"H X 22"W X 24"D OVERALL DIMENSIONS, FRONT AND REAR SECTION KEYED SEPARATELY, LOUVERED SIDES, 19" PANEL MOUNTING, UNIVERSAL MOUNTING RAILS, KNOCKOUTS IN TOP AND BOTTOM OF BACKPAN, TWO-HINGE DESIGN FOR FRONT-TO-REAR ACCESS, 250LB LOAD CAPACITY, PROVIDES (16) 1.75" MOUNTING SPACES. PROVIDE WITH 3" DEEP PERFORATED FRONT DOOR. VERIFY MANUFACTURER WALL MOUNTING AND BLOCKING REQUIREMENTS COORDINATE WITH E.C. FOR QUAD 20A/120V AC POWER OUTLET MOUNTED INSIDE EQUIPMENT RACK COORDINATE CONDUIT ENTRANCES INTO BACKPAN.	ATLAS WMA 16-23 MPFD16-3
SM-GEN-1	SOUND MASKING GENERATOR. 2 INPUT, 4 OUTPUT PINK NOISE GENERATOR. RS-232 AND USB CONTROL. OUTPUT POWER +22dBM BALANCED AND +18dBM UNBALANCED. 20Hz-20KHz FREQUENCY RESPONSE. PROVIDE WITH POWER SOURCE AND LATEST MANUFACTURER'S VERSION. PROVIDE WITH SCHEDULING CARD.	ATLAS ASP-MG24TDB
SM-PLT-1	ATTENUATOR RACK PLATE. 2 RU METAL PLATE PRE-PUNCHED FOR SIX PRECISION ATTENUATORS.	ATLAS ATPLATE-052
SM-SM1-C	8 INCH SOUND MASKING LOUDSPEAKER. PRE-ASSEMBLED UNIT CONTAINS LOUDSPEAKER, TRANSFORMER, ENCLOSURE, BAFFLE, AND MOUNTING HARDWARE. 100Hz TO 10KHz FREQUENCY RESPONSE, 94dB AVERAGE SENSITIVITY. 70V POWER TAPS OF 0.25, 0.5, 1, 2, AND 4 WATTS. PROVIDE IN BLACK. REFER TO 5/T401 FOR MOUNTING AND INSTALLATION DETAILS. SPEAKERS SHALL FIRE UP.	ATLAS M1000
SM-SRGX	SURGE PROTECTOR: COMPACT SURGE PROTECTION. UNIT IS 8 AMP LOAD CAPABLE AND HOUSED IN A HALF RACK ENCLOSURE (1.75" H x 5.31" W x 9.06" D) WEIGHING 3.4 LBS. UNIT FEATURES BOTH COMMON MODE AND NORMAL MODE IMPEDANCE TOLERANT EMI/RFI FILTERING. MOUNT INSIDE SOUND MASKING EQUIPMENT RACK WITH NO UNSECURED PLUG LOCATION. COORDINATE FINAL LOCATED FOR AC POWER FEED WITH ELECTRICAL CONTRACTOR.	SURGEX SA-82
VS-CM-1	FIXED SINGLE VARIFOCAL LENS, INTERIOR IP CAMERA. CEILING MOUNTED. 5 MEGAPIXEL. FEATURES: WIDE DYNAMIC RANGE, IR ILLUMINATION. VIDEO COMPRESSION: H.264, H.265, MOTION JPEG; IK10 IMPACT-RESISTANT CASING WITH HARD-COATED DOME; POWER: TYPICAL 6.4W, MAX 10.7W; OPERATING CONDITIONS: 0-50 DEG C.; INCLUDES VANDAL RESISTANT SCREWS. CAMERA COLOR: WHITE. INFORMATION OUTLET FOR CAMERA SHALL BE TERMINATED IN AN RJ-45 PLUG. REFER TO THE INFORMATION OUTLET SCHEDULE FOR ADDITIONAL INFORMATION PIN CONFIGURATION.	CAMERA: AXIS P3267-LV 2 TERMINATION: MODULAR PLUG (CAT6) HXJ6 SERIES OR PRE-APPROVED EQUAL

CONTROLLED SECURITY SCHEME (CSS) TYPE SCHEDULE (NORTH)

GENERAL NOTES:

1. ELECTRONIC DOOR HARDWARE SUCH AS ELECTRIC STRIKES, ELECTRIC LATCH RETRACTION, ETC. SHALL BE PROVIDED AND INSTALLED BY DOOR HARDWARE PROVIDER. REFER TO THE TECHNOLOGY EQUIPMENT SCHEDULE ON TN600 FOR CREDENTIAL READER TYPE INFORMATION.
2. REFER TO SPECIFICATIONS SECTION 08 71 00 FOR DOOR HARDWARE SETS AS IT RELATES TO THIS SCHEDULE.

		CREDENTIAL READER		INTEGRATION							REQUEST TO EXIT			DOOR HARDWARE				OTHER (REFER TO NOTES)		
DOOR #	ROUGH-IN ONLY	CREDENTIAL READER TYPE	MULTIPLE CREDENTIAL READERS OPERATES SINGLE DOOR	AUTOMATIC DOOR OPERATOR	LOCKED BY EMERGENCY DURESS SEQUENCE	REMOTE UNLOCK VIA INTERCOM MASTER	REMOTE UNLOCK VIA PUSHBUTTON	INTRUSION DETECTION	REMOTE UNLOCK VIA FIRE COMMAND CENTER	VIDEO SURVEILLANCE	INTERNAL ELECTRIFIED HARDWARE CONNECTION	LOCAL PUSHBUTTON DOOR HARDWARE OVERRIDE	MOTION DETECTOR	ELECTRONIC LOCKING HARDWARE (BY OTHERS)	MAG LOCK	MONITOR DOOR POSITION SWITCH SPDT	MONITOR DOOR POSITION SWITCH DPDT	LOCAL 120VAC POWER SUPPLY	SCHEDULE BASED LOCKING	NOTES
A01		CR2		•									•	•		•			•	
A03		CR1											•	•		•				
A12		CR1											•	•		•				
CC01		CR1		•									•	•		•			•	
CC03		CR1				•							•	•		•				
CL01		CR2		•									•	•		•			•	
CL03		CR1											•	•		•				
CL06		CR1											•	•		•				
CL07		CR1											•	•		•				
CL10		CR1											•	•		•				
OIM01		CR1		•									•	•		•			•	
OIM03A		CR1											•	•		•				
SBC05A		CR1		•									•	•		•				
SBR05A		CR1											•	•		•				
SBR05B		CR1											•	•		•				
SCR01B		CR1											•	•		•				
SIT03		CR1												•						
T01		CR2		•									•	•		•			•	
T02		CR1		•		•							•	•		•				
T02B		CR1		•		•							•	•		•				
T03A		CR1											•	•		•				
T04A		CR1											•	•		•				
T09		CR1											•	•		•				

T 414.220.9640
751 North
Jefferson St,
Suite 200
Milwaukee, WI
53202

CONSULTANTS:

IMEG
1800 DEMING WAY
SUITE 200
MIDDLETON, WI 53562
P: 608.223.9600 F: 608.223.9601
PROJECT #21001230.00

PHASE 2 CCB CITY OFFICE REMODELS, FIRST AND FIFTH FLOORS

210 Martin Luther King Jr. Blvd.
Madison, WI 53703

BPW CONTRACT #: 9226

SHEET TITLE:
TECHNOLOGY SCHEDULES - NORTH

REVISIONS:
2 3/22/23 Addendum #2

SCALE	VARIES
PROJECT NUMBER	210101
SET TYPE	PLAN REVIEW
DATE ISSUED	12/22/2022
SHEET NUMBER	T600N