Procurement & Payment Services
District Office Building D
4905 East Broadway Blvd., Room D206
Tucson, Arizona 85709-1420

Addendum No. 3
INVITING SEALED BIDS ITB No. 21/10039
Project: West Campus Laboratories Bldg. F Renovation

Issue Date: February 24, 2021

This addendum # 3 is issued to address questions and issues not answered in Addendum 2 and submitted by potential respondents during the Question period.

This addendum supplements and amends the original Construction Document specifications and drawings, dated January 8, 2020 and those reissued in Addendum #2. This Addendum 3 will be taken into account in preparing bids, and will become part of the Contract Documents. In case of conflicts between the Specifications, Drawings, and this Addendum, this Addendum shall govern.

Acknowledge receipt of this Addendum in the space provided on the bid form. Failure to do so may subject bidder to disqualification.

Addendum – Material changes to the solicitation.

Item One #1: Reissued Drawings
Mechanical, Electrical, Lab Plumbing drawings have been reissued by BWS. These reissued drawings are attached to this Addendum.

Item Two #2: Specifications
Specifications 233600, 233713 and 237313 have been reissued by BWS. These Specification documents are attached to this Addendum.

Item Three #3: Room finish schedule
BWS has clarified the ceiling tile specification. Refer to Question #4 and the attached BWS Addendum 3

Attachment:
Addendum 3, Construction Documents Prepared by BWS Architects 2/24/2021 – 21 pages

Questions and Answers – Addendum 3:

Question #1: Reference Specifications Division 27 Telecommunications and Construction Drawings "Telecom" sheets T1.0, T1.1, T2.1, T2.2. After looking through and reviewing the drawings there is a few keynotes that call out on the Low Voltage work to be installed by the Owners vendor. Does this apply to the whole scope of work for the Division 27 ? Can you please advise so we know how to proceed?

Answer #1: Pima College will provide vendor to install and terminate cabling only. All requirements shown on the Construction Drawings Sheets identified above, and Division 27 are the responsibility of the contractor.

Question #2: Refer to Specification 135310, Drawing No. A2.7. Please confirm epoxy resin work surface color is graphite per finish legend on sheet A2.7. The specifications (135310 2.4 A.3a) reference epoxy resin work surface color to be black.

Answer #2: Color name may vary by manufacturer or brand name.

Question #3: Spec calls for alternating tread stair to hatch and then calls out ladder safety post for hatch. Ladder safety posts are for vertical rung ladders. Please advise.

Answer #3: Safety post and guardrail to be as per 077200

Question #4: On the room finish schedule you have Armstrong Cirrus High NRC but do not have a number or grid type listed. When looking at that specific tile we found that there are various numbers associated with that tile name, for example NRC 556 or NRC 558. Please provide a specification for exact tile as well as grid dimension (15/16 or 9/16).

Answer #4: Ceiling tile to be Armstrong 574 or equal. Grid dimension to be as per section 095133

Question #5: Worker's comp limits: $2M per accident, $1M disease. Would it be acceptable to carry a limit of $1M per accident?

Answer #5: No

Question #6: Confirm that the AV is not part of General Contractor's responsibility.

Answer #6: AV is not part of the Contractors responsibility.

Question #7: Please provide a drawing of MDF or IDF buildout (rack layout, tray layout, grounding layout, patch panel/switch layout and grounding layout).

Answer #7: Contractor's responsibility for the IDF build out is shown on the Construction Plans page T2.2. Only the rack and cable tray are included. Owner will install network MDF equipment which includes grounding layout and panel layouts

Question #8: Please provide a drawing of MDF or IDF buildout (rack layout, tray layout, grounding layout, patch panel/switch layout and grounding layout).

Answer #8: Contractor's responsibility for the IDF build out is shown on the Construction Plans page T2.2. Only the rack and cable tray are included. Owner will install network MDF equipment which includes grounding layout and panel layouts

Question #9: Does not specify if cables are required to be plenum or riser rated cables.
Answer #9: Not part of this contract. These cables are owner furnished and owner installed.

Question #10: Need clarification if customer requires category 6 or 6A cable and preference of colored jacket on cable.
Answer #10: Not part of this contract. These cables are owner furnished and owner installed.

Question #11: Are all faceplates to be Stainless Steel due to being in a lab environment?
Answer #11: Faceplates are to comply with Division 26, Section 262726 Part 2.5

Addendum 2 – Carry Over

Question #14: What electrical systems need to b certified?
Answer #14: This project does not require electrical systems certification.

Question #27: There is a drawing in between LP3.10 and LP3.12 with no page number or information. What is this sheet for? Is it supposed to be LP3.11?
Answer #27: Refer to the attached BWS Addendum 3

Question #28: Are any luminaires to be controlled by nLIGHT system. Sheet 3.3 has a schematic drawing for an nLIGHT system, but the Lighting Fixture Schedule does not specify any luminaires with nLIGHT control.
Answer #28: Lighting controls are nLight or equivalent.

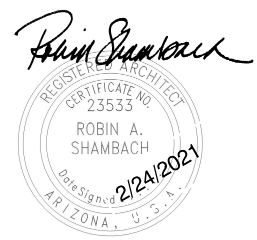
Question #29: Are wall switches to be conventional line voltage, single pole, 3 way, 4 way, utilizing powerpack relays or low voltage control, dimming, 3 way, 4 way?
Answer #29: Refer to symbols on sheet E0.1

Question #30: Should Panel 1LP1 have a 200 amp main breaker? I see that all the other panels that are fed from switch gear have main breakers rated the same as the breaker feeding it.
Answer #30: The 150 amp breaker called out on the 1LP1 panel is correct as dawn.

Question #32: Refer to Drawings / Specification Reference: Drawings - Plumbing Demolition Plans P1.1.1, P1.1.2, P1.2.1,P1.2.2, Keynote 2. Question: Any lab equipment that requires a backflow preventer is expected to be identified on the bid /contract documents; this is not indicated in the drawings or specs.
Answer #32: The plumbing demolition drawings referenced, keynote 2 call for 'remove all existing s back to 4" s main'. This is correct. Rest of the question, see question 35

Question #33: Refer to Drawings – Lab Plumbing Details LP3.11. Something seems to have gone off-track with this drawing. There is no biddable, buildable information, no title block, date, AE seal, notes or scale, etc. It may be an early SD phase 'sketch' and not the intent for this drawing to be issued like this for bidding and construction. There are many other drawings and notes referencing this drawing and specific details. It is key for this PCC labs project. Please take a look at drawing LP3.11, correct and re-issue this sheet ASAP.
Answer #33: Refer to the attached BWS Addendum 3
Question #35: Any lab equipment that requires a backflow preventer is expected to be identified on the bid /contract documents; this is not indicated in the drawings or specs.
Answer #35: See Sheet P2.2.3 KN#4.

Prepared by:
BWS Architects
261 N. Court Ave.
Tucson, Arizona 85701



EXPIRES 06/30/2022

Project:
Pima Community College
WEST CAMPUS LAB BUILDING F RENOVATION

ADDENDUM NO. 3
February 24, 2021

All requirements contained in the Contract Documents dated December January 8, 2020 shall apply to this Addendum, and the general character of the Work called for in this Addendum shall be the same as originally set forth in the applicable portions of the Contract Documents for similar Work, unless otherwise specified under this Addendum, and all incidental Work necessitated by this Addendum as required to complete the Work shall be included in the bids, even though not particularly mentioned in this Addendum.

This Addendum is hereby made a part of the Contract Documents. Acknowledge receipt of this Addendum in the space provided on the proposal form. Failure to do so may subject bidder to disqualification.

ITEMS FROM PREVIOUS ADDENDA:

1. None

DRAWINGS RE-ISSUED WITH THIS ADDENDUM:

Mechanical drawings issued for changes in equipment, ductwork, air flows, and other miscellaneous items:

M1.0	**MECHANICAL GENERAL NOTES AND LEGEND**
M2.1.1	**MECHANICAL PLAN – LEVEL 1 AREA A**
M2.1.2	**MECHANICAL PLAN – LEVEL 1 AREA B**
M2.2.1	**MECHANICAL PLAN – LEVEL 2 AREA A**
M2.2.2	**MECHANICAL PLAN - LEVEL 2 AREA B**
M6.1	**MECHANICAL SCHEDULES**

Electrical drawings provided for changes in equipment and other miscellaneous items:

E2.20 ELECTRICAL SECOND FLOOR POWER PLAN
E5.0 ELECTRICAL PANEL SCHEDULES
E6.0 ONE-LINE DIAGRAM

LP3.11 LAB PLUMBING DETAILS

SPECIFICATIONS RE - ISSUED WITH THIS ADDENDUM:

1. **233600 AIR TERMINAL UNITS**
2. **233713 DIFFUSERS, REGISTERS, & GRILLES**
3. **237313 AIR HANDLING UNITS**

GENERAL ITEMS:
Questions and Answers:

Question #39: On the room finish schedule you have Armstrong Cirrus High NRC but do not have a number or grid type listed. When looking at that specific tile we found that there are various numbers associated with that tile name, for example NRC 556 or NRC 558. Please provide a specification for exact tile as well as grid dimension (15/16 or 9/16).

Answer #39: **Ceiling tile to be Armstrong 574 or equal. Grid dimension to be as per section 095133.**

SPECIFICATION ITEMS:
1. None

END OF ADDENDUM NO. 3

OUTDOOR AIR CALCULATION													
BUILDING UNIT	ROOM NUM.	ROOM NAME	ZONE FLOOR AREA, Az (SQ.FT.)	CODE	OCCUPANCY CATEGORY, Ra, Rp	ZONE POPULATION Pz	ZONE AIR DISTRIBUTION EFFECTIVENESS, Ez	ZONE SUPPLY AIR FLOW Vpz (CFM)	SYSTEM POPULATION Ps	OUTDOOR AIR INTAKE Vot (CFM)	REQUIRED EXHAUST VENTILATION (CFM)	ZONE MIN. EXHAUST AIR FLOW (CFM)	ZONE MAX EXHAUST AIR FLOW (CFM)
AHU-1.1	101	ORGANIC CHEMISTRY LAB	1,668	22	SCIENCE LABORATORIES	41.7		3 7,100			1,668	2,760	7,460
	102	ORGANIC CHEMISTRY LAB	1,634	22	SCIENCE LABORATORIES	40.9		7,100			1,634	2,760	7,460
	103	INSTRUMENTATION	326	22	SCIENCE LABORATORIES	8.2		700			326	340	340
	104	PREPARATION ROOM	856	22	SCIENCE LABORATORIES	21.4		1,700			856	920	920
			4,484			112.1	CSCR	3 16,600	112	2,280	4,484	6,780	16,180
AHU-1.2	110	MICROBIOLOGY LAB	1,560	22	SCIENCE LABORATORIES	39.0		3,200			1,560	1,600	1,600
	111	MICROBIOLOGY LAB	1,574	22	SCIENCE LABORATORIES	39.4		3,200			1,574	1,600	1,600
	112	MICROBIOLOGY PREP	1,051	22	SCIENCE LABORATORIES	26.3		2,200			1,051	1,100	1,100
	113	AUTOCLAVE ROOM	159	22	SCIENCE LABORATORIES	4.0		3 750			159	200	850
	114	CLEAN SPACE	172	50	STORAGE ROOMS	0.3		550			0	0	0
			4,516			108.9	CSCR	3 9,900	109	2,031	4,344	4,500	5,150
AHU-2.1	201	GENERAL CHEMISTRY	1,550	22	SCIENCE LABORATORIES	38.8		3,120			1,550	1,600	2,220
	202	GENERAL CHEMISTRY	1,551	22	SCIENCE LABORATORIES	38.8		3,120			1,551	1,600	2,220
	203	GENERAL CHEMISTRY	1,556	22	SCIENCE LABORATORIES	38.9		3,120			1,556	1,600	2,220
	204	GENERAL CHEMISTRY	1,551	22	SCIENCE LABORATORIES	38.8		3,120			1,551	1,600	2,220
	205	PREPARATION ROOM	1,783	22	SCIENCE LABORATORIES	44.6		3,600			1,783	1,860	3,480
	206	CHEMICAL STORAGE	494	113	STORAGE ROOM, CHEMICAL	0.0		580			371	600	600
	207	LAB WASTE	154	113	STORAGE ROOM, CHEMICAL	0.0		120			116	240	240
	208	ALCOVE	100	50	STORAGE ROOMS	0.2		80			0	0	0
	209	OPEN OFFICE	137	51	OFFICE SPACE	0.7		140			0	0	0
			8,876			200.7	CSCR	17,000	201	3,694	8,477	9,100	13,200

MECHANICAL LEGEND

DESCRIPTION	SYMBOL
EXISTING - SHOWN IN LIGHTWEIGHT PEN	
DEMOLISH - SHOWN IN DASHED PEN	
LINED DUCTWORK (UNLESS NOTED OTHERWISE)	
RECTANGULAR BRANCH TAKE-OFF WITH 45° TAP	
RECTANGULAR ELBOW WITH TURNING VANES	
RECTANGULAR 90° ELBOW DOWN / UP - SUPPLY	DN UP
RECTANGULAR 90° ELBOW DOWN / UP - RETURN	DN UP
RECTANGULAR 90° ELBOW DOWN / UP - EXHAUST	DN UP
RECTANGULAR DUCT RISER - SUPPLY / RETURN / EXHAUST	
ROUND BRANCH TAKE-OFF WITH CONICAL TAP	
ROUND ELBOW	
ROUND 90° ELBOW DOWN / UP - SUPPLY	DN UP
ROUND 90° ELBOW DOWN / UP - RETURN	DN UP
ROUND 90° ELBOW DOWN / UP - EXHAUST	DN UP
ROUND DUCT RISER - SUPPLY / RETURN / EXHAUST	
MANUAL BALANCING DAMPER	
FIRE DAMPER	FD
SMOKE DAMPER	SD
FIRE SMOKE DAMPER	FSD
DUCT SMOKE DETECTOR	
SPIN IN COLLAR WITH BALANCING DAMPER	
ROUND FLEXIBLE DUCT	
SUPPLY AIR DEVICE	OR
RETURN AIR DEVICE	OR
RETURN AIR DEVICE WITH PLENUM BOOT	
EXHAUST AIR DEVICE	OR
WALL GRILLE - ARROW INDICATES AIRFLOW	OR
CEILING EXHAUST FAN	
ROOFTOP CURB MOUNTED EXHAUST FAN	
THERMOSTAT	T
DUCT SMOKE DETECTOR	SD

MECHANICAL PIPING LEGEND

DESCRIPTION	SYMBOL
ELBOW DOWN	
ELBOW UP	
TEE DOWN	
TEE UP	
SHUT OFF VALVE - BALL VALVE	
SHUT OFF VALVE - GATE VALVE	
UNION	
ARROW INDICATES DIRECTION OF FLOW	

MECHANICAL ABBREVIATIONS

ABV	ABOVE	EA	EXHAUST AIR
AFF	ABOVE FINISH FLOOR	HWS	HEATING WATER SUPPLY
A.D.	ACCESS DOOR	HWR	HEATING WATER RETURN
CD	CONDENSATE	MUW	MAKE-UP WATER
CHWS	CHILLED WATER SUPPLY	OA	OUTSIDE AIR
CHWR	CHILLED WATER RETURN	OH	OVERHEAD
CLG	CEILING	RA	RETURN AIR
CONT	CONTINUATION	SA	SUPPLY AIR
CWS	CONDENSER WATER SUPPLY	SOV	SHUT OFF VALVE
CWR	CONDENSER WATER RETURN	TYP	TYPICAL
DN	DOWN	U.N.O.	UNLESS NOTED OTHERWISE
DTR	DUCT THRU ROOF	UG	UNDERGROUND
E	EXISTING	VTR	VENT THRU ROOF

MECHANICAL GENERAL NOTES

1. COORDINATE ALL MECHANICAL WORK WITH ALL OTHER TRADES. VERIFY ALL EXISTING CONDITIONS BEFORE THE START OF WORK.
2. PROVIDE ALL REQUIRED DEMOLITION OF EXISTING MECHANICAL EQUIPMENT, MATERIALS AND OTHER ITEMS WHICH ARE NOT TO BE REUSED IN NEW DESIGN. ALL ITEMS WHICH THE OWNER DOES NOT WISH TO SALVAGE SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE SITE.
3. TRANSITION ALL SUPPLY, RETURN, OUTSIDE AIR AND EXHAUST DUCTWORK FROM AIR HANDLING UNITS AND EXHAUST FANS TO DUCT THROUGH ROOF (DTR) OR DUCT THROUGH FLOOR SIZE. COORDINATE EXACT LOCATIONS WITH ROOF AND FLOOR STRUCTURAL SYSTEM. VERIFY ADEQUACY OF STRUCTURE TO SUPPORT MECHANICAL EQUIPMENT WITH ARCHITECT PRIOR TO INSTALLATION.
4. DIMENSIONS ON DRAWINGS ARE SHEET METAL DUCT SIZES. INSULATE DUCTWORK PER SPECIFICATIONS.
5. ALL RECTANGULAR DUCT ELBOWS SHALL BE MITERED WITH SINGLE THICKNESS TURNING VANES UNLESS INSTRUCTED OTHERWISE ON DRAWINGS. PROVIDE 45 DEGREE ENTRY FITTINGS AT BRANCH DUCT CONNECTIONS TO DUCT MAINS. FLEXIBLE DUCTS SHALL BE INSTALLED TO MAINTAIN FULL CROSS-SECTIONAL FREE AREA. PROVIDE RIGID SHEET METAL ELBOWS OR LINED PLENUM BOXES AT AIR DEVICES WHEN REQUIRED.
6. COORDINATE EXACT LOCATION OF ALL AIR DEVICES WITH ARCHITECTURAL REFLECTED CEILING PLAN.
7. OFFSET EXHAUST DISCHARGE AS REQUIRED INSURING A MINIMUM 25'-0" CLEARANCE FROM ALL OUTSIDE AIR INTAKES.
8. ALL LOW VOLTAGE CONTROL WIRING AND ITS INSTALLATION TO BE BY MECHANICAL CONTRACTOR.INSTALL PER ELECTRICAL SPECIFICATIONS. MOUNTING HEIGHT OF THERMOSTATS SHALL BE PER ADA REQUIREMENTS.
9. PROVIDE SMOKE DETECTOR IN RETURN AIR SYSTEM(S) MOVING MORE THAN 2000 CFM AS INDICATED ON DRAWINGS. RETURN AIR PLENUMS MOVING MORE THAN 2000 CFM REQUIRE A RETURN DUCT SMOKE DETECTOR AT EACH UNIT. SMOKE DETECTORS SHALL DISENGAGE FAN(S) WHEN ACTIVATED. SMOKE DETECTORS INSTALLED IN THE RETURN AIR DUCT(S) MUST BE LOCATED AHEAD OF ANY OUTSIDE AIR INLET.
10. MECHANICAL CONTRACTOR SHALL REVIEW ALL ELECTRICAL DRAWINGS BEFORE PURCHASING EQUIPMENT TO INSURE THAT PROPER ELECTRICAL SERVICE IS TO BE PROVIDED FOR ALL NEW EQUIPMENT.

MECHANICAL PIPING GENERAL NOTES

1. PROVIDE HIGH CAPACITY AUTOMATIC AIR VENTS AT ALL HIGH POINTS IN PIPING WITHIN MECHANICAL ROOMS OR EXTERIOR TO BUILDING PER PCC MDSS STANDARD DETAIL. PROVIDE MANUAL AIR VENTS AT ALL OTHER HIGH POINTS IN PIPING.
2. PROVIDE MANUAL DRAINS AT ALL LOW POINTS IN PIPING.
3. SEAL ALL ROOF OR WALL PIPING PENETRATIONS WEATHER TIGHT.
4. INSULATE ALL PIPING PER SPECIFICATIONS. PROVIDE AN ALUMINUM JACKET FOR ALL EXTERIOR PIPING PER SPECIFICATIONS.
5. LABEL ALL PIPING PER SPECIFICATIONS. INCLUDE ARROW INDICATING DIRECTION OF FLOW.

BASE BID & ALTERNATES DESCRIPTION

BASE BID:
- GENERAL CHEMISTRY AND ASSOCIATED SYSTEMS.
- SECOND FLOOR ENCLOSURES FOR MECHANIAL ROOMS.

ADD ALTERNATE #01
- MICROBIOLOGY AND ASSOCIATED SYSTEMS.

ADD ALTERNATE #02
- ORGANIC CHEMISTRY AND ASSOCIATED SYSTEMS.

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Renovation
2202 W Anklam Rd, Tucson, AZ 85745

Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
25035
KENNETH M.
CAWTHORNE
DATE SIGNED 1.6.21
ARIZONA U.S.A.
Expires 6/30/2023

DRAWN BY: TCB
JOB NO: 1931.000
DATE: 01/08/2020
REVISIONS
3 ADD#3 02/24/2021

KC MECHANICAL ENGINEERING, L.L.C.
5447 East Fifth Street # 112 520/327-7611
Tucson, Arizona 85711 520/327-0432
Designers Mech: TCB Plumb: MT PROJECT# 19-366

MECHANICAL GENERAL NOTES AND LEGEND

M1.0

100% CONSTRUCTION DOCUMENTS

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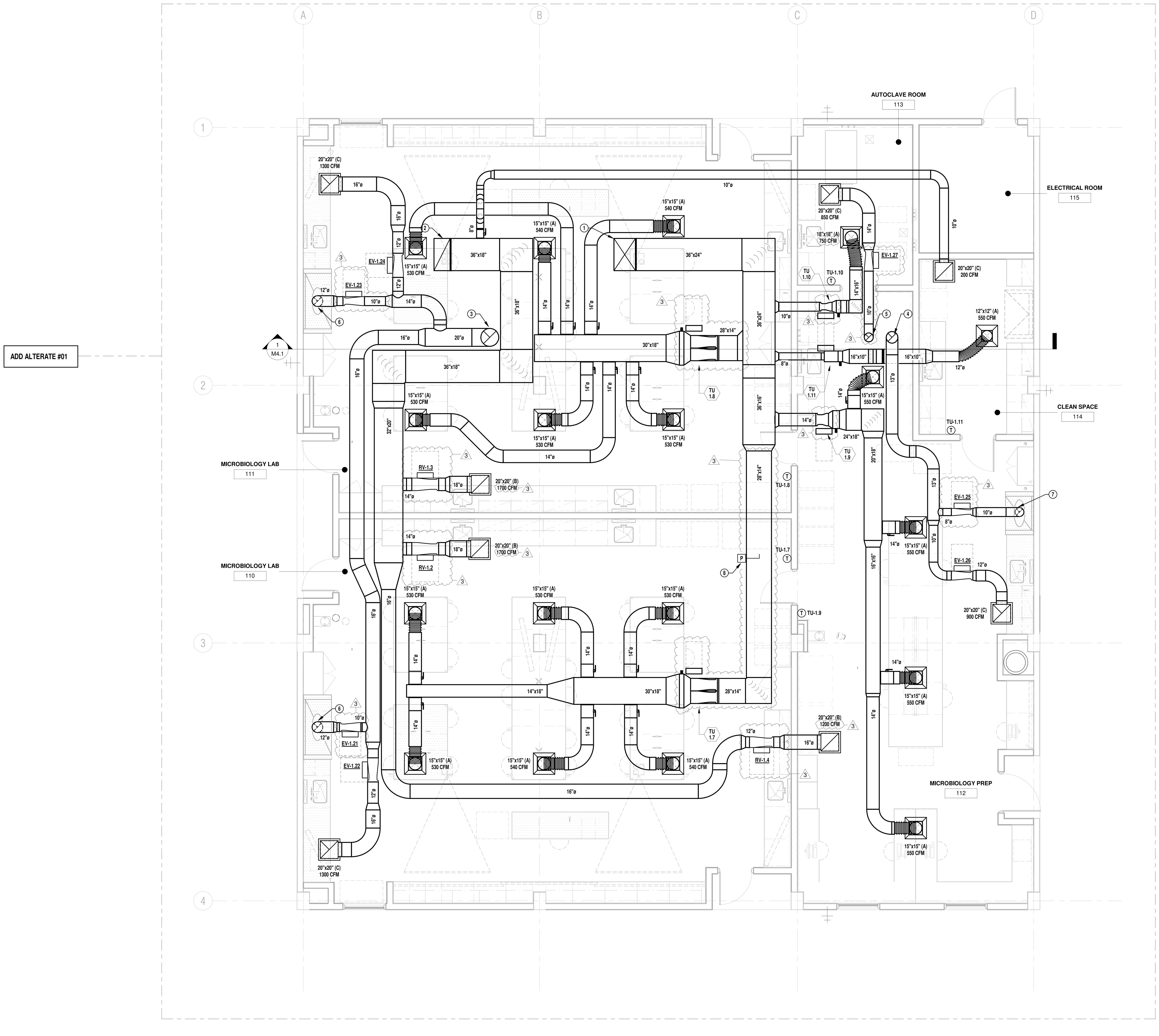

1 Mechanical Plan 1st Floor - A
1/4" = 1'-0"

MECHANICAL KEYNOTES

1. 36"x24" SUPPLY MAIN UP THRU LEVEL 2 FLOOR TO UNIT INLET. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
2. 36"x18" RETURN MAIN UP THRU LEVEL 2 FLOOR TO UNIT INLET. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
3. 20"Ø EXHAUST DUCT UP THRU LEVEL 2 FLOOR, SEE M2.2.1 FOR CONTINUATION.
4. 13"Ø EXHAUST DUCT UP THRU LEVEL 2 FLOOR, SEE M2.2.1 FOR CONTINUATION.
5. 10"Ø EXHAUST DUCT UP THRU LEVEL 2 FLOOR, SEE M2.2.1 FOR CONTINUATION.
6. 12"Ø EXHAUST DUCT DOWN TO 6' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
7. 10"Ø EXHAUST DUCT DOWN TO 4' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
8. SUPPLY DUCT STATIC PRESSURE SENSOR FOR AHU-1.2

3 NOTE: THE AIRFLOWS SHOWN ON THIS PLAN FOR CEILING SUPPLY, RETURN AND EXHAUST AIR DEVICES ARE WITH ALL LAB HOODS AT THEIR MINIMUM AIRFLOW (CLOSED SASH POSITION) AND SUPPLY AIR DEVICES AT MAXIMUM AIRFLOW. REFER TO THE SUPPLY, RETURN AND EXHAUST VALVE SCHEDULES AND CONTROL SEQUENCE OF OPERATION.

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Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
25035
KENNETH M.
CAWTHORNE
DATE SIGNED 1.6.21
ARIZONA U.S.A.
Expires 6/30/2023

DRAWN BY: TCB
JOB NO: 1931.000
DATE: 01/08/2020
REVISIONS
3 ADD#3 02/24/2021

KC MECHANICAL ENGINEERING, L.L.C.
5447 East Fifth Street # 112
Tucson, Arizona 85711
Designers Mech: TCB Plumb: MT
520/327-7611
520/327-0432
PROJECT# 19-366

MECHANICAL PLAN - LEVEL 1 AREA A

M2.1.1

100% CONSTRUCTION DOCUMENTS

2/23/2021 5:20:41 PM

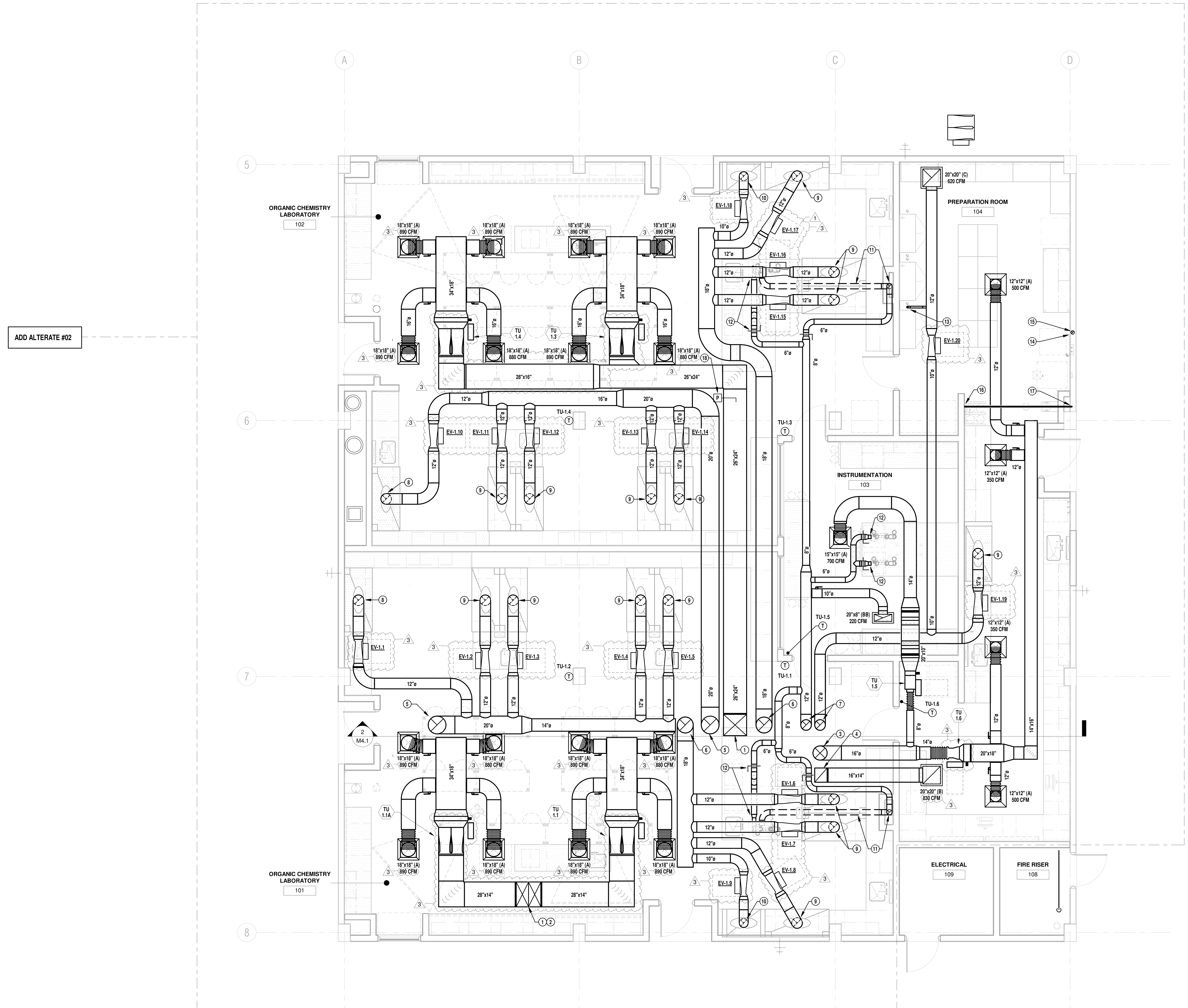
MECHANICAL KEYNOTES

1. 26"x24" SUPPLY UP THRU FLOOR TO LEVEL 2, SEE M2.2.2 FOR CONTINUATION.
2. TRANSITION TO 28"x28" WITH (2) 28"x14" MITERED ELBOWS.
3. 16"Ø SUPPLY UP THRU FLOOR TO LEVEL 2, SEE M2.2.2 FOR CONTINUATION.
4. 16"x14" RETURN WITH 1" LINER UP, TRANSITION TO 18"x16" WITH 2" LINER THRU FLOOR TO LEVEL 2.
5. 20"Ø EXHAUST DUCT UP THRU LEVEL 2 FLOOR, SEE M2.2.2 FOR CONTINUATION.
6. 18"Ø EXHAUST DUCT UP THRU LEVEL 2 FLOOR, SEE M2.2.2 FOR CONTINUATION.
7. 12"Ø EXHAUST DUCT UP THRU LEVEL 2 FLOOR, SEE M2.2.2 FOR CONTINUATION.
8. 12"Ø EXHAUST DUCT DOWN TO 6' AFVH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
9. 12"Ø EXHAUST DUCT DOWN TO 6' FVH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
10. 10"Ø EXHAUST DUCT DOWN TO 4'CFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
11. 6"Ø DOWN IN WALL CHASE TO BASE CABINET CHASE. 6"Ø IN BASE CABINET CHASE TO VACUUM PUMP CABINET EXHAUST CONNECTION, REFER TO LABORATORY FURNISHINGS DETAIL. BALANCE TO 100 CFM.
12. 6"Ø MANUAL DAMPER, 6"Ø REDUCE TO 4"Ø EXHAUST SNORKEL CONNECTION, REFER TO LABORATORY FURNISHINGS DETAIL. BALANCE TO 60 CFM.
13. 2"Ø SCHEDULE 80 PVC/CPVC EXHAUST DUCT DOWN TO TALL CORROSIVE STORAGE CABINET, REFER TO LABORATORY FURNISHINGS DRAWINGS.
14. PROVIDE DRYER WALL BOX WITH 4"Ø DRYER VENT.
15. 4"Ø DRYER VENT UP IN WALL AND UP THRU LEVEL 2 FLOOR, SEE M2.2.2 FOR CONTINUATION.
16. 1"Ø VENT UP FROM PRESSURE RELIEF VALVE TO ABOVE CEILING.
17. 1"Ø VENT UP IN WALL AND UP THRU LEVEL 2 FLOOR, SEE M2.2.2 FOR CONTINUATION.
18. SUPPLY DUCT STATIC PRESSURE SENSOR FOR AHU-1.1

3

NOTE:
ORGANIC CHEMISTRY LABORATORY 101 & 102 - AIRFLOWS SHOWN ON THIS PLAN FOR CEILING SUPPLY AIR DEVICES ARE WITH ALL LAB HOODS AT THEIR DESIGN AIRFLOW (OPEN SASH POSITION) AND SUPPLY AIR DEVICES AT MAXIMUM AIRFLOW. REFER TO THE SUPPLY AND EXHAUST VALVE SCHEDULES AND CONTROL SEQUENCE OF OPERATION.

PREPARATION ROOM 104 - AIRFLOWS SHOWN ON THIS PLAN FOR CEILING SUPPLY, RETURN AND EXHAUST AIR DEVICES ARE WITH THE LAB HOOD AT MINIMUM AIRFLOW (CLOSED SASH POSITION) AND SUPPLY AIR DEVICES AT MAXIMUM AIRFLOW. REFER TO THE SUPPLY, RETURN AND EXHAUST VALVE SCHEDULES AND CONTROL SEQUENCE OF OPERATION.



1 Mechanical Plan 1st Floor - B
1/4" = 1'-0"

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Phone: 619.297.0159	Phone: 520.327.7611	Phone: 520.323.3422	Phone: 520.884.0045

Pima Community College
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Renovation
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Registered Professional Engineer (Mechanical)
25035
KENNETH M. CAWTHORNE
Expires 6/30/2023

DRAWN BY: TCB
JOB NO: 1931.000
DATE: 01/08/2020
REVISIONS

1 ADD#1	02/12/2021
3 ADD#3	02/24/2021

KC MECHANICAL ENGINEERING, L.L.C.
5447 East Fifth Street # 112
Tucson, Arizona 85711
Designers Mech: TCB Plumb: MT
520/327-7611
520/327-0432
PROJECT# 19-366

MECHANICAL PLAN - LEVEL 1 AREA B

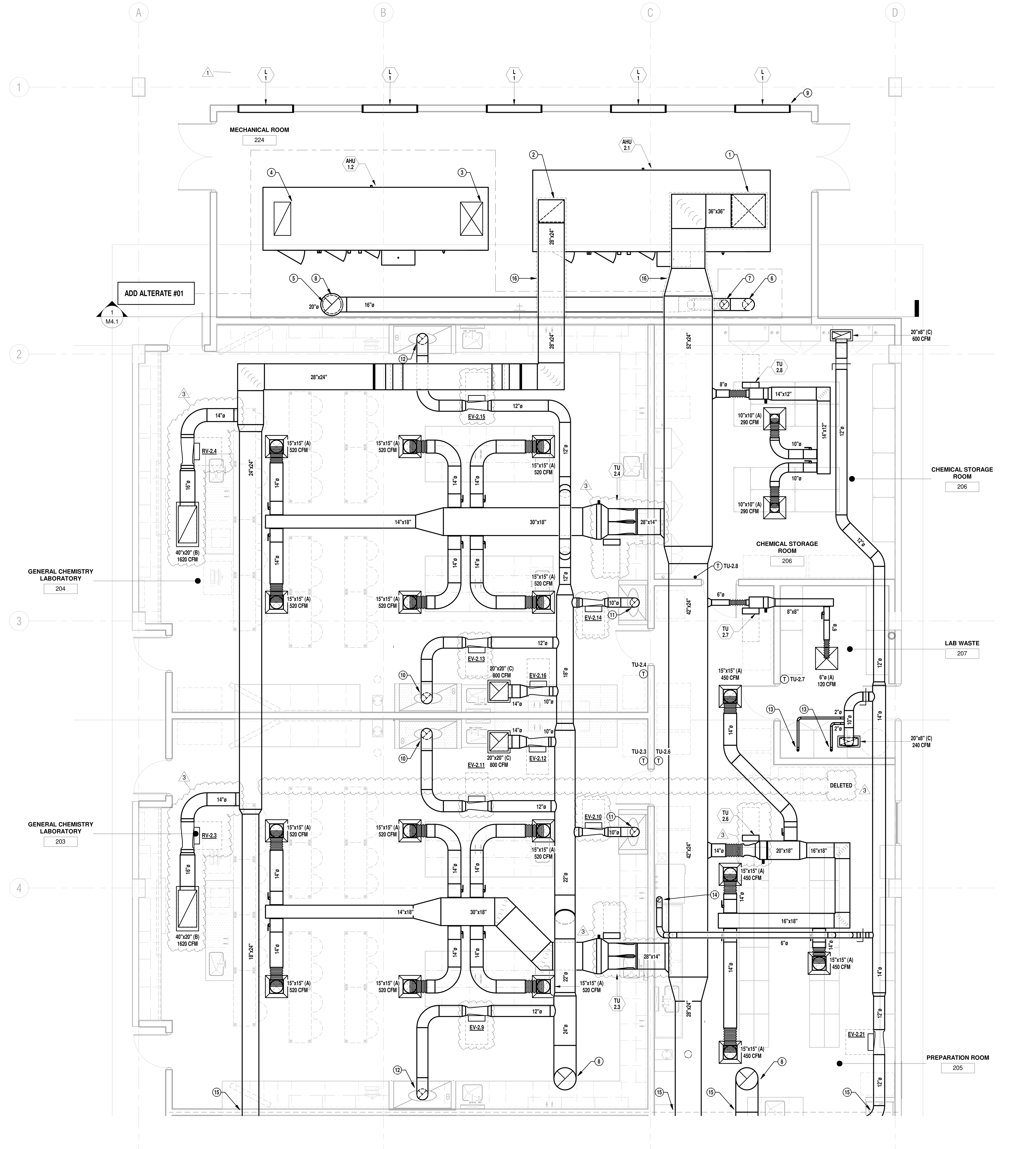
M2.1.2

100% CONSTRUCTION DOCUMENTS

MECHANICAL KEYNOTES

1. 36"x36" SUPPLY UP FROM UNIT. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
2. 28"x24" RETURN UP FROM UNIT. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
3. 36"x24" SUPPLY DOWN FROM UNIT AND THRU FLOOR TO LEVEL 1. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
4. 36"x18" RETURN DOWN FROM UNIT AND THRU FLOOR TO LEVEL 1. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
5. 20"Ø EXHAUST DUCT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.1 FOR CONTINUATION.
6. 13"Ø EXHAUST DUCT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.1 FOR CONTINUATION.
7. 12"Ø EXHAUST DUCT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.1 FOR CONTINUATION.
8. 24"Ø EXHAUST DUCT THRU ROOF, SEE M2.3.1 FO CONTINUATION.
9. 1 ACOUSTIC WALL LOUVERS FOR OUTSIDE AIR INTAKE, REFER TO LOUVER SCHEDULE. INSTALL BOTTOM OF LOUVER AT 12'-0" ABOVE FINISHED FLOOR. SEE ARCHITECTURAL DRAWINGS.
10. 12"Ø EXHAUST DUCT DOWN TO 6' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
11. 10"Ø EXHAUST DUCT DOWN TO 4' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
12. 12"Ø EXHAUST DUCT DOWN TO 6' CFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
13. 2"Ø EXHAUST DUCT DOWN TO VENTED STORAGE CABINET, REFER TO LABORATORY FURNISHINGS DRAWINGS.
14. 6"Ø EXHAUST DUCT DOWN TO TALL GLASSWARE WASHER, REFER TO LABORATORY FURNISHINGS DRAWINGS. BALANCE TO 60 CFM.
15. SEE M2.2.2 FOR CONTINUATION.
16. PROVIDE MINIMUM R8 INSULATION FOR SUPPLY AND RETURN AIR CONDITIONING DUCT IN MECHANICAL ROOM.

3 NOTE: THE AIRFLOWS SHOWN ON THIS PLAN FOR CEILING SUPPLY, RETURN AND EXHAUST AIR DEVICES ARE WITH ALL LAB HOODS AT THEIR MINIMUM AIRFLOW (CLOSED SASH POSITION) AND SUPPLY AIR DEVICES AT MAXIMUM AIRFLOW. REFER TO THE SUPPLY, RETURN AND EXHAUST VALVE SCHEDULES AND CONTROL SEQUENCE OF OPERATION.



1 Mechanical Plan 2nd Floor - A
1/4" = 1'-0"

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25035
KENNETH M.
CAWTHORNE
Registered Professional Engineer (Mechanical)
CERTIFICATE NO.
DATE SIGNED 1.6.21
ARIZONA U.S.A.
Expires 6/30/2023

DRAWN BY: TCB
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520/327-0432
PROJECT# 19-366

MECHANICAL PLAN - LEVEL 2 AREA A

M2.2.1

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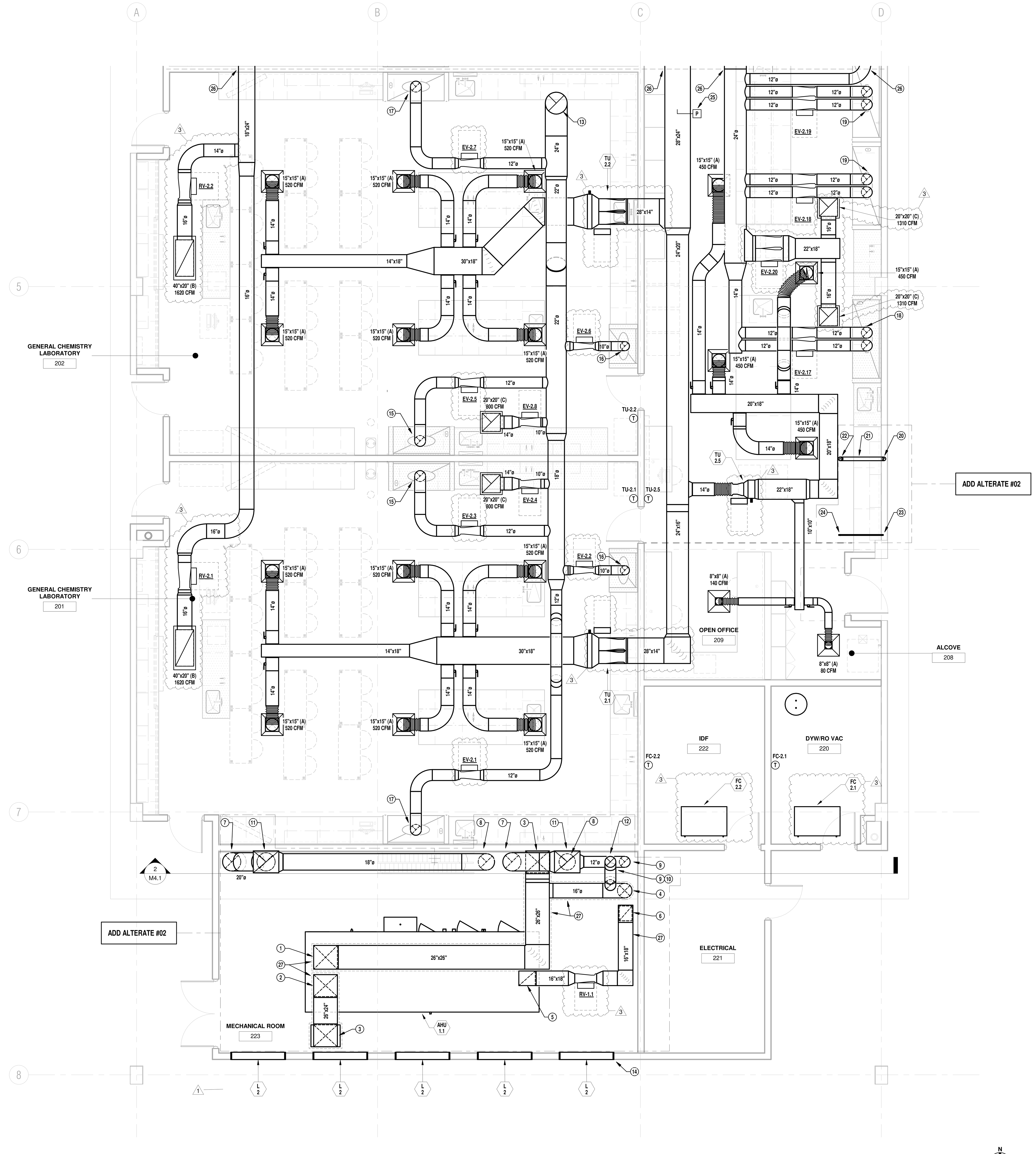

1 Mechanical Plan 2nd Floor - B
1/4" = 1'-0"

MECHANICAL KEYNOTES

1. 26"x26" SUPPLY UP FROM UNIT. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
2. 26"x24" SUPPLY UP FROM UNIT. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT
3. 26"x24" SUPPLY DOWN THRU FLOOR TO LEVEL 1, SEE M2.1.2 FOR CONTINUATION.
4. 16"Ø SUPPLY DOWN THRU FLOOR TO LEVEL 1, SEE M2.1.2 FOR CONTINUATION.
5. 16"x18" RETURN WITH 2" LINER UP FROM UNIT. PROVIDE FLEXIBLE DUCT CONNECTION AT UNIT.
6. 16"x18" RETURN WITH 2" LINER DOWN THRU FLOOR TO LEVEL 1, SEE M2.1.2 FOR CONTINUATION.
7. 20"Ø EXHAUST DUCT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.2 FOR CONTINUATION.
8. 18"Ø EXHAUST DUCT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.2 FOR CONTINUATION.
9. 12"Ø EXHAUST DUCT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.2 FOR CONTINUATION.
10. 12"Ø EXHAUST DUCT OFFSET AS REQUIRED TO AVOID OTHER DUCTS.
11. 28"x24" EXHAUST DUCT THRU ROOF, SEE M2.3.2 FOR CONTINUATION.
12. 12"Ø EXHAUST DUCT THRU ROOF, SEE M2.3.2 FOR CONTINUATION.
13. 24"Ø EXHAUST DUCT THRU ROOF, SEE M2.3.2 FOR CONTINUATION.
14. ACOUSTIC WALL LOUVERS FOR OUTSIDE AIR INTAKE, REFER TO LOUVER SCHEDULE. INSTALL BOTTOM OF LOUVER AT 12'-0" ABOVE FINISHED FLOOR. SEE ARCHITECTURAL DRAWINGS.
15. 12"Ø EXHAUST DUCT DOWN TO 6' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
16. 10"Ø EXHAUST DUCT DOWN TO 4' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
17. 12"Ø EXHAUST DUCT DOWN TO 6' CFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
18. (2) 12"Ø EXHAUST DUCT DOWN TO 8' ACFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
19. (2) 12"Ø EXHAUST DUCT DOWN TO 8' CFH CHEMICAL FUME HOOD, REFER TO LABORATORY FURNISHINGS DRAWINGS.
20. 4"Ø DRYER VENT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.2, AND UP IN WALL TO ABOVE CEILING.
21. 4"Ø DRYER VENT OFFSET WITH 45° FITTINGS .
22. 4"Ø DRYER VENT UP THRU ROOF, SEE M2.3.2 FOR CONTINUATION.
23. 1"Ø VENT UP THRU FLOOR FROM LEVEL 1, SEE M2.1.2, AND UP IN WALL TO ABOVE CEILING.
24. 1"Ø VENT UP THRU ROOF, SEE M2.3.2 FOR CONTINUATION.
25. SUPPLY DUCT STATIC PRESSURE SENSOR FOR AHU-2.1
26. SEE M2.2.1 FOR CONTINUATION.
27. PROVIDE MINIMUM R8 INSULATION FOR SUPPLY AND RETURN AIR CONDITIONING DUCT IN MECHANICAL ROOM.

3 NOTE: THE AIRFLOWS SHOWN ON THIS PLAN FOR CEILING SUPPLY, RETURN AND EXHAUST AIR DEVICES ARE WITH ALL LAB HOODS AT THEIR MINIMUM AIRFLOW (CLOSED SASH POSITION) AND SUPPLY AIR DEVICES AT MAXIMUM AIRFLOW. REFER TO THE SUPPLY, RETURN AND EXHAUST VALVE SCHEDULES AND CONTROL SEQUENCE OF OPERATION.

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MECHANICAL PLAN - LEVEL 2 AREA B

M2.2.2

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AIR HANDLER SCHEDULE			
MARK	AHU-1.1	AHU-1.2	AHU-2.1
TYPE	INDOOR	INDOOR	INDOOR
POSITION	HORIZONTAL	HORIZONTAL	HORIZONTAL
TOTAL SUPPLY AIR (CFM)	16,600	9,900	17,000
SUPPLY FAN EXTERNAL STATIC PRESSURE (IN. W.G.)	3.5	3.5	3.5
MINIMUM SUPPLY FAN TOTAL STATIC PRESSURE (IN. W.G.)	5.6	5.6	5.6
OUTSIDE AIR (CFM)	16,250	5,500	13,200
MINIMUM PREHEAT CAPACITY (MBH)	750	250	690
ENTERING AIR TEMPERATURE (°F)	30	49	40
ENTERING HEATING WATER TEMPERATURE (°F)	160	160	160
HEATING WATER FLOW RATE (GPM)	40	15	40
MAXIMUM COIL PRESSURE DROP (FT. W.C.)	15	15	15
MINIMUM TOTAL COOLING CAPACITY (MBH)	1,300	585	1155
MINIMUM SENSIBLE COOLING CAPACITY (MBH)	650	335	605
ENTERING AIR TEMPERATURE (°F DB/WB)	84 /73.5	80/69	82/71.5
ENTERING CHILLED WATER WATER TEMPERATURE (°F)	45	45	45
CHILLED WATER FLOW RATE (GPM)	290	120	250
MAXIMUM COIL PRESSURE DROP (FT. W.C.)	20	20	20
MAXIMUM COIL VELOCITY (FPM)	500	500	500
MINIMUM FILTER AREA (SQ.FT.)	36	20	36
DRIVE TYPE	DIRECT	DIRECT	DIRECT
SUPPLY FAN MOTOR (QUANTITY / HP)	4 / 6-HP	4 / 3.5-HP	4 / 6-HP
VOLTS/PHASE/HZ (SUPPLY AND RETURN)	460/3/60	460/3/60	460/3/60
POWER POINT 1 (SUPPLY FAN) FLA	28	18	28
POWER POINT 1 (SUPPLY FAN) MCA	29	19	29
VOLTS/PHASE/HZ (LIGHTS)	115/1/60	115/1/60	115/1/60
POWER POINT 2 (LIGHTS) - MOCP	15	15	15
MAXIMUM OPERATING WEIGHT (LBS.)	11,500	8,500	11,500
REFERENCE	NORTEK	NORTEK	NORTEK
NOTES	1 THRU 12	1 THRU 13	1 THRU 12

1. CAPACITY SCHEDULED SHALL BE FOR 2500 FT. ELEVATION.
2. UNIT CONSTRUCTION SHALL BE PER SPECIFICATIONS.
3. PROVIDE STAINLESS STEEL MULTI SLOPED (IAQ) DRAIN PAN PER SPECIFICATIONS.
4. PROVIDE 2" THICK, MERV-8, PLEATED TYPE FILTERS. SEE SPECIFICATIONS. PROVIDE FILTER DIFFERENTIAL PRESSURE GAUGE, FACTORY INSTALLED AND WIRED TO CONTROL PANEL.
5. PROVIDE UNIT MOUNTED VFD(S) PANEL WITH DISCONNECT FOR FAN SYSTEM POWER POINT. PROVIDE HIGH LIMIT DIFFERENTIAL PRESSURE SENSOR WIRED TO DISABLE SUPPLY FANS.
6. ALL FAN SYSTEMS SHALL PROVIDE "N+1" REDUNDANCY AND MAINTAIN A MINIMUM OF 90% DESIGN FLOW AND PRESSURE IN THE EVENT OF A SINGLE MOTOR OR VFD FAILURE.
7. PROVIDE AIR FLOW MEASURING SYSTEM FOR SUPPLY FAN SYSTEM.
8. PROVIDE FULL FACE AVERAGING MIXED AIR AND SUPPLY AIR TEMPERATURE SENSORS. PROVIDE COOLING COIL FREEZE-STAT TO DISABLE SUPPLY FANS AT 40 F; FACTORY INSTALLED.
9. PROVIDE 12" THICK, FINAL FILTER SECTION.
10. PROVIDE VAPOR TIGHT LED LIGHTS IN EACH SECTION, FACTORY INSTALLED AND WIRED TO SWITCH AND JUNCTION BOX.
11. DISCONNECT MEANS FOR LIGHTS POWER POINT BY ELECTRICAL. COORDINATE FINAL CONNECTION.
12. EXERNAL STATIC PRESSURES SCHEDULED INCLUDE A LOADED FILTER ALLOWANCE.
13. PROVIDE AIR FLOW MEASURING SYSTEM FOR OUTSIDE AIR INTAKE.

EXHAUST FAN SCHEDULE						
MARK	EF-1.1	EF-1.2	EF-1.3	EF-1.4	EF-2.1, 2	EF-2.3
SERVICE	O. CHEM	O. CHEM, PREP	O. CHEM, PREP	M. BIO	G. CHEM	PREP
BLOWER TYPE	B.I. SCROLL	B.I. SCROLL	B.I. SCROLL	B.I. SCROLL	B.I. SCROLL	B.I. SCROLL
MAXIMUM AIR FLOW (CFM)	7300	8220	660	5150	4440	4320
MINIMUM AIR FLOW (CFM)	2600	3520	660	4500	3200	2700
E.S.P. ("w.g.)	2	2	1.5	2	1.75	1.75
DRIVE TYPE	BELT	BELT	BELT	BELT	BELT	BELT
MAXIMUM FAN SPEED (RPM)	1200	1200	1200	1400	1400	1400
MAXIMUM SONES - INLET	25	25	12	22	20	20
MOTOR HP	5	7-1/2	1/2	5	3	3
VOLTS/PHASE/HZ	460/3/60	460/3/60	460/3/60	460/3/60	460/3/60	460/3/60
MAXIMUM OPERATING WEIGHT (LBS.)	2200	2200	300	1400	1400	1400
REFERENCE	GREENHECK VK-CH-24-19	GREENHECK VK-CH-27-21	GREENHECK USF-10-B2	GREENHECK VK-CH-22-18	GREENHECK VK-CH-22-16	GREENHECK VK-CH-22-16
NOTES	1 THRU 10	1 THRU 10	1 THRU 6, 9, 10, 11	1 THRU 10	1 THRU 10	1 THRU 10

1. SCHEDULE CAPACITY SHALL BE FOR 2500 FT. ELEVATION.
2. FAN PERFORMANCE SHALL BE AMCA CERTIFIED.
3. DISCONECT MEANS PROVIDED BY ELECTRICAL.
4. PROVIDE FACTORY SUPPLIED ROOFCURB, BIRDSCREEN & BACKDRAFT DAMPER.
5. PROVIDE WEATHERHOOD, SCROLL DRAIN AND BOLTED ACCESS DOOR.
6. PROVIDE 2" DEFLECTION, HOUSED SPRING ISOLATORS UNDER FAN.
7. PROVIDE INLET PLENUM WITY BYPASS DAMPER AND INTAKE HOOD. PROVIDE FAN CONTROLLER WITH AIRFLOW MONITOR, DUCT STATIC PRESSURE SENSOR, BY-PASS DAMPER ACTUATOR AND BACNET COMMUNICATION. SEE CONTROLS.
8. PROVIDE INTEGRAL, HIGH-PLUME DISCHARGE DUCT STACK.
9. PROVIDE PREMIUM EFFICIENCY, VFD RATED FAN MOTOR. PROVIDE VFD RATED FOR MOTOR HP, COORDINATE INSTALL WITH ELECTRICAL
10. SEE CONTROLS FOR FAN CONTROL.
11. PROVIDE HIGH-PLUME DISCHARGE DUCT STACK.

TERMINAL UNIT SCHEDULE - LEVEL 1 - AHU-1.1 AND 1.2									
MARK	TU-1.1A,B; 1.3A,B	TU-1.5	TU-1.6	TU-1.7	TU-1.8	TU-1.9	TU-1.10	TU-1.11	TOTALS
MAXIMUM AIR FLOW (CFM)	3,550	700	1,700	3,200	3,200	2,200	750	550	26,500
MINIMUM AIR FLOW (CFM)	1,200	400	950	1,700	1,700	1,100	100	100	10,850
HEATING AIR FLOW (CFM)	1,200	400	950	1,700	1,700	1,100	300	200	11,150
REHEAT CAPACITY (MBH)	42	14	34	60	60	39	11	8	394
REHEAT WATER FLOW (GPM)	4.5	1.5	3.5	6	6	4	1.5	1	41.5
MINIMUM OPERATING STATIC PRESSURE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
CONTROLS	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	
MANUFACTURER	PHOENIX	KRUEGER	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	KRUEGER	
MODEL NO./INLET SIZE	MAVA 214	LMHS / 8	MAVA 114	MAVA 214	MAVA 214	MAVA 114	MAVA 110	LMHS / 8	
NOTES	1 - 3, 5 - 7	1 - 6	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 6	

TERMINAL UNIT SCHEDULE - LEVEL 2 - AHU-2.1									
MARK	TU-2.1	TU-2.2	TU-2.3	TU-2.4	TU-2.5A	TU-2.5B	TU-2.7	TU-2.8	TOTALS
MAXIMUM AIR FLOW (CFM)	3,120	3,120	3,120	3,120	2,020	1,800	120	580	17,000
MINIMUM AIR FLOW (CFM)	1,600	1,600	1,600	1,600	900	900	100	400	8,700
HEATING AIR FLOW (CFM)	1,600	1,600	1,600	1,600	900	900	120	400	8,720
REHEAT CAPACITY (MBH)	64	64	64	64	36	36	5	16	349
REHEAT WATER FLOW (GPM)	6.5	6.5	6.5	6.5	4	4	0.5	2	36.5
MINIMUM OPERATING STATIC PRESSURE	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	
CONTROLS	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	
MANUFACTURER	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	KRUEGER	KRUEGER	
MODEL NO./INLET SIZE	MAVA214	MAVA214	MAVA214	MAVA214	MAVA114	MAVA114	LMHS / 6	LMHS / 8	
NOTES	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 - 3, 5 - 7	1 THRU 6	1 THRU 6	

TERMINAL UNIT SCHEDULE NOTES

1. TERMINAL UNIT & ASSOCIATED CONTROLS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
2. TERMINAL UNIT PROVIDED SHALL OPERATE PRESSURE INDEPENDENTLY.
3. TERMINAL UNIT SHALL FAIL IN THE LAST SET POSITION.
4. PROVIDE INLET SENSOR, DAMPER & CONTROL ENCLOSURE WITH 120V/24V TRANSFORMER. SEE PLAN FOR COIL & ENCLOSURE SIDE.
5. REHEAT AIR COIL PRESSURE DROP SHALL NOT EXCEED 0.25" w.g.
6. COIL PERFORMANCE BASED ON 55 DEG. F. EAT, 160 DEG. F EWT MAX., 5 FT. W.C. PRESSURE DROP.
7. PROVIDE PRESSURE SENSORS, DAMPER, HIGH SPEED ACTUATOR & CONTROL ENCLOSURE.

RETURN VENTURI VALVE SCHEDULE - LEVEL 1 & 2								
MARK	RV-1.1	RV-1.2	RV-1.3	RV-1.4	RV-2.1	RV-2.2	RV-2.3	RV-2.4
SERVICE	CEILING	CEILING	CEILING	CEILING	CEILING	CEILING	CEILING	CEILING
ROOM NO.	104	110	111	112	201	202	203	204
DESIGN AIR FLOW (CFM)	830	1700	1700	1200	1620	1620	1620	1620
MINIMUM AIR FLOW (CFM)	80	200	200	100	100	100	100	100
MAXIMUM PRESSURE DROP	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
SIZE (IN Ø)	10	14	14	12	14	14	14	14
CONTROLS	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC
MANUFACTURER	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX
MODEL NO.	EXVA110	EXVA114	EXVA114	EXVA112	EXVA114	EXVA114	EXVA114	EXVA114
NOTES	1 THRU 3	1 THRU 3	1 THRU 3	1 THRU 3	1 THRU 3	1 THRU 3	1 THRU 3	1 THRU 3

EXHAUST VENTURI VALVE SCHEDULE NOTES

1. VENTURI VALVE & ASSOCIATED CONTROLS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
2. VENTURI VALVE SHALL FAIL IN THE LAST POSITION.
3. PROVIDE PRESSURE SENSORS, DAMPER, HIGH SPEED ACTUATOR & CONTROL ENCLOSURE.

FAN COIL UNIT SCHEDULE (HYDRONIC)		
MARK	FC-2.1	FC-2.2
SUPPLY AIR (CFM)	1400	1400
MINIMUM TOTAL COOLING CAPACITY (MBH)	38	38
MINIMUM SENSIBLE COOLING CAPACITY (MBH)	35	35
ENTERING AIR TEMPERATURE (DB/WB)	78/63	78/63
ENTERING CHILLED WATER TEMPERATURE (DEG. F)	45	45
CHILLED WATER FLOW RATE (GPM)	8	8
MAXIMUM COIL PRESSURE DROP (FT.)	10	10
DRIVE TYPE	DIRECT	DIRECT
FAN MOTOR HP	1/2 (2)	1/2 (2)
VOLTS/PHASE/HZ	115/1/60	115/1/60
UNIT MCA	4.8	4.8
UNIT MOCP	15	15
MAXIMUM OPERATING WEIGHT (LBS.)	250	250
REFERENCE	CARRIER 42DF14B	CARRIER 42DF14B
NOTES	1 THRU 4	1 THRU 4

1. CAPACITY SCHEDULED SHALL BE FOR 2500 FT. ELEVATION
2. PROVIDE UNIT COMPLETE WITH FAN, COOLING COIL AND CEILING CABINET WITH INTEGRAL BOTTOM/BACK RETURN GRILLE AND FRONT SUPPLY GRILLE.
3. PROVIDE SINGLE POINT ELECTRICAL CONNECTION.
4. DISCONNECT MEANS TO BE PROVIDED BY ELECTRICAL.

LOUVER SCHEDULE		
MARK	L-1	L-2
QUANTITY	5	5
SERVICE	AIR INTAKE	AIR INTAKE
TYPE	ACOUSTIC LOUVER	ACOUSTIC LOUVER
MINIMUM STC RATING	12	12
FINISH	AAMA 2604	AAMA 2604
AIRFLOW (CFM)	3740	3250
MAX PRESSURE DROP (IN. WG)	0.025	0.025
MINIMUM FREE AREA (SQ. FT.)	7.5	7.5
LOUVER SIZE (W X H IN.)	60 x 60	60 x 60
REFERNCE	GREENHECK AFJ-801	GREENHECK AFJ-801
NOTES	1 THRU 5	1 THRU 5

1. ACOUSTICAL LOUVER PERFORMANCE SHALL BE AMCA CERTIFIED.
2. FRAME SHALL BE MINIMUM 8" DEEP.
3. BLADES SHALL BE 'J' STYLE WITH PERFORATED INTERIOR FACE AND FILLED WITH ACOUSTIC INSULATION.
4. PROVIDE BIRDSCREEN.
5. PROVIDE FLANGE FRAME SUITABLE FOR WALL SPECIFIED ON ARCHITECTURAL DRAWINGS.

AIR DEVICE SCHEDULE			
MARK	A	B	C
SERVICE	SUPPLY	RETURN	EXHAUST
MATERIAL	STEEL	STEEL	ALUM
FINISH	WHITE	WHITE	WHITE
PATTERN	4-WAY	SINGLE DEFLECTION	SINGLE DEFLECTION
REFERNCE	KRUEGER 6204	KRUEGER S80H	KRUEGER S80H
NOTES	1,2,3	2	1,2

1. PROVIDE OPPOSED BLADE DAMPER.
2. PROVIDE FRAME STYLE SUITABLE FOR CEILING SPECIFIED ON ARCH. DRAWINGS.
3. CEILING DIFFUSER SHALL BE PERFORATED TYPE.

EXHAUST VENTURI VALVE SCHEDULE - LEVEL 1															
MARK	EV-1.1	EV-1.2 TO 1.8	EV-1.9	EV-1.10	EV-1.11 TO 1.17	EV-1.18	EV-1.19	EV-1.20	EV-1.21	EV-1.22	EV-1.23	EV-1.24	EV-1.25	EV-1.26	EV-1.27
SERVICE	6' AFVH	6' FVH	4' CFH	6' AFVH	6' FVH	4' CFH	6' ACFH	CEILING	6' ACFH	CEILING	6' ACFH	CEILING	4' ACFH	CEILING	CEILING
ROOM NO.	101	101	101	102	102	102	104	104	110	110	111	111	112	112	113
DESIGN AIR FLOW (CFM)	850	850	500	850	850	500	800	620	800	1300	800	1300	500	900	850
MINIMUM AIR FLOW (CFM)	300	300	200	300	300	200	300	120	300	800	300	800	200	600	200
MAXIMUM PRESSURE DROP	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
SIZE (IN 0)	10	10	8	10	10	8	10	8	10	12	10	12	8	10	10
CONTROLS	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC
MANUFACTURER	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX
MODEL NO./INLET SIZE	EXVB 110	EXVB 110	EXVB 108	EXVB 110	EXVB 110	EXVB 108	EXVB 110	EXVA 108	EXVB 110	EXVA 112	EXVB 110	EXVA 112	EXVB 108	EXVA 110	EXVA 110
NOTES	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 3	1 THRU 4	1 THRU 3	1 THRU 4	1 THRU 3	1 THRU 4	1 THRU 3	1 THRU 3

EXHAUST VENTURI VALVE SCHEDULE - LEVEL 2											
MARK	EV-2.1	EV-2.2	EV-2.3	EV-2.4	EV-2.5	EV-2.6	EV-2.7	EV-2.8	EV-2.9	EV-2.10	EV-2.11
SERVICE	6' CFH	4' ACFH	6' ACFH	CEILING	6' ACFH	4' ACFH	6' CFH	CEILING	6' CFH	4' ACFH	6' ACFH
ROOM NO.	201	201	201	201	202	202	202	202	203	203	203
DESIGN AIR FLOW (CFM)	800	500	800	800	800	500	800	800	800	500	800
MINIMUM AIR FLOW (CFM)	300	200	300	120	300	200	300	120	300	200	300
MAXIMUM PRESSURE DROP	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
SIZE (IN 0)	10	8	10	10	10	8	10	10	10	8	10
CONTROLS	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC
MANUFACTURER	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX
MODEL NO.	EXVB110	EXVB108	EXVB110	EXVA110	EXVB110	EXVB108	EXVB110	EXVA110	EXVB110	EXVB108	EXVB110
NOTES	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 3	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 3	1 THRU 4	1 THRU 4	1 THRU 4

EXHAUST VENTURI VALVE SCHEDULE - LEVEL 2										
MARK	EV-2.12	EV-2.13	EV-2.14	EV-2.15	EV-2.16	EV-2.17	EV-2.18, 2.19	EV-2.20	EV-2.21
SERVICE	CEILING	6' ACFH	4' ACFH	6' CFH	CEILING	8' ACFH	8' CFH	CEILING	CEILING
ROOM NO.	203	204	204	204	204	205	205	205	206, 207
DESIGN AIR FLOW (CFM)	800	800	500	800	800	1100	1100	2620	900
MINIMUM AIR FLOW (CFM)	120	300	200	300	120	400	400	180	900
MAXIMUM PRESSURE DROP	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
SIZE (IN 0)	10	10	8	10	10	12	12	12 X 2	10
CONTROLS	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC	DDC
MANUFACTURER	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX	PHOENIX
MODEL NO.	EXVA110	EXVB110	EXVB108	EXVB110	EXVA110	EXVB 112	EXVB 112	EXVA 212	EXVB110
NOTES	1 THRU 3	1 THRU 4	1 THRU 4	1 THRU 4	1 THRU 3	1 THRU 4	1 THRU 4	1 THRU 3	1 THRU 3

EXHAUST VENTURI VALVE SCHEDULE NOTES

1. VENTURI VALVE & ASSOCIATED CONTROLS SHALL BE INSTALLED PER MANUFACTURER'S INSTRUCTIONS.
2. VENTURI VALVE SHALL FAIL IN THE LAST POSITION.
3. PROVIDE PRESSURE SENSORS, DAMPER, HIGH SPEED ACTUATOR & CONTROL ENCLOSURE.
4. PROVIDE PHENOLIC COATING.

KC MECHANICAL ENGINEERING, L.L.C.
5447 East Fifth Street # 112, Tucson, Arizona 85711
520/327-7611
520/327-0432
Designers Mech: TCB Plumb: MT
PROJECT# 19-366

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STRUCTURAL
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ELECTRICAL
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Phone: 520.884.0045

Pima Community College
PCC West Lab Building F
Renovation
2202 W Anklam Rd, Tucson, AZ 85745

REGISTERED PROFESSIONAL ENGINEER (MECHANICAL) CERTIFICATE NO. 25035 KENNETH M. CAWTHORNE DATE SIGNED 1.6.21 ARIZONA U.S.A. Expires 6/30/2023

DRAWN BY: TCB
JOB NO: 1931.000
DATE: 01/08/2020
REVISIONS
3 ADD#3 02/24/2021

MECHANICAL SCHEDULES

M6.1
100% CONSTRUCTION DOCUMENTS

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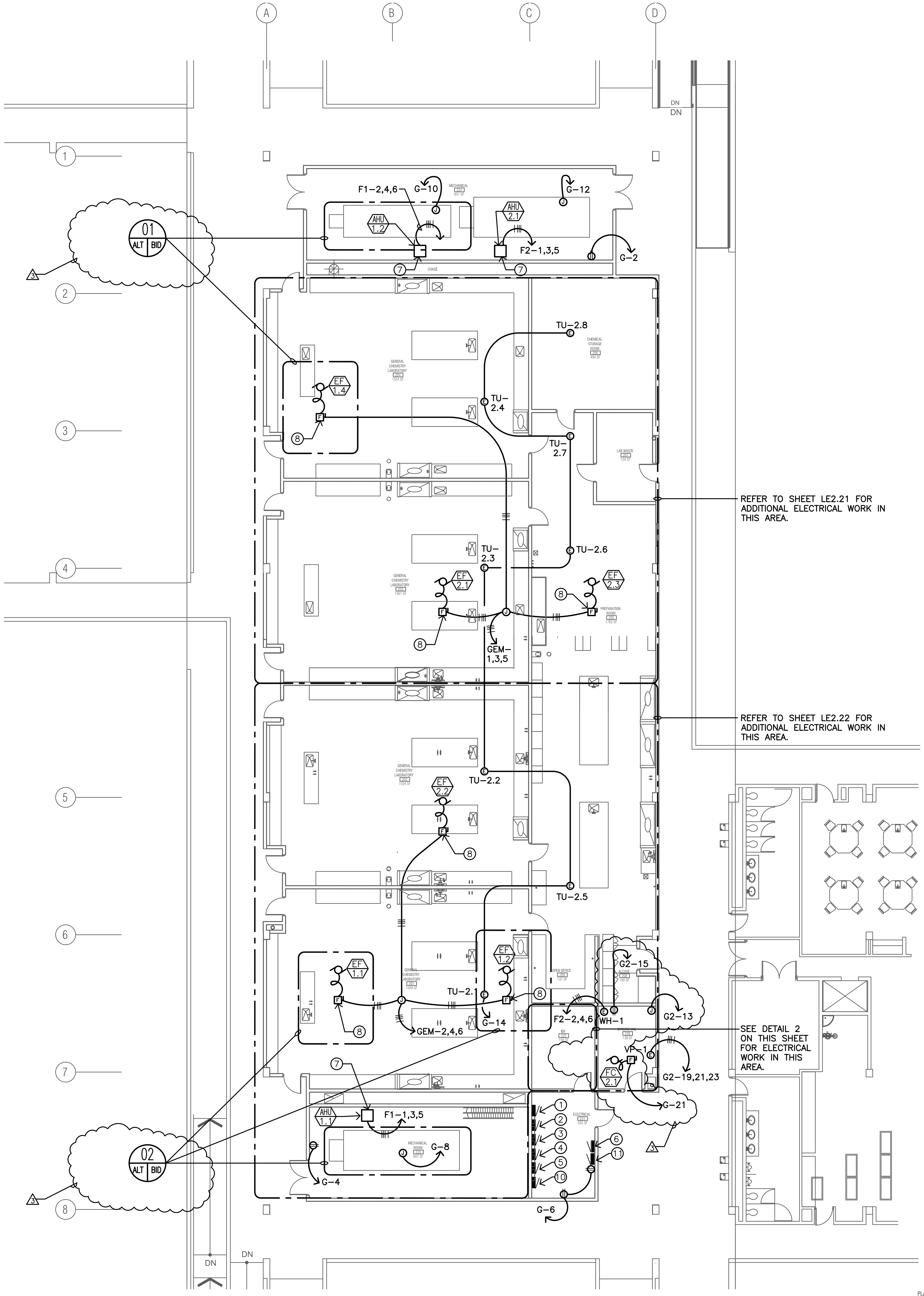
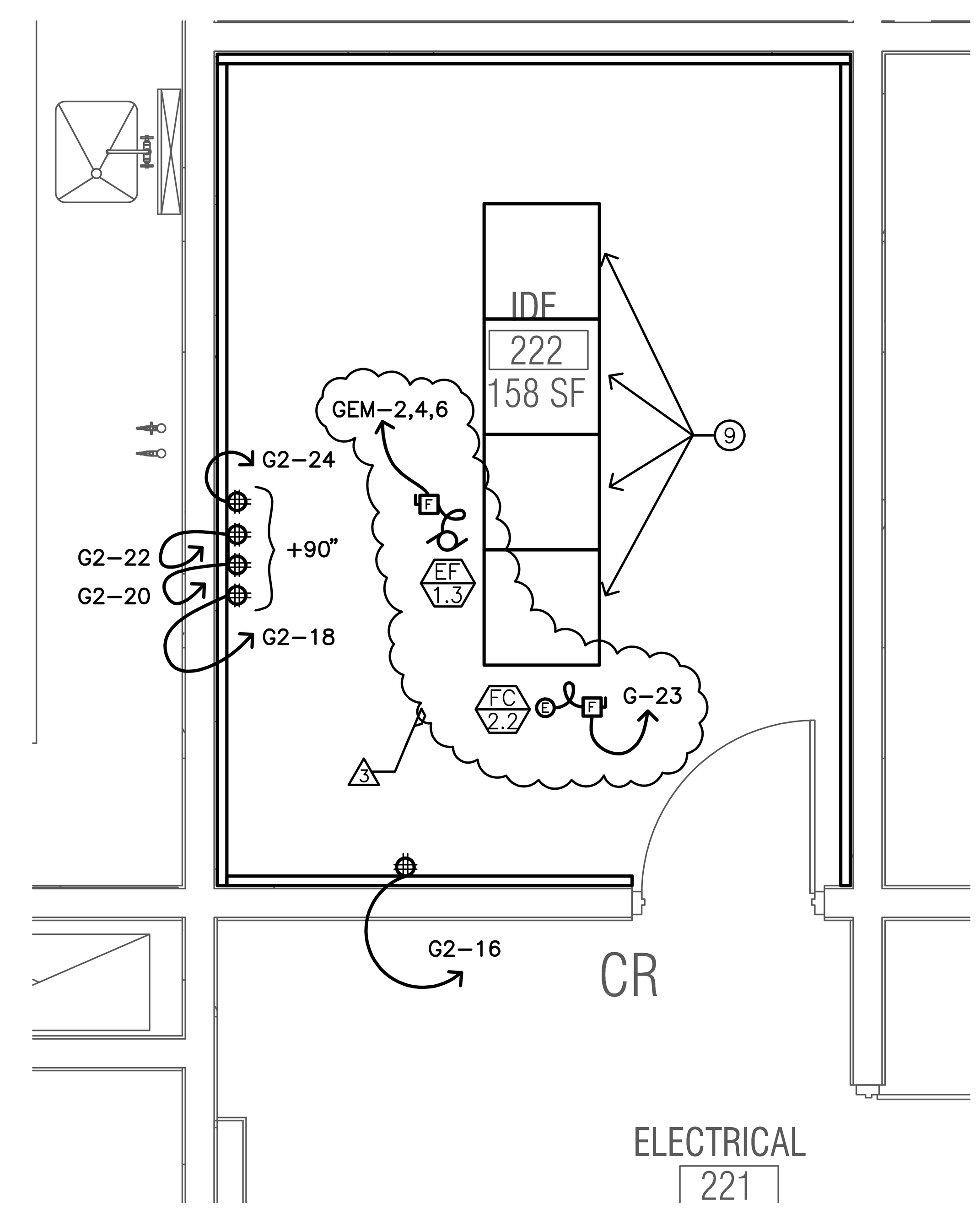


1 SECOND FLOOR ELECTRICAL POWER PLAN
SCALE: 1/8" = 1'-0"



2 SECOND FLOOR IDF ROOM ELECTRICAL POWER PLAN
SCALE: 1/2" = 1'-0"

KEYNOTES:

1. NEW PANEL "F2".
2. NEW PANEL "2LP1".
3. NEW PANEL "2LP2".
4. NEW PANEL "2LP3".
5. NEW PANEL "2LP4".
6. NEW PANEL "G".
7. REFER TO MECHANICAL DRAWINGS FOR VFD'S.
8. 30A/3P, WP, 480V, ON ROOF.
9. NEW IDF RACKS.
10. NEW PANEL "2LP5".
11. NEW PANEL "G2".

ADD ALTERNATE BID #01
HVAC UNIT FOR MICROBIOLOGY ENCLOSURE AND UNIT FOR GENERAL CHEMISTRY = BASE BID. CONSTRUCTION COMPLETE AND IN PLACE.

ADD ALTERNATE BID #02
HVAC UNIT FOR ORGANIC CHEMISTRY. ENCLOSURE SHELL SPACE = BASE BID. CONSTRUCTION COMPLETE AND IN PLACE.

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Phone: 520.884.0045

PCC West Science Labs
PCC West Lab Building F Renovation
2202 W Anklam Rd, Tucson, AZ 85745

Registered Professional Engineer (Electrical)
CERTIFICATE NO. 23911
FERNANDO GALVEZ
Date Signed 1/8/2021
ARIZONA U.S.A.
EXPIRES 12-31-23

DRAWN BY: ND
JOB NO: 1931.000
DATE: 01/08/2021
REVISIONS
3 2-24-2021 ADD#3

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MONRAD ENGINEERING INC
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Tucson, Arizona 85719-2391
(520) 884-0045 M19094

ELECTRICAL SECOND FLOOR POWER PLAN

E2.20

CONSTRUCTION DOCUMENTS

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KEYNOTES:

1. REFER TO ONE LINE DIAGRAM.

PANEL GEM — 277 / 480 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 14,000 MINIMUM A.I.C. RATING
100 A. BUS 100 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	EF-1.1, 2.1, 2.3	20	12	3/4"	3	5					3/4"	10	30	EF-1.2, 1.3, 2.2	2
3							3	5							4
5		3							3	5			3		6
7	LTG-EMERGENCY	20/1			0.4	–					–	–	20/1	SPACE	8
9							0.4	–			–	–			10
11									0.4	–	–	–			12
13					0.4	–					–	–			14
15	SPARE		–	–			–	–			–	–			16
17			–	–					–	–	–	–			18
19			–	–	–	–					–	–			20
21			–	–			–	–			–	–			22
23			–	–					–	–	–	–			24

	A	B	C
● CONTINUOUS LOAD X 1.25	1	0.5	0.5
NON-CONTINUOUS LOAD X 1	8	8	8
#	–	–	–
DEMAND KVA/PHASE	9	8.5	8.5
DEMAND AMPS/ PHASE	33	31	31

REMARKS:
TOTAL CONNECTED LOAD = 25.6 KVA
DEMAND LOAD = 26 KVA

PANEL F1 — 277 / 480 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 14,000 MINIMUM A.I.C. RATING
200 A. BUS 200 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	AHU-1.1	60	4	1"	11	7					1"	8	40	AHU-1.2	2
3							11	7							4
5		3							11	7			3		6
7	LTG	20/1	12	3/4"	1.2	–					–	–	20/1	SPACE	8
9							1.3	–			–	–			10
11	LTG-EXTERIOR								0.2	–	–	–			12
13	LTG				1.1	1					3/4"	12	20	STERILIZER	14
15							1.5	1							16
17	LTG-EXTERIOR								0.2	1			3		18
19	STERILIZER	50	8	1"	9	15					1-1/4"	2	100	PANEL "F2"	20
21							9	14							22
23		3							9	14			3		24

	A	B	C
● CONTINUOUS LOAD X 1.25	6	5	2
NON-CONTINUOUS LOAD X 1	40	40	40
#	–	–	–
DEMAND KVA/PHASE	46	45	42
DEMAND AMPS/ PHASE	167	163	152

REMARKS:
TOTAL CONNECTED LOAD = 131 KVA
DEMAND LOAD = 133 KVA

PANEL F2 — 277 / 480 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 14,000 MINIMUM A.I.C. RATING
100 A. BUS 100 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	AHU-2.1	60	4	1"	11	1.5					3/4"	12	20	WH-1	2
3							11	1.5							4
5		3							11	1.5			3		6
7	LTG	20/1	12	3/4"	1.3	–					–	–	20/1	SPARE	8
9							0.9	–			–	–			10
11									0.9	–	–	–			12
13					1.1	–					–	–		SPACE	14
15							1.3	–			–	–			16
17	LTG-EXTERIOR								0.3	–	–	–			18

	A	B	C
● CONTINUOUS LOAD X 1.25	3	1.5	1.5
NON-CONTINUOUS LOAD X 1	12.5	12.5	12.5
#	–	–	–
DEMAND KVA/PHASE	15.5	14	14
DEMAND AMPS/ PHASE	56	51	51

REMARKS:
TOTAL CONNECTED LOAD = 42.3 KVA
DEMAND LOAD = 43.5 KVA

PANEL M0 — 120 / 208 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 10,000 MINIMUM A.I.C. RATING
225 A. BUS 225 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	SPARE	20/1	–	–	–	0.2					3/4"	10	20/1	RECEPTS	2
3			–	–			–	–			–	–		SPARE	4
5			–	–					–	–	–	–			6
7	PANEL "1LP2"	100	1	1	7	0.5					3/4"	10		TU'S	8
9							7	–			–	–		SPARE	10
11		3							8	–	–	–			12
13	PANEL "1LP3"	100			7	–					–	–			14
15							7	–			–	–			16
17		3							5	–	–	–			18
19	PANEL "1LP4"	100			9	–					–	–		SPACE	20
21							9	–			–	–			22
23		3							7	–	–	–			24

	A	B	C
● CONTINUOUS LOAD X 1.25	–	–	–
NON-CONTINUOUS LOAD X 1	24	24	21
#	–	–	–
DEMAND KVA/PHASE	24	24	21
DEMAND AMPS/ PHASE	200	200	175

REMARKS:
TOTAL CONNECTED LOAD = 69 KVA
DEMAND LOAD = 69 KVA

PANEL M02 — 120 / 208 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 10,000 MINIMUM A.I.C. RATING
225 A. BUS 225 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	PANEL "1LP5	100	1	1	6	0.4					1/2"	12	20/1	TU'S	2
3							5	0.5						RECEPS	4
5		3							3	–	–	–		SPARE	6
7	PANEL "1LP6"	100			2	–					–	–			8
9							2	–			–	–			10
11		3							2	–	–	–			12
13	PANEL "1LP7"	100			10	–					–	–		SPACE	14
15							9	–			–	–			16
17		3							7	–	–	–			18
19	SPACE	20/1	–	–	–	–					–	–			20
21			–	–			–	–			–	–			22
23			–	–					–	–	–	–			24

	A	B	C
● CONTINUOUS LOAD X 1.25	–	–	–
NON-CONTINUOUS LOAD X 1	19	17	12
#	–	–	–
DEMAND KVA/PHASE	19	17	12
DEMAND AMPS/ PHASE	159	142	100

REMARKS:
TOTAL CONNECTED LOAD = 48 KVA
DEMAND LOAD = 48 KVA

PANEL G — 120 / 208 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 10,000 MINIMUM A.I.C. RATING
225 A. BUS 225 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	PANEL "2LP1"	100	1	1	6	0.2					3/4"	10	20/1	RECEPTS	2
3							6	0.2							4
5		3							6	0.4					6
7	PANEL "2LP2"	100			6	1.2								AHU-1.1	8
9							4	1.2						AHU-1.2	10
11		3							6	1.2				AHU-2.1	12
13	PANEL "2LP3"	100			6	0.5								TU'S	14
15							7	–			–	–		SPARE	16
17		3							7	–	–	–			18
19	SPARE	20/1	–	–	–	–					–	–			20
21	FC 2.1		12	3/4"			–	–			–	–			22
23	FC 2.3								–	–	–	–			24

	A	B	C
● CONTINUOUS LOAD X 1.25	–	–	–
NON-CONTINUOUS LOAD X 1	20	19	21
#	–	–	–
DEMAND KVA/PHASE	20	19	21
DEMAND AMPS/ PHASE	167	159	175

REMARKS:
TOTAL CONNECTED LOAD = 60 KVA
DEMAND LOAD = 60 KVA

PANEL G2 — 120 / 208 VOLTS, 3 PHASE, 4 WIRE
TYPE –; 10,000 MINIMUM A.I.C. RATING
225 A. BUS 225 A. MAIN CIRCUIT BREAKER; MOUNTING FLUSH ☐ SURFACE ☒
LOCATION –
–
ENCLOSURE: NEMA 1

	SERVES	BKR	WIRE	COND	LOAD KVA A		B		C		COND	WIRE	BKR	SERVES	
1	PANEL "2LP4"	100	1	1	6	–					–	–	20/1	SPARE	2
3							6	–			–	–			4
5		3							4	–	–	–			6
7	PANEL "2LP5"	100			6	–					–	–			8
9							5	–			–	–			10
11		3							4	–	–	–			12
13	DI	20/1	12	3/4"	1.6	–					–	–		SPACE	14
15	RECIRC PUMP						1.6	1			3/4"	12		RECEPTS	16
17	SPARE								1.6	1					18
19	VP-1	60	6	1"	6	1									20
21							6	1							22
23		3							6	1					24

	A	B	C
● CONTINUOUS LOAD X 1.25	–	–	–
NON-CONTINUOUS LOAD X 1	21	21	18
#	–	–	–
DEMAND KVA/PHASE	21	21	18
DEMAND AMPS/ PHASE	175	175	150

REMARKS:
TOTAL CONNECTED LOAD = 60 KVA
DEMAND LOAD = 60 KVA

PANEL SCHEDULE KEY:

GEM	F1	F2
MO	MO2	–
G	G2	–

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Mechanical: KC Mechanical Engineering, 5447 E Fifth St., Tucson Az 85711, Phone: 520.327.7611
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PCC West Science Labs
PCC West Lab Building F Renovation
2202 W Anklam Rd, Tucson, AZ 85745

23911 FERNANDO GALVEZ
EXPIRES 12-31-23

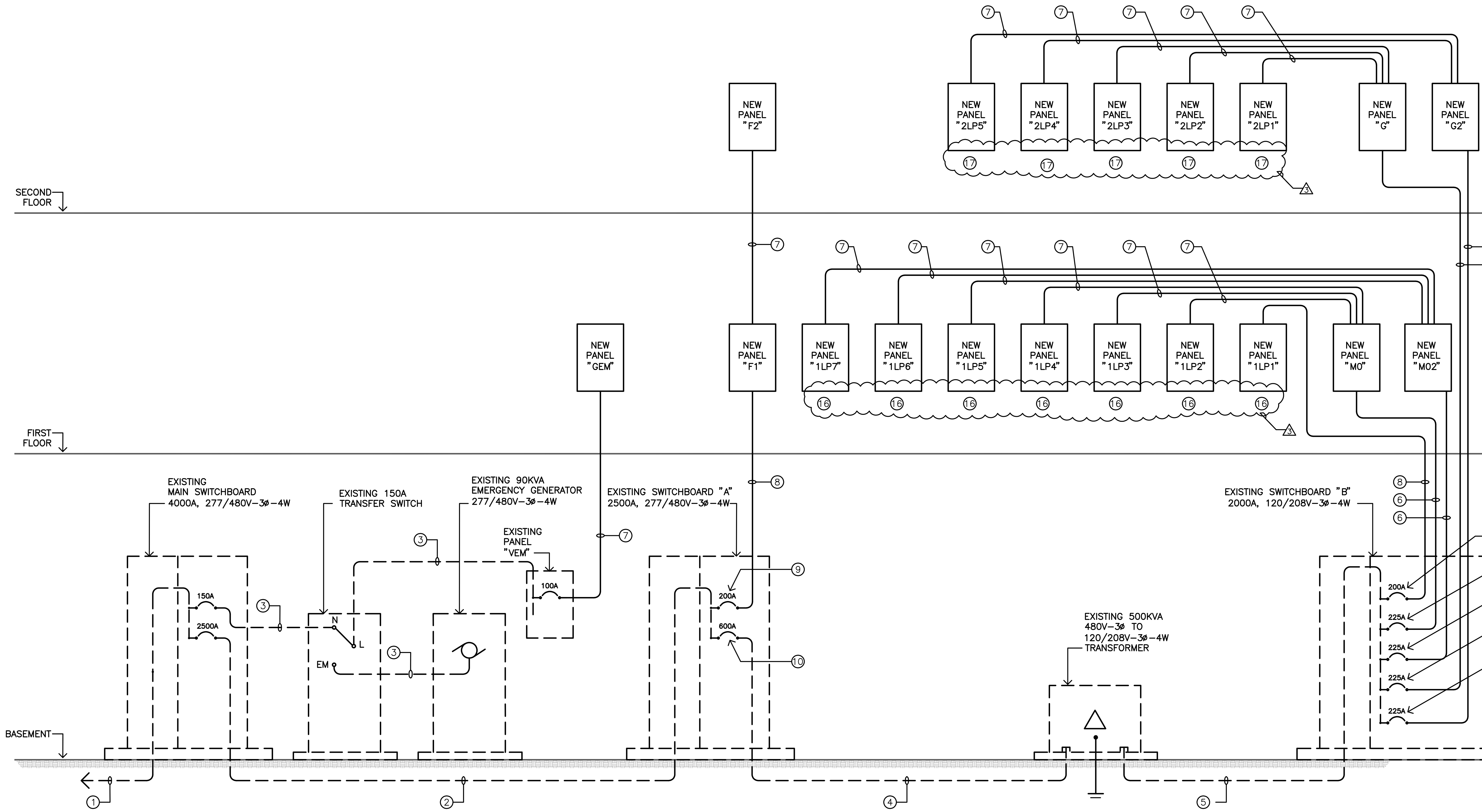
DRAWN BY: ND
JOB NO: 1931.000
DATE: 01/08/2021
REVISIONS
3 2-24-2021 ADD#3

ELECTRICAL PANEL SCHEDULES

E5.0

KEYNOTES:

1. EXISTING 4000A FEEDER TO REMAIN.
2. EXISTING 2500A FEEDER TO REMAIN.
3. EXISTING 150A FEEDER TO REMAIN..
4. EXISTING 600A FEEDER TO REMAIN.
5. EXISTING 2000A FEEDER TO REMAIN.
6. NEW 4#4/0 CU., 1#3 CU. GRD., 2"C.
7. NEW 4#2 CU., 1#8 CU. GRD., 1-1/4"C.
8. NEW 4#3/0 CU., 1#6 CU. GRD., 2"C.
9. EXISTING SPARE CIRCUIT BREAKER WITH PROVISIONS FOR FUSES. PROVIDE NEW 200A FUSES.
10. EXISTING CIRCUIT BREAKER TO REMAIN.
11. EXISTING CIRCUIT BREAKER TO BE RELABELED FROM "FD1/FD2/GD1/GD2" TO "1LP1".
12. EXISTING CIRCUIT BREAKER TO BE RELABELED FROM "FP1/GP1" TO "MO".
13. EXISTING CIRCUIT BREAKER TO BE RELABELED FROM "FP2/GP2" TO "MO2".
14. EXISTING CIRCUIT BREAKER TO BE RELABELED FROM "FP3/GP3" TO "G".
15. EXISTING BUSSED SPACE. PROVIDE NEW CIRCUIT BREAKER.
16. REFER TO LABORATORY ELECTRICAL DRAWING LE3.10 FOR PANEL SCHEDULES.
17. REFER TO LABORATORY ELECTRICAL DRAWING LE3.11 FOR PANEL SCHEDULES.



PARTIAL ONE LINE DIAGRAM

NOT TO SCALE

5/14/2020 9:55:28 AM

LOCKOUT - TAGOUT - TESTOUT

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CONSULTING ELECTRICAL ENGINEERS
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Tucson, Arizona 85719-2391
(520) 884-0045 M19094

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Tucson Az 85716
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PCC West Science Labs
PCC West Lab Building F Renovation
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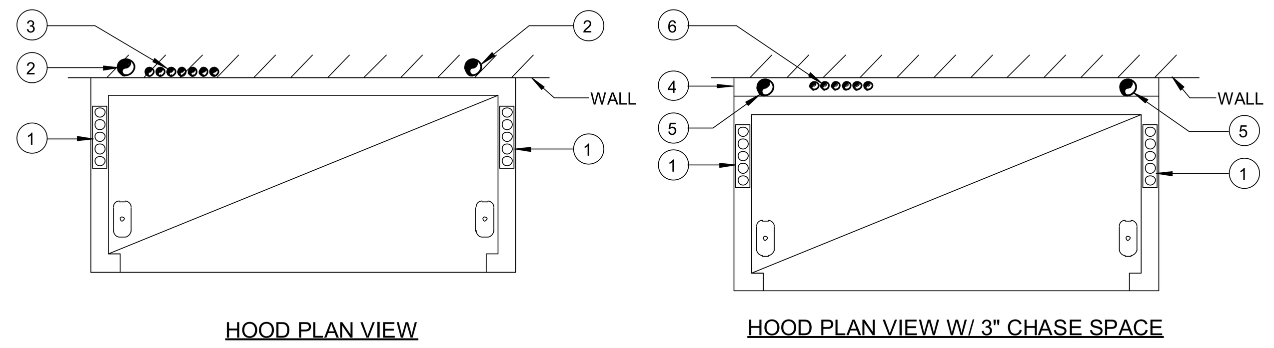
23911 FERNANDO GALVEZ
EXPIRES 12-31-23

DRAWN BY: ND
JOB NO: 1931.000
DATE: 01/08/2021
REVISIONS
3 2-24-2021 ADD#3

ONE LINE DIAGRAM

E6.0

CONSTRUCTION DOCUMENTS

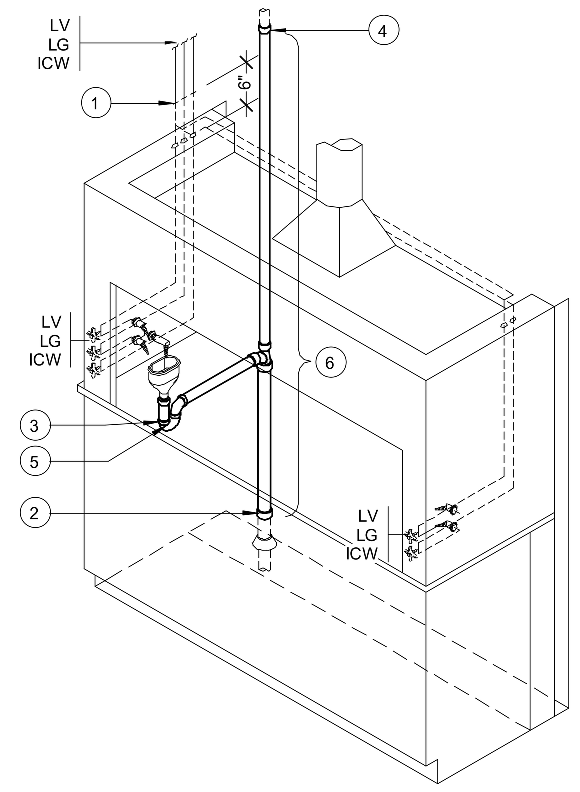


1. PRE-PIPED WET & DRY SERVICE SUPPLIES TO HOOD SERVICES MAY VARY, REFER TO PLANS FOR TYPES.
2. LABORATORY WASTE AND VENT RISER LOCATED WITHIN WALL.
3. PIPED SERVICES LOCATED IN WALL TO FEED ADJACENT BENCH SERVICE FITTINGS. REFER TO PLANS FOR WHERE OCCURS.
4. 3" FILLER PANEL/CHASE PROVIDED PER DIVISION 11. REFER TO LF PLANS FOR LOCATIONS.
5. LOCATION OF LABORATORY WASTE AND VENT RISER LOCATED BEHIND HOOD IN 3" CHASE. REFER TO PLANS FOR WHERE OCCURS.
6. PIPED SERVICES BEHIND HOOD IN 3" CHASE TO FEED ADJACENT BENCH SERVICE FITTINGS. REFER TO PLANS FOR WHERE OCCURS.

NOTE:
WASTE PENETRATION LOCATIONS MAY REQUIRE OFFSET TO AVOID STRUCTURAL BEAMS, REFER TO P-SERIES DRAWINGS.

TYPICAL PIPING AT CHEMICAL FUME HOOD - PLAN

SCALE: NTS (1)

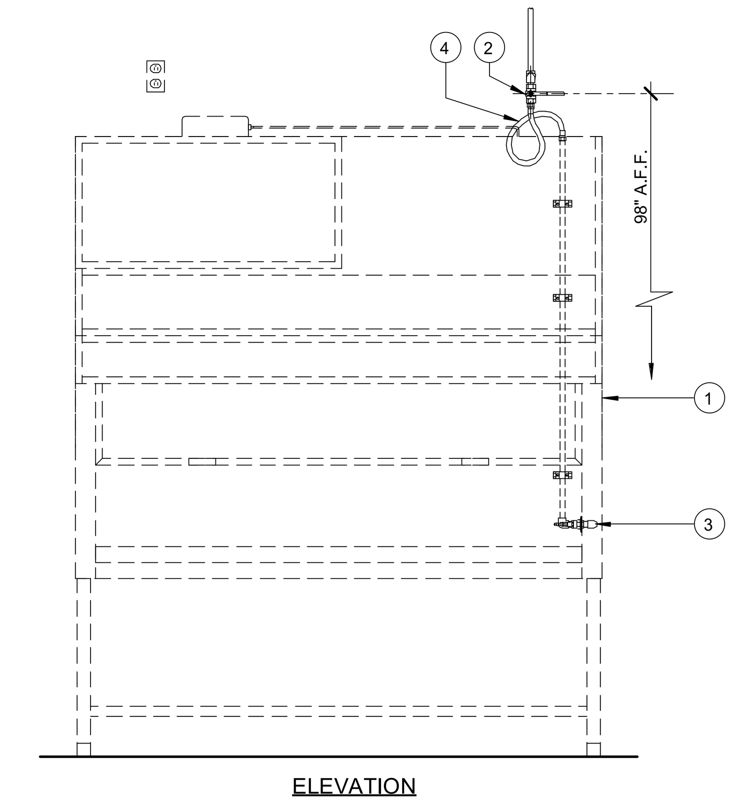


1. POINT OF CONNECTION TO PRE-PIPED HOOD SERVICES.
2. POINT OF CONNECTION TO 2" LABORATORY WASTE AT 6" ABOVE FINISHED FLOOR. REFER TO P-SERIES DRAWINGS.
3. POINT OF CONNECTION TO CUP SINK TAILPIECE.
4. POINT OF CONNECTION TO 1-1/2" LABORATORY VENT @ 6" ABOVE FINISHED CEILING.
5. 1-1/2" P-TRAP.
6. LABORATORY WASTE AND VENT RISER BEHIND HOOD IN 3" CHASE OR IN WALL. REFER TO PLANS FOR LOCATIONS.

NOTES:
1. SERVICES MAY VARY, REFER TO PLANS.
2. REFER TO SCHEDULES FOR PIPE SIZES. REFER ALSO TO DETAIL: 1/LP3.11
3. PIPING SHOWN DASHED IS PART OF PRE-PIPED FUME HOOD PER DIVISION 11.
4. PIPING SHOWN SOLID TO BE PROVIDED UNDER DIVISION 22.

TYPICAL PIPING AT CHEMICAL FUME HOOD W/ CUPSINK

SCALE: NTS (2)

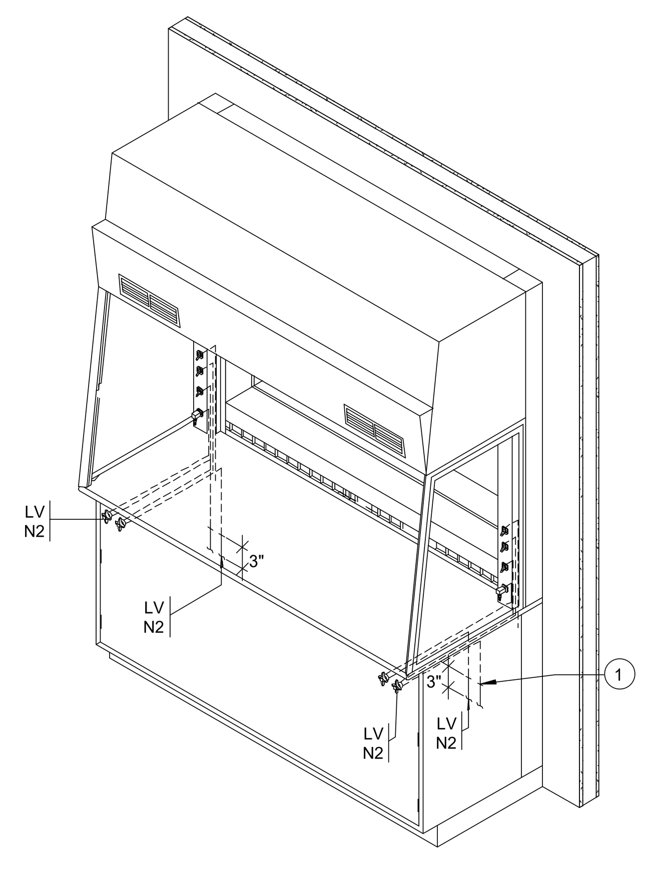


1. BIOLOGICAL SAFETY CABINET.
2. BSC WALL MOUNTED POINT OF CONNECTION SHUT-OFF VALVE
3. PIPING WITHIN BIOLOGICAL SAFETY CABINET CHASE TO SERVICE FITTING
4. FLEX PIPE CONNECTOR

NOTES:
1. NUMBER OF SERVICES MAY VARY, REFER TO PLANS.
2. OFOI BSC MAY NOT BE PRE-PIPED.

PIPING AT BIOLOGICAL SAFETY CABINET

SCALE: NTS (3)

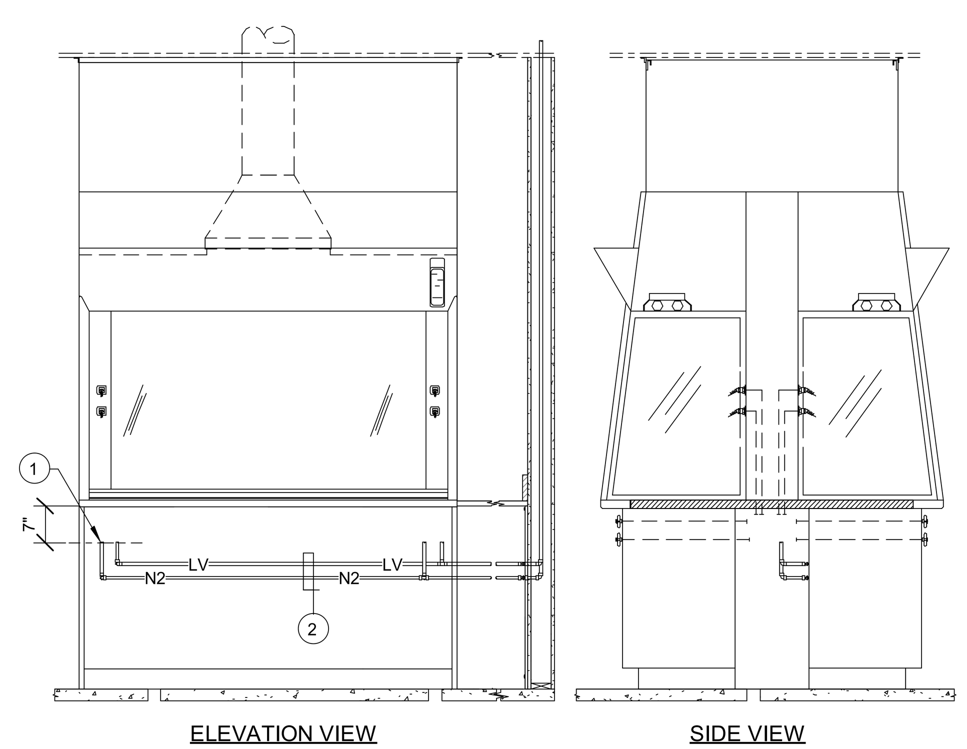


1. POINT OF CONNECTION TO PRE PIPED HOOD SERVICES 3" BELOW WORK SURFACE.

NOTES:
1. SERVICES MAY VARY, REFER TO PLANS.
2. REFER TO SCHEDULES FOR PIPE SIZES. REFER ALSO TO DETAIL: 1/LP3.11
3. PIPING SHOWN DASHED IS PART OF PRE PIPED FUME HOOD PER DIVISION 11.
4. PIPING SHOWN SOLID TO BE PROVIDED UNDER DIVISION 22.

TYP. PIPING AT FULL VIEW HOOD

SCALE: NTS (4)

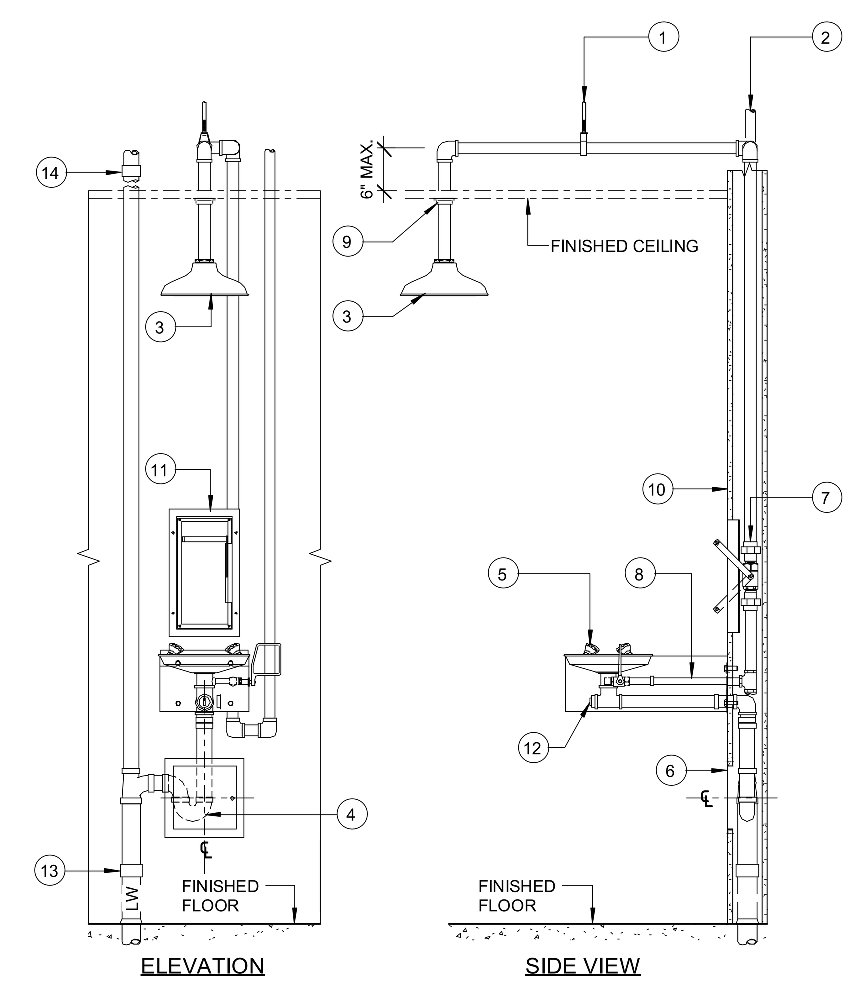


1. POINT OF CONNECTION TO PRE-PIPED HOOD SERVICES 7" BELOW WORK SURFACE.
2. PIPING SUPPORTED BY PIPE SUPPORT ASSEMBLY.

NOTES:
1. SERVICES MAY VARY, REFER TO PLANS.
2. REFER TO SCHEDULES FOR PIPE SIZES.
3. PIPING SHOWN DASHED IS PART OF PRE-PIPED FUME HOOD PER DIVISION 11.
4. PIPING SHOWN SOLID TO BE PROVIDED UNDER DIVISION 22.

PIPING AT FULL VIEW HOOD

SCALE: NTS (5)

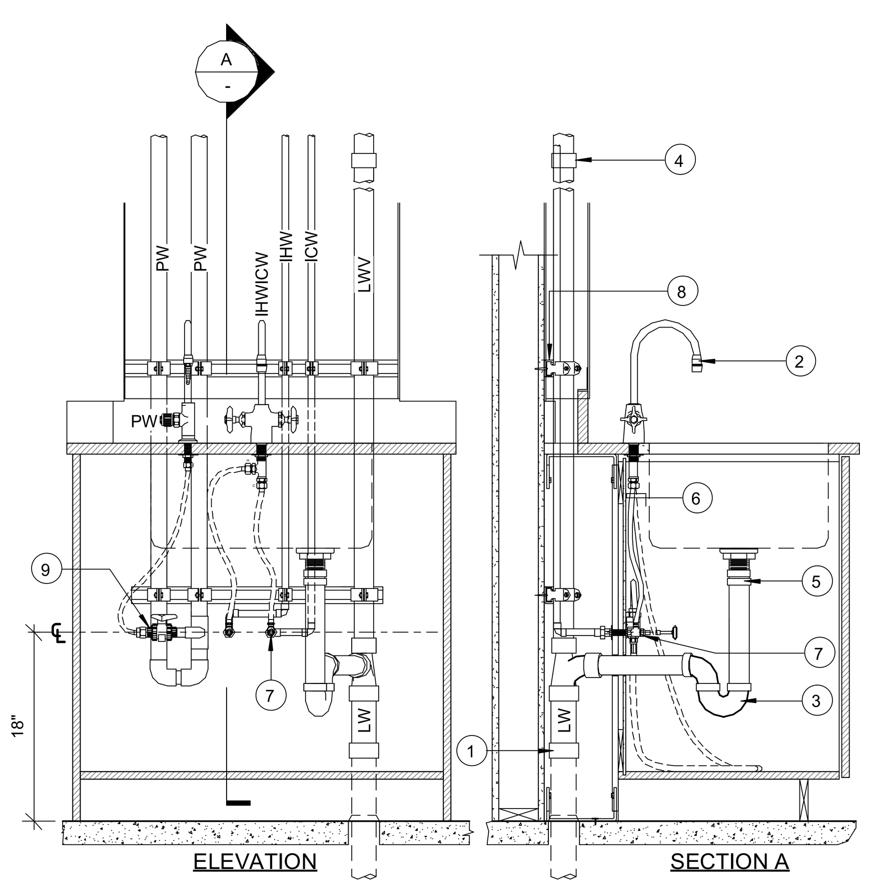


1. SINGLE PIPE HANGER TO STRUCTURE ABOVE
2. 1-1/4" CW SUPPLY
3. SAFETY SHOWER SUPPLIED PER DIV. 11 INSTALLED PER DIV. 22
4. 1 1/2" P-TRAP CONNECTED TO WASTE AND VENT SYSTEM.
5. EYE/FACE WASH W/ BOWL AT WALL SUPPLIED PER DIV. 11 INSTALLED PER DIV. 22
6. P-TRAP ACCESS PANEL, 10"x10" STEEL PAINTED TO MATCH WALL FINISH.
7. 1" IPS UNION
8. 1/2" CW SUPPLY TO EYEWASH
9. POLISHED CHROME PLATED BRASS ESCUTCHEON
10. WALL
11. ST. STL. ACTUATING ARM FOR SAFETY SHOWER SUPPLIED UNDER DIVISION 11
12. CLEAN-OUT
13. POINT OF CONNECTION TO 2" LABORATORY WASTE AT 6" ABOVE FINISHED FLOOR, REFER TO P-SERIES DRAWINGS
14. POINT OF CONNECTION TO 1-1/2" LABORATORY WASTE VENT AT 6" ABOVE FINISHED CEILING REFER TO P-SERIES DRAWINGS

NOTES:
1. DETAIL IS SHOWN DIAGRAMMATICALLY. PIPING SHALL BE MAINTAINED WITHIN WALL AND CEILING SPACE.
2. LOCATION OF WASTE AND VENT MAY VARY. REFER TO PLANS.

SAFETY SHOWER/EYEWASH BOWL UNIT

SCALE: NTS (6)

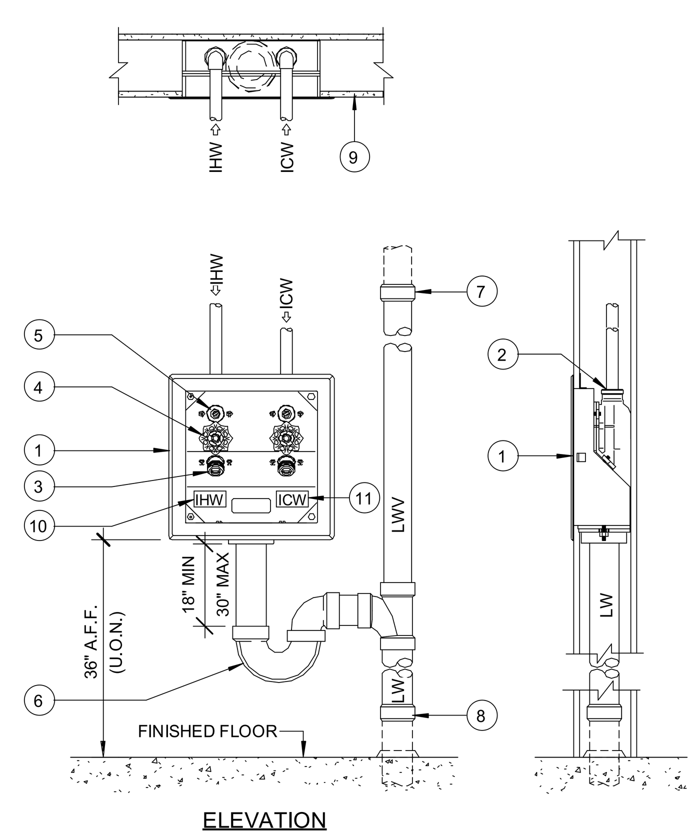


1. POINT OF CONNECTION TO 2" LABORATORY WASTE AT 6" ABOVE FINISHED FLOOR, REFER TO P-SERIES DRAWINGS
2. SERVICE FITTINGS AS SHOWN ON LF-SERIES DRAWINGS. REFER TO SCHEDULE DRAWING LP1.10
3. 1-1/2" P-TRAP
4. POINT OF CONNECTION TO 1-1/2" LABORATORY WASTE VENT AT 6" ABOVE FINISHED CEILING REFER TO P-SERIES DRAWINGS
5. LABORATORY WASTE POINT OF CONNECTION TO SINK TAILPIECE
6. 1/2" DIAMETER FLEXIBLE CONNECTORS
7. FIXTURE SUPPLY STOP VALVE WITH KEY & ESCUTCHEON PLATE AT CABINET BACK RAIL. MOUNT AT HEIGHT ACCESSIBLE FROM SINK CABINET(TYP.)
8. "STRUT" TYPE BRACKET ANCHORED TO WALL
9. 1/2" PW BALL VALVE BY DIV 22

NOTES:
1. SERVICES MAY VARY, REFER TO PLANS & SCHEDULES.

TYPICAL PIPING AT LABORATORY SINK

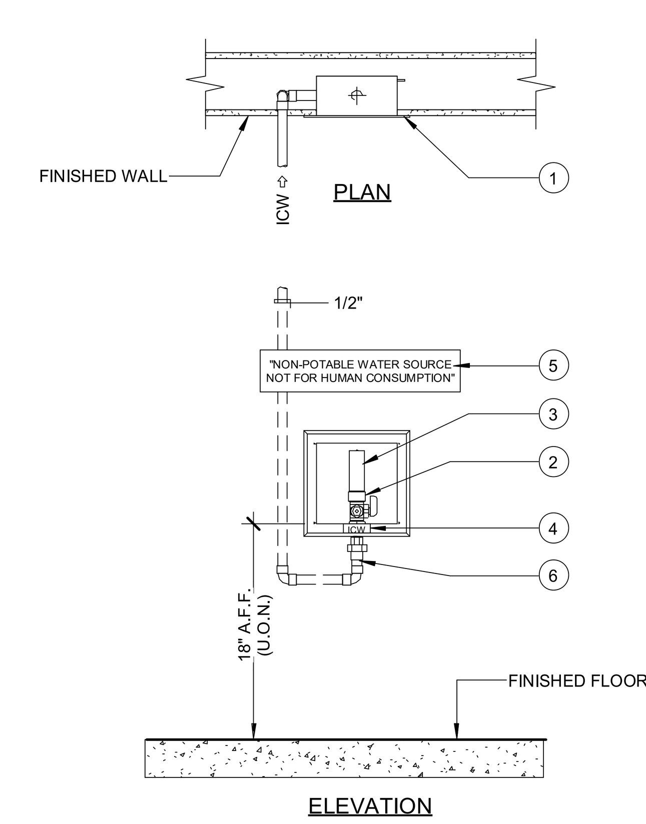
1" = 1'-0" (7)



1. 10-1/2" x 10-1/2" WATER SUPPLY AND WASTE BOX
2. 1/2" ICW & 1/2" IHW SUPPLY CONNECTION
3. HOSE CONNECTION, (TYPICAL)
4. WHEEL HANDLE, (TYPICAL)
5. SCREW DRIVER STOP, (TYPICAL)
6. 2" P-TRAP
7. POINT OF CONNECTION TO 1-1/2" LABORATORY WASTE VENT AT 6" ABOVE FINISHED CEILING
8. POINT OF CONNECTION TO 2" LABORATORY WASTE AT 6" ABOVE FINISHED FLOOR, REFER TO P-SERIES DRAWINGS
9. WALL
10. ENGRAVED PLASTIC LABEL. WHITE LETTERING ON RED LABEL
11. ENGRAVED PLASTIC LABEL. WHITE LETTERING ON GREEN LABEL

RECESSED WATER SUPPLY & WASTE BOX

1 1/2" = 1'-0" (8)



1. ICE MAKER HOOK-UP BOX
2. 1/2" FIP INLET x 1/4"OD OUTLET COMPRESSION ANGLE VALVE SUPPLY CONNECTION IS 1/2" NPT.
3. WATER HAMMER ARRESTER AS PART OF ICE MAKER BOX ASSEMBLY.
4. ENGRAVED PLASTIC LABEL. WHITE LETTERING ON GREEN LABEL.
5. ENGRAVED PLASTIC LABEL. BLACK LETTERING ON YELLOW LABEL.
6. VALVE SHALL BE BOTTOM FED FOR UPRIGHT VALVE INSTALLATION.

EQUIPMENT VALVE BOX

1 1/2" = 1'-0" (9)

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Registered Professional Engineer (Mechanical) CERTIFICATE NO. 72291 ANDREW BROOKS STOUT ARIZONA U.S.A.

DRAWN BY: RI
JOB NO: 1931.000
DATE: 01/08/2020
REVISIONS

LAB PLUMBING DETAILS

LP3.11

100% CONSTRUCTION DOCUMENTS

SECTION 233600 - AIR TERMINAL UNITS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Single duct terminal units.

1.2 RELATED WORK

A. Section 230500 – Common Work Results for HVAC

B. Section 230529 – Hangers & Supports for HVAC

C. Section 230593 – Testing, Adjusting & Balancing For HVAC

D. Section 230900 – Instrumentation & Control For HVAC

E. Division 26 – Electrical Requirements

1.3 REFERENCES

A. NFPA 90A - Installation of Air Conditioning and Ventilation Systems.

B. UL 181 - Factory-Made Air Ducts and Connectors.

C. ARI 880 - Air-Conditioning and Refrigeration Institute Standard Rating Conditions for Air Terminals

1.4 SUBMITTALS

A. Submit shop drawings in accordance with Section 230500.

B. Submit shop drawings and product data sheets indicating configuration, general assembly, and materials used in fabrication. Include catalog performance ratings which indicate air flow, static pressure, and radiated sound power levels (2nd through 7th octave bands) at design maximum operating conditions.

C. Submit manufacturer's installation instructions.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit operation and maintenance data.

B. Include manufacturer's descriptive literature, operating instructions, maintenance and repair data.

C. Include directions for resetting all control setpoints.

1.6 WARRANTY

A. Provide one year manufacturer's parts and labor warranty.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products manufactured by Trane, Carrier, Titus, Krueger, Anemostat, Nailor, or Price meeting these specifications.

B. Unit performance data must be Rated in Accordance with ARI Standard 880, and must display the ARI Symbol on all standard units.

2.2 PERFORMANCE

A. Unit performance shall meet or exceed performance scheduled on the drawings.

2.3 GENERAL

A. Identify each terminal unit with clearly marked identification label and airflow indicator. Label shall include unit nominal air flow, maximum factory set air flow and minimum factory set air flow.

2.4 FABRICATION

A. Casings: Units shall be completely factory assembled, manufactured of corrosion protected welded steel, and fabricated with a minimum of 18-gauge metal on the high pressure (inlet) side of the VAV dampers and 22-gauge metal on the low pressure (outlet) side and unit casing.

B. Lining: Minimum 1/2 inch thick tuff-skin mat or aluminum foil-faced glass insulation, 1.5 lb/cu ft. density, meeting NFPA 90A requirements and UL 181 erosion requirements.

C. Assembly: Air volume damper, fans and controls in single cabinet.

2.5 VOLUME DAMPER

A. Air volume control dampers shall be factory calibrated and tested assembly consisting of air modulation dampers and extension for connection to control actuators. All actuator linkages shall be protected by a sheet metal enclosure.

2.6 CONTROLS

A. Provide inlet air flow sensor, control cabinet, and 120/24VAC control power transformer with inlet/outlet disconnects.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 233713 – DIFFUSERS, REGISTERS & GRILLES

PART 1 GENERAL

1.1 WORK INCLUDED

A. Supply, Return, Transfer and Exhaust Air Devices and Accessories.

1.2 RELATED WORK

A. Section 230500 – Common Work Results for HVAC

B. Section 230593 – Testing, Adjusting & Balancing For HVAC

C. Section 233113 – Ductwork

D. Section 233300 – Air Duct Accessories

1.3 QUALITY ASSURANCE

A. Make air flow tests and sound level measurement in accordance with applicable ADC equipment test codes and ASHRAE standards.

B. Manufacturer shall certify cataloged performance and ensure correct application of air outlet types.

1.4 SUBMITTALS

A. Submit in accordance with Section 230500.

B. Submit product data and shop drawings covering each item together with schedule of outlets, listing cfm, neck velocity, NC level and Ak factor and air flow measurement procedures.

1.5 JOB CONDITIONS

A. Review requirements (including architectural drawings) of outlets as to size, finish, and type of mounting prior to submitting shop drawings and schedules of outlets.

B. Check location of outlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Products manufactured by Krueger, Tuttle & Baily, Titus, Anemostat, J&J, Price or Nailor, meeting these specifications are acceptable.

2.2 GENERAL REQUIREMENTS

A. Provide air devices equal in all respects to those scheduled on the drawings.

B. Rate units in accordance with ADC standards.

C. Base air outlet application on space noise level of NC 35 maximum in all areas unless indicated otherwise on drawings.

D. Provide supply outlets with sponge rubber seal around edge.

E. All devices shall be factory finished.

F. When required provide air devices factory installed in metal panels painted to match air device finish. Panel shall be suitable for insertion into lay-in-tile ceilings.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install items in accordance with manufacturer's printed instructions.

B. Paint ductwork visible behind air outlets matt black.

C. Seal square to round adaptors or lined plenum boxes air tight to diffusers or grilles.

D. When required cut metal panels for insertion in ceiling at grid location where tiles may be less than nominal size. Center diffuser or grille within modified panel.

END OF SECTION

SECTION 237313 - AIR HANDLING UNITS

PART 1 GENERAL

1.1 WORK INCLUDED

A. Air Handlers

B. Electrical and Controls

C. ETL Listed and Labeled

1.2 RELATED WORK

A. Section 230500 – Common Work Results for HVAC

B. Section 230519 – Mechanical Piping Specialties

C. Section 230523 – General-Duty Valves For HVAC

D. Section 230593 – Testing, Adjusting & Balancing For HVAC

E. Section 230900 – Instrumentation & Control For HVAC

F. Section 232113 – Hydronic Piping

G. Section 233113 – Ductwork

H. Section 233300 – Air Duct Accessories

I. Division 26 – Electrical Requirements

1.3 QUALITY ASSURANCE

A. Provide fans bearing AMCA certified rating seal.

1.4 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 230500.

B. Submit coil capacity data, motor data and filter data.

C. Submit fan curves showing fan performance with system operating point plotted on curves.

D. Submit dimensioned data.

E. Submit manufacturer's installation instructions and maintenance and operating procedures.

1.5 REFERENCED STANDARDS

A. ASHRAE Test Standard 52-76.

B. UL listing for filters, Class 2.

C. ARI Standard 410.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Units manufactured by Carrier, Daikin, Energy Labs, Huntair, BASX Solutions, Nortek, Temtrol, Trane, Thermal Corporation, York meeting these specifications are acceptable.

2.2 TYPE AND PERFORMANCE

A. Provide draw-through design as indicated on contract drawings.

B. Unit shall meet or exceed the performance schedule on the drawings.

2.3 CASING

A. Provide minimum 2” thick double wall AHU casing. Exposed insulation is not acceptable. Provide an insulation system that is resistant to mold growth in accordance with a standardized test method such as UL 181 or ASTM C 1338. Encapsulate insulation with sheet metal so that air does not contact insulation. Solid lined panels insulated with spray injected foam shall be hermetically sealed at each corner and around their entire perimeter, to eliminate airflow through the panel and to eliminate microbial growth potential within the casing wall. Provide casing with minimum thermal resistance (R-value) of 17 hr-ft^2-°F/BTU. Provide panels with acoustical perforated liner in the fan section. Interior liner will be perforated galvanized. Minimum perforated panel thermal resistance (R-Value) will be R11 hr-ft^2-°F/BTU.

B. Provide a unit frame of galvanized steel that provides the overall structure of the unit and does not rely on the casing panels for structural integrity. Insulate frame in the same manner as panels, roof, and floors.

C. Provide AHU casing that leaks no more than 1% of design airflow at +/-8” w.g.

D. Provide wall panels and access doors that deflect no more than L/240 when subjected to +/- 8” w.g. ‘L’ is the panel-span length and ‘L/240’ is the deflection at panel midpoint. Provide floors and roofs that deflects no more than L/240 when subjected to a 300 lb load at mid-span. ‘L’ is the panel-span length and ‘L/240’ is the deflection at panel midpoint.

E. Provide double wall hinged access doors for access to sections and components requiring servicing. Doors shall be adequately sized and swing 180 degrees to allow operating personnel to access unit. Doors shall be of the same construction as the wall casing. Provide gasket seals, door latch and handle assemblies.

2.4 FANS

A. Fan performance shall be AMCA certified.

B. All fans shall be statically and dynamically balanced including final trim balance at the factory for quiet operation.

C. Fans shall be multiple single width single inlet direct drive airfoil plenum fans. Fans shall not pass through their first critical speed before reaching operating RPM.

D. Provide solid steel fan shafts with self-aligning ball bearings having minimum average life of 200,000 hours. Extend lubrication fittings to exterior of fan casing.

E. Provide OSHA fan and drive guard. Provide fan inlet guard.

F. Fan shall be isolated from unit with 1” minimum deflection spring isolators with seismic restraints.

2.5 FILTER SECTION

A. Filters shall be provided with holding frames and all required hardware shall be serviceable from both sides of the unit.

B. Filters shall be 2” thick MERV 8 efficiency, disposable, pleated media type. The efficiency shall be per the ASHRAE Test Standard 52-76. Filters shall be UL listed, Class 2.

C. The media shall be a nonwoven cotton fabric and shall be reinforced with a wove scrim backing. The media support grid shall be welded wire with an approximate free area of 96 percent. The wire grid shall be bonded to the media.

D. The enclosure frame shall be constructed of a rigid heavy- duty chipboard secured to the air entrance and exit side of each pleat.

E. Holding frames shall be factory fabricated of 16 gauge minimum galvanized steel and shall be provided with gaskets and spring type positive sealing fasteners.

F. An additional filter section shall be provided for future carbon filters or 12” thick MERV 13 filters.

G. Provide flush mount differential pressure gauge across the pre-filter section.

H. One set of filters shall be provided with the unit during construction and one set for testing and balancing of the unit.

2.6 COILS

A. Enclose coils in coil section with headers and U-bends fully contained within the casing.

B. Coils shall be removable from the unit without dismantling the unit. Water coil capacities, pressure drops and selection procedures shall be certified in accordance with ARI Standard 410-64. Coils shall have same end supply and return connections unless otherwise indicated. All coils shall be leak tested by the manufacturer.

C. Coils shall be of the extended surface type meeting all conditions and having the minimum face area and pressure drops scheduled on the drawings. Coils shall be constructed of 5/8" O.D. copper tubes and plate type aluminum or copper fins bonded to the tubes by mechanical expansion. Minimum acceptable tube thickness is 0.02" and minimum acceptable fin thickness is 0.008. Coil headers shall be constructed of close gained cast iron extra heavy copper or extra heavy red brass. The coil section shall be provided with a galvanized steel casing no lighter than 16-gauge. Galvanized intermediate tube support sheets shall be provided in coils having tube lengths in excess of 48" and on long coils the spacing of coil supports shall not exceed 48".

D. Maximum coil face velocity shall be 450 fpm. Maximum fin spacing shall be 12 fpi.

E. Condensate drain pans shall be fabricated from 16 gauge 304 stainless steel. Drain pans shall be double sloped at minimum 1/8” per foot for complete drainage with no standing water in the unit.

2.7 MOTORS AND VARIABLE FREQUENCY DRIVE

A. Motors shall be open-drip-proof premium efficiency type with a minimum 1.15 service factor with greasable ball bearings and of the voltage scheduled on the drawings. Motors shall be inverter ready and compatible with variable frequency drive.

B. Factory install and wire variable frequency drive with manual by-pass starter equal of ABB Model ACH550 with full ASHRAE BACnet communication connection.

C. Provide wiring from VFD to fan motor per NEC requirements. Provide conduit routing through unit exterior for single point field electrical connection to unit.

2.8 CONTROLS

A. Provide factory installed and wired 24VAC transformer connected to the fan motor primary power with hi/lo disconnects. Transformer shall be adequately sized for air handler field mounted controller and all associated sensors and actuators.

B. Provide factory installed and wired control components described in the contract documents including the control drawings, sequence of operation, and Section 230900. Provide wiring from each device to a terminal strip located in a control enclosure with sufficient space for a field mounted air handler controller. All wiring and terminals shall be clearly labeled. Devices and sensor to be factory shall meet all the requirements of Section 230900 and shall include the following:

1. Variable frequency drive enable/disable, frequency input, operating frequency, alarm status, and full BACnet communication connection.

2. Fan high limit differential pressure sensor factory interlocked to disable VFD if fan pressure exceeds the value described in the sequence of operation.

3. Full face averaging supply air temperature sensor.

4. Freeze stat set at 40F and wired to shut-down fan.

5. Supply airflow monitor to measure and display supply air cfm.

6. Outside airflow monitor to measure and display outside air cfm.

7. Filter differential pressure gauge and sensor, photohelic gauge.

8. Outside air damper with 24V N.C. modulating actuator.

C. Factory calibrate and commission all controls.

2.9 ELECTRICAL

A. Provide a U.L. listed and labeled (as a completed assembly) single source power and control panel including all of the necessary starters, VFDs, transformers, branch circuit protection and main fused disconnect, factory wired to the air handler’s electrical devices such as fan motors, and controls.

B. Provide LED lighting in each air handler section in vapor proof marine-type fixtures with a labeled toggle switch mounted near the filter access door. Provide all conduit and wiring for the lights and switch to the main control panel. All wiring and installation shall be per NEC requirements and be UL listed.

PART 3 EXECUTION

3.1 ASSEMBLY

A. Assemble fan by bolting sections together to make single unit.

3.2 FACTORY TESTING

A. Weigh fan and motor assembly at factory for isolator selection. Statically and dynamically balance fan section assemblies. Fan section assemblies include fan wheels, shafts, bearings, isolation bases and isolators. The assembled fan section shall be run and the peak to peak displacement shall be measured at the pillow block bearing in all three dimensions per ASTM DH167 Standards. Allow spring isolators to free float when performing fan balance. Measure vibration at each fan shaft bearing in horizontal, vertical and axial directions. Balance at design RPM's as scheduled on drawings and balance in accordance with ARI Guideline D or better. For fan sections controlled by variable frequency drives, balance at all speeds between 25% and 100% of design RPM.

B. Balance variable volume fan assemblies from 10% to 100% of design RPM.

C. Manufacturer shall hipot test wiring intended to carry voltages greater than 30VAC.

3.3 INSTALLATION

A. Install items in accordance with manufacturer's instructions and as shown on the drawings.

3.4 START-UP

A. Provide the services of a factory authorized service technician to assist the installing contractor with startup services and instruct the contractor and owner’s personnel in the maintenance and use of the equipment.

END OF SECTION