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ADDENDUM NO. 5

Date:	2025-08-07
From:	Jim Shearer, Lawrence Group
Architect's Project No.	2024110
Project:	East Central College – Rolla Campus
Owner:	East Central College 1964 Prairie Dell Rd. Union, MO 63084
Owners Representative:	Navigate Building Solutions 8419 Manchester Rd. St. Louis, MO 63144

This Addendum is issued before execution of Contract to inform the Bidders of revisions to the Bid Documents and shall be included in the contract.

All requirements contained in the Bidding Documents shall apply to the Addendum. The work called for in this Addendum shall be the same as set forth in the applicable portions of the Bidding Documents unless otherwise specified in this Addendum. All incidental work necessitated by this Addendum as required to properly complete the work shall be included in the Bids even though not specifically stated in this Addendum.

Architectural Specification Addenda

None.

Architectural Drawing Addenda

1 A-030 DOOR ELEVATIONS & DETAILS

1.1 Revise 16, 17/A030 to add hardware information

Contractor Questions

- **Video surveillance specs do not call out any type of camera(s). Plans (symbol list) indicates "single lens FOV" for the cameras. the technology equipment schedule on T600 lists an Ubiquiti PTZ camera. What kind of camera should be bid?**
  The video surveillance system indicates that it is to have its own separate network and that switches and accessories needed to be provided as part of the video surveillance system. I didn't see any specs for network components.
  There are Fortinet components listed in the schedule from T600 but those components are labeled as "SC-NS-x". it is my understanding that the "SC" means structured cabling and that those would not be part of the video surveillance system.
  The AV Camera System and Security/Surveillance System should be two separate systems. These systems should be located within the MTR-1A with the primary Network Equipment and have the required network equipment to interface with the primary Fortinet Network Equipment.
  See T600 Technology Equipment Schedule.
  Note: The UBIQUITI Networks G5 PTZ Camera is only to be used for Surveillance in the Testing Rooms.
  See T201A Drawing.
  See Revised Technology Drawings 07-10-2025.

- **After review of bid packaged, dated 6.20.2025, the plans show cameras slated for A/V versus surveillance. Do the two different camera systems need to integrate with each other?**
  Please clarify.
  The A/V Cameras System should be separate from the Security/Surveillance Camera System.

- **After review of bid packaged, dated 6.20.2025, the plans/specs only list a Ubiquiti PTZ camera on technology schedule. Do all areas on the plans specified for video surveillance cameras require this Ubiquiti PTZ camera?**
  Additionally, can we substitute a mixture of PTZ and fixed lens Illustra cameras for video surveillance? This would allow for better integration between the video surveillance and access control systems as laid out in bid package. Please see product specification sheets as product substitution reference.
  The A/V & Security/Surveillance Cameras should be on separate Systems.
  See T600 Technology Equipment Schedule. The A/V PTZ Camera specified is the AVER PTZ TR315.
  See T600 Technology Equipment Schedule. The Security/Surveillance PTZ Camera specified is the UBIQUITI NETWORKS G5 PTZ.

- **After review of bid packaged, dated 6.20.2025, the plans/specs show location of access control headend panel. Is this the same location as the network for the project location or will a network switch need to be provided to connect the headend unit into the location's network?**

Access Control Headend Panel can be located within the MTR-1A where primary Network Switch is located. See T600 Technology Equipment Schedule.
See revised Technology Drawings 07.10.2025

- **Regarding the bridge crane are they going to be aluminum or steel? Also are we supposed to supply the hoist crane?**
  The bridge crane is to be steel. The hoist crane is to be provided as well.
- **Regarding the Headwalls for ECC.**
  Not clear if a Bed Locator is to be included on the Headwall (In Specs, not on elevation or equipment schedule).
  Not clear if a manifold utilizing hoses is to be utilized in the Headwall, or if the Headwall can be hard piped
  Provide Bed Locators as called out in the specs. Provide a manifold utilizing hoses.
- **There are several different solid surface tops and laminate on the finish schedule but I cannot find what goes where.**
  Refer to Finish Keyed Notes, 2,3,7,8,10 and Finish Schedule on Sheet A901 for casework finish locations
- **Please confirm JCI Metasys is an approved BAS provider for project.**
  JCI Metasys is acceptable
- **Please confirm if JCI will be able to utilize East Central College Server located in Union, MO or if separate server will be required for ECC Rolla location.**
  Utilizing the Union server is acceptable
- **Will all of the existing RTUs (RTU-E-1 – RTU-E-7) need to have new controls provided to meet the SOO/Flow Diagram shown on Detail 1 on M501? Or will the existing RTUs only require a LON integration?**
  Existing RTUs only require LON integration. Diagram is intended for new RTU-8 only.

BID ADDENDUM 5

PLUMBING:

SPECIFICATION ITEMS

1. Section 221000 – PLUMBING PIPING
    a. ADD section 3.2.J for argon and 75/25 piping.

DRAWING ITEMS

None.

ELECTRICAL:

SPECIFICATION ITEMS

None.

DRAWING ITEMS

1. Drawing E211C – LEVEL 01 PLAN – POWER – AREA C
    a. REVISE location of HDPE and LPW panels in IET - Industrial Maintenance (Phase II) 238.
2. Drawing E211D – LEVEL 01 PLAN – POWER – AREA D
    a. REMOVE E-connection for portable x-ray in Rad Tech Lab2 203.
3. Drawing E211E – LEVEL 01 PLAN – POWER – AREA E
    a. REVISE location of HDPE and LPW panels in IET - Industrial Maintenance (Phase II) 238.
    b. REVISE panel LPW to single tub from double tub in IET - Industrial Maintenance (Phase II) 238.
4. Drawing E603 – ELECTRICAL PANEL SCHEDULES
    a. ADD note in LPW panel schedule.

END OF MECHANICAL/ELECTRICAL BID ADDENEDUM 5

SES:HND/sdb

Enclosures

SECTION 221000 - PLUMBING PIPING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pipe and Pipe Fittings.

B. Valves.

C. Check Valves.

1.2 QUALITY ASSURANCE

A. Valves: Manufacturer's name and pressure rating marked on valve body. Remanufactured valves are not acceptable.

B. Welding Materials and Procedures: Conform to ASME Code and applicable state labor regulations.

C. Welders Certification: In accordance with ANSI/ASME Sec 9 or ANSI/AWS D1.1.

D. All grooved couplings, fittings, valves, and specialties shall be the products of a single manufacturer. Grooving tools shall be of the same manufacturer as the grooved components.

1. All castings used for couplings housings, fittings, or valve and specialty bodies shall be date stamped for quality assurance and traceability.

E. Piping, Fittings, Valves, and Flux for Potable Water Systems: All components shall be lead free per Federal Act S.3874, Reduction of Lead in Drinking Water Act.

1.3 SUBMITTALS

A. Submit shop drawings per Section 220500.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store valves in shipping containers with labeling in place.

1.5 COORDINATION DRAWINGS

A. Reference Coordination Drawings article in Section 220500 for required plumbing systems electronic CAD drawings to be provided to Coordinating Contractor for inclusion into composite coordination drawings.

PART 2 - PRODUCTS

2.1 CAST IRON PIPE

A. Cast Iron; Standard Weight; Hub and Spigot Joints:
1. Pipe: Standard weight hub and spigot cast iron soil pipe, bituminous corrosion protective coating inside and outside, CISPI 301 or ASTM A74.
2. Design Pressure: Gravity Maximum Design Temperature: 180F.
3. Joints: Compression gasket, ASTM C564.
4. Restraints: Install pipe and fittings per the Cast Iron Soil Pipe Institute's Designation 301. Restrain pipe and fittings using an engineered and tested product manufactured for restraining no-hub cast iron soil pipe. Install per manufacturer's recommendations.
5. Adapters: Heavy duty no-hub transition for joining cast iron and PVC pipe. Adapters shall be tested and certified to ASTM C 1460 and be constructed with Type 304 stainless steel shield, thickness 0.015" shield, gasket material to meet ASTM C564, 1-1/2" to 4" will be 3" wide with four 304 stainless steel bands, and 6" to 10" will be 4" wide with six 304 stainless steel bands and 3/8" 305 stainless steel hex head screws torqued to 80 inch pounds.

B. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets:

1. Pipe: Standard weight no-hub cast iron soil pipe, bituminous corrosion protective coating inside and outside, CISPI 301 or ASTM A888.
2. Design Pressure: Gravity Maximum Design Temperature: 180F.
3. Joints: ASTM C1540, FM 1680, and ASTM C-564.

a. Super Duty, Shielded Stainless Steel Couplings: Neoprene sleeve gasket, 0.015" thick 304 stainless steel shield , stainless steel 3/8" screw type clamps, minimum of four clamps for 1-1/2" to 4" and six clamps for 5" and larger pipe sizes. Clamps shall be tightened to minimum 80 inch pounds or as manufacturer requires. Husky SD-4000 or equal.

4. Restraints: Install pipe and fittings per the Cast Iron Soil Pipe Institute's Designation 310. Restrain pipe and fittings using an engineered and tested product manufactured for restraining no-hub cast iron soil pipe. Install per manufacturer's recommendations.
5. Adapters: Transition from cast iron soil pipe to other pipe materials with manufactured adapters specifically for the application. Adapter must meet the same requirements as the joints listed above. ASTM C1460. Sticker identifying transition fitting application must be visible to view. For example, the most commonly used transition fitting from cast iron no-hub to PVC would be the Husky SD-4200 series.

2.2 COPPER PIPE

A. Copper Pipe; Type L; Solder Joints:

1. Pipe: Type L hard drawn seamless copper tube, ASTM B88.
2. Design Pressure: 175 psi; Maximum Design Temperature: 200F.
3. Joints: Solder with 100% lead-free solder and flux, ASTM B32.
4. Fittings: Wrought copper solder joint, ANSI B16.22.

B. Copper Pipe; Type K; Solder Joints:

1. Pipe: Type K annealed copper tube, ASTM B88.
2. Design Pressure: 150 psi. Maximum Design Temperature: 200F.

3. Joints: Solder with 100% lead-free solder and flux ASTM B32BCuP silver braze, AWS A5.8.
4. Fittings: Wrought copper solder joint, ANSI B16.22.

2.3 PLASTIC PIPE

A. PVC-DWV or ABS-DWV; Schedule 40; Solvent Weld Joints:

1. Pipe: Schedule 40 rigid, PVC-DWV, or ABS-DWV, cell classification 12454 for PVC per ASTM D1784 or 42222 for ABS per ASTM D3965, with plain ends, conforming to ASTM Standards D2665 or D2661. Cellular core piping is not acceptable.
2. Design Pressure/Temperature: Gravity at 140F.
3. Joints: Solvent-weld socket type with solvent recommended by pipe manufacturer.
4. Fittings: PVC-DWV, or ABS-DWV, cell classification 12454 for PVC per ASTM D1784 or 42222 for ABS per ASTM D3965, with solvent-weld socket type ends for Schedule 40 pipe.
5. Limits: Schedule 40 PVC-DWV, or ABS-DWV pipe must not be threaded. Do not use where exposed or in return air plenums.
6. Use: Use PVC or ABS only where allowed by local jurisdiction. Comply with all special requirements or limitations.
7. Special Requirements: Provide expansion loop(s) and/or expansion joints in the piping system per the manufacturer's guidelines and as shown on the drawings. Refer to Section 220516 for expansion joint requirements.

B. Polypropylene (Fire Retardant); Schedule 40 Drainage; Electrically Fused Joints:

1. Pipe: Fire retardant polypropylene Schedule 40 drainage pipe, ASTM F1412.
2. Joints:

    a. Join pipe and fittings with electrically fused joints. Make fittings between dissimilar materials with adapters furnished by the polypropylene pipe manufacturer.
    b. Above Floor Only: Mechanical joint with gasket, stainless steel outer sleeve and corrosion resistant nuts and bolts or threaded fittings with gasket and compression nuts.

3. Fittings: Fire retardant polypropylene DWV pattern with socket ends for electrically fused joints. Pipe and fittings shall be a system provided by the same manufacturer.
4. Limitations: For use in non-return air plenums.
5. Special Requirements: Provide expansion loop(s) and/or expansion joints in the piping system per the manufacturer's guidelines and as shown on the drawings. Refer to Section 220516 for expansion joint requirements.

2.4 VALVES

A. Shutoff Valves:

1. Gate Valves:

    a. GA-1: 2" and under, 150 psi steam at 406F, 300 psi CWP at 150F, screwed, bronze, rising stem, screwed bonnet, lead free NSF-372. Hammond UP640, Milwaukee UP148, Watts B-3210, NIBCO T111-LF, Jomar T-351G.

b. GA-2: 2-1/2" thru 12", 125 psi S at 353F, 200 psi CWP at 150F, flanged, iron body, bronze mounted, OS&Y, lead free NSF-372. Hammond IR1146-HI, Milwaukee F-2885-MRW, Watts #F-503, NIBCO F-607-RWSB, Apollo Valves; a division of Aalberts- IPS 611F.

2. Butterfly Valves:

a. BF-1:

1) 2-1/2" thru 6", 175 psi CWP, elastomers rated for 20F to 250F at 125 psig, fully lugged end, ductile or cast iron body (not in contact with fluid); bronze, aluminum-bronze or stainless steel disc; EPDM seat, stainless steel stem, lead free NSF-372, extended neck, 175 psi bubble-tight, bi-directional dead-end shutoff without backing flange or nuts and with cap screws extending to centerline of valve body (for pipe extension without draining system), 10 position locking operator up to 6" size. Cv of at least 1580 in 6" size.
2) Manufacturers:

a) Apollo Valves; a division of Aalberts-IPS LD141
b) Watts #DBF-03-121-1P
c) NIBCO N200 Series or LD2000 Series
d) Milwaukee CL series
e) Hammond 5200 series
f) Jomar 600-__DSEL series
g) Metraflex #Butterfly Valve, DINC DISK

3. Ball Valves:

a. BA-1: 3" and under, 150 psi saturated steam, 600 psi CWP, full port, threaded or solder ends (acceptable only if rated for soldering in line with 470F melting point of lead-free solder), stainless steel ball and trim, Teflon seats and seals.

1) Body: Lead free NSF-372, two-piece bronze of a copper alloy containing less than 15% zinc. Apollo Valves; a division of Aalberts–IPS #77CLF140/240 Series, Milwaukee #UPBA450S, Watts #LFB6080G2-SS, NIBCO #T-585-66-LF, Jomar T-200CSSG.
2) Body: Dezincification resistant brass alloy, lead free NSF-372. Jomar T-100CSSG.
3) Provide solid extended shaft for all insulated piping. (For example, Apollo adds option -04 Stem Extension, NIBCO Nib-Seal Handle-NS, and Jomar modifies valve part number with -IH for insulated handle.)
4) Provide lock out trim for all valves opening to atmosphere installed in domestic water piping over 120F, heating water piping over 120F, steam, condensate, boiler feed water piping, and gasoline/kerosene piping, and as indicated on the drawings. Solid extended shaft is not required on valves with lockout trim. (For example, Jomar and NIBCO modify valve part number with -LH for locking handle.)

B. Throttling Valves

1. Globe Valves:

a. GL-1: 2" and under, 150 psi saturated steam, 300 psi CWP, screwed, bronze, lead free NSF-372. Milwaukee #UP502, Hammond #UP440.

2. Plug Valves:

a. PL-1: 2" and under, 125 psi steam at 450F, 175 psi CWP at 180F, cast iron body, screwed, full port. Walworth #1700, DeZurik #425, S-RS49.
b. PL-2: 2-1/2" thru 4", 125 psi steam at 450F, 175 psi CWP at 180F, flanged, cast iron body, full port. Walworth #1700F, DeZurik #425, F-RS49.
c. PL-13: 2" and under, 175 psi CWP, 250F elastomer, screwed, bronze body, resilient plug facing (RS-55), adjustable memory stop, non-removable lever handle. DeZurik #120-S.
d. PL-15: 2-1/2" thru 8", 150 psi CWP, 250F elastomer, flanged, bronze body, resilient plug facing (RS-55 or RS-56), adjustable memory stop. DeZurik #120-F.

2.5 STRAINERS

A. ST-1: Threaded Ends, 4" and under, lead free bronze or 304 stainless steel body, threaded connections, threaded removable cover, 0.045□□ 304 stainless steel perforated screen, 125 psi S at 350F, 200 psi CWP at 150F. Apollo Valves, a division of Aalberts-IPS YB-LF (59LF), Metraflex SSFT, Mueller / Watts LF351, Watts LF777, Jomar T-651G, Zurn SXL.

B. ST-2: Flanged Ends, 2-1/2" thru 12", Lead free cast iron with FDA/NSF approved electrostatically applied fusion bonded epoxy coating body, flanged connections, bolted or flanged cover, 304 stainless steel perforated screen, 125 psi steam, 200 psi CWP. Watts 77F-DI-FDA-125, Victaulic Series 969-F, Apollo Valves, a division of Aalberts-IPS YCF0XM40E, Zurn FSC.

2.6 CHECK VALVES

A. CK-1: Threaded Ends, 2" and under, 125 psi steam at 406F, 200 psi CWP at 150F, threaded connection, lead free bronze body with brass or bronze disc, horizontal swing. Hammond #UP904, Milwaukee #UP509, NIBCO T-413-Y-LF, Jomar T-511G, Apollo Valves, a division of Aalberts-IPS #161T-LF.

B. CK-3: Grooved Ends, 2-1/2" thru 12", 300 psi, grooved end, Grade CF8M stainless steel body and disc, 17-4PH stainless steel shaft, with 17-4PH or 316 stainless steel spring, and Grade P fluoroelastomer seat. Suitable for vertical or horizontal installation. Victaulic Series 816.

C. CK-5: Flanged Style for Vacuum, 2" and larger, 125 psi CWP, flanged, iron body, cast iron or carbon steel body with stainless steel internals. Hoerbiger Design "CT". Note: Use only for compressor discharge.

2.7 LOCK OUT TRIM

A. Provide lock out trim for all quarter turn shutoff valves opening to atmosphere and installed in domestic water piping over 120F and as indicated on the drawings.

2.8 VALVE OPERATORS

A. Provide handwheels for gate valves and gear operators for butterfly valves.

2.9 VALVE CONNECTIONS

A. Provide all connections to match pipe joints. Valves shall be same size as pipe unless noted otherwise.

2.10 CONNECTIONS BETWEEN DISSIMILAR METALS

A. Connections between dissimilar metals shall be insulating dielectric types that provide a water gap between the connected metals, and that either allow no metal path for electron transfer or that provide a wide water gap lined with a non-conductive material to impede electron transfer through the water path.

B. Joints shall be rated for the temperature, pressure, and other characteristics of the service in which they are used, including testing procedure.

C. Aluminum, iron, steel, brass, copper, bronze, galvanized steel and stainless steel are commonly used and require isolation from each other with the following exceptions:

1. Iron and steel connected to each other.
2. Brass, copper, and bronze connected to each other.
3. Brass or bronze valves and specialties connected in closed systems with steel, iron, or stainless steel on both sides of the brass or bronze valves and specialties. Where two or more brass or bronze items occur together, they shall be connected with brass nipples. Brass or bronze valves and specialties cannot be used as a dielectric separation between pipe materials.

D. Dielectric protection is required at connections to equipment of a material different than the piping.

E. Screwed and/or Grooved Joints (acceptable up to 4" size):

1. Dielectric waterway rated for 300 psi CWP and 225F.
2. Optional: Copper-silicon casting conforming to UNS C87850 with grooved and/or threaded ends.
3. UL classified in accordance with ANSI / NSF-61 for potable water service.
4. Manufacturers:

a. Elster Group ClearFlow fittings
b. Victaulic Series 647
c. Grinnell Series 407
d. Matco-Norca

F. Flanged Joints (any size):

1. Use 1/8" minimum thickness, non-conductive, full-face gaskets.
2. Employ one-piece molded sleeve-washer combinations to break the electrical path through the bolts.
3. Sleeve-washers are required on one side only, with sleeves minimum 1/32" thick and washers minimum 1/8" thick.
4. Install steel washers on both sides of flanges to prevent damage to the sleeve-washer.
5. Separate sleeves and washers may be used only if the sleeves are manufactured to exact lengths and installed carefully so the sleeves must extend partially past each steel washer when tightened.
6. Manufacturers:

a. EPCO
b. Central Plastics
c. Pipeline Seal and Insulator
d. F. H. Maloney
e. Calpico

G. Grooved Mechanical Transition Couplings (2" thru 6"):

1. Grooved mechanical coupling rated for 300 psi CWP and 180F (82C). Consisting of two ductile iron housings, Grade P flouroelastomer gasket, and bolts and hex nuts zinc electroplated plated, ASTM B-633.
2. Provides a single coupling connection for grooved end stainless steel pipe to grooved end copper tubing of the same nominal size.
3. UL classified in accordance with ANSI / NSF-61 for potable water service.
4. For use only on Types 304 or 316 Schedules 10S and 40S stainless steel pipe, and ASTM B88 Types K, L and M and ASTM B306 Type DWV copper tubing. Victaulic Style 644.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install all products per manufacturer's recommendations.

B. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

C. Remove scale and dirt, on inside and outside, before assembly.

D. Remove all scale, rust, dirt, oils, stickers and thoroughly clean exterior of all bare metal exposed piping, hangers, and accessories in preparation to be painted.

E. Connect to equipment with flanges or unions. Unions or flanges for servicing and disconnect are not required in installations using grooved joint couplings.

F. Use only piping materials rated for the maximum temperature of the application, e.g., do not use PVC for dishwasher drainage or piping that receives boiler blowdown.

G. Roof Penetration (Vent) Flashing:

1. Membrane Roofs: Flash vents with premolded pipe flashing cones for single-ply membrane roofs, metal roofs, or shingled roofs.

H. Existing building sewers or building drains which are shown on the documents to be reused shall be inspected and recorded by closed circuit television for their condition. Report findings back to the Architect, Engineer, and Owner before proceeding with work so any necessary rework can take place if needed.

3.2 SYSTEM, PIPING AND VALVE SCHEDULE

A. Cold Water, Hot Water - Potable and Non-Potable (Above Ground):

1. Copper Pipe; Type L; Solder Joints: All Sizes
2. Shutoff Valves: BF-1, BA-1
3. Throttling Valves: GL-1, GA-2
4. Strainers:, ST-2

B. Cold Water, Hot Water - Potable and Non-Potable (Underground):

1. Copper Pipe; Type K; Solder Joints: All Sizes

2. Strainers:, ST-2

C. Vacuum (Non-Medical):

1. Copper Pipe; Type L; Solder Joints: All Sizes
2. Shutoff Valves: BA-1, PL-15
3. Throttling Valves: GL-1
4. Strainers:, ST-2

D. Sanitary Waste and Vent, Gravity (Above Ground):

1. Cast Iron; Standard Weight; Hub and Spigot Joints: All Sizes

E. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets: 1-1/2" to 15"Storm Drainage, Clear Water Waste and Vent, Gravity (Above Ground):

1. Cast Iron; Standard Weight; Hub and Spigot Joints: All Sizes
2. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets: 1-1/2" to 15"

F. Sanitary Waste and Vent, Gravity (Underground - Inside Building):

1. Cast Iron; Standard Weight; Hub and Spigot Joints: All Sizes
2. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets: 1-1/2" to 15"

G. Sanitary Waste and Vent, Gravity (Underground - Outside Building):

1. Cast Iron; Standard Weight; Hub and Spigot Joints: All Sizes
2. Cast Iron; Standard Weight; No-Hub Sleeve Gaskets: 1-1/2" to 15"

H. Shutoff Valves: BA-1, BF-1Shutoff Valves: BA-1, BF-1Acid Waste and Vent:

1. Polypropylene (Fire Retardant); Schedule 40 Drainage; Electrically Fused Joints: All Sizes

I. Condensate/Equipment Drainage:

1. PVC-DWV or ABS-DWV; Schedule 40; Solvent Weld Joints: All Sizes

J. Argon, 75/25 (Above Ground): (2025.08.05 Bid Addendum 5)

1. Copper Pipe; Type L; Solder Joints: All Sizes
2. Shutoff Valves: BA-1, PL-15
3. Throttling Valves: GL-1
4. Strainers:, ST-2

3.3 TESTING PIPING

A. Sanitary Drainage, Sanitary Vent, Acid Waste, Acid Vent:

1. Test all piping with water to prove tight.
2. Test piping before insulation is applied.
3. Hydrostatically test all soil, waste, and vent piping inside of building with 10 feet head of water for 15 minutes. Inspect before fixtures are connected. If leaks appear, repair them and repeat the test.

4. Hydrostatically test interior downspouts with 10 feet head of water for 15 minutes with no leaks.
5. A smoke/air test at the same pressure may be used in lieu of the hydrostatic water test. Exception: Smoke/air test shall not be performed on plastic piping.
6. Test force mains with water at 105% of the operating pump discharge pressure for 15 minutes.
7. Test pressures stated above shall be as listed or as required by the Authority Having Jurisdiction, whichever is most stringent.

B. Hot Water - Potable and Non-Potable, Cold Water - Potable and Non-Potable:

1. Test pipes underground or in chases and walls before piping is concealed.
2. Test all pipes before the insulation is applied. If insulation is applied before the pipe is tested and a leak develops which ruins the insulation, replace damaged insulation.
3. Test the pipe with 100 psig water pressure or equal inert gas such as nitrogen. Exception: Inert gas test shall not be used to test plastic piping.
4. Hold test pressure for at least 2 hours.
5. Test to be witnessed by the Architect/Engineer's representative, if requested by the Architect/Engineer.

C. Vacuum Piping:

1. Testing pipes in chases, walls, or above non-accessible ceilings before piping is concealed.
2. Test with 100 psig compressed air or nitrogen.
3. During the test, strike all soldered joints sharply with a rubber or rawhide mallet to cause failure of any weak joints. After striking, soap test each joint.
4. Repair and retest all leaking joints.
5. After all joints pass the soap test, the system must maintain test pressure for 24 hours. If system fails the 24-hour, retest ALL joints by resoaping and repair all faulty joints. Repeat this procedure until the test pressure can be maintained for 24 hours.
6. After passing the above test, operate the vacuum pump. With all vacuum valves closed, the pump and piping system shall be able to maintain a vacuum of 25" Hg for at least one hour.
7. All materials, labor and equipment for testing shall be provided by the installing Contractor.
8. Tests to be witnessed by the Architect/Engineer's representative, if requested by the Architect/Engineer.
9. After testing, seal the complete system against entry of foreign material until it is turned over to the Owner.

D. All Other Piping:

1. Test piping at 150% of normal operating pressure.
2. Piping shall hold this pressure for one hour with no drop in pressure.
3. Test piping using water, nitrogen, or air as compatible with the final service of the pipe. Do not use combustible fluids.
4. Drain and clean all piping after testing is complete.

3.4 CLEANING PIPING

A. Air Blow:

1. Blow out pipe and components with clean compressed air. Instrument air lines shall be blown out with dry, oil free air or nitrogen gas. "Oil Free" is defined as air compressed in a centrifugal, Teflon ring, carbon ring or water pumped air compressor. Where air supply is judged to be inadequate to continually attain cleaning velocity, alternate pressurization and sudden relief procedure may be used until discharge at all blow out points is clean. Use 80-90 psig pressure unless otherwise indicated.
2. Air blow applies to the following systems:

    a. Instrument Air (use oil free air or nitrogen gas)
    b. Air Compressor Intakes

B. All Water Piping:

1. Flush all piping using faucets, flush valves, etc. until the flow is clean.
2. After flushing, thoroughly clean all inlet strainers, aerators, and other such devices.
3. If necessary, remove valves to clean out all foreign material.

3.5 INSTALLATION

A. General Installation Requirements:

1. Provide dielectric connections between dissimilar metals.
2. Route piping in orderly manner and maintain gradient. Install to conserve building space.
3. Group piping whenever practical at common elevations.
4. Install piping to allow for expansion and contraction without stressing pipe, joints, or equipment.
5. Slope water piping and arrange to drain at low points.
6. Install bell and spigot piping with bells upstream.
7. Where pipe supports are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
8. Seal pipes passing through exterior walls with a wall seal per Section 220529. Provide Schedule 40 galvanized sleeve at least 2 pipe sizes larger than the pipe.
9. All non-potable outlets shall be clearly marked with a permanently affixed laminated sign with 3/8" high lettering saying "Non-Potable Water Not for Human Consumption." Sign shall have black lettering on a yellow background.
10. All vertical pipe drops to sinks or other equipment installed below the ceiling shall be routed within a wall cavity, unless specifically noted otherwise to be surface mounted. For renovation projects, this Contractor is responsible for opening and patching existing walls for installation of piping. Wall patching shall match existing condition.

B. Installation Requirements in Electrical Rooms:

1. Do not install piping or other equipment above electrical switchboards or panelboards. This includes a dedicated space extending 25 feet from the floor to the structural ceiling with width and depth equal to the equipment.

C. Valves/Fittings and Accessories:

1. Install shutoff valves that permit the isolation of equipment/fixtures in each room without isolating any other room or portion of the building. Individual fixture angle stops do not meet this requirement. Exception: Back-to-back rooms in no more than two adjacent rooms.
2. Provide clearance for installation of insulation and access to valves and fittings.
3. Provide access doors for concealed valves and fittings.

4. Install valve stems upright or horizontal, not inverted.
5. Provide one plug valve wrench for every ten plug valves 2" and smaller, minimum of one. Provide each plug valve 2-1/2" and larger with a wrench with set screw.
6. Install corrugated, stainless steel tubing system according to manufacturer's written instructions. Include striker plates to protect tubing from puncture where tubing is restrained and cannot move.

D. Underground Piping:
1. Install buried water piping outside the building with at least 5 feet of cover.Refer to Section 220500 for Excavation, Fill, Backfill and Compaction requirements
2. As an option, the Contractor may provide factory applied protective coatings consisting of a polyethylene plastic film bonded to the pipe surface by a hot applied thermo-plastic adhesive.

a. Manufacturers:

1) Republic Steel Corp. "X-Tru-Coat"

3. Exercise care in handling, storing and laying pipe to avoid damaging factory applied coatings. If any damage occurs, repair the coating to a condition equal to the original.
4. Field application of protective coatings to joints, fittings and to any damaged factory applied coatings shall be similar to factory applied coatings specified above and shall be done in strict accordance with recommendations of the supplier of pipe coatings.
5. After completion of the fabrication, laying and field coating of the joints and fittings, but prior to backfilling, inspect the entire line in the presence of the Architect/Engineer's representative with an electronic holiday detector. Any defects in the protective coatings shall be repaired in accordance with requirements for original coatings.
6. Coat flange bolts and nuts in pits and below ground at the time of installation with a corrosion protective coating.

E. Sanitary and Storm Piping:

1. Install all sanitary and storm piping inside the building with a slope as shown on the drawings.
2. Install horizontal offset at all connections to roof drains to allow for pipe expansion.
3. Slope sanitary and storm piping outside the building to meet invert elevations shown on drawings and to maintain a minimum velocity of 2 feet per second.
4. All sanitary and storm piping shall have at least 42" of cover when leaving the building.
5. Starter fittings with internal baffles are not permitted.

3.6 PIPE ERECTION AND LAYING

A. Carefully inspect all pipe, fittings, valves, equipment and accessories before installation. Any items that are unsuitable, cracked or otherwise defective shall be removed from the job immediately.

B. All pipe, fittings, valves, equipment and accessories shall have factory applied markings, stampings, or nameplates with sufficient data to determine their conformance with specified requirements.

C. Exercise care at every stage of storage, handling, laying and erecting to prevent entry of foreign matter into piping, fittings, valves, equipment and accessories. Do not install any item that is not clean.

D. Until system is fully operational, all openings in piping and equipment shall be kept closed except when actual work is being performed on that item or system. Closures shall be plugs, caps, blind flanges or other items specifically designed and intended for this purpose.

E. Run pipes straight and true, parallel to building lines with minimum use of offsets and couplings. Provide only offsets required to provide needed headroom or clearance and to provide needed flexibility in pipe lines.

F. Make changes in direction of pipes only with fittings or pipe bends. Changes in size only with fittings. Do not use miter fittings, face or flush bushings, or street elbows. All fittings shall be of the long radius type, unless otherwise shown on the drawings or specified.

G. Provide flanges or unions at all final connections to equipment, traps and valves.

H. Arrange piping and connections so equipment served may be totally removed without disturbing piping beyond final connections and associated shutoff valves.

I. Use full and double lengths of pipe wherever possible.

J. Unless otherwise indicated, install all piping, including shutoff valves and strainers, to coils, pumps and other equipment at line size with reduction in size being made only at control valve or equipment.

K. Cut all pipe to exact measurement and install without springing or forcing except in the case of expansion loops where cold springing is indicated on the drawings.

L. Underground pipe shall be laid in dry trenches maintained free of accumulated water. Refer to Section 220500 for Excavation, Fill, Backfill and Compaction requirements.

M. Unless otherwise indicated, branch take-offs shall be from top of mains or headers at either a 45-degree or 90-degree angle from the horizontal plane for air lines, and from top, bottom or side for liquids.

3.7 DRAINING AND VENTING

A. Unless otherwise indicated on the drawings, all horizontal water lines, including branches, shall pitch 1" in 40 feet to low points for complete drainage, removal of condensate and venting.

B. Maintain accurate grade where pipes pitch or slope for venting and drainage. No pipes shall have pockets due to changes in elevation.

C. Provide drain valves at all low points of water piping systems for complete or sectionalized draining.

D. Use eccentric reducing fittings on horizontal runs when changing size of pipes for proper drainage and venting. Install gravity drain pipes with bottom of pipe and eccentric reducers in a continuous line; all other liquid lines with top of pipe and eccentric reducers in a continuous line.

E. Provide air vents at high points and wherever else required to eliminate air in all water piping systems.

F. Install air vents in accessible locations. If necessary to trap and vent air in a remote location, install an 1/8" pipe from the tapping location to an accessible location and terminate with a venting device.

G. All vent and drain piping shall be of same materials and construction for the service involved.

3.8 PLUMBING VENTS

A. Vent as shown on the drawings and in accordance with all codes having jurisdiction.

B. Extend the high side of the soil and waste stacks at least 12" above roof.

C. Flash pipes at roof with premolded EPDM pipe flashing cones adhered to roof membrane by General Contractor. Secure top of cone with stainless steel clamp and seal watertight.

D. Increase vent pipes through the roof two pipe sizes with long increasers located at least 12" below the roof.

E. In no case shall the vent through the roof be less than 4" in diameter.

F. Vent pipes through the roof shall be located a minimum of 10 feet from any air intake opening on the roof.

3.9 BRANCH CONNECTIONS

A. For domestic water and vent systems only, make branch connections with standard tee or cross fittings of the type required for the service.

B. Reducers are generally not shown. Where pipe sizes change at tee, the tee shall be the size of the largest pipe shown connecting to it.

C. Do not use double wye or double combination wye and eighth bend DWV fittings in horizontal piping.

D. Branch connections from the headers and mains may be mechanically formed using an extraction device. The branch piping connection shall be brazed connection for the following services only:

1. Domestic water piping above ground.

E. Further limit use of mechanically formed fittings as follows:

1. Must have at least same pressure rating as the main.
2. Main must be Type K or L copper tubing.
3. Permanent marking shall indicate insertion depth and orientation.
4. Branch pipe shall conform to the inner curve of the piping main.
5. Main must be 1" or larger.
6. Branch must be 3/4" or larger.

F. Forged weld-on fittings are limited as follows:

1. Must have at least same pressure rating as the main.
2. Main must be 2-1/2" or larger.
3. Branch line is at least two pipe sizes under main size.

3.10 JOINING OF PIPE

A. Solder Joints (Copper Pipe):

1. Make up joints with 100% lead-free solder, ASTM B32. Cut tubing so ends are perfectly square and remove all burrs inside and outside. Thoroughly clean sockets of fittings and ends of tubing to remove all oxide, dirt and grease just prior to soldering. Apply flux evenly, but sparingly, over all surfaces to be joined. Heat joints uniformly so solder will flow to all mated surfaces. Wipe excess solder, leaving a uniform fillet around cup of fitting.
2. Flux shall be non-acid type.
3. Solder end valves may be installed directly in the piping system if the entire valve is suitable for use with 470F melting point solder. Remove discs and seals during soldering if they are not suitable for 470F.

B. Hub and Spigot Joints - Sanitary Pipe and Storm Pipe (Cast Iron Pipe):

1. Lead and Oakum Joints: Pack joint with oakum made of vegetable fiber, cotton, or hemp. Pour joint with molten lead up to top of hub. Ensure leak-free joints by working joint with inside and outside caulking irons.
2. Compression Gasket Joints: Joint shall be one-piece double seal compression type gasket made specifically for joining cast iron soil pipe. Gasket shall be neoprene, permitting joint to flex as much as 5 degrees without loss of seal. Gasket shall be extra heavy weight class, conforming to ASTM C-564.

C. Solvent Weld Joints (PVC):

1. Make joints with a two-step process. Use primer conforming to ASTM F656 and solvent cement conforming to ASTM D2564.
2. All contractor personnel that will prepare solvent cemented joints shall be qualified for such bonding practices according to the bonding qualifications procedures described in ASME B31.3, Chapter VII for bonding of plastic piping.

D. Electrically Fused Joints (Acid Waste and Acid Vent):

1. Fused joints shall be made in accordance with manufacturer's installation instructions.
2. All installers shall undergo training provided by the manufacturer or manufacturer's representative.
3. Follow the manufacturer's cold weather installation procedures.

E. No-Hub Sleeve Gaskets (No-Hub) (Cast Iron Pipe):

1. Gasket shall be heavy weight class, conforming to ASTM C564.
2. The gasket shall have an internal center stop.
3. The gasket shall be covered by a stainless steel band secured with a minimum of four stainless steel bands per fitting/joint.
4. Sleeve gaskets shall be installed in accordance with the manufacturer's installation instructions.

F. Couplings: Assemblies with combinations of clamps, gaskets, sleeves, and threaded or flanged parts; compatible with piping and system liquid; and made by piping manufacturer for joining system piping.

G. Adapters and Transition Fittings: Assemblies with combinations of clamps, couplings, adapters, gaskets, and threaded or flanged parts; compatible with piping and system liquid; and made for joining different piping materials.

H. Flanges: Assemblies of companion flanges and gaskets complying with ASME B16.21 and compatible with system liquid, and bolts and nuts.

3.11 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Disinfection of the domestic water piping shall be completed within three (3) weeks prior to building occupancy. Contractor is responsible for disinfecting water piping if used by workers during construction; disinfection during construction does not eliminate the requirement for final disinfection prior to occupancy. Flushing of piping shall be completed within two (2) weeks prior to building occupancy.

B. Provide necessary connections at the start of individual sections of mains for adding chlorine.

C. Before starting work, verify system is complete, flushed and clean.

D. Follow the disinfection of potable water procedure outlined in this project's applicable plumbing code. For example: IPC 610.1, UPC 609.10, CPC 609.10, and Illinois 890.1180. Where local codes do not outline a disinfection procedure, follow the International Plumbing Code procedure 610.1.

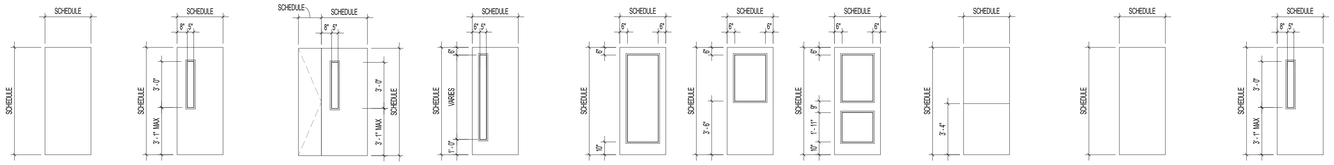
E. Bleed water from all outlets to ensure chlorine distribution throughout the entire domestic water system.

F. Take water samples, no sooner than 24 hours after flushing, from 2% of outlets and from water entry. Obtain, analyze, and test samples in accordance with AWWA C651, Section 5 - Verification.

3.12 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations needed for sewer connections, confirm inverts and verify these can be properly connected with slope for drainage and cover to avoid freezing.

END OF SECTION 221000



PANEL TYPE: WD-F
DESCRIPTION: WOOD FLUSH

PANEL TYPE: WD-NV1
DESCRIPTION: WOOD NARROW VISION

PANEL TYPE: WD-F
DESCRIPTION: WOOD FLUSH

PANEL TYPE: WD-NV1
DESCRIPTION: WOOD NARROW VISION

PANEL TYPE: WD-NV3
DESCRIPTION: WOOD NARROW VISION

PANEL TYPE: WD-GF
DESCRIPTION: WOOD GLASS FULL

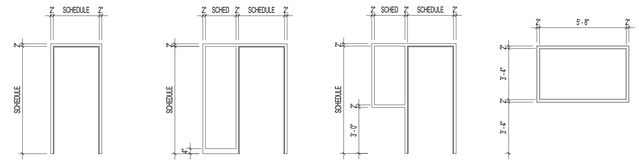
PANEL TYPE: WD-G1
DESCRIPTION: WOOD GLASS

PANEL TYPE: WD-G2
DESCRIPTION: WOOD GLASS TWO

PANEL TYPE: WD-DD
DESCRIPTION: WOOD DUTCH

PANEL TYPE: HM-F
DESCRIPTION: HOLLOW METAL FLUSH

PANEL TYPE: HM-NV1
DESCRIPTION: HOLLOW METAL NARROW VISION

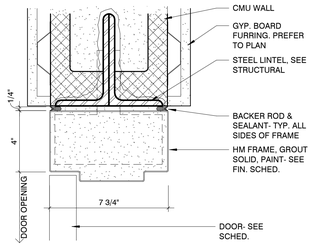


FRAME TYPE: HM-001
DESCRIPTION: HOLLOW METAL DOUBLE RABBET

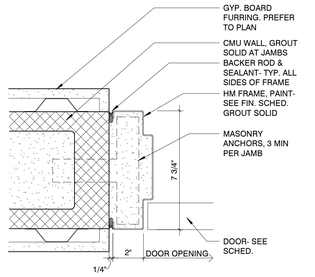
FRAME TYPE: HM-010
DESCRIPTION: HOLLOW METAL DOUBLE RABBET SIDELIGHT STRIKE

FRAME TYPE: HM-012
DESCRIPTION: HOLLOW METAL DOUBLE RABBET SIDELIGHT STRIKE RAISED

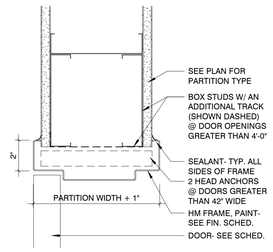
FRAME TYPE: HM
DESCRIPTION: HOLLOW METAL INTERIOR WINDOW FRAME



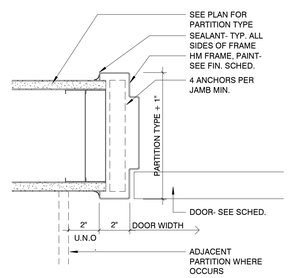
1 DETAIL - HM DOOR - CMU HEAD
A-030 | 3" = 1'-0"



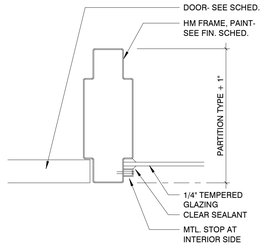
2 DETAIL - HM DOOR - CMU JAMB
A-030 | 3" = 1'-0"



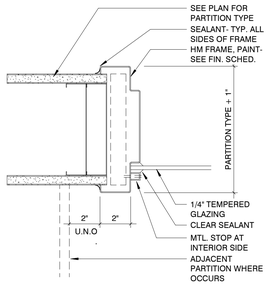
3 DETAIL - HM DOOR - INTERIOR HEAD - TYP.
A-030 | 3" = 1'-0"



4 DETAIL - HM DOOR - INTERIOR JAMB - TYP.
A-030 | 3" = 1'-0"



5 DETAIL - INTERIOR SIDELITE JAMB
A-030 | 3" = 1'-0"



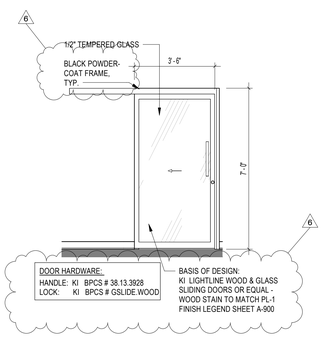
6 DETAIL - HM DOOR - INTERIOR SIDELITE JAMB
A-030 | 3" = 1'-0"

9 DETAIL - HM DOOR - EXTERIOR BRICK JAMB
A-030 | 3" = 1'-0"

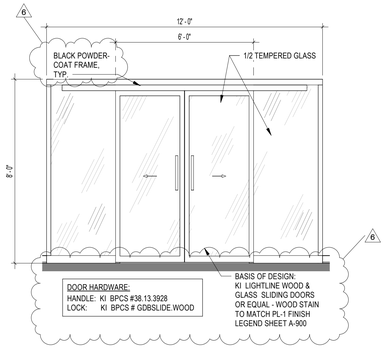
8 DETAIL - HM DOOR - EXTERIOR BRICK HEAD
A-030 | 3" = 1'-0"

7 DETAIL - HM DOOR - INTERIOR SILL - TYP.
A-030 | 3" = 1'-0"

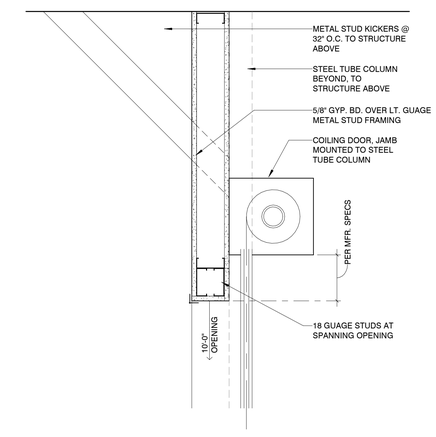
10 DETAIL - HM CASED OPENING - INTERIOR JAMB (HEAD SIM)
A-030 | 3" = 1'-0"



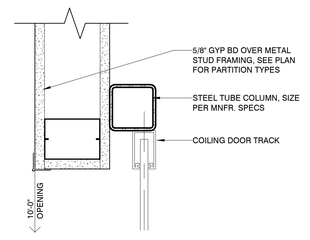
17 SLIDING DOOR @ SIM LAB 208B
A-030 | 3/8" = 1'-0"



16 SLIDING DOORS 102, 118, 138A, 138B, 156
A-030 | 3/8" = 1'-0"



15 DOOR - OVERHEAD COILING HEAD
A-030 | 1 1/2" = 1'-0"



14 DOOR - OVERHEAD COILING BTWN JAMB STL TUBE
A-030 | 3" = 1'-0"

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Professional Seal:

Architect COA: CORPORATE COA

Project Status / Milestone

ECC - Rolla Campus

1400 Independence Rd. Rolla, MO 65401

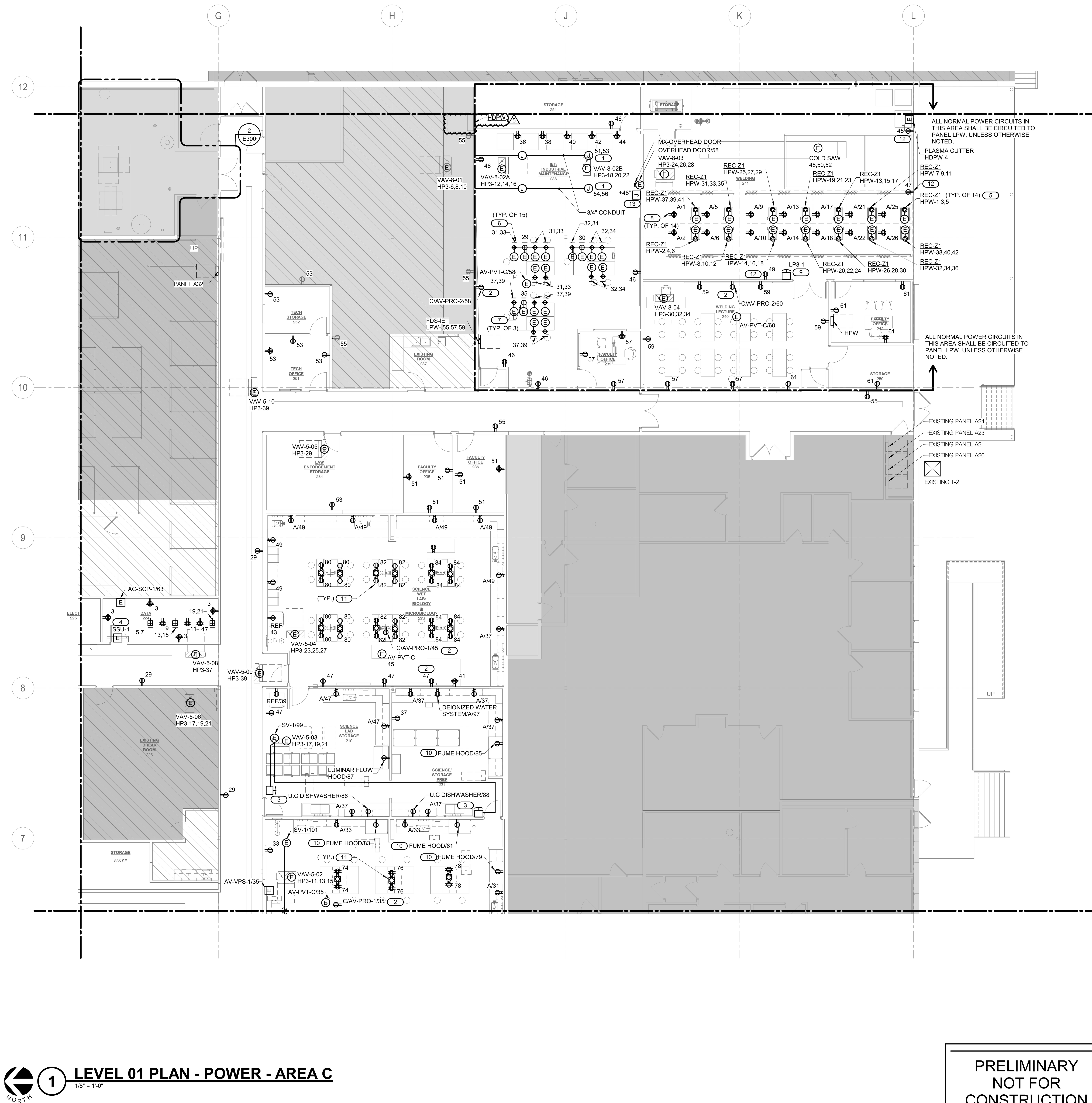
No.	Description	Date
3	Addendum 03	7.22.25
5	Addendum 04	7.30.25
6	Addendum 05	8.07.25

Sheet Title:

DOOR AND FRAME TYPES

Project Number: 2024110
Drawn By: Author
Issue Date: 6.20.2025

Sheet Number: **A-030**



1 LEVEL 01 PLAN - POWER - AREA C

1/8" = 1'-0"

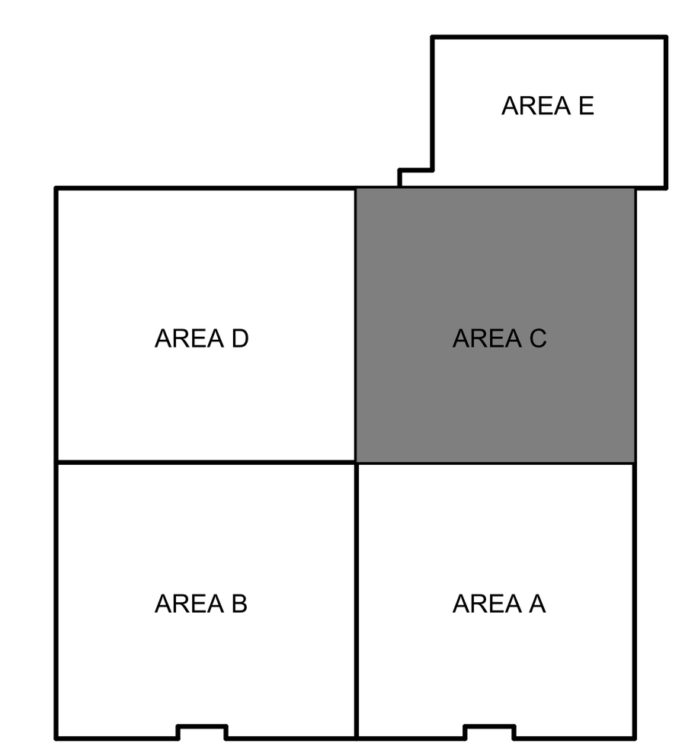
NORTH

SHEET NOTES:

1. ALL SHOWN POWER CIRCUITS ON THIS SHEET SHALL RUN TO PANEL 'LP3', UNLESS NOTED OTHERWISE.

KEYNOTES:

1. PROVIDE CIRCUITS PROVISION FOR FUTURE EQUIPMENT CONNECTION AT JUNCTION BOX.
2. EC SHALL INSTALL RECEPTACLE IN AV MOUNT BOX. COORDINATE EXACT LOCATION WITH AV INSTALLER.
3. PROVIDE ENGRAVED NAMEPLATE "GAS SHUT OFF". REFER TO SHEET 8/E400 FOR EMERGENCY GAS SHUTOFF WRING DIAGRAM DETAIL.
4. SPLIT SYSTEM UNIT POWER FROM ASSOCIATED CONDENSING UNIT. PROVIDE 2# 12 &1#2 GND IN 3/4" CONDUIT FROM CONDENSING UNIT. COORDINATE CONNECTION WITH MECHANICAL CONTRACTOR PRIOR TO PERFORMING WORK.
5. FIXED DROP CORD AND PLUG SETS. PROVIDE WITH PIN AND SLEEVE RECEPTACLE. FIELD COORDINATE FINAL LENGTH OF CORD AND LOCATION OF PLUG WITH OWNER PRIOR TO INSTALLATION. REFER TO DETAIL 2/E401 FOR ADDITIONAL INFORMATION.
6. FIXED DROP CORD AND PLUG SETS. PROVIDE WITH TWIST AND LOCK RECEPTACLE L14-30R. FIELD COORDINATE FINAL LENGTH OF CORD AND LOCATION OF PLUG WITH OWNER PRIOR TO INSTALLATION. REFER TO DETAIL 2/E401 FOR ADDITIONAL INFORMATION.
7. FIXED DROP CORD AND PLUG SETS. PROVIDE WITH TWIST AND LOCK RECEPTACLE L5-20R. FIELD COORDINATE FINAL LENGTH OF CORD AND LOCATION OF PLUG WITH OWNER PRIOR TO INSTALLATION. REFER TO DETAIL 2/E401 FOR ADDITIONAL INFORMATION.
8. E.C. PROVIDE OUTLET WITH DUSTPROOF COVER. PROVIDE LARGE/DEEP COVERS THAT ALLOW FOR CORD BEND. MOUNT AT WALL OF WELDING BOOTH.
9. REFER TO DETAIL 7/E400 FOR WELDING EQUIPMENT SHUTDOWN CONTROL.
10. COORDINATE MOUNTING HEIGHT AND LOCATION WITH FUME HOOD SUPPLIER.
11. PROVIDE A PEDESTAL-MOUNTED RECEPTACLES ON THE TABLE. SAW CUT THE FLOOR AS REQUIRED TO ROUTE THE CONDUIT TO THE TABLE LOCATION. COORDINATE THE CONDUIT ROUTING PATH WITHIN THE TABLE TO THE PEDESTAL WITH THE ARCHITECT.
12. E.C. PROVIDE OUTLET WITH DUSTPROOF COVER. PROVIDE LARGE/DEEP COVERS THAT ALLOW FOR CORD BEND.
13. PROVIDE ROUGH-IN FOR OVERHEAD DOOR CONTROLLER. COORDINATE EXACT LOCATION WITH ARCHITECT.



KEY PLAN

PRELIMINARY NOT FOR CONSTRUCTION

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ST. LOUIS, MO 63143
P: 314.645.1132 F: 314.645.1173
www.imegcorp.com

REF. SCALE IN INCHES 0 1 2 3
PROJECT #24006673.00

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Professional Seal:

Architect COA:

ECC/Rolla,MO/Rolla Bldg Reno

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Rolla, MO 65401

No.	Description	Date
2	ADDENDUM 02	7.10.25
3	ADDENDUM 03	7.22.25
5	ADDENDUM 05	08.05.2025

Sheet Title:

LEVEL 01 PLAN - POWER - AREA C

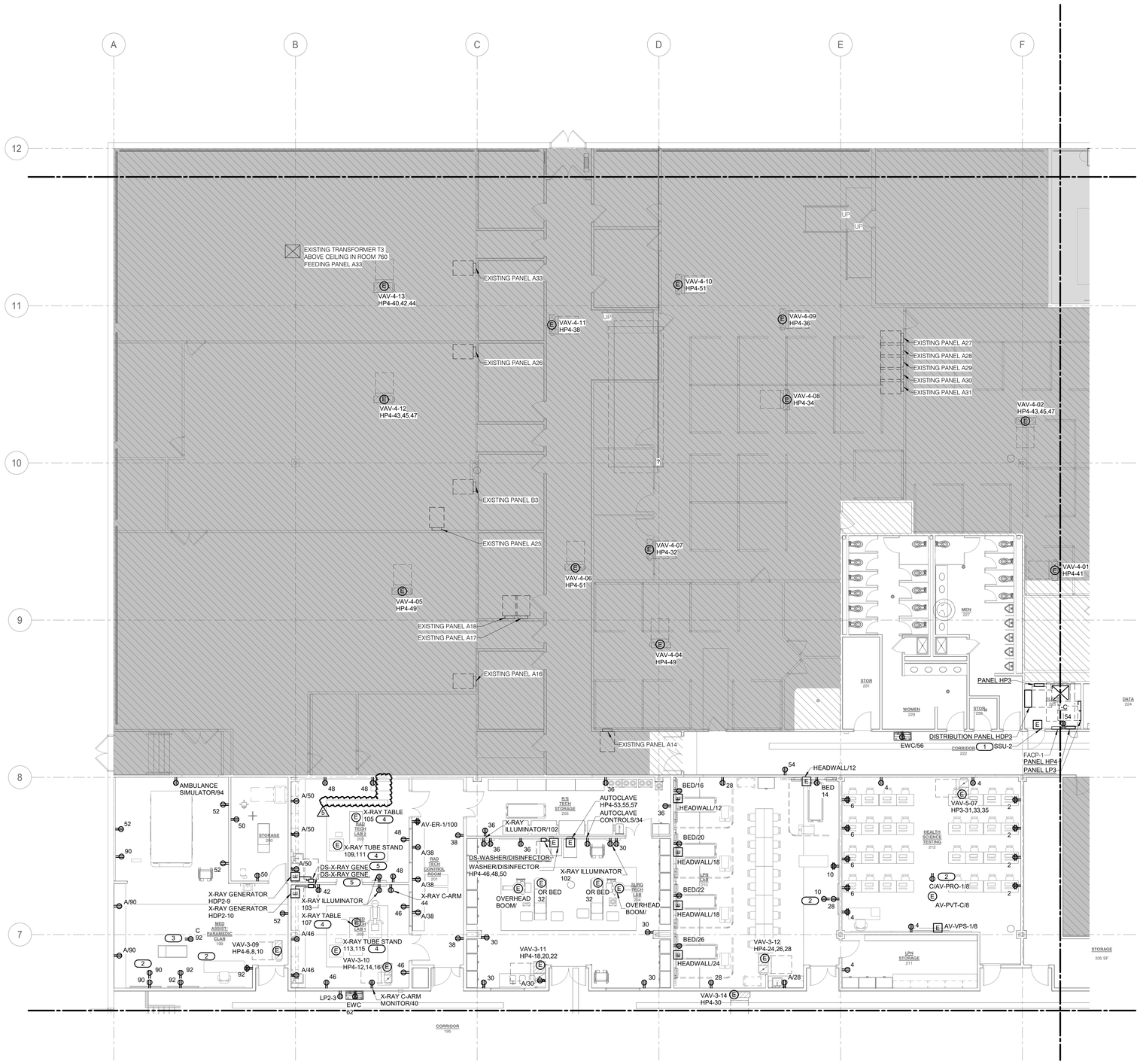
Project Number: 24006673.00
Drawn By: IMEG
Issue Date: 6.20.2025
Sheet Number: E211C

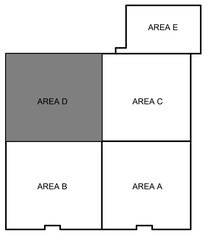
SHEET NOTES:

1. ALL SHOWN POWER CIRCUITS ON THIS SHEET SHALL RUN TO PANEL 'LP3', UNLESS NOTED OTHERWISE.

KEYNOTES:

1. SPLIT SYSTEM UNIT POWER FROM ASSOCIATED CONDENSING UNIT. PROVIDE 2# 12 &1#2 GND IN 3/4" CONDUIT FROM CONDENSING UNIT. COORDINATE CONNECTION WITH MECHANICAL CONTRACTOR PRIOR TO PERFORMING WORK.
2. EC SHALL INSTALL RECEPTACLE IN AV MOUNT BOX. COORDINATE EXACT LOCATION WITH AV INSTALLER.
3. PROVIDE RECEPTACLE FOR FUTURE PROJECTOR.
4. E.C. TO PROVIDE POWER CONNECTION FROM FLOOR TO EQUIPMENT. COORDINATE EXACT LOCATION WITH EQUIPMENT SUPPLIER.
5. PROVIDE 3#6 & 1#4 GND FROM DISCONNECT TO X-RAY GENERATORS.





KEY PLAN

1 LEVEL 01 PLAN - POWER - AREA D

1/8" = 1'-0"

NORTH

PRELIMINARY NOT FOR CONSTRUCTION

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Missouri Certificate of Authority #2023010035

REF. SCALE IN INCHES 0 1 2 3 — PROJECT #24006673.00

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MEPFP Engineer	IMEG 15 Sunnen Dr, Suite 104 St. Louis, MO 63143
COA	o: 314.257.0632 m: 314.827.7022

Professional Seal:

Architect COA:

ECC/Rolla,MO/Rolla Bldg Reno

1400 Independence Rd. Rolla, MO 65401

No.	Description	Date
2	ADDENDUM 02	7.10.25
3	ADDENDUM 03	7.22.25
5	ADDENDUM 05	08.05.2025

Sheet Title:

LEVEL 01 PLAN - POWER - AREA D

Project Number: 24006673.00
Drawn By: IMEG
Issue Date: 6.20.2025

Sheet Number: E211D

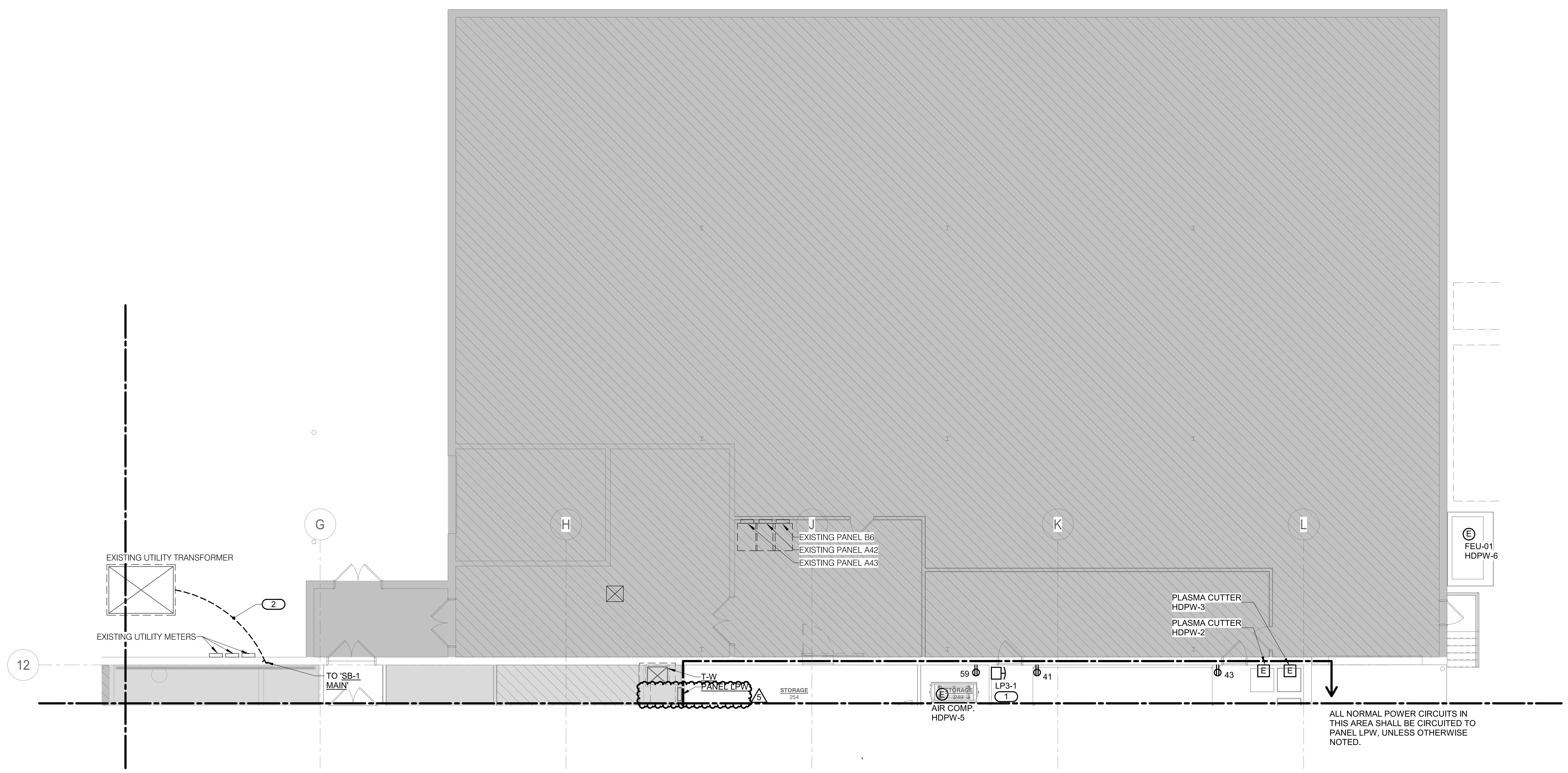
2020.01.20

SHEET NOTES:

1. ALL SHOWN POWER CIRCUITS ON THIS SHEET SHALL RUN TO PANEL 'LP3', UNLESS NOTED OTHERWISE.

KEYNOTES:

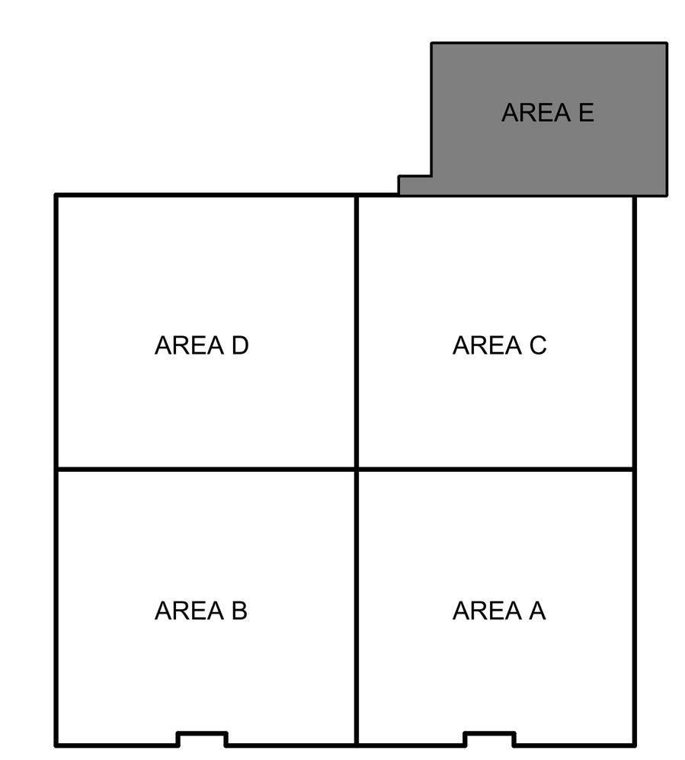
1. REFER TO DETAIL 7/E400 FOR WELDING EQUIPMENT SHUTDOWN CONTROL.
2. E.C. SHALL REMOVE THE EXISTING CONDUITS RUNNING FROM THE EXISTING UTILITY TRANSFORMER TO THE EXISTING MAIN SWITCHBOARD SCHEDULED FOR DEMOLITION. PROVIDE A NEW CONDUIT FROM THE EXISTING UTILITY TRANSFORMER TO THE NEW MAIN SWITCHBOARD (SB-1-MAIN). REFER TO DETAIL 4/E401 FOR UNDERGROUND CONDUIT INSTALLATION REQUIREMENTS. THE CONDUIT ROUTING SHOWN IS FOR BIDDING PURPOSES ONLY. THE E.C. IS RESPONSIBLE FOR FIELD VERIFYING THE FINAL CONDUIT PATH AND ENSURE COMPLIANCE WITH UTILITY PROVIDER REQUIREMENTS. COORDINATE ALL THE NECESSARY OUTAGES IN ADVANCE WITH THE OWNER.



1 LEVEL 01 PLAN - POWER - AREA E

1/8" = 1'-0"

NORTH



KEY PLAN

PRELIMINARY NOT FOR CONSTRUCTION

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15 SUNNEN DRIVE
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Missouri Certificate of Authority #2023010035

REF. SCALE IN INCHES — PROJECT #24006673.00

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Professional Seal:

Architect COA:

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Rolla, MO 65401

No.	Description	Date
2	ADDENDUM 02	7.10.25
4	ADDENDUM 04	7.30.2025
5	ADDENDUM 05	08.05.2025

Sheet Title:

LEVEL 01 PLAN - POWER - AREA E

Project Number: 24006673.00

Drawn By: IMEG

Issue Date: 6.20.2025

Sheet Number: E211E

DISTRIBUTION PANEL HDPW

ENCLOSURE: NEMA 1
FED FROM: 800 A/3P MCCB @ SB-1 DIST
LOCATION: IET/ INDUSTRIAL MAINTENANCE (PHASE II) 1288

SOLID NEUTRAL
GROUND BUS

MAIN: 800 A MCCB
VOLTS: 480/277 Wye
PHASE: 3
WIRE: 4
SCCR: 35 kA
ISC: 21.78 kA

NOTES:

CKT	LOAD DESCRIPTION	Load	POLES	FRAME	TRIP	TYPE	ACC.	WIRE AND RACEWAY	CIRCUIT KEY
1	HPW	210 kVA	3	300 A	300 A	MCCB		4#500 AL & 1#4 CU EGC IN 3" C.	
2	PLASMA CUTTER	37.41 kVA	3	150 A	60 A	MCCB		3#4 & 1#10 EGC IN 1" C.	
3	PLASMA CUTTER	37.41 kVA	3	150 A	60 A	MCCB		3#4 & 1#10 EGC IN 1" C.	
4	PLASMA CUTTER	37.41 kVA	3	150 A	60 A	MCCB		3#4 & 1#10 EGC IN 1" C.	
5	AIR COMP. RM STORAGE 249	9.15 kVA	3	150 A	20 A	MCCB		3#12 & 1#12 EGC IN 3/4" C.	
6	FEU-FAN-1	54.04 kVA	3	150 A	150 A	MCCB		3#3 & 1#6 EGC IN 1 1/4" C.	
7	SPARE	0 kVA	1	200 A	200 A	--	--	--	--
8	200A SPACE	--	1	--	--	--	--	--	--
9	400A SPACE	--	1	--	--	--	--	--	--

LOAD SUMMARY (INCLUDES ALL TUBS IN THIS PANEL)

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*	
Motor	175.422 kVA	100.00%	175.422 kVA		
Welders	210 kVA	68.21%	143.25 kVA	TOTAL CONNECTED LOAD:	385.42 kVA
				TOTAL ESTIMATED DEMAND LOAD:	318.672 kVA
				TOTAL CONNECTED AMPS:	463.59 A
				TOTAL ESTIMATED DEMAND AMPS:	383.3 A

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES:

PANEL HPW

MOUNTING: SURFACE
ENCLOSURE: NEMA 1
FED FROM: 300 A/3P MCCB @ HDPW
LOCATION: FACULTY OFFICE 242

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 300 A MLO
VOLTS: 480/277 Wye
PHASE: 3
WIRE: 4
SCCR: 35 kA
ISC: 15.91 kA

NOTES:

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE H	N	G	VD %	A		B		C		VD %	WIRE SIZE G	N	H	P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
	1								5	5												2	
	3	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.34			5	5			0.39	10	--	10	3	30 A	REC-Z1 RM WELDING 241	4	
	5												5	5								6	
	7								5	5												8	
	9	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.29			5	5			0.35	10	--	10	3	30 A	REC-Z1 RM WELDING 241	10	
	11												5	5								12	
	13								5	5												14	
	15	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.25			5	5			0.29	10	--	10	3	30 A	REC-Z1 RM WELDING 241	16	
	17												5	5								18	
	19								5	5												20	
	21	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.27			5	5			0.25	10	--	10	3	30 A	REC-Z1 RM WELDING 241	22	
	23												5	5								24	
	25								5	5												26	
	27	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.32			5	5			0.23	10	--	10	3	30 A	REC-Z1 RM WELDING 241	28	
	29												5	5								30	
	31								5	5												32	
	33	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.37			5	5			0.27	10	--	10	3	30 A	REC-Z1 RM WELDING 241	34	
	35												5	5								36	
	37								5	5												38	
	39	REC-Z1 RM WELDING 241	30 A	3	10	--	10	0.42			5	5			0.31	10	--	10	3	30 A	REC-Z1 RM WELDING 241	40	
	41												5	5								42	
--	43	SPARE	20 A	1	--	--	--		0	0						--	--	--	1	20 A	SPARE	44	--
--	45	SPARE	20 A	1	--	--	--				0	0				--	--	--	1	20 A	SPARE	46	--
--	47	SPARE	20 A	1	--	--	--						0	0		--	--	--	1	20 A	SPARE	48	--
--	49	SPARE	20 A	1	--	--	--		0	0						--	--	--	1	20 A	SPARE	50	--
--	51	SPARE	20 A	1	--	--	--				0	0				--	--	--	1	20 A	SPARE	52	--
--	53	SPARE	20 A	1	--	--	--						0	0		--	--	--	1	20 A	SPARE	54	--
--	55	SPACE	--	1	--	--	--		--	--						--	--	--	1	--	SPACE	56	--
--	57	SPACE	--	1	--	--	--				--	--				--	--	--	1	--	SPACE	58	--
--	59	SPACE	--	1	--	--	--						--	--		--	--	--	1	--	SPACE	60	--
								Total Load:	70.00 kVA		70.00 kVA		70.00 kVA										
								Total Amps:	252.71		252.71		252.71										

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*	
Welders	210 kVA	68.21%	143.25 kVA		
				TOTAL CONNECTED LOAD:	210.00 kVA
				TOTAL ESTIMATED DEMAND LOAD:	143.25 kVA
				TOTAL CONNECTED AMPS:	252.59 A
				TOTAL ESTIMATED DEMAND AMPS:	172.3 A

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES:

PANEL LPW

MOUNTING: SURFACE
ENCLOSURE: NEMA 1
FED FROM: 225 A/3P @ T-W
LOCATION: IET/ INDUSTRIAL MAINTENANCE (PHASE II)...

SINGLE TUB
SOLID NEUTRAL
GROUND BUS

MAIN: 225 A MCB
VOLTS: 120/208 Wye
PHASE: 3
WIRE: 4
SCCR: 10 kA
ISC: 4.62 kA

NOTES: PROVIDE WITH SINGLE TUB PANELBOARD 5

KEY	CKT NO.	LOAD DESCRIPTION	OCPD AMPS	P	WIRE SIZE H	N	G	VD %	A		B		C		VD %	WIRE SIZE G	N	H	P	OCPD AMPS	LOAD DESCRIPTION	CKT NO.	KEY
*S	1	RCPT RM WELDING 241	20 A	1	12	12	12	0.62	0.36	0.36					0.65	12	12	12	1	20 A	RCPT RM WELDING 241	2	*S
--	3	SPACE SHUNT TRIP	--	1	--	--	--				--	--				--	--	--	1	--	SPACE SHUNT TRIP	4	--
*S	5	RCPT RM WELDING 241	20 A	1	12	12	12	0.67					0.36	0.36	0.7	12	12	12	1	20 A	RCPT RM WELDING 241	6	*S
--	7	SPACE SHUNT TRIP	--	1	--	--	--		--	--						--	--	--	1	--	SPACE SHUNT TRIP	8	--
*S	9	RCPT RM WELDING 241	20 A	1	12	12	12	0.74			0.36	0.36			0.77	12	12	12	1	20 A	RCPT RM WELDING 241	10	*S
--	11	SPACE SHUNT TRIP	--	1	--	--	--						--	--		--	--	--	1	--	SPACE SHUNT TRIP	12	--
*S	13	RCPT RM WELDING 241	20 A	1	12	12	12	0.8	0.36	0.36					0.83	12	12	12	1	20 A	RCPT RM WELDING 241	14	*S
--	15	SPACE SHUNT TRIP	--	1	--	--	--				--	--				--	--	--	1	--	SPACE SHUNT TRIP	16	--
*S	17	RCPT RM WELDING 241	20 A	1	12	12	12	0.85					0.36	0.36	0.9	12	12	12	1	20 A	RCPT RM WELDING 241	18	*S
--	19	SPACE SHUNT TRIP	--	1	--	--	--		--	--						--	--	--	1	--	SPACE SHUNT TRIP	20	--
*S	21	RCPT RM WELDING 241	20 A	1	12	12	12	0.91			0.36	0.36			0.94	12	12	12	1	20 A	RCPT RM WELDING 241	22	*S
--	23	SPACE SHUNT TRIP	--	1	--	--	--						--	--		--	--	--	1	--	SPACE SHUNT TRIP	24	--
*S	25	RCPT RM WELDING 241	20 A	1	12	12	12	0.96	0.36	0.36					1	12	12	12	1	20 A	RCPT RM WELDING 241	26	*S
--	27	SPACE SHUNT TRIP	--	1	--	--	--				--	--				--	--	--	1	--	SPACE SHUNT TRIP	28	--
	29	CORD & PLUG RM 238	20 A	1	12	12	12	2.03					1.8	1.8	2.51	12	12	12	1	20 A	CORD & PLUG RM 238	30	
	31	CORD & PLUG RM 238	30 A	2	10	--	10	1.23	2.5	2.5					1.49	10	--	10	2	30 A	CORD & PLUG RM 238	32	
	33										2.5	2.5										34	
	35	CORD & PLUG RM 238	20 A	1	12	12	12	2.48					1.8	0.36	0.12	12	12	12	1	20 A	RCPT RM 238	36	
	37	CORD & PLUG RM 238	30 A	2	10	--	10	1.48	2.5	0.36					0.15	12	12	12	1	20 A	RCPT RM 238	38	
	39										2.5	0.36			0.21	12	12	12	1	20 A	RCPT RM 238	40	
	41	RCPT RM WELDING 241	20 A	1	12	12	12	0.31					0.18	0.36	0.23	12	12	12	1	20 A	RCPT RM 238	42	
	43	RCPT RM WELDING 241	20 A	1	12	12	12	0.42	0.18	0.36					0.23	12	12	12	1	20 A	RCPT RM 238	44	
	45	RCPT RM WELDING 241	20 A	1	12	12	12	0.46			0.18	0.9			1.51	12	12	12	1	20 A	TV, RCPTS RM 238	46	
	47	RCPT RM WELDING 241	20 A	1	12	12	12	0.51					0.18	1.09								48	
	49	RCPT RM WELDING 241	20 A	1	12	12	12	0.45	0.18	1.09					1.16	12	--	12	3	20 A	COLD SAW RM 241	50	
	51	J.BOX RM 238	20 A	1	12	12	12	0.18			0.25	1.09										52	
	53	J.BOX RM 238	20 A	1	12	12	12	0.3					0.25	0.25	0.33	12	12	12	1	20 A	J.BOX RM 238	54	
	55								5.67	0.25					0.33	12	12	12	1	20 A	J.BOX RM 238	56	
	57	IET	60 A	3	6	6	10	1.05			5.67	1.9			1.48	10	10	10	1	30 A	OVERHEAD DOOR RM 238	58	
	59												5.67	0		--	--	--	1	20 A	SPARE	60	--
--	61	SPARE	20 A	1	--	--	--		0	0						--	--	--	1	20 A	SPARE	62	--
--	63	SPARE	20 A	1	--	--	--				0	0				--	--	--	1	20 A	SPARE	64	--
--	65	SPARE	20 A	1	--	--	--						0	0		--	--	--	1	20 A	SPARE	66	--
--	67	SPARE	20 A	1	--	--	--		0	0						--	--	--	1	20 A	SPARE	68	--
--	69	SPACE	--	1	--	--	--				--	--				--	--	--	1	--	SPACE	70	--
--	71	SPACE	--	1	--	--	--						--	--		--	--	--	1	--	SPACE	72	--
--	73	SPACE	--	1	--	--	--		--	--						--	--	--	1	--	SPACE	74	--
--	75	SPACE	--	1	--	--	--				--	--				--	--	--	1	--	SPACE	76	--
--	77	SPACE	--	1	--	--	--						--	--		--	--	--	1	--	SPACE	78	--
--	79	SPACE	--	1	--	--	--		--	--						--	--	--	1	--	SPACE	80	--
--	81	SPACE	--	1	--	--	--				--	--				--	--	--	1	--	SPACE	82	--
--	83	SPACE	--	1	--	--	--						--	--		--	--	--	1	--	SPACE	84	--
								Total Load:	17.75 kVA		19.29 kVA		15.18 kVA										
								Total Amps:	151.21		164.04		126.50										

LOAD SUMMARY

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	TOTALS*	
Motor	5.178 kVA	100.00%	5.178 kVA		
Power	38.4 kVA	100.00%	38.4 kVA	TOTAL CONNECTED LOAD:	52.22 kVA
Receptacles	8.64 kVA	100.00%	8.64 kVA	TOTAL ESTIMATED DEMAND LOAD:	52.218 kVA
				TOTAL CONNECTED AMPS:	144.94 A
				TOTAL ESTIMATED DEMAND AMPS:	144.9 A

*TOTAL DEMAND CALCS SUBTRACT ANY REDUNDANT LOAD AND THE SMALLER OF ANY NONCOINCIDENT HVAC LOADS. THIS CALC IS DONE AT EACH PANEL.

CIRCUIT KEY NOTES:

PRELIMINARY
NOT FOR
CONSTRUCTION

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REF. SCALE IN INCHES PROJECT #24006673.00

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Professional Seal:

Architect COA:

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1400 Independence Rd. Rolla, MO 65401

No.	Description	Date
2	ADDENDUM 02	7.10.25
3	ADDENDUM 03	7.22.25
5	ADDENDUM 05	08.05.2025

Sheet Title:

ELECTRICAL PANEL SCHEDULES

Project Number: 24006673.00
Drawn By: IMEG
Issue Date: 6.20.2025
Sheet Number: E603