MSU MOLECULAR BIOSCIENCE BUILDING

BOZEMAN, MT

PROJECT INFORMATION

PROJECT SITE:
960 TECHNOLOGY BOULEVARD
BOZEMAN, MT 59715

CODE INFORMATION:

APPLICABLE CODES: (STATE OF MONTANA)
-INTERNATIONAL BUILDING CODE, 2021 EDITION
-INTERNATIONAL EXISTING BUILDING CODE, 2021 EDITION
-UNIFORM PLUMBING CODE, 2021 EDITION
-INTERNATIONAL MECHANICAL CODE, 2021 EDITION
-INTERNATIONAL FUEL GAS CODE, 2021 EDITION
-NATIONAL ELECTRICAL CODE, 2020 EDITION
-INTERNATIONAL ENERGY CONSERVATION CODE, 2021 EDITION

ZONING: BP

FIRE SPRINKLERS: YES

BUILDING CONSTRUCTION TYPE: V-A
BUILDING OCCUPANCY TYPE: B - BUSINESS

ALLOWABLE BUILDING HEIGHT: 40'-0"
EXISTING BUILDIG HEIGHT: 29'-0"
NEW OVERALL BUILDING HEIGHT: 38'-4"

PROJECT AREA: TASK 2B

MAIN FLOOR:	3,976 SF
LEVEL 2:	5,672 SF
LEVEL 3:	788 SF
TOTAL :	10,436 SF

BUILDING AREA

MAIN FLOOR:	18,000 SF
LEVEL 2:	18,514 SF
LEVEL 3:	1,739 SF
TOTAL BUILDING AREA:	38,253 SF

*1 HR. FIRE SEPERATION WALL AT COORIDOR WALLS SHALL BE MAINTAINED WITH THIS PROJECT

PROJECT DIRECTORY

OWNER:

MONTANA STATE UNIVERSITY
PO BOX 172760
BOZEMAN, MT 59717
(406) 994-4547
CONTACT: DON BEEBE

ARCHITECT:

BECHTLE ARCHITECTS
4515 VALLEY COMMONS DRIVE #201
BOZEMAN, MT 59718
(406) 585-4161
CONTACT: NICK FULTON

CIVIL ENGINEER:

MERIDIAN LAND SURVEYING, INC.
4135 VALLEY COMMONS DRIVE, SUITE C
BOZEMAN, MT 59718
(406) 579-1746
CONTACT: MICHAEL S. LAPP

ELECTRICAL ENGINEER:

BLACKSHEEP ENGINEERING
602 W HEMLOCK ST
BOZEMAN, MT 59715
(406) 551-3669
CONTACT: ANDY MOORE

MECHANICAL ENGINEER:

SE ENGINEERS
PO BOX 1491
THREE FORKS, MT 59752
(406) 600-8796
CONTACT: BILL EDDEN

FIRE SUPPRESSION ENGINEER:

COFFMAN ENGINEERING
751 OSTERMAN DR., SUITE 104
BOZEMAN, MT 59715
(406) 582-1936
CONTACT: ROBERT BLACKMAN

FIRE ALARM ENGINEER:

APEX FIRE ALARM DESIGN, LLC
PO BOX 883
BELGRADE, MT 59714
(208) 949-5110
CONTACT: BRIAN MOSS

SHEET INDEX - TASK 2B

TASK 2 - TI

GENERAL

G002	COVER SHEET
G112	ACCESSSIBILITY DETAILS
G113	ADA INFO. & FINISH SCHED.

ARCHITECTURAL

A001	SITE PLAN (MOD)
A011	MAIN / DEMO PLANS
A012	LVL 2 / DEMO PLANS
A013	LVL 3 / DEMO PLAN & RCP
A021	MAIN / DEMO RCP
A022	LVL 2 / DEMO RCP
A111	MAIN / REMODEL PLANS
A112	LVL 2 / REMODEL PLANS
A113	LVL 3 / REMODEL PLANS
A121	MAIN / REMODEL RCP
A122	LVL 2 / REMODEL RCP
A123	LVL 3 / REMODEL PLAN & RCP
A401	REMODEL INT ELEVATIONS

MECHANICAL

M001	LEVEL 1 MECHANICAL DEMO PLAN
M002	LEVEL 2 MECHANICAL DEMO PLAN
M003	LEVEL 3 MECHANICAL DEMO PLAN
M.101	MECHANICAL LEGEND, NOTES, AND SCHEDULES
M.102	MECHANICAL SCHEDULES
M.201	LEVEL 1 - HVAC PLANS
M.202	LEVEL 2 - HVAC PLANS
M.203	LEVEL 3 & ROOF-HVAC PLAN
M.301	LEVEL 1 & 2 - CHILLED WATER PIPING PLANS
M.302	LEVEL 3 - CHILLED WATER PIPING PLAN
M.303	LEVEL 1 & 2 - HEATING HOT WATER PLANS
M.304	LEVEL 3 - HEATING HOT WATER PIPING PLANS
M.401	FLOW DIAGRAMS
M.501	CONTROLS
M.502	CONTROL LEGEND AND SEQUENCE OF OPERATIONS
M.601	MECHANICAL DETAILS

PLUMBING

P001	LEVEL 1 - PLUMBING DEMO PLAN
P002	LEVEL 2 - PLUMBING DEMO PLAN
P101	PLUMBING LEGEND, SCHEDULES, & DTAILS
P201	LEVEL 1 - D-W-V PLAN
P202	LEVEL 2 - D-W-V PLAN
P301	LEVEL 1 - DOMESTIC WATER PLAN
P302	LEVEL 2 - DOMESTIC WATER PLAN
P303	LEVEL 3 - DOMESTIC WATER PLAN

ELECTRICAL

E000	ELECTRICAL COVER SHEET
E011	LEVEL 1 ELECTRICAL DEMOLITION PLAN
E012	LEVEL 2 ELECTRICAL DEMOLITION PLAN
E013	LEVEL 3 ELECTRICAL DEMOLITION PLAN
E111	LEVEL 1 ELECTRICAL PLAN
E112	LEVEL 2 ELECTRICAL PLAN
E113	LEVEL 3 ELECTRICAL PLAN
E501	ELECTRICAL DEMO ONE-LINE DIAGRAM
E502	ELECTRICAL ONE-LINE DIAGRAM
E503	ELECTRICAL DISTRIBUTION PANEL SCHEDULES
E504	ELECTRICAL HOUSE SCHEDULES
E505	ELECTRICAL TENANT 1 SCHEDULES
E506	ELECTRICAL TENANT 1 SCHEDULES
E507	ELECTRICAL TENANT 1 SCHEDULES
E508	ELECTRICAL TENANT 2 SCHEDULES
E509	ELECTRICAL SCHEDULES
EL011	LIGHTING PLANS
T101	LEVEL 1 TECHNOLOGY PLAN
T102	LEVEL 2 TECHNOLOGY PLAN
T301	CABLE TRAY & CONDUIT PLAN
T501	TECHNOLOGY TYPICAL DETAILS
T611	TECH EQUIPMENT SCHEDULES

ELECTRICAL

FA001	FIRE ALARM COVER SHEET
FA002	FIRE ALARM DEVICE LEGEND
FA100	FIRE ALARM PLAN
FA500	FIRE ALARM FACU DETAILS
FA501	FIRE ALARM WIRING DETAILS
FA502	FIRE ALARM DEVICE WIRING DETAILS
FA600	FIRE ALARM RISER DIAGRAM
FA700	FIRE ALARM CALCS (NAC LOAD/LOSS)
FA701	FIRE ALARM CALCS (BATTERY)

FIRE SUPPRESION

FX001	FIRE SPRINKLER COVER
FX101	LEVEL 1 FIRE SPRINKLER PLAN
FX102	LEVEL 2/3 FIRE SPRINKLER PLANS
FXD01	LEVEL 1 FIR DEMO PLAN
FXD02	LEVEL 2/3 FIRE DEMO PLAN
FXD04	RISER & DEMO SECTIONS

VICINITY MAP

GENERAL PROJECT NOTES

1. AIA DOCUMENT A201, GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION APPLIES TO THIS PROJECT AND SHALL BE INCORPORATED IN THE SERVICES PROVIDED BY THE GENERAL CONTRACTOR.

2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND JOB SITE CONDITIONS BEFORE COMMENCING WORK AND SHALL REPORT ANY DISCREPANCIES TO THE ARCHITECT.

3. USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS. WHERE NO DIMENSION IS PROVIDED, CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.

4. THE DESIGN, ADEQUACY, AND SAFETY OF ERECTING/ BRACING/ SHORING/ TEMPORARY SUPPORTS/ ETC. ETC. IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND HAS NOT BEEN CONSIDERED BY AN ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR THE STABILITY OF THE STRUCTURE PRIOR TO THE COMPLETION OF WALLS, CEILING, AND FINISH MATERIALS.

5. GENERAL CONTRACTOR TO COORDINATE ARCHITECTURAL DRAWINGS WITH MECHANICAL, ELECTRICAL, AND PLUMBING.

6. ALL MATERIALS AND FINISHES ARE TO BE AS SPECIFIED, OR PRE-APPROVED EQUAL.

7. SUBSTITUTIONS SHALL BE BY APPROVAL PRIOR TO THE BID, OR INDICATED AS A LINE ITEM ON THE BID AS AN ALTERNATE TO THE BASE BID. SEE SPECIFICATIONS IF AND WHEN APPLICABLE.

8. CONTRACTOR IS TO USE WATER-RESISTANT GYPSUM WALL BOARD IN ALL WET SPACES (RESTROOMS, JANITORIAL AREAS, MECHANICAL/PLUMBING ROOMS, FOOD SERVICE ROOMS, ETC. ETC.)

9. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS, SHOWING ANY CHANGES TO PLANS, ELEVATIONS, SYSTEMS, DIMENSIONS, ETC.

SCOPE OF TASK SERVICES

TASK 1A: BUILDING ENCLOSURE CONDITIONS ASSESSMENT
TASK 1B: BUILDING ENCLOSURE REPAIR/REPLACEMENT
TASK 2A: INTERIOR TENANT IMPROVEMENTS (TENANTS 154-162)
TASK 2B: INTERIOR TENANT IMPROVEMENTS (TENANTS 257)
TASK 2B: FIRE ALARM REPLACEMENT
TASK 3B: UIT CONNECTION & UPGRADES
TASK 3C: MEP MODIFICATIONS

LIST OF ABBREVIATIONS

AP	ACCESS PANEL	BLDG	BUILDING	DS	DOWN SPOUT	FND	FOUNDATION	MATL	MATERIAL	PERP	PERPENDICULAR	SERV	SERVICE	VERT	VERTICAL
ACT	ACOUSTIC CEILING TILE	CAB	CABINET	D	DRYER	GALV	GALVANIZE	MAX	MAXIMUM	PL	PLATE	SHT	SHEET	VEST	VESTIBULE
ALT	ALTERNATE	CLG	CEILING	EA	EACH	GA	GAGE	MTL	METAL	PLMB	PLUMBING	SHTHG	SHEATHING	VIF	VERIFY IN FIELD
AB	ANCHOR BOLT	CL	CENTER LINE	E	EAST	GL	GRADELINE	MIN	MINIMUM	PT	POINT	SIM	SIMILAR	WTP	WATERPROOFING
	ANGLE	CC	CENTER TO CENTER	ELEC	ELECTRIC	GWB	GYPSUM WALL BOARD	MISC	MISCELLATNEOUS	LB	POUND	S	SOUTH	WP	WEATHERPROOF
APPD	APPROVED	CER	CERAMIC	EL	ELEVATION	HDWD	HARDWOOD	MOD	MODULAR	PSI	POUNDS PER SQUARE INCH	SPEC	SPECIFICATION	WH	WEEPHOLE
APPR	APPROXIMATE	CIR	CIRCLE	EQ	EQUAL	HT	HEIGHT	MECH	MECHANICAL	PREFAB	PREFABRICATED	SQ	SQUARE	WT	WEIGHT
ARCH	ARCHITECTURAL	CLR	CLEAR	EQUIP	EQUIPMENT	HOR	HORIZONTAL	NOM	NOMINAL	QTY	QUANITITY	STD	STANDARD	W	WEST
ASPH	ASPHALT	COL	COLUMN	EXIST	EXISTING	HB	HOSE BIB	N	NORTH	R	RADIUS	STL	STEEL	W	WIDTH
@	AT	CONC	CONCRETE	EXT	EXTERIOR	IN	INCH	NTS	NOT TO SCALE	REF	REFRIGERATOR	STG	STROAGE	WDW	WINDOW
AVE	AVERAGE	CMU	CONCRETE MASONRY UNIT	FT	FEET	INSUL	INSULATION	NO	NUMBER	REG	REGISTER	STRUCT	STRUCTURAL	WG	WIRE GLASS
BM	BEAM	CONST	CONSTRUCTION	FIN	FINISH	INT	INTERIOR	OC	ON CENTER	REINF	REINFORCE	SYS	SYSTEM	W/O	WITH OUT
BRG	BEARING	CONT	CONTINUE	FF	FINISHED FLOOR	JT	JOINT	OPNG	OPENING	REQD	REQUIRED	THRU	THROUGH	WD	WOOD
BM	BENCH MARK	CT	CERAMIC TILE	FE	FIRE EXTINGUISHER	JST	JOIST	OPP	OPPOSITE	REV	REVISION	T&G	TONGUE AND GROOVE	WM	WASHING MACHINE
BLKG	BLOCKING	DP	DAMP ROOFING	FIX	FIXTURE	LAM	LAMINATE	OVHD	OVERHEAD	R	RISER	TR	TREAD		
BD	BOARD	DIA	DIAMETER	FL	FLOOR	LAV	LAVATORY	PTD	PAINTED	RFG	ROOFING	TYP	TYPICQAL		
BS	BOTH SIDES	DIM	DIMENSION	FD	FLOOR DRAIN	LG	LENGTH	PNL	PANEL	RM	ROOM	UNO	UNLESS NOTED OTHERWISE		
BOT	BOTTOM	DW	DISHWASHER	FT	FOOT	LT	LIGHT	PTN	PARTITION	SCHED	SCHEDULE	VIF	VERIFY IN FIELD		
BRK	BRICK	DN	DOWN	FTG	FOOTING	MFG	MANUFACTURING	PERM	PERMANENT	SECT	SECTION	VP	VENT PIPE		

PROJECT SYMBOLS

- N — NORTH ARROW
- ROOM NAME / 101 — ROOM TAG
- W1 — WINDOW NUMBER
- XXX — DOOR NUMBER
- A — GRID HEAD
- X — PLAN NOTE
- 1 / A101 SIM — SECTION HEAD
- 1 / A101 SIM — WALL SECTION HEAD
- 1 / A101 SIM — DETAIL CALLOUT
- SPOT ELEVATION

KEY PLAN

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100% CONSTRUCTION DOCUMENTS

MOLECULAR BIOSCIENCE BUILDING

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717
PHONE: 406.994.5413
FAX: 406.994.5665

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	NF	
REVIEWED BY:	NF	
REV.	DESCRIPTION	DATE

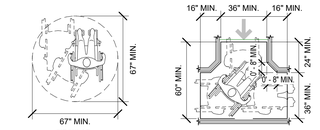
Nicholas W. Fulton
2021
BOZEMAN, MT

PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
COVER SHEET

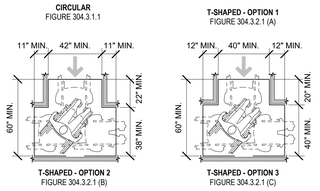
G002

DATE
JUN. 03, 2026



CIRCULAR
FIGURE 304.3.1.1

T-SHAPED - OPTION 1
FIGURE 304.3.2.1 (A)



T-SHAPED - OPTION 2
FIGURE 304.3.2.1 (B)

T-SHAPED - OPTION 3
FIGURE 304.3.2.1 (C)

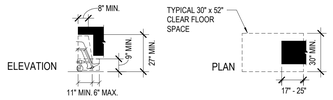
NOTES:

1. THE FLOOR OR GROUND SURFACE WITHIN THE REQUIRED MANEUVERING CLEARANCES OR CLEAR FLOOR SPACE SHALL SLOPE NO MORE THAN 2%; AND CHANGES IN LEVEL WITHIN THIS AREA ARE NOT PERMITTED.
2. WHERE TURNING SPACE IS REQUIRED THE T-SHAPE SPACE MAY BE USED.

1 WHEELCHAIR TURNING IN NEW BUILDINGS Copy 1

1/4" = 1'-0"

ANSI A117.1-2017 - 304.3.1 &304.3.2.1



TOE & KNEE CLEARANCE
FIGURE 306.2 (A) & (B), 306.3 (A) & (B)

NOTES:

1. SPACE UNDER AN ELEMENT BETWEEN THE FINISH FLOOR OR GROUND AND 9" ABOVE THE FINISH FLOOR OR GROUND SHALL BE CONSIDERED TOE CLEARANCE. SPACE UNDER AN ELEMENT BETWEEN 9" AND 27" ABOVE THE FINISH FLOOR SHALL BE CONSIDERED KNEE CLEARANCE
2. TOE CLEARANCE SHALL EXTEND 25" MAXIMUM UNDER ELEMENT. KNEE CLEARANCE SHALL EXTEND 25" MAXIMUM UNDER ELEMENT AT 9" ABOVE THE FINISHED FLOOR
3. WHERE TOE CLEARANCE IS REQUIRED AT AN ELEMENT AS PART OF THE CLEAR FLOOR SPACE, THE TOE CLEARANCE SHALL EXTEND 17" MINIMUM UNDER THE ELEMENT. WHERE KNEE CLEARANCE IS REQUIRED AT AN ELEMENT, AS PART OF THE CLEAR FLOOR SPACE, THE KNEE CLEARANCE SHALL BE 11" DEEP MINIMUM AT 9" ABOVE THE FLOOR OR GROUND. THE KNEE CLEARANCE SHALL ALSO HAVE A DEPTH OF AT LEAST 8" DEEP (MINIMUM), AT 27" ABOVE THE FINISH FLOOR OR GROUND (MEASURED FROM THE FRONT EDGE OF THE ELEMENT).
4. TOE CLEARANCE SHALL BE 30" WIDE MINIMUM.
5. BETWEEN 9" AND 27" ABOVE THE FINISH FLOOR OR GROUND, THE KNEE CLEARANCE SHALL BE PERMITTED TO REDUCE AT A RATE OF 1" IN DEPTH FOR EVERY 6" IN HEIGHT

TOE & KNEE CLEARANCE DETAIL Copy 1

NTS

ANSI A117.1-2017 - 306.2 &306.3

REDUCED VERTICAL CLEARANCE
FIGURE 307.4

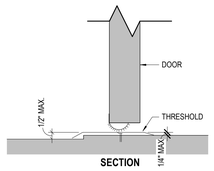
NOTES:

1. VERTICAL CLEARANCE SHALL BE 80" MINIMUM. GUARDRAILS OR OTHER BARRIERS SHALL BE PROVIDED WHERE THE VERTICAL CLEARANCE IS LESS THAN 80" HIGH.
2. THE LEADING EDGE OF GUARDRAILS OR BARRIERS SHALL BE 27" MAXIMUM ABOVE THE FINISHED FLOOR.
3. WHERE RAILINGS ARE USED AS A BARRIER, IT IS RECOMMENDED TO PROVIDE AT LEAST ONE DETECTABLE RAIL BELOW, AT A MAXIMUM OF 27" AFF. HOWEVER IT IS PREFERRED TO HAVE 2 RAILINGS: ONE AT A LOW HEIGHT (AT 6" AFF) WITH AN ADDITIONAL RAIL AT A HIGHER HEIGHT (AT 34" AFF).

VERTICAL CLEARANCE DETAIL Copy 1

NTS

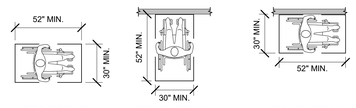
ANSI A117.1-2017 - 307.4



ACCESSIBLE DOOR THRESHOLD Copy 1

NTS

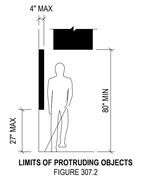
ANSI A117.1-2017 - 404.2.4



2 MINIMUM CLEAR FLOOR SPACE FOR WHEELCHAIRS IN NEW BUILDINGS Copy 1

1/4" = 1'-0"

ANSI A117.1-2017 - 305.3, 305.5, & 305.7



LIMITS OF PROTRUDING OBJECTS
FIGURE 307.2

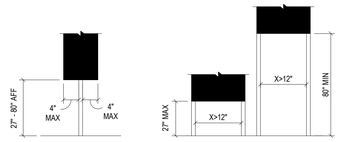
NOTES:

1. OBJECTS THAT PROTRUDE INTO THE CIRCULATION PATH MUST BE LOWER THAN 27".
2. OBJECTS THAT PROTRUDE INTO THE CIRCULATION PATH OVERHEAD MUST BE HIGHER THEN OR EQUAL TO 80" ABOVE THE FINISHED FLOOR OR GROUND.
3. PROTRUDING OBJECTS SHALL NOT REDUCE THE CLEAR WIDTH FOR ANY ACCESSIBLE ROUTES.

PROTRUDING OBJECTS DETAIL Copy 1

NTS

ANSI A117.1-2017 - 307.2



POST-MOUNTED PROTRUDING OBJECTS
FIGURE 307.3(A) & (B)

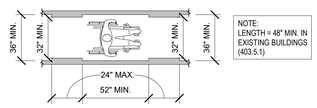
NOTES:

1. WHEN BOTTOM OF POST-MOUNTED OBJECTS ARE LOCATED BETWEEN 27" AND 80" ABOVE THE FLOOR OR GROUND, IT MAY PROTRUDE A MAXIMUM OF 4" INTO THE CIRCULATION PATH.
2. WHERE AN OBJECT IS MOUNTED BETWEEN TWO POSTS AND THE CLEAR DISTANCE BETWEEN POSTS IS GREATER THAN 12", THE LOWEST EDGE OF THE SIGN OR OBSTRUCTION SHALL BE AT A 27" MAXIMUM HEIGHT FROM FINISHED FLOOR OR GROUND.
3. WHEN AN OBJECT IS OVERHEAD, THE LOWEST EDGE MUST BE AT LEAST 80" MINIMUM ABOVE THE FLOOR OR GROUND (AS SEEN IN "B").

POST MOUNTED PROTRUDING OBJECT DETAIL Copy 1

NTS

ANSI A117.1-2017 - 307.3

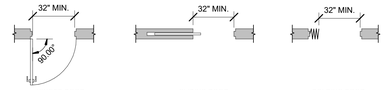


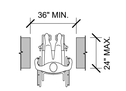
ACCESSIBLE ROUTE CLEAR WIDTH
FIGURE 403.5.1 (A)

3 ACCESSIBLE ROUTE CLEAR WIDTH Copy 1

1/4" = 1'-0"

ANSI A117.1-2017 - 403.5.1





DOORWAYS WITHOUT DOORS
FIGURE 404.2.2 (d)

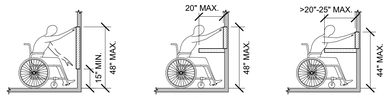
NOTES:

1. OPENINGS MORE THAN 24" DEEP SHALL PROVIDE A CLEAR OPENING OF 36" MINIMUM.
2. THERE SHALL BE NO PROJECTIONS INTO THE REQUIRED CLEAR OPENING WIDTH LOWER THAN 34" ABOVE THE FINISHED FLOOR OR GROUND.
3. PROJECTIONS INTO A CLEAR OPENING, WITH WIDTHS BETWEEN 34" AND 80" ABOVE FINISHED FLOOR OR GROUND SHALL NOT EXCEED 4"

6 CLEAR DOORWAY WIDTH & DEPTH Copy 1

1/4" = 1'-0"

ANSI A117.1-2017 - 404.2.2



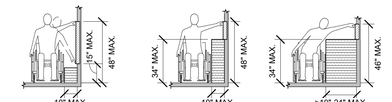
NOTES:

1. WHERE A FORWARD REACH IS UNOBSTRUCTED, THE TALLER, FORWARD REACH SHALL BE 48" MAXIMUM AND THE LOWER, FORWARD REACH SHALL BE 15" MINIMUM ABOVE THE FINISHED FLOOR OR GROUND.
2. WHERE THE HIGH FORWARD REACH IS OVER AN OBSTRUCTION, THE CLEAR FLOOR SPACE SHALL EXTEND BENEATH THE ELEMENT FOR A DISTANCE NOT LESS THAN THE REQUIRED REACH DEPTH OVER THE OBSTRUCTION. THE FORWARD REACH SHALL BE 48" MAXIMUM WHERE THE REACH DEPTH HAS A 20" MAX.
3. WHEN THE REACH DEPTH EXCEEDS 20" THE HIGH FORWARD REACH SHALL BE PLACED AT A 44" MAXIMUM AFF AND THE DEPTH HAS A 25" MAXIMUM DIMENSION.

9 FORWARD REACH Copy 1

1/4" = 1'-0"

ANSI A117.1-2017 - 308.2



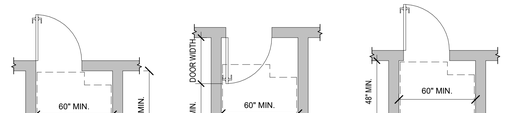
NOTE:

1. WHERE A CLEAR FLOOR OR GROUND SPACE ALLOWS A PARALLEL APPROACH TO AN ELEMENT AND THE SIDE REACH IS UNOBSTRUCTED, THE HIGH-SIDE REACH SHALL BE AT A 48" MAXIMUM HEIGHT AND THE LOW SIDE REACH SHALL BE AT A 15" MINIMUM HEIGHT ABOVE THE FINISHED FLOOR OR GROUND.
2. WHERE A CLEAR FLOOR OR GROUND SPACE ALLOWS A PARALLEL APPROACH TO AN ELEMENT AND THE HIGH SIDE REACH IS OVER AN OBSTRUCTION, THE HEIGHT OF THE OBSTRUCTION SHALL HAVE A 34" MAXIMUM, AND THE DEPTH OF THE OBSTRUCTION SHALL BE NO LARGER THAN THE 24" MAXIMUM.
3. THE HIGH SIDE REACH SHALL HAVE A 48" MAXIMUM HEIGHT WITH A REACH WIDTH OF 10" MAXIMUM. WHERE THE REACH EXCEEDS 10" THE HIGH SIDE REACH SHALL BE 46" MAXIMUM FOR A REACH DEPTH OF 24" MAXIMUM.

11 SIDE REACH Copy 1

1/4" = 1'-0"

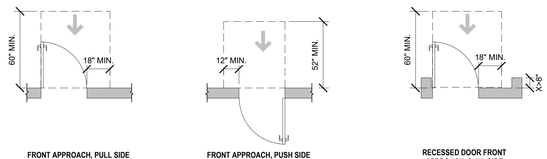
ANSI A117.1-2017 - 308.3

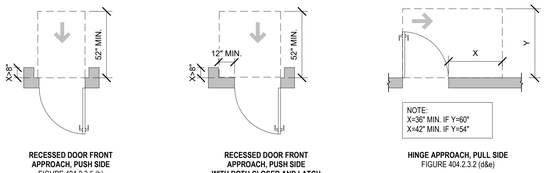


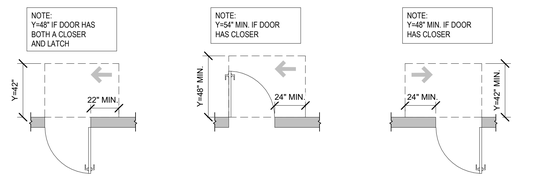
4 TWO HINGED DOORS IN SERIES IN NEW BUILDINGS1 Copy 1

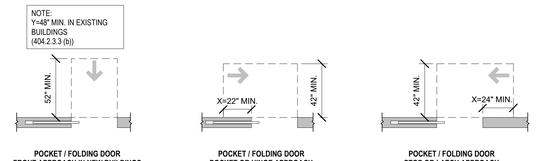
1/4" = 1'-0"

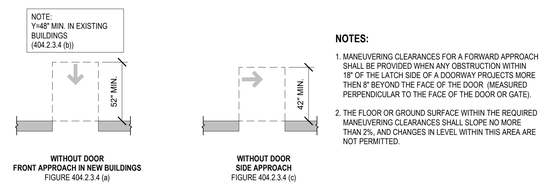
ANSI A117.1-2017 - 404.2.5











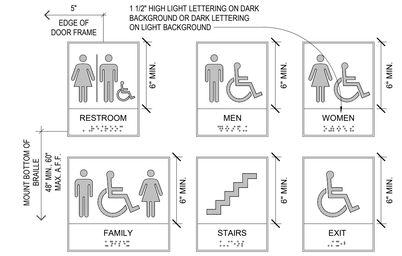
NOTES:

1. MANEUVERING CLEARANCES FOR A FORWARD APPROACH SHALL BE PROVIDED WHEN ANY OBSTRUCTION WITHIN 18" OF THE LATCH SIDE OF A DOORWAY PROJECTS MORE THEN 8" BEYOND THE FACE OF THE DOOR (MEASURED PERPENDICULAR TO THE FACE OF THE DOOR OR GATE).
2. THE FLOOR OR GROUND SURFACE WITHIN THE REQUIRED MANEUVERING CLEARANCES SHALL SLOPE NO MORE THAN 2%, AND CHANGES IN LEVEL WITHIN THIS AREA ARE NOT PERMITTED.

12 MANEUVERING CLEARANCES AT DOORS Copy 1

1/4" = 1'-0"

ANSI A117.1-2017 - 404.2.3



NOTES:

1. PROVIDE (1) SIGN PER TOILET COMPLYING WITH ANSI 2017, SECTION 703. SIGN TO HAVE RAISED AND BRAILLE CHARACTERS AND PICTORIAL SYMBOL OF ACCESSIBILITY. MOUNT 48" MIN. TO 60" MAX. TO BOTTOM OF BRAILLE A.F.F.
2. DARK PLASTIC (FIELD) BACKGROUND WITH RAISED, LIGHT EMBLEMS OR LIGHT PLASTIC (FIELD) BACKGROUND WITH RAISED, DARK EMBLEMS OR CAN USE DEPRESSED EMBLEMS (NOTE- EMBLEMS & LETTERING MUST BE RAISED OR DEPRESSED MIN. 1/32" TYPICAL)

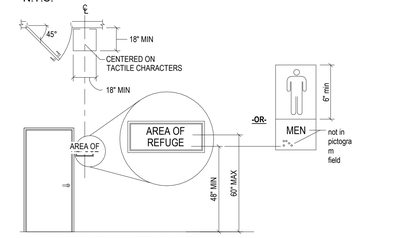
INTERNATIONAL SYMBOL OF ACCESSIBILITY
FIGURE 703.6.3.1

INTERNATIONAL TTY SYMBOL
FIGURE 703.6.3.2

INTERNATIONAL SYMBOL OF ACCESS FOR HEARING LOSS
FIGURE 703.6.3.3

14 ACCESSIBLE SIGNAGE

N.T.S.



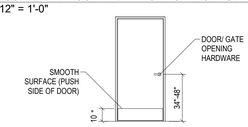
HEIGHT OF RAISED CHARACTERS ABOVE FLOOR
FIGURE 703.3.10, 703.3.11 & 703.5

NOTES:

1. CHARACTERS SHALL BE 48 INCHES MINIMUM AND 60 INCHES MAXIMUM ABOVE THE FINISHED FLOOR OR GROUND SURFACE, MEASURED TO THE BASELINE OF THE CHARACTERS.
2. WHERE A SIGN CONTAINING TACTILE CHARACTERS IS PROVIDED AT THE DOOR, THE SIGN SHALL BE PLACED ALONGSIDE ON THE LATCH SIDE. WHERE A TACTILE SIGN IS PROVIDED AT DOUBLE DOORS, THE SIGN SHALL BE TO THE RIGHT OF THE RIGHT-HAND DOOR. WHERE THERE IS NO WALL SPACE ON THE LATCH SIDE OF A SINGLE DOOR, OR THE RIGHT SIDE OF THE DOUBLE DOORS, SIGNS SHALL BE ON THE NEAREST ADJACENT WALL. SIGNS CONTAINING TACTILE CHARACTERS SHALL HAVE AN 18" MINIMUM BY 18" MINIMUM SPACE ON THE FLOOR , CENTERED ON THE SIGN, BEYOND THE ARC OF THE DOOR SWING BETWEEN THE CLOSED POSITION AND 45 DEGREE OPEN POSITION.
3. DOOR-MOUNTED SIGNS, SHALL BE PERMITTED ON THE PUSH SIDE OF DOORS WITH CLOSERS AND WITHOUT HOLD-OPEN DEVICES.
4. REFER TO SECTION 703 OF THE 2010 ADA STANDARDS FOR REQUIREMENTS OF TACTILE CHARACTERS, VISUAL CHARACTERS, AND PICTOGRAMS.

15 ACCESSIBLE ROOM IDENTIFICATION SIGNAGE DETAIL

12" = 1'-0"



NOTES:

1. HANDLES, PULLS, LATCHES, LOCKS, AND OTHER OPERABLE PARTS ON ACCESSIBLE DOORS SHALL HAVE A SHAPE THAT IS EASY TO GRIP WITH ONE HAND AND DOES NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST TO OPERATE. SUCH HARDWARE SHALL BE 34 INCHES MINIMUM AND 48 INCHES MAXIMUM ABOVE THE FLOOR OR GROUND WHERE SLIDING DOORS ARE IN THE FULLY OPEN POSITION. OPERATING HARDWARE SHALL BE EXPOSED AND USABLE FROM BOTH SIDES.
2. DOOR CLOSERS SHALL BE REQUIRED SO THAT FROM AN OPEN POSITION OF 90 DEGREES, THE TIME REQUIRED TO MOVE THE DOOR TO AN OPEN POSITION OF 12 DEGREES SHALL BE 5 SECONDS MINIMUM.
3. DOOR SPRING HINGES SHALL ADJUST SO THAT FROM THE OPEN POSITION OF 70 DEGREES, THE DOOR SHALL MOVE TO THE CLOSED POSITION IN 1.5 SECONDS MINIMUM, MEASURED UNDER AMBIENT CONDITIONS.
4. FIRE DOORS SHALL HAVE THE MINIMUM OPENING FORCE ALLOWED BY THE APPROPRIATE ADMINISTRATIVE AUTHORITY. THE MAXIMUM FORCE FOR PUSHING OPEN OR PULLING OPEN DOORS OTHER THAN FIRE DOORS SHALL BE 5 POUNDS. THESE FORCES DO NOT APPLY TO THE FORCE REQUIRED TO RETRACT LATCH BOLTS OR DISENGAGE OTHER DEVICES THAT HOLD THE DOOR IN A CLOSED POSITION.
5. DOOR SURFACES WITHIN 10 INCHES OF THE FLOOR OR GROUND MEASURED VERTICALLY SHALL BE SMOOTH SURFACE ON THE PUSH SIDE EXTENDING THE FULL WIDTH OF THE DOOR. PARTS CREATING HORIZONTAL OR VERTICAL JOINTS IN SUCH SURFACE SHALL BE WITHIN 1/16 INCH OF THE SAME PLANE AS THE OTHER. CAVITIES CREATED BY ADDED KICK PLATES SHALL BE CAPPED.

16 ACCESSIBLE DOOR AND GATE HARDWARE

12" = 1'-0"

100% CONSTRUCTION DOCUMENTS

MOLECULAR BIOSCIENCE BUILDING

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

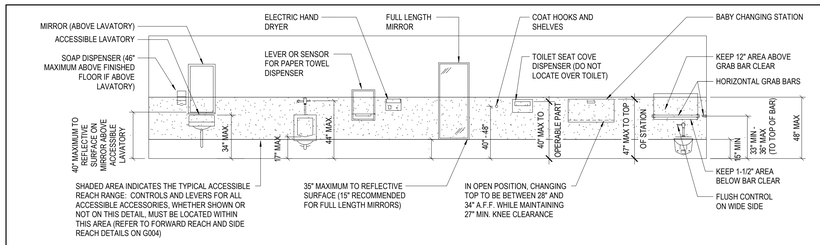
PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
ACCESSSIBILITY DETAILS

G112

DATE
JUN. 03, 2026

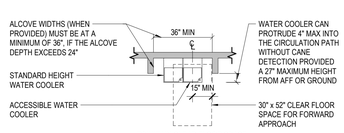
TOILET & BATHING ROOM ACCESSIBLE ACCESSORY MOUNTING HEIGHTS
NTS



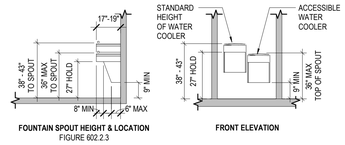
NOTES:

1. THE CLEAR FLOOR SPACE AT ACCESSORIES SHALL HAVE AT LEAST 30" (MINIMUM WIDTH) BY 52" (MINIMUM LENGTH).
2. UNLESS OTHERWISE SPECIFIED, THE CLEAR FLOOR SPACE MAY BE POSITIONED FOR EITHER FORWARD OR PARALLEL APPROACH TO AN ELEMENT.
3. OPERABLE PARTS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE OPERABLE PARTS SHALL BE NO MORE THAN 5 POUNDS (MAXIMUM).
4. TOILET AND BATH ROOM ACCESSORIES MUST BE LOCATED OR SELECTED SO THEY ARE NOT PROTRUDING OBJECTS INTO THE CIRCULATION PATH SPACE.

DRINKING FOUNTAIN DETAIL
NTS



FOUNTAIN CLEAR FLOOR SPACE
FIGURE 602.2.1 (A)



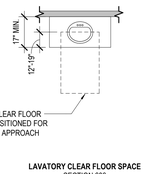
FOUNTAIN SPOUT HEIGHT & LOCATION
FIGURE 602.2.3

FRONT ELEVATION

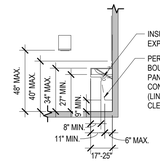
NOTES:

1. THE CLEAR FLOOR SPACE REQUIRED FOR FORWARD APPROACH SHALL BE CENTERED ON THE UNIT AND SHALL INCLUDE KNEE AND TOE CLEARANCES.
2. OPERABLE PARTS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING, OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE OPERABLE PARTS SHALL BE 5 POUNDS MAXIMUM.
3. THE SPOUT SHALL BE LOCATED 15" MAXIMUM FROM THE VERTICAL SUPPORT AND 5" MAXIMUM FROM THE FRONT OF THE UNIT, INCLUDING BUMPERS.
4. THE SPOUT SHALL PROVIDE A FLOW OF WATER AT LEAST 1" HIGH (MINIMUM). THE ANGLE OF THE WATER STREAM SHALL BE MEASURED HORIZONTALLY RELATIVE TO THE FRONT OF THE UNIT.
5. WHERE SPOUTS ARE LOCATED LESS THAN 3" FROM THE FRONT OF THE UNIT, THE ANGLE OF THE WATER SHALL BE 30 DEGREES (MAXIMUM).
6. WHERE THE SPOUTS ARE LOCATED BETWEEN 3" AND 5" MAXIMUM FROM THE FRONT OF THE UNIT, THE ANGLE OF THE WATER STREAM SHALL BE 15 DEGREES (MAXIMUM).
7. WHEN NOT LOCATED IN AN ALCOVE, THE BOTTOM OF THE WATER COOLER MUST BE HELD AT 27" AFF OR GROUND, OR CANE DETECTION MAY BE REQUIRED AT NO MORE THAN 27" ABOVE FINISHED FLOOR OR GROUND.

ACCESSIBLE SINK & COUNTERTOP
NTS



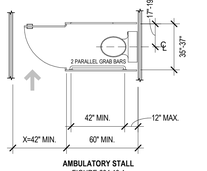
LAVATORY CLEAR FLOOR SPACE
SECTION 606



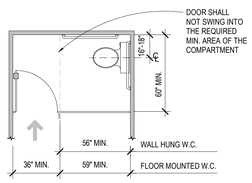
LAVATORY SECTION
SECTION 606

NOTES:

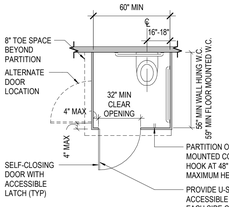
1. A CLEAR FLOOR SPACE, POSITIONED FOR FORWARD APPROACH AND KNEE AND TOE CLEARANCE SHALL BE PROVIDED.
2. THE FRONT OF SINKS SHALL BE 34" MAXIMUM ABOVE THE FLOOR, MEASURED TO THE FIXTURE RIM OR COUNTER SURFACE, WHICHEVER IS HIGHER.
3. HAND-OPERATED, SELF-CLOSING FAUCETS SHALL REMAIN OPEN FOR 10 SECONDS MINIMUM.
4. WATER SUPPLY AND DRAIN PIPES UNDER SINKS SHALL BE INSULATED OR OTHERWISE CONFIGURED TO PROTECT AGAINST CONTACT. THERE SHALL BE NO SHARP OR ABRASIVE SURFACES UNDER SINKS.
5. OPERABLE PARTS SHALL BE OPERABLE WITH ONE HAND AND SHALL NOT REQUIRE TIGHT GRASPING, PINCHING OR TWISTING OF THE WRIST. THE FORCE REQUIRED TO ACTIVATE OPERABLE PARTS SHALL BE 5 POUNDS MAXIMUM.



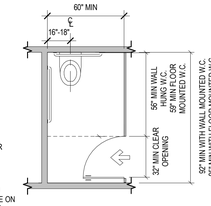
AMBULATORY STALL
FIGURE 604.10.1



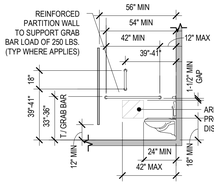
STANDARD STALL (END OF ROW)
FIGURE 604.9.3 (a)



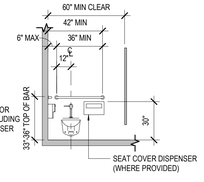
ADULT WHEELCHAIR WALL HUNG TOILET CLOSET
FIGURE 604.9.2 (A)



DOOR SWINGING INTO WHEELCHAIR TOILET CLOSET
FIGURE 604.9.3 (A)



SIDE-WALL GRAB BARS FOR WATER CLOSET
FIGURE 604.5.1 & 604.7 (A)



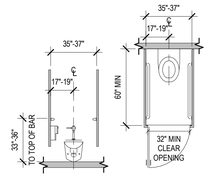
REAR-WALL GRAB BARS FOR WATER CLOSET
FIGURE 604.5.2

NOTES:

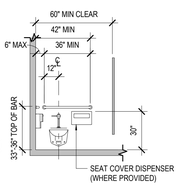
1. THE WATER CLOSET SHALL BE POSITIONED WITH A WALL OR PARTITION TO THE REAR, AND THE WATER CLOSET SHALL BE POSITIONED WITH A WALL OR PARTITION TO EITHER SIDE.
2. FOR WALL HUNG WATER CLOSETS, WHEELCHAIR ACCESSIBLE COMPARTMENTS SHALL BE AT LEAST 60" WIDE (MINIMUM) PERPENDICULAR TO THE SIDE WALL; AND SHALL BE AT LEAST 56" DEEP (MINIMUM).
3. FOR FLOOR MOUNTED WATER CLOSETS, MEASURED PERPENDICULAR TO THE REAR WALL, WHEELCHAIR ACCESSIBLE COMPARTMENTS SHALL BE AT LEAST 59" DEEP (MINIMUM) AND SHALL BE AT LEAST 60" WIDE (MINIMUM).
4. DOORS SHALL BE LOCATED IN THE FRONT PARTITION OR IN THE SIDE WALL. DOORS CAN ALSO BE LOCATED ON THE PARTITION FARTHEST FROM THE WATER CLOSET. WHEN LOCATED IN THE FRONT PARTITION, THE DOOR OPENING SHALL BE 4" MAXIMUM FROM THE SIDE WALL OR PARTITION FARTHEST FROM THE WATER CLOSET.
5. WHEN DOORS ARE LOCATED IN THE SIDE WALL OR PARTITION, THE DOOR OPENING SHALL BE 4" MINIMUM FROM THE FRONT PARTITION. THE DOOR SHALL BE SELF CLOSING. AN ACCESSIBLE DOOR PULL SHALL BE PLACED ON BOTH SIDES OF THE DOOR NEAR THE LATCH. COMPARTMENT DOORS SHALL NOT SWING INTO THE MINIMUM HEIGHT REQUIRED COMPARTMENT AREA.
6. IN WHEELCHAIR ACCESSIBLE COMPARTMENTS, THE FRONT PARTITION AND AT LEAST ONE SIDE PARTITION SHALL PROVIDE A 12" MINIMUM TOE CLEARANCE EXTENDING 8" DEEP BEYOND THE COMPARTMENT PARTITION, EXCLUSIVE OF PARTITION SUPPORT MEMBERS.
7. TOE CLEARANCE AT THE FRONT OF THE PARTITION IS NOT REQUIRED IN A COMPARTMENT GREATER THAN 64" DEEP WITH A WALL HUNG WATER CLOSET OR 67" DEEP WITH A FLOOR MOUNTED WATER CLOSET.
8. TOE CLEARANCE AT THE SIDE PARTITION IS NOT REQUIRED IN A COMPARTMENT GREATER THE 68" WIDE.
9. SIDE WALL GRAB BARS SHALL BE PROVIDED ON THE WALL CLOSEST TO THE WATER CLOSET, AND SHALL BE PROVIDED ON THE REAR WALL.
10. COAT HOOKS PROVIDED WITHIN A TOILET COMPARTMENT SHALL BE AT A 48" MAXIMUM ABOVE THE FINSIHED FLOOR. WHERE PROVIDED, A FOLD-DOWN SHELF SHALL BE BETWEEN 40" (MINIMUM) AND 48" (MAXIMUM) ABOVE THE FINISHED FLOOR OR GROUND.
11. DOOR MANEUVERING CLEARANCE SHALL BE PROVIDED AT COMPARTMENT DOORS. IF THE APPROACH IS TO THE LATCH SIDE OF THE DOOR, CLEARANCE BETWEEN THE DOOR SIDE OF THE COMPARTMENT AND ANY OBSTRUCTION SHALL BE AT LEAST 42" (MINIMUM).

ACCESSIBLE TOILET STALL & WATER CLOSET DETAIL
NTS

AMBULATORY ACCESSIBLE TOILET STALL & WATER CLOSET DETAIL
NTS



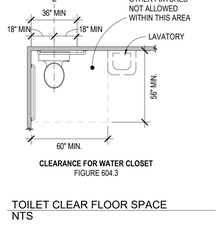
AMBULATORY TOILET COMPARTMENT
FIGURE 604.10.1



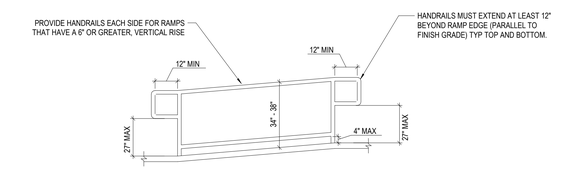
NOTES:

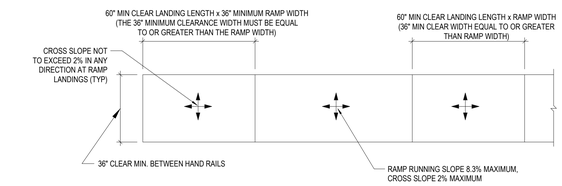
1. THE CENTERLINE OF THE WATER CLOSET SHALL BE 17" TO 19" FROM THE SIDE WALLS OR PARTITIONS IN THE AMBULATORY ACCESSIBLE TOILET STALLS.
2. AMBULATORY ACCESSIBLE COMPARTMENTS SHALL HAVE A DEPTH OF AT LEAST 60" (MINIMUM) AND A WIDTH OF 35" - 37".
3. THE DOOR SHALL BE SELF-CLOSING. AN ACCESSIBLE DOOR PULL SHALL BE PLACED ON BOTH SIDES OF THE DOOR NEAR THE LATCH. TOILET COMPARTMENT DOORS SHALL NOT SWING INTO THE MINIMUM REQUIRED COMPARTMENT AREA.
4. A 42" SIDE-WALL GRAB BAR SHALL BE PROVIDED ON BOTH SIDES OF THE COMPARTMENT.
5. COAT HOOKS, PROVIDED WITHIN TOILET COMPARTMENTS, SHALL BE HUNG AT A 48" MAXIMUM ABOVE THE FINISHED FLOOR , WHEN PROVIDED. A FOLD-DOWN SHELF SHALL BE 40" MINIMUM AND 48" MAXIMUM ABOVE THE FLOOR.
6. DOOR MANEUVERING CLEARANCES SHALL BE PROVIDED AT COMPARTMENT DOORS. IF THE APPROACH IS TO THE LATCH SIDE OF THE DOOR. CLEARANCE BETWEEN THE DOOR SIDE OF THE COMPARTMENT AND ANY OBSTRUCTION SHALL BE 42" MINIMUM.

TOILET CLEAR FLOOR SPACE
NTS

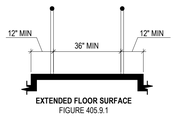


CLEARANCE FOR WATER CLOSET
FIGURE 604.3

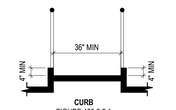




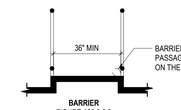
RAMP AND RAMP HANDRAIL DETAIL
NTS



EXTENDED FLOOR SURFACE
FIGURE 405.9.1



CURB
FIGURE 405.9.2.1



BARRIER
FIGURE 405.9.2.2

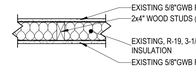
RAMP NOTES:

1. THE MAXIMUM RISE FOR ANY RAMP RUN IS 30 INCHES.
2. RAMPS SHALL HAVE A LANDING AT THE TOP AND BOTTOM OF EACH RUN.
3. RAMPS THAT RISE MORE THAN 30 INCHES MUST HAVE INTERMEDIATE LANDINGS AS REQUIRED TO MAINTAIN MAXIMUM 30" RISE FOR EACH RAMP.
4. RAMPS THAT CHANGE DIRECTION AT LANDINGS SHALL HAVE A 60" x 60" MINIMUM LANDING.
5. OUTDOOR RAMPS AND APPROACHES TO RAMPS SHALL NOT ACCUMULATE WATER ON WALKING SURFACES.
6. PROVIDE RAMP SURFACES THAT ARE FIRM, STABLE, AND SLIP-RESISTANT.

RAMP HANDRAIL NOTES:

1. HANDRAILS SHALL BE PROVIDED ON BOTH SIDES OF THE RAMP AND HANDRAILS SHALL BE CONTINUOUS ON ALL RUNS OF RAMPS. INSIDE HANDRAILS ON SWITCH BACKS OR DOG-LEG RAMPS SHALL BE CONTINUOUS BETWEEN RUNS.
2. TOP OF HANDRAILS MUST BE BETWEEN 34" (MINIMUM) TO 38" (MAXIMUM) ABOVE THE FINISHED GRADE AT A CONSISTENT HEIGHT THROUGHOUT.
3. HANDRAILS SHALL HAVE A CIRCULAR CROSS SECTION WITH AN OUTSIDE DIAMETER BETWEEN 1 1 \4" (MINIMUM) AND 2" (MAXIMUM).
4. CLEARANCE BETWEEN HANDRAIL GRIPPING SURFACES MUST BE 1 1\2" MINIMUM IF ADJACENT SURFACE (I.E. WALL) IS PRESENT. IF THIS IS THE CASE, THE ADJACENT SURFACE MUST BE FREE OF ANY SHARP OR ABRASIVE ELEMENTS.
5. RAMP HANDRAILS SHALL EXTEND HORIZONTALLY ABOVE THE LANDING FOR A MINIMUM OF 12" BEYOND THE TOP AND THE BOTTOM OF THE RAMPS' RUNS. EXTENSIONS SHALL RETURN TO A WALL, GUARD, OR THE LAND SURFACE OR SHALL BE CONTINUOUS TO THE HANDRAIL OF THE NEXT, ADJACENT RAMP RUN.
6. RAMPS WITH AN OVERALL RISE OF 6" OR LESS DO NOT REQUIRE HANDRAILS.

PARTITION TYPE SCHEDULE

CONSTRUCTION ASSEMBLY DETAIL	TYPE	SUBSTITUTIONS/ ADDITIONS/ OMISSIONS	NOTES
2X4 WOOD PARTITION UL #U305 1-HR. 	P1	• NONE	1. SUBSTITUTE 5/8" CEMENT BOARD TILE SUBSTRATE FOR 5/8" GYP. AT WALL TILE LOCATIONS. 2. SEE INTERIOR ELEVATIONS AND FINISH PLANS FOR LOCATIONS
	P1.1	• NONE	1. SUBSTITUTE 5/8" CEMENT BOARD TILE SUBSTRATE FOR 5/8" GYP. AT WALL TILE LOCATIONS. 2. SEE INTERIOR ELEVATIONS AND FINISH PLANS FOR LOCATIONS

INTERIOR MATERIAL SCHEDULE

SYMBOL	MATERIAL	MANUFACTURER	TYPE, COLOR	COMMENTS
BS-1	BACK SPLASH		3/4" X 4" PLAM BACKSPLASH, PROVIDE CLEAR SILICONE SEALANT @ JOINTS, MATCH (E) COLOR	
CAB-1	BASE CABINET		PLAM CABINETRY, MATCH (E)	
CAB-2	BASE CABINET DRAWERS		PLAM CABINETRY, MATCH (E)	
CAB-3	BASE CABINET FILLER		PLAM CABINETRY, MATCH (E)	
CAB-4	UPPER CABINET		PLAM CABINETRY, MATCH (E)	
CT-1	COUNTERTOP		PLAM COUNTERTOP W/ 3MM EDGE BAND, MATCH (E)	
CTB-1	COUNTERTOP BRACKET		STEEL BRACKET, PAINT BLACK	
FRP	FIBER REINFORCED PANEL		4X8 FRP, SMOOTH, PROVIDE MATCHING TRIM	
GWB-1	5/8" GYPSUM WALL BOARD		TEXTURE, PRIME & PAINT, COLOR: TBD	
GWB-2	5/8" TYPE 'X' GYPSUM WALL BOARD		TEXTURE, PRIME & PAINT, COLOR: TBD	
HM-1	HOLLOW METAL FRAME		(E) HOLLOW METAL FRAME, PAINTED	
PT-1	PAINT	SHERWIN WILLIAMS	EGGSHELL WALL PAINT	
PT-2	PAINT	SHERWIN WILLIAMS	SEMI-GLOSS TRIM PAINT	
TL-1	TILE SLATE		EXISTING TO REMAIN	EXISTING
TR-1	1X4 MDF TRIM		1X4 MDF TRIM, PAINTED TO MATCH WALL COLOR	

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MOLECULAR BIOSCIENCE BUILDING

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: **Author**
REVIEWED BY **Checker**

REV.	DESCRIPTION	DATE

Jonathan W. Fallon
2026
REGISTERED ARCHITECT

PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
ADA INFO. & FINISH SCHED.

G113

DATE
JUN. 03, 2026

SHADING LEGEND

NOT IN SCOPE OF WORK

GENERAL SITE PLAN NOTES

A. SHADED AREA IS NOT IN PROJECT SCOPE

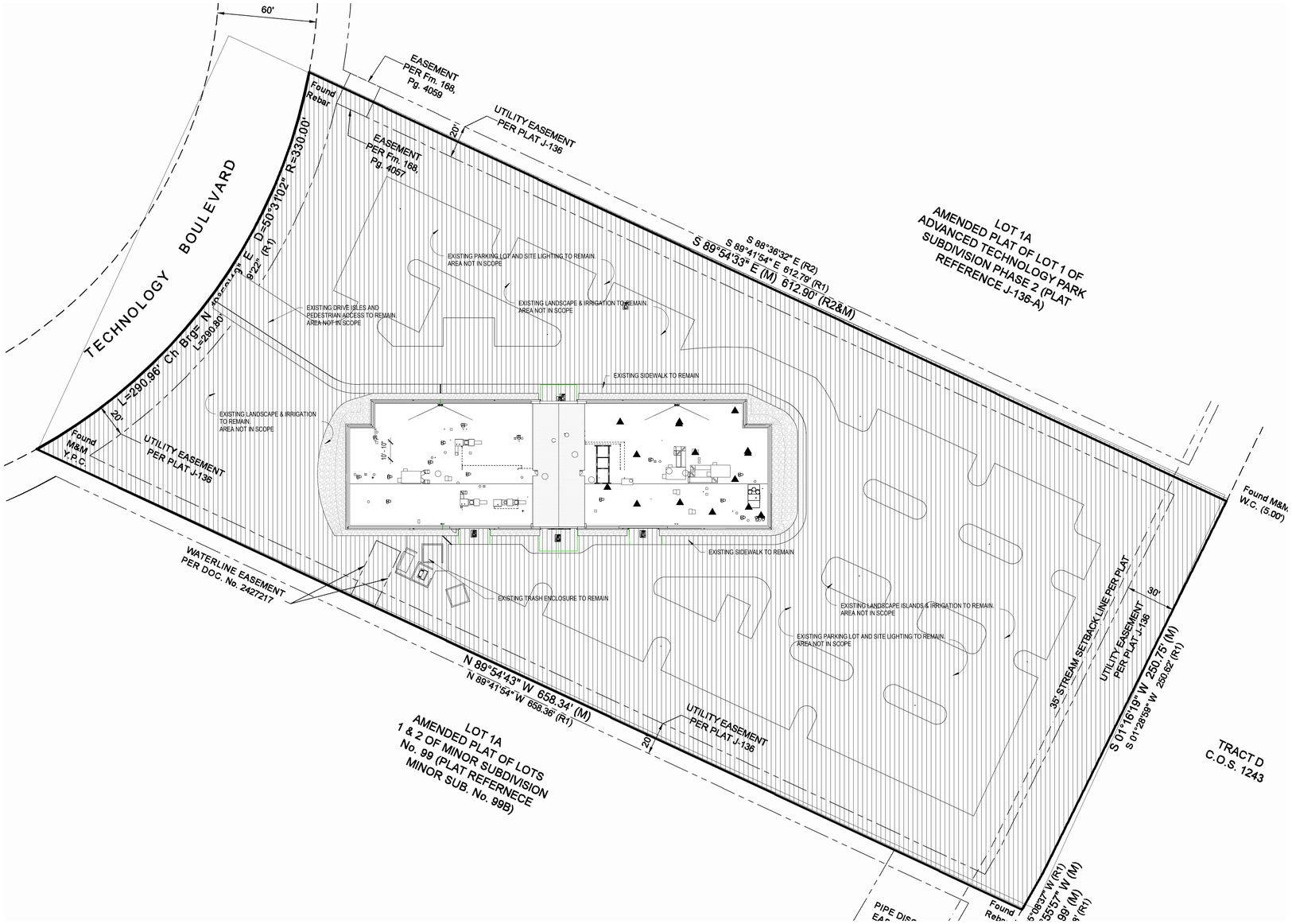
B. EXISTING PARKING LOT, SITE LIGHTING, LANDSCAPING & IRRIGATION TO REMAIN.

C. USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.

D. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING UTILITIES. ALL EXISTING UTILITIES ARE TO REMAIN. REFER TO CIVIL SURVEY.

E. ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.

F. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.



1 PROPOSED ARCHITECTURAL SITE PLAN
SCALE: 1" = 30'-0"

0' 1' 5' 10' 20' 40'

KEY PLAN

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MOLECULAR BIOSCIENCE BUILDING

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

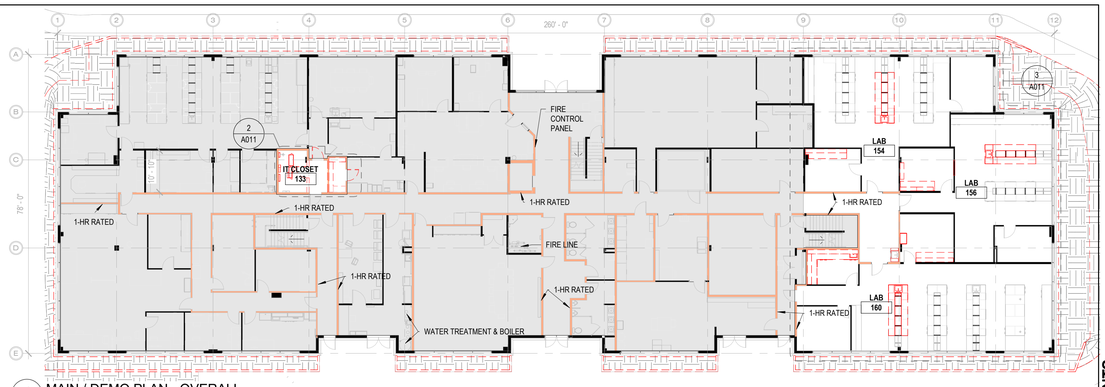
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2326

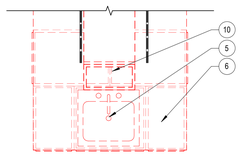
SHEET TITLE
SITE PLAN (MOD)

A001

DATE
JUN. 03, 2026



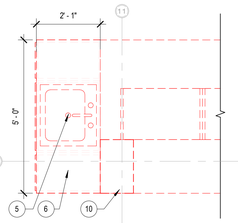
1 MAIN / DEMO PLAN - OVERALL
SCALE: 1/16" = 1'-0"



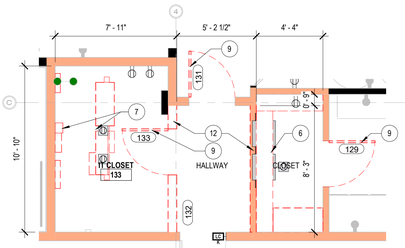
4 TYP. LABORATORY SINK DEMO PLAN
SCALE: 1/2" = 1'-0"

3 MAIN / DEMO ENLARGED PLAN
SCALE: 1/4" = 1'-0"

0' 1' 5' 10' 15'



5 LABORATORY SINK DEMO PLAN
SCALE: 1/2" = 1'-0"



2 MAIN FLOOR IT CLOSET DEMO PLAN
SCALE: 1/4" = 1'-0"

DEMOLITION LEGEND

- (E) WALL/ITEM TO BE DEMOLISHED
- (E) WALL/ITEM TO REMAIN
- NOT IN SCOPE OF WORK - EXISTING TO REMAIN

DEMOLITION GENERAL NOTES

- A DRAWINGS COMMUNICATE DESIGN INTENT ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXISTING CONDITIONS AND CONTRACTOR SHALL CONTACT ARCHITECT WITH ANY DISCREPANCIES PRIOR TO COMMENCING WORK
- B CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL PERMITS PRIOR TO COMMENCEMENT OF ANY AND ALL DEMOLITION WORK.
- C CONTRACTOR SHALL BE RESPONSIBLE FOR SIZING AND PLACEMENT OF TEMPORARY SHORING FOR ALL EXISTING STRUCTURAL COMPONENTS.
- D CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITY LOCATIONS PRIOR TO COMMENCEMENT OF ANY, AND ALL, DEMOLITION WORK.
- E CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE OCCURRING DURING DEMOLITION AND CONSTRUCTION ACTIVITIES. ALSO, CONTRACTOR SHALL PREP AND MATCH DEMOLISHED SURFACES, AND THEN INSTALL NEW, MATCHING FINISHES AS REQUIRED.
- F CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF ALL WASTE LEGALLY AND CONTRACTOR SHALL HAVE IT DOCUMENTED. THE OWNER RESERVES THE RIGHT TO RETAIN ANY REMOVED ITEM(S). ITEMS REQUESTED TO BE RETAINED BY THE OWNER WILL BE IDENTIFIED DURING THE PRE-CONSTRUCTION MEETING, AS WELL AS IDENTIFYING A LOCATION ON SITE FOR STORAGE OF REQUESTED ITEM(S).
- G CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE ARCHITECT OF ANY EXISTING MATERIALS TO REMAIN THAT HAS BEEN UNCOVERED AND SHOWS SIGNS OF WEATHER DAMAGE, MOLD, AND/OR DETERIORATION.
- H ALL EXISTING CEILING TILES & GRIDS SHALL BE REMOVED. REINSTALL CEILING TILES THAT ARE IN GOOD CONDITION.
- I ALL EXISTING FINISH FLOORING SHALL BE REPAIRED AS NECESSARY FOR REMODEL.
- J REFER TO THE MECHANICAL DRAWINGS FOR HVAC DEMOLITION
- K REFER TO THE ELECTRICAL DRAWINGS FOR LIGHTING FIXTURES & ELECTRICAL OUTLETS / SWITCHES TO BE REMOVED.

DEMO PLAN KEYED NOTES

NO.	NOTE DESCRIPTION
1	ROOM LAYOUT TO SAY AS IS
2	REMOVE ELECTRICAL EQUIPEMENT
3	1 HR FIRE RATED ASSEMBLY
4	DEMO WALL FOR ROUGH OPENING OF WINDOW, SEE REMODEL PLANS
5	DEMO SINK
6	DEMO COUNTERTOP/CASEWORK/SHELVING
7	IT/DATA CONNECTION TO BE COORDINATED WITH OWNER, SEE ELEC
8	REMOVE SHELVING & RETAIN FOR REINSTALLATION
9	EXISTING DOOR TO BE REMOVED
10	DEMO WALLS OF EXISTING CHASE TO EXPOSE MEP
11	REMOVE SINK AND RETAIN FOR REINSTALLATION PER REMODEL PLANS
12	DEMO WALL

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

MOLECULAR BIOSCIENCE BUILDING

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

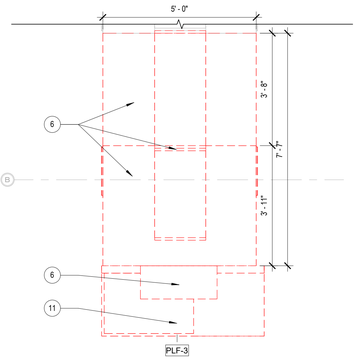
Nicholas W. Fulton
REG. NO. 23078
BOZEMAN, MT
12/31/2026

PPA#22-0045
A/E#00-00-00
BA# 2326

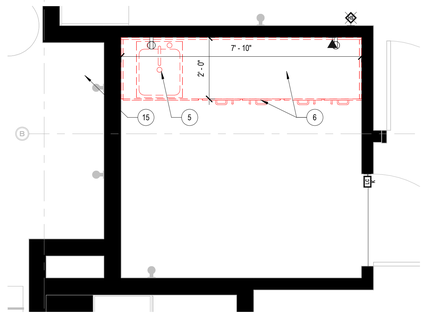
SHEET TITLE
MAIN / DEMO PLANS

A011

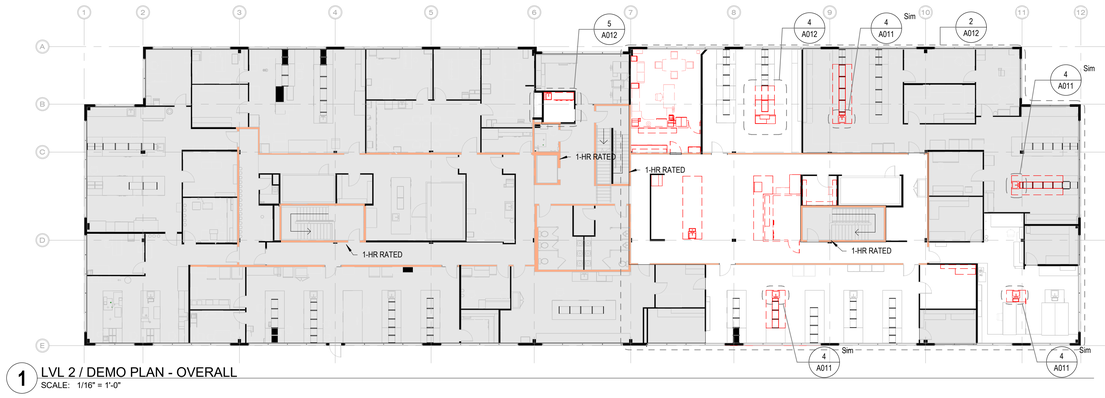
DATE
JUN. 03, 2026



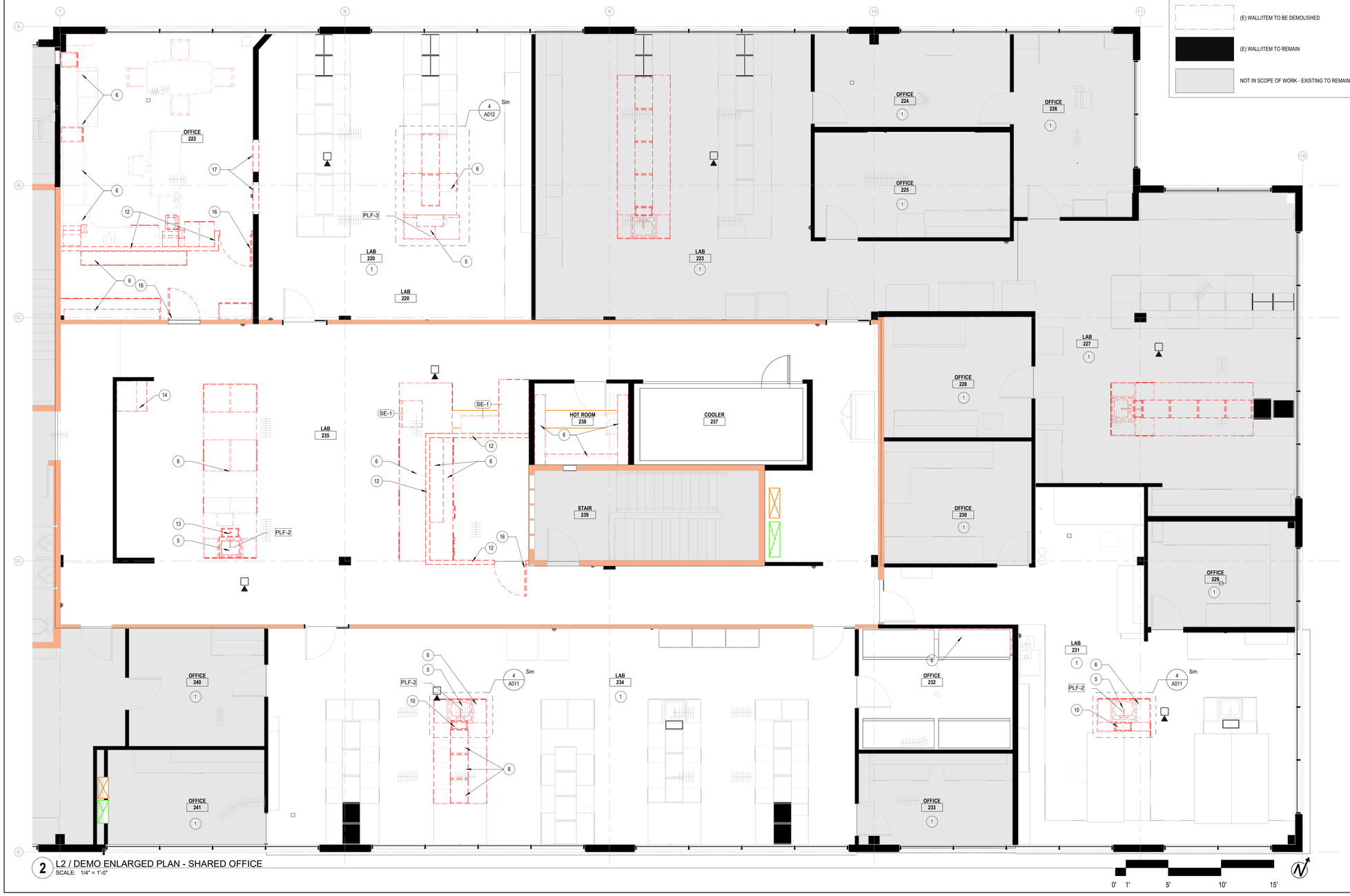
4 LAB - SHOWER & EYEWASH STATION1
SCALE: 1/2" = 1'-0"



5 L2 - DATA CLOSET REMODEL1
SCALE: 1/2" = 1'-0"



1 LVL 2 / DEMO PLAN - OVERALL
SCALE: 1/16" = 1'-0"



2 L2 / DEMO ENLARGED PLAN - SHARED OFFICE
SCALE: 1/4" = 1'-0"

DEMOLITION LEGEND

- (E) WALL/ITEM TO BE DEMOLISHED
- (E) WALL/ITEM TO REMAIN
- NOT IN SCOPE OF WORK - EXISTING TO REMAIN

DEMOLITION GENERAL NOTES

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- C CONTRACTOR SHALL BE RESPONSIBLE FOR SIZING AND PLACEMENT OF TEMPORARY SHORING FOR ALL EXISTING STRUCTURAL COMPONENTS.
- D CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITY LOCATIONS PRIOR TO COMMENCEMENT OF ANY, AND ALL, DEMOLITION WORK.
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- G CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE ARCHITECT OF ANY EXISTING MATERIALS TO REMAIN THAT HAS BEEN UNCOVERED AND SHOWS SIGNS OF WEATHER DAMAGE, MOLD, AND/OR DETERIORATION.
- H ALL EXISTING CEILING TILES & GRIDS SHALL BE REMOVED. REINSTALL CEILING TILES THAT ARE IN GOOD CONDITION.
- I ALL EXISTING FINISH FLOORING SHALL BE REPAIRED AS NECESSARY FOR REMODEL.
- J REFER TO THE MECHANICAL DRAWINGS FOR HVAC DEMOLITION
- K REFER TO THE ELECTRICAL DRAWINGS FOR LIGHTING FIXTURES & ELECTRICAL OUTLETS / SWITCHES TO BE REMOVED.

DEMO PLAN KEYED NOTES

NO.	NOTE DESCRIPTION
1	ROOM LAYOUT TO SAY AS IS
5	DEMO SINK
6	DEMO COUNTERTOP/CASEWORK/SHELVING
8	REMOVE SHELVING & RETAIN FOR REINSTALLATION
10	DEMO WALLS OF EXISTING CHASE TO EXPOSE MEP
11	REMOVE SINK AND RETAIN FOR REINSTALLATION PER REMODEL PLANS
12	DEMO WALL
13	DEMO WALLS OF EXISTING CHASE & MEP. REROUTE PER MECHANICAL
14	REMOVE ICE MACHINE, RELOCATE PER REMODEL DRAWINGS
15	PREP FLOOR FOR NEW PIPE PENATRATIONS
16	EXISTING DOOR TO BE REMOVED & RELOCATED
17	DEMO SECTION OF WALL FOR NEW DOORS

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE BUILDING

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

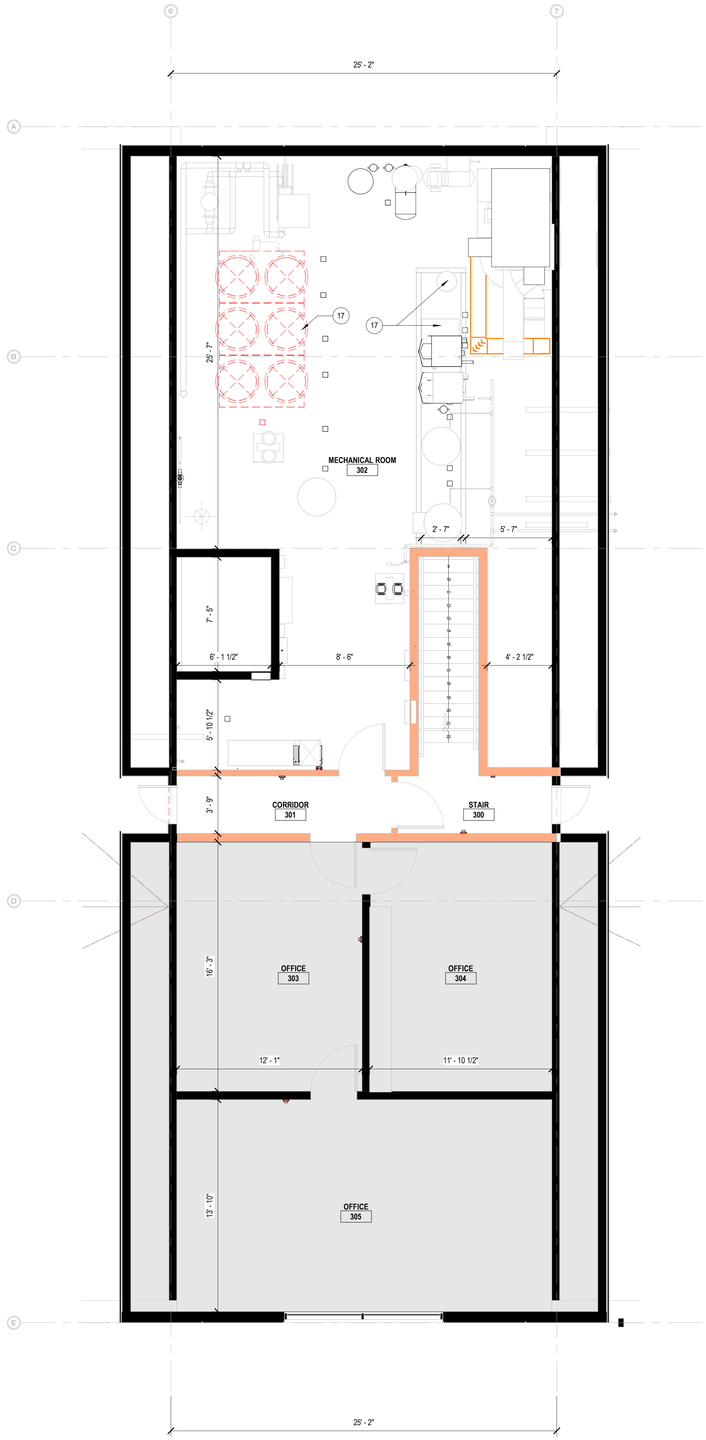
Nicholas W. Fulton
Date
BOZEMAN MT

PPA#22-0045
A/E#00-00-00
BA# 2326

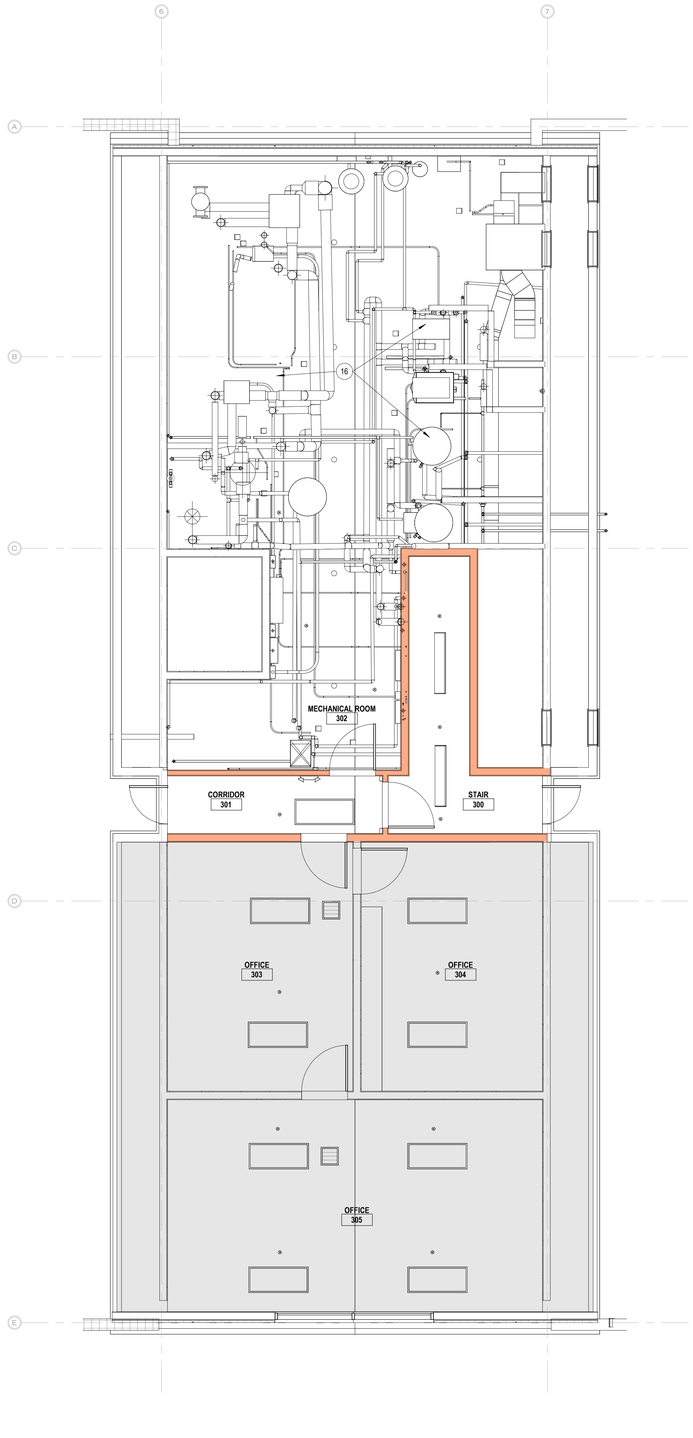
SHEET TITLE
LVL 2 / DEMO PLANS

A012

DATE
JUN. 03, 2026



1 LVL 3 / DEMO PLAN - OVERALL
SCALE: 1/4" = 1'-0"



2 LEVEL 3 - DEMO RCP
SCALE: 1/4" = 1'-0"

0' 1' 5' 10' 15'

DEMOLITION LEGEND

(E) WALL/ITEM TO BE DEMOLISHED

(E) WALL/ITEM TO REMAIN

NOT IN SCOPE OF WORK - EXISTING TO REMAIN

DEMOLITION GENERAL NOTES

A. DRAWINGS COMMUNICATE DESIGN INTENT ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXISTING CONDITIONS AND CONTRACTOR SHALL CONTACT ARCHITECT WITH ANY DISCREPANCIES PRIOR TO COMMENCING WORK

B. CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL PERMITS PRIOR TO COMMENCEMENT OF ANY AND ALL DEMOLITION WORK.

C. CONTRACTOR SHALL BE RESPONSIBLE FOR SIZING AND PLACEMENT OF TEMPORARY SHORING FOR ALL EXISTING STRUCTURAL COMPONENTS.

D. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL EXISTING UTILITY LOCATIONS PRIOR TO COMMENCEMENT OF ANY, AND ALL, DEMOLITION WORK.

E. CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE OCCURRING DURING DEMOLITION AND CONSTRUCTION ACTIVITIES. ALSO, CONTRACTOR SHALL PREP AND MATCH DEMOLISHED SURFACES, AND THEN INSTALL NEW, MATCHING FINISHES AS REQUIRED.

F. CONTRACTOR SHALL BE RESPONSIBLE FOR THE DISPOSAL OF ALL WASTE LEGALLY AND CONTRACTOR SHALL HAVE IT DOCUMENTED. THE OWNER RESERVES THE RIGHT TO RETAIN ANY REMOVED ITEM(S). ITEMS REQUESTED TO BE RETAINED BY THE OWNER WILL BE IDENTIFIED DURING THE PRE-CONSTRUCTION MEETING, AS WELL AS IDENTIFYING A LOCATION ON SITE FOR STORAGE OF REQUESTED ITEM(S).

G. CONTRACTOR SHALL BE RESPONSIBLE FOR NOTIFYING THE ARCHITECT OF ANY EXISTING MATERIALS TO REMAIN THAT HAS BEEN UNCOVERED AND SHOWS SIGNS OF WEATHER DAMAGE, MOLD, AND/OR DETERIORATION.

H. ALL EXISTING CEILING TILES & GRIDS SHALL BE REMOVED. REINSTALL CEILING TILES THAT ARE IN GOOD CONDITION.

I. ALL EXISTING FINISH FLOORING SHALL BE REPAIRED AS NECESSARY FOR REMODEL.

J. REFER TO THE MECHANICAL DRAWINGS FOR HVAC DEMOLITION

K. REFER TO THE ELECTRICAL DRAWINGS FOR LIGHTING FIXTURES & ELECTRICAL OUTLETS / SWITCHES TO BE REMOVED.

GENERAL RCP NOTES

A. SEE G116 FOR PARTITIONS & ASSEMBLIES

B. DIMENSIONS ARE TO F.O. OF STRUCTURE

C. USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.

D. FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.

E. ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.

F. CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.

G. ALL CEILING TILES AND GRIDS TO BE RE-INSTALLED TO ORIGINAL LOCATIONS / LAYOUTS

REFLECTED CEILING LEGEND

CEILING MATERIAL

CEILING HEIGHT

ADDITIONAL NOTES

LIGHTING - SEE ELECTRICAL

HVAC REGISTERS - SEE MECHANICAL

CEILING MATERIALS

ACT

CEILING HEIGHT

VAR - VARIES

DEMO PLAN KEYED NOTES

NO.	NOTE DESCRIPTION
17	SEE MECH. DRAWINGS FOR EXTENTS OF DEMO

DEMO RCP KEYED NOTES

NO.	NOTE DESCRIPTION
16	SEE MECH. DRAWINGS FOR EXTENTS OF DEMO

RCP MATERIALS LEGEND

ACT-1

GYP

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE BUILDING

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

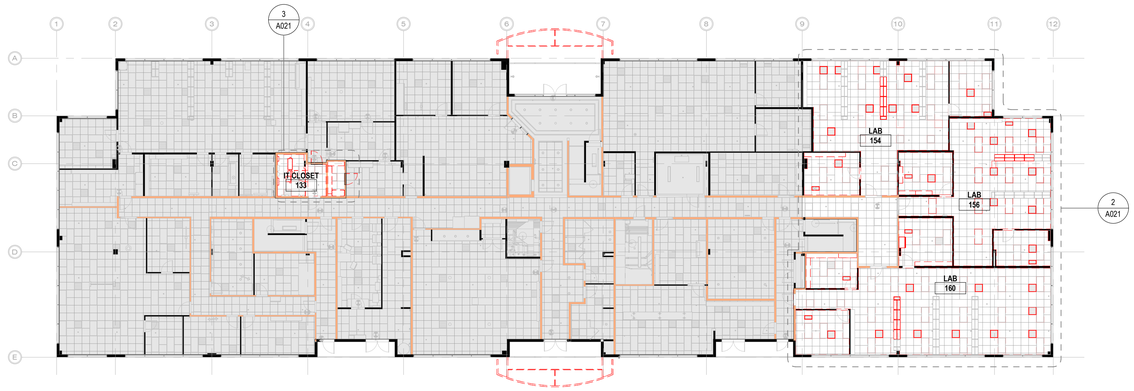
Jonathan W. Fulton
2026
REGISTERED ARCHITECT

PPA#22-0045
A/E#00-00-00
BA# 2326

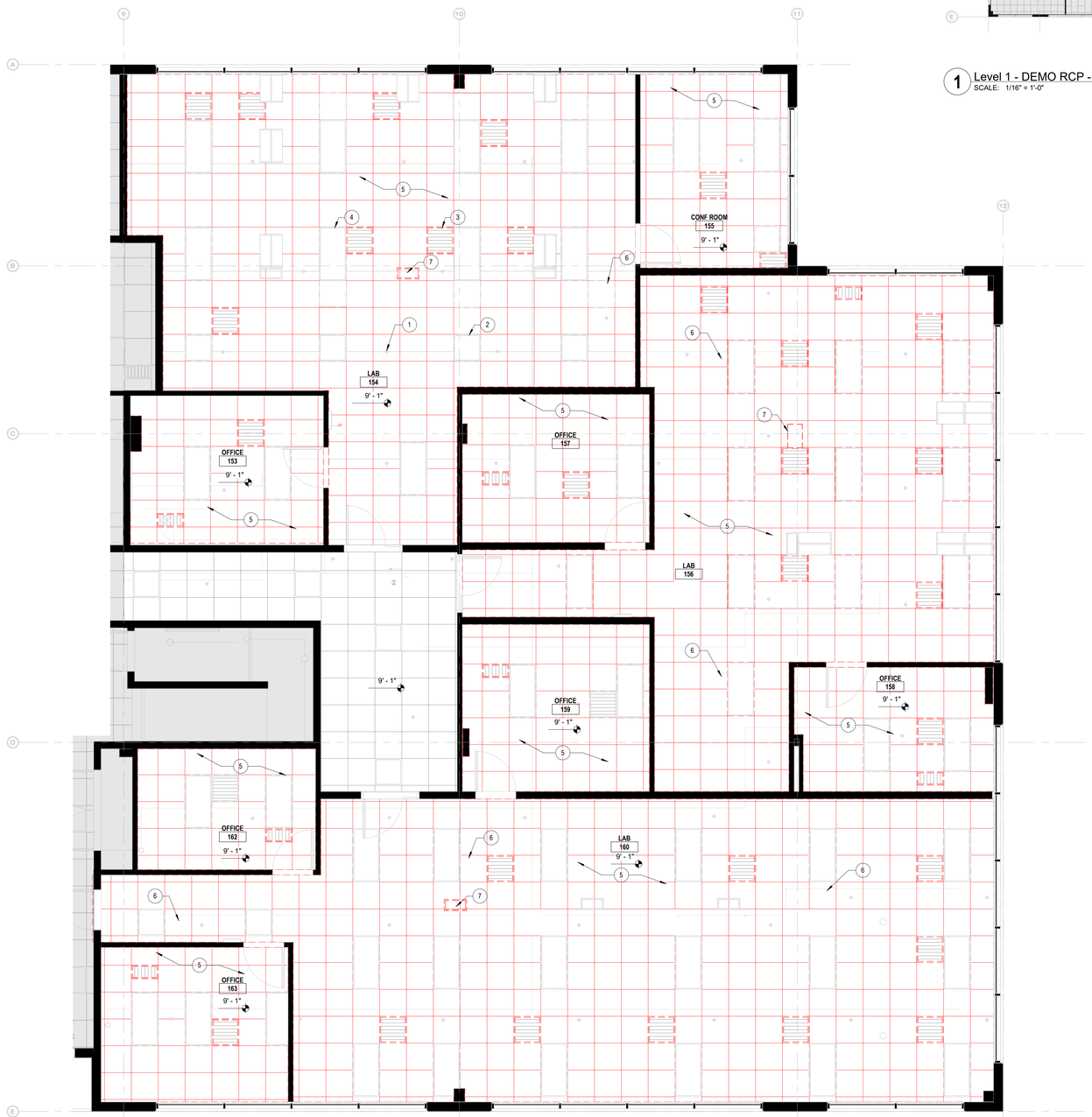
SHEET TITLE
LVL 3 / DEMO PLAN & RCP

A013

DATE
JUN. 03, 2026

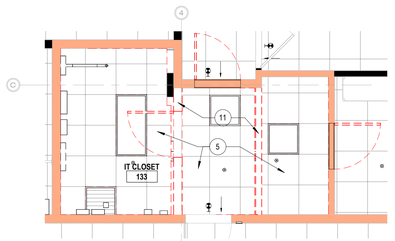


1 Level 1 - DEMO RCP - OVERALL
SCALE: 1/16" = 1'-0"



2 Level 1 - DEMO RCP
SCALE: 1/4" = 1'-0"

0' 1' 5' 10' 15'



3 Level 1 - DEMO RCP - OVERALL - IT CLOSET
SCALE: 1/4" = 1'-0"

DEMOLITION LEGEND

- (E) WALL/ITEM TO BE DEMOLISHED
- (E) WALL/ITEM TO REMAIN
- NOT IN SCOPE OF WORK - EXISTING TO REMAIN

REFLECTED CEILING LEGEND

CEILING MATERIAL
CEILING HEIGHT
ADDITIONAL NOTES

LIGHTING - SEE ELECTRICAL

HVAC REGISTERS - SEE MECHANICAL

CEILING MATERIALS
ACT

CEILING HEIGHT
VAR - VARIES

DEMO RCP KEYED NOTES

NO.	NOTE DESCRIPTION
1	SPRINKLER HEAD
2	2X2 RECESSED LIGHTING FIXTURE (TYP), REINSTALL PER ELECTRICAL
3	HVAC REGISTER (TYP), DEMO PER M001
4	2X4 RECESSED LIGHTING FIXTURE (TYP), REINSTALL PER ELECTRICAL
5	REMOVE ACT CEILING, PREP FOR REINSTALLMENT. REPLACE DAMAGED PANELS AS NECESSARY
6	DEMO FAN COIL UNIT, DUCT WORK, GRILLES, AND ASSOCIATED EQUIPMENT PER M001
7	DEMO WALLS OF EXISTING CHASE TO EXPOSE MEP
11	DEMO WALL

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MOLECULAR BIOSCIENCE BUILDING

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4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author		
REVIEWED BY: Checker		
REV.	DESCRIPTION	DATE

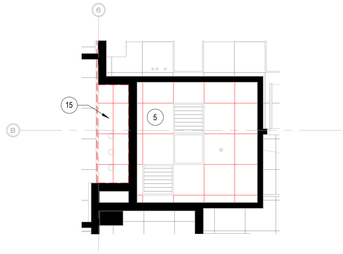
Nicholas W. Fulton
LICENSED
ARCHITECT
BOZEMAN, MT

PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
MAIN / DEMO RCP

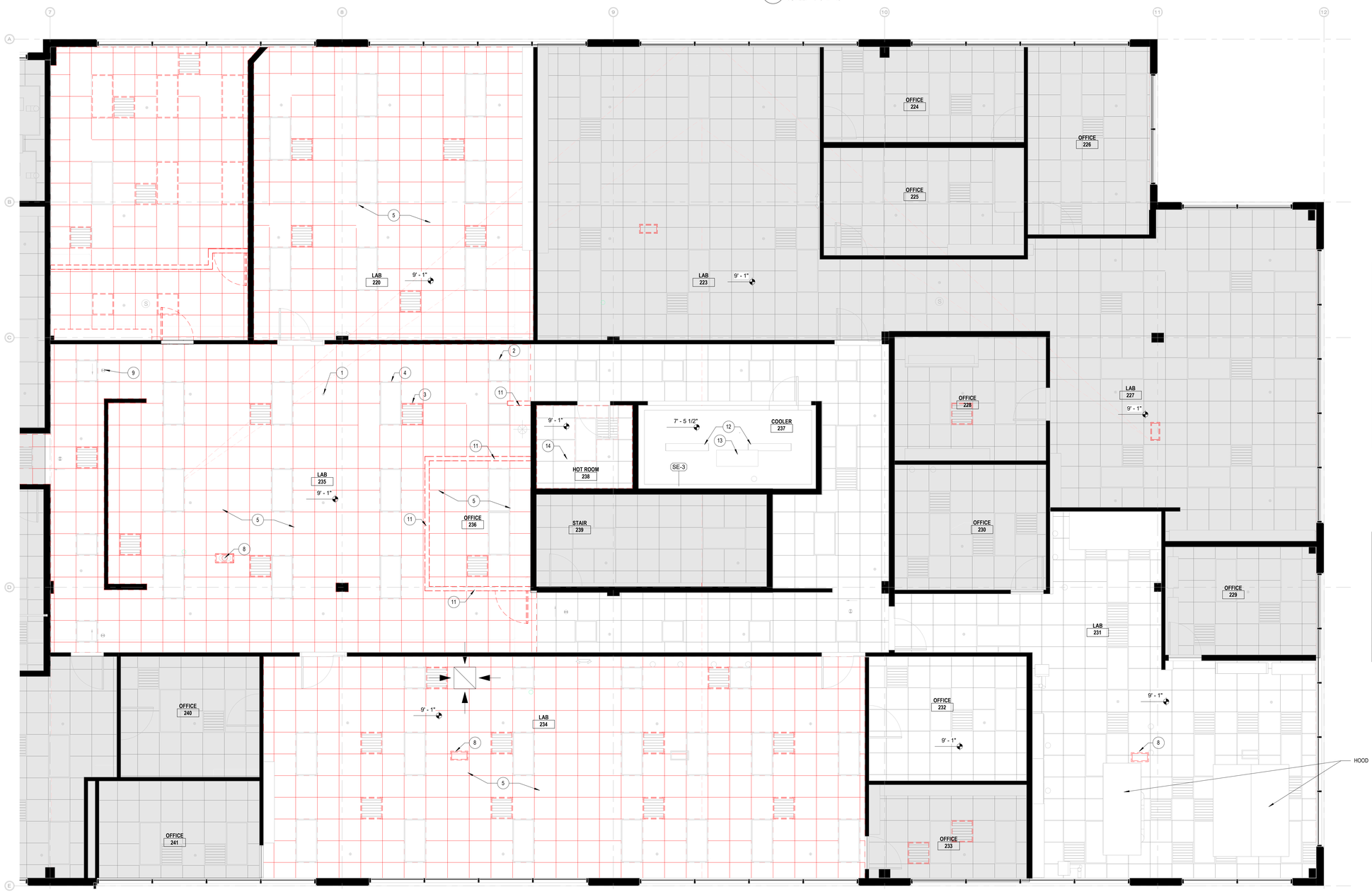
A021

DATE
JUN. 03, 2026



4 L2 - DATA CLOSET RCP DEMO
SCALE: 1/4" = 1'-0"

1 Level 2 - DEMO RCP - OVERALL
SCALE: 1/16" = 1'-0"



2 Level 2 - DEMO RCP
SCALE: 1/4" = 1'-0"

DEMOLITION LEGEND

- (E) WALL/ITEM TO BE DEMOLISHED
- (E) WALL/ITEM TO REMAIN
- NOT IN SCOPE OF WORK - EXISTING TO REMAIN

REFLECTED CEILING LEGEND

CEILING MATERIAL
CEILING HEIGHT
ADDITIONAL NOTES

LIGHTING - SEE ELECTRICAL
HVAC REGISTERS - SEE MECHANICAL

CEILING MATERIALS

ACT

CEILING HEIGHT

VAR - VARIES

DEMO RCP KEYED NOTES

NO.	NOTE DESCRIPTION
1	SPRINKLER HEAD
2	2X2 RECESSED LIGHTING FIXTURE (TYP), REINSTALL PER ELECTRICAL
3	HVAC REGISTER (TYP), DEMO PER M001
4	2X4 RECESSED LIGHTING FIXTURE (TYP), REINSTALL PER ELECTRICAL
5	REMOVE ACT CEILING, PREP FOR REINSTALLMENT. REPLACE DAMAGED PANELS AS NECESSARY
8	DEMO WALLS OF EXISTING CHASE & MEP, REROUTE PER MECHANICAL
9	EXIT SIGN
11	DEMO WALL
12	COOLER LIGHTING FIXTURE
13	COOLER AIR CONDITIONING UNIT
14	DEMO CEILING FOR REPLACEMENT ASSEMBLY
15	REMOVE ACT & DISCARD

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BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE BUILDING

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

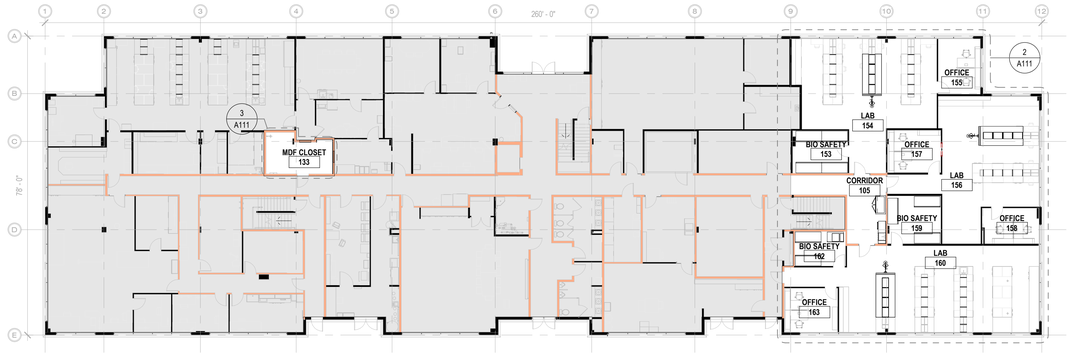
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2326

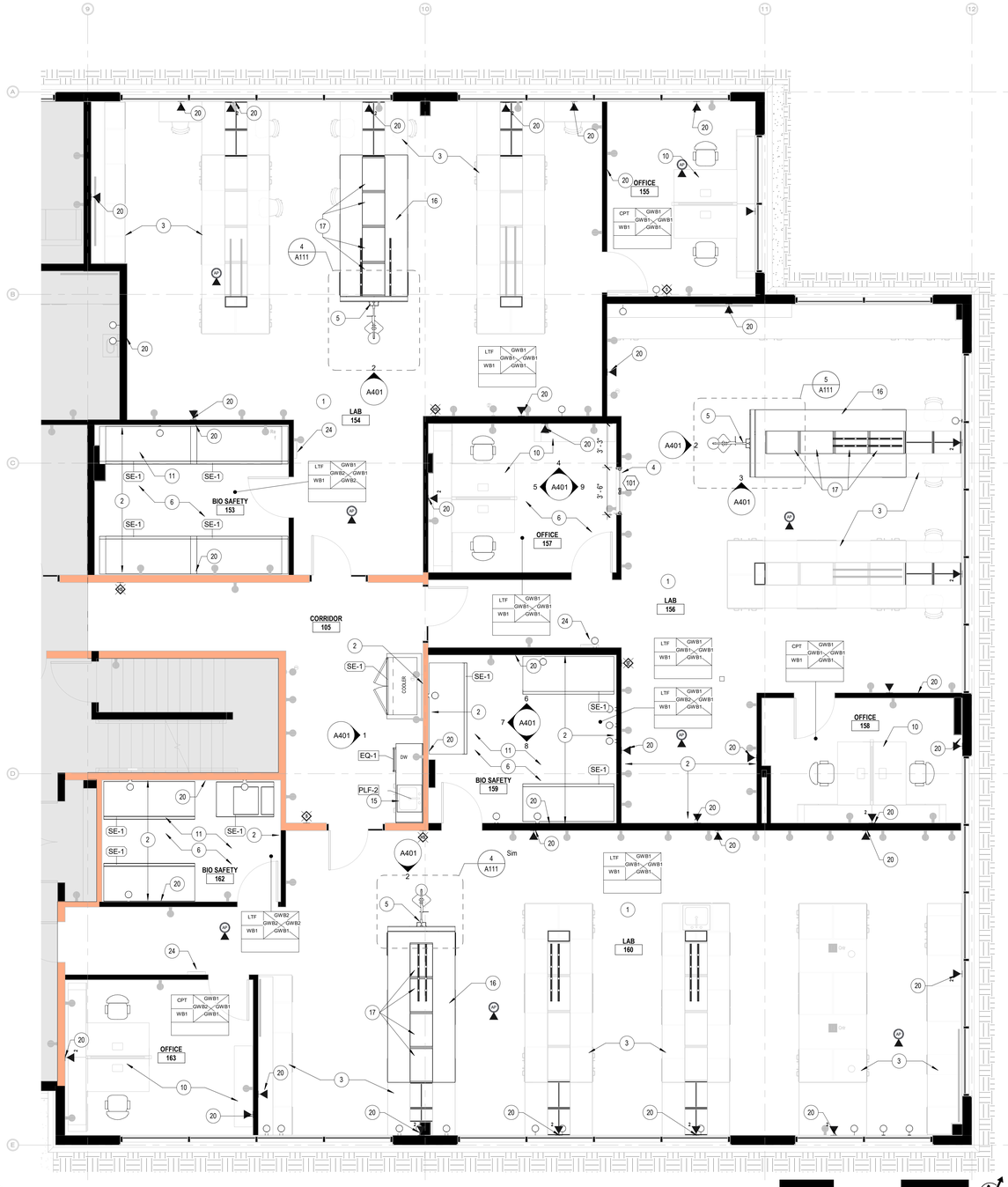
SHEET TITLE
LVL 2 / DEMO RCP

A022

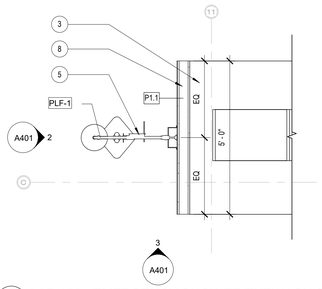
DATE
JUN. 03, 2026



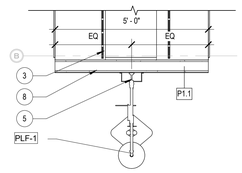
1 MAIN / REMODEL PLAN - OVERALL
SCALE: 1/16" = 1'-0"



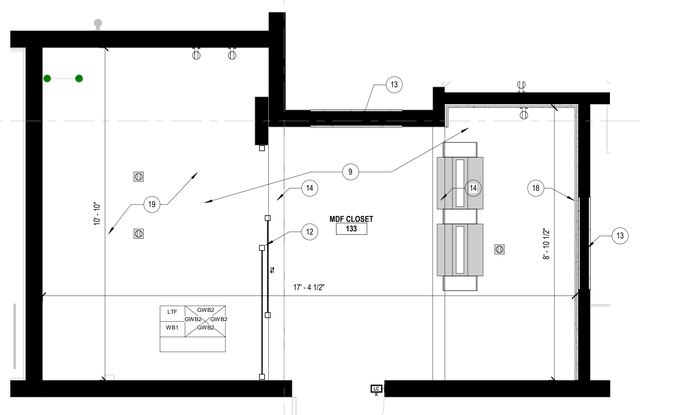
2 MAIN / REMODEL ENLARGED PLAN
SCALE: 1/4" = 1'-0"



5 LAB 156 - EMERGENCY SHOWER/EYEWASH STATION
SCALE: 1/2" = 1'-0"



4 TYPICAL EMERGENCY EYEWASH/SHOWER STATION
SCALE: 1/2" = 1'-0"



3 REMODEL PLAN - LEVEL 1 - MDF CLOSET
SCALE: 1/2" = 1'-0"

SHADING LEGEND

- NOT IN SCOPE OF WORK - EXISTING TO REMAIN
- 1 HR FIRE RATED ASSEMBLY

GENERAL FLOOR PLAN NOTES

- A SEE G113 FOR PARTITIONS & ASSEMBLIES.
- B DIMENSIONS ARE TO F.O. STUD, F.O. CONCRETE, OR CENTERLINE OF COLUMN.
- C USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- D FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.
- E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.
- F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.

PARTITION NOTES

- A GWB FINISH & TEXTURE:
  - TYPICAL GWB FINISH SHALL BE LEVEL 4 WITH LIGHT HAND TROWEL TEXTURE.
- B SOUND ATTENUATION AT SOUND WALLS:
  - LEAVE 1/4" GAP AT ALL EDGES OF GWB ABUTTING PERPENDICULAR SURFACES AND FILL GAP WITH ACOUSTICAL SEALANT
  - APPLY 1/4" BEAD ACOUSTICAL SEALANT AROUND ALL ELECTRICAL BOXES, DUCTWORK, PIPES & OTHER WALL PENETRATIONS (THIS INCLUDES ALL PENETRATIONS OF SOUND WALLS IN CONCEALED CEILING SPACES)
- C MOLD RESISTANCE:
  - INSTALL 5/8" MOLD RESISTANT GWB AT ALL WALLS & CEILINGS OF BATHROOMS WITH SHOWERS.
  - INSTALL 6 MIL. VAPOR RETARDER IMMEDIATELY BEHIND GYP @ WET SIDE OF ROOM
- D COORDINATION:
  - CONTRACTOR RESPONSIBLE FOR COORDINATING INSTALLATION OF SOUND ISOLATION CLIPS AND SHEAR WALL PLYWOOD WITH ALL OTHER TRADES.
- E CONTINUITY:
  - EXTEND PARTITIONS TO UNDERSIDE OF FLOOR OR ROOF STRUCTURE ABOVE UNLESS NOTED OTHERWISE
  - AT WALL, GWB AND SOUND INSULATION SHALL EXTEND TO THE UNDERSIDE OF THE SUBFLOOR OR TO THE ROOF'S SHEATHING ABOVE, TYPICAL.
  - FOR WALLS PERPENDICULAR TO THE STRUCTURE, BLOCKING SHALL BE INSTALLED OVER PARTITIONS, AND THE ENTIRE PERIMETER OF BLOCKING SHALL BE CAULKED WITH ACOUSTICAL SEALANT. SOUND INSULATION SHALL EXTEND UP INTO JOIST BAYS TYPICAL AT ALL SOUND WALLS.
  - AT GROUND FLOOR TENANT LEASE SPACES, INSTALL GWB AT EXTERIOR PERIMETER WALLS AND DEMISING WALLS BETWEEN UNITS 6" BELOW BOTTOM OF SUSPENSION GRID ONLY.
- F SILL PLATES @ CONCRETE:
  - EXTERIOR AND INTERIOR WALLS FRAMED OVER CONCRETE SLAB SHALL HAVE A SINGLE P.T. SILL PLATE, TYPICAL.

INSULATION REQUIREMENTS

CONTRACTOR SHALL BE RESPONSIBLE FOR INSULATING THE RESIDENCE IN ACCORDANCE WITH THE 2021 INTERNATIONAL ENERGY CONSERVATION CODE (IECC) INCLUDING ALL MONTANA AMENDMENTS.

APPLICABLE PRESCRIPTIVE PATH MINIMUM REQUIREMENTS:

ROOFS	
INSUL ENTIRELY ABOVE ROOF DECK:	R-30 CI
METAL BUILDINGS:	R-25 + R-11 LS
ATTIC AND OTHER:	R-49
WALLS ABOVE GRADE	
MASS:	R-13.3 CI
METAL BUILDING:	R-13 + R-14 CI
METAL FRAMED:	R-13 + R-12.5 CI
WOOD FRAMED AND OTHER:	R-13 + R7.5 CI **OR** R-20 + R-3.8 CI
WALLS BELOW GRADE:	R-10 CI
FLOORS	
MASS:	R-16.7 CI
JOIST/FRAMING:	R-38
SLAB-ON-GRADE FLOORS	
UNHEATED SLABS:	R-20 FOR 24" BELOW
HEATED SLABS:	R-15 FOR 36" BELOW +R-5 FULL SLAB

NOTE: A RESCHECK ANALYSIS MAY ALLOW LOWER R-VALUES (R-10 MIN.)

REMODEL FP KEYED NOTES

NO.	NOTE DESCRIPTION
1	ROOM LAYOUT TO STAY AS IS
2	PROVIDE POWER FOR SPECIALTY EQUIPMENT
3	COUNTERTOP AND CASEWORK TO REMAIN. REPAIR DAMAGES AS NEEDED
4	FIXED 42"X 48" WINDOW. SILL HIGHT 3'-0"
5	EMERGENCY EYE WASH/SHOWER STATION. EMERGENCY FIXTURES ARE TO BE PROVIDED WITH TEMPERED WATER SYSTEMS WITH ADEQUATE CAPACITY TO PROVIDE REQUIRED TEMPERATURE OF WATER FOR REQUIRED LENGTH OF TIME PER ANSI GUIDELINES. SEE PLUMBING.
6	DEEP CLEAN, PATCH & PAINT AS NEEDED
8	PARTITION WALL TO PROVIDE BARRIER BETWEEN WASH STATION AND COUNTERTOP/SHELVING. FRP FINISH ON WATER SIDE
9	IT/DATA CONNECTION TO BE COORDINATED WITH OWNER. SEE ELEC
10	FURNITURE BY OWNER
11	SE-1 SPECIALTY LAB EQUIPMENT BY OWNER
12	WIRE SECURITY FENCE W/ SLIDING DOOR
13	INFILL DOOR OPENING
14	PATCH FLOOR
15	REINSTALL SINK. SEE PLUMBING
16	INSTALL NEW COUNTERTOP
17	REINSTALL SHELVING
18	POWER NEEDED FOR 3RD PARTY ISP. APPLY 3/4" PLYWOOD FROM BASE WALL TO T.O. FLOOR DECKING ABOVE, FINISH TO BE FIRE-RATED PAINT.
19	POWER MOUNTED TO DATA RACKS, L6-30. SEE ELECTRICAL
20	UIT DATA JACK. ASSUMED 2 CAT6 CABLES UNLESS OTHERWISE SPECIFIE. 1-1/4" CONDUIT FROM SINGLE GANG BOX UP TO J-HOOKS EVERY 4' OR CABLE TRAY LEADING TO TELECOMM ROOM. SEE ELEC.
24	(E) FIRE EXTINGUISHER CABINET TO REMAIN

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406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

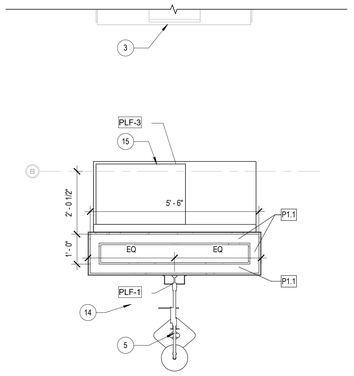
Joshua W. Fuller
REGISTERED ARCHITECT
STATE OF MONTANA

PPA#22-0045
A/E#00-00-00
BA# 2326

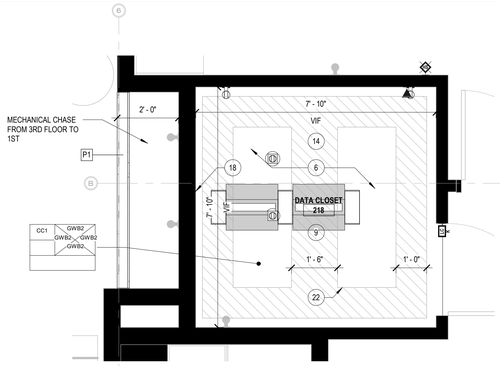
SHEET TITLE
MAIN / REMODEL PLANS

A111

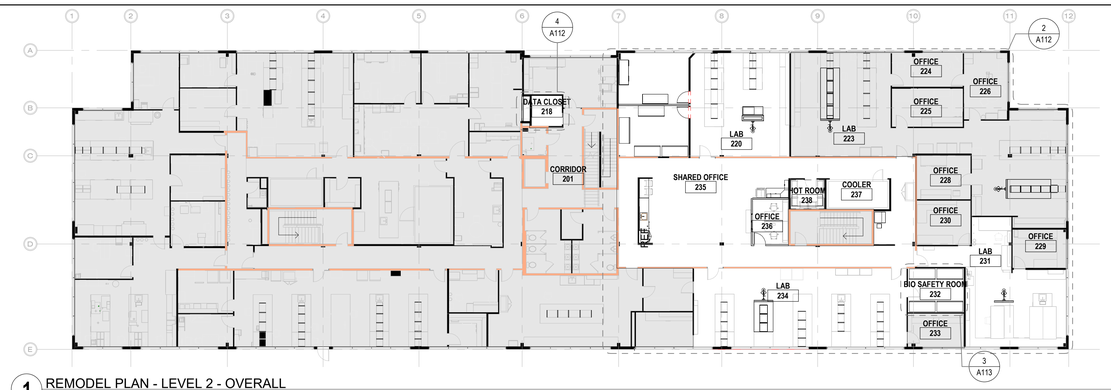
DATE
JUN. 03, 2026



3 LAB - SHOWER & EYEWASH STATION
SCALE: 1/2" = 1'-0"



4 L2 - DATA CLOSET REMODEL
SCALE: 1/2" = 1'-0"



1 REMODEL PLAN - LEVEL 2 - OVERALL
SCALE: 1/16" = 1'-0"

2 L2 - REMODEL PLAN - SHARED OFFICE
SCALE: 1/4" = 1'-0"

SHADING LEGEND

	NOT IN SCOPE OF WORK - EXISTING TO REMAIN
	1 HR FIRE RATED ASSEMBLY

GENERAL FLOOR PLAN NOTES

- A SEE G113 FOR PARTITIONS & ASSEMBLIES.
- B DIMENSIONS ARE TO F.O. STUD, F.O. CONCRETE, OR CENTERLINE OF COLUMN.
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- E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.
- F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.

PARTITION NOTES

- A GWB FINISH & TEXTURE:
  - TYPICAL GWB FINISH SHALL BE LEVEL 4 WITH LIGHT HAND TROWEL TEXTURE.
- B SOUND ATTENUATION AT SOUND WALLS:
  - LEAVE 1/4" GAP AT ALL EDGES OF GWB ABUTTING PERPENDICULAR SURFACES AND FILL GAP WITH ACOUSTICAL SEALANT
  - APPLY 1/4" BEAD ACOUSTICAL SEALANT AROUND ALL ELECTRICAL BOXES, DUCTWORK, PIPES & OTHER WALL PENETRATIONS (THIS INCLUDES ALL PENETRATIONS OF SOUND WALLS IN CONCEALED CEILING SPACES)
- C MOLD RESISTANCE:
  - INSTALL 5/8" MOLD RESISTANT GWB AT ALL WALLS & CEILINGS OF BATHROOMS WITH SHOWERS.
  - INSTALL 6 MIL. VAPOR RETARDER IMMEDIATELY BEHIND GYP @ WET SIDE OF ROOM
- D COORDINATION:
  - CONTRACTOR RESPONSIBLE FOR COORDINATING INSTALLATION OF SOUND ISOLATION CLIPS AND SHEAR WALL PLYWOOD WITH ALL OTHER TRADES.
- E CONTINUITY:
  - EXTEND PARTITIONS TO UNDERSIDE OF FLOOR OR ROOF STRUCTURE ABOVE UNLESS NOTED OTHERWISE
  - AT WALL, GWB AND SOUND INSULATION SHALL EXTEND TO THE UNDERSIDE OF THE SUBFLOOR OR TO THE ROOF'S SHEATHING ABOVE, TYPICAL.
  - FOR WALLS PERPENDICULAR TO THE STRUCTURE, BLOCKING SHALL BE INSTALLED OVER PARTITIONS, AND THE ENTIRE PERIMETER OF BLOCKING SHALL BE CAULKED WITH ACOUSTICAL SEALANT. SOUND INSULATION SHALL EXTEND UP INTO JOIST BAYS TYPICAL AT ALL SOUND WALLS.
  - AT GROUND FLOOR TENANT LEASE SPACES, INSTALL GWB AT EXTERIOR PERIMETER WALLS AND DEMISING WALLS BETWEEN UNITS 6" BELOW BOTTOM OF SUSPENSION GRID ONLY.
- F SILL PLATES @ CONCRETE:
  - EXTERIOR AND INTERIOR WALLS FRAMED OVER CONCRETE SLAB SHALL HAVE A SINGLE P.T. SILL PLATE, TYPICAL.

INSULATION REQUIREMENTS

CONTRACTOR SHALL BE RESPONSIBLE FOR INSULATING THE RESIDENCE IN ACCORDANCE WITH THE 2021 INTERNATIONAL ENERGY CONSERVATION CODE (IECC) INCLUDING ALL MONTANA AMENDMENTS.

APPLICABLE PRESCRIPTIVE PATH MINIMUM REQUIREMENTS:

ROOFS	
INSUL ENTIRELY ABOVE ROOF DECK:	R-30 CI
METAL BUILDINGS:	R-25 + R-11 LS
ATTIC AND OTHER:	R-49
WALLS ABOVE GRADE	
MASS:	R-13.3 CI
METAL BUILDING:	R-13 + R-14 CI
METAL FRAMED:	R-13 + R-12.5 CI
WOOD FRAMED AND OTHER:	R-13 + R7.5 CI **OR** R-20 + R-3.8 CI
WALLS BELOW GRADE:	R-10 CI
FLOORS	
MASS:	R-16.7 CI
JOIST/FRAMING:	R-38
SLAB-ON-GRADE FLOORS	
UNHEATED SLABS:	R-20 FOR 24" BELOW
HEATED SLABS:	R-15 FOR 36" BELOW +R-5 FULL SLAB

NOTE: A RESCHECK ANALYSIS MAY ALLOW LOWER R-VALUES (R-10 MIN.)

REMODEL FP KEYED NOTES

NO.	NOTE DESCRIPTION
1	ROOM LAYOUT TO STAY AS IS
3	COUNTERTOP AND CASEWORK TO REMAIN. REPAIR DAMAGES AS NEEDED
5	EMERGENCY EYE WASH/SHOWER STATION. EMERGENCY FIXTURES ARE TO BE PROVIDED WITH TEMPERED WATER SYSTEMS WITH ADEQUATE CAPACITY TO PROVIDE REQUIRED TEMPERATURE OF WATER FOR REQUIRED LENGTH OF TIME PER ANSI GUIDELINES. SEE PLUMBING.
6	DEEP CLEAN, PATCH & PAINT AS NEEDED
7	DEEP CLEAN COOLER
9	IT/DATA CONNECTION TO BE COORDINATED WITH OWNER, SEE ELEC
10	FURNITURE BY OWNER
11	SE-1 SPECIALTY LAB EQUIPMENT BY OWNER
14	PATCH FLOOR
15	REINSTALL SINK, SEE PLUMBING
16	INSTALL NEW COUNTERTOP
17	REINSTALL SHELVING
18	POWER NEEDED FOR 3RD PARTY ISP, APPLY 3/4" PLYWOOD FROM BASE WALL TO T.O. FLOOR DECKING ABOVE, FINISH TO BE FIRE-RATED PAINT.
20	UIT DATA JACK. ASSUMED 2 CAT6 CABLES UNLESS OTHERWISE SPECIFIE. 1-1/4" CONDUIT FROM SINGLE GANG BOX UP TO J-HOOKS EVERY 4' OR CABLE TRAY LEADING TO TELECOMM ROOM. SEE ELEC.
21	PROVIDE TWO DATA CABLES PER WORK STATION, SUPPLY FROM OVERHEAD
22	CABLE TRAY. 12" WIDE PERIMETER, 18" WIDE CENTER
23	DOOR RELOCATED
24	INFIL DOOR OPENING, PATCH WALL BASE / FLOORING

0' 1' 5' 10' 15'

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406.585.4161 ph 406.585.6919 fax

DRAWN BY: **Author**
REVIEWED BY: **Checker**

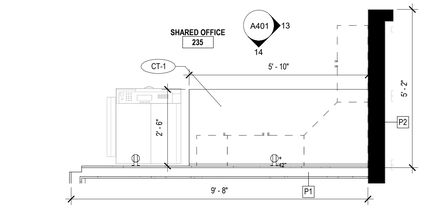
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2326

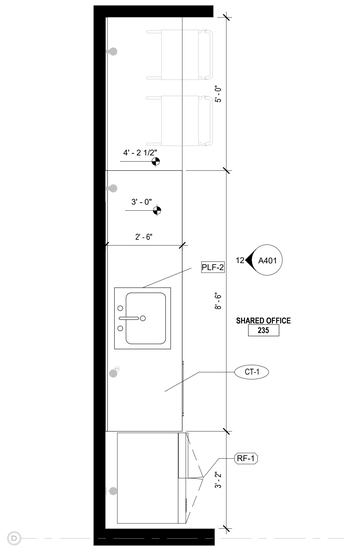
SHEET TITLE
LVL 2 / REMODEL PLANS

A112

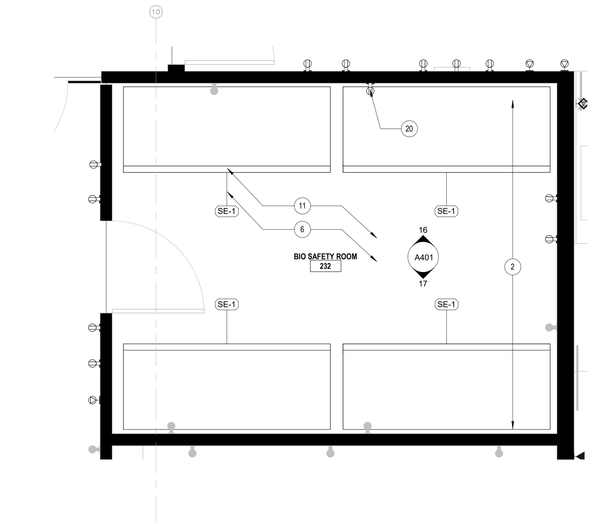
DATE
JUN. 03, 2026



5 L2 - OFFICE SUPPLY REMODEL
SCALE: 1/2" = 1'-0"



4 L2 - SHARED OFFICE REMODEL
SCALE: 1/2" = 1'-0"



3 L2 - BIOSAFETY ROOM REMODEL
SCALE: 1/2" = 1'-0"

0' 1' 2' 5' 10'

SHADING LEGEND

NOT IN SCOPE OF WORK - EXISTING TO REMAIN

1 HR FIRE RATED ASSEMBLY

GENERAL FLOOR PLAN NOTES

A SEE G113 FOR PARTITIONS & ASSEMBLIES.

B DIMENSIONS ARE TO F.O. STUD, F.O. CONCRETE, OR CENTERLINE OF COLUMN.

C USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED, CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.

D FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.

E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.

F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.

PARTITION NOTES

A GWB FINISH & TEXTURE:
- TYPICAL GWB FINISH SHALL BE LEVEL 4 WITH LIGHT HAND TROWEL TEXTURE.

B SOUND ATTENUATION AT SOUND WALLS:
- LEAVE 1/4" GAP AT ALL EDGES OF GWB ABUTTING PERPENDICULAR SURFACES AND FILL GAP WITH ACOUSTICAL SEALANT
- APPLY 1/4" BEAD ACOUSTICAL SEALANT AROUND ALL ELECTRICAL BOXES, DUCTWORK, PIPES & OTHER WALL PENETRATIONS (THIS INCLUDES ALL PENETRATIONS OF SOUND WALLS IN CONCEALED CEILING SPACES)

C MOLD RESISTANCE:
- INSTALL 5/8" MOLD RESISTANT GWB AT ALL WALLS & CEILINGS OF BATHROOMS WITH SHOWERS.
- INSTALL 6 MIL. VAPOR RETARDER IMMEDIATELY BEHIND GYP @ WET SIDE OF ROOM

D COORDINATION:
- CONTRACTOR RESPONSIBLE FOR COORDINATING INSTALLATION OF SOUND ISOLATION CLIPS AND SHEAR WALL PLYWOOD WITH ALL OTHER TRADES.

E CONTINUITY:
- EXTEND PARTITIONS TO UNDERSIDE OF FLOOR OR ROOF STRUCTURE ABOVE UNLESS NOTED OTHERWISE
- AT WALL, GWB AND SOUND INSULATION SHALL EXTEND TO THE UNDERSIDE OF THE SUBFLOOR OR TO THE ROOF'S SHEATHING ABOVE, TYPICAL.
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- AT GROUND FLOOR TENANT LEASE SPACES, INSTALL GWB AT EXTERIOR PERIMETER WALLS AND DEMISING WALLS BETWEEN UNITS 6" BELOW BOTTOM OF SUSPENSION GRID ONLY.

F SILL PLATES @ CONCRETE:
- EXTERIOR AND INTERIOR WALLS FRAMED OVER CONCRETE SLAB SHALL HAVE A SINGLE P.T. SILL PLATE, TYPICAL.

INSULATION REQUIREMENTS

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APPLICABLE PRESCRIPTIVE PATH MINIMUM REQUIREMENTS:

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METAL BUILDINGS:	R-25 + R-11 LS
ATTIC AND OTHER:	R-49
WALLS ABOVE GRADE	
MASS:	R-13.3 CI
METAL BUILDING:	R-13 + R-14 CI
METAL FRAMED:	R-13 + R-12.5 CI
WOOD FRAMED AND OTHER:	R-13 + R7.5 CI **OR** R-20 + R-3.8 CI
WALLS BELOW GRADE:	R-10 CI
FLOORS	
MASS:	R-16.7 CI
JOIST/FRAMING:	R-38
SLAB-ON-GRADE FLOORS	
UNHEATED SLABS:	R-20 FOR 24" BELOW
HEATED SLABS:	R-15 FOR 36" BELOW +R-5 FULL SLAB

NOTE: A RESCHECK ANALYSIS MAY ALLOW LOWER R-VALUES (R-10 MIN.)

REMODEL FP KEYED NOTES

NO.	NOTE DESCRIPTION
2	PROVIDE POWER FOR SPECIALTY EQUIPMENT
6	DEEP CLEAN, PATCH & PAINT AS NEEDED
11	SE-1 SPECIALTY LAB EQUIPMENT BY OWNER
20	UIT DATA JACK. ASSUMED 2 CAT6 CABLES UNLESS OTHERWISE SPECIFIE. 1-1/4" CONDUIT FROM SINGLE GANG BOX UP TO J-HOOKS EVERY 4' OR CABLE TRAY LEADING TO TELECOMM ROOM. SEE ELEC.

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BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

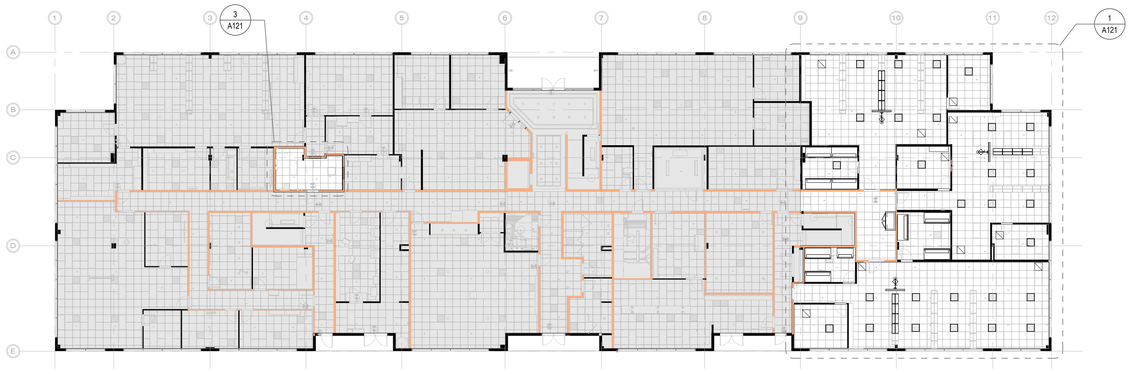
Nicholas W. Fulton
5822
BOZEMAN, MT

PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
LVL 2 / REMODEL PLANS

A113

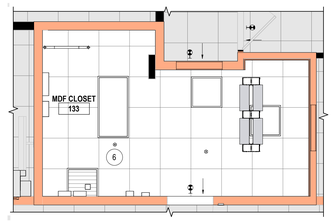
DATE
JUN. 03, 2026



2 Level 1 - REMODEL RCP - OVERALL
SCALE: 1/16" = 1'-0"

1 Level 1 - REMODEL RCP
SCALE: 1/4" = 1'-0"

0' 1' 5' 10' 15'



3 LEVEL 1 - ENLARGED RCP
SCALE: 1/4" = 1'-0"

GENERAL RCP NOTES

- A SEE G116 FOR PARTITIONS & ASSEMBLIES
- B DIMENSIONS ARE TO F.O. OF STRUCTURE
- C USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- D FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.
- E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.
- F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.
- G ALL CEILING TILES AND GRIDS TO BE RE-INSTALLED TO ORIGINAL LOCATIONS / LAYOUTS

SHADING LEGEND

- NOT IN SCOPE OF WORK - EXISTING TO REMAIN
- 1 HR FIRE RATED ASSEMBLY

REFLECTED CEILING LEGEND

CEILING MATERIAL
CEILING HEIGHT
ADDITIONAL NOTES

LIGHTING - SEE ELECTRICAL
HVAC REGISTERS - SEE MECHANICAL

CEILING MATERIALS
ACT

CEILING HEIGHT
VAR - VARIES

REMODEL RCP KEYED NOTES

NO.	NOTE DESCRIPTION
1	REPLACE ANY DAMAGED OR STAINED ACT PANELS
5	WIRELESS UIT DATA ACCESS POINT, SURFACE MOUNTED TO ACT OR SINGLE GANG BOX.
6	INSTALL NEW CEILING GRID, REPLACE UNDAMAGED TILE, NEW TILE TO MATCH AS REQUIRED

100% CONSTRUCTION DOCUMENTS

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE BUILDING

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

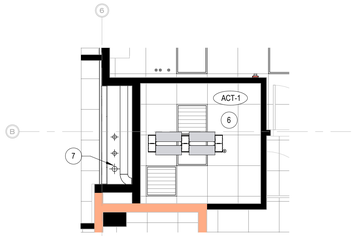
Nicholas W. Fulton
2568
BOZEMAN MT

PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
MAIN / REMODEL RCP

A121

DATE
JUN. 03, 2026



3 L2 DATA CLOSET RCP
SCALE: 1/4" = 1'-0"

2 Level 2 - REMODEL RCP - OVERALL
SCALE: 1/16" = 1'-0"

1 Level 2 - REMODEL RCP
SCALE: 1/4" = 1'-0"

0' 1' 5' 10' 15'

GENERAL RCP NOTES

- A SEE G116 FOR PARTITIONS & ASSEMBLIES
- B DIMENSIONS ARE TO F.O. OF STRUCTURE
- C USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- D FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.
- E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.
- F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.
- G ALL CEILING TILES AND GRIDS TO BE RE-INSTALLED TO ORIGINAL LOCATIONS / LAYOUTS

SHADING LEGEND

- NOT IN SCOPE OF WORK - EXISTING TO REMAIN
- 1 HR FIRE RATED ASSEMBLY

REFLECTED CEILING LEGEND

CEILING MATERIAL
CEILING HEIGHT
ADDITIONAL NOTES

LIGHTING - SEE ELECTRICAL
HVAC REGISTERS - SEE MECHANICAL

CEILING MATERIALS
ACT

CEILING HEIGHT
VAR - VARIES

REMODEL RCP KEYED NOTES

NO.	NOTE DESCRIPTION
1	REPLACE ANY DAMAGED OR STAINED ACT PANELS
2	SEE MECH.
3	LAB HOOD
4	COOLER CEILING
6	INSTALL NEW CEILING GRID, REPLACE UNDAMAGED TILE, NEW TILE TO MATCH AS REQUIRED
7	MECHANICAL CHASE

RCP MATERIALS LEGEND

- ACT-1
- GYP

100% CONSTRUCTION DOCUMENTS

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BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE BUILDING

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: NB
REVIEWED BY: NF

REV.	DESCRIPTION	DATE

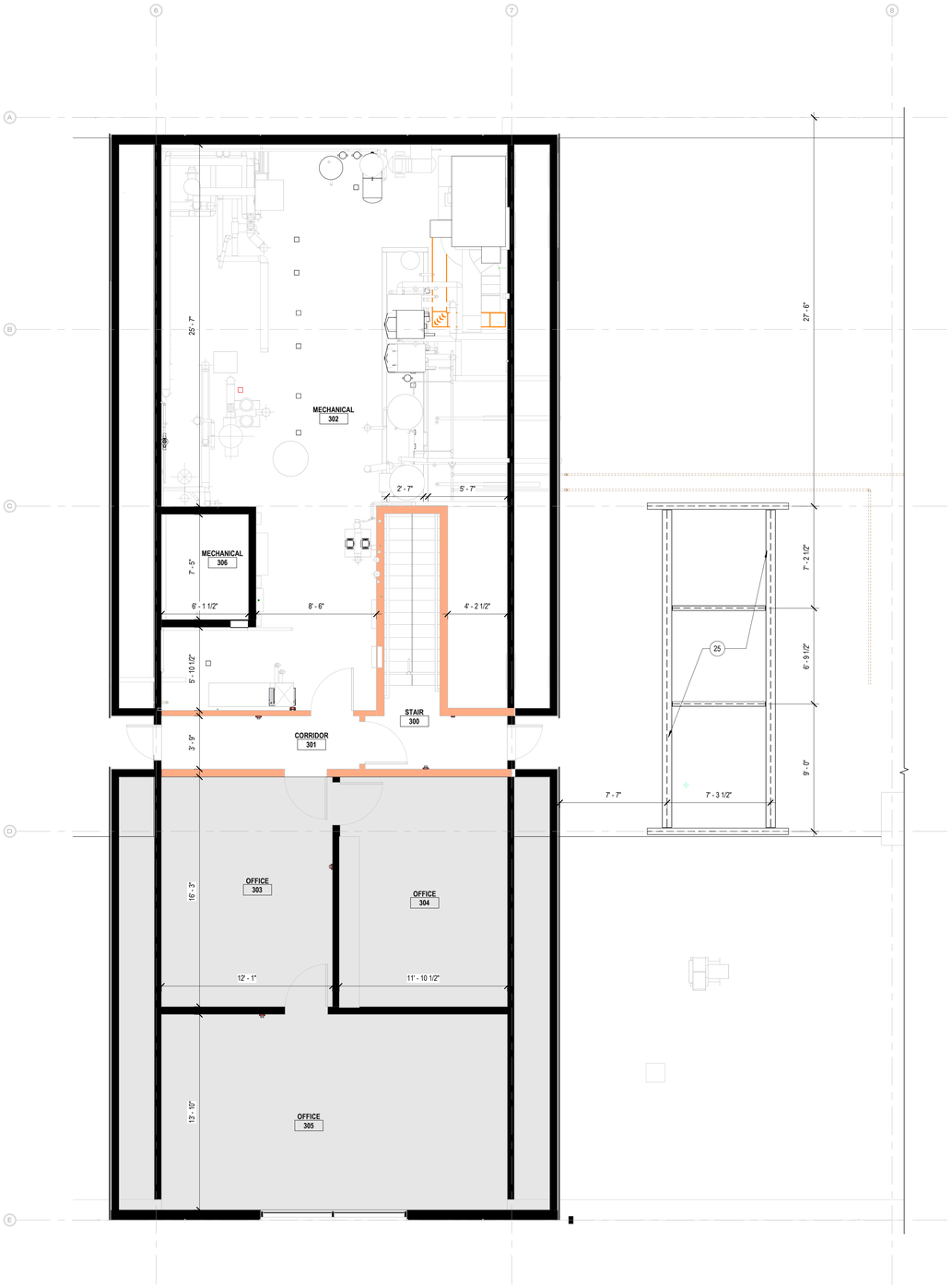
Nicholas R. Fulton 22560 BOZEMAN MT

PPA#22-0045
A/E#00-00-00
BA# 2326

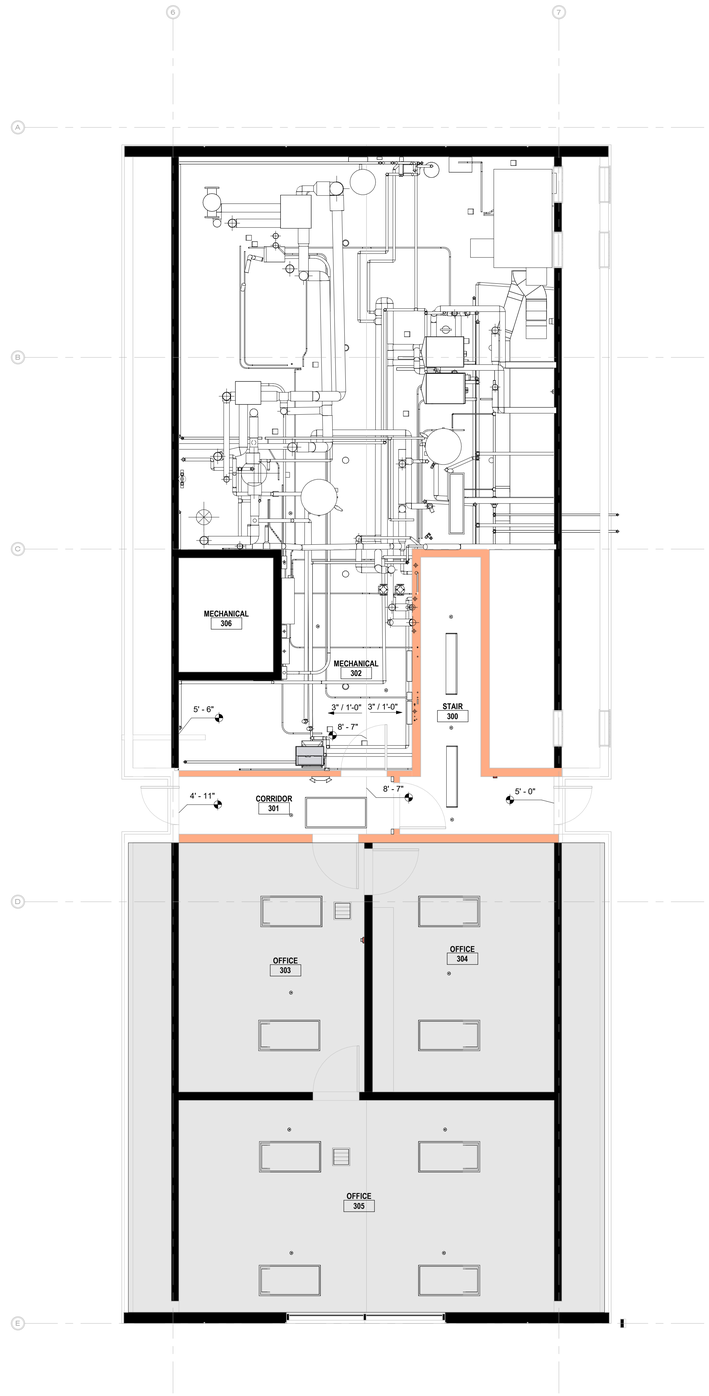
SHEET TITLE
LVL 2 / REMODEL RCP

A122

DATE
JUN. 03, 2026



1 LEVEL 3 - REMODEL PLAN
SCALE: 1/4" = 1'-0"



2 LEVEL 3 - REMODEL RCP
SCALE: 1/4" = 1'-0"

0' 1' 5' 10' 15'

SHADING LEGEND

- NOT IN SCOPE OF WORK - EXISTING TO REMAIN
- 1 HR FIRE RATED ASSEMBLY

GENERAL FLOOR PLAN NOTES

- A SEE G113 FOR PARTITIONS & ASSEMBLIES.
- B DIMENSIONS ARE TO F.O. STUD, F.O. CONCRETE, OR CENTERLINE OF COLUMN.
- C USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- D FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.
- E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.
- F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.

PARTITION NOTES

- A GWB FINISH & TEXTURE:
  - TYPICAL GWB FINISH SHALL BE LEVEL 4 WITH LIGHT HAND TROWEL TEXTURE.
- B SOUND ATTENUATION AT SOUND WALLS:
  - LEAVE 1/4" GAP AT ALL EDGES OF GWB ABUTTING PERPENDICULAR SURFACES AND FILL GAP WITH ACOUSTICAL SEALANT
  - APPLY 1/4" BEAD ACOUSTICAL SEALANT AROUND ALL ELECTRICAL BOXES, DUCTWORK, PIPES & OTHER WALL PENETRATIONS (THIS INCLUDES ALL PENETRATIONS OF SOUND WALLS IN CONCEALED CEILING SPACES)
- C MOLD RESISTANCE:
  - INSTALL 5/8" MOLD RESISTANT GWB AT ALL WALLS & CEILINGS OF BATHROOMS WITH SHOWERS.
  - INSTALL 6 MIL. VAPOR RETARDER IMMEDIATELY BEHIND GYP @ WET SIDE OF ROOM
- D COORDINATION:
  - CONTRACTOR RESPONSIBLE FOR COORDINATING INSTALLATION OF SOUND ISOLATION CLIPS AND SHEAR WALL PLYWOOD WITH ALL OTHER TRADES.
- E CONTINUITY:
  - EXTEND PARTITIONS TO UNDERSIDE OF FLOOR OR ROOF STRUCTURE ABOVE UNLESS NOTED OTHERWISE
  - AT WALL, GWB AND SOUND INSULATION SHALL EXTEND TO THE UNDERSIDE OF THE SUBFLOOR OR TO THE ROOF'S SHEATHING ABOVE, TYPICAL.
  - FOR WALLS PERPENDICULAR TO THE STRUCTURE, BLOCKING SHALL BE INSTALLED OVER PARTITIONS, AND THE ENTIRE PERIMETER OF BLOCKING SHALL BE CAULKED WITH ACOUSTICAL SEALANT. SOUND INSULATION SHALL EXTEND UP INTO JOIST BAYS TYPICAL AT ALL SOUND WALLS.
  - AT GROUND FLOOR TENANT LEASE SPACES, INSTALL GWB AT EXTERIOR PERIMETER WALLS AND DEMISING WALLS BETWEEN UNITS 6" BELOW BOTTOM OF SUSPENSION GRID ONLY.
- F SILL PLATES @ CONCRETE:
  - EXTERIOR AND INTERIOR WALLS FRAMED OVER CONCRETE SLAB SHALL HAVE A SINGLE P.T. SILL PLATE, TYPICAL.

GENERAL RCP NOTES

- A SEE G116 FOR PARTITIONS & ASSEMBLIES
- B DIMENSIONS ARE TO F.O. OF STRUCTURE
- C USE WRITTEN DIMENSIONS. DO NOT SCALE DRAWINGS, WHERE NO DIMENSION IS PROVIDED. CONSULT THE ARCHITECT FOR CLARIFICATION BEFORE PROCEEDING WITH THE WORK.
- D FRAMING CONTRACTOR IS TO COORDINATE LOCATION AND INSTALL ADEQUATE BLOCKING FOR ALL OWNER AND CONTRACTOR SUPPLIED EQUIPMENT.
- E ALL MATERIAL AND FINISHES ARE TO BE AS SPECIFIED, OR APPROVED EQUAL.
- F CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS SHOWING ANY CHANGES TO PLANS AND DIMENSIONING.
- G ALL CEILING TILES AND GRIDS TO BE RE-INSTALLED TO ORIGINAL LOCATIONS / LAYOUTS

REMODEL RCP KEYED NOTES

NO.	NOTE DESCRIPTION

REMODEL FP KEYED NOTES

NO.	NOTE DESCRIPTION
25	NEW STEEL FRAME FOR CHILLER, SEE STRUCT. REPORT & DETAILING

REFLECTED CEILING LEGEND

CEILING MATERIAL
CEILING HEIGHT
ADDITIONAL NOTES

LIGHTING - SEE ELECTRICAL

HVAC REGISTERS - SEE MECHANICAL

CEILING MATERIALS

ACT

CEILING HEIGHT

VAR - VARIES

MONTANA STATE UNIVERSITY

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE BUILDING

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DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

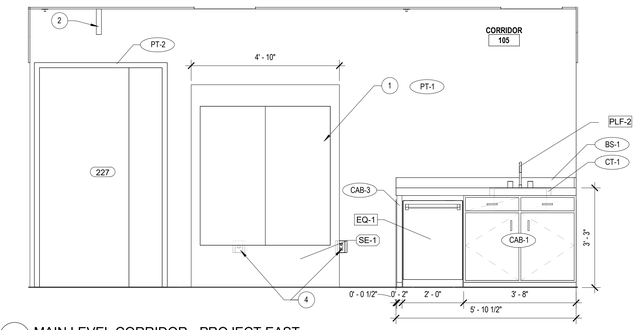
Nicholas W. Fulton
2026
BOZEMAN, MT

PPA#22-0045
A/E#00-00-00
BA# 2326

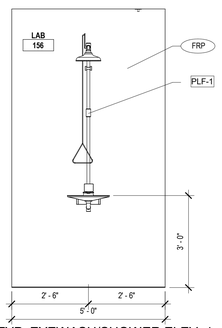
SHEET TITLE
LVL 3 / REMODEL PLAN & RCP

A123

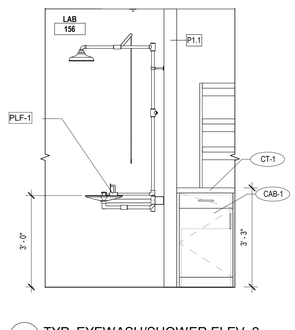
DATE
JUN. 03, 2026



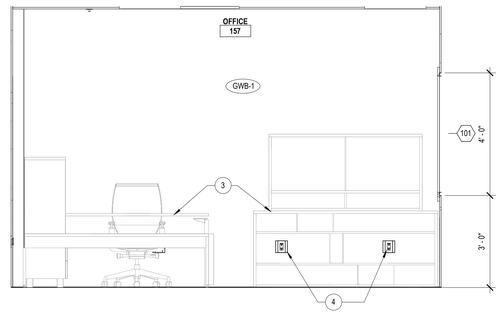
1 MAIN LEVEL CORRIDOR - PROJECT EAST
SCALE: 1/2" = 1'-0"



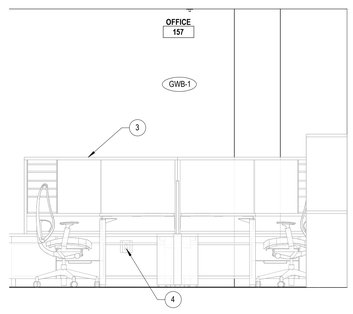
2 TYP. EYEWASH/SHOWER ELEV. 1
SCALE: 1/2" = 1'-0"



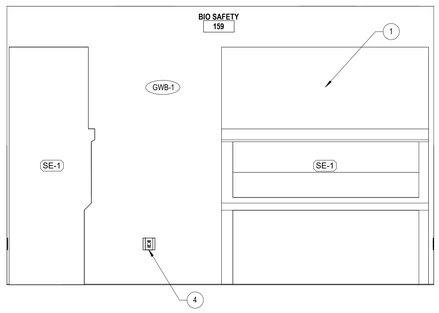
3 TYP. EYEWASH/SHOWER ELEV. 2
SCALE: 1/2" = 1'-0"



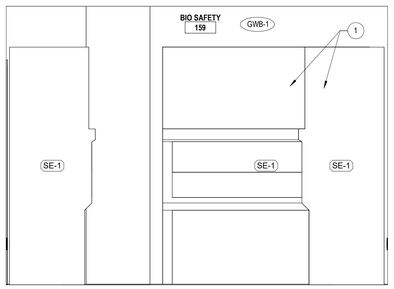
4 OFFICE 157 - PROJECT NORTH
SCALE: 1/2" = 1'-0"



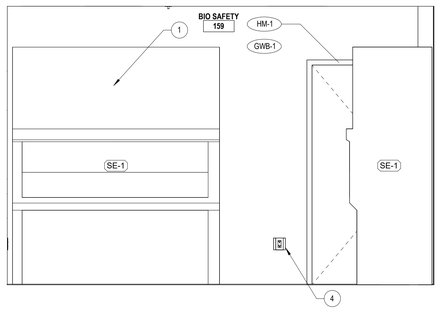
5 OFFICE 157 - PROJECT WEST
SCALE: 1/2" = 1'-0"



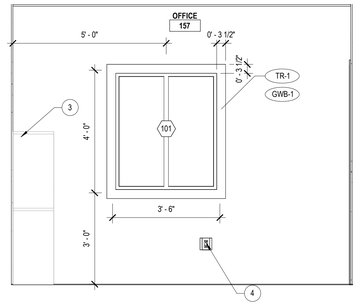
6 BIOSAFTEY 159 - PROJECT NORTH
SCALE: 1/2" = 1'-0"



7 BIOSAFTEY 159 - PROJECT WEST
SCALE: 1/2" = 1'-0"



8 BIOSAFTEY 159 - PROJECT SOUTH
SCALE: 1/2" = 1'-0"



9 OFFICE 157 WINDOW ADDITION
SCALE: 1/2" = 1'-0"

INT. ELEV. GENERAL NOTES

A SEE G113 FOR PARTITIONS & ASSEMBLIES: P#

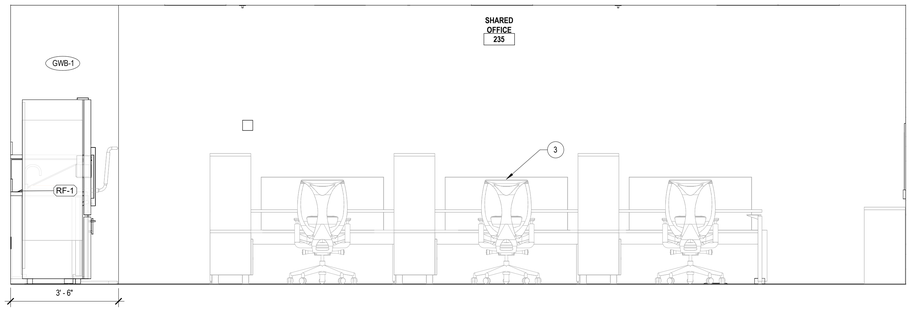
B "SE-1" SPECIAL EQUIPMENT, PROVIDED & INSTALLED BY OWNER

INTERIOR MATERIALS

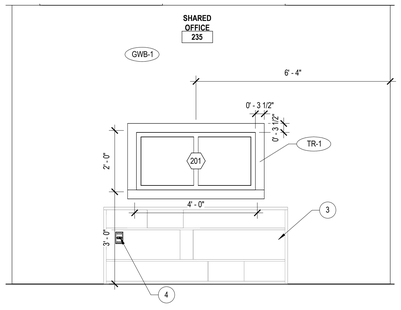
SYMBOL	MATERIAL
BS-1	BACK SPLASH
CAB-1	BASE CABINET
CAB-2	BASE CABINET DRAWERS
CAB-3	BASE CABINET FILLER
CAB-4	UPPER CABINET
CT-1	COUNTERTOP
CTB-1	COUNTERTOP BRACKET
FRP	FIBER REINFORCED PANEL
GWB-1	5/8" GYPSUM WALL BOARD
GWB-2	5/8" TYPE 'X' GYPSUM WALL BOARD
HM-1	HOLLOW METAL FRAME
PT-1	PAINT
PT-2	PAINT
TL-1	TILE SLATE
TR-1	1X4 MDF TRIM

INT ELEV KEYED NOTES

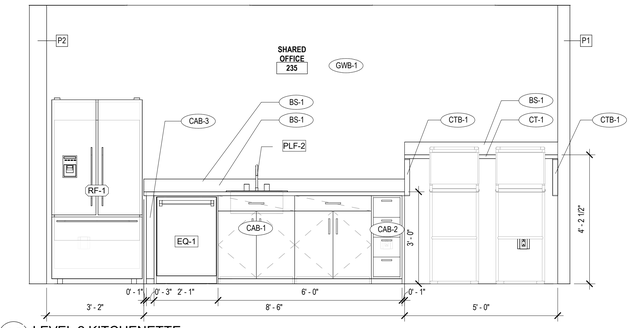
NO.	NOTE DESCRIPTION
1	SPECIALTY LAB EQUIPMENT BY OWNER, SEE ELECTRICAL
2	EXIT SIGN
3	FURNITURE BY OWNER
4	POWER RECEPTACLE, SEE ELECTRICAL



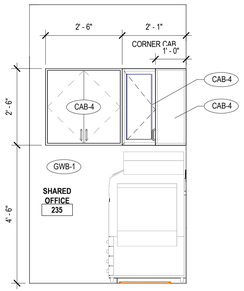
10 SHARED OFFICE 235 - PROJECT NORTH
SCALE: 1/2" = 1'-0"



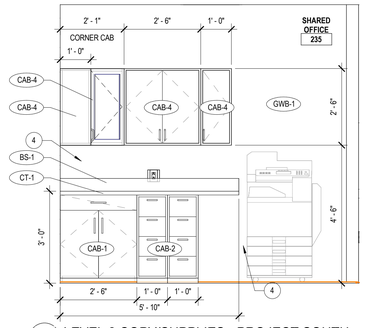
11 SHARED OFFICE 235 - PROJECT EAST
SCALE: 1/2" = 1'-0"



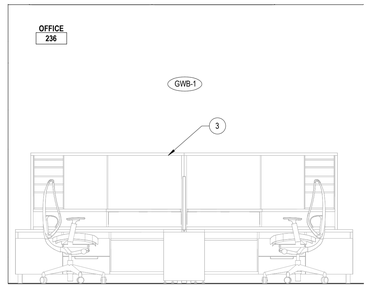
12 LEVEL 2 KITCHENETTE
SCALE: 1/2" = 1'-0"



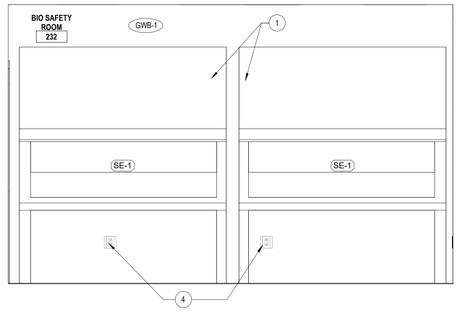
13 LEVEL 2 COPY/SUPPLIES - PROJECT EAST
SCALE: 1/2" = 1'-0"



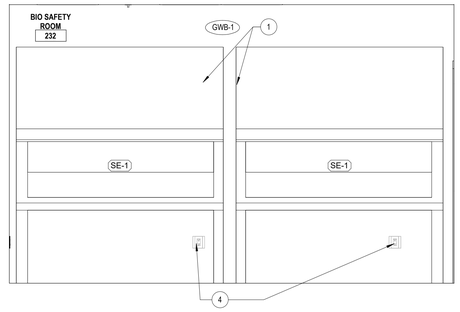
14 LEVEL 2 COPY/SUPPLIES - PROJECT SOUTH
SCALE: 1/2" = 1'-0"



15 OFFICE 236 - PROJECT EAST
SCALE: 1/2" = 1'-0"



16 BIOSAFTEY ROOM 232 - PROJECT NORTH
SCALE: 1/2" = 1'-0"



17 BIOSAFTEY ROOM 232 - PROJECT SOUTH
SCALE: 1/2" = 1'-0"

100% CONSTRUCTION DOCUMENTS

MOLECULAR BIOSCIENCE BUILDING

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717
PHONE: 406.994.3413
FAX: 406.994.5665

BECHTLE ARCHITECTS
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406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author		
REVIEWED BY Checker		
REV.	DESCRIPTION	DATE

Jonathan W. Fallon
2026
REGISTERED ARCHITECT

PPA#22-0045
A/E#00-00-00
BA# 2326

SHEET TITLE
REMODEL INT
ELEVATIONS

A401

DATE
JUN. 03, 2026

DEMOLITION NOTES

A. ALL BOLD DASHED DUCTWORK, PIPING AND EQUIPMENT TO BE DEMOLISHED.

B. COORDINATE DEMOLITION WORK/ W/ ARCHITECTURAL AND ELECTRICAL DEMOLITION DRAWINGS.

C. ANY EXISTING PLUMBING, DUCTWORK, PIPING, WALLS, AND CEILINGS THAT REMOVED OR DAMAGED DURING ANY PART OF THE RENOVATION/ REMODEL SHALL BE REPLACED/ REPAIRED.

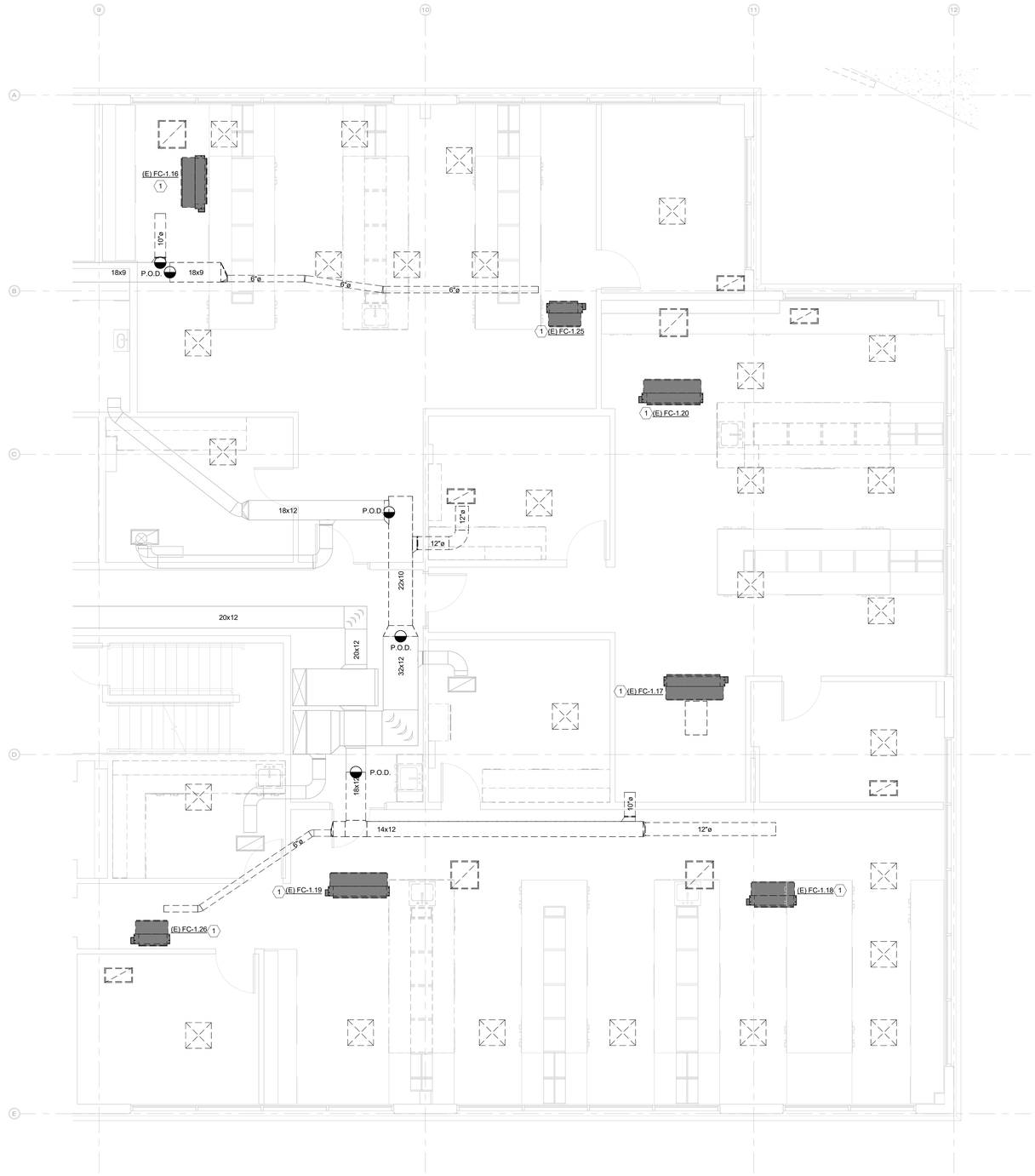
D. FIELD VERIFY LOCATIONS OF ALL ASSOCIATED EQUIPMENT SHOWN ON DEMO PLANS PRIOR TO ANY DEMOLITION WORK.

E. ALL (E) DUCTWORK THAT IS TO BE REUSED TO BE CLEANED BY CERTIFIED DUCT CLEANING SERVICE.

F. DISPOSE OF ALL DEMOLISHED ITEMS OFF SITE. OWNER HAS THE FIRST RIGHT SAVE ANY EQUIPMENT SCHEDULED FOR DEMOLITION.

KEYNOTES

1	Demolish fan coil unit, ductwork, grilles, and all associated equipment. Some items not shown.



1 Level 1 - MECHANICAL DEMO PLAN
1/4" = 1'-0"

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

%100% CD

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author		
REVIEWED BY Checker		
REV.	DESCRIPTION	DATE

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE

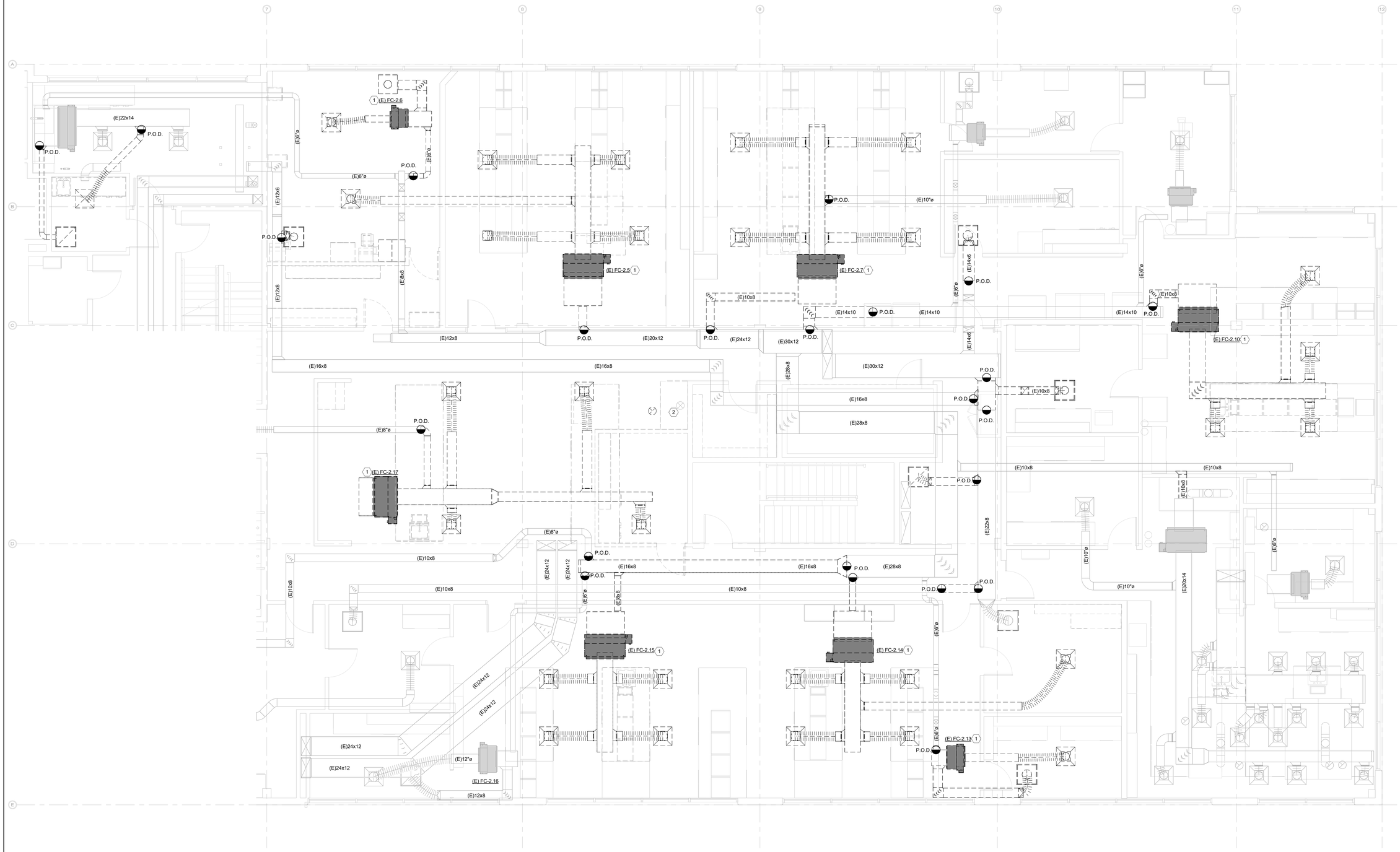
LEVEL 1 - MECHANICAL DEMO PLAN

SHEET

M001

DATE

12/12/25



1 Level 2 - HVAC DEMO PLAN
1/4" = 1'-0"

DEMOLITION NOTES

A. ALL BOLD DASHED DUCTWORK, PIPING AND EQUIPMENT TO BE DEMOLISHED.

B. COORDINATE DEMOLITION WORK/ W/ ARCHITECTURAL AND ELECTRICAL DEMOLITION DRAWINGS.

C. ANY EXISTING PLUMBING, DUCTWORK, PIPING, WALLS, AND CEILINGS THAT REMOVED OR DAMAGED DURING ANY PART OF THE RENOVATION/ REMODEL SHALL BE REPLACED/ REPAIRED.

D. FIELD VERIFY LOCATIONS OF ALL ASSOCIATED EQUIPMENT SHOWN ON DEMO PLANS PRIOR TO ANY DEMOLITION WORK.

E. ALL (E) DUCTWORK THAT IS TO BE REUSED TO BE CLEANED BY CERTIFIED DUCT CLEANING SERVICE.

F. DISPOSE OF ALL DEMOLISHED ITEMS OFF SITE. OWNER HAS THE FIRST RIGHT SAVE ANY EQUIPMENT SCHEDULED FOR DEMOLITION.

KEYNOTES

1	Demolish fan coil unit, ductwork, grilles, and all associated equipment. Some items not shown.
2	Demolish all associated fume hood ductwork, exhaust fan and associated equipment.

%100% CD

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 2 - MECHANICAL DEMO PLAN

SHEET
M002

DATE
12/12/25

DEMOLITION NOTES

A. ALL BOLD DASHED DUCTWORK, PIPING AND EQUIPMENT TO BE DEMOLISHED.

B. COORDINATE DEMOLITION WORK/ W/ ARCHITECTURAL AND ELECTRICAL DEMOLITION DRAWINGS.

C. ANY EXISTING PLUMBING, DUCTWORK, PIPING, WALLS, AND CEILINGS THAT REMOVED OR DAMAGED DURING ANY PART OF THE RENOVATION/ REMODEL SHALL BE REPLACED/ REPAIRED.

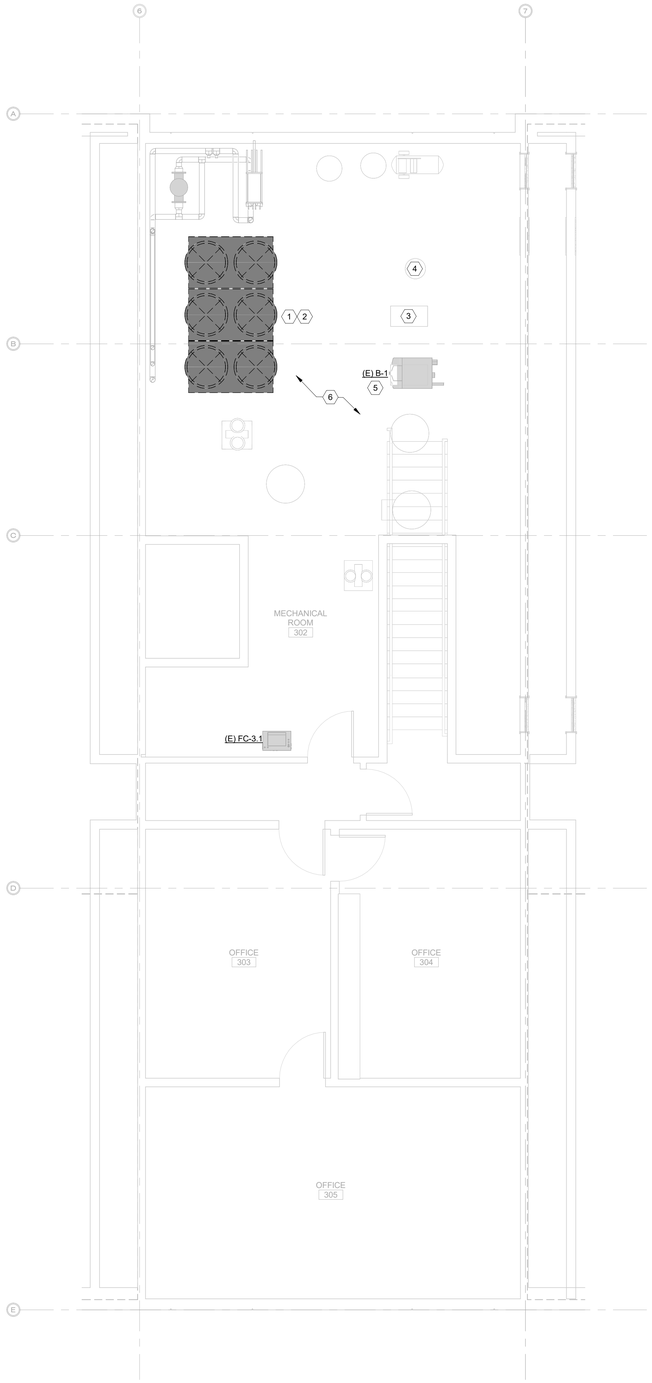
D. FIELD VERIFY LOCATIONS OF ALL ASSOCIATED EQUIPMENT SHOWN ON DEMO PLANS PRIOR TO ANY DEMOLITION WORK.

E. ALL (E) DUCTWORK THAT IS TO BE REUSED TO BE CLEANED BY CERTIFIED DUCT CLEANING SERVICE.

F. DISPOSE OF ALL DEMOLISHED ITEMS OFF SITE. OWNER HAS THE FIRST RIGHT SAVE ANY EQUIPMENT SCHEDULED FOR DEMOLITION.

KEYNOTES

1	Demolish chiller, chilled water pump, condenser pump, air separator, and associated expansion tank. Demolish chilled water piping back to fire protection mains. Coordinate chilled water piping separation w/ fire protection contractor.
2	Demolish condenser water piping back to decoupled point on geotheramal piping. cap condenser water piping at decoupled point.
3	Demolish boiler and all associated piping, valvess, and equipment.
4	Demolish Plumbing expansion tank.
5	(E) boiler (B-1) to remain for reuse in new heating hot water system.
6	Demolish heating hot water pump, air separator, and associated expansion tank. Demolish entire heating hot water piping system from boilers to all fan coil units.



1 Level 3 - MECHANICAL DEMO PLAN
1/4" = 1'-0"

%100% CD

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406 600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE

LEVEL 3 - MECHANICAL DEMO PLAN

SHEET

M003

DATE

12/12/25

FAN COIL SCHEDULE

PLAN CODE	MFGR	MODEL	FAN				COOLING								HEATING							ELECTRICAL		FILTER	REMARKS
			ACFM	OSA ACFM	DRIVE	ESP (IN W.C.)	COIL ROWS	CLG GPM	CLG WPD (FT WG)	TOTAL (MBH)	SENSIBLE (MBH)	EWT/LWT (°F)	EAT DB/ WB (°F)	LAT DB/ WB (°F)	COIL ROWS	HTG GPM	HTG WPD (FT WG)	TOTAL (MBH)	EWT/LWT (°F)	EAT DB (°F)	LAT DB (°F)	POWER	HP		
FC-1.1 (FUTURE)	PRICE	FHP 10	900	250	DIRECT	0.5	6C	5.8	3.7	23.1	18.6	44.0/ 52.8	75.0/ 63.0	52.0/ 48.5	2H	2.7	2.7	29.5	140/ 115.5	62.1	95.0	208/1/60	0.50	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.2 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.3 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.4 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.5 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.6 (FUTURE)	PRICE	FHP 10	505	150	DIRECT	0.5	6C	3.9	4.8	15.5	11.4	44.0/ 52.7	75.0/ 63.0	50.4/ 46.0	2H	1.1	0.6	16.9	140/ 107.1	61.5	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.7 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.8 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.9 (FUTURE)	PRICE	FHP 10	685	120	DIRECT	0.5	6C	4.8	6.8	18.9	14.7	44.0/ 52.7	75.0/ 63.0	51.2/ 47.6	2H	1.4	0.9	19.8	140/ 108.9	65.1	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.10 (FUTURE)	PRICE	FHP 10	900	250	DIRECT	0.5	6C	5.8	3.7	23.1	18.6	44.0/ 52.8	75.0/ 63.0	52.0/ 48.5	2H	2.7	3.4	29.5	140/ 115.5	62.1	95.0	208/1/60	0.50	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.11 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.12 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.13 (FUTURE)	PRICE	FHP 10	900	250	DIRECT	0.5	6C	5.8	3.7	23.1	18.6	44.0/ 52.8	75.0/ 63.0	52.0/ 48.5	2H	3.5	2.7	29.5	140/ 115.5	62.1	95.0	208/1/60	0.50	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.14 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.15 (FUTURE)	PRICE	FHP 10	900	250	DIRECT	0.5	6C	5.8	3.7	23.1	18.6	44.0/ 52.8	75.0/ 63.0	52.0/ 48.5	2H	2.7	2.7	29.5	140/ 115.5	59.4	95.0	208/1/60	0.50	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.16	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.17	PRICE	FHP 10	505	150	DIRECT	0.5	6C	3.9	4.8	15.5	11.4	44.0/ 52.7	75.0/ 63.0	50.4/ 46.0	2H	1.1	0.6	16.9	140/ 107.1	61.5	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.18	PRICE	FHP 20	1,600	350	DIRECT	0.5	4C	7.4	5.2	31.9	27.9	44.0/ 53.5	75.0/ 63.0	55.7/ 50.9	2H	3.9	2.6	48.8	140/ 110.9	63.8	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.19	PRICE	FHP 20	1,600	350	DIRECT	0.5	4C	7.4	5.2	31.9	27.9	44.0/ 53.5	75.0/ 63.0	55.7/ 50.9	2H	3.9	2.6	48.8	140/ 110.9	61.7	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.20	PRICE	FHP 20	1,600	350	DIRECT	0.5	4C	7.4	5.2	31.9	27.9	44.0/ 53.5	75.0/ 63.0	55.7/ 50.9	2H	3.9	2.6	48.8	140/ 110.9	61.7	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.21	PRICE	FHP 20	1,600	350	DIRECT	0.5	4C	7.4	5.2	31.9	27.9	44.0/ 53.5	75.0/ 63.0	55.7/ 50.9	2H	3.9	2.6	48.8	140/ 110.9	61.7	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.22	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.23 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.24 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.25 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-1.26 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.1 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.2 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.3 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.4 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.5	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.6	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.7	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.8 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.9 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.10	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.11 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.12 (FUTURE)	PRICE	FHP 26	2,250	0	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.13	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.14	PRICE	FHP 20	1,800	325	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.15	PRICE	FHP 20	1,800	325	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.16 (FUTURE)	PRICE	FHP 10	505	50	DIRECT	0.5	6C	5.2	7.1	16.0	11.4	45.0/ 51.6	75.0/ 63.0	49.9/ 45.9	2H	0.8	0.3	13.3	140/ 103.4	66.2	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.17	PRICE	FHP 26	2,250	300	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.18 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.19 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.20 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.21 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.22 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.23 (FUTURE)	PRICE	FHP 26	2,250	350	DIRECT	0.5	8C	12.0	9.9	57.0	48.3	44.0/ 54.4	75.0/ 63.0	51.2/ 46.1	2H	6.9	3.3	63.4	140/ 119.5	65.6	95.0	208/1/60	0.75 X 2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.24 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.25 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.26 (FUTURE)	PRICE	FHP 20	1,800	350	DIRECT	0.5	6C	10.4	6.9	44.0	36.0	44.0/ 53.3	75.0/ 63.0	52.8/ 48.5	2H	4.4	3.3	53.4	140/ 113.1	64.5	95.0	208/1/60	0.5 X2	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.27 (FUTURE)	PRICE	FHP 10	505	150	DIRECT	0.5	6C	3.9	4.8	15.5	11.4	44.0/ 52.7	75.0/ 63.0	50.4/ 46.0	2H	1.1	0.6	16.9	140/ 107.1	61.6	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-2.28 (FUTURE)	PRICE	FHP 10	335	50	DIRECT	0.5	3C	4.9	3.8	9.3	6.7	44.0/ 48.2	75.0/ 63.0	52.6/ 47.5	1H	2.0	0.9	9.4	140/ 129.6	65.8	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5
FC-3.1 (FUTURE)	PRICE	FHP 10	505	150	DIRECT	0.5	6C	3.9	4.8	15.5	11.4	44.0/ 52.7	75.0/ 63.0	50.4/ 46.0	2H	1.1	0.6	16.9	140/ 107.1	61.6	95.0	208/1/60	0.5	2FTR-8	NOTE 1, 2, 3, 4, 5

NOTE:
1) CONTROL CONTRACTOR TO PROVIDE THERMOSTAT AND 2-WAY CONTROL VALVES FOR CLG AND HTG COILS.
2) PROVIDE DISCONNECT SWITCH.
3) PROVIDE STAINLESS STEEL DRAIN PAN.
4) BASED ON 40% PROPYLENE GLYCOL SOLUTION FOR CLG AND HTG.
5) FUTURE FAN COIL/S LOCATIONS CORRESPOND W/ (E) FAN COIL UNIT/S TAGS. FLOWS SHOWN ARE FUTURE FLOWS.

MECHANICAL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
D	DRAIN	T	ELECTRIC THERMOSTAT
CHWS	CHILLED WATER SUPPLY	T	ELECTRIC THERMOSTAT W/GUARD
CHWR	CHILLED WATER RETURN		ACOUSTICALLY LINED SHEET METAL DUCT
HWS	HEATING HOT WATER SUPPLY		MANUAL BALANCING DAMPER
HWR	HEATING HOT WATER RETURN		FLEX CONNECTOR
WWS	WELL WATER SUPPLY		ACCESS DOORS
WWR	WELL WATER RETURN	ACAD	
	GATE VALVE	AD	
	BALL VALVE	FD	FIRE DAMPER
	BUTTERFLY VALVE	F/SD	FIRE/SMOKE DAMPER
	GLOBE VALVE	M	MOTORIZED DAMPER
	TRIPLE DUTY VALVE		TURNING VANE ELL
	SWING CHECK VALVE		45° LOW-LOSS TAKE-OFF FITTING W/ DAMPER & FLEX DUCT
	STRAINER		45° LOW-LOSS TAKE-OFF FITTING W/ DAMPER & RIGID ROUND DUCT
	FLEX CONNECTOR		90° TEE TAKE-OFF FITTING
	HOSE END DRAIN VALVE		CONICAL 90° TEE TAKE-OFF FITTING
	PRESSURE REDUCING VA.		45° TEE TAKE-OFF FIITTING
	SAFETY RELIEF VALVE		45°-90° TEE TAKE-OFF FITTING
	UNION	SA	SUPPLY AIR DUCT (SINGLE LINE)
	MOTORIZED T.C. VA/2-WAY	RA	RETURN AIR DUCT (SINGLE LINE)
	MOTORIZED T.C. VA/3-WAY	EA	EXHAUST AIR DUCT (SINGLE LINE)
	ECCENTRIC PLUG BALANCING VALVE	SD-1 (PLAN CODE) 8x8 (NECK SIZE) 200 (CFM)	DIFFUSER, REGISTER, OR GRILLE THROW PATTERN SHOWN ON DWGS. (2 WAY DEPICTED)
	VALVE IN RISER		CONNECT NEW WORK TO EXISTING
	TEE UP	P	PRESSURE GAUGE W/ SNUBBER
	TEE DOWN		
	ELBOW UP		
	ELBOW DOWN		
	PIPE SIZE CHANGE		
M	MANUAL FLOW BALANCING VALVE (CIRCUIT SETTER)		
A	AUTOMATIC FLOW BALANCING VALVE		
	PIPE GUIDE		
	PIPE ANCHOR		
	PRESSURE/TEMP. TEST PLUG		
T	DIAL THERMOMETER		

HVAC ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	LAT	LEAVING AIR TEMPERATURE
ACFM	ACTUAL CFM	LWT	LEAVING WATER TEMPERATURE
AHU	AIR HANDLING UNIT	LF	LINEAR FEET
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MAX	MAXIMUM
AMP	AMPERE (AMP,AMPS)	M.C.	MECHANICAL CONTRACTOR
APD	AIR PRESSURE DROP	MIN	MINIMUM
APPROX	APPROXIMATE	N O	NORMALLY OPEN
BFC	BRAKE HORSEPOWER, BOILER HORSEPOWER	N C	NORMALLY CLOSED
BTU	BRITISH THERMAL UNIT	N/A	NOT APPLICABLE
MBH	BTU PER HOUR (THOUSAND)	NIC	NOT IN CONTRACT
CU FT	CUBIC FEET	NTS	NOT TO SCALE
CU IN	CUBIC INCH	(N)	NEW
CFM	CUBIC FEET PER MINUTE	OBD	OPPOSED BLADE DAMPER
SCFM	CFM, STANDARD CONDITIONS	OA	OUTSIDE AIR
DB	DECIBEL	%	PERCENT
DIA, Ø	DIAMETER	PH	PHASE(ELECTRICAL)
ID	DIAMETER, INSIDE	LBS	POUNDS
OD	DIAMETER, OUTSIDE	PSI	POUNDS PER SQUARE INCH
DBT	DRY-BULB TEMPERATURE	PSIA	PSI ABSOLUTE
EAT	ENTERING AIR TEMPERATURE	PD	PRESSURE DROP OR DIFFERENCE
E.C.	ELECTRICAL CONTRACTOR	PSIG	PSI GAUGE
(E)	EXISTING	R/O	RUN OUT
EXP	EXPANSION	RH	RELATIVE HUMIDITY
EWT	ENTERING WATER TEMPERATURE	RA	RETURN AIR
F	FAHRENHEIT	RPM	REVOLUTIONS PER MINUTE
FPM	FEET PER MINUTE	SH	SENSIBLE HEAT
FPS	FEET PER SECOND	SPEC	SPECIFICATION
FT	FOOT OR FEET	SP VOL	SPECIFIC VOLUME
HZ	FREQUENCY	STD	STANDARD
GA	GAGE OR GAUGE	SP	STATIC PRESSURE
GAL	GALLONS	SUCT	SUCTION
G.C.	GENERAL CONTRACTOR	SA	SUPPLY AIR
GPH	GALLONS PER HOUR	TEMP	TEMPERATURE
GPM	GALLONS PER MINUTE	TD	TEMPERATURE DIFFERENCE
GPD	GALLONS PER DAY	T STAT	THERMOSTAT
HD	HEAD	TONS	TONS OF REFRIGERATION
HGT	HEIGHT	T.C.	TEMPERATURE CONTROL
HP	HORSEPOWER	VAC	VACUUM
RH	HUMIDITY, RELATIVE	VAV	VARIABLE AIR VOLUME
KW	KILOWATT	VEL	VELOCITY
KWH	KILOWATT HOUR	V	VOLT
		VOL	VOLUME
		VFD	VARIBLE FREQUENCY DRIVE
		WPD	WATER PRESSURE DROP
		W/	WITH

GENERAL MECHANICAL NOTES :

1. **FOR MECHANICAL SPECIFICATIONS, REFER TO PROJECT MANUAL.**
2. CODES AND STANDARDS LISTED IN SPECIFICATIONS AND DRAWINGS ARE MINIMUM STANDARDS. WHERE REQUIREMENTS ON THE DRAWINGS OR SPECIFICATIONS EXCEED THE MINIMUM CODE REQUIREMENTS, THE DRAWINGS OR SPECIFICATIONS SHALL GOVERN.
3. THE POWER RATING OF MOTORS AND OTHER MECHANICAL EQUIPMENT AND THE ELECTRICAL CHARACTERISTICS OF ELECTRICAL SYSTEMS SERVING THEM HAVE BEEN ESTABLISHED AS MINIMUMS WHICH ALLOW THAT EQUIPMENT TO FUNCTION PROPERLY TO PRODUCE THE REQUIRED CAPACITIES. POWER RATINGS INCLUDE REASONABLE SAFETY FACTORS TO ACCOMMODATE COMMON DIFFERENCES BETWEEN DESIGN PARAMETERS AND FIELD CONSTRUCTION PRACTICES. EQUIPMENT WITH POWER RATINGS LESS THAN THOSE INDICATED ON THE DRAWINGS SHALL NOT BE PERMITTED.
4. REASONABLE EFFORTS HAVE BEEN MADE TO COORDINATE ELECTRICAL REQUIREMENTS OF MECHANICAL EQUIPMENT WITH THE ELECTRICAL SYSTEMS SERVING THAT EQUIPMENT. DIFFERENCES AMONG MANUFACTURERS OF MECHANICAL EQUIPMENT MAKE IT IMPOSSIBLE TO PRODUCE A SINGLE ELECTRICAL DESIGN WHICH WILL SATISFY THE VARYING ELECTRICAL REQUIREMENTS OF THE THOSE MANUFACTURERS. CONSEQUENTLY, THE CONTRACTOR SHALL COORDINATE THE ELECTRICAL REQUIREMENTS OF THE MECHANICAL EQUIPMENT ACTUALLY FURNISHED ON THIS PROJECT WITH THE EQUIPMENT ACTUALLY FURNISHED ON THIS PROJECT AND PROVIDE ELECTRICAL SYSTEMS REQUIRED BY THAT EQUIPMENT. THIS COORDINATION EFFORT SHALL BE COMPLETED PRIOR TO THE INSTALLATION OF EITHER THE MECHANICAL EQUIPMENT OR THE ELECTRICAL SYSTEMS SERVING THAT EQUIPMENT. ELECTRICAL SYSTEM REVISIONS REQUIRED TO COORDINATE WITH THE MECHANICAL EQUIPMENT ACTUALLY FURNISHED SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
5. DRAWINGS INDICATE GENERAL LOCATIONS OF FIXTURES, APPARATUS, EQUIPMENT, PIPING, AND DUCTWORK. CHANGES ON LOCATION SHALL BE MADE TO ACCOMMODATE EXISTING OR NEW BUILDING CONDITIONS AND COORDINATION WITH OTHER TRADES, INCLUDING HVAC, PLUMBING, ELECTRICAL, FIRE PROTECTION, STRUCTURAL, AND ARCHITECTURAL, SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER.
6. PROVIDE ACCESS TO EQUIPMENT AND PORTIONS OF BUILDING SYSTEMS REQUIRING SERVICE.
7. DO NOT INSTALL DUCTWORK, PIPING, OR EQUIPMENT IN ELECTRICAL ROOMS, ELEVATOR ROOMS, OR ELEVATOR SHAFTS, UNLESS EXPLICITLY INDICATED ON THE DRAWINGS. PIPING, DUCTWORK, AND EQUIPMENT (SWITCHGEAR, SWITCHBOARDS, PANELS, MOTOR CONTROL CENTERS, VARIABLE FREQUENCY DRIV

AIR COOLED CHILLER SCHEDULE

PLAN CODE	MFGR	MODEL	NOM CAPACITY (TONS)	EWT (°F)	LWT (°F)	GPM	WPD (FT)	AMBIENT TEMP. WINTER/ SUMMER (°F)	ARI IPLV	COMPRESSOR (KW)	ARI PARTIAL LOAD EER 25% / 50% / 75% / 100%	COMPRESSOR TYPE/#	POWER			REFRIGERANT	WEIGHT (LBS)	REMARKS
													(V/PH/HZ)	MCA	MOCP	REFRIGERANT		
CH-1	DAIKIN	AGZ008F	114.4	54	44	300.4	17.1	-10 / 95.0	16.96	138.9	19.4/ 19.1 / 14.2 / 10.7	SCROLL/ 4	208/3/60	578	700	R32	6,940	NOTE 1, 2, 3

REMARKS:
1) EER PARTIAL LOAD VALUES BASED ON ARI STANDARD CONDITIONS.
2) BASED ON 4,500 FT ELEVATION W/ 40% PROPYLENE GLYCOL SOLUTION.
3) PROVIDE VIBRO ACOUSTICS SCSR SPRING ISOLATORS. FINAL SPRING ISOLATOR SIZES AND LOCATIONS PROVIDED BY MFGR DESIGN.

EXISTING ERV UNIT BALANCING SCHEDULE

PLAN CODE	ROOM/S SERVED	MODEL	OSA CFM	ROOM EXH CFM	REMARKS
(E) ERV-3					
FC-1.15 (FUTURE)	OFFICE 150 & 152	FHP 10	250	300	
FC-1.16	LAB 154 & BIO 153	FHP 26	350	500	
FC-1.17	OFFICE 155	FHP 10	150		
FC-1.18	LAB 160	FHP 20	350	500	
FC-1.19	LAB 160 & BIO 162	FHP 20	350	500	
FC-1.20	LAB 156 & OFFICE 157	FHP 20	350	500	
FC-1.21	LAB 156 & BIO 159	FHP 20	350	500	
FC-1.22	OFFICE 163	FHP 10	50		
FC-1.23 (FUTURE)	OFFICE 165	FHP 20	350		
FC-1.24 (FUTURE)	OFFICE 151	FHP 10	50		
FC-1.26 (FUTURE)	OFFICE 150	FHP 20	350		
TOTAL			2,950	2,950	
(E) ERV-2					
FC-2.5	LAB 120	FHP 26	300	400	
	BIO 221			350	
FC-2.6	OFFICE 222	FHP 10	50	100	
FC-2.7	LAB 223 & OFFICE 225	FHP 26	300	400	
FC-2.8 (FUTURE)	OFFICE 224	FHP 10	50		
FC-2.9 (FUTURE)	OFFICE 226	FHP 10	50		
FC-2.10	LAB 227	FHP 26	300	400	
FC-2.11 (FUTURE)	LAB 231	FHP 10	50		
FC-2.12 (FUTURE)	OFFICE 229	FHP 26	0		
FC-2.13	OFFICE 233	FHP 10	50		
FC-2.14	LAB 234 7 BIO 232	FHP 20	300	425	
FC-2.15	LAB 234	FHP 20	300	425	
FC-2.16 (FUTURE)	OFFICE 241	FHP 10	50		
FC-2.17	SHARED OFFICE 235	FHP 26	300		
FC-2.18 (FUTURE)	LAB 242	FHP 20	300		
	OFFICE 240			300	
	AUTOCLAVE		300		
TOTAL			2,700	2,800	

NOTE:

PUMP SCHEDULE

PLAN CODE	MFGR	SERVES	MODEL NO	TYPE	GPM	HEAD (FT)	RPM	HP (WATTS)	POWER (V/PH/HZ)	REMARKS
GWP-1.1	TACO	PRIMARY - GEOTHERMAL	FI3007D-4P-PM	BASE MTD	200	30.0	1,760	3.0	208/3/60	NOTE 1, 3, 4
GWP-1.2	TACO	PRIMARY - GEOTHERMAL	FI3007D-4P-PM	BASE MTD	200	30.0	1,760	3.0	208/3/60	NOTE 1, 3, 4
CHWP-1.1	TACO	PRIMARY - CHILLER	FI3007D-4P-PM	BASE MTD	300	38.0	1,760	5.0	208/3/60	NOTE 1, 3, 5
CHWP-1.2	TACO	PRIMARY - CHILLER	FI3007D-4P-PM	BASE MTD	300	38.0	1,760	5.0	208/3/60	NOTE 1, 3, 5
CHWP-2.1	TACO	SECONDARY - CHILLED	FI3009D-4P-PM	BASE MTD	460	60.0	1,760	15.0	208/3/60	NOTE 1, 2, 5
CHWP-2.2	TACO	SECONDARY - CHILLED	FI3009D-4P-PM	BASE MTD	460	60.0	1,760	15.0	208/3/60	NOTE 1, 2, 5
BP-2	TACO	PRIMARY - BOILER	0034e	CIRCULATOR	38	9	1,760	(170)	120/1/60	NOTE 6
BP-3	TACO	PRIMARY - BOILER	1915	VERTICAL INLINE	38	28	1,760	(170)	120/1/60	NOTE 6
HWP-1	TACO	SECONDARY - HEATING HOT WATER	KV 3007D	VERTICAL INLINE	224	45	1,760	5.0	208/3/60	NOTE 2, 6
HWP-2	TACO	SECONDARY - HEATING HOT WATER	KV 3007D	VERTICAL INLINE	224	45	1,760	5.0	208/3/60	NOTE 2, 6

REMARKS:
1.) BASED ON 40% PROPYLENE GLYCOL SOLUTION.
2.) PROVIDE DANFOSS 102 DRIVE W/ 3 CONTACT BYPASS, MAINS DISCONNECT SWITCH, INTERNAL DUAL DC LINK REACTORS, 100kA SCCR.
3.) PROVIDE DANFOSS 102 DRIVE W/ 3 CONTACT BYPASS, MAINS DISCONNECT SWITCH, INTERNAL DUAL DC LINK REACTORS, 100kA SCCR. PUMP TO BE RAN AS CONSTANT VOLUME W/ VFD USED FOR BALANCING PURPOSES.
4.) PROVIDE TACO 040040-5 SUCTION DIFFUSER W/ ADJUSTABLE FOOT SUPPORT.
5.) PROVIDE TACO 060040-5 SUCTION DIFFUSER W/ ADJUSTABLE FOOT SUPPORT.
6.) BASED ON 35% PROPYLENE GLYCOL SOLUTION.

HOT WATER BOILER SCHEDULE

PLAN CODE	MFGR	MODEL NO	FUEL	MBH INPUT	MBH OUTPUT	MIN. EFFICIENCY	GPM	ENT. WATER TEMP.	LVG. WATER TEMP.	MAX P.D. (FT.)	POWER (V/PH/HZ)	OPER. WT. (LBS.)	ASME PRESSURE RATING	REMARKS
B-2	LOCHINVAR	FTX-400N	NG	399	392	98%	39	120	140	3.5	120/1/60	545	160	NOTE 1,2
B-3	LOCHINVAR	FTX-400N	NG	399	392	98%	39	120	140	3.5	120/1/60	545	160	NOTE 1,2

NOTES:
1) VENTING MATERIAL TO BE 4" CATEGORY IV CPVC.
2) PROVIDE CONDENSATE NEUTRALIZATION KIT.

AIR SEPARATOR SCHEDULE

PLAN CODE	MFGR	MODEL	GPM	PIPE SIZE	REMARKS
AS-1	TACO	4906AD-125	469	6"	-
AS-2	TACO	4905AD-125	304	5"	-

EXPANSION TANK SCHEDULE

PLAN CODE	MFGR	MODEL	TOTAL VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	PRECHARGE PRESSURE (PSIG)
ET-1	TACO	CA300-125	79	79	20
ET-2	TACO	CA450-125	119	119	20

SPLIT SYSTEM AC UNIT SCHEDULE

EVAPORATOR		
PLAN CODE	SS-1	SS-2
MANUFACTURER	VERTIV	VERTIV
MODEL	WLM0110A	WLM070A
SENSIBLE CAP	37,500	24,000
CFM	1,885	1,300
POWER	208/1/60	208/1/60
CONDENSING UNIT		
PLAN CODE	SS-1	SS-1
MFGR	VERTIV	VERTIV
MODEL	CUD11	RK30WMVJU9
AMBIENT TEMP	95	95
LOW AMBIENT TEMP	-31	-31
REFRIGERANT	R-32	R-32
POWER	208/1/60	208/1/60
MCA/ MOP	16.3/ 20	16.6/ 20

Notes:
1. PROVIDE WIRED THERMOSTAT.
2. PROVIDE CONDENSATE PUMP KIT.
3. PROVIDE 24" ROOF STAND FOR CONDENSING UNIT.

GLYCOL FEED UNIT SCHEDULE

PLAN CODE	MFGR	MODEL	SERVICE	CAPACITY (GAL)	PUMP GPM	HP	POWER	TANK MATERIAL	REMARKS
GF-1	ADVANTAGE CONTROLS	GF-1A1A1G-C12	CHILLED	55	2.0	1/3	120/1/60	POLY	NOTE 1, 2, 3

REMARKS:
1.) PROVIDE COMMUNICATIONS CARD BACNET TCP/IP
2.) PROVIDE LOW LEVEL SWITCH W/ AUDIBLE ALARM.
3.) PROVIDE PRE-CONFIGURED ETL LISTED XS SERIES CONTROLLER PREWIRED FOR SINGLE PUMP SYSTEM.

GRILLES, REGISTERS, AND DIFFUSERS SCHEDULE

PLAN CODE	MFGR	MODEL	NOMINAL FACE SIZE	NECK SIZE	MAX. CFM	MATERIAL	FINISH	FRAME	REMARKS
S-1	PRICE	SPD	24x24	10"□	380	STEEL	NOTE 1	LAY-IN	-
S-2	PRICE	SPD	24x24	12"□	550	STEEL	NOTE 1	LAY-IN	-
R-1	PRICE	PDDR	24x24	18x18	2100	STEEL	NOTE 1	LAY-IN	-
R-2	PRICE	PDDR	24x24	14"□	1035	STEEL	NOTE 1	LAY-IN	-
R-3	PRICE	PDDR	24x24	10"□	500	STEEL	NOTE 1	LAY-IN	-
E-1	PRICE	PDDR	24x24	12"□	500	STEEL	NOTE 1	LAY-IN	-

NOTES:
1 - ARCHITECTURAL FIELD REPRESENTATIVE TO SELECT FINAL COLOR.

%100% CD

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

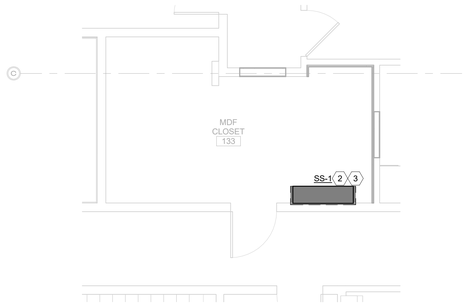
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

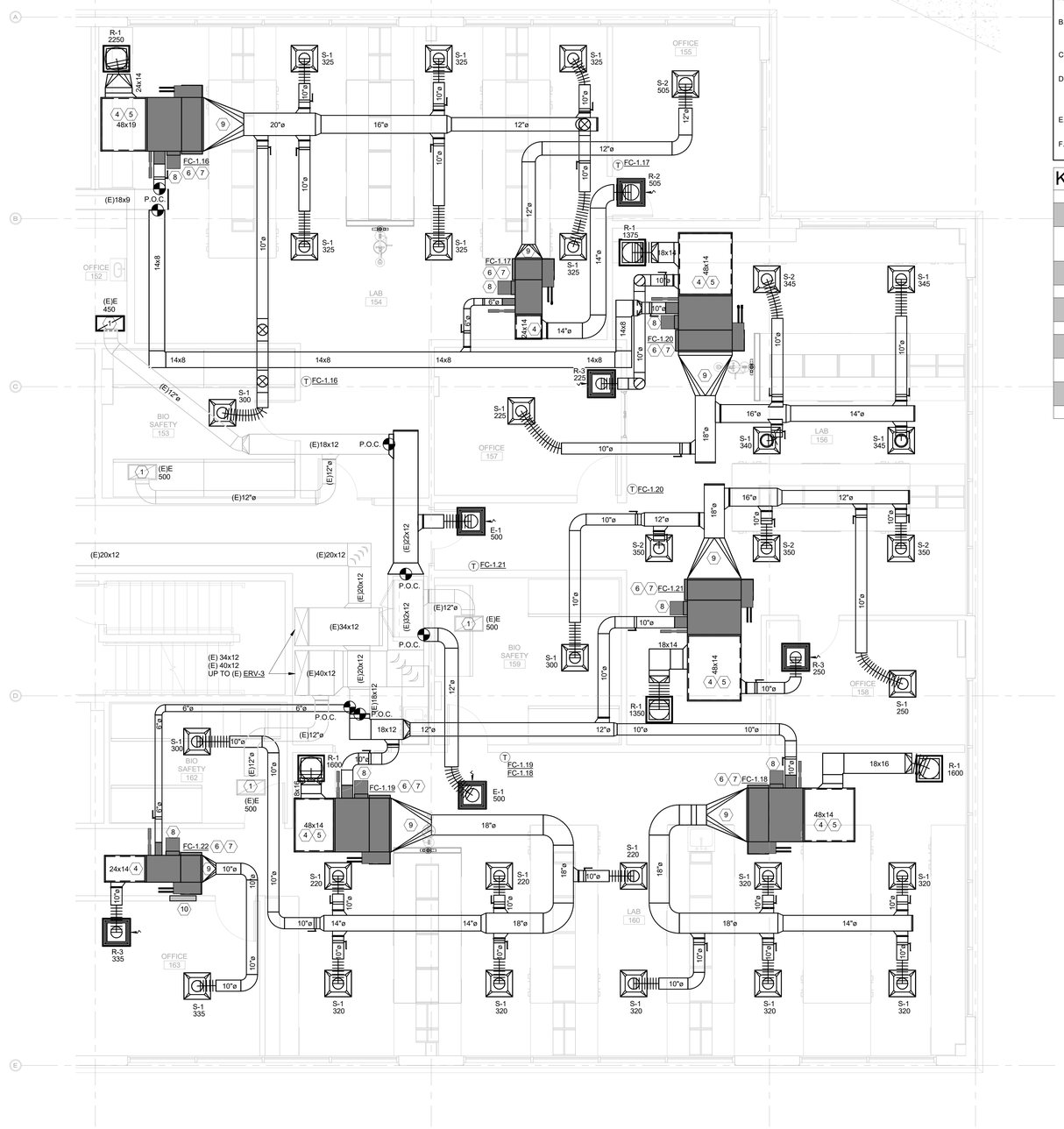
SHEET TITLE
MECHANICAL SCHEDULES

SHEET
M102

DATE
12/12/25



2 Level 1 - HVAC ENLARGED - MDF ROOM
1/4" = 1'-0"



1 Level 1 - HVAC PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. ITEMS SHOWN DARK AND DASHED AND/ OR NOTED TO BE REMOVED. ITEMS SHOWN IN LIGHT LINE AND/ OR NOTED (E) ARE EXISTING TO REMAIN. ITEMS SHOWN IN HEAVY LINE AND/ OR NOTED W/ (N) ARE NEW.

C. PROVIDE SEISMIC BRACING ON ALL PIPING, DUCTWORK, AND EQUIPMENT AS REQUIRED BY 2021 IBC.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Balance (E) grille/ diffuser to shown flow rate. See M102 for detail.
2	Install wall mounted fan coil/ split system per mfgr's instructions. Route refrigeration piping to/ from indoor/ outdoor unit.
3	Pump condensate to nearest trap tailpiece, mop sink or floor drain.
4	Provide 1" acoustically lined return duct.
5	Provide duct smoke detector on return duct. Upon detection of smoke unit shall shut down.
6	Connect to (E) fan coil unit condensate drain.
7	Install fan coil per mfgr's instructions. Maintain all required clearances.
8	MFRG clearance requirements shown on this side of unit. Maintain clear area around unit for ladder access.
9	Provide 10x10 duct access door for use in future fan coil unit coil cleaning.
10	Provide access through wall to access fan coil valve box.

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MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author		
REVIEWED BY Checker		
REV.	DESCRIPTION	DATE

PPA#22-0045

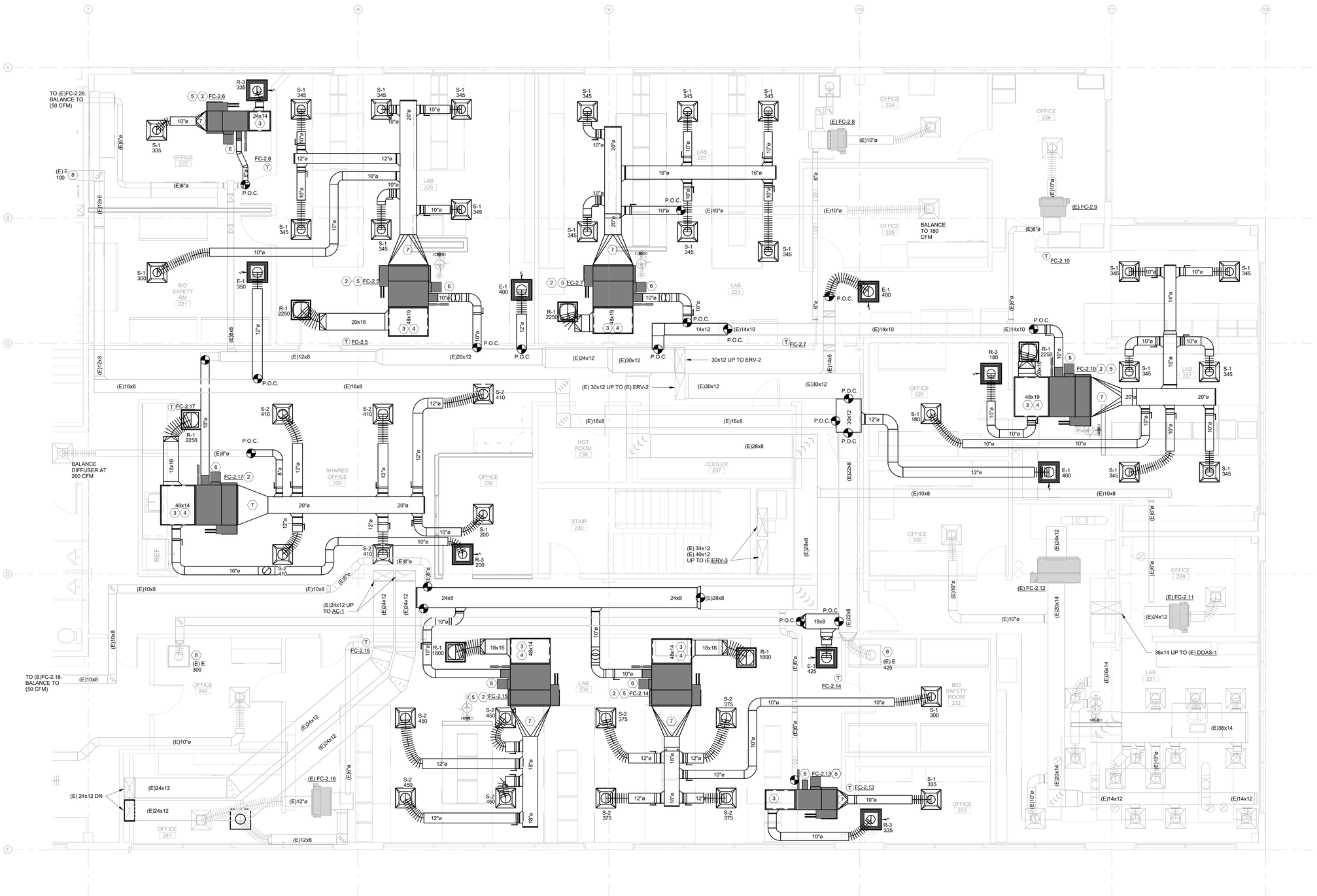
A/E#00-00-00

BA# 2236

SHEET TITLE
LEVEL 1 - HVAC PLANS

SHEET
M201

DATE
12/12/25



1 Level 2 - HVAC PLAN
1/4" = 1'-0"

2 Level 2 - HVAC ENLARGED - DATA ROOM
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. ITEMS SHOWN DARK AND DASHED AND/ OR NOTED TO BE REMOVED. ITEMS SHOWN IN LIGHT LINE AND/ OR NOTED (E) ARE EXISTING TO REMAIN. ITEMS SHOWN IN HEAVY LINE AND/ OR NOTED W/ (N) ARE NEW.

C. PROVIDE SEISMIC BRACING ON ALL PIPING, DUCTWORK, AND EQUIPMENT AS REQUIRED BY 2021 IBC.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Install wall mounted fan coil/ split system per mfgr's instructions. Route refrigeration piping to/ from indoor/ outdoor unit.
2	Connect to (E) fan coil unit condensate drain.
3	Provide 1" acoustically lined return duct.
4	Provide duct smoke detector on return duct. Upon detection of smoke unit shall shut down.
5	Install fan coil per mfgr's instructions. Maintain all required clearances.
6	MFRG clearance requirements shown on this side of unit. Maintain clear area around unit for ladder access.
7	Provide 10x10 duct access door for use in future fan coil unit coil cleaning.
8	Balance (E) grille/ diffuser to shown flow rate. See M102 for detail.
9	

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717
PHONE: 406.994.3413
FAX: 406.994.5665

%100% CD

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

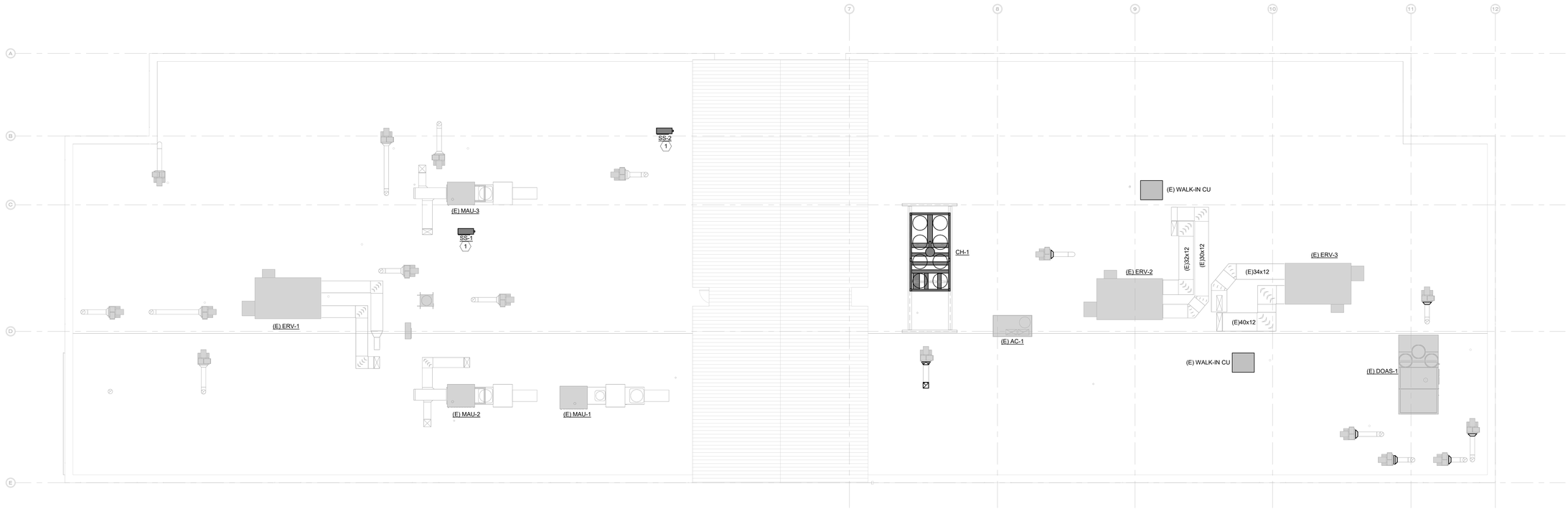
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

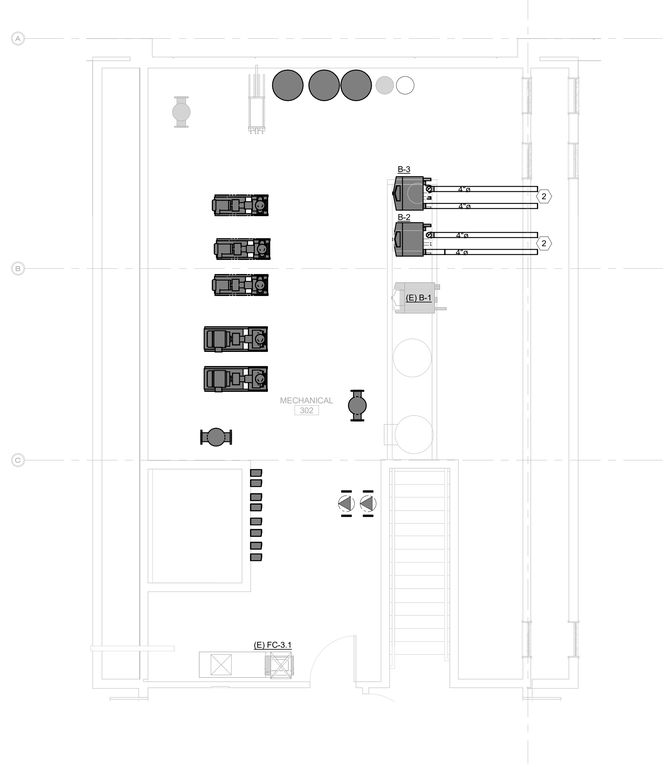
SHEET TITLE
LEVEL 2 - HVAC PLANS

SHEET
M202

DATE
12/12/25



1 ROOF - HVAC ROOF PLAN
1/8" = 1'-0"



2 Level 3 - HVAC PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. ITEMS SHOWN DARK AND DASHED AND/ OR NOTED TO BE REMOVED. ITEMS SHOWN IN LIGHT LINE AND/ OR NOTED (E) ARE EXISTING TO REMAIN. ITEMS SHOWN IN HEAVY LINE AND/ OR NOTED W/ (N) ARE NEW.

C. PROVIDE SEISMIC BRACING ON ALL PIPING, DUCTWORK, AND EQUIPMENT AS REQUIRED BY 2021 IBC.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Install condensing unit on stand. Seal all refrigerant piping penetrations weather tight.
2	Route 4" CPVC boiler intake and flue piping to exterior wall. Terminate per mfgr's instructions.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: BRE
REVIEWED BY Checker

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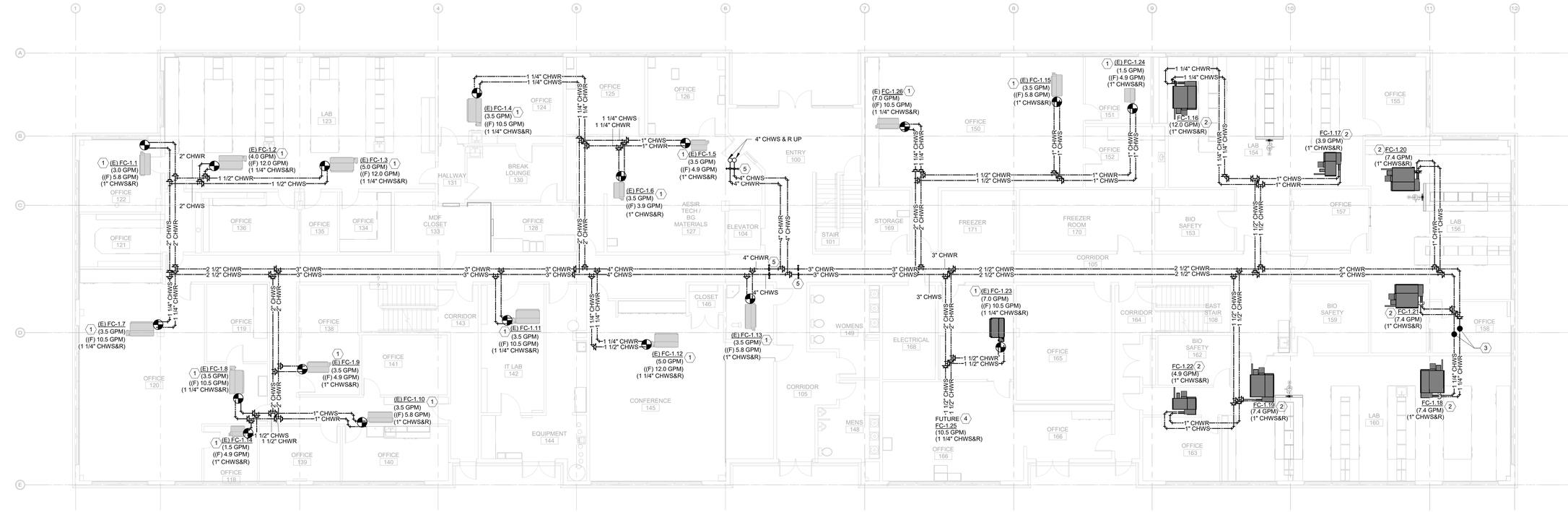
PPA#22-0045
A/E#00-00-00
BA# 2236

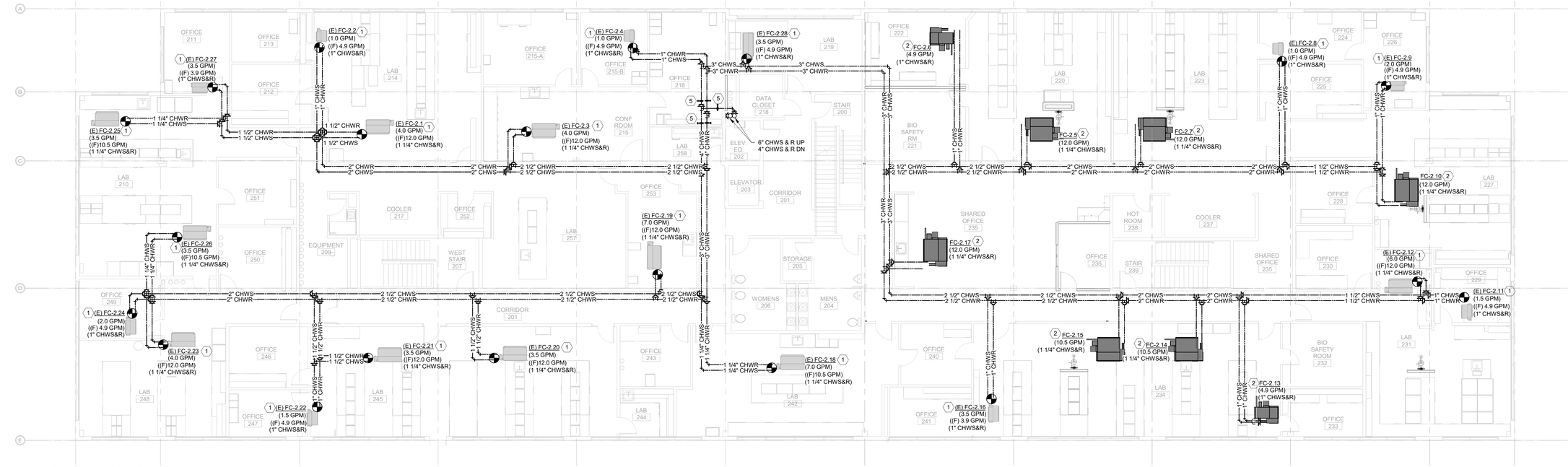
SHEET TITLE
LEVEL 3 & ROOF- HVAC PLAN

SHEET
M203

DATE
12/12/25



1 Level 1 - CHILLED WATER PIPING PLAN
1/8" = 1'-0"



2 Level 2 - CHILLED WATER PIPING PLAN
1/8" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

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E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Connect chilled water to (E) fan coil. Provide new control valve set. See M601 for detail.
2	Connect to (N) fan coil unit to chilled water piping. Provide control valve set. See M601 for detail.
3	Provide differential pressure sensor for chilled water pump control (CHWP-2.1 or 2) at this location.
4	Valve and cap chilled water piping for future fan coil unit.
5	Provide isolation valves off main to allow for floor, East and West hydronic piping isolation.

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MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA 59717
PHONE: 406.994.3413
FAX: 406.994.5665

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

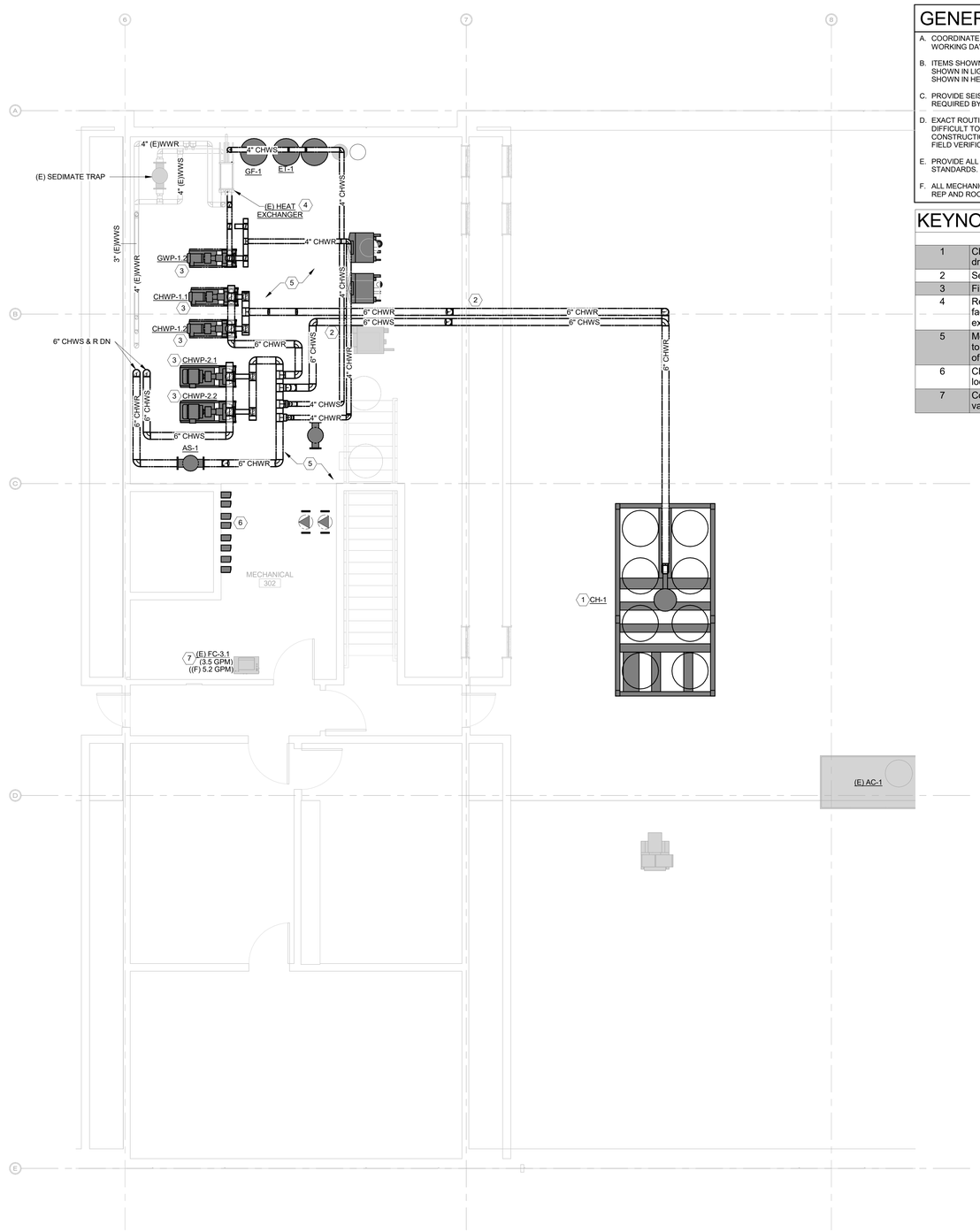
DRAWN BY: Author		
REVIEWED BY Checker		
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 1 & 2 - CHILLED WATER PIPING PLANS

SHEET
M301

DATE
12/12/25



1 Level 3 - CHILLED WATER PIPING PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

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E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Chiller to be mounted on structural system. See structural drawings for details.
2	Seal wall penetration weather tight.
3	Fill pump base w/ grout.
4	Relocate (E) Geothermal Heat Exchanger as required to facilitate new piping arrangements. Chemical flush heat exchanger before bringing online.
5	Mechanical room has limited space. Route piping as tight to ceiling as possible. Maintain minimum head clearance of 6'-8".
6	Chilled water pump/s VFD location. Coordinate final locations w/ (E) VFD drives in location.
7	Connect chilled water to (E) fan coil. Provide new control valve set. See M601 for detail.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

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MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

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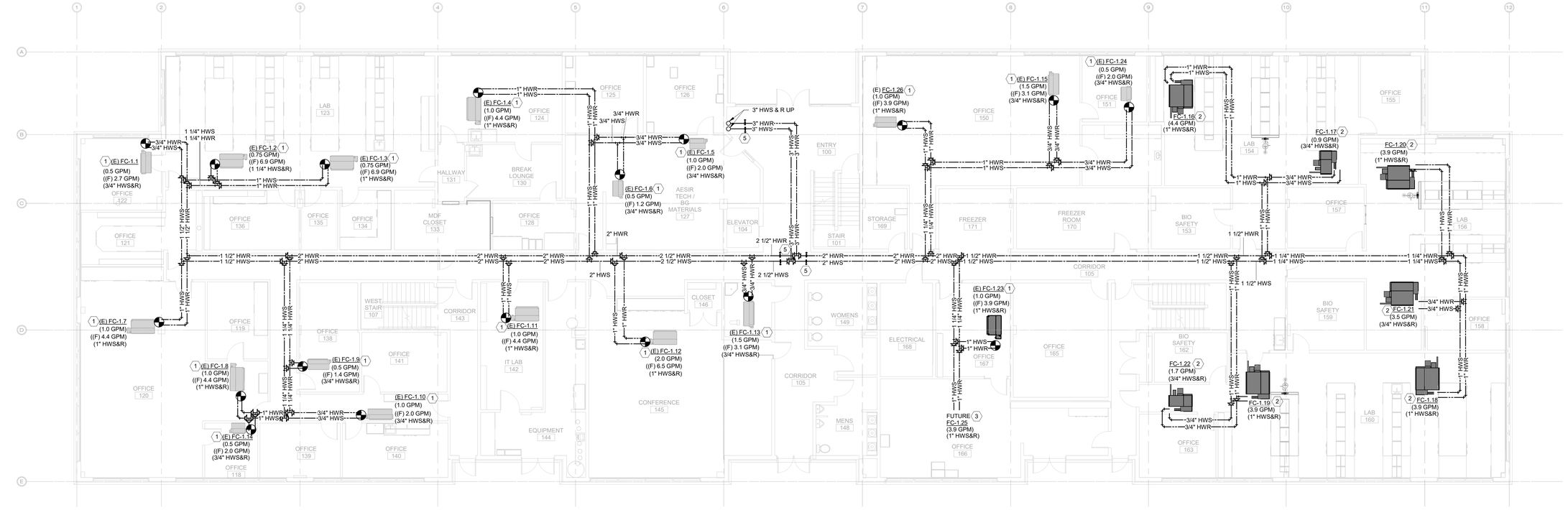
PPA#22-0045
A/E#00-00-00
BA# 2236

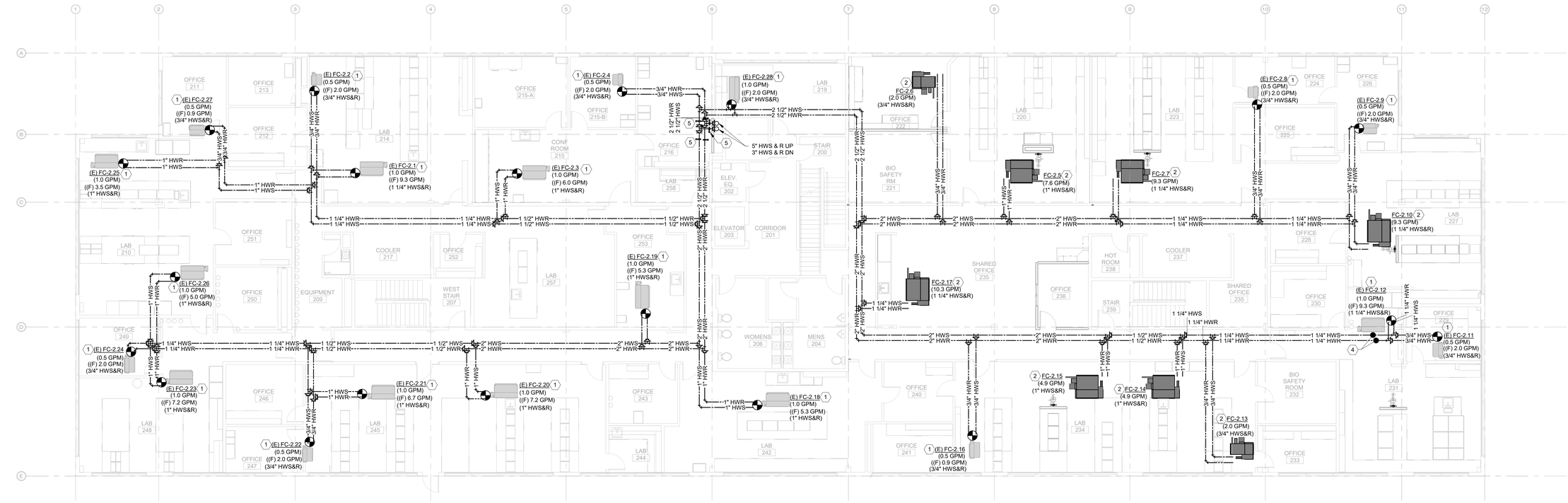
SHEET TITLE
LEVEL 3 - CHILLED WATER PIPING PLAN

SHEET
M302

DATE
12/12/25



1 Level 1 - HEATING HOT WATER PIPING PLAN
1/8" = 1'-0"



2 Level 2 - HEATING HOT WATER PIPING PLAN
1/8" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

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C. PROVIDE SEISMIC BRACING ON ALL PIPING, DUCTWORK, AND EQUIPMENT AS REQUIRED BY 2021 IBC.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Connect heating hot water to (E) fan coil. Provide new control valve set. See M601 for detail.
2	Connect to (N) fan coil unit to heating hot water piping. Provide control valve set. See M601 for detail.
3	Valve and cap heating hot water piping for future fan coil unit.
4	Provide differential pressure sensor for heating hot water pump control (HWP-1.1 or 2) at this location.
5	Provide isolation valves off main to allow for floor, East and West hydronic piping isolation.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

%100% CD

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

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REV.	DESCRIPTION	DATE

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE

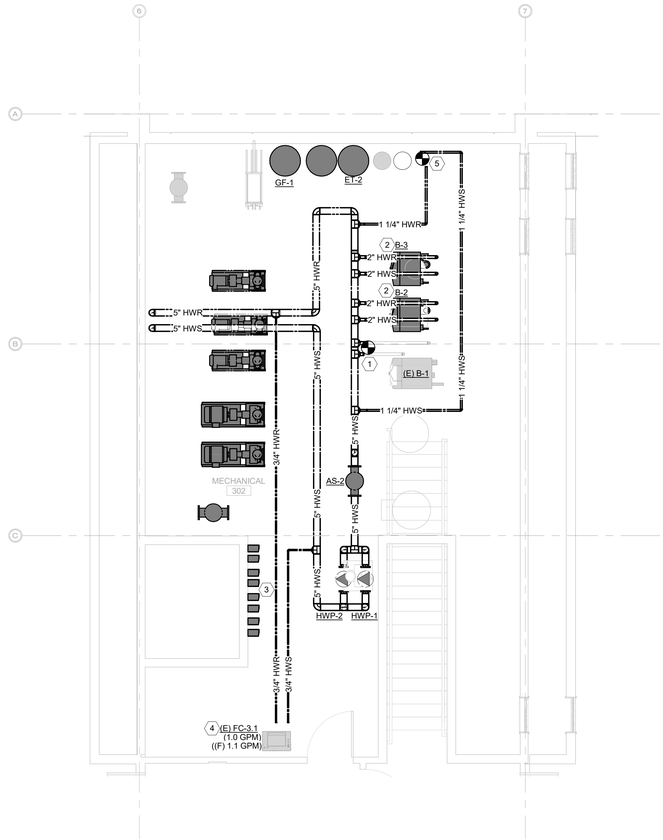
LEVEL 1 & 2 - HEATING HOT WATER PLANS

SHEET

M303

DATE

12/12/25



1 Level 3 - HEATING HOT WATER PIPING PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

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E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL MECHANICAL WORK SHALL BE COORDINATED W/ ARCHITECTURAL FIELD REP AND ROOFING MFGR REQUIRES.

KEYNOTES

1	Connect (e) 2" boiler piping to heating hot water secondary loop.
2	Install new boiler in (E) floor tray. Route condensate to nearest floor sink.
3	Heating hot water pump/s VFD location. Coordinate final locations w/ (E) VFD drives in location.
4	Connect heating hot water to (E) fan coil. Provide new control valve set. See M601 for detail.
5	Connect to (E) snow melt system.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406 600.8796
www.seengineersmt.com

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SHEET TITLE

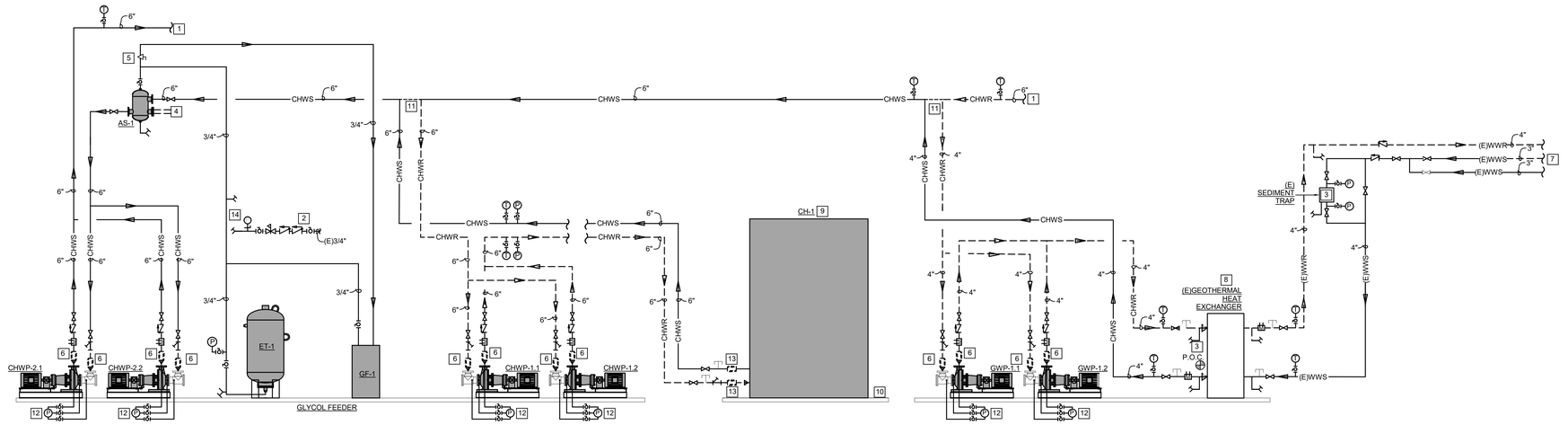
LEVEL 3 - HEATING HOT WATER PIPING PLAN

SHEET

M304

DATE

12/12/25

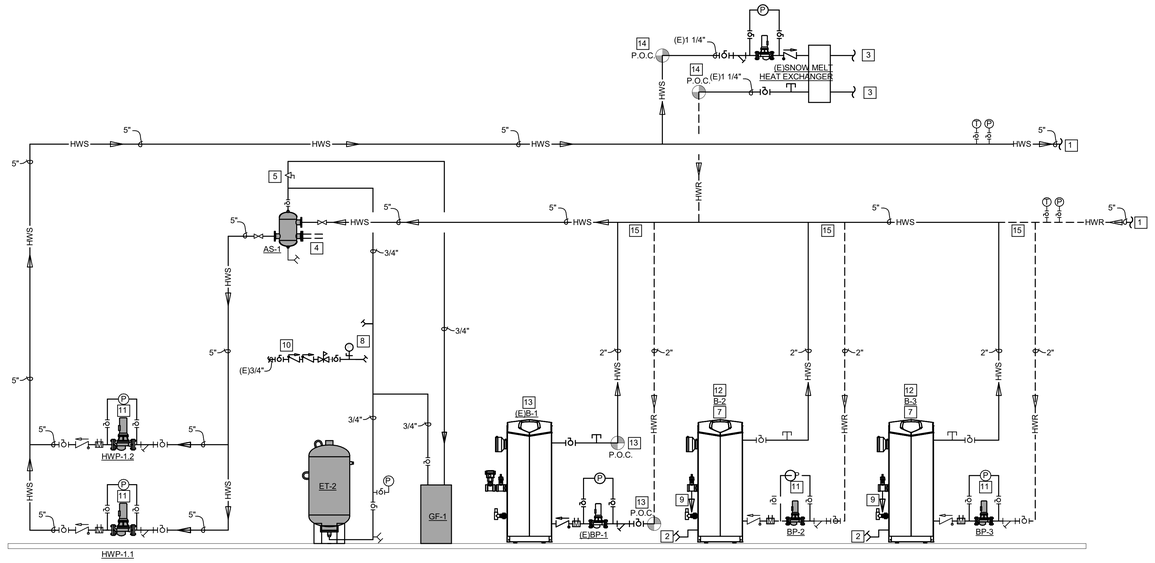


1 M401 CHILLED WATER FLOW DIAGRAM

NTS

FLOW DIAGRAM NOTES:

1. SECONDARY CHILLED WATER LOOP CONTINUED TO BUILDING.
2. (E)3/4" WATER FILL VALVE ASSEMBLY. FIELD VERIFY LOCATION.
3. CLEAN/ SERVICE (E) SEDIMENT TRAP.
4. KEEP AREA CLEAR FOR STRAINER SERVICE.
5. AUTOMATIC AIR VENT PIPED TO GLYCOL FEEDER GF-1.
6. COMBINATION DISCHARGE INCREASER, BRAIDED FLEXIBLE PUMP CONNECTOR AND FLOW STRAIGHTENER. METRAFLEX MODEL VFRFG OR EQUAL.
7. CONTINUED TO BUILDING/ (E) GEOTHERMAL WELLS.
8. (E) GEOTHERMAL HEAT EXCHANGER TO BE FLUSHED AND CLEANED IN PLACE.
9. AIR COOLED CHILLER LOCATED OUTDOORS ON ROOF. SEE 1/M302 FOR LOCATION.
10. EQUIPMENT LOCATED ON OUTDOORS ROOF.
11. PRIMARY/ SECONDARY DECOUPLE LOCATION. DECOUPLE PIPING TO BE (3) PIPE DIAMETERS IN LENGTH.
12. LIQUID FILLED PRESSURE GAUGE WITH (0-100) PSIG RANGE.
13. BRAIDED FLEXIBLE EQUIPMENT CONNECTOR. METRAFLEX MODEL SLPC OR EQUAL.
14. PROVIDE HOSE END VALVE FOR EMERGENCY FILL.



HEATING HOT WATER FLOW DIAGRAM NOTES

1. CONTINUED TO BUILDING HEATING HOT WATER PIPNG.
2. BOILER DRAIN COCK WITH HOSE END CONNECTION, TYPICAL.
3. CONTINUED TO SNOW MELT SYSTEM.
4. KEEP AREA CLEAR FOR STRAINER SERVICE
5. AUTOMATIC AIR VENT PIPED TO GLYCOL FEEDER GF-1.
6. LIQUID FILLED PRESSURE GAUGE WITH (0-100) PSIG RANGE
7. COORDINATE PIPING WITH FLUE VENTING AND COMBUSTION AIR VENT. INSTALL FLUE & VENT IN ACCORDANCE WITH MANUFACTURERS WRITTEN INSTALLATION INSTRUCTIONS.
8. PROVIDE HOSE END VALVE FOR EMERGENCY FILL.
9. PIPE BOILER RELIEF TO FLOOR DRAIN - FULL SIZE.
10. (E)3/4" WATER FILL VALVE ASSEMBLY. FIELD VERIFY LOCATION.
11. PRESSURE GAUGE MANIFOLD SHALL BE CONSTRUCTED OF 1/2" A53 THREADED BLACK STEEL PIPE AND 1/2" BALL VALVES. CONNECTIONS SHALL BE MADE TO THE FLANGE TAPS ON THE INLET AND OUTLET OF EACH PUMP. INSTALL A SNUBBER ON EACH PRESSURE GUAGE. TYPICAL FOR ALL PUMPS.
12. ROUTE CONDENSATE DRAIN TO NEAREST FLOOR DRAIN. PROVIDE CONDENSATE NEUTRALIZATION KIT.
13. CONNECT TO (E) BOILER PIPING. FIELD VERIFY EXACT LOCATION. RELOCATE BOILER AS NECESSARY.
14. CONNECT TO (E) SNOWMELT HEAT EXCHANGER PIPING. FIELD VERIFY EXACT LOCATION.
15. PRIMARY/ SECONDARY DECOUPLE LOCATION. DECOUPLE PIPING TO BE (3) PIPE DIAMETERS IN LENGTH.

2 M401 HEATING HOT WATER FLOW DIAGRAM

NOT TO SCALE

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION

MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

%100% CD

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author		
REVIEWED BY Checker		
REV.	DESCRIPTION	DATE

BRIAN KOHLER SE 25 NATIONAL

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE

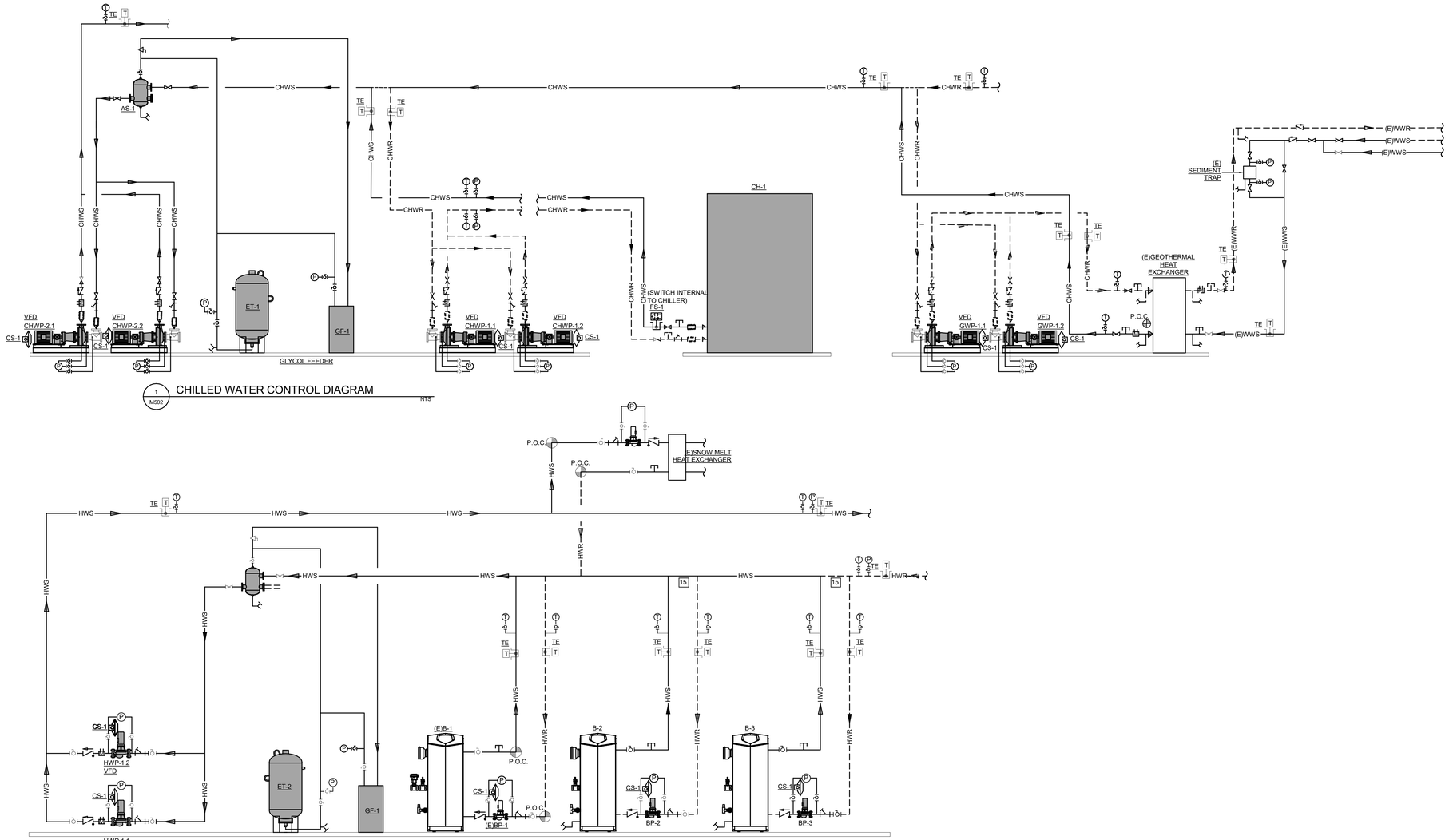
FLOW DIAGRAMS

SHEET

M401

DATE

12/12/25



1 M502 CHILLED WATER CONTROL DIAGRAM NTS

2 M502 HEATING HOT WATER CONTROL DIAGRAM NTS

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author		
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PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE

CONTROLS

SHEET

M501

DATE

12/12/25

DDC TEMPERATURE CONTROL LEGEND

TE-1	WELL-MOUNTED INSERTION SENSOR
TE-1	DUCT-MOUNTED INSERTION SENSOR
TLL-1	LOW LIMIT TEMPERATURE SWITCH
TS-1	WELL-MOUNTED TEMPERATURE SWITCH
TS-1	DUCT-MOUNTED TEMPERATURE SWITCH
DPS-1	DIFFERENTIAL PRESSURE SWITCH
DPT-1	DIFFERENTIAL PRESSURE TRANSIMITTER
HE-1	ROOM HUMIDITY SENSOR
HE-1	DUCT-MOUNTED HUMIDITY SENSOR
	EMCS CONTROL POINT
FM-2	FLOW MEASURING STATION
SD-1	SMOKE DETECTOR
D-1	CONTROL DAMPER W/ ACTUATOR (NORMALLY CLOSED DAMPER INDICATED)
C02-1	CARBON DIOXIDE SENSOR
R-1	CONTROL RELAY
CS-1	CURRENT-SENSING STATUS SWITCH
V-1	3-WAY CONTROL VALVE (NORMALLY OPEN, NORMALLY CLOSED & COMMON PORTS INDICATED)
V-1	2-WAY CONTROL VALVE. (NORMALLY OPEN VALVE INDICATED)
TT-1	AVERAGING TEMPERATURE SENSOR
TT-1	OUTDOOR TEMPERATURE SENSOR (WITH SUN SHIELD)
TE-1	ROOM TEMPERATURE SENSOR

EA	EXHAUST AIR
RA	RETURN AIR
RLA	RELIEF AIR
SA	SUPPLY AIR
OA	OUTDOOR AIR
NC	NORMALLY CLOSED VALVE OR DAMPER
NO	NORMALLY OPEN VALVE OR DAMPER

CONTROL SYSTEM POINTS LIST

	DIGITAL INPUT								ANALOG INPUT						BINARY	ANALOG OUTPUT		INTERFACE DISPLAY				REMARKS
	PULSE	END SWITCH	AUX. CONTACT	ALARM CONTACT	PRESSURE SWITCH (PRESS., DIFF. PRESS.)	TEMPERATURE SWITCH	VOLTAGE SENSING RELAY	CURRENT SENSING RELAY	POSITION FEEDBACK	4-20 MA INPUT	0-10 VDC INPUT	TEMPERATURE SENSOR	PRESSURE SENSOR (PRESS., DIFF. PRESS.)	HUMIDITY SENSOR	MOMENTARY	MAINTAINED	4-20 MA OUTPUT	0-10 VDC OUTPUT	ALARM NOTIFICATION	COMMAND OUTPUT	SETPOINT ADJUSTMENT	OVERRIDE ON/OFF	
CHILLED WATER																							
CHWS SETPOINT																				X			
CHWP-2.1 ENABLE																X							
CHWP-2.1 STATUS								X															
CHWP-2.1 VFD INTERFACE																			X	X	X	X	
CHWP-2.2 ENABLE																X							
CHWP-2.1 STATUS								X															
CHWP-2.1 VFD INTERFACE																			X	X	X	X	
CHW SYSTEM PRESS. DIFF 1													X										
CHW SYSTEM SUPPLY TEMP												X											
CHW SYSTEM RETURN TEMP												X											
GWP-1.1 ENABLE																X							
GWP-1.1 STATUS								X															
GWP-1.2 ENABLE																X							
GWP-1.2 STATUS								X															
CHWP-1.1 ENABLE																X							
CHWP-1.1 STATUS								X															
CHWP-1.2 ENABLE																X							
CHWP-1.2 STATUS								X															
GEOTHERMAL WATER SUPPLY TEMP												X											
GEOTHERMAL WATER RETURN TEMP												X											
CHILLER CH-1 STATUS																X							
HEATING HOT WATER																							
HWS SETPOINT																				X			
HWP-1.1 ENABLE																X							
HWP-1.1 STATUS								X															
HWP-1.1 VFD INTERFACE																			X	X	X	X	
HWP-1.2 ENABLE																X							
HWP-1.2 STATUS								X															
HWP-1.2 VFD INTERFACE																			X	X	X	X	
HW SYSTEM PRESS. DIFF 1													X										
HW SYSTEM SUPPLY TEMP												X											
HW SYSTEM RETURN TEMP												X											
BOILER B-1 STATUS																X							
BOILER PUMP BP-1 STATUS																X							
BOILER B-2 STATUS																X							
BOILER PUMP BP-2 STATUS																X							
BOILER B-3 STATUS																X							
BOILER PUMP BP-3 STATUS																X							
FAN COIL UNITS (15 NEW UNITS)																							
(15) ZONE TEMPERATURE												X											
(15) HEATING WATER VALVE																	X						
(15) CHILLED WATER VALVE																	X						
GENERAL CONTROL POINTS																							
OUTSIDE AIR TEMPERATURE												X											

NOTE:
POINTS LIST IS A MINIMUM LIST OF POINTS FOR THE SYSTEM. CONTRACTOR SHALL PROVIDE ALL POINTS NEEDED FOR FULLY OPERATIONAL SYSTEM AND TO MEET SYSTEM REQUIREMENTS.
ALL POINTS SHALL BE ADJUSTABLE.

1.1 CHILLED WATER PLANT CONTROL SEQUENCE

A. SECONDARY CHILLED WATER PUMPS (CHWP-2.1 & 2) : THE SECONDARY PUMPS ARE 100% REDUNDANT AND SHALL ALTERNATE ON A WEEKLY BASIS. DURING PUMP ALTERNATION LAG PUMP SHALL RAMP UP TO LEAD PUMP SPEED AND AFTER A 1 MINUTE DELAY THE LEAD PUMP SHALL RAMP DOWN AND SHUT OFF. PUMPS SHALL OPERATE 24/7/365.
THE PUMPS SHALL BE CONTROLLED IN A MANNER TO MAINTAIN THE SYSTEM DIFFERENTIAL PRESSURE DETERMINED BY THE TEST AND BALANCE CONTRACTOR. THE CONTROL CONTRACTOR SHALL FURNISH THE VFD'S FOR EACH PUMP MOTOR. THE LEAD PUMP SHALL OPERATE CONTINUOUSLY TO MAINTAIN THE SYSTEM DIFFERENTIAL SET POINT. IF THE LEAD PUMP FAILS, THE LAG PUMP SHALL BE ENABLED AND AN ALARM REQUIRING ACKNOWLEDGEMENT SHALL BE INITIATED AT THE OPERATOR WORKSTATION. PROVIDE CURRENT SENSORS FOR PROOF OF FLOW AND PUMP STATUS INDICATION.

B. PRIMARY CHILLED WATER PUMPS CHWP 1.1 & 2 : THE PRIMARY PUMPS SHALL BE STARTED AND STOPPED BASED ON CHILLER SEQUENCE LISTED BELOW. THE PRIMARY PUMPS ARE 100% REDUNDANT AND SHALL ALTERNATE ONCE A WEEK. PUMPS SHALL OPERATE 24/7/365. PROVIDE A CURRENT SENSOR FOR EACH PUMP FOR PROOF OF FLOW. IF THE LEAD PUMP FAILS, THE LAG PUMP SHALL BE ENABLED AND AN ALARM. PUMP SHALL OPERATE AS CONSTANT VOLUME.

B. GEOTHERMAL WATER PUMPS GWP 1.1 & 2 : THE GEOTHERMAL PUMPS SHALL BE STARTED AND STOPPED BASED ON GEOTHERMAL SEQUENCE LISTED BELOW. THE GEOTHERMAL PUMPS ARE 100% REDUNDANT AND SHALL ALTERNATE ONCE A WEEK. PUMPS SHALL OPERATE 24/7/365 PROVIDE A CURRENT SENSOR FOR EACH PUMP FOR PROOF OF FLOW. IF THE LEAD PUMP FAILS, THE LAG PUMP SHALL BE ENABLED AND AN ALARM. PUMP SHALL OPERATE AS CONSTANT VOLUME.

C. CHILLED SEQUENCE: WHEN THE OUTDOOR AIR TEMPERATURE IS ABOVE -5 DEG F. (FIELD ADJUSTABLE) THE CHILLER SHALL UTILIZE PACKAGED FACTORY CONTROLS TO OPERATE THE CHILLER TO MAINTAIN 44 DEG F. (FIELD ADJUSTABLE) CHILLED WATER SUPPLY TEMPERATURE. CHWP-1.1 & 2 SHALL OPERATE TO MAINTAIN MINIMUM FLOW THROUGH CH-1.

D. GEOTHERMAL SEQUENCE: WHEN THE OUTDOOR AIR TEMPERATURE IS BELOW THE CHILLER OPERATING LOW SETPOINT (-5 DEG F. FIELD ADJUSTABLE), THE CONTROL SYSTEM SHALL ENABLE GWP-1.1 OR 2. WELL PUMP SHALL OPERATE 24/7/365 AT 45HZ (FIELD ADJUSTABLE).

1.2 HEATING HOT WATER PLANT CONTROL SEQUENCE

A. SECONDARY HEATING HOT WATER PUMPS (HWP-1.1 & 2) : THE SECONDARY PUMPS ARE 100% REDUNDANT AND SHALL ALTERNATE ON A WEEKLY BASIS. DURING PUMP ALTERNATION LAG PUMP SHALL RAMP UP TO LEAD PUMP SPEED AND AFTER A 1 MINUTE DELAY THE LEAD PUMP SHALL RAMP DOWN AND SHUT OFF. THE PUMPS SHALL BE CONTROLLED IN A MANNER TO MAINTAIN THE SYSTEM DIFFERENTIAL PRESSURE DETERMINED BY THE TEST AND BALANCE CONTRACTOR. THE CONTROL CONTRACTOR SHALL FURNISH THE VFD'S FOR EACH PUMP MOTOR. THE LEAD PUMP SHALL OPERATE CONTINUOUSLY TO MAINTAIN THE SYSTEM DIFFERENTIAL SET POINT. IF THE LEAD PUMP FAILS, THE LAG PUMP SHALL BE ENABLED AND AN ALARM REQUIRING ACKNOWLEDGEMENT SHALL BE INITIATED AT THE OPERATOR WORKSTATION. PROVIDE CURRENT SENSORS FOR PROOF OF FLOW AND PUMP STATUS INDICATION. SHALL OPERATE 24/7/365.

B. BOILERS AND BOILER PUMPS (B-1, 2 & 3) (BP-1, 2, & 3) : THE BOILERS AND BOILER PUMPS SHALL BE MONITORED FOR "STATUS" ONLY. THE BOILERS AND BOILER PUMPS SHALL OPERATE IN A "STAGED" FASHION W/ A SINGLE BOILER OPERATING TO MAINTAIN HOT WATER SUPPLY SET POINT. ONCE A SINGLE BOILER IS UNABLE TO MAINTAIN SETPOINT A SECOND BOILER AND ASSOCIATED BOILER PUMP SHALL ENERGIZE WITH THE THIRD FOLLOWING THE SAME SEQUENCING AFTER THE SECOND FAILS TO MAINTAIN SET POINT. MASTER BOILER DESIGNATION SHALL ALTERNATE FROM BOILER TO BOILER ON A MONTHLY CYCLE. BOILERS AND BOILER PUMPS SHALL BE AVAILABLE 24/7/365.

C. BOILER SEQUENCE: FACTORY CONTROLS TO OPERATE THE BOILER/S AND BOILER PUMP/S. FACTORY CONTROLS TO OPERATE THE BOILER/S AND BOILER PUMP/S TO MAINTAIN 140 DEG F. (FIELD ADJUSTABLE) HEATING WATER SUPPLY TEMPERATURE. SHALL OPERATE TO MAINTAIN MINIMUM FLOW THROUGH CH-1. BOILERS AND BOILER PUMPS SHALL BE AVAILABLE 24/7/365.

1.3 FAN COILS

A. ROOM THERMOSTAT MODULATES THE HEATING AND COOLING VALVES TO MODULATE TO MAINTAIN OCCUPIED SPACE TEMPERATURES. THERMOSTAT SHALL BE PROGRAMMED TO PROVIDE A DEAD-BAND BETWEEN HEATING AND COOLING SET POINTS. UPON A DEMAND FOR HEATING OR COOLING, THE FAN SHALL ENERGIZE.

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MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY: Checker

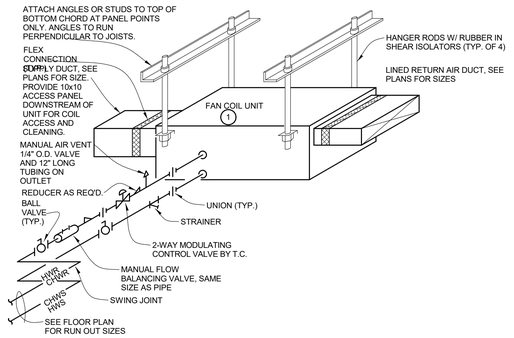
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
CONTROL LEGEND AND SEQUENCE OF OPERATIONS

SHEET
M502

DATE
12/12/25

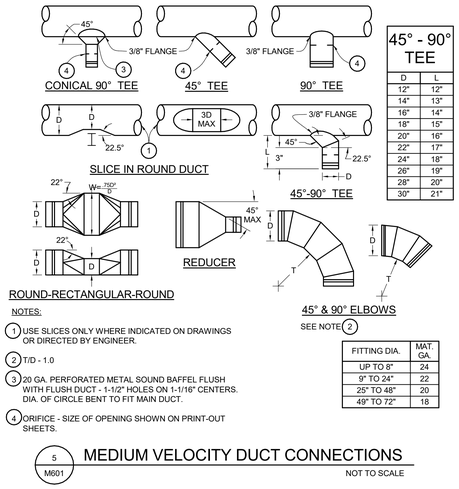


1 M601 **FCU INSTALLATION**

NOT TO SCALE

NOTES:

1. LOCATE FAN COIL UNITS OVER AREAS FREE OF OBSTRUCTION SO UNITS CAN BE SERVICED AND LOWERED IF NECESSARY.



45° - 90° TEE	
D	L
12"	12"
14"	13"
16"	14"
18"	15"
20"	16"
22"	17"
24"	18"
26"	19"
28"	20"
30"	21"

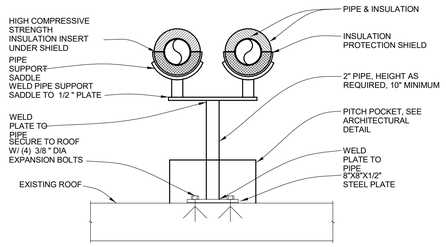
NOTES:

1. USE SLICES ONLY WHERE INDICATED ON DRAWINGS OR DIRECTED BY ENGINEER.
2. T/D - 1.0
3. 20 GA. PERFORATED METAL SOUND BAFFEL FLUSH WITH FLUSH DUCT - 1-1/2" HOLES ON 1-1/16" CENTERS. DIA. OF CIRCLE BENT TO FIT MAIN DUCT.
4. ORIFICE - SIZE OF OPENING SHOWN ON PRINT-OUT SHEETS.

FITTING DIA.	MAT. GA.
UP TO 8"	24
9" TO 24"	22
25" TO 48"	20
49" TO 72"	18

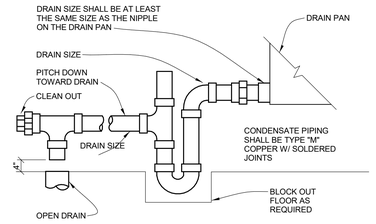
5 M601 **MEDIUM VELOCITY DUCT CONNECTIONS**

NOT TO SCALE



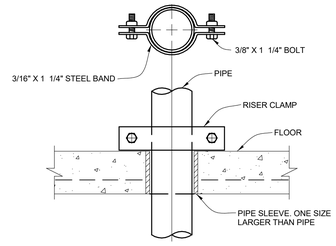
2 M601 **PIPE ON ROOF SUPPORT DETAIL**

NOT TO SCALE



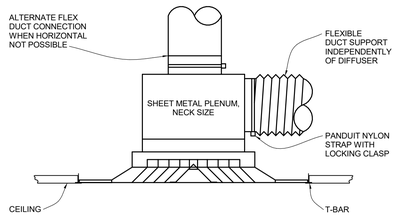
3 M601 **DRAIN TRAP DETAIL**

NOT TO SCALE



4 M601 **RISER CLAMP DETAIL**

NOT TO SCALE



6 M601 **DIFFUSER IN LAY-IN CEILING DETAIL**

NOT TO SCALE

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION

MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5565

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

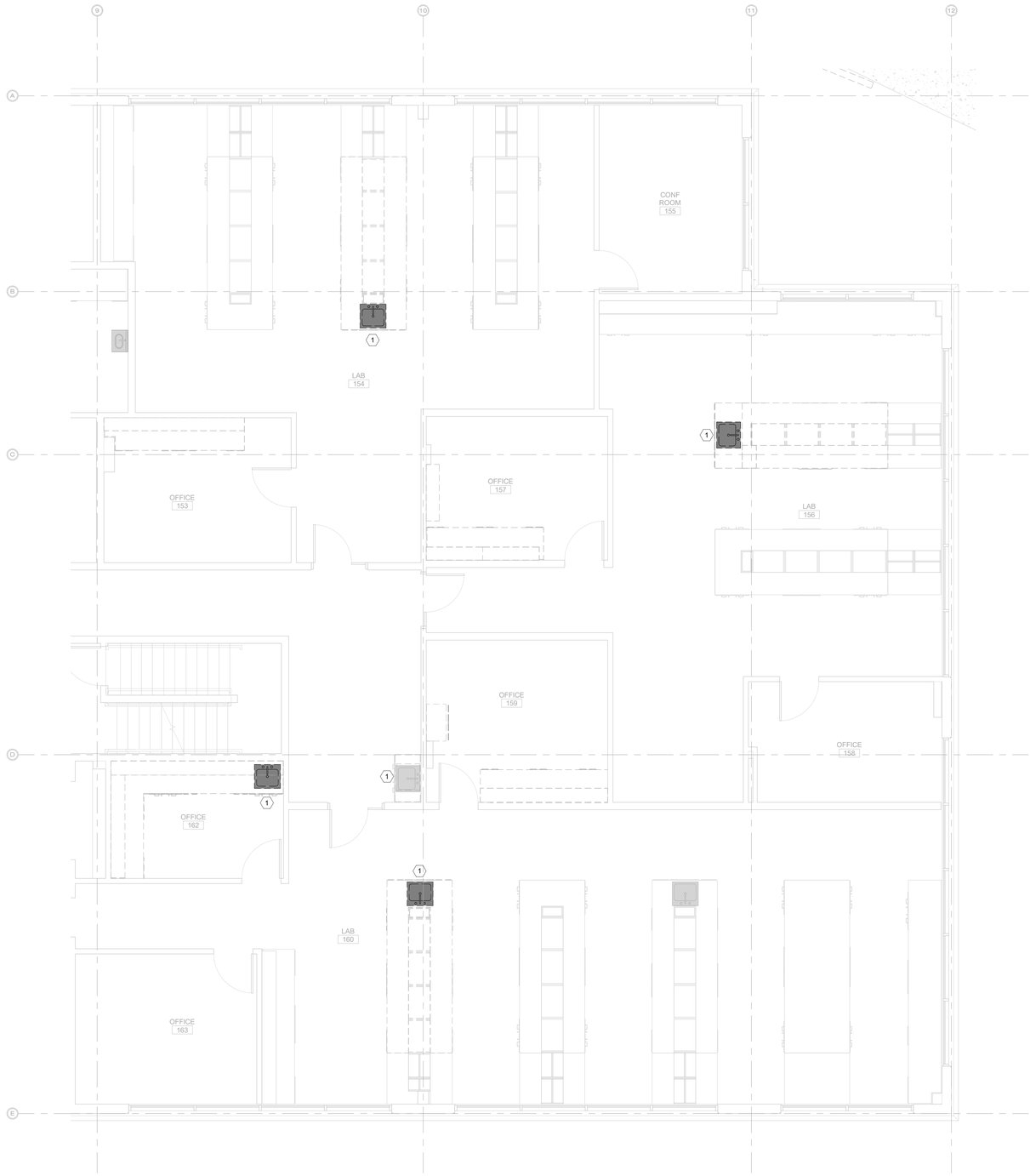
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
MECHANICAL DETAILS

SHEET
M601

DATE
12/12/25



1 Level 1 - PLUMBING DEMO PLAN
1/4" = 1'-0"

DEMOLITION NOTES

A. ALL BOLD DASHED PIPING AND EQUIPMENT TO BE DEMOLISHED.

B. COORDINATE DEMOLITION WORK/ W/ ARCHITECTURAL AND ELECTRICAL DEMOLITION DRAWINGS.

C. ANY EXISTING PLUMBING, PIPING, WALLS, AND CEILINGS THAT REMOVED OR DAMAGED DURING ANY PART OF THE RENOVATION/ REMODEL SHALL BE REPLACED/ REPAIRED.

D. FIELD VERIFY LOCATIONS OF ALL ASSOCIATED EQUIPMENT SHOWN ON DEMO PLANS PRIOR TO ANY DEMOLITION WORK.

E. ALL WATER PIPING THAT IS TO BE REUSED TO BE CLEANED AND STERILIZED.

F. DISPOSE OF ALL DEMOLISHED ITEMS OFF SITE. OWNER HAS THE FIRST RIGHT SAVE ANY EQUIPMENT SCHEDULED FOR DEMOLITION.

KEYNOTES

1	Demolish sink and all associated equipment.

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MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION

MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406 600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE

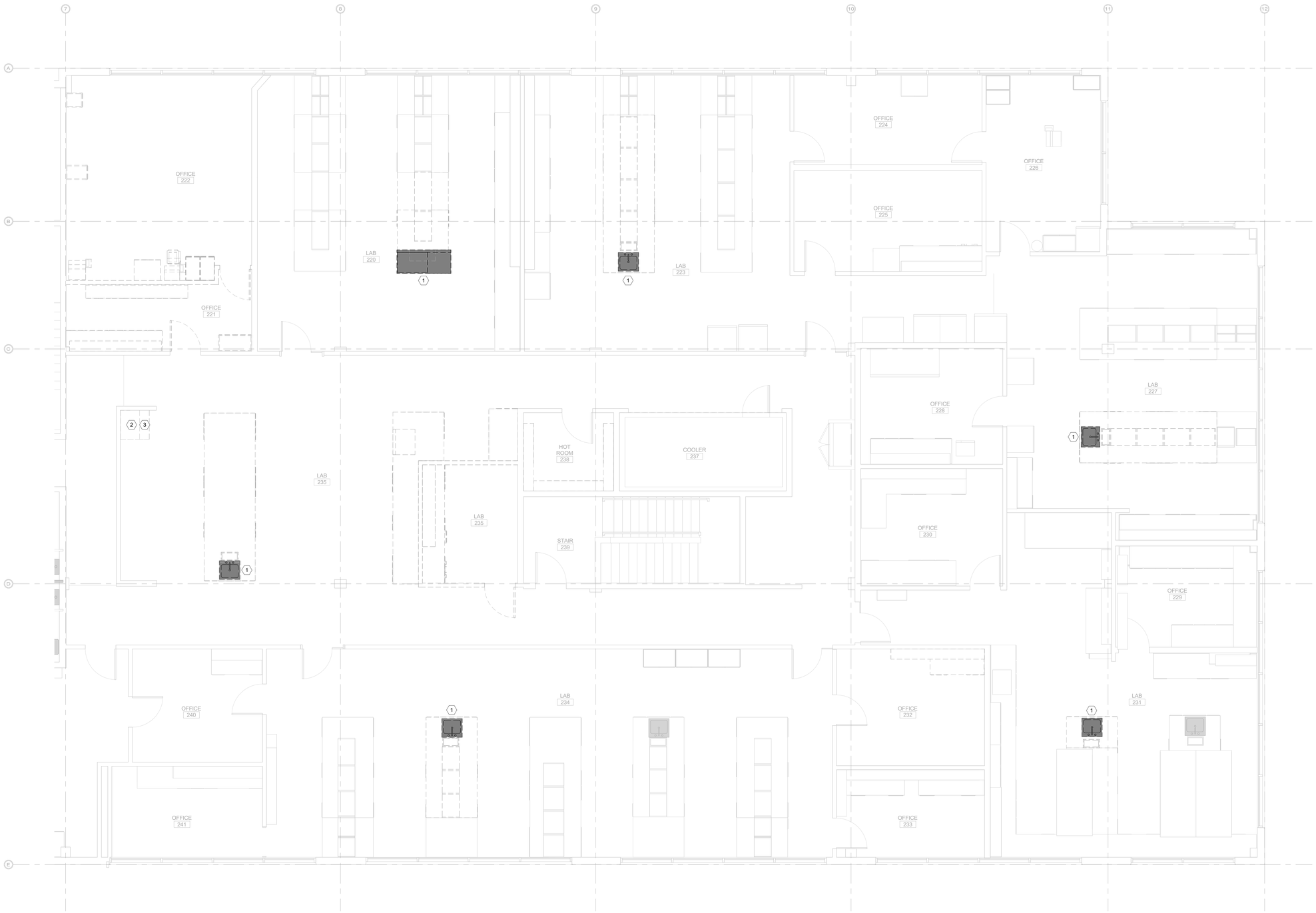
LEVEL 1 - PLUMBING DEMO PLAN

SHEET

P001

DATE

12/12/25



1 Level 2 - PLUMBING DEMO PLAN
1/4" = 1'-0"

DEMOLITION NOTES

A. ALL BOLD DASHED PIPING AND EQUIPMENT TO BE DEMOLISHED.

B. COORDINATE DEMOLITION WORK/ W/ ARCHITECTURAL AND ELECTRICAL DEMOLITION DRAWINGS.

C. ANY EXISTING PLUMBING, PIPING, WALLS, AND CEILINGS THAT REMOVED OR DAMAGED DURING ANY PART OF THE RENOVATION/ REMODEL SHALL BE REPLACED/ REPAIRED.

D. FIELD VERIFY LOCATIONS OF ALL ASSOCIATED EQUIPMENT SHOWN ON DEMO PLANS PRIOR TO ANY DEMOLITION WORK.

E. ALL WATER PIPING THAT IS TO BE REUSED TO BE CLEANED AND STERILIZED.

F. DISPOSE OF ALL DEMOLISHED ITEMS OFF SITE. OWNER HAS THE FIRST RIGHT SAVE ANY EQUIPMENT SCHEDULED FOR DEMOLITION.

KEYNOTES

1	Demolish sink and all associated equipment.
2	Ice maker drain to be demolished. Demolish waste and vent piping back to main and cap.
3	Route condensate that was routed to ice maker drain to new sink drain tailpiece.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author		
REVIEWED BY Checker		
REV.	DESCRIPTION	DATE

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE
LEVEL 2 - PLUMBING DEMO PLAN

SHEET
P002

DATE
12/12/25

PLUMBING FIXTURE CONNECTION SCHEDULE

MINIMUM CONNECTION SIZES UNLESS INDICATED ON PLANS
ROUGH IN SIZE (SEE ARCH DRAWINGS FOR MANUFACTURE AND MODELS OF FIXTURES)

SYMBOL	DESCRIPTION	WASTE	VENT	CW	HW	NOTES
S-1	SINK	2	1 1/2	1/2	1/2	NOTE 1, 2, 3, 4, 5
ES-1	EMERGENCY SHOWER	-	-	1 1/4	-	NOTE 6
MV-1	MIXING VALVE	-	-	1	1	NOTE 7

NOTES:
1 - PROVIDE POLISHED CHROME ANGLE STOP(S) "BRASS CRAFT AQUAFLOW E-Z TURN BALL VALVE."
2 - PROVIDE 3/8" BRAIDED STAINLESS STEEL SUPPLY CONNECTORS.
3 - PROVIDE P-TRAP AS REQUIRED. PROVIDE TEE FOR CONDENSATE IF NOTED.
4 - PROVIDE CONNECTION TO DISHWASHER AS REQUIRED.
5 - COMPLY W/ ALL ADA REQUIREMENTS. SEE ARCH FOR DETAIL.
6 - PROVIDE ACORN MODEL S1320 W/ 1 1/4" INLET.
7 - PROVIDE ACORN ET71-3-BVS-OTG W/ 1" CW & HW INLET AND 1 1/4" MIXED OUTLET.

DOMESTIC PUMP SCHEDULE

PLAN CODE	SERVICE	MFGR	MODEL	CAPACITY GPM	HEAD LOSS FT	HP	ELEC SERVICE	NOTES
CP-1	EMERGENCY SHOWER HOT WATER CIRC.	TACO	007-SF5	3	10	0.0400	120/1/60	NOTE 1, 2

NOTES:
1) FURNISH W/ COMPANION FLANGES, STRAP ON AQUASTAT & TIMER.
2) BRONZE CONSTRUCTION, NONMETALLIC IMPELLOR. LISTED FOR USE IN POTABLE WATER APPLICATIONS.

EXPANSION TANK SCHEDULE

PLAN CODE	MFGR	MODEL	TOTAL VOLUME (GAL)	ACCEPTANCE FACTOR	PRECHARGE PRESSURE
PET-1	AMTROL	ST-60V	34.0	1.0	40

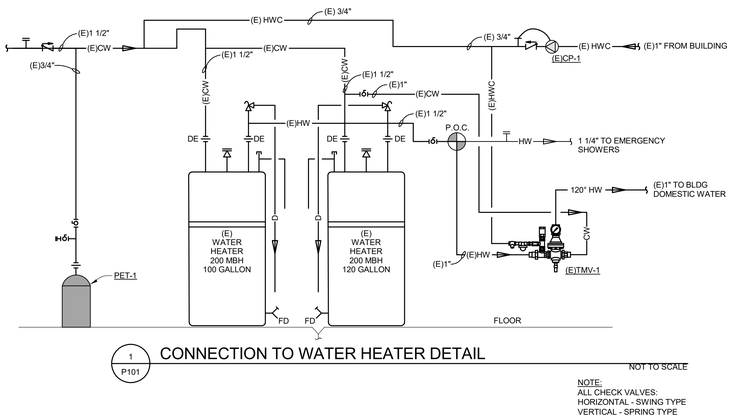
PLUMBING LEGEND

SYMBOL	DESCRIPTION
CW	DOMESTIC COLD WATER
HW	DOMESTIC HOT WATER
HWC	DOMESTIC HOT WATER RECIRCULATION
W	WASTE
V	VENT
NG	NATURAL GAS
FCO	FLOOR CLEAN OUT
WCO	WALL CLEAN OUT
	BALL VALVE
P.O.C.	POINT OF CONNECTION

SYMBOL	DESCRIPTION
	BACKFLOW PREVENTOR
	HOSE END DRAIN VALVE
	PRESSURE REDUCING VA.
	TEMP. & PRESSURE RELIEF VALVE
	DIELECTRIC WATERWAY
	UNION
	DIAL THERMOMETER
	PRESSURE GAUGE
	TEE UP
	TEE DOWN
	ELBOW UP
	ELBOW DOWN

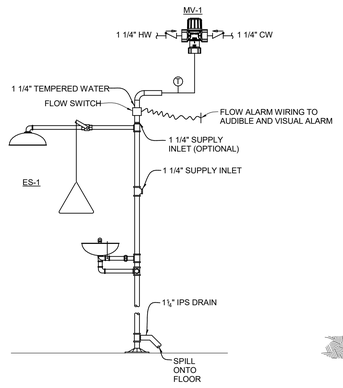
PLUMBING ABREVIATIONS

ACCS	**ACCESSORIES**	**MIN**	**MINIMUM**
AFF	**ABOVE FINISHED FLOOR BELOW**	**N.C.**	**NORMALLY CLOSED (VALVE)**
BFF	**FINISHED FLOOR**	**N.O.**	**NORMALLY OPEN (VALVE)**
C.I.	**CAST IRON**	**OFL**	**OVERFLOW RAIN LEADER**
CD	**CONDENSATE DRAIN**	**P.O.C.**	**POINT OF CONNECTION**
CO	**CLEANOUT**	**RWL**	**RAIN WATER LEADER**
CW	**COLD WATER**	**SS**	**SANITARY SEWER**
CX	**CONNECT TO EXISTING**	**TPL**	**TRAP PRIMER LINE**
DN	**PIPE DROP TO NEXT LEVEL**	**UG**	**UNDERGROUND**
DTL.	**DETAIL**	**US**	**UNDER SLAB**
(E)	**EXISTING**	**V**	**VENT**
FMFT	**FLOOR MOUNT FLUSH TANK HOT**	**VA**	**VALVE**
HW	**WATER**	**VTR**	**VENT THRU ROOF**
HWC	**HOT WATER CIRCULATION**	**W**	**WASTE**
MAX.	**MAXIMUM**	**WCO**	**WALL CLEANOUT**

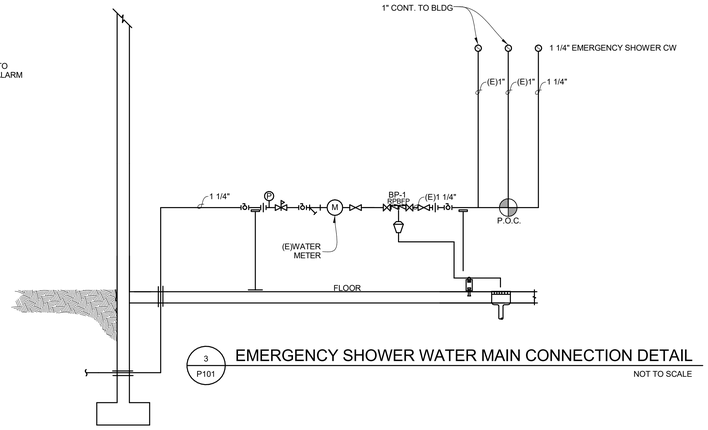


1 / P101 CONNECTION TO WATER HEATER DETAIL
NOT TO SCALE

NOTE:
ALL CHECK VALVES:
HORIZONTAL - SWING TYPE
VERTICAL - SPRING TYPE



2 / P101 EMERGENCY SHOWER
NOT TO SCALE



3 / P101 EMERGENCY SHOWER WATER MAIN CONNECTION DETAIL
NOT TO SCALE

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

%100% CD

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

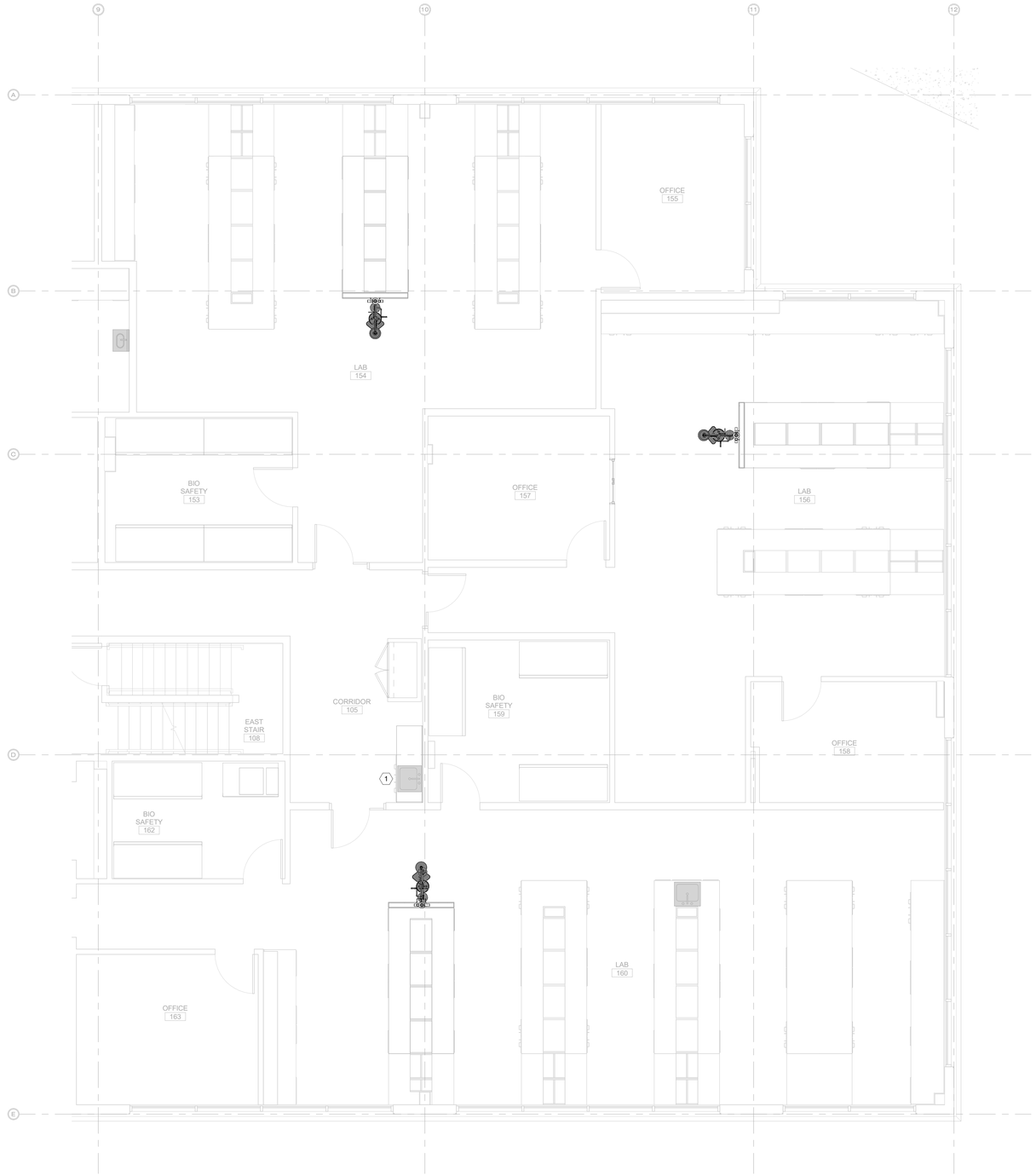
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
PLUMBING LEGEND, SCHEDULES, & DETAILS

SHEET
P101

DATE
12/12/25



1 Level 1 - D-W-V PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. PIPING ROUTING SHOWN IS EXPANDED FOR CLARITY. EXACT ROUTING MAY VARY TO ACCOMMODATE EQUIPMENT AND ACCESSIBILITY REQUIREMENTS.

C. PLUMBING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES TO PREVENT CONFLICT WITH OTHER BUILDING SYSTEMS. ANY INSTALLATION WITHOUT PROPER COORDINATION IS SUBJECT TO REMOVAL AND REINSTALLATION AT THE CONTRACTORS EXPENSE.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL PIPING LEADING TO INDIVIDUAL FIXTURES IS SIZED ON THE PLUMBING FIXTURES CONNECTION SCHEDULE SHEET.

KEYNOTES

1	Route DWV & CW/ HW piping from demo'd sink to new sink location.

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MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

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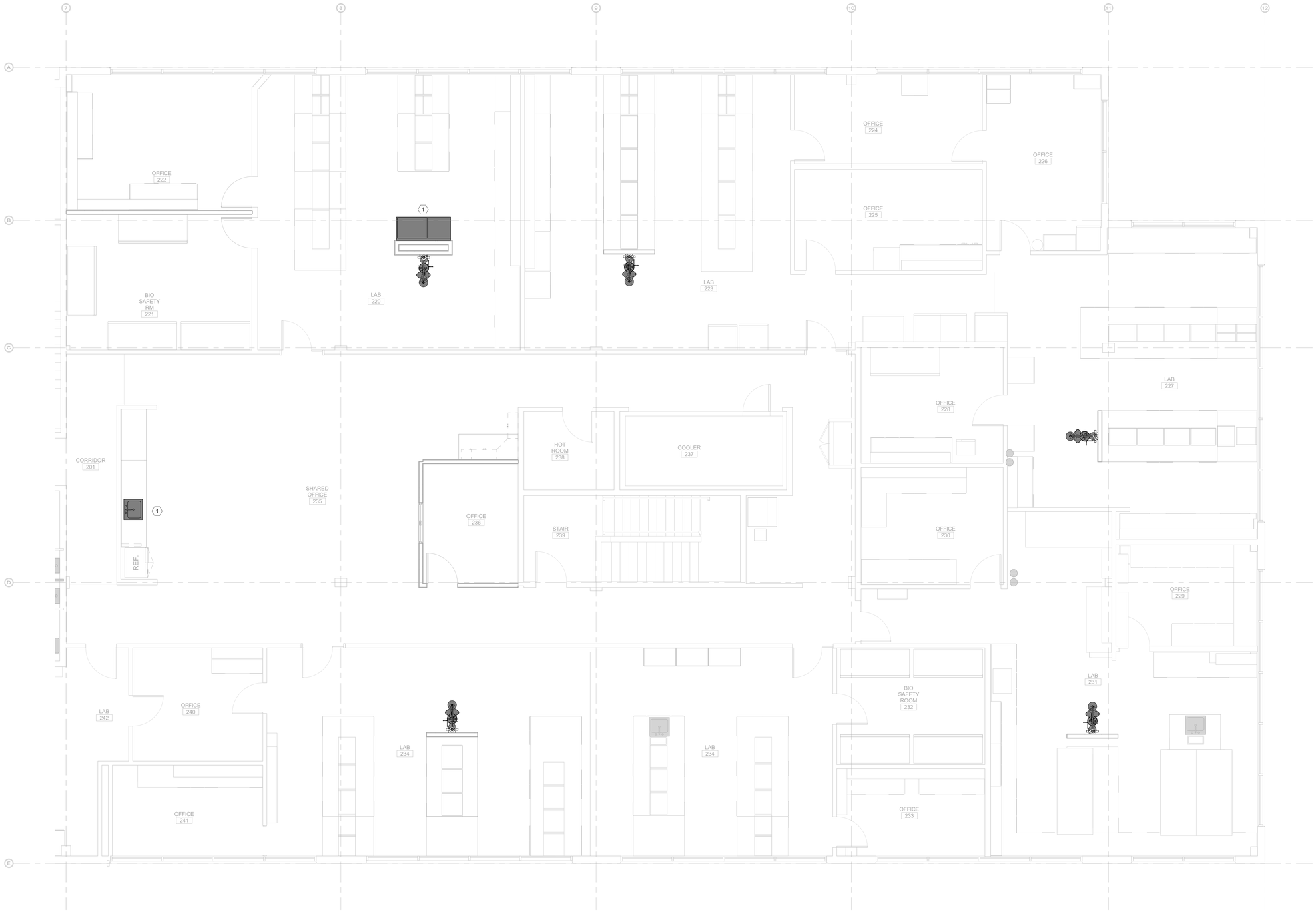
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 1 - D-W-V PLAN

SHEET
P201

DATE
12/12/25



1 Level 2 - D-W-V PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. PIPING ROUTING SHOWN IS EXPANDED FOR CLARITY. EXACT ROUTING MAY VARY TO ACCOMMODATE EQUIPMENT AND ACCESSIBILITY REQUIREMENTS.

C. PLUMBING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES TO PREVENT CONFLICT WITH OTHER BUILDING SYSTEMS. ANY INSTALLATION WITHOUT PROPER COORDINATION IS SUBJECT TO REMOVAL AND REINSTALLATION AT THE CONTRACTORS EXPENSE.

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E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL PIPING LEADING TO INDIVIDUAL FIXTURES IS SIZED ON THE PLUMBING FIXTURES CONNECTION SCHEDULE SHEET.

KEYNOTES

1	Route DWV & CW/ HW piping from demo'd sink to new sink location.

%100% CD

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

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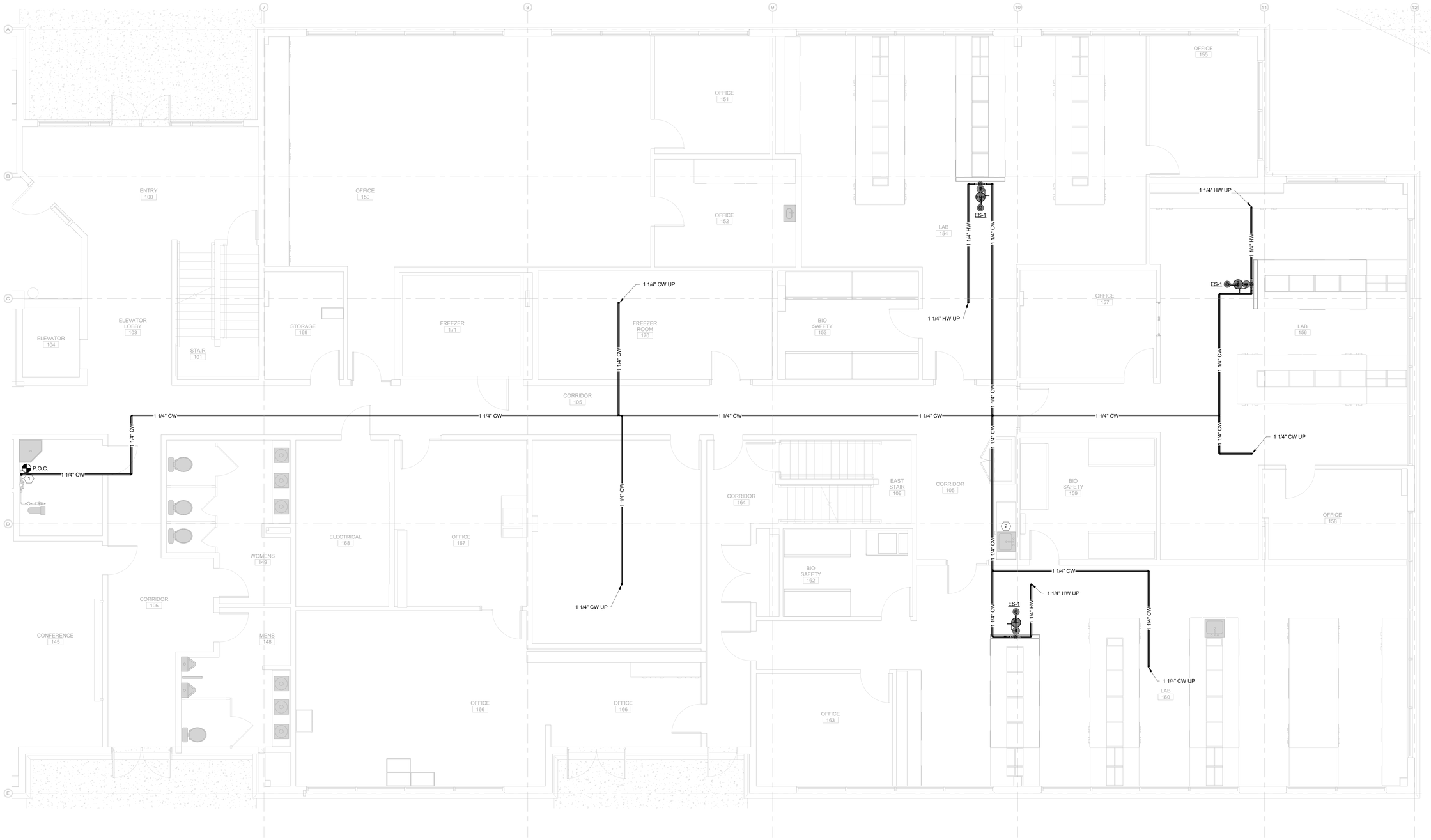
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 2 - D-W-V PLAN

SHEET
P202

DATE
12/12/25



1 Level 1 - DOMESTIC WATER PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. PIPING ROUTING SHOWN IS EXPANDED FOR CLARITY. EXACT ROUTING MAY VARY TO ACCOMMODATE EQUIPMENT AND ACCESSIBILITY REQUIREMENTS.

C. PLUMBING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES TO PREVENT CONFLICT WITH OTHER BUILDING SYSTEMS. ANY INSTALLATION WITHOUT PROPER COORDINATION IS SUBJECT TO REMOVAL AND REINSTALLATION AT THE CONTRACTORS EXPENSE.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL PIPING LEADING TO INDIVIDUAL FIXTURES IS SIZED ON THE PLUMBING FIXTURES CONNECTION SCHEDULE SHEET.

KEYNOTES

1	Connect 1" CW after backflow preventor at building CW water service entrance.
2	Route DWV & CW/ HW piping from demo'd sink to new sink location.

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY: Checker

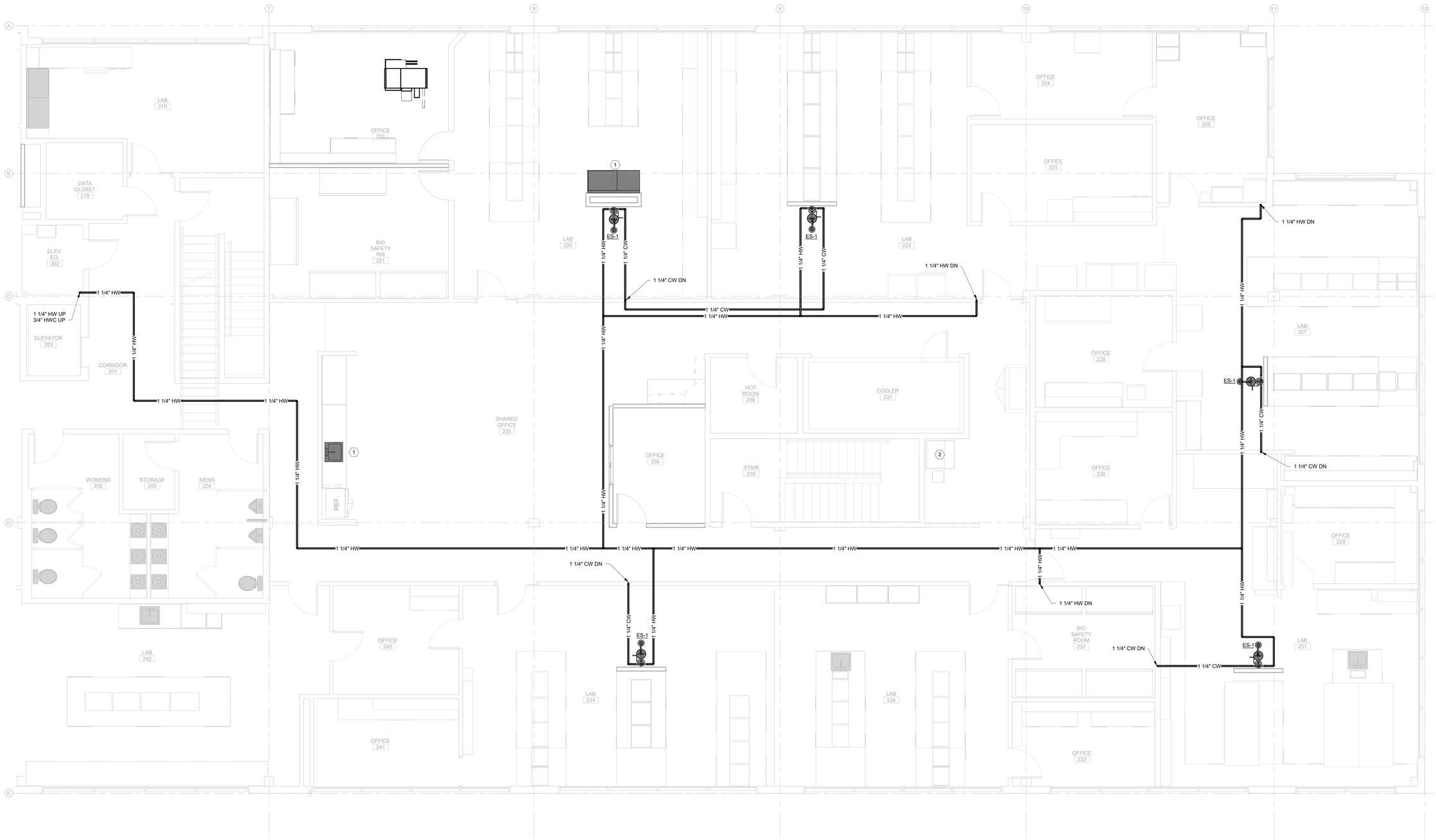
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 1 - DOMESTIC WATER PLAN

SHEET
P301

DATE
12/12/25



1 Level 2 - DOMESTIC WATER PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. PIPING ROUTING SHOWN IS EXPANDED FOR CLARITY. EXACT ROUTING MAY VARY TO ACCOMMODATE EQUIPMENT AND ACCESSIBILITY REQUIREMENTS.

C. PLUMBING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES TO PREVENT CONFLICT WITH OTHER BUILDING SYSTEMS. ANY INSTALLATION WITHOUT PROPER COORDINATION IS SUBJECT TO REMOVAL AND REINSTALLATION AT THE CONTRACTORS EXPENSE.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL PIPING LEADING TO INDIVIDUAL FIXTURES IS SIZED ON THE PLUMBING FIXTURES CONNECTION SCHEDULE SHEET.

KEYNOTES

1	Route DWV & CW/ HW piping from demo'd sink to new sink location.
2	Connect ice maker CW to (E) icemaker CW service.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

%100% CD

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406.600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY: Checker

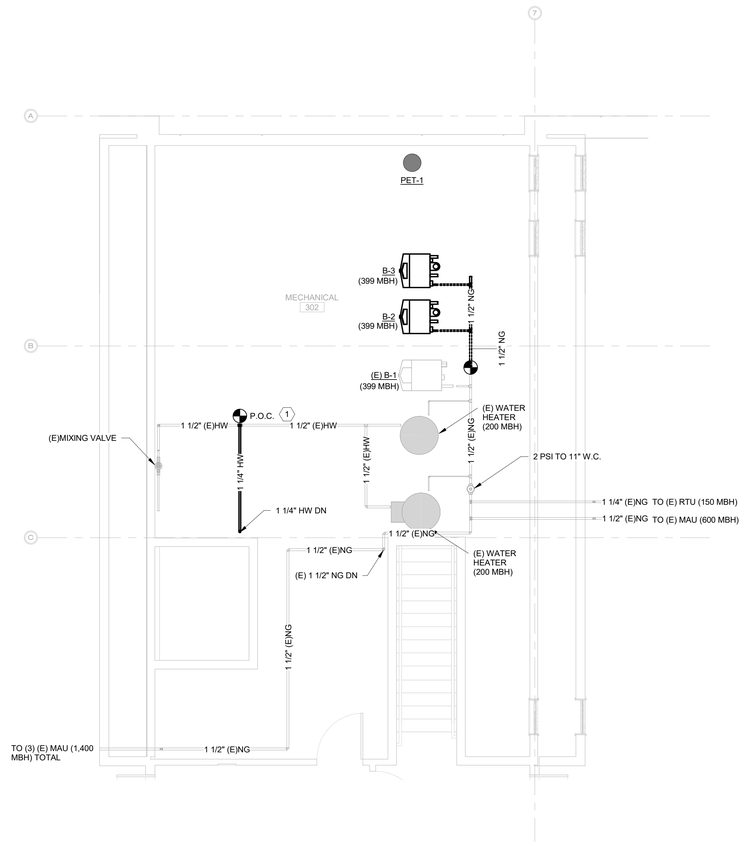
REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 2 -DOMESTIC WATER PLAN

SHEET
P302

DATE
12/12/25



1 Level 3 - DOMESTIC WATER PLAN
1/4" = 1'-0"

GENERAL NOTES

A. COORDINATE ALL UTILITY INTERRUPTIONS W/ THE OWNER AND PROVIDE (5) WORKING DAYS NOTIFICATION PRIOR TO ANY UTILITY SHUT DOWN.

B. PIPING ROUTING SHOWN IS EXPANDED FOR CLARITY. EXACT ROUTING MAY VARY TO ACCOMMODATE EQUIPMENT AND ACCESSIBILITY REQUIREMENTS.

C. PLUMBING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES TO PREVENT CONFLICT WITH OTHER BUILDING SYSTEMS. ANY INSTALLATION WITHOUT PROPER COORDINATION IS SUBJECT TO REMOVAL AND REINSTALLATION AT THE CONTRACTORS EXPENSE.

D. EXACT ROUTING AND SIZES OF (E) PLUMBING AND PIPING IN THE BUILDING IS DIFFICULT TO DETERMINE DIE TO CONCEALMENT IN OR BEHIND (E) CONSTRUCTION. DRAWINGS SHOW APPROXIMATE (E) CONDITIONS, HOWEVER FIELD VERIFICATION WILL BE REQUIRED.

E. PROVIDE ALL WORK TO MEET CURRENT CODES AND CONSTRUCTION STANDARDS.

F. ALL PIPING LEADING TO INDIVIDUAL FIXTURES IS SIZED ON THE PLUMBING FIXTURES CONNECTION SCHEDULE SHEET.

KEYNOTES

1	See P101 for detailed hot water and recirculation connections.

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MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

MOLECULAR BIOSCIENCE - PHASE 2

SE Engineers
Three Forks, MT 59752
Local 406 600.8796
www.seengineersmt.com

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 3 - DOMESTIC WATER PLAN

SHEET
P303

DATE
12/12/25

Project Information

MSU Molecular Bioscience . Electrical, Lighting, & Technology Plans

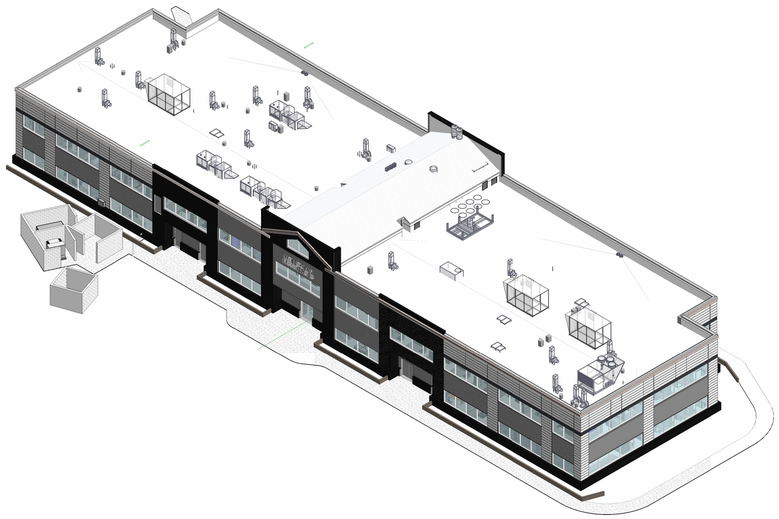
960 Technology Blvd, Bozeman, MT 59718

100% CONSTRUCTION DOCUMENTS

Date Issued | 01.31.2026
Project Manager | Andrew Moore

Rev 0

Project 3D View



Sheet Index & Revision History

Sheet #	Sheet Name	Rev.	Description	Date
E000	Electrical Cover Sheet			
E011	Level 1 Electrical Demolition Plan			
E012	Level 2 Electrical Demolition Plan			
E013	Level 3 Electrical Demolition Plan			
E111	Level 1 Electrical Plan			
E112	Level 2 Electrical Plan			
E113	Level 3 Electrical Plan			
E501	Electrical Demo One-Line Diagram			
E502	Electrical One-Line Diagram			
E503	Electrical Distribution Panel Schedules			
E504	Electrical House Schedules			
E505	Electrical Tenant 1 Schedules			
E506	Electrical Tenant 1 Schedules			
E507	Electrical Tenant 1 Schedules			
E508	Electrical Tenant 2 Schedules			
E509	Electrical Schedules			
EL011	Lighting Plans			
EL012	Lighting + Fan Coil Plan			
T101	Level 1 Technology Plan			
T102	Level 2 Technology Plan			
T301	Cable Tray & Conduit Plan			
T501	Technology Typical Details			
T611	Tech Equipment Schedules			

General Notes

The symbols and abbreviations list on this sheet is a comprehensive standard guide intended for general use on all projects. Therefore, not all symbols and abbreviations contained in this list are necessarily used on this particular project and should be used for clarification only.

1. All work shall be installed in accordance with the latest National Electrical Code (NEC) and all local codes having jurisdiction. General work practices for construction shall be in accordance with NECA 1 standard for good workmanship in electrical construction (ANSI).
2. All materials provided by the contractor shall be new and free of defects, listed / labeled for the intended purpose by Underwriters (UL) or other organization that is acceptable to the AHJ.
3. The contractor is responsible for providing all equipment required to complete the project. Any bill of materials referenced in this plan set is for reference only to illustrate design intent.
4. These drawings and accompanying specifications are intended to describe and illustrate systems which will not interfere with the structure of the building, and which will fit into the available spaces. The contractor is responsible for laying out all work to conform to NEC clearances, architectural, structural, mechanical, and site conditions, to avoid obstructions and to allow the proper installation of each item. Coordinate with drawings of other trades to fit the actual space conditions. Headroom and space condition to be maintained.
5. Upon the completion of the work, the entire electrical system shall be tested and shall be shown to be in proper working condition in accordance with the intent of the specifications and drawings. It shall be the responsibility of the contractor to have all systems ready for operation and inspection by AHJ.
6. Electrical contractor to verify actual installed equipment electrical name plate data before energizing the circuit. Confirm electrical design values and actual equipment being installed in compliance with electrical code and manufacturer installation requirements.
7. Conduit runs when shown are diagrammatic. Final location and routing shall be established by the contractor based on the installation conditions and shall be verified in the field. All conduit types and installation requirements shall be in accordance with the specifications. Where conductor and cable routing are not shown on the plans, contractor shall determine routing and lengths required.
8. Provide conduit expansion fittings with bonding jumpers to allow for thermal expansion and contraction where necessary, per NEC 300.7(B).
9. Provide support for conductors in vertical conduits per NEC 300.19. Support conduit using steel pipe straps, lay-in adjustable hangers, clevis hangers, or split hangers. Hanger spacing shall be installed per NEC requirements for the type of conduit being installed.
10. Provide pull or junction boxes where required to facilitate the installation of conductors. Bends in conduit between pull boxes shall not exceed a total of 360-degrees.
11. Provide branch circuit wiring to all items requiring electrical connections. Where branch circuit wiring is not shown, connect items to circuits indicated. Unless indicated otherwise, all branch circuits shall be minimum # 12 AWG.
12. Provide independent support for disconnect switches, control stations, boxes, panels, etc. where no walls or other structural surface exists.
13. Provide disconnect switches for HVAC equipment within eyesight of the equipment.
14. Contractor shall provide signage to all electrical boxes, junction boxes, disconnects, conduit runs, subpanels, and main service equipment.
15. Grounding system: Permanently and effectively ground all metallic conduit, supports, cabinets, panelboards, and system neutral conductors. Maintain continuity of equipment ground throughout the system. Ground clamps shall be approved type, specifically designed for grounding. Where grounding conductor is enclosed in conduit, ground clamp shall be of a type which grounds both conductor and conduit. All circuits in flexible metal or plastic conduit shall include a ground wire sized in accordance with NEC.
16. Conductors: Copper with color coding, #10 AWG and smaller to be solid or stranded, #8 AWG and larger to be stranded. Minimum #12 AWG unless otherwise indicated. Aluminum conductors permitted for feeders 100A and larger. Conductors must be installed in accordance with NEC and cannot be supported from ceiling support wires. All power conductors in conduit shall be THWN-2, XHHN-2, RHW-2, PVWIRE, or XLPE.
17. All smoke detectors to be listed and installed in accordance with the latest edition of NFPA 72. Smoke detectors to be wired together and receive primary power from the buildings wiring.
18. The EC may submit substitution requests for prior approval no less than 10 days prior to bid date. Blacksheep separates prior approval packages for luminaires & controls. The EC shall break out separate line items for each to prevent 'lockout' of pricing respective to this project.
19. Submittals shall be provided by the installer for Blacksheep review and approved prior to ordering.

Symbol Legend

Symbols listed below are for reference and for the use in understanding the design intent. Not all symbols listed below are necessarily used elsewhere in the construction documents. Cabling information is for reference only; All devices need to be assessed on an individual basis. Halftone symbols represent scope that is not included in the construction documents.

Electrical

- NEMA 5-15R / 5-20R, Mounted Vertically, Non-Essential Power
- NEMA 5-15R / 5-20R, Mounted Horizontally, Non-Essential Power
- NEMA 5-15R Quadruplex, '+_' Indicates Height AFF
- NEMA 5-15R / 5-20R, Essential Power
- NEMA 5-15R / 5-20R, Optional Standby Power
- NEMA 5-15R / 5-20R, GFCI-Protected Receptacle
- NEMA 5-15R / 5-20R, GFCI Receptacle
- NEMA 5-15R / 5-20R, Weatherproof Receptacle
- NEMA 5-15R / 5-20R, Weatherproof Receptacle, In-Use
- NEMA 6-X0R, 250V, 2-Pole; Number Indicates Amperage (i.e., 2 = 20A)
- NEMA 14-X0R, 250/125V, 2-Pole w/ Neutral; Number Indicates Amperage
- NEMA 15-X0R, 250V, 3-Pole; Number Indicates Amperage
- NEMA L6-X0R, 250V, 2-Pole; Number Indicates Amperage
- NEMA L14-X0R, 250/125V, 2-Pole w/ Neutral; Number Indicates Amperage
- NEMA L15-X0R, 250V, 3-Pole; Number Indicates Amperage
- Electrical Provision or Equipment Connection Provision
- Electrical Floor Receptacle, Flush Mounted
- Junction Box, Mounted Above Accessible Ceiling
- Junction Box, Recessed Wall Mounted
- Junction Box, Flush Floor Mounted
- Wiremold Power Outlet Strip
- Non-Fused Disconnect Switch, Surface Mounted
- Fused Disconnect Switch, Surface Mounted
- Panelboard, Flush Mounted
- Panelboard, Surface Mounted
- Push Button | EPO = Emergency Power Off
- Solar Photovoltaic Panel / Array
- Inverter

Security | Life Safety | Surveillance | Access

- Security Panel (Requires Dedicated 20A Circuit) | (4) CAT6
- Security Keypad | (1) 22/4, (1) CAT6
- Cellular Communicator | (1) 22/4, (1) 18/4 FPLR, (2) CAT6
- RF Receiver | (1) 22/4
- RF Repeater | (1) 18/4 FPLR
- Door / Window Contact Sensor | (1) 22/4
- Overhead Door Contact | (1) 22/4
- Motion Detector | (1) 22/4
- Glass Break Sensor | (1) 22/4
- Interior Siren | (1) 18/4 FPLR
- Horn / Strobe | (1) 18/4 FPLR
- Sewage Ejector Interface | (1) 22/4
- Surveillance Camera | (2) CAT6
- Water / Flood Sensor | (1) 22/4
- Low Temperature Sensor | (1) 22/4
- Wireless Flood / Low Temp Sensor
- Water Shutoff Valve (Requires Dedicated 20A Circuit) | (1) CAT6
- Carbon Monoxide Sensor | (1) 22/4
- Gas Detector | (1) 22/4
- Heat Detector | (1) 22/4
- Smoke Detector | (1) 18/4, FPLR
- Sprinkler Flow / Tamper Valve | (1) 18/4 FPLR
- Access Control Panel (Requires 20A Dedicated Circuit) | (2) CAT6A
- Access Control Interface | (1) CAT6A
- Access Control Lock | (1) 18/2 Shielded

Communications | Audio | Video

- Cable Enclosure (Requires 1 Dedicated 20A Circuit)
- Phone/Data Outlet | (2) CAT6A | Superscript number indicates additional CAT6A cables (4 indicates (4) CAT6A, 6 indicates (6) CAT6A)
- Outlet (Ceiling | In-Floor) | (2) CAT6A | Superscript number indicates additional CAT6A cables (4 indicates (4) CAT6A, 6 indicates (6) CAT6A)
- Wireless Access Point
- Satellite Dish Location
- Touch Panel
- Control RF Gateway
- Display/Television
- Projector
- Screen
- AV I/O Plate Location | Reference page text, keynotes, and scehdule descriptions for exact plate details and cabling information.
- Aux Input Location | AUX1 - (2) HDMI located adjacent to TV/Display for local source connection. | AUX2 - HDMI Extender - (2) Sielded Cat6A between the TV/Display and another location (more than 20 ft) for source connection
- Backbox
- Speaker
- Subwoofer
- Soundbar - LR / LCR / Center
- Equipment Rack with Vertical Cable Management

Lighting Control | Shades | Environmental

- Lighting Control Panel (Requires 1 Dedicated 20A Circuit) | (3) CAT6
- Lighting Control Dimming Panel | (1) QSC
- Lighting Repeater | (1) QSC
- Lighting Keypad | (1) QSC
- Occupancy Sensor | (1) QSC
- Thermostat | (1) 18/6, (1) CAT6
- Thermostat Sensor | (1) CAT6
- Oxygen Control | (1) 18/6, (1) CAT6
- Fireplace Control | (1) 18/6, (1) CAT6
- Wireless Hybrid Keypad
- Wireless Keypad
- Wireless Dimmer
- Remote Dimmer - 3-Way
- Wireless Switch
- Remote Switch - 3-Way
- Standard Switch (Provided by the EC)
- Shade Panel (Requires 2 Dedicated 20A Circuits)
- Single Roller Motorized Shade | (1) QSC
- Dual Roller Motorized Shade | (2) QSC
- Motorized Drape | (1) QSC
- Electronic Smart Glass | (1) 18/4

Lighting Luminaires

- Bollard
- Ceiling Mounted
- Recessed Downlight | Round or Square
- Recessed Multiple Downlight | 4 Light Sources
- Pendant | Round or Square
- Wall Mounted
- Wall Mounted Exterior
- Table Lamp
- Linear LED
- Recessed Linear
- Surface Mounted Linear
- Step Light

General Drawing Symbols

- Callout View Tag
- Keynote Tag
- Elevation Tag
- Mechanical Equipment Tag w/ Circuit ID
- Electrical Equipment Tag
- Lighting Tag w/ Circuit ID
- Section Head & Tail
- Technology Tag w/ Cable ID

Lamp Replacement Schedule

Type Mark	Description	Manufacturer	Model	Source	CRI	Load	Life	Luminaire Qty.	Lamp Count	Note
D1	CFL Bi-Pin - Compact 2-pin LED	Keystone	KT-LED82P-V-835-D-DP	LED	83+	8 VA	50,000+	49	1	
R2	2' TB Replacement - 2' Type B LED	PLT	PLTS-20125	LED	82	27 VA	50,000+	138	3	
R4	4' TB Replacement - 4' Type B LED	PLT	PLTS-20109	LED	82	51 VA	50,000+	371	3	
S1	4' TB Replacement - 4' Type B LED	PLT	PLTS-20109	LED	82	34 VA	50,000+	6	2	
S2	4' TB Replacement - 4' Type B LED	PLT	PLTS-20109	LED	82	34 VA	50,000+	10	2	

*Note: Refer to sheet EL011 for floor plan layout of existing luminaires based on as-built drawings.

Executive Summary

Electrical Systems

The existing three-phase 208Y/120V main electrical service will remain in place as part of this project. The current generator is outdated, and will be replaced. At present, both emergency life safety loads and optional standby loads are connected to the same panel, which does not comply with NEC requirements. These loads must be separated and connected to a dedicated automatic transfer switches (ATS). A load study has been conducted on both existing ATS units and will be used to help determine the new calculated electrical design load. This will guide the sizing of the new generator and the installation of separate ATS units for life safety and optional standby loads.

Each Tenant will receive two dedicated circuits connected to the new Optional Standby panels to support two future -80°C freezers, if these are not already accounted for within their space. Additionally, all new and future fan coils (shown per mechanical plans) will be connected to the Optional Standby panels to ensure the building remains heated and protected from freezing during power outages in the winter months.

Within some of the Lab areas there will be some architectural renovation to replace the existing outdated wiremold located on the desks. The old wiremold will need to be removed and recycled. The circuit for the new wiremolds shall reused from removed wiremold.

The new generator is to be MTU 1804W diesel generator, or similar. Refer to one-line for additional notes.

Lighting

The existing lamps within all interior light fixtures within the building will have an add/alternate price added to the bid to replace with LED replacements. Remove all existing fluorescent lamps and replace with an approved LED replacement lamp. Remove and bypass existing ballast.

Fire & Life Safety

The fire alarm system shall be replaced one-for-one for existing devices and will be a digital, addressable system. Additional devices shall be added to meet current requirements and MSU specifications. The fire alarm system will be designed to meet the requirements of NFPA 72 and will include the following components. The system will be designed by a NICET-certified personnel per state of Montana's requirements.

- Fire alarm control panel - primary system control, receiving messages from initiating devices and turning on corresponding notification devices to alert occupants of a fire-related emergency in specific areas.
  1. Panel will be addressable, monitoring the status of all alarm devices separately
  2. Communicates with emergency services at a centrally controlled and monitored location
- Addressable initiation & notification devices - standard fire alarm devices that initiate alarms, notification devices, and a standard sequence of operations for evacuation and smoke / fire mitigation.

Sole fire alarm system to be specified is Edwards EST4 products. Refer to Division 28 specifications for additional requirements.

Technology

Coordinate with UIT to design and document the network infrastructure of the 1st and 2nd floor tenant improvement. Design a new TR on the 2nd floor to accomodate the tenant improvement. Update the 1st floor TR design to incorporate both the UIT and tenant network sections into a single, partitioned space. Design of cable tray distribution throught the 1st and 2nd floor tenant improvement areas back to the respective TRs.

J-Hook Sizing

B-Line Series J-Hook		Maximum Number of Cables
Part Number	Size (HxW)	(Commscope cable UN884019304/10 w/ .285" Diam.)
BCH21	1-5/16"	12 Cat6A
BCH32	2"	20 Cat6A
BCH64	4"	92 Cat6A

EMT Conduit Sizing

EMT Conduit Size	Maximum Number of Cables
1-1/4 Inch	8 Cat6A
1-1/2 Inch	11 Cat6A
2 Inch	19 Cat6A
2-1/2 Inch	21 Cat6A
3 Inch	55 Cat6A
4 Inch	92 Cat6A

Cable Tray Sizing

Flextray Series		Maximum Number of Cables
Part Number	Size (HxW)	(Commscope cable UN884019304/10 w/ .285" Diam.)
FT4X4	4" x 4"	100 Cat6A
FT4X8	4" x 8"	200 Cat6A
FT4X12	4" x 12"	300 Cat6A
FT4X18	4" x 18"	451 Cat6A
FT4X24	4" x 24"	601 Cat6A

Cable Tray Load Capacity

Flextray Series		Support Span / Loading Capacity (Lbs/Ft max)			
Part Number	Size (HxW)	5'-0"	6'-0"	7'-0"	8'-0"
FT4X4	4" x 4"	58	49	42	36
FT4X8	4" x 8"	94	78	61	47
FT4X12	4" x 12"	119	83	61	47
FT4X18	4" x 18"	119	83	61	47
FT4X24	4" x 24"	128	89	65	50

Abbreviations

A, AMP	Ampere	LV	Low Voltage
AIC	Amps Interrupting Capacity	LVR	Low Voltage Relay
AC	Alternating Current	MCB	Main Circuit Breaker
AFCI	Arc-Fault Circuit Interrupter	MDP	Main Distribution Panel
AFF	Above Finished Floor	MFGR	Manufacturer
AFG	Above Finished Grade	MIN	Minimum
ATS	Automatic Transfer Switch	MLO	Main Lug Only
AV	Audio Visual	MSB	Main Switchboard
AWG	American Wire Gauge	MV	Medium Voltage
BAS	Building Automation System	N	Neutral
BTU	British Thermal Units	(N)	New
C, CDT	Conduit	NA, N/A	Not Applicable
CB	Circuit Breaker	NEMA	National Electrical Manufacturer Association
CKT	Circuit	N.C.	Normally Closed
CL	Centerline	N.O.	Normally Open
CLG	Ceiling	NTS	Not to Scale
CO	Carbon Monoxide	OCPD	Overcurrent Protective Device
C.O.	Conduit Only	P	Poles
CT	Current Transformer	PB	Pullbox
CU	Copper	PH	Phase
DDC	Digital Data Control	PNL	Panelboard
DWG	Drawing	POE	Power Over Ethernet
(E)	Existing	PWR	Power
E.C.	Electrical Contractor	RECPT	Receptacle
ELEC	Electric / Electrical	RS	Rigid Steel
EM	Emergency	SD	Smoke Detector
EMT	Electrical Metallic Tubing	SHT	Sheet
EQ	Equal	SOH	Standard Outlet Height
FA	Fire Alarm	SP	Spare
FACP	Fire Alarm Control Panel	SPEC	Specification
FBO	Furnished by Others	SPD	Surge Protective Device
FLA	Full Load Amps	SS	Surge Supression
FSD	Fire Smoke Damper	SW	Switch
G, GND	Ground	SWBD	Switchboard
G.C.	General Contractor	SWGR	Switchgear
GEN	Generator	TEMP	Temporary
GFCI	Ground-Fault Circuit Interrupter	TVSS	Transient Voltage Surge Suppressor
HP	Horse Power	TYP	Typical
IBEC	Installed by Electrical Contractor	UG	Underground
IG	Isolated Ground	UON	Unless Otherwise Noted
J, JB	Junction Box	UPS	Uninterruptible Power Supply
KV	Kilovolt	V	Voltage
KVA	Kilovolt Ampere	VA	Volt Amperes
KW	Kilowatt	W	Watt
KWH	Kilowatt Hour	WP	Weatherproof
LCP	Lighting Control Panel	XFMR	Transformer

KEY PLAN

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100% Construction Documents

Molecular Bioscience Building
Phase 2
MSU

MONTANA STATE UNIVERSITY

BLACKSHEEP ENGINEERING
ELECTRICAL | TECHNOLOGY | LIGHTING
MECHANICAL | PLUMBING
602 W Hemlock | Bozeman, MT 59715
moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	EB	
REVIEWED BY:	AM	
REV.	DESCRIPTION	DATE

MONTANA LICENSED PROFESSIONAL ENGINEER
ANDREW S. MOORE
No. 36404PE
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical Cover Sheet

SHEET
E000

DATE
01.30.2026

Reference Keynotes	General Sheet Notes
1. Remove existing plugmold. Save circuit for reuse in same room. Refer to new power plan for location of new equipment. 2. Remove device and branch circuit/conduit back to last existing to remain device or source panel. 3. Generator enclosure to be demolished and increased for new generator. Refer to Architectural drawings and new power plan ETFI for additional information.	1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect. 2. The electrical plans are diagrammatic only. Coordinate the electrical equipment location and installation with equipment being served. 3. Exact location of mechanical and plumbing equipment that require electrical connections are shown on the mechanical and plumbing drawings. Coordinate with mechanical and plumbing contractors. 4. All conductors shall be copper, unless otherwise noted. Minimum size shall be #12 AWG. Aluminum conductors are permitted above 100A. 5. Refer to the mechanical equipment connection schedule for disconnect requirements. 6. Refer to the architectural drawings for exact mounting height of receptacles.

1 E011 Level 1 Electrical Demo Plan
1/8" = 1'-0"

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moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	EB
REVIEWED BY:	AM

REV.	DESCRIPTION	DATE

MONTANA ANDREW S. MOORE No. 36404PE REGISTERED PROFESSIONAL ENGINEER
01.30.2026

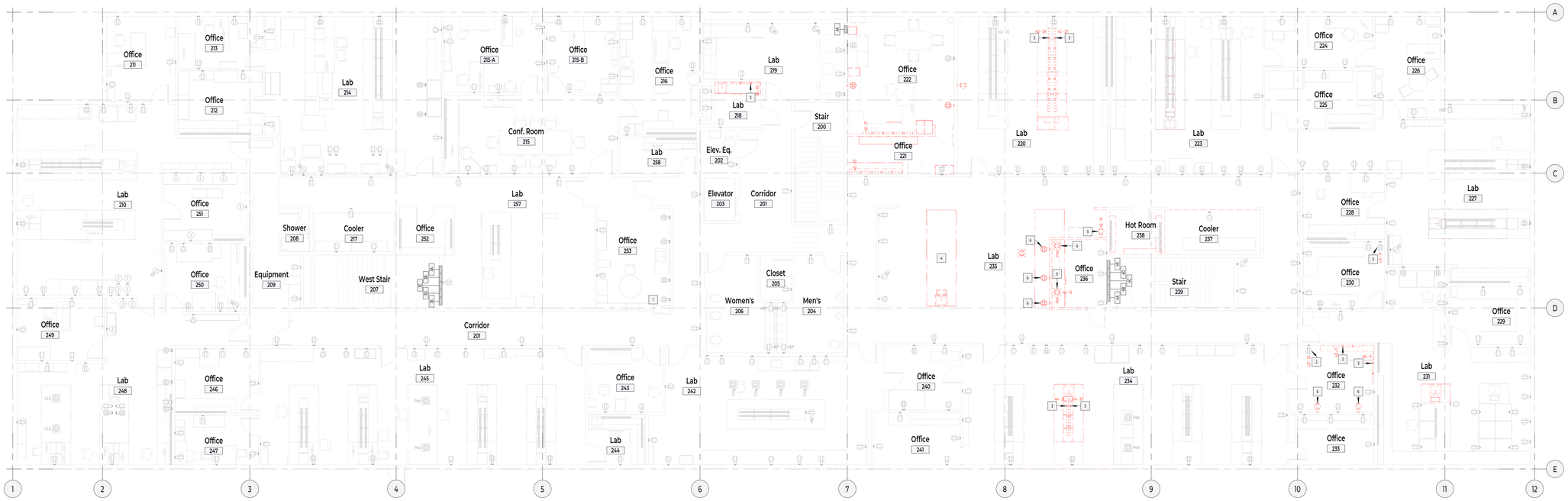
PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Level 1 Electrical Demolition Plan

SHEET
E011

DATE
01.30.2026

Reference Keynotes	General Sheet Notes
1. E.C. shall replace existing dead outlet with new. Verify outlet is functional or replace branch circuit back to panel. 2. E.C. shall remove circuit from new Life Safety panel. Refer to new Power Plan for new circuit information. 3. Remove existing plugmold. Save circuit for reuse in same room. Refer to new power plan for location of new equipment. 4. Remove all existing electrical devices within Lab counter, as required. Remove branch circuit and conduit back to source panel. 5. Remove existing device. Save circuit for reconnection. Refer to new power plan for location of new equipment. 6. Remove device and branch circuit/conduit back to last existing to remain device or source panel.	1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect. 2. The electrical plans are diagrammatic only. Coordinate the electrical equipment location and installation with equipment being served. 3. Exact location of mechanical and plumbing equipment that require electrical connections are shown on the mechanical and plumbing drawings. Coordinate with mechanical and plumbing contractors. 4. All conductors shall be copper, unless otherwise noted. Minimum size shall be #12 AWG. Aluminum conductors are permitted above 100A. 5. Refer to the mechanical equipment connection schedule for disconnect requirements. 6. Refer to the architectural drawings for exact mounting height of receptacles.



1 E012 Level 2 Electrical Demo Plan

1/8" = 1'-0"

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moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
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01.30.2026

PPA#22-0045

A/E#00-00-00

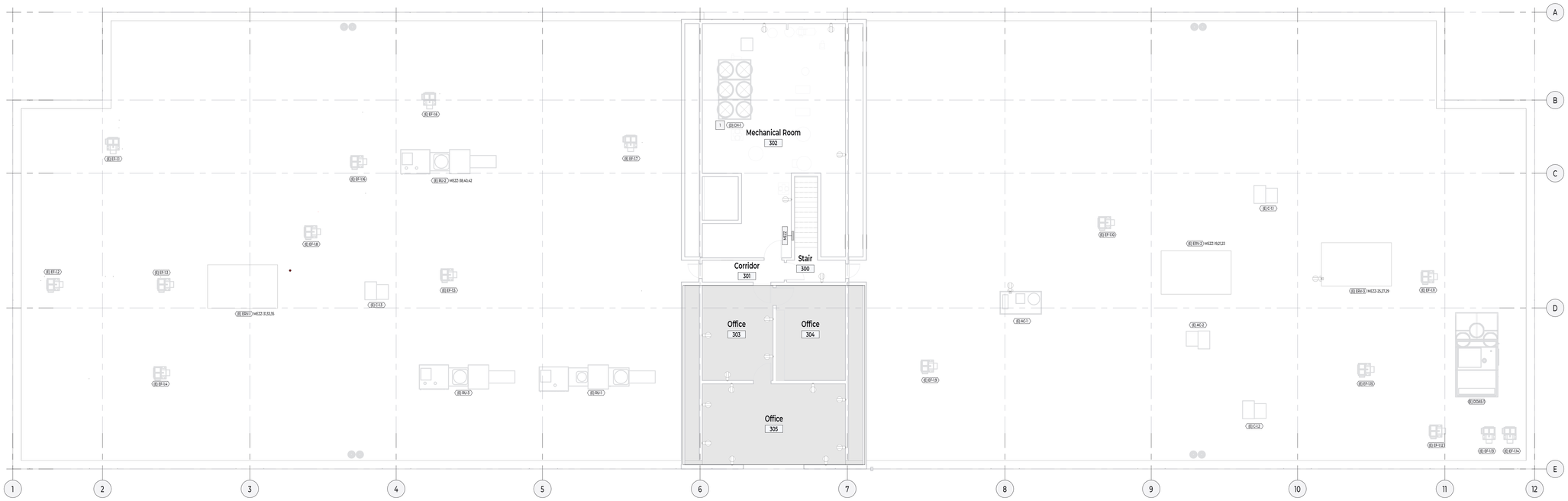
BA# 2236

SHEET TITLE
Level 2 Electrical Demolition Plan

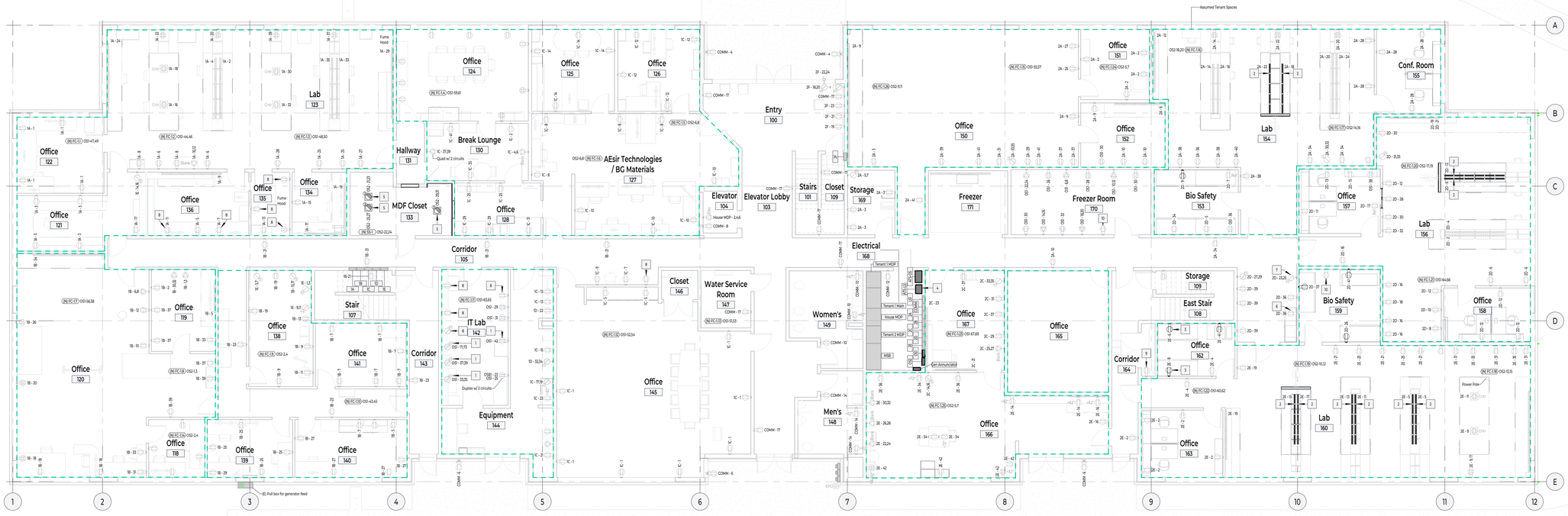
SHEET
E012

DATE
01.30.2026

Reference Keynotes	General Sheet Notes
1. Chiller shall be removed once new chiller is up and running. Refer to mechanical for additional information.	1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect. 2. The electrical plans are diagrammatic only. Coordinate the electrical equipment location and installation with equipment being served. 3. Exact location of mechanical and plumbing equipment that require electrical connections are shown on the mechanical and plumbing drawings. Coordinate with mechanical and plumbing contractors. 4. All conductors shall be copper, unless otherwise noted. Minimum size shall be #12 AWG. Aluminum conductors are permitted above 100A. 5. Refer to the mechanical equipment connection schedule for disconnect requirements. 6. Refer to the architectural drawings for exact mounting height of receptacles.



Reference Keynotes	General Sheet Notes
1. E.C. shall relocate circuit to Optional Standby ATS, panel OSB#. Refer to specific device for which OSB panel to circuit. Splice and extend branch circuit, as needed.	1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect.
2. Provide new plugmold (Wiremold #2GSB5067R, color by Architect and/or Owner) to counter top. Length of plugmold to be verified with approved millwork shop drawings prior to ordering. Connect to saved circuit from demolition.	2. The electrical plans are diagrammatic only. Coordinate the electrical equipment location and installation with equipment being served.
3. Reconnect to existing circuit saved from demolition. Extend branch circuit and conduit as needed.	3. Exact location of mechanical and plumbing equipment that require electrical connections are shown on the mechanical and plumbing drawings. Coordinate with mechanical and plumbing contractors.
4. Replace Generac ATS with new ATS that will communicate with new generator. Basis of design: ASCO.	4. All conductors shall be copper, unless otherwise noted. Minimum size shall be #12 AWG. Aluminum conductors are permitted above 100A.
5. Rack receptacles shall be placed facing vertically or down, to prevent dbris from building up on within the receptacles. Coordinate final location of receptacle with UIT representative.	5. Refer to the mechanical equipment connection schedule for disconnect requirements.
6. Existing receptacle to remain. Recircuit to dedicated circuit for new dishwasher. Receptacle shall be located to be readily accessible under the sink, as needed. Device shall be replaced with GFCI-rated device or a GFCI-breaker shall be provided.	6. Refer to the architectural drawings for exact mounting height of receptacles.
7. E.C. shall verify existing power is sufficient for new cooler.	
8. Circuit tracing could not be performed due to the equipment being active.	
9. E.C. shall replace existing dead outlet with new. Verify outlet is functional or replace branch circuit back to panel.	
10. Circuit tracing could not be performed, this receptacle was not accessible.	
11. Generator basis of design is MTU 180kW (112"L x 48"W x 53"H). Level 3 enclosure is assumed to be 136"L x 48"W x 53"H. Clearances shall be 4' minimum from sides of generator to ensure air intake and electrical clearances are maintained per NEC 110.26. If E.C. proposes substitues (refer to MSU Engineering Guidelines), E.C. must coordinate changes to size and enclosure clearances with G.C. prior to bidding.	



1 Level 1 Electrical Plan
E111 1/8" = 1'-0"

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moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author		
REVIEWED BY: Checker		
REV.	DESCRIPTION	DATE

MONTANA LICENSED PROFESSIONAL ENGINEER ANDREW S. MOORE No. 36404PE REGISTERED PROFESSIONAL ENGINEER
01.30.2026

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE
Level 1 Electrical Plan

SHEET
E111

DATE
01.30.2026

Reference Keynotes	General Sheet Notes
1. E.C. shall replace existing dead outlet with new. Verify outlet is functional or replace branch circuit back to panel. 2. E.C. shall reconnect circuit to closest new Optional Standby Panel, OSB#. Refer to specific device for which OSB panel to circuit 3. E.C. shall relocate circuit to Optional Standby ATS, panel OSB#. Refer to specific device for which OSB panel to circuit. Splice and extend branch circuit, as needed. 4. Receptacles are integral to Bio Safety Cabinet. 5. Replace device with a standard duplex. 6. Provide new plugmold (Wiremold #20GB506TR, color by Architect and/or Owner) to counter top. Length of plugmold to be verified with approved millwork shop drawings prior to ordering. Connect to saved circuit from demolition. 7. Verify outlet is dedicated for new Bio Safety cabinet. 8. This junction box is capped off within panel 3B. 9. Junction box has been blanked off, no circuit tracing was marked. 10. Junction box does not have a circuit, box was empty. 11. Circuit tracing could not be performed due to the equipment being active. Circuit number is assumed from existing panel schedule. 12. Circuit tracing could not be performed, this receptacle was not accessible. 13. New furniture feed power pole provided and installed by furniture supplier. E.C. shall utilize raceway system for furniture system power & data connections. Refer to Technology plans for data requirements. Coordinate final cubicle layout and requirements with MSU prior to rough-in. 14. Rack receptacles shall be placed facing vertically or down, to prevent dbris from building up on within the receptacles. Coordinate final location of receptacle with UIT representative. 15. Remove existing circuit for different tenant suite. Existing traced circuit is shown in gray. Connect to circuit within room, as shown in black. 16. New furniture feed, wall mounted, provided and installed by furniture supplier. E.C. shall utilize raceway system for furniture system power & data connections. Refer to Technology plans for data requirements. Coordinate final cubicle layout and requirements with MSU prior to rough-in.	1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect. 2. The electrical plans are diagrammatic only. Coordinate the electrical equipment location and installation with equipment being served. 3. Exact location of mechanical and plumbing equipment that require electrical connections are shown on the mechanical and plumbing drawings. Coordinate with mechanical and plumbing contractors. 4. All conductors shall be copper, unless otherwise noted. Minimum size shall be #12 AWG. Aluminum conductors are permitted above 100A. 5. Refer to the mechanical equipment connection schedule for disconnect requirements. 6. Refer to the architectural drawings for exact mounting height of receptacles.

1 E112 Level 2 Electrical Plan
1/8" = 1'-0"

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BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

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REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

MONTANA ANDREW S. MOORE No. 36404PE REGISTERED PROFESSIONAL ENGINEER
01.30.2026

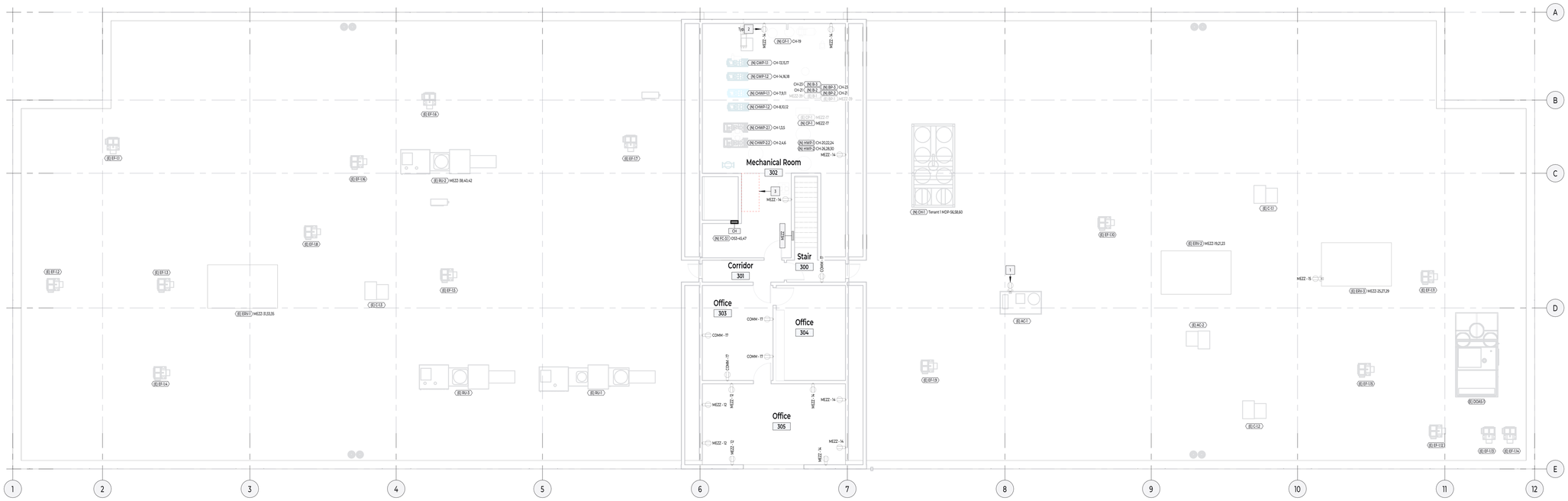
PPA#22-0045
A/E#00-00-00
BA# 2236

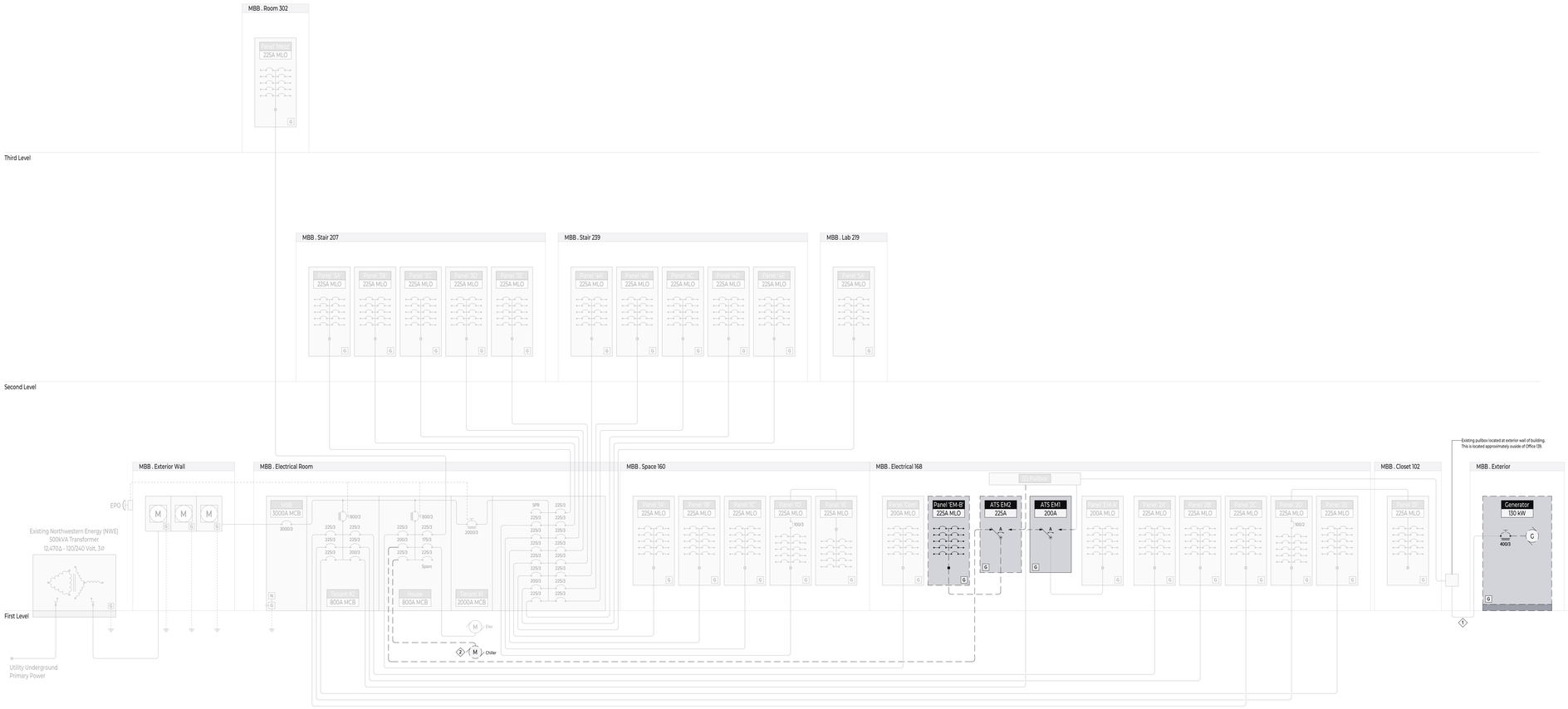
SHEET TITLE
Level 2 Electrical Plan

SHEET
E112

DATE
01.30.2026

Reference Keynotes	General Sheet Notes
1. E.C. shall replace existing dead outlet with new. Verify outlet is functional or replace branch circuit back to panel. 2. Circuit tracing could not be performed. Circuit number is assumed from existing panel schedule. 3. Approximate location of VFDs for chiller pumps. Refer to mechanical sheet M302 for additional information.	1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect. 2. The electrical plans are diagrammatic only. Coordinate the electrical equipment location and installation with equipment being served. 3. Exact location of mechanical and plumbing equipment that require electrical connections are shown on the mechanical and plumbing drawings. Coordinate with mechanical and plumbing contractors. 4. All conductors shall be copper, unless otherwise noted. Minimum size shall be #12 AWG. Aluminum conductors are permitted above 100A. 5. Refer to the mechanical equipment connection schedule for disconnect requirements. 6. Refer to the architectural drawings for exact mounting height of receptacles.





1 E501 Electrical Demolition Riser Diagram

1/4" = 1'-0"

Demo One-Line Diagram Notes

1. Maintain existing conduit from generator to pullbox, remove existing feeder conductors, and provide pull string for future feeder. Refer to updated One-Line Diagram for additional information. It is assumed that this is an existing 4" conduit from the generator to the pull box on the exterior wall. Conduit from exterior pull box to the ATS pull box is assumed to be 2". E.C. shall verify prior to bidding and provide additional pricing to replace conduit from generator to exterior pull box and to ATS pull box.
2. Existing Chiller to be removed as part of this scope. Remove existing chiller once new CH-1 system has been installed and is operational. Refer to mechanical drawings for additional details.

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MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: EB
REVIEWED BY: AM

REV.	DESCRIPTION	DATE

MONTANA
ANDREW S. MOORE
No. 36404PE
REGISTERED PROFESSIONAL ENGINEER

01.30.2026

PPA#22-0045

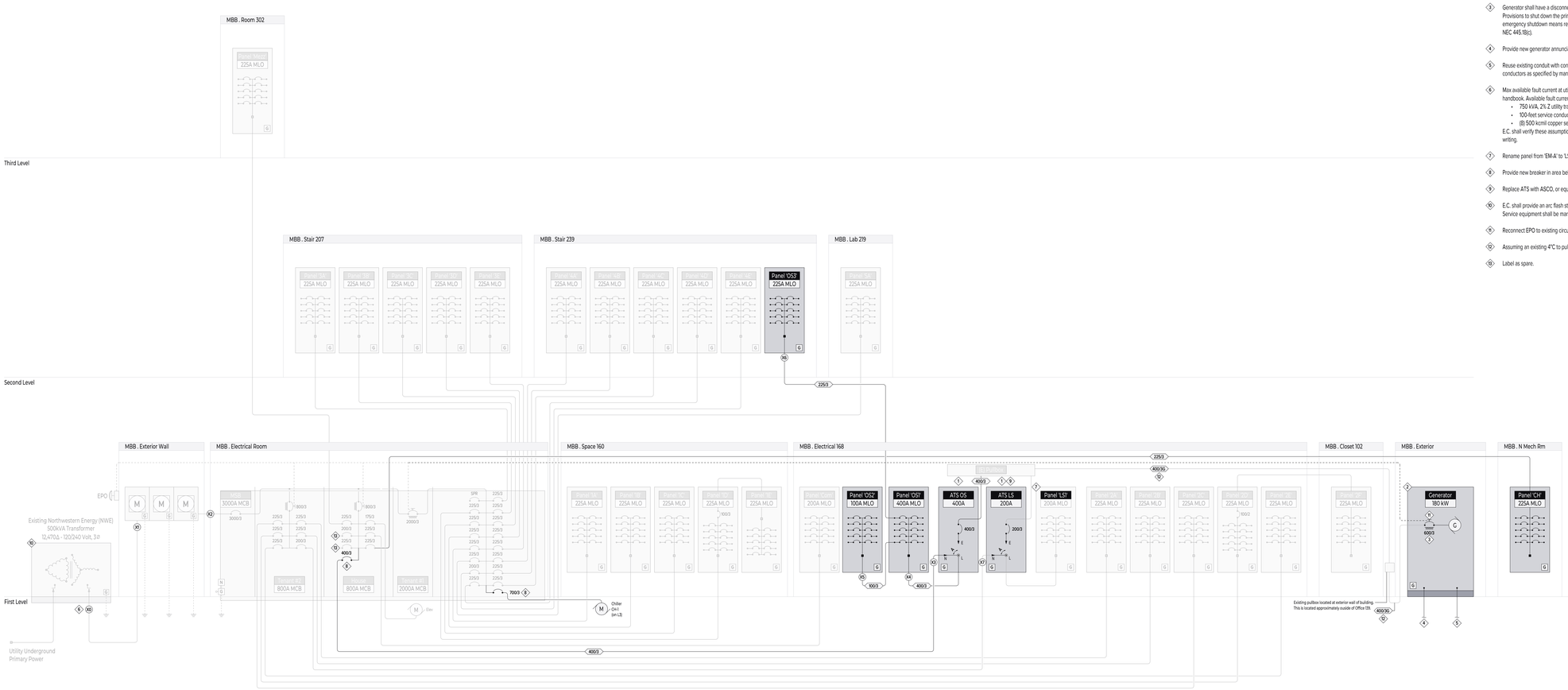
A/E#00-00-00

BA# 2236

SHEET TITLE
Electrical Demo
One-Line Diagram

SHEET
E501

DATE
01.30.2026



1 E502 **Electrical Riser Diagram**

NTS

One-Line Diagram Notes

1. ATS shall be break before make. Disconnect all ungrounded conductors connected to LVE's system prior to connecting the generator to the conductors supplying the load.
2. New 180 kW diesel generator. Basis of Design is MTU 6R0113 DS 180. Generator must be installed in accordance with current applicable NFPA 37 and NFPA 70 standards as well as any other federal, state, and local codes for minimum distances from other structures.
3. Generator shall have a disconnecting means per NEC 445.18(a) and have provisions to shut down the prime mover as required per NEC 445.18(b). Provisions to shut down the prime mover may serve as the disconnecting means if capable of being locked in the open position. Additional remote emergency shutdown means required. The additional shutdown means shall be located outside the equipment room or generator enclosure per NEC 445.18(c).
4. Provide new generator annunciator in Electrical Room and coordinate location with Architect.
5. Reuse existing conduit with conductors as specified by manufacturer from generator to generator annunciator. Reuse existing conduit with conductors as specified by manufacturer from generator to ATS for start/stop circuit.
6. Max available fault current at utility transformer is assumed to be 66,091 A, taken from Cooper Bussmann's Short Circuit Current Calculations handbook. Available fault current calculations assume
   - 750 kVA, 2% Z utility transformer
   - 100-feet service conductor length or longer
   - (8) 500 kcmil copper service conductors per phase

   E.C. shall verify these assumptions with the utility. If assumptions are not valid, E.C. shall request updated available fault currents from engineer in writing.
7. Rename panel from 'EM-A' to 'LS1'. Only life safety loads shall be added to this panel. Refer to NEC 100 for definition of life safety.
8. Provide new breaker in area below existing breakers in provisional space.
9. Replace ATS with ASCO, or equal. Reuse feeders after resistance testing to verify continuity. Provide new feeder, as necessary.
10. E.C. shall provide an arc flash study through manufacturer / distributor for exact values per NEC requirements, prior to approval of gear submittals. Service equipment shall be marked with the available fault current and the date the arc fault study was performed per NEC 110.24.
11. Reconnect EPO to existing circuit, extend branch circuit as necessary.
12. Assuming an existing 4"C to pull box from generator. E.C. shall verify size and report back to Engineer of Record if different.
13. Label as spare.

Short Circuit and Feeder Schedule

	Short Circuit						Feeder			
Point	Device	Fault at Device	AIC Rating	Tag	Parallel Runs	Conduit	Phase	Neutral	Ground	Length
X0	Utility	66,091								
X1*	MSB	44,212	65,000 A	3000/3S	8	3-1/2"C	(8)500kcmil	500kcmil	1/0	160'
X2*	House MDP	39,794	65,000 A	800/3	3	3"C	(3)300kcmil	300kcmil	1/0	17'
X3	ATS-OS	33,641	65,000 A	400/3	2	2"C	(2)3/0	3/0	#3	25'
X4	OS1	28,557	35,000 A	400/3	2	2"C	(2)3/0	3/0	#3	28'
X5	OS2	24,265	35,000 A	225/3	1	2-1/2"C	4/0	4/0	#4	11'
X6	OS3	13,717	22,000 A	250	1	2-1/2"C	250kcmil	250kcmil	#3	72'
X7	ATS-LS	24,518	35,000 A	200/3	1	2"C	3/0	3/0	#6	25'
N/A	Generator	1,545	N/A	400/3	2	2"C	(2)3/0	3/0	#3	162'

*Notes:
This feeder is existing and assumed based on breaker sizing for short circuit calculations. E.C. shall inform Engineer of Record if this is incorrect.

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4515 Valley Commons Drive #201
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MONTANA
ANDREW S. MOORE
No. 36404PE
REGISTERED PROFESSIONAL ENGINEER
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical One-Line Diagram

SHEET
E502

DATE
01.30.2026

Schedule || Tenant 1 MDP

Panel	Tenant 1 MDP	**Voltage**	120/208 Wye	**Main Bus Rating**	2000 A	**Main Bus Feed Location**	
Location	Office 162	**Phases**	3Ø	**Main Interior Type**	MCB	**Main Bus Feed-Thorugh Load**	
Mounting		**Wire**	4	**Main Circuit Breaker**	2000 A	**Sub-Feed #1 Breaker Rating**	
Fed From	Tenant 1 Main	**Enclosure Type**	NEMA 1	**Short Circuit AIC Rating**	65,000 A	**Sub-Feed #2 Breaker Rating**	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.

CKT	Circuit Description	Wire	Type	Trip	Poles	A	B	C	Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Panel '4A'	Existing	Ex	225 A	3	6614 VA 4740 VA			3	225 A	Ex	Existing	(E) Panel '1A'	2
3	--	--	--	--	--		8240 VA 8520 VA		--	--	--	--	--	4
5	--	--	--	--	--			5894 VA 6660 VA	--	--	--	--	--	6
7	(E) Panel '4B'	Existing	Ex	225 A	3	4140 VA 5730 VA			3	225 A	Ex	Existing	(E) Panel '1B'	8
9	--	--	--	--	--		2880 VA 8370 VA		--	--	--	--	--	10
11	--	--	--	--	--			4140 VA 8880 VA	--	--	--	--	--	12
13	(E) Panel '4C'	Existing	Ex	225 A	3	6880 VA 13110 VA			3	225 A	Ex	Existing	(E) Panel '1C'	14
15	--	--	--	--	--		4680 VA 7660 VA		--	--	--	--	--	16
17	--	--	--	--	--			9040 VA 12270 VA	--	--	--	--	--	18
19	(E) Panel '4D'	Existing	Ex	225 A	3	8033 VA 25371 VA			3	225 A	Ex	Existing	(E) Panel '1D'	20
21	--	--	--	--	--		6383 VA 21426 VA		--	--	--	--	--	22
23	--	--	--	--	--			8633 VA 22375 VA	--	--	--	--	--	24
25	(E) Panel '4E'	Existing	Ex	200 A	3	7170 VA 12203 VA			3	225 A	Ex	Existing	(E) Panel '3A'	26
27	--	--	--	--	--		9340 VA 14003 VA		--	--	--	--	--	28
29	--	--	--	--	--			8170 VA 11993 VA	--	--	--	--	--	30
31	(E) Panel '3D'	Existing	Ex	225 A	3	5760 VA 10860 VA			3	225 A	Ex	Existing	(E) Panel '3B'	32
33	--	--	--	--	--		6080 VA 8340 VA		--	--	--	--	--	34
35	--	--	--	--	--			4280 VA 4500 VA	--	--	--	--	--	36
37	(E) Panel '3E'	Existing	Ex	225 A	3	10733 VA 6605 VA			3	225 A	Ex	Existing	(E) Panel '3C'	38
39	--	--	--	--	--		8213 VA 9495 VA		--	--	--	--	--	40
41	--	--	--	--	--			10193 VA 7190 VA	--	--	--	--	--	42
43	(E) Panel '5A'	Existing	Ex	225 A	3	13388 VA 18333 VA			3	200 A	Ex	Existing	(E) Rm 219 Autoclave #2	44
45	--	--	--	--	--		10013 VA 18333 VA		--	--	--	--	--	46
47	--	--	--	--	--			9208 VA 18333 VA	--	--	--	--	--	48
49	(E) Rm 219 Autoclave #1	Existing	Ex	175 A	3	16333 VA 16333 VA			3	175 A	Ex	Existing	(E) Rm 231 Makeup R2R	50
51	--	--	--	--	--		16333 VA 16333 VA		--	--	--	--	--	52
53	--	--	--	--	--			16333 VA 16333 VA	--	--	--	--	--	54
55	Space	--	--	--	1	-- 55333 VA			3	700 A	S	(2)3-1/2"C, 3-500kcmil,...	(N) Chiller CH-1	56
57	Space	--	--	--	1		-- 55333 VA		--	--	--	--	--	58
59	Space	--	--	--	1			-- 55333 VA	--	--	--	--	--	60
	Total Apparent Power Phase Loads:					247672 VA	239978 VA	239761 VA						
	Total Current Phase Loads:					2064 A	2000 A	1998 A						

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	247672 VA	Commercial - Motors	16250 VA	106.92%	17375 VA	Total Connected Load:	727410 VA
Phase B:	239978 VA	Commercial - Receptacles	309910 VA	51.61%	159955 VA	Total Estimated Demand:	583455 VA
Phase C:	239761 VA	Equipment	162250 VA	100.00%	162250 VA	Total Connected Current:	2017 A
Total:	**727410 VA**	HVAC	219500 VA	100.00%	219500 VA	Total Estimated Demand Current:	1620 A
		Lighting	19500 VA	125.00%	24375 VA		

Schedule || Tenant 2 MDP

Panel	Tenant 2 MDP	**Voltage**	120/208 Wye	**Main Bus Rating**	3000 A	**Main Bus Feed Location**	
Location	Office 162	**Phases**	3Ø	**Main Interior Type**	MCB	**Main Bus Feed-Thorugh Load**	
Mounting		**Wire**	4	**Main Circuit Breaker**	800 A	**Sub-Feed #1 Breaker Rating**	
Fed From	MSB	**Enclosure Type**	NEMA 1	**Short Circuit AIC Rating**	65,000 A	**Sub-Feed #2 Breaker Rating**	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.

CKT	Circuit Description	Wire	Type	Trip	Poles	A	B	C	Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Panel '2C'	Existing	Ex	225 A	3	7290 VA 7350 VA			3	225 A	Ex	Existing	(E) Panel '2A'	2
3	--	--	--	--	--		10344 VA 7110 VA		--	--	--	--	--	4
5	--	--	--	--	--			4274 VA 8340 VA	--	--	--	--	--	6
7	(E) Panel '2D'	Existing	Ex	225 A	3	16455 VA 4000 VA			3	225 A	Ex	Existing	(E) Panel '2B'	8
9	--	--	--	--	--		16575 VA 3000 VA		--	--	--	--	--	10
11	--	--	--	--	--			9060 VA 1500 VA	--	--	--	--	--	12
13	(E) Panel '2E'	Existing	Ex	225 A	3	10490 VA 1969 VA			3	200 A	Ex	2"C, 3-3/0, 3/0N, #6G	(N) ATS-LS	14
15	--	--	--	--	--		11060 VA 1969 VA		--	--	--	--	--	16
17	--	--	--	--	--			11130 VA 1969 VA	--	--	--	--	--	18
	Total Apparent Power Phase Loads:					47554 VA	50058 VA	36273 VA						
	Total Current Phase Loads:					411 A	432 A	302 A						

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	47554 VA	Commercial - Receptacles	116150 VA	54.30%	63075 VA	Total Connected Load:	133886 VA
Phase B:	50058 VA	Equipment	500 VA	100.00%	500 VA	Total Estimated Demand:	83664 VA
Phase C:	36273 VA	Existing Load - 30 Day Metered	5908 VA	125.00%	7386 VA	Total Connected Current:	372 A
Total:	**133886 VA**	HVAC	5828 VA	100.00%	5828 VA	Total Estimated Demand Current:	232 A
		Lighting	5500 VA	125.00%	6875 VA		

Schedule || MSB

Panel	MSB	**Voltage**	120/208 Wye	**Main Bus Rating**	3000 A	**Main Bus Feed Location**	
Location	Office 162	**Phases**	3Ø	**Main Interior Type**	MCB	**Main Bus Feed-Thorugh Load**	
Mounting		**Wire**	4	**Main Circuit Breaker**	3000 A	**Sub-Feed #1 Breaker Rating**	
Fed From	Utility	**Enclosure Type**	NEMA 1	**Short Circuit AIC Rating**	65,000 A	**Sub-Feed #2 Breaker Rating**	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

CKT	Circuit Description	Wire	Type	Trip	Poles	A	B	C	Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Tenant 2 MDP	Existing	Ex	800 A	3	47554 VA 112959 VA			3	800 A	Ex	(3)3"C, 3-300kcmil,...	(E) House MDP	2
3	--	--	--	--	--		50058 VA 106144...		--	--	--	--	--	4
5	--	--	--	--	--			36273 VA 107687...	--	--	--	--	--	6
7	(E) Tenant 1 Main	Existing	Ex	2000 A	3	247672... --			1	--	--	--	Space	8
9	--	--	--	--	--		239978... --		1	--	--	--	Space	10
11	--	--	--	--	--			239761... --	1	--	--	--	Space	12
	Total Apparent Power Phase Loads:					408186 VA	396180 VA	383721 VA						
	Total Current Phase Loads:					3418 A	3317 A	3198 A						

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	408186 VA	Commercial - Motors	138982 VA	102.99%	143143 VA	Total Connected Load:	1188087 VA
Phase B:	396180 VA	Commercial - Receptacles	504974 VA	50.99%	257487 VA	Total Estimated Demand:	960332 VA
Phase C:	383721 VA	Equipment	165400 VA	100.00%	165400 VA	Total Connected Current:	3298 A
Total:	**1188087 VA**	Existing Load - 30 Day Metered	23634 VA	125.00%	29542 VA	Total Estimated Demand Current:	2666 A
		HVAC	316447 VA	100.00%	316447 VA		
		Lighting	38650 VA	125.00%	48313 VA		

Schedule || House MDP

Panel	House MDP	**Voltage**	120/208 Wye	**Main Bus Rating**	3000 A	**Main Bus Feed Location**	
Location	Office 162	**Phases**	3Ø	**Main Interior Type**	MCB	**Main Bus Feed-Thorugh Load**	
Mounting		**Wire**	4	**Main Circuit Breaker**	800 A	**Sub-Feed #1 Breaker Rating**	
Fed From	MSB	**Enclosure Type**	NEMA 1	**Short Circuit AIC Rating**	65,000 A	**Sub-Feed #2 Breaker Rating**	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.

CKT	Circuit Description	Wire	Type	Trip	Poles	A	B	C	Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Panel 'Mezz' (labeled Mech room)	Existing	Ex	225 A	3	24690 VA 15083 VA			3	175 A	Ex	Existing	(E) Elevator 104 with Shunt Trip	2
3	--	--	--	--	--		20330 VA 15083 VA		--	--	--	--	--	4
5	--	--	--	--	--			20000... 15083 VA	--	--	--	--	--	6
7	(N) Spare	--	--	200 A	3	0 VA 12075 VA			3	225 A	Ex	Existing	(E) Panel 'Comm'	8
9	--	--	--	--	--		0 VA 11840 VA		--	--	--	--	--	10
11	--	--	--	--	--			0 VA 11755 VA	--	--	--	--	--	12
13	(N) Spare	--	--	225 A	3	0 VA 22528 VA			3	225 A	Ex	3"C, 3-350kcmil, 350kcmil...	(N) Panel 'CH'	14
15	--	--	--	--	--		0 VA 21884 VA		--	--	--	--	--	16
17	--	--	--	--	--			0 VA 21884 VA	--	--	--	--	--	18
19	(N) ATS -EM2	(2)2"C, 3-3/0, 3/0N, #3G	S	400 A	3	38583 VA --			1	--	--	--	Space	20
21	--	--	--	--	--		37006 VA --		1	--	--	--	Space	22
23	--	--	--	--	--			38965 VA --	1	--	--	--	Space	24
	Total Apparent Power Phase Loads:					112959 VA	106144 VA	107687 VA						
	Total Current Phase Loads:					943 A	885 A	899 A						

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	112959 VA	Commercial - Motors	122732 VA	103.39%	126893 VA	Total Connected Load:	326790 VA
Phase B:	106144 VA	Commercial - Receptacles	78914 VA	56.34%	44457 VA	Total Estimated Demand:	304338 VA
Phase C:	107687 VA	Equipment	2650 VA	100.00%	2650 VA	Total Connected Current:	907 A
Total:	**326790 VA**	Existing Load - 30 Day Metered	17725 VA	125.00%	22156 VA	Total Estimated Demand Current:	845 A
		HVAC	91119 VA	100.00%	91119 VA		
		Lighting	13650 VA	125.00%	17063 VA		

100% Construction Documents

Molecular Bioscience Building
Phase 2
MSU

MONTANA STATE UNIVERSITY

BLACKSHEEP ENGINEERING
ELECTRICAL | TECHNOLOGY | LIGHTING
MECHANICAL | PLUMBING
602 W Hemlock | Bozeman, MT 59715
moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	EB
REVIEWED BY:	AM

REV.	DESCRIPTION	DATE

MONTANA ANDREW S. MOORE No. 38404PE REGISTERED PROFESSIONAL ENGINEER

01.30.2026

PPA#22-0045

A/E#00-00-00

BA# 2236

SHEET TITLE
Electrical Distribution Panel Schedules

SHEET
E503

DATE
01.30.2026

Schedule || OS1

Panel	OS1	Voltage	120/208 Wye	Main Bus Rating	400 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	400 A	Sub-Feed #1 Breaker Rating	
Fed From	ATS-OS	Enclosure Type	NEMA 1	Short Circuit AIC Rating	35,000 A	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Circuit shall be relocated from new Life Safety Panel LS1.
[2] Load from 30-day meter study for use in panel loading only. This value is combining LS1 30-day meter reading and OS1 meter reading since several circuits were relocated from the emergency panel.
[3] Load is included within meter study load.

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.
2. Where panel schedule and plans indicate GFCI protection for the same circuit, E.C. shall determine whether to install a GFCI receptacle / device or a GFCI circuit breaker but not both.
3. Reference Mechanical Equipment Connection Schedule and manufacturer instructions for electrical installation requirements.
4. If mechanical equipment is within sight [less than 50-feet] of the load center, a molded case circuit breaker may serve as the disconnecting means. The circuit breaker must be capable of being locked in the open...

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Rm 152 Dedicated 20A [3]	Existing	S	20 A	1	0 VA	0 VA					1	20 A	--	--	Spare	2
3	(E) AC-1 [3]	Existing	S	20 A	2			0 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(R) #240 Incbtr (relocated from LS1 - 40) [1] [3]	4
5	--	--	--	--	--					0 VA	0 VA	2	20 A	S	2#12, #12N, #12G	(E) Freezer -80 Dedicated [3]	6
7	(E) AC-2 [3]	Existing	S	20 A	2	0 VA	0 VA					--	--	--	--	--	8
9	--	--	--	--	--			0 VA	0 VA			2	20 A	S	2#12, #12N, #12G	(E) Freezer -80 Dedicated [3]	10
11	(E) Rm -80 MR Slim Fan [3]	Existing	S	20 A	1					0 VA	0 VA	--	--	--	--	--	12
13	(E) Rm -80 MR Slim Fan Rm 142 [3]	Existing	S	20 A	1	0 VA	0 VA					2	20 A	S	2#12, #12N, #12G	(E) Freezer -80 Dedicated [3]	14
15	(E) Rm 170 Rooftop Compressor [3]	Existing	S	20 A	2			0 VA	0 VA			--	--	--	--	--	16
17	--	--	--	--	--					0 VA	0 VA	2	20 A	S	2#12, #12N, #12G	(E) Freezer -80 Dedicated [3]	18
19	(E) Generator Heater [3]	Existing	S	20 A	1	0 VA	0 VA					--	--	--	--	--	20
21	(E) Battery Charger Generator [3]	Existing	S	20 A	1			0 VA	0 VA			2	20 A	S	2#12, #12N, #12G	(E) Freezer -80 Dedicated [3]	22
23	(R) Frzr Rm 142 (relocated from LS1 - 28) [1] [3]	1#12, #12N, #12G	S	20 A	1					0 VA	0 VA	--	--	--	--	--	24
25	(R) Frzr Rm 142 (relocated from LS1 - 30) [1] [3]	1#12, #12N, #12G	S	20 A	1	0 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(E) Freezer -80 Dedicated 20A [3]	26
27	(R) Incbtr 251 (relocated from LS1 - 16) [1] [3]	1#12, #12N, #12G	S	20 A	1			0 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(E) Freezer -80 Dedicated 20A [3]	28
29	(R) Frzr Rm 142 (relocated from LS1 - 4) [1] [3]	1#12, #12N, #12G	S	20 A	1					0 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(E) Freezer -80 Dedicated 20A [3]	30
31	(R) Frzr Rm 142 (relocated from LS1 - 6) [1] [3]	1#12, #12N, #12G	S	20 A	1	0 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(E) Freezer -80 Dedicated 20A [3]	32
33	(R) Frzr 142 (relocated from LS1 - 8,10) [1] [3]	2#12, #12N, #12G	S	20 A	2			0 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(E) Freezer -80 Dedicated 20A [3]	34
35	--	--	--	--	--					0 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(E) Rm 153 Dedicated 20A [3]	36
37	(R) Frzr Rm 142 (relocated from LS1 - 11,13) [1] [3]	2#12, #12N, #12G	S	20 A	2	0 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(E) Rm 157 Dedicated 20A [3]	38
39	--	--	--	--	--			0 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(E) Rm 159 Dedicated 20A [3]	40
41	(R) #222 Outlets (relocated from LS1 - 5) [1] [3]	1#12, #12N, #12G	S	20 A	1					500 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(R) Incbtr 142 (relocated from LS1 - 34) [1] [3]	42
43	(N) FC-1.10	2#12, #12N, #12G	S	20 A	2	312 VA	998 VA					2	20 A	S	2#10, #10N, #10G	(N) FC-1.2	44
45	--	--	--	--	--			312 VA	998 VA			--	--	--	--	--	46
47	(N) C-1.1	2#12, #12N, #12G	S	20 A	2					312 VA	998 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-1.3	48
49	--	--	--	--	--	312 VA	998 VA					--	--	--	--	--	50
51	(N) FC-1.13	2#12, #12N, #12G	S	20 A	2			312 VA	998 VA			2	20 A	S	2#12, #12N, #12G	(N) FC-1.12	52
53	--	--	--	--	--					312 VA	998 VA	--	--	--	--	--	54
55	(N) FC-1.15	2#12, #12N, #12G	S	20 A	2	312 VA	655 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-1.7	56
57	--	--	--	--	--			312 VA	655 VA			--	--	--	--	--	58
59	(N) FC-1.4	2#12, #12N, #12G	S	20 A	2					655 VA	312 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-1.22	60
61	--	--	--	--	--	655 VA	312 VA					--	--	--	--	--	62
63	(N) FC-1.11	2#12, #12N, #12G	S	20 A	2			655 VA	655 VA			2	20 A	S	2#12, #12N, #12G	(N) FC-1.21	64
65	--	--	--	--	--					655 VA	655 VA	--	--	--	--	--	66
67	(N) FC-1.23	2#12, #12N, #12G	S	20 A	2	655 VA	--					1	--	--	--	Space	68
69	--	--	--	--	--			655 VA	--			1	--	--	--	Space	70
71	(R) Frzr Room 142 (relocated from LS1 - 7,9) [1]...	2#12, #12N, #12G	S	20 A	2					0 VA	--	1	--	--	--	Space	72
73	--	--	--	--	--	0 VA	5908 VA					3	0 A		N/A	Existing Metered Load [2]	74
75	Space	--	--	--	1			--	5908 VA			--	--	--	--	--	76
77	Space	--	--	--	1					--	5908 VA	--	--	--	--	--	78
79	(N) Panel 'OSB2'	2-1/2"C, 3-4/0, 4/0N, #4G	S	225 A	3	10483 VA	16981 VA					3	225 A	S	2-1/2"C, 3-250kcmil,...	(N) Panel 'OSB3'	80
81	--	--	--	--	--			9905 VA	15640 VA			--	--	--	--	--	82
83	--	--	--	--	--					10903 VA	16754 VA	--	--	--	--	--	84
		Total Apparent Power Phase Loads:				38583 VA		37006 VA		38965 VA							
		Total Current Phase Loads:				324 A		308 A		327 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	38583 VA	Commercial - Receptacles	25460 VA	69.64%	17730 VA	Total Connected Load:	114554 VA
Phase B:	37006 VA	Equipment	0 VA	0.00%	0 VA	Total Estimated Demand:	111255 VA
Phase C:	38965 VA	Existing Load - 30 Day Metered	17725 VA	125.00%	22156 VA	Total Connected Current:	318 A
Total:	114554 VA	HVAC	71369 VA	100.00%	71369 VA	Total Estimated Demand Current:	309 A

Schedule || OS2

Panel	OS2	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting	Recessed	Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	OS1	Enclosure Type	NEMA 1	Short Circuit AIC Rating	35,000 A	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Circuit shall be relocated from new Life Safety Panel LS1.
[2] Load is included within meter study load on panel OS1.

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.
2. Where panel schedule and plans indicate GFCI protection for the same circuit, E.C. shall determine whether to install a GFCI receptacle / device or a GFCI circuit breaker but not both.
3. Reference Mechanical Equipment Connection Schedule and manufacturer instructions for electrical installation requirements.
4. If mechanical equipment is within sight [less than 50-feet] of the load center, a molded case circuit breaker may serve as the disconnecting means. The circuit breaker must be capable of being locked in the open position.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(N) FC-1.8	2#12, #12N, #12G	S	20 A	2	655 VA	624 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-1.9,14	2
3	--	--	--	--	--			655 VA	624 VA			--	--	--	--	--	4
5	(N) FC-1.24,25	2#12, #12N, #12G	S	20 A	2					967 VA	624 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-1.5,6	6
7	--	--	--	--	--	967 VA	624 VA					--	--	--	--	--	8
9	(N) FC-1.26	2#12, #12N, #12G	S	20 A	2			655 VA	655 VA			2	20 A	S	2#12, #12N, #12G	(N) FC-1.19	10
11	--	--	--	--	--					655 VA	655 VA	--	--	--	--	--	12
13	(N) FC-1.18	2#12, #12N, #12G	S	20 A	2	655 VA	312 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-1.17	14
15	--	--	--	--	--			655 VA	312 VA			--	--	--	--	--	16
17	(N) FC-1.20	2#12, #12N, #12G	S	20 A	2					655 VA	998 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-1.16	18
19	--	--	--	--	--	655 VA	998 VA					--	--	--	--	--	20
21	(N) Receptacle | MDF . Rack	2#10, #10N, #10G	S	30 A	2			2496 VA	1356 VA			2	20 A	S	2#12, #12N, #12G	(N) SS-1 MDF Closet	22
23	--	--	--	--	--					2496 VA	1356 VA	--	--	--	--	--	24
25	(N) Receptacle | MDF . Rack	2#10, #10N, #10G	S	30 A	2	2496 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(R) Incubators (relocated from LS1-12) [1], [2]	26
27	--	--	--	--	--			2496 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(R) Incubators (relocated from LS1-14) [1], [2]	28
29	(N) Receptacle | MDF . 3rd Party Rack	2#8, #8N, #8G	S	30 A	2					2496 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(R) Freezer Rm (relocated from LS1-32) [1], [2]	30
31	--	--	--	--	--	2496 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(R) Incubators (relocated from LS1-36) [1], [2]	32
33	Space	--	--	--	1			--	0 VA			1	20 A	S	1#12, #12N, #12G	(R) Incubators (relocated from LS1-38) [1], [2]	34
35	Space	--	--	--	1					--	0 VA	1	20 A	S	1#12, #12N, #12G	(R) -80 Freezer (relocated from LS1-42) [1], [2]	36
37	Space	--	--	--	1	--	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	--			1	--	--	--	Space	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
		Total Apparent Power Phase Loads:				10483 VA		9905 VA		10903 VA							
		Total Current Phase Loads:				88 A		83 A		92 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	10483 VA	Commercial - Receptacles	14976 VA	83.39%	12488 VA	Total Connected Load:	31292 VA
Phase B:	9905 VA	HVAC	16316 VA	100.00%	16316 VA	Total Estimated Demand:	28804 VA
Phase C:	10903 VA					Total Connected Current:	87 A
Total:	31292 VA					Total Estimated Demand Current:	80 A

Schedule || MEZZ

Panel	MEZZ	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	House MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Fan coil units are to all be replaced as part of this scope. Relocate branch circuit to optional standby panels, turn breaker off, mark spare. Provide typed updated circuit directory.
[2] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) CW VFD #2	Existing	Ex	30 A	2	2250 VA	2250 VA					2	30 A	Ex	Existing	(E) CW VFD #1	2
3	--	--	--	--	--			2250 VA	2250 VA			--	--	--	--	--	4
5	(E) HW VFD #2	Existing	Ex	20 A	2					1500 VA	1500 VA	2	20 A	Ex	Existing	(E) HW VFD #1	6
7	--	--	--	--	--	1500 VA	1500 VA					--	--	--	--	--	8
9	(E) HW Tank 1-6	Existing	Ex	20 A	1			500 VA	400 VA			1	20 A	Ex	Existing	(E) Mezzanine Lights	10
11	(E) Snow Melt	Existing	Ex	20 A	1					500 VA	720 VA	1	20 A	Ex	Existing	(E) Mezzanine Outlets	12
13	(E) Venmar	Existing	Ex	20 A	1	500 VA	1440 VA					1	20 A	Ex	Existing	(E) Mezzanine Outlets	14
15	(E) Rooftop Outlet, CP-1	Existing	Ex	20 A	1			180 VA	400 VA			1	20 A	Ex	Existing	(E) Mezzanine Lights	16
17	(E) Mezzanine Circ Pump	Existing	Ex	20 A	1					100 VA	180 VA	1	20 A	Ex	Existing	(E) Roof Top Outlet	18
19	(E) Rooftop Venmar ERV-2	Existing	Ex	20 A	3	1500 VA	1333 VA					3	15 A	Ex	Existing	(E) Chiller Pump	20
21	--	--	--	--	--			1500 VA	1333 VA			--	--	--	--	--	22
23	--	--	--	--	--					1500 VA	1333 VA	--	--	--	--	--	24
25	(E) Rooftop Venmar ERV-3	Existing	Ex	20 A	3	1500 VA	3500 VA					3	40 A	Ex	Existing	(E) Well VFD #1	26
27	--	--	--	--	--			1500 VA	3500 VA			--	--	--	--	--	28
29	--	--	--	--	--					1500 VA	3500 VA	--	--	--	--	--	30
31	(E) Rooftop Venmar ERV-1	Existing	Ex	30 A	3	2500 VA	500 VA					1	20 A	Ex	Existing	(E) NU Metrics	32
33	--	--	--	--	--			2500 VA	0 VA			1	20 A	--	--	Spare [1]	34
35	--	--	--	--	--					2500 VA	500 VA	1	20 A	Ex	Existing	(E) VFD Controls	36
37	(E) Boiler #2	Existing	Ex	20 A	1	500 VA	3917 VA					3	45 A	Ex	Existing	(E) Lennox #1 Roof Top East	38
39	(E) Boiler #1	Existing	Ex	20 A	1			100 VA	3917 VA			--	--	--	--	--	40
41	(E) Wall Heater for Duct Work	Existing	Ex	20 A	1					750 VA	3917 VA	--	--	--	--	--	42
		Total Apparent Power Phase Loads:				24690 VA		20330 VA		20000 VA							
		Total Current Phase Loads:				206 A		170 A		167 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	24690 VA	Commercial - Motors	41400 VA	107.10%	44338 VA	Total Connected Load:	65020 VA
Phase B:	20330 VA	Commercial - Receptacles	2520 VA	100.00%	2520 VA	Total Estimated Demand:	68158 VA
Phase C:	20000 VA	Equipment	2550 VA	100.00%	2550 VA	Total Connected Current:	180 A
Total:	65020 VA	HVAC	17750 VA	100.00%	17750 VA	Total Estimated Demand Current:	189 A
		Lighting	800 VA	125.00%	1000 VA		

Schedule || COMM

Panel	COMM	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	House MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Sprinkler Pump	Existing	Ex	20 A	1	1000 VA	400 VA					1	20 A	Ex	Existing	(E) Lights "N"	2
3	(E) Upstairs Bath Mens	Existing	Ex	20 A	1			540 VA	360 VA			1	20 A	Ex	Existing	(E) Receptacle | N. Exterior	4
5	(E) Upstairs Bath Womens	Existing	Ex	20 A	1					540 VA	540 VA	1	20 A	Ex	Existing	(E) Receptacle | S. Exterior	6
7	(E) Elevator Room	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) Receptacle | Elevator Pit	8
9	(E) Lights D-25 "L"	Existing	Ex	20 A	1			400 VA	540 VA			1	20 A	Ex	Existing	(E) Downstairs Bath Womens	10
11	(E) Entry Stair Lights	Existing	Ex	20 A	1					400 VA	180 VA	1	20 A	Ex	Existing	(E) #168 Receptacle	12
13	(E) Lights	Existing	Ex	20 A	1	400 VA	540 VA					1	20 A	Ex	Existing	(E) Downstairs Bath Mens	14
15	Shunt Trip Machine	--	--	20 A	1			0 VA	1125 VA			2	20 A	Ex	Existing	(E) Exterior Lights	16
17	(E) Hall Outlets	Existing	Ex	20 A	1					1220 VA	1125 VA	--	--	--	--	--	18
19	(E) Pond North	Existing	Ex	30 A	3	2500 VA	1125 VA					2	20 A	Ex	Existing	(E) Exterior Lights	20
21	--	--	--	--	--			2500 VA	1125 VA			--	--	--	--	--	22
23	--	--	--	--	--					2500 VA	1125 VA	2	20 A	Ex	Existing	(E) Exterior Lights	24
25	(E) Pond South	Existing	Ex	30 A	3	2500 VA	1125 VA					--	--	--	--	--	26
27	--	--	--	--	--			2500 VA	1125 VA			2	20 A	Ex	Existing	(E) Exterior Lights	28
29	--	--	--	--	--					2500 VA	1125 VA	--	--	--	--	--	30
31	(E) Heat Tape	Existing	Ex	20 A	1	500 VA	1125 VA					2	20 A	Ex	Existing	(E) Exterior Lights	32
33	(E) Heat Tape	Existing	Ex	20 A	1			500 VA	1125 VA			1	--	--	--	--	34
35	(E) Heat Tape	Existing	Ex	20 A	1					500 VA	0 VA	1	20 A	--	--	Spare	36
37	(E) Heat Tape	Existing	Ex	20 A	1	500 VA	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	--			1	--	--	--	Space	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
		Total Apparent Power Phase Loads:				12075 VA		11840 VA		11755 VA							
		Total Current Phase Loads:				101 A		99 A		98 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	12075 VA	Commercial - Motors	16000 VA	111.72%	17875 VA	Total Connected Load:	35670 VA
Phase B:	11840 VA	Commercial - Receptacles	4820 VA	100.00%	4820 VA	Total Estimated Demand:	40758 VA
Phase C:	11755 VA	HVAC	2000 VA	100.00%	2000 VA	Total Connected Current:	99 A
Total:	35670 VA	Lighting	12850 VA	125.00%	16063 VA	Total Estimated Demand Current:	113 A

Schedule || CH

Panel	CH	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	House MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating		Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.
2. Where panel schedule and plans indicate GFCI protection for the same circuit, E.C. shall determine whether to install a GFCI receptacle / device or a GFCI circuit breaker but not both.
3. Reference Mechanical Equipment Connection Schedule and manufacturer instructions for electrical installation requirements.
4. If mechanical equipment is within sight [less than 50-feet] of the load center, a molded case circuit breaker may serve as the disconnecting means. The circuit breaker must be capable of being locked in the open position.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(N) Secondary Chiller Pump . CHWP-2.1	1-1/4"C, 3#4, #4N, #10G	S	60 A	3	5548 VA	5548 VA					3	60 A	S	1-1/4"C, 3#4, #4N, #10G	(N) Secondary Chiller Pump . CHWP-2.2	2
3	--	--	--	--	--			5548 VA	5548 VA			--	--	--	--	--	4
5	--	--	--	--	--					5548 VA	5548 VA	--	--	--	--	--	6
7	(N) Primary Chiller Pump . CHWP-1.1	3#10, #10N, #10G	S	30 A	3	2006 VA	2006 VA					3	30 A	S	3#10, #10N, #10G	(N) Primary Chiller Pump . CHWP-1.2	8
9	--	--	--	--	--			2006 VA	2006 VA			--	--	--	--	--	10
11	--	--	--	--	--					2006 VA	2006 VA	--	--	--	--	--	12
13	(N) Geothermal Pump . GWP-1.1	3#12, #12N, #12G	S	20 A	3	1273 VA	1273 VA					3	20 A	S	3#12, #12N, #12G	(N) Geothermal Pump . GWP-1.2	14
15	--	--	--	--	--			1273 VA	1273 VA			--	--	--	--	--	16
17	--	--	--	--	--					1273 VA	1273 VA	--	--	--	--	--	18
19	(N) GF-1	1#12, #12N, #12G	S	20 A	1	864 VA	2006 VA					3	30 A	S	3#10, #10N, #10G	(N) Hot Water Pump . HWP-1	20
21	(N) Boiler #2, Boiler Pump #2 . B-2, BP-2	1#12, #12N, #12G	S	20 A	1			220 VA	2006 VA			--	--	--	--	--	22
23	(N) Boiler #3, Boiler Pump #3 . B-3, BP-3	1#12, #12N, #12G	S	20 A	1					220 VA	2006 VA	--	--	--	--	--	24
25	Space	--	--	--	1	--	2006 VA					3	30 A	S	3#10, #10N, #10G	(N) Hot Water Pump . HWP-2	26
27	Space	--	--	--	1			--	2006 VA			--	--	--	--	--	28
29	Space	--	--	--	1					--	2006 VA	--	--	--	--	--	30
31	Space	--	--	--	1	--	--					1	--	--	--	Space	32
33	Space	--	--	--	1			--	--			1	--	--	--	Space	34
35	Space	--	--	--	1					--	--	1	--	--	--	Space	36
37	Space	--	--	--	1	--	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	--			1	--	--	--	Space	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
		Total Apparent Power Phase Loads:				22528 VA		21884 VA		21884 VA							
		Total Current Phase Loads:				188 A		182 A		182 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	22528 VA	Commercial - Motors	65332 VA	106.37%	69493 VA	Total Connected Load:	66296 VA
Phase B:	21884 VA	Commercial - Receptacles	864 VA	100.00%	864 VA	Total Estimated Demand:	70457 VA
Phase C:	21884 VA	Equipment	100 VA	100.00%	100 VA	Total Connected Current:	184 A
Total:	66296 VA					Total Estimated Demand Current:	196 A

MONTANA STATE UNIVERSITY

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REVIEWED BY:	AM	
REV.	DESCRIPTION	DATE

MONTANA LICENSED PROFESSIONAL ENGINEER
ANDREW S. MOORE
No. 38404PE
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical House Schedules

SHEET
E504

DATE
01.30.2026

Schedule || 1D

Panel	1D	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:
Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:
[1] Fan coil units are to all be replaced as part of this scope. Relocate branch circuit to optional standby panels, turn breaker off, mark spare. Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Lights	Existing	Ex	20 A	1	500 VA	0 VA					1	20 A	--	--	Spare [1]	2
3	(E) Lights	Existing	Ex	20 A	1			500 VA	0 VA			1	20 A	--	--	Spare [1]	4
5	(E) Lights	Existing	Ex	20 A	1					500 VA	0 VA	1	20 A	--	--	Spare [1]	6
7	(E) Lights	Existing	Ex	20 A	1	500 VA	0 VA					1	20 A	--	--	Spare [1]	8
9	(E) Lights	Existing	Ex	20 A	1			500 VA	0 VA			1	20 A	--	--	Spare [1]	10
11	(E) Lights	Existing	Ex	20 A	1					500 VA	0 VA	1	20 A	--	--	Spare [1]	12
13	(E) Lights	Existing	Ex	20 A	1	500 VA	0 VA					1	20 A	--	--	Spare [1]	14
15	(E) Lights	Existing	Ex	20 A	1			500 VA	0 VA			1	20 A	--	--	Spare [1]	16
17	(E) Lights	Existing	Ex	20 A	1					500 VA	0 VA	1	20 A	--	--	Spare [1]	18
19	(E) Lights	Existing	Ex	20 A	1	500 VA	0 VA					1	20 A	--	--	Spare [1]	20
21	(E) Lights	Existing	Ex	20 A	1			500 VA	180 VA			1	20 A	Ex	Existing	(E) Ice Maker	22
23	(E) Lights	Existing	Ex	20 A	1					500 VA	1375 VA	2	20 A	Ex	Existing	(E) Irrigation Pump	24
25	(E) Lights	Existing	Ex	20 A	1	500 VA	1375 VA					--	--	--	--	--	26
27	(E) Phone Rack	Existing	Ex	20 A	1			500 VA	0 VA			1	20 A	--	--	Spare	28
29	Spare	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare	30
31	Spare	--	--	20 A	1	0 VA	2496 VA					2	30 A	Ex	Existing	(E) Rm 144 50A Recpetacle	32
33	Spare	--	--	20 A	1			0 VA	2496 VA			--	--	--	--	--	34
35	(E) Panel '1E'	Existing	Ex	100 A	3					19000 VA	0 VA	3	50 A	--	--	Spare	36
37	--	--	--	--	--	19000 VA	0 VA					--	--	--	--	--	38
39	--	--	--	--	--			16250 VA	0 VA			--	--	--	--	--	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
		Total Apparent Power Phase Loads:				25371 VA		21426 VA		22375 VA							
		Total Current Phase Loads:				213 A		179 A		188 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	25371 VA	Commercial - Motors	2750 VA	125.00%	3438 VA	Total Connected Load:	69772 VA
Phase B:	21426 VA	Commercial - Receptacles	59922 VA	58.34%	34961 VA	Total Estimated Demand:	46524 VA
Phase C:	22375 VA	Lighting	6500 VA	125.00%	8125 VA	Total Connected Current:	192 A
Total:	69772 VA					Total Estimated Demand Current:	129 A

Schedule || 1A

Panel	1A	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:
Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:
[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #122 Office Outlets [1]	Existing	Ex	20 A	1	720 VA	180 VA					1	20 A	Ex	Existing	(E) #123 Plugmold	2
3	(E) #121 Office Outlets [1]	Existing	Ex	20 A	1			720 VA	180 VA			1	20 A	Ex	Existing	(E) #123 Plugmold	4
5	(E) #136 Bio Hood	Existing	Ex	20 A	1					180 VA	360 VA	1	20 A	Ex	Existing	(E) #123 RCF / F	6
7	(E) #136 Bio Hood	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) #123 Centrifuge	8
9	(E) #136 Plugmold [1]	Existing	Ex	20 A	1			180 VA	2250 VA			2	20 A	Ex	Existing	(E) #123 Centrifuge	10
11	(E) #136 Ref / F [1]	Existing	Ex	20 A	1					180 VA	2250 VA	--	--	--	--	--	12
13	(E) #135 Outlets	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #123 Lab Outlets	14
15	(E) #134 Outlet	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #123 Counter Outlets [1]	16
17	(E) #134 Lab Plugmold	Existing	Ex	20 A	1					360 VA	180 VA	1	20 A	Ex	Existing	(E) #123 Counter Outlets [1]	18
19	(E) #134 Lab Plugmold	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #123 Computer Outlets	20
21	(E) #133 Tel / Com	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #123 Computer Outlets	22
23	(E) #133 Tel / Com	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #123 Plugmold	24
25	(E) #123 Lab Outlets	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #123 Lab Outlets	26
27	(E) #123 Lab Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #123 Lab Outlets	28
29	(E) #123 Plugmold [1]	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #123 Counter Outlets [1]	30
31	(E) #123 Plugmold	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #123 Counter Outlets [1]	32
33	(E) #123 Plugmold	Existing	Ex	20 A	1			180 VA	2250 VA			2	30 A	Ex	Existing	(E) Lab Hood Room	34
35	(E) #123 Plugmold	Existing	Ex	20 A	1					180 VA	2250 VA	--	--	--	--	--	36
37	(E) #123 Computer Outlet	Existing	Ex	20 A	1	180 VA	1500 VA					2	20 A	Ex	Existing	(E) 123 TC	38
39	(E) #123 Computer Outlet	Existing	Ex	20 A	1			180 VA	1500 VA			--	--	--	--	--	40
41	Spare	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare	42
		Total Apparent Power Phase Loads:				4740 VA		8520 VA		6660 VA							
		Total Current Phase Loads:				40 A		73 A		58 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	4740 VA	Commercial - Receptacles	12420 VA	90.26%	11210 VA	Total Connected Load:	19920 VA
Phase B:	8520 VA	Equipment	7500 VA	100.00%	7500 VA	Total Estimated Demand:	18710 VA
Phase C:	6660 VA					Total Connected Current:	55 A
Total:	19920 VA					Total Estimated Demand Current:	52 A

Schedule || 1E

Panel	1E	Voltage	120/208 Wye	Main Bus Rating	100 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	100 A	Sub-Feed #1 Breaker Rating	
Fed From	1D	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:
Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:
[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Rm 138 8060	Existing	Ex	30 A	2	2125 VA	2500 VA					3	30 A	Ex	Existing	(E) AESIR	2
3	--	--	--	--	--			2125 VA	2500 VA			--	--	--	--	--	4
5	(E) Rm 138 8040	Existing	Ex	20 A	2					1500 VA	2500 VA	--	--	--	--	--	6
7	--	--	--	--	--	1500 VA	3583 VA					3	40 A	Ex	Existing	(E) AESIR XRF	8
9	(E) Rm 138 Pump	Existing	Ex	20 A	2			1500 VA	3583 VA			--	--	--	--	--	10
11	--	--	--	--	--					1500 VA	3583 VA	--	--	--	--	--	12
13	(E) Rm 120 40A Ceiling South Drop	Existing	Ex	40 A	3	3583 VA	2125 VA					2	30 A	Ex	Existing	(E) AESIR	14
15	--	--	--	--	--			3583 VA	2125 VA			--	--	--	--	--	16
17	--	--	--	--	--					3583 VA	--	1	--	--	--	Space	18
19	(E) Rm 120 40A Ceiling South Drop	Existing	Ex	40 A	3	3583 VA	--					1	--	--	--	Space	20
21	--	--	--	--	--			3583 VA	--			1	--	--	--	Space	22
23	--	--	--	--	--					3583 VA	--	1	--	--	--	Space	24
25	Space	--	--	--	1	--	--					1	--	--	--	Space	26
27	Space	--	--	--	1			--	--			1	--	--	--	Space	28
29	Space	--	--	--	1					--	--	1	--	--	--	Space	30
31	Space	--	--	--	1	--	--					1	--	--	--	Space	32
33	Space	--	--	--	1			--	--			1	--	--	--	Space	34
35	Space	--	--	--	1					--	--	1	--	--	--	Space	36
37	Space	--	--	--	1	--	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	--			1	--	--	--	Space	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
		Total Apparent Power Phase Loads:				19000 VA		19000 VA		16250 VA							
		Total Current Phase Loads:				162 A		162 A		135 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	19000 VA	Commercial - Receptacles	54250 VA	59.22%	32125 VA	Total Connected Load:	54250 VA
Phase B:	19000 VA					Total Estimated Demand:	32125 VA
Phase C:	16250 VA					Total Connected Current:	151 A
Total:	54250 VA					Total Estimated Demand Current:	89 A

Schedule || 1B

Panel	1B	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:
Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:
[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) LC-8040 30A 119 [1]	Existing	Ex	20 A	2	90 VA	180 VA					1	20 A	Ex	Existing	(E) #119 Bio Hood	2
3	--	--	--	--	--			90 VA	180 VA			1	20 A	Ex	Existing	(E) #119 Bio Hood	4
5	(E) #140 Breakrm Ref // Outlets (Tandem)	Existing	Ex	20 A	1					360 VA	90 VA	2	20 A	Ex	Existing	(E) #120 Lab	6
7	(E) #140 Brkrm Outlets // #141 Outlets (Tandem)	Existing	Ex	20 A	1	1260 VA	90 VA					--	--	--	--	--	8
9	(E) #138 Outlets	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #120 Lab Outlets	10
11	(E) #138 Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #120 Lab Outlets	12
13	(E) #138 Outlets	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #120 Plugmold	14
15	(E) #138 Scope Tables	Existing	Ex	30 A	2			2250 VA	180 VA			1	20 A	Ex	Existing	(E) #120 Plugmold	16
17	--	--	--	--	--					2250 VA	540 VA	1	20 A	Ex	Existing	(E) #120 Quad Outlets	18
19	(E) #138 Lazier Module	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #120 Quad Outlets	20
21	(E) Hall Outlets	Existing	Ex	20 A	1			900 VA	180 VA			1	20 A	Ex	Existing	(E) #120 Plugmold	22
23	(E) Hall Outlets	Existing	Ex	20 A	1					540 VA	180 VA	1	20 A	Ex	Existing	(E) #120 Plugmold	24
25	(E) #139 Outlets	Existing	Ex	20 A	1	720 VA	180 VA					1	20 A	Ex	Existing	(E) #120 Quad Outlets	26
27	(E) #140 Outlets	Existing	Ex	20 A	1			720 VA	180 VA			1	20 A	Ex	Existing	(E) #120 Plugmold // Plugmold (Tandem)	28
29	(E) #139 Outlets	Existing	Ex	20 A	1					180 VA	90 VA	2	20 A	Ex	Existing	(E) LC-8040 20A 119 [1]	30
31	(E) #120 Outlets	Existing	Ex	20 A	1	180 VA	90 VA					--	--	--	--	--	32
33	(E) #119, 120 Outlets [1]	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #120 Plugmold	34
35	(E) #120 Outlets	Existing	Ex	20 A	1					180 VA	1500 VA	2	20 A	Ex	Existing	(E) Sink Beck	36
37	(E) #119 Ref / F	Existing	Ex	20 A	1	540 VA	1500 VA					--	--	--	--	--	38
39	(E) #119 Plugmold	Existing	Ex	20 A	1			360 VA	2250 VA			2	30 A	Ex	Existing	(E) LC 8060 NW Ceiling	40
41	(E) 257 Plugmold [1]	Existing	Ex	20 A	1					360 VA	2250 VA	--	--	--	--	--	42
		Total Apparent Power Phase Loads:				5730 VA		8370 VA		8880 VA							
		Total Current Phase Loads:				48 A		73 A		77 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	5730 VA	Commercial - Receptacles	19980 VA	75.03%	14990 VA	Total Connected Load:	22980 VA
Phase B:	8370 VA	Equipment	3000 VA	100.00%	3000 VA	Total Estimated Demand:	17990 VA
Phase C:	8880 VA					Total Connected Current:	64 A
Total:	22980 VA					Total Estimated Demand Current:	50 A

Schedule || 1C

Panel	1C	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:
Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:
[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #145 Seminar Outlets	Existing	Ex	20 A	1	1260 VA	180 VA					1	20 A	Ex	Existing	(E) #130 Sequence	2
3	(E) #145 Video Equipment	Existing	Ex	20 A	1			180 VA	1500 VA			2	20 A	Ex	Existing	(E) #130 Sequence	4
5	(E) #145 Seminar Outlets	Existing	Ex	20 A	1					360 VA	1500 VA	--	--	--	--	--	6
7	(E) #105 Vending Machine [1]	Existing	Ex	20 A	1	180 VA	900 VA					1	20 A	Ex	Existing	(E) #127 Outlets	8
9	(E) #105 Vending Machine [1]	Existing	Ex	20 A	1			180 VA	720 VA			1	20 A	Ex	Existing	(E) #127 Outlets	10
11	(E) #128 Vending Machine	Existing	Ex	20 A	1					180 VA	720 VA	1	20 A	Ex	Existing	(E) #126 Office Outlets	12
13	(E) #144 Ice Machine / outlet	Existing	Ex	20 A	1	360 VA	720 VA					1	20 A	Ex	Existing	(E) #125 Office Outlets	14
15	(E) #144 Washer	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #124 Cytometer	16
17	(E) #144 Dryer	Existing	Ex	30 A	2					2250 VA	180 VA	1	20 A	Ex	Existing	(E) #124 Cytometer	18
19	--	--	--	--	--	2250 VA	180 VA					1	20 A	Ex	Existing	(E) #124 Cytometer	20
21	(E) #144 Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #124 Computer	22
23	(E) #144 Laundry Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #124 Computer	24
25	(E) #128 Copy Machine [1]	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #124 Computer	26
27	(E) #129 Copy Outlets	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) FAC's Equipment	28
29	(E) #128 Copy Outlets [1]	Existing	Ex	20 A	1					360 VA	500 VA	1	20 A	Ex	Existing	(E) FAC's Equipment	30
31	(E) #128 Copy Outlets [1]	Existing	Ex	20 A	1	540 VA	500 VA					1	20 A	Ex	Existing	(E) FAC's Equipment	32
33	(E) #130 Sequence	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) FAC's Equipment	34
35	(E) #130 Outlets	Existing	Ex	20 A	1					180 VA	4000 VA	2	50 A	Ex	Existing	(E) FAC's Equipment	36
37	(E) #130 Sequence	Existing	Ex	20 A	2	1500 VA	4000 VA					--	--	--	--	--	38
39	--	--	--	--	--			1500 VA	1500 VA			2	20 A	Ex	Existing	(E) Ceiling Humidifier	40
41	(E) #130 Sequence Outlet	Existing	Ex	20 A	1					180 VA	1500 VA	--	--	--	--	--	42
		Total Apparent Power Phase Loads:				13110 VA		7660 VA		12270 VA							
		Total Current Phase Loads:				115 A		64 A		108 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	13110 VA	Commercial - Motors	3000 VA	125.00%	3750 VA	Total Connected Load:	33040 VA
Phase B:	7660 VA	Commercial - Receptacles	20040 VA	74.95%	15020 VA	Total Estimated Demand:	28770 VA
Phase C:	12270 VA	Equipment	10000 VA	100.00%	10000 VA	Total Connected Current:	92 A
Total:	33040 VA					Total Estimated Demand Current:	80 A

MONTANA STATE UNIVERSITY

BLACKSHEEP ENGINEERING
ELECTRICAL | TECHNOLOGY | LIGHTING
MECHANICAL | PLUMBING
602 W Hemlock | Bozeman, MT 59715
moduluscorp.com | 406.219.8489

100% Construction Documents

Molecular Bioscience Building
Phase 2
MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	EB
REVIEWED BY:	AM

REV.	DESCRIPTION	DATE

MONTANA ANDREW S. MOORE No. 38404PE REGISTERED PROFESSIONAL ENGINEER
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical Tenant 1 Schedules

SHEET
E505

DATE
01.30.2026

Schedule || 3D

Panel	3D	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Fan coil units are to all be replaced as part of this scope. Relocate branch circuit to optional standby panels, turn breaker off, mark spare. Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #254 Centifuge	Existing	Ex	30 A	2	2250 VA	--					1	--	--	--	Space	2
3	--	--	--	--	--			2250 VA	--			1	--	--	--	Space	4
5	(E) #209 Yeast Chambers	Existing	Ex	20 A	1					180 VA	--	1	--	--	--	Space	6
7	(E) #209 Yeast Chambers	Existing	Ex	20 A	1	180 VA	--					1	--	--	--	Space	8
9	(E) Walk In Lights	Existing	Ex	20 A	1			500 VA	180 VA			1	20 A	Ex	Existing	(E) 253 Centrifuge	10
11	(E) Walk In Fans	Existing	Ex	20 A	1					500 VA	180 VA	1	20 A	Ex	Existing	(E) 253 Centrifuge	12
13	(E) Walk In Compressor	Existing	Ex	30 A	2	2250 VA	180 VA					1	20 A	Ex	Existing	(E) #258 Fume Hood	14
15	--	--	--	--	--			2250 VA	180 VA			1	20 A	Ex	Existing	(E) #258 Plugmold	16
17	(E) Walk In Plugmold	Existing	Ex	20 A	1					720 VA	1440 VA	1	20 A	Ex	Existing	(E) #257 Outlets Hall	18
19	(E) #256 Plugmold	Existing	Ex	20 A	1	180 VA	0 VA					1	20 A	--	--	Spare [1]	20
21	(E) #256 Plugmold	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare [1]	22
23	(E) #257 Fume Hood	Existing	Ex	20 A	1					180 VA	0 VA	1	20 A	--	--	Spare [1]	24
25	(E) #215 Outlet	Existing	Ex	20 A	1	360 VA	0 VA					1	20 A	--	--	Spare [1]	26
27	(E) #257 Plugmold	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare // Spare [1]	28
29	(E) #215 Plugmold	Existing	Ex	20 A	1					360 VA	0 VA	1	20 A	--	--	Spare [1]	30
31	(E) #257 Outlets	Existing	Ex	20 A	1	180 VA	0 VA					1	20 A	--	--	Spare [1]	32
33	(E) #257 Outlets	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare [1]	34
35	(E) #253 Outlets	Existing	Ex	20 A	1					540 VA	0 VA	1	20 A	--	--	Spare [1]	36
37	(E) #253 Outlets	Existing	Ex	20 A	1	180 VA	0 VA					1	20 A	--	--	Spare [1]	38
39	(E) #253 Outlets	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare	40
41	(E) #253 Outlets	Existing	Ex	20 A	1					180 VA	0 VA	1	20 A	--	--	Spare	42
	Total Apparent Power Phase Loads:					5760 VA		6080 VA		4280 VA							
	Total Current Phase Loads:					50 A		53 A		36 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	5760 VA	Commercial - Motors	5000 VA	122.50%	6125 VA	Total Connected Load:	16120 VA
Phase B:	6080 VA	Commercial - Receptacles	6120 VA	100.00%	6120 VA	Total Estimated Demand:	17370 VA
Phase C:	4280 VA	Equipment	4500 VA	100.00%	4500 VA	Total Connected Current:	45 A
Total:	16120 VA	Lighting	500 VA	125.00%	625 VA	Total Estimated Demand Current:	48 A

Schedule || 3A

Panel	3A	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #215 -20F	Existing	Ex	20 A	1	180 VA	1500 VA					2	20 A	Ex	Existing	(E) Lab 210 208V Outlet	2
3	(E) #215 -20F	Existing	Ex	20 A	1			180 VA	1500 VA			--	--	--	--	--	4
5	(E) #215 2 Door Cooler	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #248 Outlet	6
7	(E) #215 2 Door Cooler	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #248 Outlet	8
9	(E) #215 Centrifuge	Existing	Ex	60 A	3			5333 VA	180 VA			1	20 A	Ex	Existing	(E) #248 Ceiling Outlet	10
11	--	--	--	--	--					5333 VA	180 VA	1	20 A	Ex	Existing	(E) #248 Ceiling Outlet	12
13	--	--	--	--	--	5333 VA	180 VA					1	20 A	Ex	Existing	(E) RTU Service outlet, control panel	14
15	(E) #215 Plugmold	Existing	Ex	20 A	1			180 VA	2250 VA			2	30 A	Ex	Existing	(E) Warm Heater	16
17	(E) #215 Outlets	Existing	Ex	20 A	1					180 VA	2250 VA	--	--	--	--	--	18
19	(E) #248 Outlets	Existing	Ex	20 A	1	180 VA	0 VA					1	20 A	--	--	Spare	20
21	(E) #215 Quad Outlets	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #248 Outlet	22
23	(E) #215 Quad Outlets	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #248 Outlet	24
25	(E) #215 Outlets	Existing	Ex	20 A	1	180 VA	1500 VA					2	20 A	Ex	Existing	(E) Existing Load	26
27	(E) #248 Outlet	Existing	Ex	20 A	1			180 VA	1500 VA			--	--	--	--	--	28
29	(E) #248 Outlet	Existing	Ex	20 A	1					180 VA	2250 VA	2	30 A	Ex	Existing	(E) #219 D/W	30
31	(E) #215 Plugmold	Existing	Ex	20 A	1	180 VA	2250 VA					--	--	--	--	--	32
33	(E) #216 Outlets	Existing	Ex	20 A	1			1080 VA	180 VA			1	20 A	Ex	Existing	(E) #219 D/W	34
35	(E) #217 Bio Hood	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #219 D/W	36
37	(E) #217 Bio Hood	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #219 Outlets	38
39	(E) #217 Ref / F	Existing	Ex	20 A	1			720 VA	180 VA			1	20 A	Ex	Existing	(E) #219 Outlets	40
41	(E) #217 Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #218 Outlet / Plugmold	42
	Total Apparent Power Phase Loads:					12203 VA		14003 VA		11993 VA							
	Total Current Phase Loads:					102 A		117 A		100 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	12203 VA	Commercial - Receptacles	38200 VA	63.09%	24100 VA	Total Connected Load:	38200 VA
Phase B:	14003 VA					Total Estimated Demand:	24100 VA
Phase C:	11993 VA					Total Connected Current:	106 A
Total:	38200 VA					Total Estimated Demand Current:	67 A

Schedule || 3E

Panel	3E	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #243 Plugmold	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #245 Chrome Cooler	2
3	(E) #243 Bio Hood	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) #245 Outlets	4
5	(E) #243 Bio Hood	Existing	Ex	20 A	1					180 VA	90 VA	2	20 A	Ex	Existing	(E) #245 Centrifuge	6
7	(E) #244 Plugmold	Existing	Ex	20 A	1	180 VA	90 VA					--	--	--	--	--	8
9	(E) #244 Plugmold	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #245 Plugmold	10
11	(E) #245 Quad Outlets	Existing	Ex	20 A	1					360 VA	180 VA	1	20 A	Ex	Existing	(E) #245 Plugmold	12
13	(E) #245 Quad Outlets	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #245 Plugmold	14
15	(E) #245 Quad Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #245 Plugmold	16
17	(E) #245 Quad Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #245 Outlets	18
19	(E)	Existing	Ex	20 A	1	1080 VA	180 VA					1	20 A	Ex	Existing	(E) #245 Outlets	20
21	(E) #246 Ref / F	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #245 Plugmold	22
23	(E) #246 Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #245 Plugmold	24
25	(E) #246 Bio Hood	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #245 Plugmold	26
27	(E) #246 Outlets	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #245 Plugmold	28
29	(E) #245 Centrifuge	Existing	Ex	30 A	2					2250 VA	180 VA	1	20 A	Ex	Existing	(E) #210 Fume Hood	30
31	--	--	--	--	--	2250 VA	180 VA					1	20 A	Ex	Existing	(E) #210 Fume Hood	32
33	(E) #245 Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #250 Outlet	34
35	(E) #251 Outlets	Existing	Ex	20 A	1					720 VA	180 VA	1	20 A	Ex	Existing	(E) #250 Outlet	36
37	(E) #245 Chrome Computer	Existing	Ex	20 A	1	180 VA	5333 VA					3	60 A	Ex	Existing	(E) Bio Hood 250	38
39	(E) #245 2 Door Cooler	Existing	Ex	20 A	1			180 VA	5333 VA			--	--	--	--	--	40
41	Spare	--	--	20 A	1					0 VA	5333 VA	--	--	--	--	--	42
	Total Apparent Power Phase Loads:					10733 VA		8213 VA		10193 VA							
	Total Current Phase Loads:					92 A		68 A		87 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	10733 VA	Commercial - Receptacles	29140 VA	67.16%	19570 VA	Total Connected Load:	29140 VA
Phase B:	8213 VA					Total Estimated Demand:	19570 VA
Phase C:	10193 VA					Total Connected Current:	81 A
Total:	29140 VA					Total Estimated Demand Current:	54 A

Schedule || 3B

Panel	3B	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #248 Outlets	Existing	Ex	20 A	1	180 VA	1500 VA					2	20 A	Ex	Existing	(E) #252 Hood	2
3	(E) #248 Outlets	Existing	Ex	20 A	1			180 VA	1500 VA			--	--	--	--	--	4
5	(E) #214 Fume Hood	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #210 Fume Hood	6
7	(E) #214 Fume Hood	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #210 Quad Outlets	8
9	(E) #248 Plugmold	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #210 Quad Outlets	10
11	(E) #214 Fume Hood	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #210 Plugmold	12
13	(E) #214 Fume Hood	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #248 Counter	14
15	(E) #248 Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #210 Plugmold	16
17	(E) #248 Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #252 Plugmold	18
19	(E) #249 Outlets	Existing	Ex	20 A	1	900 VA	180 VA					1	20 A	Ex	Existing	(E) #210 Plugmold	20
21	Spare	--	--	20 A	1			0 VA	180 VA			1	20 A	Ex	Existing	(E) #210 Plugmold	22
23	(E) #251 Outlet	Existing	Ex	20 A	2					2250 VA	180 VA	1	20 A	Ex	Existing	(E) #210 Outlet	24
25	--	--	--	--	--	2250 VA	2250 VA					2	30 A	Ex	Existing	(E) #252 Centrifuge	26
27	(E) #250 Centrifuge	Existing	Ex	20 A	1			180 VA	2250 VA			--	--	--	--	--	28
29	(E) #250 Centrifuge	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #252 Outlets	30
31	(E) Lab 248	Existing	Ex	20 A	2	2250 VA	360 VA					1	20 A	Ex	Existing	(E) #210 Outlet	32
33	--	--	--	--	--			2250 VA	720 VA			1	20 A	Ex	Existing	(E) #211 Outlets	34
35	(E) ICP 251	Existing	Ex	30 A	2					90 VA	180 VA	1	20 A	Ex	Existing	(E) #251 Bio Hood	36
37	--	--	--	--	--	90 VA	180 VA					1	20 A	Ex	Existing	(E) #252 Bio Hood	38
39	(E) #252 Ref / F	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #252 Outlets	40
41	(E) #252 -20 F	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #252 Outlets	42
	Total Apparent Power Phase Loads:					10860 VA		8340 VA		4500 VA							
	Total Current Phase Loads:					95 A		74 A		38 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	10860 VA	Commercial - Receptacles	23700 VA	71.10%	16850 VA	Total Connected Load:	23700 VA
Phase B:	8340 VA					Total Estimated Demand:	16850 VA
Phase C:	4500 VA					Total Connected Current:	66 A
Total:	23700 VA					Total Estimated Demand Current:	47 A

Schedule || 3C

Panel	3C	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #213 Outlet	Existing	Ex	20 A	1	360 VA	500 VA					1	20 A	Ex	Existing	(E) Lights	2
3	(E) #214 Outlet	Existing	Ex	20 A	1			540 VA	500 VA			1	20 A	Ex	Existing	(E) Lights	4
5	(E) #212 Outlet (30A2P breaker)	Existing	Ex	20 A	1					180 VA	500 VA	1	20 A	Ex	Existing	(E) Lights	6
7	(E) #212 Outlet (30A2P breaker)	Existing	Ex	20 A	1	180 VA	500 VA					1	20 A	Ex	Existing	(E) Lights	8
9	(E) #212 Plugmold	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) Lights	10
11	(E) #214 Outlet	Existing	Ex	20 A	1					180 VA	500 VA	1	20 A	Ex	Existing	(E) Lights	12
13	(E) #214 Outlet	Existing	Ex	20 A	1	180 VA	500 VA					1	20 A	Ex	Existing	(E) Lights	14
15	(E) #214 Plugmold	Existing	Ex	20 A	1			180 VA	1250 VA			2	20 A	Ex	Existing	(E) Lights	16
17	(E) #214 Plugmold	Existing	Ex	20 A	1					180 VA	1250 VA	--	--	--	--	--	18
19	(E) #214 Quad Outlet	Existing	Ex	20 A	1	180 VA	500 VA					1	20 A	Ex	Existing	(E) Lights	20
21	(E) #214 Quad Outlet	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) Lights	22
23	(E) #214 Plugmold	Existing	Ex	20 A	1					180 VA	500 VA	1	20 A	Ex	Existing	(E) Lights	24
25	(E) #214 Plugmold	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) #250, 251 Plugmold	26
27	(E) #214 Outlet	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #251 Plugmold	28
29	(E) #214 Outlet	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #248 Outlets	30
31	(E) Hall Freezer	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) #257 Outlets	32
33	(E) #214 Outlet	Existing	Ex	20 A	1			180 VA	1500 VA			2	20 A	Ex	Existing	(E) White Lab	34
35	(E) #214 Outlet	Existing	Ex	20 A	1					180 VA	1500 VA	--	--	--	--	--	36
37	(E) Lights	Existing	Ex	20 A	1	500 VA	2125 VA					2	30 A	Ex	Existing	(E) #214 220V Outlet	38
39	(E) #214 220V Outlet	Existing	Ex	20 A	2			1500 VA	2125 VA			--	--	--	--	--	40
41	--	--	--	--	--					1500 VA	180 VA	1	20 A	Ex	Existing	(E) Fume Hood 214	42
	Total Apparent Power Phase Loads:					6605 VA		9495 VA		7190 VA							
	Total Current Phase Loads:					55 A		80 A		61 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	6605 VA	Commercial - Receptacles	15290 VA	82.70%	12645 VA	Total Connected Load:	23290 VA
Phase B:	9495 VA	Lighting	8000 VA	125.00%	10000 VA	Total Estimated Demand:	22645 VA
Phase C:	7190 VA					Total Connected Current:	65 A
Total:	23290 VA					Total Estimated Demand Current:	63 A

MONTANA STATE UNIVERSITY

BLACKSHEEP ENGINEERING
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MECHANICAL | PLUMBING
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100% Construction Documents

Molecular Bioscience Building
Phase 2
MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	EB
REVIEWED BY:	AM

REV.	DESCRIPTION	DATE

MONTANA
ANDREW S. MOORE
No. 38404PE
REGISTERED PROFESSIONAL ENGINEER
STATE OF MONTANA
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical Tenant 1 Schedules

SHEET
E506

DATE
01.30.2026

Schedule || 4D

Panel	4D	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Hot Room 238	Phases	3ϕ	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #220 Outlets	Existing	Ex	20 A	1	180 VA	540 VA					1	20 A	Ex	Existing	(E) #226 Outlets	2
3	(E) #222 Outlets	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) #220 Ref / F	4
5	(E) #220 Quad Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #222 Incubator	6
7	(E) #222 Quad Outlets	Existing	Ex	20 A	1	180 VA	720 VA					1	20 A	Ex	Existing	(E) #220 Incubator	8
9	(E) Rm 231 Fume Hoods	Existing	Ex	20 A	3			1583 VA	500 VA			1	20 A	Ex	Existing	(E) Lights	10
11	--	--	--	--	--					1583 VA	500 VA	1	20 A	Ex	Existing	(E) Lights	12
13	--	--	--	--	--	1583 VA	360 VA					1	20 A	Ex	Existing	(E) Outlets 242 [1]	14
15	(E) Rm 231 Fume Hoods	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) Outlets 242 [1]	16
17	(E) #222 Plugmold, 220 Quad	Existing	Ex	20 A	1					180 VA	540 VA	1	20 A	Ex	Existing	(E) Outlets 242 [1]	18
19	(E) #221 Ref / F	Existing	Ex	20 A	1	500 VA	180 VA					1	20 A	Ex	Existing	(E) Outlets 242 [1]	20
21	(E) #222 Outlets	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) Lights	22
23	(E) #222 Plugmold	Existing	Ex	20 A	1					180 VA	500 VA	1	20 A	Ex	Existing	(E) Lights	24
25	(E) #220 Plugmold	Existing	Ex	20 A	1	180 VA	500 VA					1	20 A	Ex	Existing	(E) Lights	26
27	(E) #222 Plugmold	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) Lights	28
29	(E) #220 Plugmold	Existing	Ex	20 A	1					180 VA	500 VA	1	20 A	Ex	Existing	(E) Lights	30
31	(E) #222 Plugmold	Existing	Ex	20 A	1	180 VA	500 VA					1	20 A	Ex	Existing	(E) Lights	32
33								180 VA				1	20 A	Ex	Existing	(E) #227 Plugmold	34
35	(E) #222 Centrifuge	Existing	Ex	30 A	2					2250 VA	180 VA	1	20 A	Ex	Existing	(E) #227 Plugmold	36
37	--	--	--	--	--	2250 VA	180 VA					1	20 A	Ex	Existing	(E) #222 Outlets	38
39	(E) #230 208V Outlet	Existing	Ex	20 A	2			1500 VA	180 VA			1	20 A	Ex	Existing	(E) #225 Bio Hood	40
41	--	--	--	--	--					1500 VA	180 VA	1	20 A	Ex	Existing	(E) #225 Bio Hood	42
	Total Apparent Power Phase Loads:					8033 VA		6383 VA		8633 VA							
	Total Current Phase Loads:					69 A		53 A		74 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	8033 VA	Commercial - Receptacles	9800 VA	100.00%	9800 VA	Total Connected Load:	23050 VA
Phase B:	6383 VA	Equipment	9250 VA	100.00%	9250 VA	Total Estimated Demand:	24050 VA
Phase C:	8633 VA	Lighting	4000 VA	125.00%	5000 VA	Total Connected Current:	64 A
Total:	23050 VA					Total Estimated Demand Current:	67 A

Schedule || 4A

Panel	4A	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Hot Room 238	Phases	3ϕ	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #234 20F	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #234 Plugmold	2
3	(E) #232 Ref / F	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #234 Plugmold	4
5	(E) #231 Hall Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #234 Quad Outlets	6
7	(E) #231 Hall Outlets	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #234 Quad Outlets	8
9	(E) #234 Outlets	Existing	Ex	20 A	1			900 VA	180 VA			1	20 A	Ex	Existing	(E) #234 Quad Outlets	10
11	(E) #234 2 Door Cooler	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #234 Quad Outlets	12
13	Spare	--	--	20 A	1	0 VA	360 VA					1	20 A	Ex	Existing	(E) #240, #241 Outlets	14
15	(E) #234 Outlets	Existing	Ex	20 A	1			180 VA	540 VA			1	20 A	Ex	Existing	(E) #241 Outlets	16
17	(E) #230 Outlets [1]	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #240 Biohood	18
19	(E) #234 Outlets	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #240 Biohood	20
21	(E) #234 Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #240 Plugmold	22
23	(E) #234 2 Door Cooler	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #234 Outlets	24
25	(E) #234 Outlets	Existing	Ex	20 A	1	540 VA	180 VA					1	20 A	Ex	Existing	(E) #234 Outlets	26
27	(E) #234 Plugmold	Existing	Ex	20 A	1			180 VA	2250 VA			2	30 A	Ex	Existing	(E) #234 Centrifuge	28
29	(E) #234 Plugmold	Existing	Ex	20 A	1					180 VA	2250 VA	--	--	--	--	--	30
31	(E) #234 Plugmold	Existing	Ex	20 A	1	180 VA	2250 VA					2	30 A	Ex	Existing	(E) Warm Room Heater	32
33	(E) #234 Plugmold	Existing	Ex	20 A	1			360 VA	2250 VA			--	--	--	--	--	34
35	(E) #234 Outlets	Existing	Ex	20 A	1					180 VA	1664 VA	2	20 A	Ex	Existing	(E) Room 223 208V Outlet	36
37	(E) #234 Outlets	Existing	Ex	20 A	1	180 VA	1664 VA					--	--	--	--	--	38
39	(E) #234 Plugmold	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) Snorkel Roof Fan 231	40
41	(E) #234 Plugmold	Existing	Ex	20 A	1					180 VA	--	1	--	--	--	Space	42
	Total Apparent Power Phase Loads:					6614 VA		8240 VA		5894 VA							
	Total Current Phase Loads:					56 A		70 A		49 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	6614 VA	Commercial - Motors	500 VA	125.00%	625 VA	Total Connected Load:	20748 VA
Phase B:	8240 VA	Commercial - Receptacles	11248 VA	94.45%	10624 VA	Total Estimated Demand:	20249 VA
Phase C:	5894 VA	Equipment	4500 VA	100.00%	4500 VA	Total Connected Current:	58 A
Total:	20748 VA	HVAC	4500 VA	100.00%	4500 VA	Total Estimated Demand Current:	56 A

Schedule || 4E

Panel	4E	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Hot Room 238	Phases	3ϕ	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	200 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Fan coil units are to all be replaced as part of this scope. Relocate branch circuit to optional standby panels, turn breaker off, mark spare. Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #239 Outlet	Existing	Ex	20 A	1	180 VA	2250 VA					2	30 A	Ex	Existing	(E) #235 Centrifuge	2
3	(E) #239 Ice Machine	Existing	Ex	20 A	1			180 VA	2250 VA			--	--	--	--	--	4
5	(E) #239 Outlet	Existing	Ex	20 A	1					180 VA	90 VA	2	20 A	Ex	Existing	(E) Revco Freezer	6
7	(E) #239 Plugmold	Existing	Ex	20 A	1	180 VA	90 VA					--	--	--	--	--	8
9	(E) #239 Plugmold	Existing	Ex	20 A	1			180 VA	2250 VA			2	30 A	Ex	Existing	(E) #236 Centrifuge	10
11	(E) #239 Outlet	Existing	Ex	20 A	1					500 VA	2250 VA	--	--	--	--	--	12
13	(E) #239 Outlet	Existing	Ex	20 A	1	500 VA	500 VA					1	20 A	Ex	Existing	(E) Cooler Lights	14
15	(E) #235 Copier	Existing	Ex	20 A	1			540 VA	500 VA			1	20 A	Ex	Existing	(E) Cooler Fans	16
17	(E) #239 Plugmold	Existing	Ex	20 A	1					180 VA	2250 VA	2	30 A	Ex	Existing	(E) Cooler Compressor	18
19	(E) #235 Counter	Existing	Ex	20 A	1	180 VA	2250 VA					--	--	--	--	--	20
21	(E) #236 5700 ABI	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	S	1#12, #12N, #12G	(N) Receptacle | Office 221 . BioSafety Cabinet...	22
23	(E) #236 Outlet	Existing	Ex	20 A	1					180 VA	500 VA	1	20 A	S	1#12, #12N, #12G	(N) Receptacle | Office 221 . BioSafety Cabinet...	24
25	(E) #236 Liquid Sanitize	Existing	Ex	20 A	1	180 VA	500 VA					1	20 A	S	1#12, #12N, #12G	(N) Receptacle | Office 221 . BioSafety Cabinet...	26
27	Spare [1]	--	--	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	28
29	(E) #235 Outlet	Existing	Ex	20 A	1					180 VA	0 VA	1	20 A	--	--	Spare [1]	30
31	(E) #236 Outlet	Existing	Ex	20 A	1	180 VA	0 VA					1	20 A	--	--	Spare [1]	32
33	(E) #236 Outlet	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare [1]	34
35	(E) Cooler Plugmold	Existing	Ex	20 A	1					180 VA	0 VA	1	20 A	--	--	Spare [1]	36
37	(E) #238 Plugmold	Existing	Ex	20 A	1	180 VA	0 VA					1	20 A	--	--	Spare [1]	38
39	(E) Hallway Outlet	Existing	Ex	20 A	1			1080 VA	1500 VA			2	20 A	Ex	Existing	(E) #236 Autoclave	40
41	(E) Hallway Outlet	Existing	Ex	20 A	1					180 VA	1500 VA	--	--	--	--	--	42
	Total Apparent Power Phase Loads:					7170 VA		9340 VA		8170 VA							
	Total Current Phase Loads:					60 A		79 A		69 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	7170 VA	Commercial - Motors	5000 VA	122.50%	6125 VA	Total Connected Load:	24680 VA
Phase B:	9340 VA	Commercial - Receptacles	16180 VA	80.90%	13090 VA	Total Estimated Demand:	22840 VA
Phase C:	8170 VA	Equipment	3000 VA	100.00%	3000 VA	Total Connected Current:	69 A
Total:	24680 VA	Lighting	500 VA	125.00%	625 VA	Total Estimated Demand Current:	63 A

Schedule || 4B

Panel	4B	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Hot Room 238	Phases	3ϕ	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #230 Plugmold	Existing	Ex	20 A	1	180 VA	1260 VA					1	20 A	Ex	Existing	(E) #242 Outlets [1]	2
3	(E) #230 Outlets, Bio Hood	Existing	Ex	20 A	1			540 VA	180 VA			1	20 A	Ex	Existing	(E) #232 Bio Hood	4
5	(E) #230 Outlet	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #232 Bio Hood	6
7	(E) #231 -20F	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #242 Ceiling Outlet [1]	8
9	(E) #231 Ref / F	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #242 Ceiling Outlet [1]	10
11	(E) #229 Outlets	Existing	Ex	20 A	1					900 VA	180 VA	1	20 A	Ex	Existing	(E) #242 Ceiling Outlet [1]	12
13	(E) #229 Outlets	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #231 Plugmold	14
15	(E) #231 2 Door Cooler	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #242 Ceiling Outlets	16
17	(E) #229 Outlet	Existing	Ex	20 A	1					180 VA	900 VA	1	20 A	Ex	Existing	(E) #235 Outlets	18
19	(E) #231 HDLC	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #242 Outlets	20
21	(E) #231 Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #242 Ceiling Outlets	22
23	(E) #231 Outlets	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #242 Ceiling Outlets	24
25	(E) #231 Outlets	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) #231 Plugmold	26
27	(E) #231 Plugmold	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) #242 Outlets	28
29	(E) #231 Plugmold	Existing	Ex	20 A	1					360 VA	180 VA	1	20 A	Ex	Existing	(E) #242 Outlets	30
31	(E) #231 Plugmold	Existing	Ex	20 A	1	360 VA	180 VA					1	20 A	Ex	Existing	(E) Plugmold 227[1]	32
33	(E) #231 Bio Hood	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare	34
35	(E) #231 Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #242 Outlets	36
37	(E) #231 -20F	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #227 Ref / F	38
39	(E) #231 Chest Freezer	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #242 Bio Hood	40
41	(E) #231 Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #242 Bio Hood	42
	Total Apparent Power Phase Loads:					4140 VA		2880 VA		4140 VA							
	Total Current Phase Loads:					36 A		24 A		36 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	4140 VA	Commercial - Receptacles	11160 VA	94.80%	10580 VA	Total Connected Load:	11160 VA
Phase B:	2880 VA					Total Estimated Demand:	10580 VA
Phase C:	4140 VA					Total Connected Current:	31 A
Total:	11160 VA					Total Estimated Demand Current:	29 A

Schedule || 5A

Panel	5A	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location		Phases	3ϕ	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Oven	Existing	Ex	50 A	2	4000 VA	180 VA					1	20 A	Ex	Existing	(E) Outlets	2
3	--	--	--	--	--			4000 VA	180 VA			1	20 A	Ex	Existing	(E) Outlets	4
5	(E) Oven	Existing	Ex	20 A	2					3875 VA	0 VA	1	20 A	--	--	Shunt Trip	6
7	--	--	--	--	--	3875 VA	5333 VA					3	60 A	Ex	Existing	(E) Autoclave	8
9	(E) Hood	Existing	Ex	20 A	1			500 VA	5333 VA			--	--	--	--	--	10
11	Space	--	--	--	1					--	5333 VA	--	--	--	--	--	12
13	Space	--	--	--	1	--						1	--	--	--	Space	14
15	Space	--	--	--	1			--	--			1	--	--	--	Space	16
17	Space	--	--	--	1					--	--	1	--	--	--	Space	18
19	Space	--	--	--	1	--	--					1	--	--	--	Space	20
21	Space	--	--	--	1			--	--			1	--	--	--	Space	22
23	Space	--	--	--	1					--	--	1	--	--	--	Space	24
25	Space	--	--	--	1	--	--					1	--	--	--	Space	26
27	Space	--	--	--	1			--	--			1	--	--	--	Space	28
29	Space	--	--	--	1					--	--	1	--	--	--	Space	30
31	Space	--	--	--	1	--	--					1	--	--	--	Space	32
33	Space	--	--	--	1			--	--			1	--	--	--	Space	34
35	Space	--	--	--	1					--	--	1	--	--	--	Space	36
37	Space	--	--	--	1	--	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	--			1	--	--	--	Space	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
	Total Apparent Power Phase Loads:					13388 VA		10013 VA		9208 VA							
	Total Current Phase Loads:					113 A		84 A		77 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	13388 VA	Commercial - Receptacles	16110 VA	81.04%	13055 VA	Total Connected Load:	32610 VA
Phase B:	10013 VA	Equipment	16500 VA	100.00%	16500 VA	Total Estimated Demand:	29555 VA
Phase C:	9208 VA					Total Connected Current:	91 A
Total:	32610 VA					Total Estimated Demand Current:	82 A

Schedule || 4C

Panel	4C	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Hot Room 238	Phases	3ϕ	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 1 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) #226 Office Outlets	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) Hall Outlets	2
3	(E) #224 Admin Outlets	Existing	Ex	20 A	1			1080 VA	180 VA			1	20 A	Ex	Existing	(E) Hall Outlets	4
5	(E) #225 Bio Hood	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) Centrifuge	6
7	(E) #225 Bio Hood	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) Centrifuge	8
9	(E) #225 Bio Hood	Existing	Ex	20 A	1			180 VA	0 VA			1	20 A	--	--	Spare	10
11	(E) #225 Plug Strip	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #227 Lab Counter Outlet	12
13	(E) #227 Lab -20F	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) #227 Outlet	14
15	(E) #225 Outlet	Existing	Ex	20 A	1			180 VA	720 VA			1	20 A	Ex	Existing	(E) #227 Lab Cooler	16
17	(E) #223 Outlet	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #227 Lab -20 Freezer	18
19	(E) #223 Outlet	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) #228 Bio Hood	20
21	(E) #223 Outlet	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) #228 Bio Hood	22
23	(E) #223 Cryostat	Existing	Ex	50 A	2					4000 VA	2880 VA	1	30 A	Ex	Existing	(E) #227 Twist Lock	24
25	--	--	--	--	--	4000 VA	180 VA					1	20 A	Ex	Existing	(E) Centrifuge	26
27	(E) #220 Plugmold	Existing	Ex	20 A	1			540 VA	180 VA			1	20 A	Ex	Existing	(E) Plugmold	28
29	(E) #223 -20 Freezer	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) #223 Lab Plug Strip	30
31	(E) #223 -20 Freezer	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #223 Plugmold	32
33	(E) #223 -20 Freezer	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) #223 Plugmold	34
35	(E) #223 -20 Freezer	Existing	Ex	20 A	1					180 VA	360 VA	1	20 A	Ex	Existing	(E) #220 Plugmold	36
37	(E) #223 Centrifuge	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) #223 Lab Plug Strip	38
39	(E) #223 Refer / F	Existing	Ex	20 A	1			180 VA	540 VA			1	20 A	Ex	Existing	(E) #227 Lab Plug Strip	40
41	Spare	--	--	20 A	1					0 VA	180 VA	1	20 A	Ex	Existing	(E) #227 Lab Plug Strip	42
	Total Apparent Power Phase Loads:					6880 VA		4680 VA		9040 VA							
	Total Current Phase Loads:					60 A		39 A		78 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	6880 VA	Commercial - Receptacles	20600 VA	74.27%	15300 VA	Total Connected Load:	20600 VA
Phase B:	4680 VA					Total Estimated Demand:	15300 VA
Phase C:	9040 VA					Total Connected Current:	57 A
Total:	20600 VA					Total Estimated Demand Current:	42 A

MONTANA STATE UNIVERSITY

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Phase 2
MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY:	EB
REVIEWED BY:	AM

REV.	DESCRIPTION	DATE

MONTANA LICENSED PROFESSIONAL ENGINEER
ANDREW S. MOORE
No. 31404PE
REGISTERED PROFESSIONAL ENGINEER

01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical Tenant 1 Schedules

SHEET
E507

DATE
01.30.2026

Schedule || 2B

Panel	2B	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 2 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Rm 163 Lights	Existing	Ex	20 A	1	500 VA	500 VA					1	20 A	Ex	Existing	(E) Rm 160 Lights	2
3	(E) Rms 160, 162 Lights	Existing	Ex	20 A	1			500 VA	500 VA			1	20 A	Ex	Existing	(E) Rm 154 Lights	4
5	Spare	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare	6
7	(E) Rm 156 Lights	Existing	Ex	20 A	1	500 VA	0 VA					1	20 A	--	--	Spare	8
9	(E) Rms 158, 159 Lights	Existing	Ex	20 A	1			500 VA	500 VA			1	20 A	Ex	Existing	(E) Rm 160 Lights	10
11	(E) Rms 150, 171 Lights	Existing	Ex	20 A	1					500 VA	0 VA	1	20 A	--	--	Spare	12
13	(E) Rms 151, 152, 153, 157 Lights	Existing	Ex	20 A	1	500 VA	500 VA					1	20 A	Ex	Existing	(E) Rm 166 Lights	14
15	Space	--	--	--	1			--	500 VA			1	20 A	Ex	Existing	(E) Rm 165, 167 Lights	16
17	Space	--	--	--	1					--	500 VA	2	20 A	Ex	Existing	(E) 208V Power Pole Recepts., Rm 160	18
19	(E) Power Pole Receptn Rm 160	Existing	Ex	20 A	1	500 VA	500 VA					--	--	--	--	--	20
21	(E) Power Pole Receptn Rm 160	Existing	Ex	20 A	1			500 VA	--			1	--	--	--	Space	22
23	(E) Power Pole Receptn Rm 160	Existing	Ex	20 A	1					500 VA	--	1	--	--	--	Space	24
25	(E) Power Pole Receptn Rm 160	Existing	Ex	20 A	1	500 VA	--					1	--	--	--	Space	26
27	Space	--	--	--	1			--	--			1	--	--	--	Space	28
29	Space	--	--	--	1					--	--	1	--	--	--	Space	30
31	Space	--	--	--	1	--	--					1	--	--	--	Space	32
33	Space	--	--	--	1			--	--			1	--	--	--	Space	34
35	Space	--	--	--	1					--	--	1	--	--	--	Space	36
37	Space	--	--	--	1	--	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	--			1	--	--	--	Space	40
41	Space	--	--	--	1					--	--	1	--	--	--	Space	42
	Total Apparent Power Phase Loads:					4000 VA		3000 VA		1500 VA							
	Total Current Phase Loads:					35 A		27 A		13 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	4000 VA	Commercial - Receptacles	3000 VA	100.00%	3000 VA	Total Connected Load:	8500 VA
Phase B:	3000 VA	Lighting	5500 VA	125.00%	6875 VA	Total Estimated Demand:	9875 VA
Phase C:	1500 VA					Total Connected Current:	24 A
Total:	8500 VA					Total Estimated Demand Current:	27 A

Schedule || 2A

Panel	2A	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 2 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Rm 169 Outlets	Existing	Ex	20 A	1	180 VA	720 VA					1	20 A	Ex	Existing	(E) Rm 151 Outlets	2
3	(E) Rm 169 Outlets	Existing	Ex	20 A	1			720 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 152 Refer	4
5	(E) Rm 169 30A Outlet	Existing	Ex	30 A	2					2250 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 152 Plugmold	6
7	--	--	--	--	--	2250 VA	180 VA					1	20 A	Ex	Existing	(E) Rm 152 Biohood	8
9	(E) Rm 150 Plugmold, Outlet, 152 Outlet [1]	Existing	Ex	20 A	1			540 VA	540 VA			1	20 A	Ex	Existing	(E) Corridor Outlet	10
11	(E) Rm 150 2 Circuit Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	12
13	(E) Rm 150 Island Plugmold	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	14
15	(E) Rm 150 Island Plugmold	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	16
17	(E) Rm 150 Island Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	18
19	(E) Rm 150 Island Plugmold	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	20
21	(E) Rm 150 Island Plugmold	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	22
23	(E) Rm 150 Island Plugmold	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 154 Island Plugmold	24
25	(E) Rm 150 Outlets S Wall	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) Rm 154 Outlets	26
27	(E) Rm 150 Outlets S Wall	Existing	Ex	20 A	1			180 VA	900 VA			1	20 A	Ex	Existing	(E) Rm 154 Outlets	28
29	(E) Rm 150 Outlets S Wall	Existing	Ex	20 A	1					180 VA	1500 VA	2	20 A	Ex	Existing	(E) Rm 154 20A Outlet	30
31	(E) Rm 150 Outlets S Wall	Existing	Ex	20 A	1	180 VA	1500 VA					--	--	--	--	--	32
33	(E) Rm 150 30A Outlet	Existing	Ex	30 A	2			2250 VA	540 VA			1	20 A	Ex	Existing	(E) Rm 154 Outlets	34
35	--	--	--	--	--					2250 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 154 Outlets	36
37	(E) Rm 150 Outlets	Existing	Ex	20 A	1	360 VA	540 VA					1	20 A	Ex	Existing	(E) Rm 154 Outlets	38
39	(E) Rm 150 Outlets	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 154 Outlets	40
41	(E) Rm 150 Outlets	Existing	Ex	20 A	1					540 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 155 Outlets	42
	Total Apparent Power Phase Loads:					7350 VA		7110 VA		8340 VA							
	Total Current Phase Loads:					62 A		59 A		70 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	7350 VA	Commercial - Receptacles	22800 VA	71.93%	16400 VA	Total Connected Load:	22800 VA
Phase B:	7110 VA					Total Estimated Demand:	16400 VA
Phase C:	8340 VA					Total Connected Current:	63 A
Total:	22800 VA					Total Estimated Demand Current:	46 A

Schedule || 2D

Panel	2D	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 2 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Panel 2F' [1]	Existing	Ex	100 A	2	8500 VA	180 VA					1	20 A	Ex	Existing	(E) 156 Plugmold	2
3	--	--	--	--	--			8680 VA	180 VA			1	20 A	Ex	Existing	(E) 156 Plugmold	4
5	(E) Rm 153 Biohood	Existing	Ex	20 A	1					180 VA	540 VA	1	20 A	Ex	Existing	(E) 156 Plugmold	6
7	(E) Rm 153 Refer	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) Rm 156 Outlet	8
9	(E) 153 Bio Safety Cabinet	Existing	Ex	20 A	1			180 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 156 Outlet	10
11	(E) Rm 157 Plugmold	Existing	Ex	20 A	1					180 VA	1080 VA	1	20 A	Ex	Existing	(E) Rm 156, 158 Outlet, plugmold	12
13	(E) Rm 157 Biohood	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) Rm 156 Outlet	14
15	(E) Rm 157 Biohood	Existing	Ex	20 A	1			180 VA	720 VA			1	20 A	Ex	Existing	(E) Rm 156 Outlet	16
17	(E) Rm 157 Refer	Existing	Ex	20 A	1					180 VA	180 VA	1	20 A	Ex	Existing	(E) Rm 156 Outlet	18
19	(E) Rm 156 Two Ckt Plugmold	Existing	Ex	20 A	1	500 VA	500 VA					1	20 A	Ex	Existing	(E) Rm 159 Biohood	20
21	(E) Rm 156 Two Ckt Plugmold	Existing	Ex	20 A	1			180 VA	500 VA			1	20 A	Ex	Existing	(E) Rm 159 Biohood	22
23	(E) Rm 105 30 A Outlet (Corr) [1]	Existing	Ex	30 A	2					2250 VA	500 VA	1	20 A	Ex	Existing	(E) Rm 159 Refer	24
25	--	--	--	--	--	2250 VA	500 VA					1	20 A	Ex	Existing	(E) 159 Equipment	26
27	(E) Rm 156 30A Outlet	Existing	Ex	30 A	2			2250 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 156 Outlet [1]	28
29	--	--	--	--	--					2250 VA	360 VA	1	20 A	Ex	Existing	(E) Rm 156 Outlet [1]	30
31	(E) Rm 161 30A Outlet	Existing	Ex	30 A	2	2250 VA	180 VA					1	20 A	Ex	Existing	(E) Rm 156 Outlet [1]	32
33	--	--	--	--	--			2250 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 153 Receptacle [1]	34
35	(E) Rm 156 Island Plugmold	Existing	Ex	20 A	1					500 VA	360 VA	1	20 A	Ex	Existing	(E) Rm 165 Outlet Dishwasher [1]	36
37	(E) 159 Equipment	Existing	Ex	20 A	1	500 VA	375 VA					2	20 A	Ex	Existing	(E) Rm 161 Outlet	38
39	(E) Rm 156 Outlet	Existing	Ex	20 A	1			540 VA	375 VA			--	--	--	--	--	40
41	(E) 159 Equipment	Existing	Ex	20 A	1					500 VA	--	1	--	--	--	Space	42
	Total Apparent Power Phase Loads:					16455 VA		16575 VA		9060 VA							
	Total Current Phase Loads:					147 A		148 A		76 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	16455 VA	Commercial - Receptacles	42090 VA	61.88%	26045 VA	Total Connected Load:	42090 VA
Phase B:	16575 VA					Total Estimated Demand:	26045 VA
Phase C:	9060 VA					Total Connected Current:	117 A
Total:	42090 VA					Total Estimated Demand Current:	72 A

Schedule || 2C

Panel	2C	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 2 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

[1] Fan coil units are to all be replaced as part of this scope. Relocate branch circuit to optional standby panels, turn breaker off, mark spare. Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	Spare [1]	--	--	20 A	1	0 VA	0 VA					1	20 A	--	--	Spare [1]	2
3	Spare [1]	--	--	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	4
5	Spare [1]	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare [1]	6
7	Spare [1]	--	--	20 A	1	0 VA	500 VA					1	20 A	Ex	Existing	(E) H-1, H-2	8
9	Spare [1]	--	--	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	10
11	Space	--	--	--	1					--	0 VA	1	20 A	--	--	Spare [1]	12
13	Space	--	--	20 A	1	--	4000 VA					2	50 A	Ex	Existing	(E) Rm 166 50A Receptacle	14
15	Space	--	--	--	1			--	4000 VA			--	--	--	--	--	16
17	Space	--	--	--	1					--	--	1	--	--	--	Space	18
19	Space	--	--	--	1	--	--					1	--	--	--	Space	20
21	(E) Rm 167 Plugmold	Existing	Ex	20 A	1			180 VA	--			1	--	--	--	Space	22
23	(E) Rm 167 Plugmold	Existing	Ex	20 A	1					180 VA	--	1	--	--	--	Space	24
25	(E) Rm 167 dedicated 30A	Existing	Ex	30 A	2	2250 VA	--					1	--	--	--	Space	26
27	--	--	--	--	--			2250 VA	--			1	--	--	--	Space	28
29	(E) Rm 167 dedicated 20A	Existing	Ex	20 A	1					180 VA	--	1	--	--	--	Space	30
31	(E) Rm 167 dedicated 20A	Existing	Ex	20 A	1	180 VA	--					1	--	--	--	Space	32
33	(E) Rm 167 dedicated 30A	Existing	Ex	30 A	2			2250 VA	--			1	--	--	--	Space	34
35	--	--	--	--	--					2250 VA	--	1	--	--	--	Space	36
37	(E) Rm 167 Outlets	Existing	Ex	20 A	1	360 VA	--					1	--	--	--	Space	38
39	Space	--	--	--	1			--	1664 VA			2	20 A	Ex	Existing	(E) East Roof Fujitsu Mini Split	40
41	Space	--	--	--	1					--	1664 VA	--	--	--	--	--	42
	Total Apparent Power Phase Loads:					7290 VA		10344 VA		4274 VA							
	Total Current Phase Loads:					65 A		90 A		36 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	7290 VA	Commercial - Receptacles	18080 VA	77.65%	14040 VA	Total Connected Load:	21908 VA
Phase B:	10344 VA	Equipment	500 VA	100.00%	500 VA	Total Estimated Demand:	17868 VA
Phase C:	4274 VA	HVAC	3328 VA	100.00%	3328 VA	Total Connected Current:	61 A
Total:	21908 VA					Total Estimated Demand Current:	50 A

Schedule || 2F

Panel	2F	Voltage	120/208 Single	Main Bus Rating	125 A	Main Bus Feed Location	
Location	Office 162	Phases	1Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	3	Main Circuit Breaker	100 A	Sub-Feed #1 Breaker Rating	
Fed From	2D	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		Poles	Trip	Type	Wire	Circuit Description	CKT
1	Space	--	--	--	1	--	--			1	--	--	--	Space	2
3	Space	--	--	--	1			--	--	1	--	--	--	Space	4
5	Space	--	--	--	1	--	--			1	--	--	--	Space	6
7	Space	--	--	--	1			--	--	1	--	--	--	Space	8
9	Space	--	--	--	1	--	--			1	--	--	--	Space	10
11	Space	--	--	--	1			--	--	1	--	--	--	Space	12
13	Space	--	--	--	1	--	--			1	--	--	--	Space	14
15	Space	--	--	--	1			--	--	1	--	--	--	Space	16
17	Spare	--	--	20 A	1	0 VA	4160 VA			2	50 A	Ex	Existing	(E) Coffee Brewer	18
19	(E) Cash Register	Existing	Ex	20 A	1			180 VA	4160 VA	--	--	--	--	--	20
21	(E) Merchandiser Cooler	Existing	Ex	20 A	1	180 VA	4160 VA			2	50 A	Ex	Existing	(E) Espresso Cart	22
23	(E) 2 Door Cooler	Existing	Ex	20 A	1			180 VA	4160 VA	--	--	--	--	--	24
	Total Apparent Power Phase Loads:					8500 VA		8680 VA							
	Total Current Phase Loads:					82 A		83 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	8500 VA	Commercial - Receptacles	17180 VA	79.10%	13590 VA	Total Connected Load:	17180 VA
Phase B:	8680 VA					Total Estimated Demand:	13590 VA
Phase C:	0 VA					Total Connected Current:	83 A
Total:	17180 VA					Total Estimated Demand Current:	65 A

Schedule || 2E

Panel	2E	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	Tenant 2 MDP	Enclosure Type	NEMA 1	Short Circuit AIC Rating	Existing	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
- G = Ground-Fault Personnel
- D = Dual Arc-Fault and Ground-Fault Protection
- E = Ground-Fault Equipment
- Ex = Existing
- L = Breaker Lock-Off Device
- Re = Relocated
- S = Furnish with Standard Breaker...

Notes:

[1] Provide typed updated circuit directory.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) Rm 166 North, South Wall Outlets	Existing	Ex	20 A	1	180 VA	900 VA					1	20 A	Ex	Existing	(E) Rm 163 Outlet	2
3	(E) Rm 160 Island Outlet	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) Rm 162 Outlet	4
5	(E) Rm 160 Plugmold	Existing	Ex	20 A	1					360 VA	180 VA	1	20 A	Ex	Existing	(E) 162 Equipment	6
7	(E) Rm 160 Island Outlet	Existing	Ex	20 A	1	180 VA	180 VA					1	20 A	Ex	Existing	(E) 162 Equipment	8
9	(E) Rm 160 Plugmold	Existing	Ex	20 A	1			360 VA	180 VA			1	20 A	Ex	Existing	(E) Rm 165 Outlet	10
11	(E) Rm 160 Island Outlet	Existing	Ex	20 A	1					360 VA	180 VA	1	20 A	Ex	Existing	(E) Room 166 Outlet	12
13	(E) Rm 160 Plugmold	Existing	Ex	20 A	1	180 VA	360 VA					1	20 A	Ex	Existing	(E) Room 166 Outlet	14
15	(E) Rm 160 Plugmold	Existing	Ex	20 A	1			180 VA	360 VA			1	20 A	Ex	Existing	(E) Room 166 Outlet	16
17	(E) Rm 160 Plugmold	Existing	Ex	20 A	1					180 VA	1500 VA	2	20 A	Ex	Existing	(E) Rm 166 Dishwasher	18
19	(E) Rm 160 Plugmold & Outlet	Existing	Ex	20 A	1	360 VA	1500 VA					--	--	--	--	--	20
21	(E) Rm 160 Outlets	Existing	Ex	20 A	1			540 VA	2250 VA			2	30 A	Ex	Existing	(E) Rm 166 Oven	22
23	(E) Rm 160 Outlets	Existing	Ex	20 A	1					180 VA	2250 VA	--	--	--	--	--	24
25	(E) Rm 160 Outlets	Existing	Ex	20 A	1	180 VA	2250 VA					2	30 A	Ex	Existing	(E) Rm 166 Range	26
27	(E) Rm 160 30A Outlet	Existing	Ex	30 A	2			2250 VA	2250 VA			--	--	--	--	--	28
29	--	--	--	--	--					2250 VA	2250 VA	2	30 A	Ex	Existing	(E) Rm 166 Oven	30
31	(E) Rm 160 Outlets	Existing	Ex	20 A	1	540 VA	2250 VA					--	--	--	--	--	32
33	(E) Rm 160 Outlets	Existing	Ex	20 A	1			180 VA	540 VA			1	20 A	Ex	Existing	(E) Rm 165 N Wall Outlet	34
35	(E) Rm 160 Outlets	Existing	Ex	20 A	1					180 VA	360 VA	1	20 A	Ex	Existing	(E) Rm 165 N Wall W. Wall TV Outlet	36
37	(E) Rm 160 Two Circuit Plugmold	Existing	Ex	20 A	1	180 VA	1250 VA					2	20 A	Ex	Existing	(E) Rm 165 Exhaust Hood Fan Motor East Roof	38
39	(E) Rm 160 Two Circuit Plugmold	Existing	Ex	20 A	1			180 VA	1250 VA			--	--	--	--	--	40
41	(N) 162 Equipment	1#12, #12N, #12G	S	20 A	1					180 VA	720 VA	1	20 A	Ex	Existing	(E) Rm 166 Outlets	42
	Total Apparent Power Phase Loads:					10490 VA		11060 VA		11130 VA							
	Total Current Phase Loads:					87 A		93 A		93 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	10490 VA	Commercial - Receptacles	30180 VA	66.57%	20090 VA	Total Connected Load:	32680 VA
Phase B:	11060 VA	HVAC	2500 VA	100.00%	2500 VA	Total Estimated Demand:	22590 VA
Phase C:	11130 VA					Total Connected Current:	91 A
Total:	32680 VA					Total Estimated Demand Current:	63 A

100% Construction Documents

Molecular Bioscience Building
Phase 2
MSU

MONTANA STATE UNIVERSITY

BLACKSHEEP ENGINEERING
ELECTRICAL | TECHNOLOGY | LIGHTING
MECHANICAL | PLUMBING
602 W Hemlock | Bozeman, MT 59715
moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

ANDREW S. MOORE
No. 36404PE
PROFESSIONAL ENGINEER
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Electrical Tenant 2 Schedules

SHEET
E508

DATE
01.30.2026

Mechanical Equipment Schedule

	Mechanical Details		Electrical Details			Disconnect Details			
ID	Description	Voltage	Poles	Load	Type	Size	Class	Fuse	Notes
(N) B-2	Boiler	120 V	1	50 VA	1P Toggle	20 A	1	--	
(N) B-3	Boiler	120 V	1	50 VA	1P Toggle	20 A	1	--	
(N) BP-2	Boiler Pump	120 V	1	170 VA	1P Toggle	20 A	1	--	
(N) BP-3	Boiler Pump	120 V	1	170 VA	1P Toggle	20 A	1	--	
(N) CH-1	Chiller	208 V	3	166000 VA	3P HD	800 A	3R	NF	
(N) CHWP-1.1	Primary Chiller Pump	208 V	3	6017 VA	Integral	--	--	--	
(N) CHWP-1.2	Primary Chiller Pump	208 V	3	6017 VA	Integral	--	--	--	
(N) CHWP-2.1	Secondary Chiller Pump	208 V	3	16644 VA	Integral	--	--	--	
(N) CHWP-2.2	Secondary Chiller Pump	208 V	3	16644 VA	Integral	--	--	--	
(N) CP-1	Circulation Pump	120 V	1	50 VA	Circuit Breaker	--	--	--	
(N) FC-1.1	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.2	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-1.3	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-1.4	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.5	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.6	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.7	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.8	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.9	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.10	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.11	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.12	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-1.13	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.14	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.15	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.16	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-1.17	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.18	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.19	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.20	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.21	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.22	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.23	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.24	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-1.25	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-1.26	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-2.1	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.2	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.3	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.4	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.5	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.6	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.7	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.8	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.9	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.10	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.11	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.12	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.13	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.14	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-2.15	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-2.16	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.17	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.18	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-2.19	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.20	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.21	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.22	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.23	Fan Coil	208 V	2	1997 VA	Integral	--	--	--	
(N) FC-2.24	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.25	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-2.26	Fan Coil	208 V	2	1310 VA	Integral	--	--	--	
(N) FC-2.27	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-2.28	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) FC-3.1	Fan Coil	208 V	2	624 VA	Integral	--	--	--	
(N) GF-1	Glycol Feed	120 V	1	864 VA	Cord, Plug, Receptacle	--	1	--	
(N) GWP-1.1	Geothermal Pump	208 V	3	3819 VA	Integral	--	--	--	
(N) GWP-1.2	Geothermal Pump	208 V	3	3819 VA	Integral	--	--	--	
(N) HWP-1	Hot Water Pump	208 V	3	6017 VA	Integral	--	--	--	
(N) HWP-2	Hot Water Pump	208 V	3	6017 VA	Integral	--	--	--	
(N) SS-1	Split System	208 V	2	2762 VA	2P GD SS	30 A	1	NF	
(N) SS-2	Split System	208 V	2	2762 VA	2P GD SS	30 A	1	NF	

Note: For all equipment listed above , these are either a part of this scope or are future loads. Refer to mechanical drawings for list of future equipment versus current scope equipment.

Schedule || LS1

Panel	LS1	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Office 162	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	200 A	Sub-Feed #1 Breaker Rating	
Fed From	ATS-LS	Enclosure Type	NEMA 1	Short Circuit AIC Rating	10,000 A	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Circuit shall be relocated to Optional Standby Panel OSB#.
[2] Load from 30-day meter study for use in panel loading only. This value is larger than expected for final phase 2 implementation of this project since several circuits were relocated to the optional standby panels.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(E) E. Emergency Lights	Existing	Ex	20 A	1	0 VA	0 VA					1	20 A	Ex	Existing	(E) Fire Panel	2
3	(E) Exit Signs	Existing	Ex	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	4
5	Spare [1]	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare [1]	6
7	Spare [1]	--	--	30 A	2	0 VA	0 VA					2	20 A	--	--	Spare [1]	8
9	--	--	--	--	--			0 VA	0 VA			--	--	--	--	--	10
11	Spare [1]	--	--	30 A	2					0 VA	0 VA	1	20 A	--	--	Spare [1]	12
13	--	--	--	--	--	0 VA	0 VA					1	20 A	--	--	Spare [1]	14
15	Spare [1]	--	--	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	16
17	Spare [1]	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare [1]	18
19	Spare [1]	--	--	20 A	1	0 VA	0 VA					1	20 A	--	--	Spare [1]	20
21	(E) W. Emergency Lights	Existing	Ex	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	22
23	Spare [1]	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare [1]	24
25	Spare	--	--	20 A	1	0 VA	0 VA					1	20 A	Ex	Existing	(E) W. Emergency Lights	26
27	Spare [1]	--	--	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	28
29	Spare [1]	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare [1]	30
31	Spare [1]	--	--	20 A	1	0 VA	0 VA					1	20 A	--	--	Spare [1]	32
33	(E) E. Emergency Lights	Existing	Ex	20 A	1			0 VA	0 VA			1	20 A	--	--	Spare [1]	34
35	Spare	--	--	20 A	1					0 VA	0 VA	1	20 A	--	--	Spare [1]	36
37	Existing Metered Load [2]	N/A	N/A	0 A	3	1969 VA	0 VA					1	20 A	--	--	Spare [1]	38
39	--	--	--	--	--			1969 VA	0 VA			1	20 A	--	--	Spare [1]	40
41	--	--	--	--	--					1969 VA	0 VA	1	20 A	--	--	Spare [1]	42
					Total Apparent Power Phase Loads:	1969 VA		1969 VA		1969 VA							
					Total Current Phase Loads:	16 A		16 A		16 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	1969 VA	Equipment	0 VA	0.00%	0 VA	Total Connected Load:	5908 VA
Phase B:	1969 VA	Existing Load - 30 Day Metered	5908 VA	125.00%	7386 VA	Total Estimated Demand:	7386 VA
Phase C:	1969 VA	Lighting	0 VA	0.00%	0 VA	Total Connected Current:	16 A
Total:	5908 VA					Total Estimated Demand Current:	21 A

Schedule || OS3

Panel	OS3	Voltage	120/208 Wye	Main Bus Rating	225 A	Main Bus Feed Location	
Location	Hot Room 238	Phases	3Ø	Main Interior Type	MLO	Main Bus Feed-Thorugh Load	
Mounting		Wire	4	Main Circuit Breaker	225 A	Sub-Feed #1 Breaker Rating	
Fed From	OS1	Enclosure Type	NEMA 1	Short Circuit AIC Rating	22,000 A	Sub-Feed #2 Breaker Rating	

Details:

Circuit Breaker Protection Types |
G = Ground-Fault Personnel
D = Dual Arc-Fault and Ground-Fault Protection
E = Ground-Fault Equipment
Ex = Existing
L = Breaker Lock-Off Device
Re = Relocated
S = Furnish with Standard Breaker...

Notes:

[1] Circuit shall be relocated from new Life Safety Panel LS1.
[2] Load is included within meter study load on panel OS1.

1. All conductors to be copper unless otherwise noted. Conductors shall be upsized for all runs over 100 feet to keep maximum allowable voltage drop at 3%.
2. Where panel schedule and plans indicate GFCI protection for the same circuit, E.C. shall determine whether to install a GFCI receptacle / device or a GFCI circuit breaker but not both.
3. Reference Mechanical Equipment Connection Schedule and manufacturer instructions for electrical installation requirements.
4. If mechanical equipment is within sight [less than 50-feet] of the load center, a molded case circuit breaker may serve as the disconnecting means. The circuit breaker must be capable of being locked in the open position.

CKT	Circuit Description	Wire	Type	Trip	Poles	A		B		C		Poles	Trip	Type	Wire	Circuit Description	CKT
1	(N) FC-2.23	2#10, #10N, #10G	S	20 A	2	998 VA	655 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-2.25	2
3	--	--	--	--	--			998 VA	655 VA			--	--	--	--	--	4
5	(N) FC-2.21	2#12, #12N, #12G	S	20 A	2					998 VA	655 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-2.26	6
7	--	--	--	--	--	998 VA	655 VA					--	--	--	--	--	8
9	(N) FC-2.20	2#12, #12N, #12G	S	20 A	2			998 VA	655 VA			2	20 A	S	2#12, #12N, #12G	(N) FC-2.18	10
11	--	--	--	--	--					998 VA	655 VA	--	--	--	--	--	12
13	(N) FC-2.10	2#12, #12N, #12G	S	20 A	2	998 VA	655 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-2.14	14
15	--	--	--	--	--			998 VA	655 VA			--	--	--	--	--	16
17	(N) FC-2.5	2#12, #12N, #12G	S	20 A	2					998 VA	655 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-2.15	18
19	--	--	--	--	--	998 VA	655 VA					--	--	--	--	--	20
21	(N) FC-2.1	2#10, #10N, #10G	S	20 A	2			998 VA	624 VA			2	20 A	S	2#12, #12N, #12G	(N) FC-2.4,28	22
23	--	--	--	--	--					998 VA	624 VA	--	--	--	--	--	24
25	(N) FC-2.19	2#12, #12N, #12G	S	20 A	2	998 VA	624 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-2.6,8	26
27	--	--	--	--	--			998 VA	624 VA			--	--	--	--	--	28
29	(N) FC-2.3	2#12, #12N, #12G	S	20 A	2					998 VA	624 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-2.13,16	30
31	--	--	--	--	--	998 VA	624 VA					--	--	--	--	--	32
33	(N) FC-2.7	2#12, #12N, #12G	S	20 A	2			998 VA	624 VA			2	20 A	S	2#12, #12N, #12G	(N) FC-2,2,27	34
35	--	--	--	--	--					998 VA	624 VA	--	--	--	--	--	36
37	(N) FC-2.17	2#12, #12N, #12G	S	20 A	2	998 VA	624 VA					2	20 A	S	2#12, #12N, #12G	(N) FC-2.9,11	38
39	--	--	--	--	--			998 VA	624 VA			--	--	--	--	--	40
41	(N) FC-2.12	2#12, #12N, #12G	S	20 A	2					998 VA	624 VA	2	20 A	S	2#12, #12N, #12G	(N) FC-2,22,24	42
43	--	--	--	--	--	998 VA	624 VA					--	--	--	--	--	44
45	(N) FC-3.1	2#12, #12N, #12G	S	20 A	2			312 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(R) #230 Incbtr (relocated from LS1 - 17) [1], [2]	46
47	--	--	--	--	--					312 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(R) #232 Incbtr (relocated from LS1 - 23) [1], [2]	48
49	(N) SS-2 Data Closet	2#12, #12N, #12G	S	20 A	2	1381 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(R) #234 Incbtr (relocated from LS1 - 29) [1], [2]	50
51	--	--	--	--	--			1381 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(R) #234 Incbtr (LS1 - 31) [1], [2]	52
53	(N) Receptacle | IDF , Rack	2#10, #10N, #10G	S	30 A	2					2496 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(R) #251 Incbtr (relocated from LS1-18) [1], [2]	54
55	--	--	--	--	--	2496 VA	0 VA					1	20 A	S	1#12, #12N, #12G	(R) #250 Incbtr (relocated from LS1-20) [1], [2]	56
57	(N) Receptacle | IDF , Rack	2#10, #10N, #10G	S	30 A	2			2496 VA	0 VA			1	20 A	S	1#12, #12N, #12G	(R) #217 Incbtr (relocated from LS1-22) [1], [2]	58
59	--	--	--	--	--					2496 VA	0 VA	1	20 A	S	1#12, #12N, #12G	(R) #217 Incbtr (relocated from LS1-24) [1], [2]	60
61	Space	--	--	--	1	--	0 VA					1	20 A	S	1#12, #12N, #12G	(R) #228 Incbtr (relocated from LS1-15) [1], [2]	62
63	Space	--	--	--	1			--	0 VA			1	20 A	S	1#12, #12N, #12G	(R) #212 Incbtr (relocated from LS1-19) [1], [2]	64
65	Space	--	--	--	1					--	0 VA	1	20 A	S	1#12, #12N, #12G	(R) #225 Incbtr (relocated from LS1-27) [1], [2]	66
67	Space	--	--	--	1	--	--					1	--	--	--	Space	68
69	Space	--	--	--	1			--	--			1	--	--	--	Space	70
71	Space	--	--	--	1					--	--	1	--	--	--	Space	72
					Total Apparent Power Phase Loads:	16981 VA		15640 VA		16754 VA							
					Total Current Phase Loads:	143 A		130 A		141 A							

Connected Loads:		Load Classification	Connected Load (VA)	Demand Factor	Estimated Demand (VA)	Panel Totals	
Phase A:	16981 VA	Commercial - Receptacles	9984 VA	100.00%	9984 VA	Total Connected Load:	49375 VA
Phase B:	15640 VA	HVAC	39391 VA	100.00%	39391 VA	Total Estimated Demand:	49375 VA
Phase C:	16754 VA					Total Connected Current:	137 A
Total:	49375 VA					Total Estimated Demand Current:	137 A

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Phase 2
MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

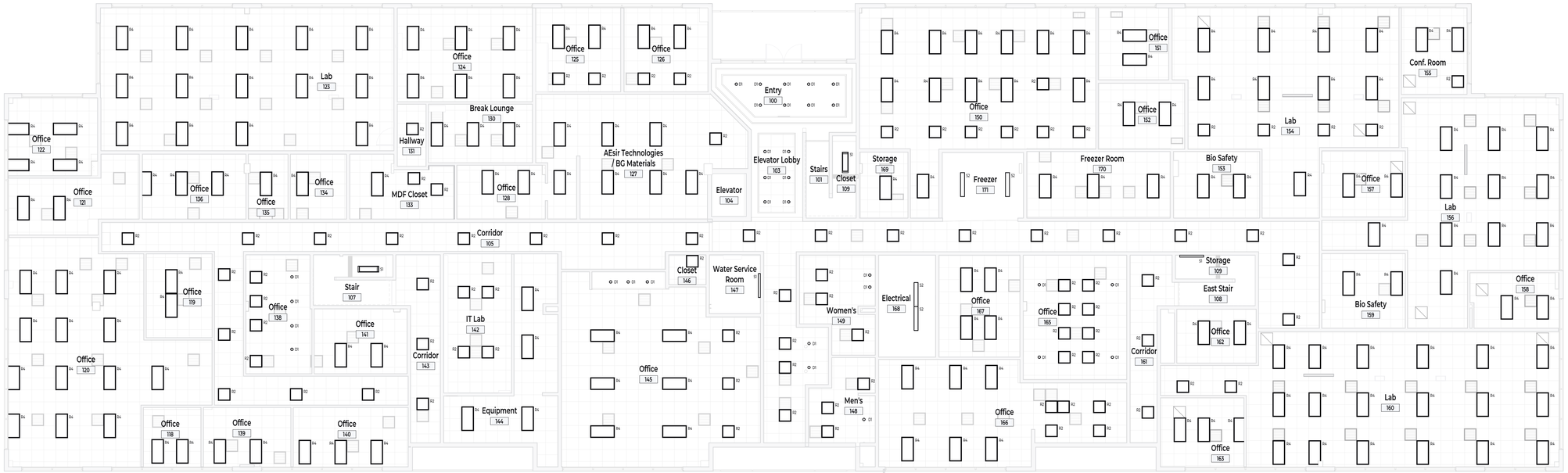
MONTANA
ANDREW S. MOORE
No. 38404PE
REGISTERED PROFESSIONAL ENGINEER
STATE OF MONTANA
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

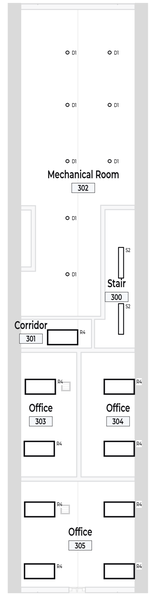
SHEET TITLE
Electrical Schedules

SHEET
E509

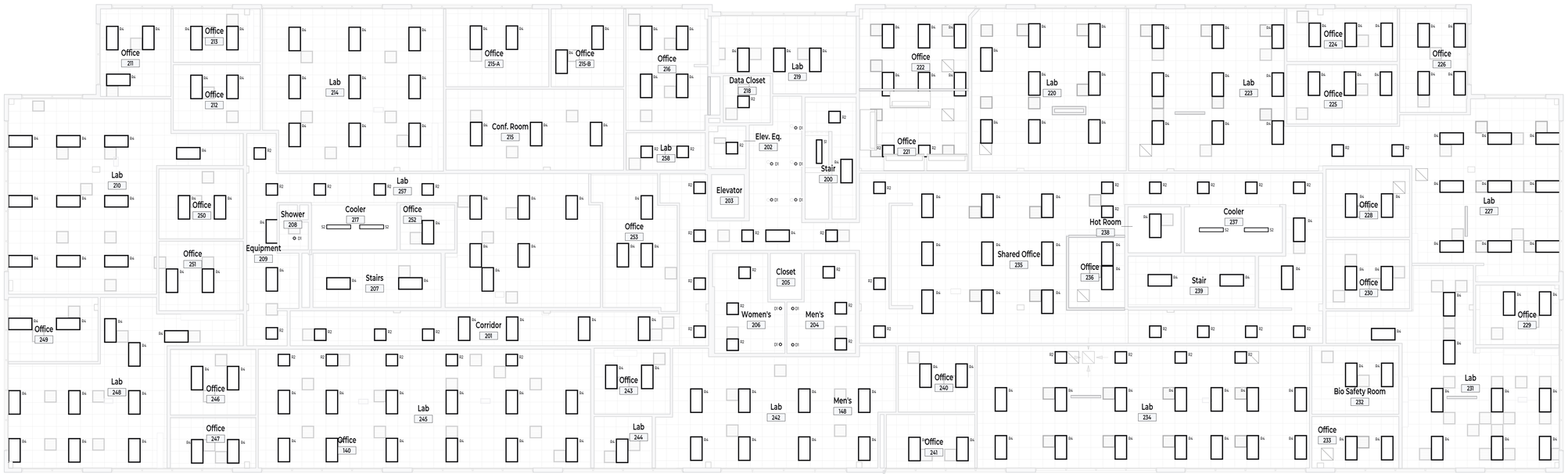
DATE
01.30.2026



1 / EL011 Level 1 Lighting Plan
1/8" = 1'-0"



3 / EL011 Level 3 Lighting Plan
1/8" = 1'-0"



2 / EL011 Level 2 Lighting Plan
1/8" = 1'-0"

General Sheet Notes

1. The scope of work is to retrofit all existing luminaires with TLEDs and LED lamps as indicated on the schedule on sheet E000. Linear TLED replacements include ballast removal and ballast bypass.
2. EC shall visit the site to verify counts prior to bidding.

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moduluscorp.com | 406.219.8489

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author		
REVIEWED BY: Checker		
REV.	DESCRIPTION	DATE

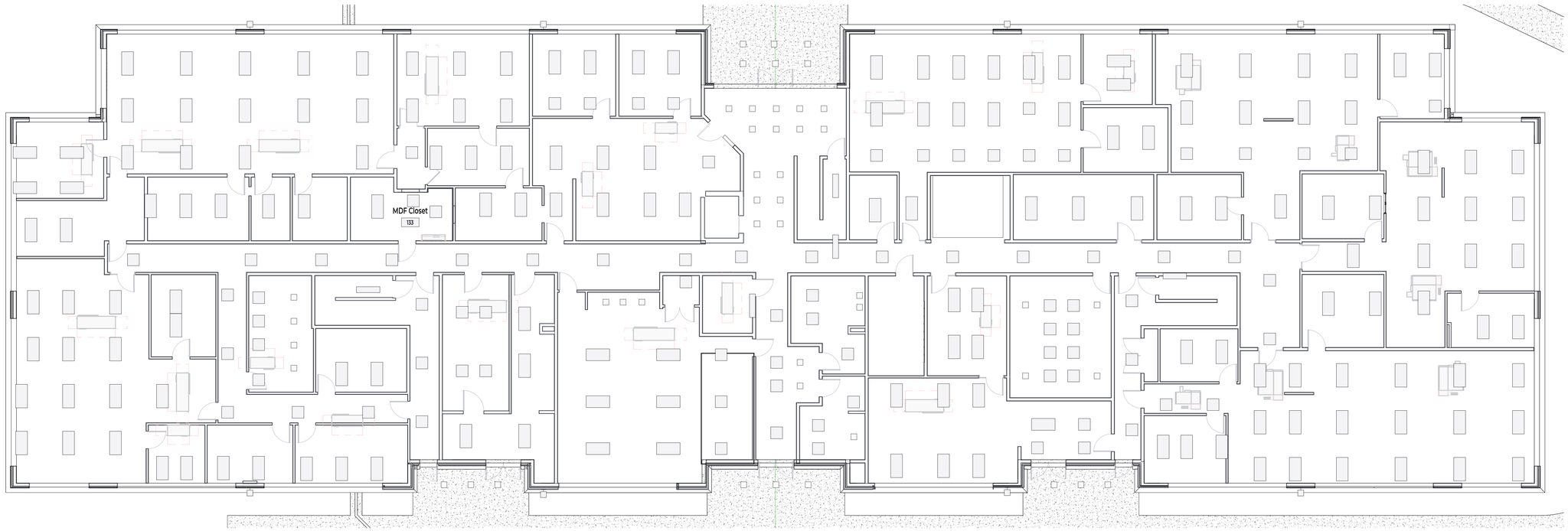
MONTANA ANDREW S. MOORE No. 36404PE REGISTERED PROFESSIONAL ENGINEER
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Lighting Plans

SHEET
EL011

DATE
01.30.2026



1 EL012 Level 1 EL+M Coord
1/8" = 1'-0"

2 EL012 Level 2 EL+M Coord
1/8" = 1'-0"

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BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

MONTANA ANDREW S. MOORE No. 38404PE PROFESSIONAL ENGINEER
01.30.2026

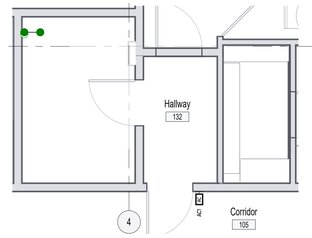
PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Lighting + Fan Coil Plan

SHEET
EL012

DATE
01.30.2026

1 T101 Level 1 Remodel Area Technology Plan
1/4" = 1'-0"



2 T101 Level 1 Data Closet Technology Plan
1/4" = 1'-0"

General Sheet Notes

1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect.
2. The low voltage plans are diagrammatic only. Coordinate low voltage equipment location and installation with equipment being served.
3. All display locations shall have an electrical receptacle installed in the back box or have a clock outlet near the center of the display if no back box is present.
4. All data locations should have a power outlet within three feet.
5. Refer to architectural drawings for exact mounting height of receptacles.
6. All data, CatCard, cable tray, and conduit installation guidelines can be found at https://www.montana.edu/uit/wiringguidelines/.

Reference Keynotes

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MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201 Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

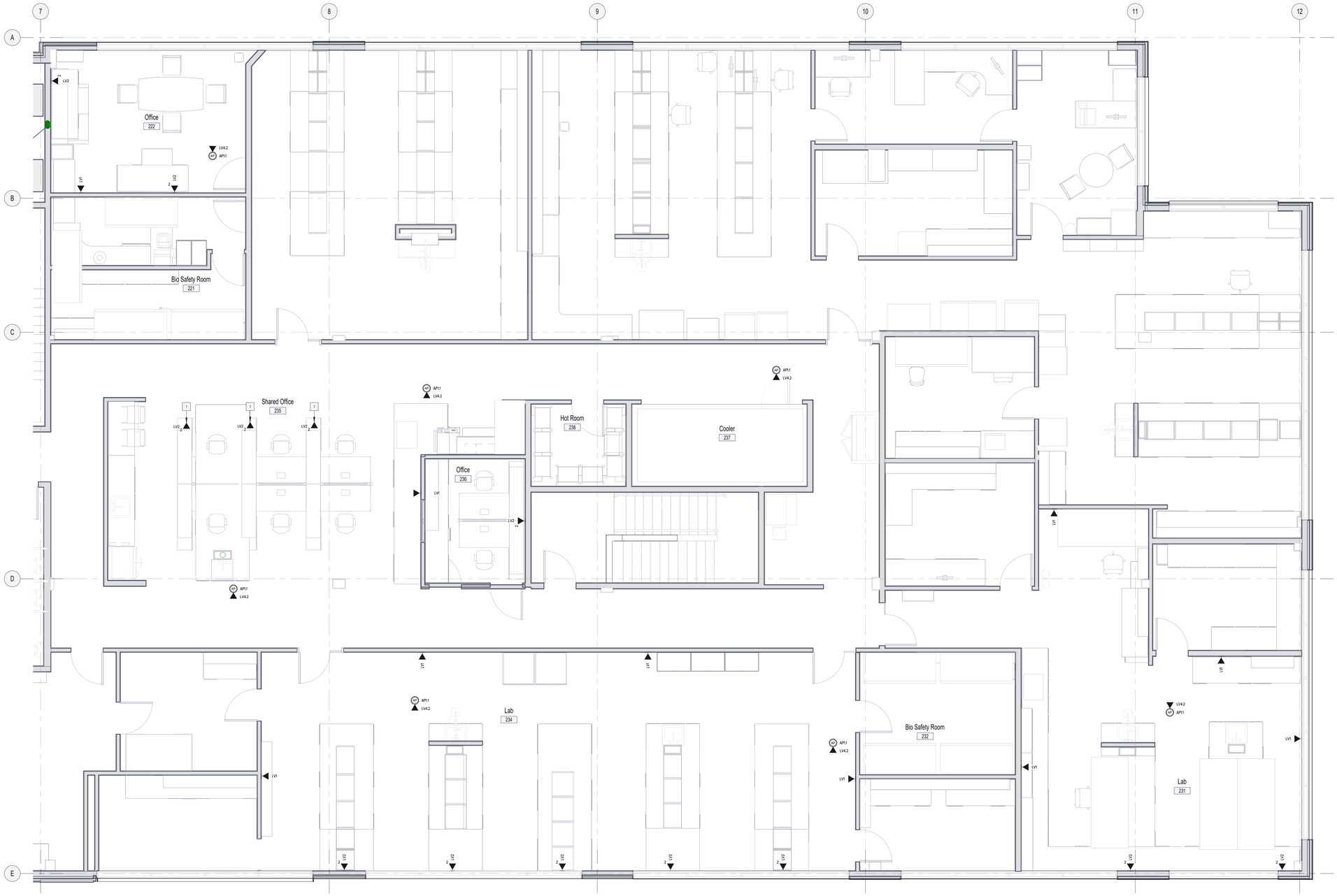
Bicsi
Registered Communications Distribution Designer
Raymond Holland
BICSI ID# 463817
EXPIRES 12-31-26
RCDD
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Level 1
Technology Plan

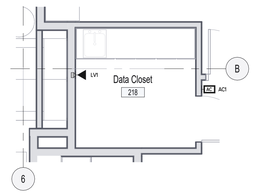
SHEET
T101

DATE
09.19.2025



1 T102 Level 2 Remodel Area Technology Plan

1/4" = 1'-0"



2 T102 Level 2 Data Closet Technology Plan

1/4" = 1'-0"

General Sheet Notes

1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect.
2. The low voltage plans are diagrammatic only. Coordinate low voltage equipment location and installation with equipment being served.
3. All display locations shall have an electrical receptacle installed in the back box or have a clock outlet near the center of the display if no back box is present.
4. All data locations should have a power outlet within three feet.
5. Refer to architectural drawings for exact mounting height of receptacles.
6. All data, CatCard, cable tray, and conduit installation guidelines can be found at https://www.montana.edu/uit/wiringguidelines/.

Reference Keynotes

1. Ceiling mounted data jack location to be coordinated in-field with furniture contractor. Data jack is intended to be extended through furniture stanchion and positioned in furniture for use at desks.

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MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201 Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

Bicsi
Raymond Holland
BICSI ID# 463817
EXPIRES 12-31-26
RCDD
REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER

01.30.2026

PPA#22-0045

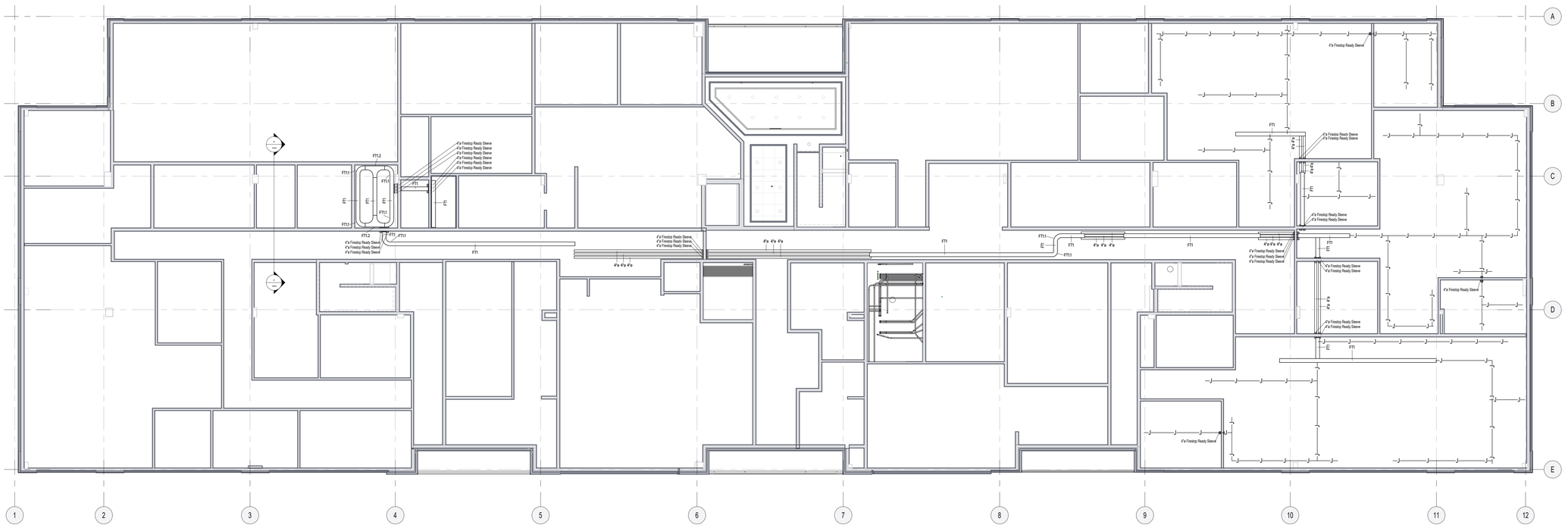
A/E#00-00-00

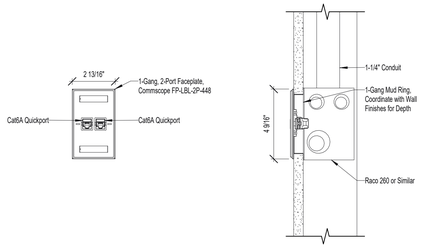
BA# 2236

SHEET TITLE
Level 2
Technology Plan

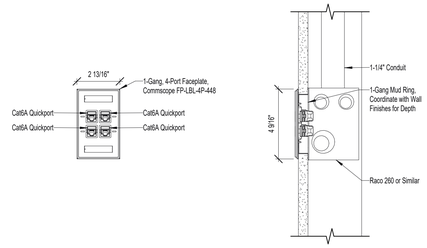
SHEET
T102

DATE
09.19.2025

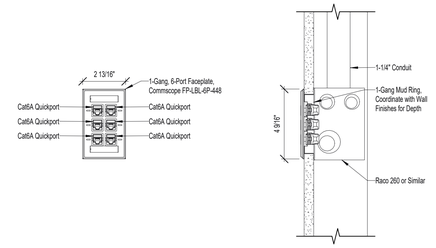

A
B
C
D
E
1
2
3
4
5
6
7
8
9
10
11
12
FT1
FT11
FT12
4"x Firestop Ready Sleeve
4"x Firestop Ready Sleeve
4"x Firestop Ready Sleeve



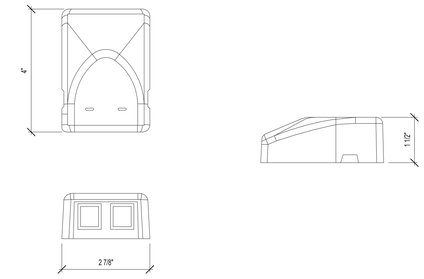
1 T501 Typ. 2-Port Data Trim Plate [LV1]
3" = 1'-0"



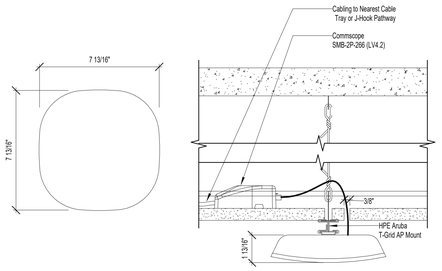
2 T501 Typ. 4-Port Data Trim Plate [LV2]
3" = 1'-0"



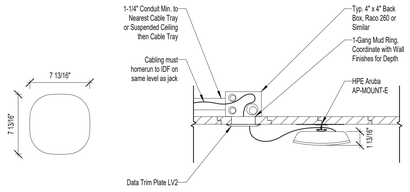
3 T501 Typ. 6-Port Data Trim Plate [LV3]
3" = 1'-0"



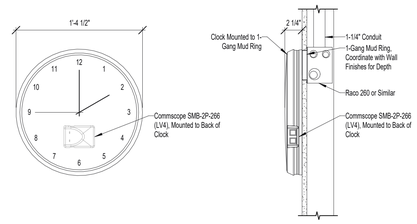
4 T501 Typ. Commscope SMB-2P-266 [LV4.1]
6" = 1'-0"



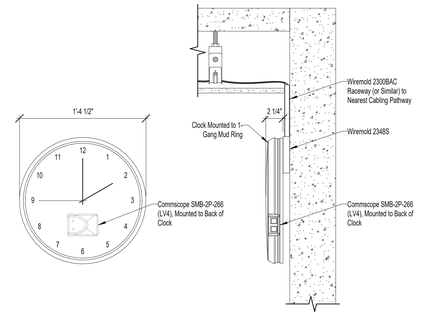
5 T501 Typ. Ceiling Mounted Interior Access Point [AP1.1]
3" = 1'-0"



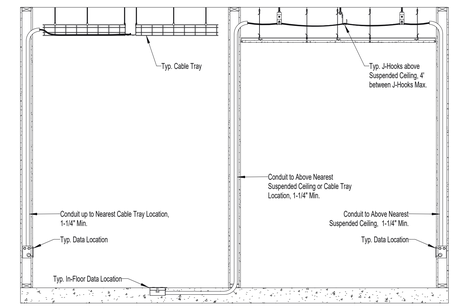
6 T501 Typ. Ceiling Mounted Interior Access Point [AP1]
1 1/2" = 1'-0"



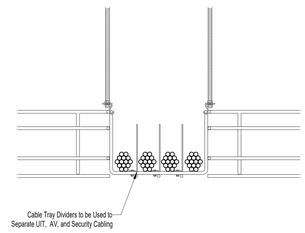
7 T501 Typ. PoE Clock [CLK1.1]
1 1/2" = 1'-0"



8 T501 Typ. PoE Clock [CLK1.2]
1 1/2" = 1'-0"



9 T501 Typ. Infrastructure Cabling Support Hardware
1/2" = 1'-0"



10 T501 Typ. Cable Tray Section
3" = 1'-0"

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4515 Valley Commons Drive #201 Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY Checker

REV.	DESCRIPTION	DATE

REGISTERED COMMUNICATIONS DISTRIBUTION DESIGNER
Bicsi
Raymond Holland
BICSI ID# 463817
EXPIRES 12-31-26
RCDD
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Technology Typical Details

SHEET
T501

DATE
09.19.2025

Technology Devices

Manufacturer	Model	Description	Qty.	Type
Access Control				
Typical	CatCard Reader Location	Cabling for a CatCard reader.	2	AC1
Typical	Electrified Hardware	Cabling for Electrified Hardware	2	LCK1
Cable Tray				
Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	18	FT1
Cooper B-Line	FT4X8 Elbow	4" Deep, 8" Wide Short Radius Horizontal Bend Created with One FT4X8 and One Washer SPL Kit	7	FT1.1
Cooper B-Line	FT4X8 Tee	4" Deep, 8" Wide Horizontal Tee Created with One FT4X8 and Three Washer SPL Kits	2	FT1.2
Specified Technologies Inc.	FS400	Firestop Ready Sleeve	34	FS1
Data				
HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	15	AP1.1
Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	31	LV1
Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	15	LV4.2
Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	26	LV2

Technology Devices By Location

Room #	Room Name	Manufacturer	Model	Description	Qty.	Type
Level 1						
105	Corridor	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	3	FS1
129	Closet	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	1	FT1
132	Hallway	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	3	FS1
132	Hallway	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	1	FT1
133	IT Closet	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	6	FS1
133	IT Closet	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	3	FT1
133	IT Closet	Cooper B-Line	FT4X8 Elbow	4" Deep, 8" Wide Short Radius Horizontal Bend Created with One FT4X8 and One Washer SPL Kit	4	FT1.1
133	IT Closet	Cooper B-Line	FT4X8 Tee	4" Deep, 8" Wide Horizontal Tee Created with One FT4X8 and Three Washer SPL Kits	2	FT1.2
154	Lab	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	5	LV1
154	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	2	LV4.2
154	Lab	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	3	LV2
154	Lab	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	3	FS1
154	Lab	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	1	FT1
154	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
155	Conference Room	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	2	LV1
155	Conference Room	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
155	Conference Room	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
156	Lab	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	6	LV1
156	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	2	LV4.2
156	Lab	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	2	LV2
156	Lab	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	5	FS1
156	Lab	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	2	FT1
156	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	2	AP1.1
157	Office	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	1	LV1
157	Office	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	1	LV2
157	Office	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	1	FT1
158	Office	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	1	LV1
158	Office	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	1	LV2
160	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	2	LV4.2
160	Lab	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	3	FS1
160	Lab	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	2	FT1
161	Lab	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	4	LV1
161	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
161	Lab	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	5	LV2
161	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	4	AP1.1
163	Office	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	1	LV1
163	Office	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	1	LV2
195	Corridor	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	3	FS1
195	Corridor	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	6	FT1
195	Corridor	Cooper B-Line	FT4X8 Elbow	4" Deep, 8" Wide Short Radius Horizontal Bend Created with One FT4X8 and One Washer SPL Kit	3	FT1.1
Level 2						
201	Corridor	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	2	FT1
201	Corridor	Cooper B-Line	FT4X8 Elbow	4" Deep, 8" Wide Short Radius Horizontal Bend Created with One FT4X8 and One Washer SPL Kit	1	FT1.1
218	Data Closet	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	1	LV1
218	IT Closet	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	3	FS1
219	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
222	Office	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	1	LV1
222	Office	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
222	Office	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	2	LV2
223	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
223	Lab	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	6	FT1
223	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
227	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
227	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
231	Lab	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	4	LV1
231	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
231	Lab	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	2	LV2
231	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
234	Lab	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	4	LV1
234	Lab	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	1	LV4.2
234	Lab	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	5	LV2
234	Lab	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	1	AP1.1
235	Shared Office	Typical	2-Port Data Jack	2-Port Data Jack Wiring and Trim Plate Location	1	LV1
235	Open Office	Typical	2-Port Surface Jack	2-Port Universal Surface Mount Jack for Wireless Access Points	2	LV4.2
235	Shared Office	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	3	LV2
235	Shared Office	Specified Technologies Inc.	FS400	Firestop Ready Sleeve	5	FS1
235	Shared Office	Cooper B-Line	FT4X8	Straight Flex Tray Section. 4" Deep, 8" Wide	6	FT1
235	Shared Office	Cooper B-Line	FT4X8 Elbow	4" Deep, 8" Wide Short Radius Horizontal Bend Created with One FT4X8 and One Washer SPL Kit	2	FT1.1
235	Open Office	HPE Aruba	Q9H63A	Aruba 510 Series campus access points. Provided and Installed by MSU UIT	2	AP1.1
236	Office	Typical	4-Port Data Jack	4-Port Data Jack Wiring and Trim Plate Location	1	LV2

General Sheet Notes

1. Installation of all work shall be in accordance with all local codes and ordinances and the edition of the National Electric Code NFPA 70 (NEC) in effect.
2. The schedules shown on this sheet may not include all necessary equipment, accessories and licenses needed for a complete functioning system. Integrator to shall verify and include any necessary items not shown in the schedules.

Reference Keynotes

MONTANA STATE UNIVERSITY

BLACKSHEEP ENGINEERING
ELECTRICAL | TECHNOLOGY | LIGHTING
MECHANICAL | PLUMBING
602 W Hemlock | Bozeman, MT 59715
modulacorp.com | 406.219.8489

Molecular Bioscience Building
Phase 2
MSU

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201 Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: Author
REVIEWED BY: Checker

REV.	DESCRIPTION	DATE

Bicsi
Raymond Holland
BICSI/RCDD #63937
RCDD
01.30.2026

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
Tech Equipment Schedules

SHEET
T611

DATE
09.19.2025

FIRE ALARM NOTES

1. FIRE ALARM SYSTEM SHALL COMPLY WITH:
   A. IBC (INTERNATIONAL BUILDING CODE), 2021
   B. IFC (INTERNATIONAL FIRE CODE), 2021
   C. NFPA 70 (NATIONAL ELECTRIC CODE), 2020
   D. NFPA 72 (FIRE ALARM CODE), 2019
   E. PROJECT SPECIFICATIONS
   F. LOCAL AHJ REQUIREMENTS (AMENDMENTS)
2. THESE DRAWINGS REPRESENT ENGINEERED FINALIZED SHOP DRAWINGS READY FOR INSTALLATION. THE CONTRACTOR SHALL PROVIDE RED-LINE FIELD ASBUILTS TO THE FIRE ALARM DESIGNER. THE FIRE ALARM DESIGNER WILL PREPARE AND PROVIDE RECORD DRAWINGS. THE CONTRACTOR IS RESPONSIBLE FOR COMPLETED NFPA 72 INSPECTION & TESTING, RECORD OF COMPLETION FORMS AND AND PROVIDE OPERATION & MAINTENANCE MANUALS TO THE OWNERS REPRESENTATIVE.
3. COORDINATE THE EXACT DEVICE LOCATIONS WITH ELECTRICAL AND MECHANICAL SYSTEM EQUIPMENT AND BUILDING ARCHITECTURAL FEATURES. INSTALLING CONTRACTOR SHALL CONSULT/CONFIRM ANY NECESSARY DEVIATION OF DEVICE BOX PLACEMENT OR CONDUIT/CIRCUIT ROUTING WITH THE DESIGNER OF RECORD PRIOR TO IMPLEMENTING CHANGES IN THE FIELD.
4. ALL FIRE ALARM CABLE AND WIRE SHALL BE INSTALLED IN 100% NO SMALLER THAN 3/4" FACTORY FINISHED RED EMT. FREE-AIR CABLE IS NOT ALLOWED. WHERE EMT IS EXPOSED TO THE PUBLIC, COLOR SHALL MATCH SURROUNDINGS.
5. ALL FIRE ALARM JUNCTION BOXES AND COVERS SHALL BE FACTORY FINISHED RED. JUNCTION BOXES AND COVERS EXPOSED TO THE PUBLIC SHALL BE PAINTED TO MATCH SURROUNDINGS.
6. MINIMUM CIRCUIT PERFORMANCE REQUIREMENTS:
   IDC - INITIATING DEVICE CIRCUIT SHALL BE CLASS B.
   NAC - NOTIFICATION APPLICATION CIRCUIT SHALL BE CLASS B.
   SLC - SIGNALING LINE CIRCUIT SHALL BE CLASS B. NO MORE THAN 12 T-TAPS OR 10% OF EST T-TAPS AT 125 PER SLC.
7. ALL NOTIFICATION APPLIANCES SHALL OPERATE IN SYNCHRONIZATION AS REQUIRED BY NFPA 72.
8. ALL DUCT DETECTORS FOR HVAC UNITS AND FIRE SMOKE DAMPERS SHALL BE EDWARDS MODEL SIGA-DDOS. REMOTE TEST SWITCH MODEL EDWARDS SD-TRK SHALL BE PROVIDED WITHIN SIGHT OF THE DETECTOR, AT LOCATIONS INDICATED ON THE DRAWINGS. MOUNT SWITCHES AT 48" AFF WHERE FEASIBLE, AND ALWAYS CONFIRM AND COORDIATE WITH MSU FIRE ALARM FOREMAN BEFORE FINAL INSTALL.
9. FIRE ALARM EQUIPMENT CABINETS, BOXES, AND DEVICES SHALL HAVE TAGS PERMANENTLY AFFIXED TO THE FACE . LABEL EACH DEVICE USING SELF-ADHESIVE LASER PRINTED COMMERCIALLY AVAILABLE ID TAGS. ADDRESSABLE DEVICES SHALL BE LABELED WITH ADDRESS. NOTIFICATION APPLIANCES SHALL BE LABELED WITH THEIR ASSOCIATED NAC IDENTIFIER MATCHING THAT ON THESE PLANS. LABEL ALL MONITOR AND RELAY MODULES WITH ASSOCIATED FUNCTION. LABEL REMOTE TEST SWITCHES WITH ASSOCIATED DUCT DETECTOR ADDRESS AND AIR HANDLER DESIGNATION. ALL LABELS SHALL BE #24 FONT.
10. FIRE ALARM WIRING SHOULD ONLY BE TERMINATED AT A DEVICE OR APPLIANCE. WHEN A CIRCUIT SPLICE IS NEEDED MAINTAIN SPLICE WITH WIRE NUTS IN AN ACCEPTABLE JUNCTION BOX PER #5 ABOVE. KEEP FIRE ALARM CONDUCTOR SPLICES TO A MINIMUM. IDENTIFY SPLICE LOCATIONS JUNCTION BOXES ON THE AS-BUILT DRAWINGS.
11. FACU SHALL BE EQUIPED WITH AN EDWARDS 4-24L24S INDICATOR CONTROL DISPLAY MODULE. FOLLOW MSU FIRE ALARM PERFORMANCE SPECIFICATIONS FOR PROGRAMMING.
12. EST4 LCD SHALL HAVE MSU LOGO. LOGO WILL BE PROVIDED FROM MSU PROJECT MANAGER.
13. ALL 120 VOLT CIRCUITS FOR THE FACU AND NAC PANELS SHALL BE FED FROM THE SAME ELECTRICAL PANEL.

PHASE PLAN

1. INSTALL ALL NEW HEADEND EQUIPMENT AND NOTIFICATION APPLIANCES THROUGHOUT THE BUILDING INCLUDING ALL ASSOCIATED RACEWAY. IN THE EVENT THAT THE INSTALLATION OF A NEW NOTIFICATION APPLIANCE CONFLICTS WITH AN EXISTING APPLIANCE, ATTEMPT TO INSTALL ADJACENT TO ONE ANOTHER, IF NOT, REMOVE THE EXISTING APPLIANCE AND RELOCATE IT TEMPORARILY SO THAT IT MAY STILL FUNCTION UNTIL PHASE 4, BUT THE NEW APPLIANCE MAY BE INSTALLED SO IT WILL BE OPERATIONAL IN PHASE 3.
2. INSTALL ALL NEW ADDRESSABLE DEVICES (DETECTION, CONTROLS, MONITORS, ETC.). MOST OF THESE NEW DEVICES WILL REQUIRE UTILIZING THE EXITING DEVICE LOCATION OR CONTROL INTERFACE. WHERE FEASIBLE, INSTALL THE NEW DEVICE ADJACENT TO THE EXISTING DEVICE. OTHERWISE PROVIDE A J-BOX AND SERVICE LOOP FOR COMPLETION IN PHASE 4. I.E. PROVIDE AN SLC SERVICE LOOP TO AN ELEVATOR MECHANICAL ROOM, THEN IN PHASE 4, ALL DEVICES, WIRING, ETC. CAN BE REMOVED ALLOWING FOR THE EXISTING CONDUIT AND BACKBOXES TO BE REUSED WITH THE NEW SYSTEM.
3. AT THIS POINT THE NEW SYSTEM SHOULD BE RUNNING 100% AS FAR NOTIFICATION IS CONCERNED. SOME INPUTS MAYBE FUNCTIONING WHERE THERE ISN'T A CONFLICT WITH EXISTING DEVICE OPERATION. A FUNCTIONAL TEST WITH THE AHJ MAY BE REQUIRED TO PROVE FULL NOTIFICATION THROUGH THE NEW SYSTEM. PROVIDE A TEMPORARY ALARM RELAY OUTPUT ON THE EXISTING SYSTEM TO A TEMPORARY ALARM MONITOR FOR THE NEW SYSTEM. DISABLE ALL NOTIFICATION ON THE EXISTING SYSTEM.
4. BEGIN CHANGING OUT EXISTING DEVICES AND CONTROLS (ELEVATORS, DOORS, SPRINKLER, ETC.) IN SMALL QUANTITIES SO THAT "OUT OF SERVICE" TIME CAN MINIMIZED. PROVIDE A FIRE WATCH FOR ANYTIME THE SPRINKLER SYSTEM IS TEMPORARILY OUT OF SERVICE DURING THE TRANSITION FROM EXISTING TO NEW. I.E ON DAY ONE DO THE ELEVATOR, ON DAY TWO CHILLER FAN CONTROLS, AND SO ON. FINISH TRANSITION WITH SPRINKLER SYSTEM MIGRATION. PROVIDE LOCKOUT/TAGOUT WHEN REQUIRED. INFORM FACILITIES WHEN ANY SYSTEM WILL BE OUT OF OPERATION. DEPROGRAM REMOVED DEVICES FROM THE EXISTING SYSTEM IF FEASIBLE. IT MAYBE ACCEPTABLE TO LEAVE TROUBLES ON THE EXISTING PANEL FOR MISSING DEVICES SO LONG AS IT DOES NOT CAUSE A CONTINUAL DISTURBANCE TO THE OCCUPANTS OF THE BUILDING. PROGRAM (ACCORDING TO THE MATRIX ON THIS SHEET) ALL NEWLY INSTALLED DEVICES INTO THE NEW SYSTEM AS THEY ARE BROUGHT ONLINE.
5. CONDUCT FUNCTIONAL PRE-TEST AND FINAL ACCEPTANCE OF THE NEW SYSTEM. MSU FIRE TECH FOREMAN AND FIRE MARSHAL TO ATTEND.
6. DEMO EXISTING NOTIFIER SYSTEM IN ITS ENTIRETY. REPAIR, PATCH PAINT ANY DISTURBED AREAS AS A RESULT OF DEMO. PAINT ANY NEW CONDUITS NOT YET PAINTED ACCORDING TO THE FIRE ALARM NOTES ON THIS SHEET.

ELECTRICAL NOTES

1. THE CONTRACTOR SHALL COMPLY WITH THE CONSTRUCTION PRACTICES AND REQUIREMENTS OF THE REFERENCED EDITION OF THE NATIONAL ELECTRIC CODE (2020 NFPA 70), CURRENT NATIONAL ELECTRICAL SAFETY CODE, AND INSTRUCTIONS OF MANUFACTURERS OF EQUIPMENT AND MATERIALS SUPPLIED FOR THE PROJECT.
2. THE CONTRACTOR SHALL PROVIDE AND INSTALL ALL JUNCTION AND PULL BOXES REQUIRED FOR THE INSTALLATION OF ELECTRICAL DEVICES AND EQUIPMENT, WHETHER OR NOT SPECIFICALLY INDICATED ON THE PLANS. SIZING OF THESE BOXES SHALL BE PER THE NATIONAL ELECTRICAL CODE AND/OR MANUFACTURES REQUIREMENTS.
3. ALL PENETRATIONS THROUGH FIRE BARRIERS SHALL BE FIRE STOPPED TO MAINTAIN THE INTEGRITY OF THE FIRE BARRIER. FIRE STOPPING MATERIAL SHALL BE U.L. LISTED.
4. THE CONTRACTOR SHALL OBTAIN APPROVAL FROM THE GENERAL CONTRACTOR QUALITY CONTROL REPRESENTATIVE PRIOR TO MAKING ANY PENETRATIONS THROUGH STRUCTURAL MEMBERS.
5. SHOULD PROJECT CONDITIONS REQUIRE REARRANGEMENT OF WORK, THE CONTRACTOR SHALL MARK SUCH CHANGES ON THE AS-BUILT DRAWINGS. IF THESE CHANGES REQUIRE ALTERNATE METHODS TO THOSE SPECIFIED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL SUBMIT DRAWINGS SHOWING THE PROPOSED ALTERNATE METHODS TO THE GENERAL CONTRACTOR. THE CONTRACTOR SHALL NOT PROCEED UNTIL APPROVAL IS OBTAINED. REARRANGEMENT OF WORK FOR THE PURPOSE OF COORDINATION SHALL NOT BE CONSIDERED AN ITEM FOR EXTRA COST.
6. REPAIR ANY DAMAGE TO EXISTING CONSTRUCTION RESULTING FROM THE INSTALLATION OF ELECTRICAL ITEMS. THE AREAS REPAIRED SHALL MATCH THE ADJACENT SURFACES IN TEXTURE AND COLOR.
7. ALL EXPOSED AND CONCEALED CONDUITS SHALL BE EMT (ELECTRICAL METALLIC TUBING). ALL UNDERGROUND CONDUIT SHALL BE PVC CONDUIT SCHEDULE 40, UNLESS NOTED OTHERWISE. USE FLEXIBLE METAL CONDUIT AND SEAL-TIGHT WHERE APPLICABLE.
8. ALL EQUIPMENT SHALL BE CAPABLE OF FITTING IN THE SPACES LOCATED WHILE MEETING THE MANUFACTURER'S RECOMMENDED ACCESS REQUIREMENTS. REVIEW ALL PLACES WHERE EQUIPMENT IS TO BE INSTALLED PRIOR TO ORDERING OF EQUIPMENT AND NOTIFY THE GENERAL CONTRACTOR OF ANY INADEQUATE CLEARANCES OR CONDITIONS THAT WILL PREVENT THE PROPER INSTALLATION, MAINTENANCE, AND OPERATIONS OF THE EQUIPMENT.
9. PROVIDE ACCESS PANELS TO ALL CONCEALED TRANSFORMERS, DEVICES, JUNCTION BOXES AND EQUIPMENT. COORDINATE THE LOCATION OF ACCESS PANELS TO INSURE THAT THE EQUIPMENT CAN BE MAINTAINED ADEQUATELY.
10. ALL EQUIPMENT AND CABLE SHALL BE PROPERLY RATED FOR THE CONDITIONS IN WHICH IT IS INSTALLED.
11. ALL 120VAC CIRCUIT BREAKERS SERVING FIRE ALARM EQUIPMENT SHALL BE RED AND LOCKABLE. CAMPUS STANDARD IS SPACE AGE ELOCK-FA.
12. ANY PENETRATION OF THE BUILDING VAPOR BARRIER SYSTEM SHALL BE APPROPRIATELY SEALED TO RETAIN THE INTEGRITY OF THE SYSTEM. THIS INCLUDES BUT IS NOT LIMITED TO CONDUITS AND BACKS OF ELECTRICAL BOXES.

SCOPE OF WORK

THE EXISTING NOTIFIER SYSTEM WILL BE REMOVED AND REPLACED WITH A NEW EST4 SYSTEM. THE NEW SYSTEM WILL BE INSTALLED IN ITS ENTIRETY BEFORE DEMO OF EXISTING SYSTEM (SEE PHASE PLAN THIS SHEET).

THIS BUILDING IS A GROUP 'B' OCCUPANCY AND WILL FOLLOW IBC 907.2.2

1. A MANUAL ALARM SYSTEM SHALL BE PROVIDED IN ACCORDANCE WITH IBC 907.2.2
2. THE BUILDING WILL BE FULLY SPRINKLERED AND WILL NOT TAKE THE EXCEPTION TO ELIMINATE MANUAL STATIONS. MANUAL STATIONS WILL BE PROVIDED AT ALL EXITS ACCORDING TO IFC.
3. NEW OCCUPANT NOTIFICATION WILL BE PROVIDED THROUGHOUT VIA VOICE EVACUATION WITH ZONE PAGING.
4. AUXILIARY SYSTEMS INCLUDE ELEVATOR RECALL, CHILLER FAN SHUTDOWN, SPRINKLER SYSTEM MONITORING.
5. DMP CELLULAR COMMUNICATOR WILL BE PROVIDED BY MSU FOR THE NEW SYSTEM.
6. REMOVE ALL RACEWAY, WIRING AND COMPONENTS.
7. SAVE ALL EQUIPMENT AND RETURN TO MSU FIRE TECH SHOP.

ACRONYMS/ABBREVIATIONS:

1.	AFF	ABOVE FINISHED FLOOR
2.	AC	ALTERNATING CURRENT
3.	AWG	AMERICAN WIRE GAGE
4.	BFC	BELOW FINISHED CEILING
5.	CD	CANDELA
6.	CKT	CIRCUIT BREAKER
7.	C	CONDUIT
8.	DB	DECIBEL
9.	DED	DEDICATED
10.	DC	DIRECT CURRENT
11.	EMT	ELECTRICAL METALLIC TUBING
12.	EOL	END OF LINE RESISTOR
13.	EOLR	END OF LINE RELAY
14.	EX	EXISTING
15.	XP	EXPLOSION PROOF
16.	FA	FIRE ALARM
17.	FPL	FIRE ALARM POWER LIMITED
18.	HVAC	HEATING VENTILATING AIR CONDITIONING
19.	HZ	HERTZ
20.	IAW	IN ACCORDANCE WITH
21.	IDC	INITIATING DEVICE CIRCUIT
22.	LV	LOW VOLTAGE
23.	NAC	NOTIFICATION APPLIANCE CIRCUIT
24.	NEMA	NATIONAL ELECTRICAL MANUFACTURER ASSOC.
25.	NEC	NATIONAL ELECTRIC CODE
26.	NIC	NOT IN CONTRACT
27.	NTS	NOT TO SCALE
28.	RGS	RIGID GALVANIZED STEEL CONDUIT
29.	SLC	SIGNALING LINE CIRCUIT
30.	SPDT	SINGLE THROW DOUBLE THROW
31.	SPST	SINGLE THROW SINGLE THROW
32.	TSP	TWISTED SHIELDED PAIR
33.	UTP	UNSHIELDED TWISTED PAIR
34.	UL	UNDERWRITERS LABORATORIES
35.	V	VOLT
36.	WP	WEATHERPROOF
37.	W/	WITH
38.	W/O	WITHOUT

SHEET INDEX

SHEET	DESCRIPTION
FA001	FIRE ALARM GENERAL NOTES & LEGENDS
FA002	FIRE ALARM DEVICE LEGEND
FA100	FIRE ALARM PLAN
FA500	FIRE ALARM FACU WIRING DETAILS
FA501	FIRE ALARM WIRING DETAILS
FA502	FIRE ALARM DEVICE WIRING DETAILS
FA600	FIRE ALARM RISER DIAGRAM
FA700	FIRE ALARM CALCS (NAC LOAD/LOSS)
FA701	FIRE ALARM CALCS (BATTERY)

SYSTEM OUTPUTS / SYSTEM INPUTS

				ANNUNCIATION				NOTIFICATION				CONTROL				OFF-SITE TRANSMITTED SIGNALS			
				DISPLAY EVENT SPECIFIC INFORMATION ON LCD DISPLAY INCLUDING BUT LIMITED TO DEVICE ADDRESS AND DESCRIPTION	ALARM NOTIFICAITON AT PANEL VIA AUDIBLE AND VISUAL MEANS	SUPERVISORY NOTIFICATION AT PANEL VIA AUDIBLE AND VISUAL MEANS	TROUBLE NOTIFICATION AT PANEL VIA AUDIBLE AND VISUAL MEANS	ACTIVATE INTERIOR FIRE ALARM AUDIBLE SPEAKER APPLIANCES THROUGHOUT FACILITY	ACTIVATE INTERIOR FIRE ALARM VISUAL STROBE APPLIANCES THROUGHOUT FACILITY	INITIATE PRE-RECORDED FIRE EVACUATION ALARM MESSAGE	ACTIVATE FIRE SPRINKLER EXTERIOR HORN STROBE (EXISTING APPLIANCE)	ALTERNATE LEVEL ELEVATOR RECALL (BASEMENT) *	DESIGNATED LEVEL ELEVATOR RECALL (FIRST FLOOR) *	ELEVATOR WARNING SIGNAL (FIRE HAT) *	ELEVATOR SHUNT TRIP	GENERAL ALARM	SPRINKLER ALARM	GENERAL SUPERVISORY	GENERAL TROUBLE
				A.1	A.2	A.3	A.4	B.1	B.2	B.3	B.4	C.1	C.2	C.3	C.4	D.1	D.2	D.3	D.4
FIRE ALARM SYSTEM INPUTS	INITIATING DEVICES	MANUAL PULL STATION	1.1	X	X			X	X	X						X			
		SMOKE DETECTOR EQUIPMENT PROTECTION	1.2	X	X			X	X	X						X			
		SMOKE DETECTOR (DESIGNATED LEVEL ELEVATOR LOBBY) *	1.3	X	X			X	X	X		X				X			
		SMOKE DETECTOR (NON-DESIGNATED LEVEL ELEVATOR LOBBY) *	1.4	X	X			X	X	X			X			X			
		SMOKE DETECTOR (ELEVATOR MACHINE ROOM) *	1.5	X	X			X	X	X			X	X		X			
		HEAT DETECTION (ELEVATOR MACHINE ROOM, SHAFT)	1.6	X	X			X	X	X					X	X			
		OTHER	1.7																
	FIRE SPRINK	WATERFLOW SWITCH	2.1	X	X			X	X	X	X						X		
		VALVE TAMPER	2.2	X		X												X	
	CONTROL EQUIP	LOW BATTERY VOLTAGE	3.1	X			X												X
		GROUND FAULT / OPEN / SHORT CIRCUIT	3.2	X			X												X
		AC POWER LOSS	3.3	X			X												X
		FIRE DRILL	3.4	X				X	X	X									X

* NOTE: MAINTAIN EXISTING ELEVATOR RECALL SEQUENCES AS CURRENTLY PROVIDED.
FIELD VERIFY EXISTING NOTIFIER PROGRAM AND IMPLEMENT INTO NEW SYSTEM SEQUENCE.
PROVIDE SHUNT TRIP FUNCTIONS. REDLINE ACCORDINGLY.

CABLE AND WIRE LEGEND

LABEL	PART NO	DESCRIPTION	TOTAL LENGTH
485	18/2 FPL	2 COND. SOLID COPPER FPL ANALOG UNSHIELDED	54'
A	18/2 FPL	2 COND. SOLID COPPER FPL LOW CAP ADDRESSABLE	844'
P	14/2 FPL OR (2) #14 THHN	2 COND. SOLID COPPER FPL UNSHIELDED	51'
S	14/2 FPL	2 COND. SOLID COPPER FPL ANALOG SPEAKER	3306'
V	14/2 FPL OR (2) #14 THHN	2 COND. SOLID COPPER FPL ANALOG UNSHIELDED	3287'
Z	18/2 FPL	2 COND. SOLID COPPER FPL ANALOG UNSHIELDED	42'

MONTANA STATE UNIVERSITY

MSU-CPDC
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

100% CONSTRUCTION DOCUMENTS - FOR BID/CONSTRUCTION

Molecular Bioscience Building Phase 2

MSU

APEX FIRE ALARM DESIGN, LLC

DRAWN BY: BSM		
REVIEWED BY: BSM		
REV.	DESCRIPTION	DATE

NICET
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp Aug 1, 2026

PPA# 22-0045
A/E# 00-00-00
APEX# 25035

SHEET TITLE
FIRE ALARM COVER SHEET

SHEET
FA001

DATE
05/28/2026

PANEL LEGEND

SYMBOL	QUANTITY	IS EXISTING	MANUFACTURER	PART NO	DESCRIPTION	SIZE	MOUNTING	TRIM	BOX
FACU	1		EDWARDS	EST4 VOICE PANEL	FACP VOICE PANEL	37.75"H X 27.34"W X 3.86"D	72" AFF TO THE TOP OF THE CABINET. NO CONDUIT PENETRATION IN BOTTOM.	4-CAB24D	3-CAB14B
	1		EDWARDS	4-CPU	MAIN CPU		LEFT 3 LRM SPACES ON 3-CHAS7		
	1		EDWARDS	4-LCDLE	DISPLAY MAIN LCD MODULE		ON 4-CPU @ INNER DOOR		
	1		EDWARDS	4-MIC	PAGING MICROPHONE		2 LRM SPACES ON 3-CHAS7		
	1		EDWARDS	4-AUDTELS	AUDIO IO AND TELEPHONE RISER MODULE		LRM SPACE ON 3-CHAS7		
	2		EDWARDS	4-PPS/M	PRIMARY POWER SUPPLY 120V		3-CHAS7		
	1		EDWARDS	3-MODCOM	MODEM COMMUNICATOR AND DIALER		LRM SPACE ON 3-CHAS7		
	1		EDWARDS	4-SDDC	SIGNATURE DUAL DRIVER CONTROLLER		LRM SPACE ON 3-CHAS7		
	1		EDWARDS	3-ZA20A	20 WATT ZONED AMPLIFIER, CLASS B, 70VRMS		LRM SPACE ON 3-CHAS7		
	2		EDWARDS	3-ZA40A	40 WATT ZONED AMPLIFIER, CLASS B, 70VRMS		LRM SPACE ON 3-CHAS7		
	1		EDWARDS	3-CAB14B	BACK BOX /W 14 LRM SPACE W/O DOOR		N/A		
	1		EDWARDS	4-CAB24D	DOOR ASSEMBLY, BRONZE		3-CAB14B		
	1		EDWARDS	4-24L24S	24 INDICATOR 24 CONTROL DISPLAY MODULE		INNER DOOR		
	2		EDWARDS	3-CHAS7	CHASSIS ASS'Y FOR 7 LRMS		3-CAB14B		
	1		EDWARDS	4-NET-TP	TWISTED PAIR SFP NETWORK CONTROLLER		ON 4-CPU		
	1		EDWARDS	BC-1	BATTERY BOX FOR 40AH BATTERIES		BELOW OR ADJACENT TO FACU		
FAA	1		EDWARDS	4-6ANN	METALLIC BRONZE ANNUNCIATOR	13.2"H X 18.75"W X 2.2"D	66" AFF TO THE TOP OF THE CABINET. NO CONDUIT PENETRATION IN BOTTOM.	4-6ANN DOOR	4-6ANNMT
	1		EDWARDS	4-LCDANN	COLOR LCD		IN 4-6ANN		
	1		EDWARDS	4-ANNCPU	ANNUNCIATOR CENTRAL PROCESSOR UNIT		IN 4-6ANNMT		
	1		EDWARDS	4-6ANNMT	WALLBOX, SURFACE/FLUSH MOUNTING		N/A		
	1		EDWARDS	4-6ANN SERIES	DOOR ASSEMBLY FOR 4-6ANNMT, BRONZE		ON 4-6ANNMT		
	1		EDWARDS	4-NET-TP	TWISTED PAIR SFP NETWORK CONTROLLER		ON 4-ANNCPU		
NAC	1		EDWARDS	BPS10A	REMOTE BOOSTER POWER SUPPLY, 10A, 120VAC, RED	17"H X 13"W X 3.375"D	72" AFF TO THE TOP OF THE CABINET. NO CONDUIT PENETRATION IN BOTTOM.	N/A	INCLUDED
CELL	1		DMP	DUALCOMNF-LA (24V)	UNIVERSAL FIRE ALARM COMMUNICATOR LTE-AT&T / VERIZON	4.5"W X 2.75"H X 1.75"D	PROVIDED BY MSU. SURFACE MOUNT ADJACENT TO FACU	N/A	INCLUDED
DOC	1		SPACE AGE ELECTRONICS	SSU00689	FIRE ALARM DOCUMENT CABINET W/8GB USB DRIVE (ACE-11), RED WITH CUSTOM LOGO	13.16"H X 12"W X 2.35"D	SURFACE MOUNT ADJACENT TO FACU	N/A	N/A
F	8		EDWARDS	SIGA-278	DOUBLE ACTION FIRE ALARM STATION	6"H X 3.5"W X 1"D	48" TO THE TOP OF THE HANDLE; PULL STATION WITHIN 5' OF THE EXIT	N/A	SINGLE GANG CUT-IN, 276B-RSB SURFACE MOUNT BOX RED
AM	1		EDWARDS	SIGA-CT1	INPUT MODULE	2.5"H X 2"W X 1"D	MOUNT WITHIN BPS CABINET (TROUBLE MONITOR)	SIGA-MP2	N/A
AM D	2		EDWARDS	SIGA-CT2	DUAL INPUT MODULE	2.5"H X 2"W X 1"D	MOUNT WITHIN 3' OF THE DEVICE BEING MONITORED	SIGA-MP2	4" SQUARE BACK BOX - 2-1/8" DEEP, 1-GANG RING
AM CRH	3		EDWARDS	SIGA-CRH	CONTROL RELAY MODULE (HIGH CURRENT)	4"L x 4"W x 1"D	MOUNT WITHIN 3' OF THE DEVICE BEING CONTROLLED	N/A	4" SQUARE BACK BOX - 2-1/8" DEEP
AM CC1S	1		EDWARDS	SIGA-CC1S	SIGNATURE SINGLE INPUT SIGNAL SYNCHRONIZATION MODULE	2.5"H X 4"W X 1"D	MOUNT WITHIN BPS CABINET (SYNC TRIGGER)	SIGA-MP1	N/A
H	3		EDWARDS	SIGA-HRD W/SIGA-SB4 BASE	INTELLIGENT FIXED TEMPERATURE /RATE-OF-RISE HEAT DETECTOR	6"Ø X 2.5"D	WITHIN 24" OF SPRINKLER HEAD.	SIGA-SB4	4" SQUARE BACK BOX, 1-1/2" DEEP
S	5		EDWARDS	SIGA-OSD W/SIGA-SB4 BASE	INTELLIGENT OPTICAL SMOKE DETECTOR W/ STANDARD BASE	6"Ø X 2.5"D	36" OR GREATER AWAY FROM VENTS OR FLUORESCENT LIGHTS.	SIGA-SB4	4" SQUARE BACK BOX, 1-1/2" DEEP
MFC	1		EDWARDS	MFC-A (ELEV RECALL)	MULTI-FUNCTION CABINET W/ UIO6 AND (4) MCR, (1) MCT2	8"H X 14"W X 3.5"D	SURFACE MOUNT. 48" AFF TO TOP OF BOX. SEE FIRE ALARM PLANS	SIGA-UIO6R	INCLUDED
	1		EDWARDS	SIGA-UIO6	6 POSITION, UIO MB		MOUNTS IN MFC-A		
	4		EDWARDS	SIGA-MCR	CONTROL RELAY MODULE - UIO MOUNT		ON SIGA-UIO6R		
	1		EDWARDS	SIGA-MCT2	DUAL INPUT MODULE - UIO MOUNT		ON SIGA-UIO6R		
MFC	1		EDWARDS	MFC-A (SPEAKER)	MULTI-FUNCTION CABINET W/ UIO6 AND (2) MCC1	8"H X 14"W X 3.5"D	SURFACE MOUNT. 48" AFF TO TOP OF BOX. SEE FIRE ALARM PLANS	SIGA-UIO6R	INCLUDED
	1		EDWARDS	SIGA-UIO6	6 POSITION, UIO MB		MOUNTS IN MFC-A		
	2		EDWARDS	SIGA-MCC1	CONTROL RELAY MODULE - UIO MOUNT		ON SIGA-UIO6R		
SW	6		EDWARDS	G4SVWA	SPEAKER/STROBE, WALL, WHITE, ALERT	5.78"H X 4.95"W X 1.62"D	80" TO THE BOTTOM OF THE BACK BOX	GRSW-10	4" SQUARE BACKBOX - 2-1/8" DEEP (FLUSH) OR G4WSB (SURFACE)
SC	100		EDWARDS	GCSVWA	SPEAKER/STROBE, CEILING, WHITE, ALERT	6.8"Ø X 1.82"D	CEILING	GCTW, GRSW-10	4" SQUARE BACKBOX - 2-1/8" DEEP
S	28		EDWARDS	GCSWA	SPEAKER, CEILING, WHITE, ALERT	6.8"Ø X 1.82"D	CEILING	GCTW, GRSW-10	4" SQUARE BACKBOX - 2-1/8" DEEP
	10		EDWARDS	GCVWN W/ GCVWA-CVR	STROBE, CEILING, WHITE, ALERT COVER	6.8"Ø X 1.82"D	CEILING	GCTW, GP-10 & GCVWA-CVR	4" SQUARE BACKBOX - 2-1/8" DEEP
SW WP	1	X	SYSTEM SENSOR	P2RHK-120	OUTDOOR RATED HORN-STROBE, 120VAC, RED WITH FIRE MARKING, CLEAR LENS	N/A	N/A	N/A	N/A
VS	1	X	GENERIC	N/A	VALVE TAMPER SUPERVISORY SWITCH	N/A	EXISTING SWITCH	N/A	N/A
WF	1	X	GENERIC	N/A	WATERFLOW SWITCH	N/A	EXISTING SWITCH	N/A	N/A
BF	2	X	GENERIC	N/A	BACKFLOW VALVE	N/A	EXISTING SWITCH	N/A	N/A
JB	N/A		GENERIC	N/A	JUNCTION BOX	N/A	SURFACE	N/A	4" SQUARE BACK BOX - 2-1/8" DEEP WITH RED BLANK COVER

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BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

100% CONSTRUCTION DOCUMENTS - FOR BID/CONSTRUCTION

Molecular Bioscience Building
Phase 2

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APEX FIRE ALARM DESIGN, LLC

DRAWN BY: BSM		
REVIEWED BY: BSM		
REV.	DESCRIPTION	DATE

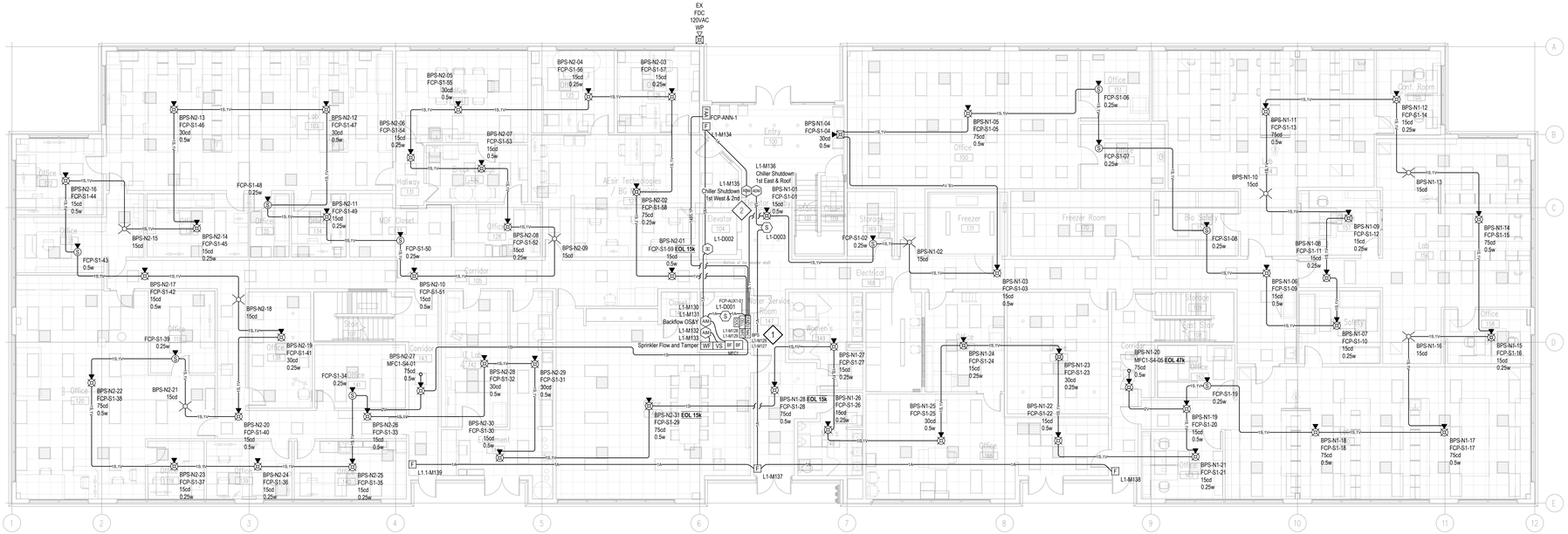
NICET
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp. Aug 1, 2026

PPA# 22-0045
A/E# 00-00-00
APEX# 25035

SHEET TITLE
FIRE ALARM DEVICE LEGEND

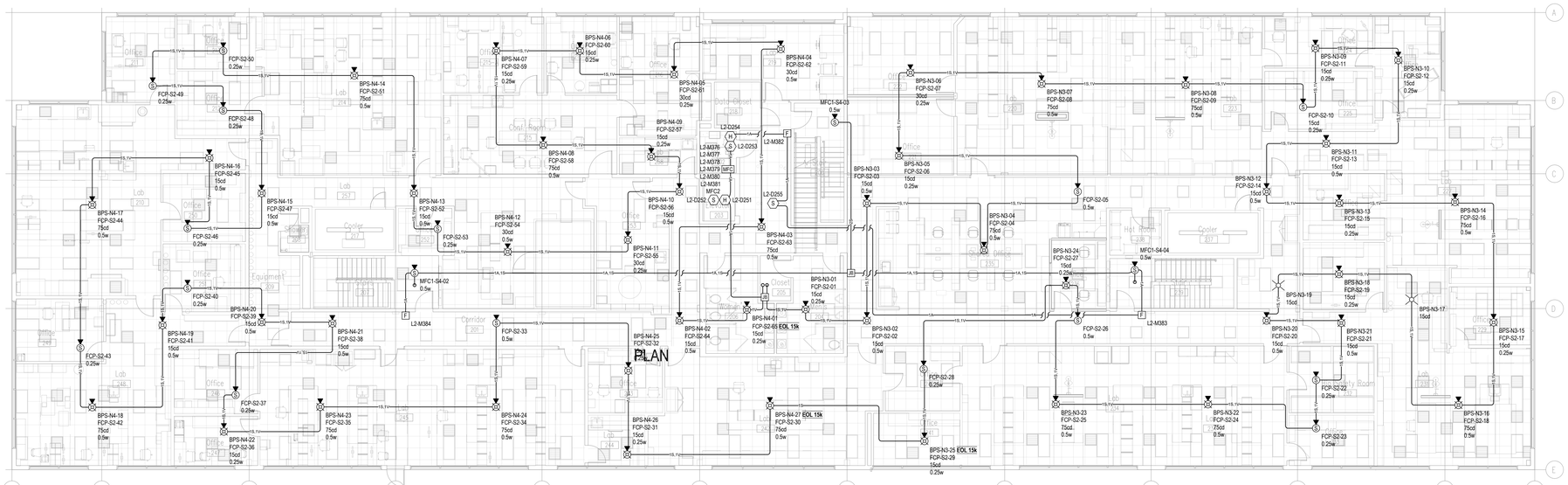
SHEET
FA002

DATE
05/28/2026



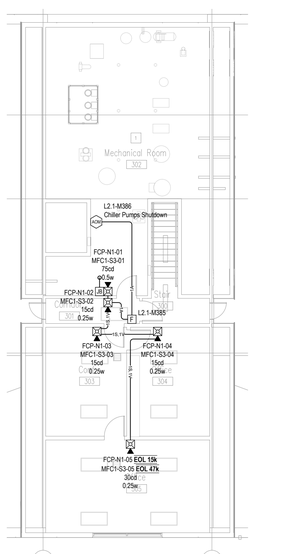
A FA001 LEVEL 1 - FIRE ALARM PLAN

3/32" = 1'-0"



B FA001 LEVEL 2 - FIRE ALARM PLAN

3/32" = 1'-0"



C FA001 LEVEL 3 - FA PLAN

3/32" = 1'-0"

0 2 4 6 8 16 24 32

3/32"=1'-0"

FIRE ALARM SHEET NOTES:

1. THE EXISTING NOTIFIER SYSTEM, INCLUDING ALL DEVICES (WHETHER SHOWN OR NOT) WILL BE REMOVED AND REPLACED WITH A NEW EST4 SYSTEM. THE NEW SYSTEM WILL BE INSTALLED IN ITS ENTIRETY BEFORE DEMO OF EXISTING SYSTEM (SEE PHASE PLAN ON COVER SHEET).

KEY NOTES:

1. SEE DETAILS 9 & 10 OF FA502. RELOCATE SPRINKLER CLOCK AS SHOWN. REMOVE AND RELOCATE SPRINKLER HEAD BOX AND SDS FILE FOLDER TO ANOTHER LOCATION IN THE WATER SERVICE ROOM.
2. EXTEND 120VAC FROM EXISTING FACU TO NEW FACU LOCATION IN WATER SERVICE ROOM 147.

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BOZEMAN, MONTANA
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FAX: 406.994.5665

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Molecular Bioscience Building Phase 2

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APEX FIRE ALARM DESIGN, LLC

DRAWN BY:	BSM	
REVIEWED BY:	BSM	
REV.	DESCRIPTION	DATE

NICET
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp Aug 1, 2026

PPA# 22-0045

A/E# 00-00-00

APEX# 25035

SHEET TITLE

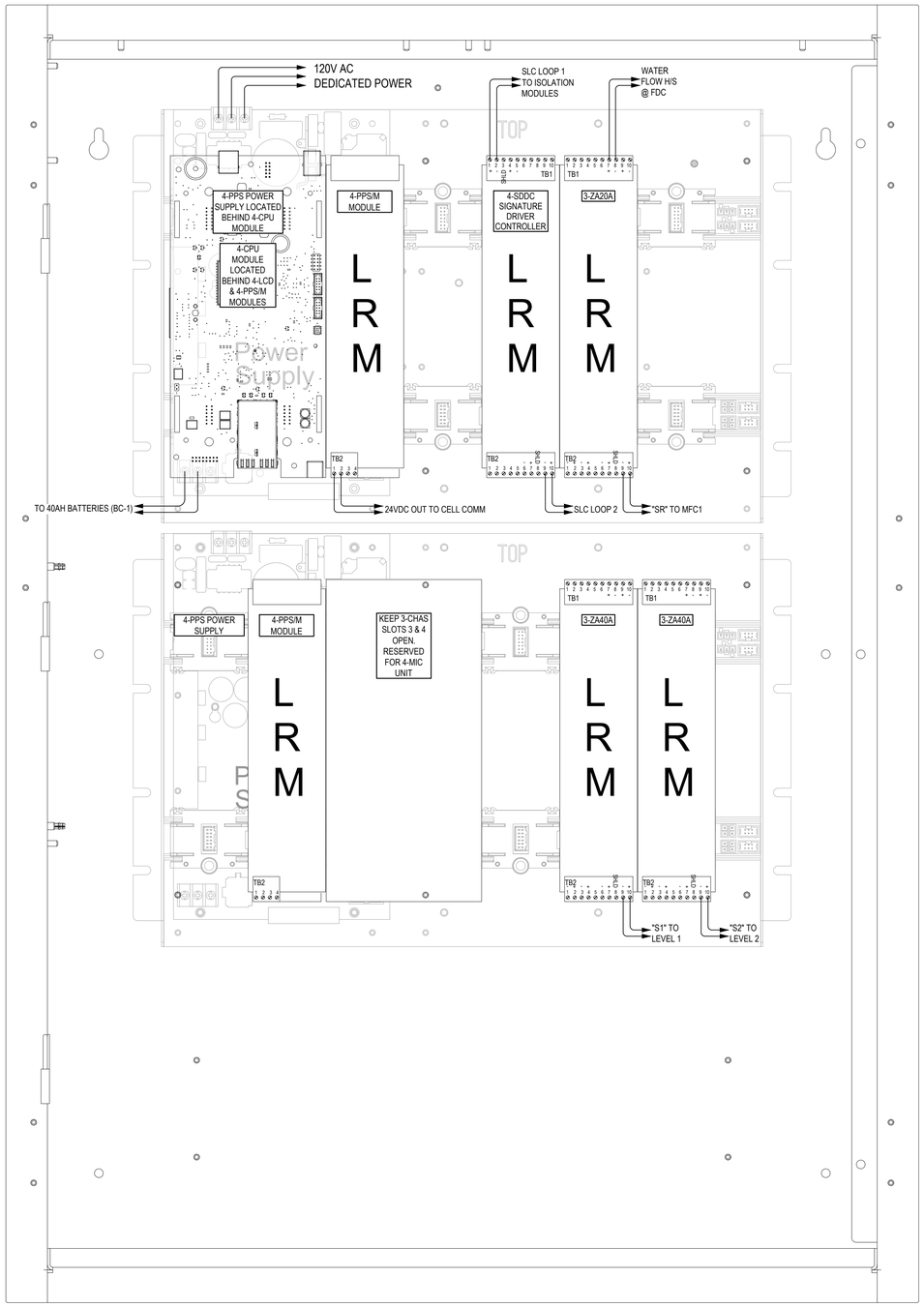
FIRE ALARM PLAN

SHEET

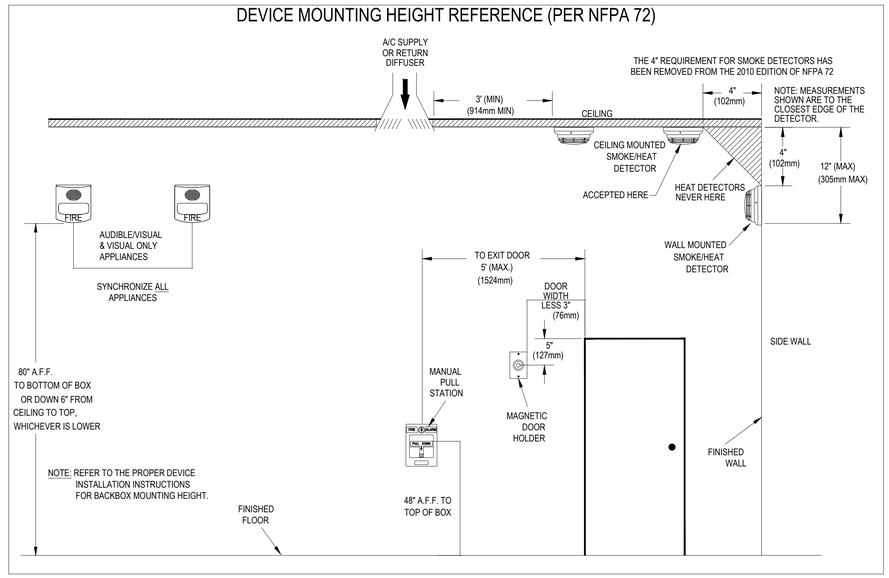
FA100

DATE

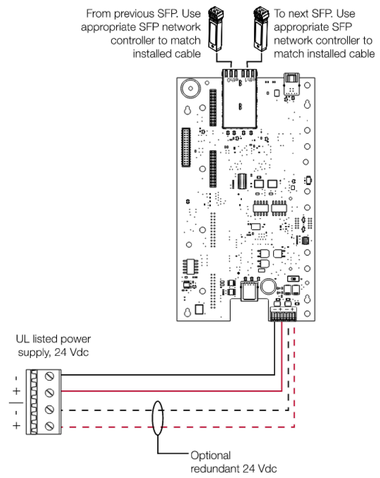
05/28/2026



1 FA500 FACU - EST4 (3CAB14B)
N.T.S



2 FA500 TYPICAL DEVICE MOUNTING HEIGHTS
N.T.S



3 FA500 FAA - 4-4ANN ANNUNCIATOR
N.T.S

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FAX: 406.994.5665

APEX FIRE ALARM DESIGN, LLC

DRAWN BY: BSM		
REVIEWED BY: BSM		
REV.	DESCRIPTION	DATE

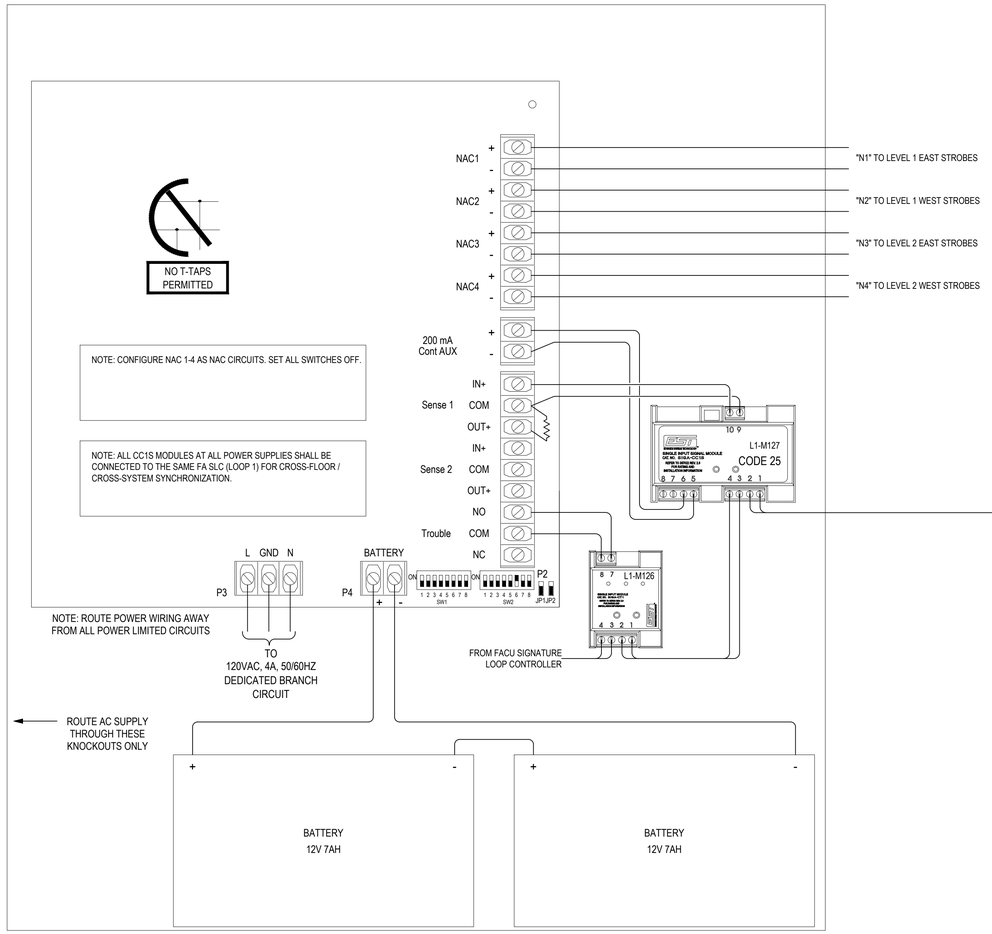
NICET V
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp Aug 1, 2026

PPA# 22-0045
A/E# 00-00-00
APEX# 25035

SHEET TITLE
FIRE ALARM FACU DETAILS

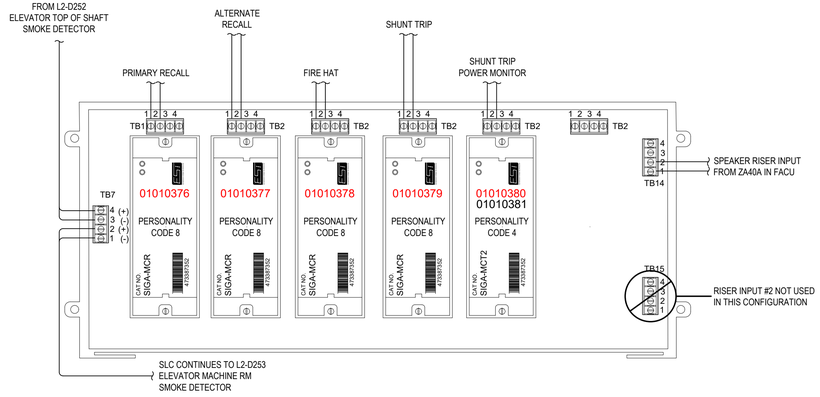
SHEET
FA500

DATE
05/28/2026



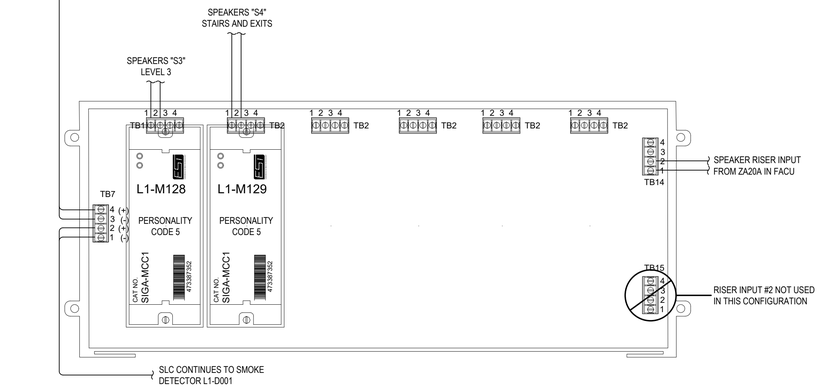
1 FA501 BPS1 - BPS10A WIRING AND DIP SWITCH CONFIGURATION

N.T.S



2 FA501 MFC2 - ELEVATOR CAR CONTROLLER (MFC-A W/UIO6)

N.T.S



3 FA501 MFC1 - MFC-A SPEAKER CIRCUIT SIGNAL CONTROLS (MFC-A W/UIO6 & MCC1's)

N.T.S

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PHONE: 406.994.5413
FAX: 406.994.5665

APEX FIRE ALARM DESIGN, LLC

DRAWN BY: BSM		
REVIEWED BY: BSM		
REV.	DESCRIPTION	DATE

NICET Bryan Moss FIRE ALARM SYSTEMS LEVEL IV 110772 Exp Aug 1, 2026

PPA# 22-0045

A/E# 00-00-00

APEX# 25035

SHEET TITLE

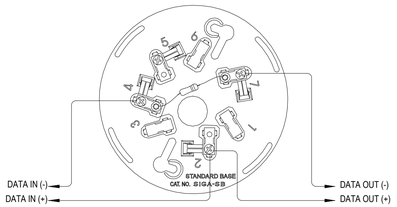
FIRE ALARM WIRING DETAILS

SHEET

FA501

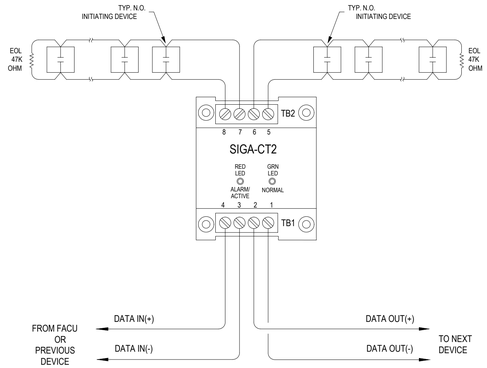
DATE

05/28/2026



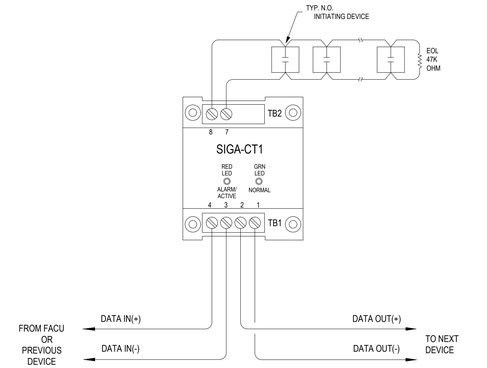
1 FA502 SIGA DETECTOR - SIGA-OSD/HRD W/ SIGA-SB4

N.T.S.



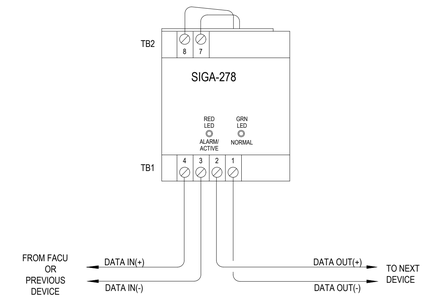
2 FA502 DUAL INPUT MODULE - SIGA-CT2

N.T.S.



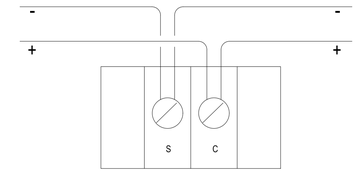
3 FA502 SINGLE INPUT MODULE - SIGA-CT1

N.T.S.



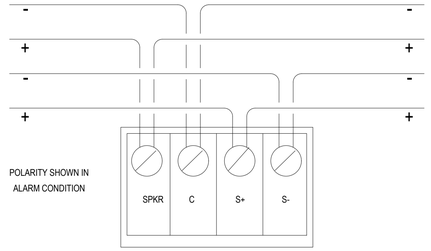
4 FA502 MANUAL STATION - SIGA-278

N.T.S.



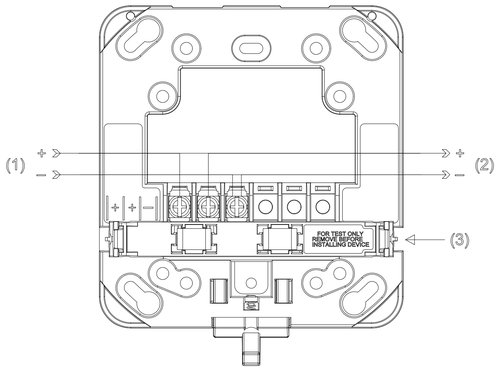
5 FA502 SPEAKER ONLY EST G4SWA/GCSWA

N.T.S



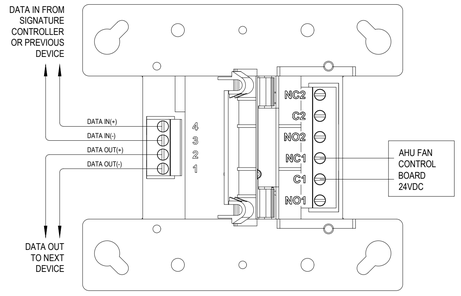
6 FA502 SPEAKER/STROBE G4SVWA/GCSVWA

N.T.S



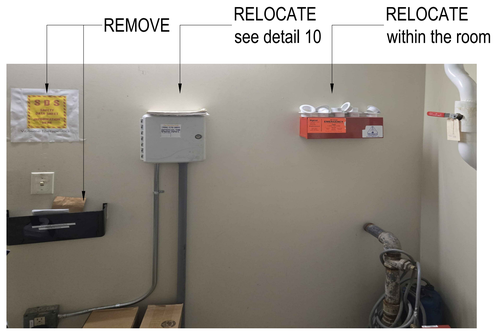
7 FA502 STROBES - G4 SERIES NOTIFICATION

N.T.S.



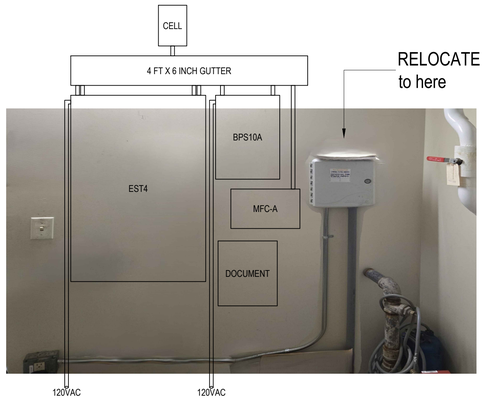
8 FA502 RELAY MODULE - SIGA-CRH (FAN CONTROL)

N.T.S



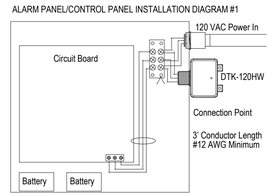
9 FA502 WATER SERVICE ROOM 147 - EAST WALL - EXISTING

N.T.S



10 FA502 WATER SERVICE ROOM 147 - EAST WALL - NEW WORK

N.T.S



11 FA502 SURGE SUPPRESSOR DTK-HW

N.T.S.

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BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

APEX FIRE ALARM DESIGN, LLC

DRAWN BY: BSM		
REVIEWED BY: BSM		
REV.	DESCRIPTION	DATE

NICET V
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110177 Exp Aug 1, 2026

PPA# 22-0045

A/E# 00-00-00

APEX# 25035

SHEET TITLE

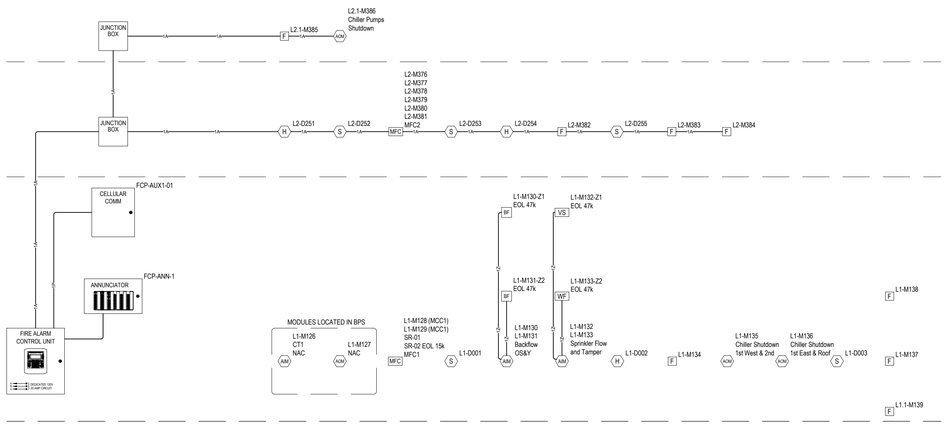
FIRE ALARM DEVICE WIRING DETAILS

SHEET

FA502

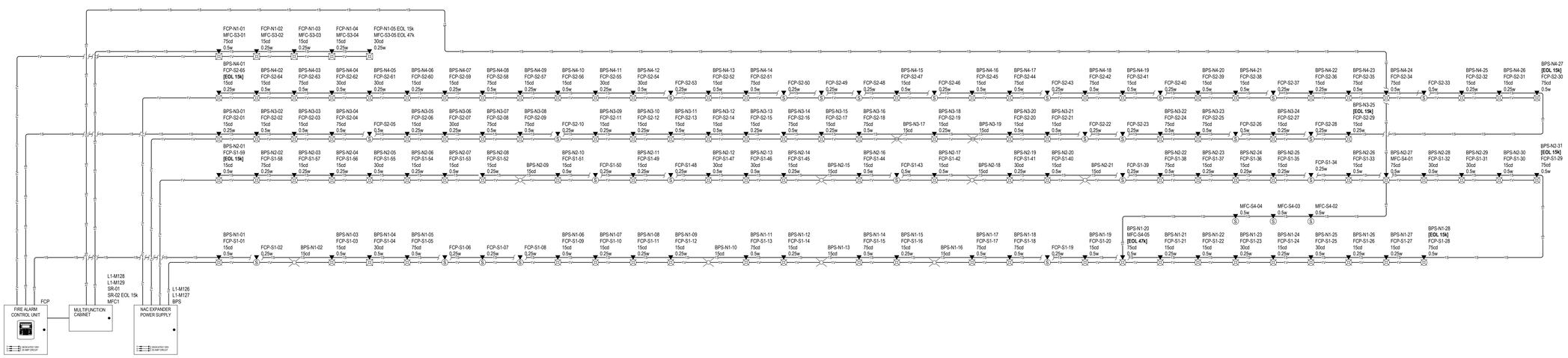
DATE

05/28/2026



1 FA600 FIRE ALARM RISER DIAGRAM - HEADEND AND SLC

N.T.S



2 FA600 FIRE ALARM RISER DIAGRAM - NOTIFICATION

N.T.S

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PHONE: 406.994.5413
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APEX FIRE ALARM DESIGN, LLC

DRAWN BY:	BSM	
REVIEWED BY:	BSM	
REV.	DESCRIPTION	DATE

NICET
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp Aug 1, 2026

PPA# 22-0045

A/E# 00-00-00

APEX# 25035

SHEET TITLE

FIRE ALARM RISER DIAGRAM

SHEET

FA600

DATE

05/28/2026

FCP N1 (ZA-20A) POINT-TO-POINT REPORT

CURRENT SUMMARY					POWER SUMMARY			
MAX. CIRCUIT CURRENT (A):	3.50	TOTAL CIRCUIT CURRENT (A):	0.14		STARTING CALC. VOLTAGE:	20.40	MAX. VOLTAGE DROP:	0.31
		SPARE CIRCUIT CURRENT (A):	3.36				VOLTAGE DROP %:	**1.52 %**
		SPARE CIRCUIT CURRENT %:	**96.00 %**		MIN. OPERATIONAL VOLTAGE:	16	END OF LINE VOLTAGE:	20.09
MAX. CARD CURRENT (A):	3.50	TOTAL CARD CURRENT (A):	0.14		WIRE RESISTANCE (Ω/KFT):	3.07	TOTAL CIRCUIT LENGTH (FT):	386
		SPARE CARD CURRENT (A):	3.36				TOTAL CIRCUIT RESISTANCE (Ω):	2.37
CIRCUIT WIRING PROPERTIES: 'V' 14/2 FPLP/R NAC 14 AWG, 2 COND. SOLID COPPER FPLP/R ANALOG UNSHIELDED		SPARE CARD CURRENT %:	**96.00 %**					
DISTANCE MEASURED USING DRAWN SEGMENT LENGTHS WITH 20.00 % ADDITIONAL LENGTH CALCULATED								

DEVICE LABEL	PART NO	CANDELAS	ALARM CURRENT (A)	REMAINING ALARM CURRENT (A)	DISTANCE FROM PREVIOUS	RESISTANCE FROM PREVIOUS (Ω)	VOLTAGE DROP FROM PREVIOUS	VOLTAGE AT DEVICE	TOTAL VOLTAGE DROP	VOLTAGE DROP PERCENT
FCP-N1-01	G4SVWA	75CD	0.028	0.14	350	2.15	0.3	20.10	0.3	1.47 %
FCP-N1-02	G4SVWA	15CD	0.028	0.112	0	0.002917	0	20.10	0.3	1.48 %
FCP-N1-03	G4SVWA	15CD	0.028	0.084	4	0.024605	0	20.10	0.3	1.49 %
FCP-N1-04	G4SVWA	15CD	0.028	0.056	9	0.057471	0	20.09	0.31	1.50 %
FCP-N1-05 EOL 15K	G4SVWA	30CD	0.028	0.028	22	0.137313	0	20.09	0.31	1.52 %
CALCULATION METHODS:										
RESISTANCE FROM PREVIOUS (Ω) = WIRE RESISTANCE (Ω/FT) X 2 X DIST. FROM PREVIOUS (FT)										
VOLTAGE DROP FROM PREVIOUS = RESISTANCE FROM PREVIOUS (Ω) X REMAINING CURRENT (A)										

BPS N1 POINT-TO-POINT REPORT

CURRENT SUMMARY					POWER SUMMARY			
MAX. CIRCUIT CURRENT (A):	3	TOTAL CIRCUIT CURRENT (A):	0.9730		STARTING CALC. VOLTAGE:	19.70	MAX. VOLTAGE DROP:	2.51
		SPARE CIRCUIT CURRENT (A):	2.03				VOLTAGE DROP %:	**12.72 %**
		SPARE CIRCUIT CURRENT %:	**67.57 %**		MIN. OPERATIONAL VOLTAGE:	16	END OF LINE VOLTAGE:	17.19
MAX. CARD CURRENT (A):	10	TOTAL CARD CURRENT (A):	3.88		WIRE RESISTANCE (Ω/KFT):	3.07	TOTAL CIRCUIT LENGTH (FT):	720
		SPARE CARD CURRENT (A):	6.117				TOTAL CIRCUIT RESISTANCE (Ω):	4.42
CIRCUIT WIRING PROPERTIES: 'V' 14/2 FPLP/R NAC 14 AWG, 2 COND. SOLID COPPER FPLP/R ANALOG UNSHIELDED								
DISTANCE MEASURED USING DRAWN SEGMENT LENGTHS WITH 20.00 % ADDITIONAL LENGTH CALCULATED		SPARE CARD CURRENT %:	**61.17 %**					

DEVICE LABEL	PART NO	CANDELAS	ALARM CURRENT (A)	REMAINING ALARM CURRENT (A)	DISTANCE FROM PREVIOUS	RESISTANCE FROM PREVIOUS (Ω)	VOLTAGE DROP FROM PREVIOUS	VOLTAGE AT DEVICE	TOTAL VOLTAGE DROP	VOLTAGE DROP PERCENT
BPS-N1-01	GCSVWA	15CD	0.035	0.9730	23	0.142225	0.14	19.56	0.14	0.70 %
BPS-N1-02	GCVWN	15CD	0.035	0.9380	39	0.241883	0.23	19.33	0.37	1.85 %
BPS-N1-03	GCSVWA	15CD	0.035	0.9030	23	0.140668	0.13	19.21	0.49	2.50 %
BPS-N1-04	G4SVWA	30CD	0.028	0.8680	57	0.35006	0.3	18.90	0.80	4.04 %
BPS-N1-05	GCSVWA	75CD	0.035	0.840	28	0.173233	0.15	18.76	0.940	4.78 %
BPS-N1-06	GCSVWA	15CD	0.035	0.8050	96	0.588	0.47	18.28	1.42	7.18 %
BPS-N1-07	GCSVWA	15CD	0.035	0.770	23	0.14384	0.11	18.17	1.53	7.75 %
BPS-N1-08	GCSVWA	15CD	0.035	0.7350	9	0.056684	0.04	18.13	1.57	7.96 %
BPS-N1-09	GCSVWA	15CD	0.035	0.70	14	0.086625	0.06	18.07	1.63	8.27 %
BPS-N1-10	GCVWN	15CD	0.035	0.6650	20	0.119823	0.08	17.99	1.71	8.67 %
BPS-N1-11	GCSVWA	15CD	0.035	0.630	16	0.096112	0.06	17.93	1.77	8.98 %
BPS-N1-12	GCSVWA	15CD	0.035	0.5950	27	0.163939	0.1	17.83	1.87	9.47 %
BPS-N1-13	GCVWN	15CD	0.035	0.560	16	0.098695	0.06	17.78	1.92	9.75 %
BPS-N1-14	GCSVWA	75CD	0.035	0.5250	22	0.133089	0.07	17.71	1.99	10.11 %
BPS-N1-15	GCSVWA	15CD	0.035	0.49	24	0.147679	0.07	17.64	2.06	10.48 %
BPS-N1-16	GCVWN	15CD	0.035	0.455	16	0.096788	0.04	17.59	2.11	10.70 %
BPS-N1-17	GCSVWA	75CD	0.035	0.42	25	0.150915	0.06	17.53	2.17	11.02 %
BPS-N1-18	GCSVWA	75CD	0.035	0.385	25	0.152886	0.06	17.47	2.23	11.32 %
BPS-N1-19	GCSVWA	15CD	0.035	0.35	36	0.221961	0.08	17.39	2.31	11.71 %
BPS-N1-20	GCSVWA	75CD	0.035	0.315	15	0.089231	0.03	17.36	2.34	11.86 %
BPS-N1-21	GCSVWA	15CD	0.035	0.28	23	0.144203	0.04	17.32	2.38	12.06 %
BPS-N1-22	GCSVWA	15CD	0.035	0.245	30	0.182311	0.04	17.28	2.42	12.29 %
BPS-N1-23	GCSVWA	30CD	0.035	0.21	15	0.090823	0.02	17.26	2.44	12.38 %
BPS-N1-24	GCSVWA	15CD	0.035	0.175	19	0.118529	0.02	17.24	2.46	12.49 %
BPS-N1-25	GCSVWA	30CD	0.035	0.14	21	0.131929	0.02	17.22	2.48	12.58 %
BPS-N1-26	GCSVWA	15CD	0.035	0.105	24	0.145673	0.02	17.21	2.49	12.66 %
BPS-N1-27	GCSVWA	15CD	0.035	0.07	17	0.101409	0.01	17.20	2.50	12.70 %
BPS-N1-28 EOL 15K	GCSVWA	75CD	0.035	0.035	18	0.113257	0	17.19	2.51	12.72 %
CALCULATION METHODS:										
RESISTANCE FROM PREVIOUS (Ω) = WIRE RESISTANCE (Ω/FT) X 2 X DIST. FROM PREVIOUS (FT)										
VOLTAGE DROP FROM PREVIOUS = RESISTANCE FROM PREVIOUS (Ω) X REMAINING CURRENT (A)										

BPS N2 POINT-TO-POINT REPORT

CURRENT SUMMARY					POWER SUMMARY			
MAX. CIRCUIT CURRENT (A):	3	TOTAL CIRCUIT CURRENT (A):	1.09		STARTING CALC. VOLTAGE:	19.70	MAX. VOLTAGE DROP:	2.41
		SPARE CIRCUIT CURRENT (A):	1.92				VOLTAGE DROP %:	**12.21 %**
		SPARE CIRCUIT CURRENT %:	**63.83 %**		MIN. OPERATIONAL VOLTAGE:	16	END OF LINE VOLTAGE:	17.29
MAX. CARD CURRENT (A):	10	TOTAL CARD CURRENT (A):	3.88		WIRE RESISTANCE (Ω/KFT):	3.07	TOTAL CIRCUIT LENGTH (FT):	714
		SPARE CARD CURRENT (A):	6.117				TOTAL CIRCUIT RESISTANCE (Ω):	4.39
CIRCUIT WIRING PROPERTIES: 'V' 14/2 FPLP/R NAC 14 AWG, 2 COND. SOLID COPPER FPLP/R ANALOG UNSHIELDED								
DISTANCE MEASURED USING DRAWN SEGMENT LENGTHS WITH 20.00 % ADDITIONAL LENGTH CALCULATED		SPARE CARD CURRENT %:	**61.17 %**					

DEVICE LABEL	PART NO	CANDELAS	ALARM CURRENT (A)	REMAINING ALARM CURRENT (A)	DISTANCE FROM PREVIOUS	RESISTANCE FROM PREVIOUS (Ω)	VOLTAGE DROP FROM PREVIOUS	VOLTAGE AT DEVICE	TOTAL VOLTAGE DROP	VOLTAGE DROP PERCENT
BPS-N2-01	GCSVWA	15CD	0.035	1.09	22	0.137767	0.15	19.55	0.15	0.76 %
BPS-N2-02	GCSVWA	75CD	0.035	1.05	23	0.140357	0.15	19.40	0.3	1.51 %
BPS-N2-03	GCSVWA	15CD	0.035	1.02	25	0.15404	0.16	19.25	0.45	2.30 %
BPS-N2-04	GCSVWA	15CD	0.035	0.980	16	0.095707	0.09	19.15	0.550	2.78 %
BPS-N2-05	GCSVWA	30CD	0.035	0.9450	28	0.170043	0.16	18.99	0.710	3.59 %
BPS-N2-06	GCSVWA	15CD	0.035	0.910	17	0.104054	0.09	18.90	0.80	4.07 %
BPS-N2-07	GCSVWA	15CD	0.035	0.8750	15	0.092564	0.08	18.82	0.880	4.48 %
BPS-N2-08	GCSVWA	15CD	0.035	0.840	15	0.090746	0.08	18.74	0.960	4.87 %
BPS-N2-09	GCVWN	15CD	0.035	0.8050	11	0.065258	0.05	18.69	1.01	5.14 %
BPS-N2-10	GCSVWA	15CD	0.035	0.770	35	0.215161	0.17	18.52	1.18	5.98 %
BPS-N2-11	GCSVWA	15CD	0.035	0.7350	27	0.164047	0.12	18.40	1.30	6.59 %
BPS-N2-12	GCSVWA	30CD	0.035	0.70	43	0.263192	0.18	18.22	1.48	7.53 %
BPS-N2-13	GCSVWA	30CD	0.035	0.6650	30	0.182358	0.12	18.10	1.60	8.14 %
BPS-N2-14	GCSVWA	15CD	0.035	0.630	26	0.162185	0.1	17.99	1.71	8.66 %
BPS-N2-15	GCVWN	15CD	0.035	0.5950	14	0.083787	0.05	17.94	1.76	8.91 %
BPS-N2-16	GCSVWA	15CD	0.035	0.560	21	0.126014	0.07	17.87	1.83	9.27 %
BPS-N2-17	GCSVWA	15CD	0.035	0.5250	32	0.199044	0.1	17.77	1.93	9.80 %
BPS-N2-18	GCVWN	15CD	0.035	0.49	23	0.138938	0.07	17.70	2	10.15 %
BPS-N2-19	GCSVWA	30CD	0.035	0.455	14	0.086699	0.04	17.66	2.04	10.35 %
BPS-N2-20	GCSVWA	15CD	0.035	0.42	22	0.137758	0.06	17.60	2.10	10.64 %
BPS-N2-21	GCVWN	15CD	0.035	0.385	12	0.07155	0.03	17.58	2.12	10.78 %
BPS-N2-22	GCSVWA	75CD	0.035	0.35	30	0.18379	0.06	17.51	2.19	11.11 %
BPS-N2-23	GCSVWA	15CD	0.035	0.315	32	0.198811	0.06	17.45	2.25	11.43 %
BPS-N2-24	GCSVWA	15CD	0.035	0.28	16	0.095892	0.03	17.42	2.28	11.56 %
BPS-N2-25	GCSVWA	15CD	0.035	0.245	18	0.109977	0.03	17.40	2.30	11.70 %
BPS-N2-26	GCSVWA	15CD	0.035	0.21	17	0.104527	0.02	17.37	2.33	11.81 %
BPS-N2-27	GCSVWA	75CD	0.035	0.175	13	0.082626	0.01	17.36	2.34	11.88 %
BPS-N2-28	GCSVWA	30CD	0.035	0.14	47	0.286237	0.04	17.32	2.38	12.09 %
BPS-N2-29	GCSVWA	30CD	0.035	0.105	9	0.054417	0.01	17.31	2.39	12.12 %
BPS-N2-30	GCSVWA	15CD	0.035	0.07	24	0.145959	0.01	17.30	2.40	12.17 %
BPS-N2-31 EOL 15K	GCSVWA	75CD	0.035	0.035	40	0.242785	0.01	17.29	2.41	12.21 %
CALCULATION METHODS:										
RESISTANCE FROM PREVIOUS (Ω) = WIRE RESISTANCE (Ω/FT) X 2 X DIST. FROM PREVIOUS (FT)										
VOLTAGE DROP FROM PREVIOUS = RESISTANCE FROM PREVIOUS (Ω) X REMAINING CURRENT (A)										

BPS N3 POINT-TO-POINT REPORT

CURRENT SUMMARY					POWER SUMMARY			
MAX. CIRCUIT CURRENT (A):	3	TOTAL CIRCUIT CURRENT (A):	0.8750		STARTING CALC. VOLTAGE:	19.70	MAX. VOLTAGE DROP:	1.83
		SPARE CIRCUIT CURRENT (A):	2.13				VOLTAGE DROP %:	**9.28 %**
		SPARE CIRCUIT CURRENT %:	**70.83 %**		MIN. OPERATIONAL VOLTAGE:	16	END OF LINE VOLTAGE:	17.87
MAX. CARD CURRENT (A):	10	TOTAL CARD CURRENT (A):	3.88		WIRE RESISTANCE (Ω/KFT):	3.07	TOTAL CIRCUIT LENGTH (FT):	665
		SPARE CARD CURRENT (A):	6.117				TOTAL CIRCUIT RESISTANCE (Ω):	4.08
CIRCUIT WIRING PROPERTIES: 'V' 14/2 FPLP/R NAC 14 AWG, 2 COND. SOLID COPPER FPLP/R ANALOG UNSHIELDED								
DISTANCE MEASURED USING DRAWN SEGMENT LENGTHS WITH 20.00 % ADDITIONAL LENGTH CALCULATED		SPARE CARD CURRENT %:	**61.17 %**					

DEVICE LABEL	PART NO	CANDELAS	ALARM CURRENT (A)	REMAINING ALARM CURRENT (A)	DISTANCE FROM PREVIOUS	RESISTANCE FROM PREVIOUS (Ω)	VOLTAGE DROP FROM PREVIOUS	VOLTAGE AT DEVICE	TOTAL VOLTAGE DROP	VOLTAGE DROP PERCENT
BPS-N3-01	GCSVWA	15CD	0.035	0.8750	20	0.1228	0.11	19.59	0.11	0.55 %
BPS-N3-02	GCSVWA	15CD	0.035	0.840	13	0.080643	0.07	19.52	0.18	0.89 %
BPS-N3-03	GCSVWA	15CD	0.035	0.8050	22	0.132564	0.11	19.42	0.28	1.43 %
BPS-N3-04	GCSVWA	75CD	0.035	0.770	31	0.192332	0.15	19.27	0.43	2.18 %
BPS-N3-05	GCSVWA	15CD	0.035	0.7350	70	0.43029	0.32	18.95	0.750	3.79 %
BPS-N3-06	GCSVWA	30CD	0.035	0.70	17	0.102501	0.07	18.88	0.820	4.15 %
BPS-N3-07	GCSVWA	75CD	0.035	0.6650	27	0.16286	0.11	18.77	0.930	4.70 %
BPS-N3-08	GCSVWA	75CD	0.035	0.630	28	0.172201	0.11	18.67	1.03	5.25 %
BPS-N3-09	GCSVWA	15CD	0.035	0.5950	39	0.240178	0.14	18.52	1.18	5.98 %
BPS-N3-10	GCSVWA	15CD	0.035	0.560	17	0.103172	0.06	18.46	1.24	6.27 %
BPS-N3-11	GCSVWA	15CD	0.035	0.5250	30	0.185014	0.1	18.37	1.33	6.76 %
BPS-N3-12	GCSVWA	15CD	0.035	0.49	19	0.119307	0.06	18.31	1.39	7.06 %
BPS-N3-13	GCSVWA	15CD	0.035	0.455	16	0.095313	0.04	18.27	1.43	7.28 %
BPS-N3-14	GCSVWA	75CD	0.035	0.42	22	0.136626	0.06	18.21	1.49	7.57 %
BPS-N3-15	GCSVWA	15CD	0.035	0.385	30	0.182506	0.07	18.14	1.56	7.93 %
BPS-N3-16	GCSVWA	15CD	0.035	0.35	22	0.137633	0.05	18.09	1.61	8.17 %
BPS-N3-17	GCVWN	15CD	0.035	0.315	30	0.182882	0.06	18.03	1.67	8.47 %
BPS-N3-18	GCSVWA	15CD	0.035	0.28	19	0.114645	0.03	18	1.70	8.63 %
BPS-N3-19	GCVWN	15CD	0.035	0.245	13	0.081814	0.02	17.98	1.72	8.73 %
BPS-N3-20	GCSVWA	15CD	0.035	0.21	7	0.044385	0.01	17.97	1.73	8.78 %
BPS-N3-21	GCSVWA	15CD	0.035	0.175	14	0.085975	0.02	17.96	1.74	8.85 %
BPS-N3-22	GCSVWA	75CD	0.035	0.14	48	0.292876	0.04	17.91	1.79	9.06 %
BPS-N3-23	GCSVWA	75CD	0.035	0.105	30	0.182358	0.02	17.90	1.80	9.16 %
BPS-N3-24	GCSVWA	15CD	0.035	0.07	26	0.159862	0.01	17.88	1.82	9.22 %
BPS-N3-25 EOL 15K	GCSVWA	15CD	0.035	0.035	56	0.341436	0.01	17.87	1.83	9.28 %
CALCULATION METHODS:										
RESISTANCE FROM PREVIOUS (Ω) = WIRE RESISTANCE (Ω/FT) X 2 X DIST. FROM PREVIOUS (FT)										
VOLTAGE DROP FROM PREVIOUS = RESISTANCE FROM PREVIOUS (Ω) X REMAINING CURRENT (A)										

BPS N4 POINT-TO-POINT REPORT

CURRENT SUMMARY					POWER SUMMARY			
MAX. CIRCUIT CURRENT (A):	3	TOTAL CIRCUIT CURRENT (A):	0.9450		STARTING CALC. VOLTAGE:	19.70	MAX. VOLTAGE DROP:	2.25
		SPARE CIRCUIT CURRENT (A):	2.06				VOLTAGE DROP %:	**11.41 %**
		SPARE CIRCUIT CURRENT %:	**68.50 %**		MIN. OPERATIONAL VOLTAGE:	16	END OF LINE VOLTAGE:	17.45
MAX. CARD CURRENT (A):	10	TOTAL CARD CURRENT (A):	3.88		WIRE RESISTANCE (Ω/KFT):	3.07	TOTAL CIRCUIT LENGTH (FT):	802
		SPARE CARD CURRENT (A):	6.117				TOTAL CIRCUIT RESISTANCE (Ω):	4.92
CIRCUIT WIRING PROPERTIES: 'V' 14/2 FPLP/R NAC 14 AWG, 2 COND. SOLID COPPER FPLP/R ANALOG UNSHIELDED								
DISTANCE MEASURED USING DRAWN SEGMENT LENGTHS WITH 20.00 % ADDITIONAL LENGTH CALCULATED		SPARE CARD CURRENT %:	**61.17 %**					

DEVICE LABEL	PART NO	CANDELAS	ALARM CURRENT (A)	REMAINING ALARM CURRENT (A)	DISTANCE FROM PREVIOUS	RESISTANCE FROM PREVIOUS (Ω)	VOLTAGE DROP FROM PREVIOUS	VOLTAGE AT DEVICE	TOTAL VOLTAGE DROP	VOLTAGE DROP PERCENT
BPS-N4-01	GCSVWA	15CD	0.035	0.9450	20	0.1228	0.12	19.58	0.12	0.59 %
BPS-N4-02	GCSVWA	15CD	0.035	0.910	14	0.087749	0.08	19.50	0.2	0.99 %
BPS-N4-03	GCSVWA	75CD	0.035	0.8750	33	0.204926	0.18	19.32	0.38	1.90 %
BPS-N4-04	GCSVWA	30CD	0.035	0.840	38	0.231623	0.19	19.13	0.570	2.89 %
BPS-N4-05	GCSVWA	30CD	0.035	0.8050	26	0.160538	0.13	19	0.70	3.55 %
BPS-N4-06	GCSVWA	15CD	0.035	0.770	22	0.137797	0.11	18.89	0.810	4.09 %
BPS-N4-07	GCSVWA	15CD	0.035	0.7350	16	0.09606	0.07	18.82	0.880	4.45 %
BPS-N4-08	GCSVWA	75CD	0.035	0.70	27	0.167147	0.12	18.71	0.990	5.04 %
BPS-N4-09	GCSVWA	15CD	0.035	0.6650	22	0.134298	0.09	18.62	1.08	5.49 %
BPS-N4-10	GCSVWA	15CD	0.035	0.630	10	0.063458	0.04	18.58	1.12	5.70 %
BPS-N4-11	GCSVWA	30CD	0.035	0.5950	18	0.109452	0.07	18.51	1.19	6.03 %
BPS-N4-12	GCSVWA	30CD	0.035	0.560	25	0.15576	0.09	18.43	1.27	6.47 %
BPS-N4-13	GCSVWA	15CD	0.035	0.5250	28	0.170513	0.09	18.34	1.36	6.92 %
BPS-N4-14	GCSVWA	75CD	0.035	0.49	34	0.206948	0.1	18.23	1.47	7.44 %
BPS-N4-15	GCSVWA	15CD	0.035	0.455	88	0.542	0.25	17.99	1.71	8.69 %
BPS-N4-16	GCSVWA	15CD	0.035	0.42	37	0.226336	0.1	17.89	1.81	9.17 %
BPS-N4-17	GCSVWA	75CD	0.035	0.385	31	0.19019	0.07	17.82	1.88	9.54 %
BPS-N4-18	GCSVWA	75CD	0.035	0.35	42	0.257649	0.09	17.73	1.97	10.00 %
BPS-N4-19	GCSVWA	15CD	0.035	0.315	29	0.181041	0.06	17.67	2.03	10.29 %
BPS-N4-20	GCSVWA	15CD	0.035	0.28	30	0.181497	0.05	17.62	2.08	10.55 %
BPS-N4-21	GCSVWA	15CD	0.035	0.245	13	0.080097	0.02	17.60	2.10	10.65 %
BPS-N4-22	GCSVWA	15CD	0.035	0.21	39	0.238897	0.05	17.55	2.15	10.90 %
BPS-N4-23	GCSVWA	75CD	0.035	0.175	23	0.141814	0.02	17.53	2.17	11.03 %
BPS-N4-24	GCSVWA	75CD	0.035	0.14	35	0.21183	0.03	17.50	2.20	11.18 %
BPS-N4-25	GCSVWA	15CD	0.035	0.105	49	0.300108	0.03	17.47	2.23	11.34 %
BPS-N4-26	GCSVWA	15CD	0.035	0.07	15	0.090721	0.01	17.46	2.24	11.37 %
BPS-N4-27 EOL 15K	GCSVWA	75CD	0.035	0.035	38	0.230667	0.01	17.45	2.25	11.41 %
CALCULATION METHODS:										
RESISTANCE FROM PREVIOUS (Ω) = WIRE RESISTANCE (Ω/FT) X 2 X DIST. FROM PREVIOUS (FT)										
VOLTAGE DROP FROM PREVIOUS = RESISTANCE FROM PREVIOUS (Ω) X REMAINING CURRENT (A)										

SPEAKER SCHEDULE SUMMARY

DISTANCE MEASURED USING DRAWN SEGMENT LENGTHS WITH 20.00 % ADDITIONAL LENGTH CALCULATED

SOURCE	CIRCUIT	PART NO	MAX. CARD WATTS	TOTAL CARD WATTS	SPARE CARD WATTS	SPARE CARD CURRENT %	MAX. CIRCUIT WATTS	TOTAL CIRCUIT WATTS	SPARE CIRCUIT WATTS	SPARE CIRCUIT WATTS %	WIRE GAUGE	WIRE RESISTANCE (Ω/KFT)	TOTAL CIRCUIT LENGTH (FT)	TOTAL CIRCUIT RESISTANCE (Ω)	STARTING CALCULATION VOLTAGE	MIN. OPERATIONAL VOLTAGE	MAX. DB LOSS	END OF LINE VOLTAGE	VOLTAGE DROP %
FCP (EST4 VOICE PANEL)	S1	3-ZA40A	40	22	18	**45.00 %**	40	22	18	**45.00 %**	14	3.07	1384	8.49	70.70	63	-0.174	69.30	**1.98 %**
	S2	3-ZA40A	40	24.75	15.25	**38.13 %**	40	24.75	15.25	**38.13 %**	14	3.07	1483	9.11	70.70	63	-0.202	69.07	**2.30 %**
	SR	3-ZA20A	20	8	12	**60.00 %**	20	8	12	**60.00 %**	14	3.07	3	0.020723	70.70	63	0.000	70.70	**0.00 %**
MFC1 (MFC-A (SPEAKER))	S3	SIGA-MCC1	N/A, PART OF 3-ZA20A				35	1.50	33.50	**95.71 %**	14	3.07	76	0.467906	70.70	63	-0.001	70.69	**0.01 %**
	S4	SIGA-MCC1	N/A, PART OF 3-ZA20A				35	2.50	32.50	**92.86 %**	14	3.07	360	2.21	70.70	63	-0.006	70.65	**0.07 %**
CALCULATION METHODS:																			
WATTS TO AMPS CONVERSION = DEVICE WATTS / VOLTAGE																			
RESISTANCE FROM PREVIOUS (Ω) = WIRE RESISTANCE (Ω/FT) X 2 X DIST. FROM PREVIOUS (FT)																			
VOLTAGE DROP FROM PREVIOUS = RESISTANCE FROM PREVIOUS (Ω) X REMAINING CURRENT (A)																			
DB LOSS FROM PREVIOUS = 20 × LOG (VOLTAGE AT PREVIOUS DEVICE / VOLTAGE AT DEVICE)																			
MAX. DB LOSS = 20 × LOG (VOLTAGE AT LAST DEVICE / START VOLTAGE)																			

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MSU-CPDC
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
FAX: 406.994.5665

100% CONSTRUCTION DOCUMENTS - FOR BID/CONSTRUCTION

Molecular Bioscience Building
Phase 2

MSU

APEX FIRE ALARM DESIGN, LLC

DRAWN BY: **BSM**
REVIEWED BY: **BSM**

REV.	DESCRIPTION	DATE

NICET
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp Aug 1, 2026

PPA# 22-0045
A/E# 00-00-00
APEX# 25035

SHEET TITLE
FIRE ALARM CALCS (NAC LOAD/LOSS)

SHEET
FA700

DATE
05/28/2026

PANEL FCP (EST4 VOICE PANEL) BATTERY CALCULATION

(SECONDARY POWER SOURCE REQUIREMENTS)

				STANDBY CURRENT (AMPS)		SECONDARY ALARM CURRENT (AMPS)	
	QTY	**PART NO.**	**DESCRIPTION**	**CURRENT DRAW (A)**	**TOTAL (A)**	**CURRENT DRAW (A)**	**TOTAL**
PANEL COMPONENTS	1	4-CPU	MAIN CPU	0.211	0.211	0.211	0.211
	1	4-LCDANN	COLOR LCD DISPLAY	0.04	0.04	0.093	0.093
	1	4-LCDLE	DISPLAY.MAIN LCD MODULE	0.04	0.04	0.093	0.093
	1	3-ZA20A	20 WATT ZONED AMPLIFIER, 70VRMS	0.062	0.062	1.12	1.12
	2	3-ZA40A	40 WATT ZONED AMPLIFIER, 70VRMS	0.062	0.124	2.48	4.96
	1	4-SDDC	SIGNATURE DUAL DRIVER CONTROLLER (LRM)	0.264	0.264	0.336	0.336
	1	4-24L24S	24 INDICATOR 24 CONTROL DISPLAY MODULE	0.00852	**0.00852**	0.00852	**0.00852**
	1	4-FWAL2	FIREWALL MODULE	0.13	0.13	0.13	0.13
	1	4-FWAL-CAT	SFP NETWORK MEDIA INTERFACE, 100BASE-TXRJ-45	0.027	0.027	0.027	0.027
	1	4-MIC	PAGING MICROPHONE	0.008	0.008	0.038	0.038

CIRCUIT	**TOTAL DEVICE QTY**	**TOTAL STANDBY (A)**	**TOTAL ALARM (A)**
FCP-ANN	1	0	0
FCP-AUX1	1	0.03	0.135
FCP-L1	14	0.002265	0.00346
FCP-L2	12	0.001396	0.00228
FCP-N1	5	0	0.14
FCP-S1	59	0	INCLUDED IN 3-ZA40A
FCP-S2	65	0	INCLUDED IN 3-ZA40A
FCP-SR	1	0	INCLUDED IN 3-ZA20A

		TOTAL STANDBY (A)	0.940
		TOTAL ALARM (A)	7.29
		REQUIRED STANDBY TIME = 24 HOURS	
		REQUIRED ALARM TIME = 15 MINUTES	
SECONDARY STANDBY LOAD (A)	0.940	24	22.55
SECONDARY ALARM LOAD (A)	7.29	0.25	1.82
STANDBY AND ALARM SUBTOTAL (AMP HOURS)		24.37	
DERATING FACTOR		1.25	
SECONDARY LOAD REQUIREMENTS (AMP HOURS)		30.47	

PROVIDE (2) 12V 40AH BATTERIES IN BC-1 BATTERY CABINET MOUNTED BELOW FCP

PANEL BPS (BPS10A) BATTERY CALCULATION

(SECONDARY POWER SOURCE REQUIREMENTS)

				STANDBY CURRENT (AMPS)		SECONDARY ALARM CURRENT (AMPS)	
PANEL COMPONENTS	**QTY**	**PART NO.**	**DESCRIPTION**	**CURRENT DRAW (A)**	**TOTAL (A)**	**CURRENT DRAW (A)**	**TOTAL**
	1	BPS10A MAINBOARD	MAINBOARD FOR BPS10A ASSEMBLY	0.07	0.07	0.27	0.27

CIRCUIT	**TOTAL DEVICE QTY**	**TOTAL STANDBY (A)**	**TOTAL ALARM (A)**
BPS-N1	28	0	0.9730
BPS-N2	31	0	1.09
BPS-N3	25	0	0.8750
BPS-N4	27	0	0.9450

		TOTAL STANDBY (A)	0.07
		TOTAL ALARM (A)	4.15
		REQUIRED STANDBY TIME = 24 HOURS	
		REQUIRED ALARM TIME = 15 MINUTES	
SECONDARY STANDBY LOAD (A)	0.07	24	1.68
SECONDARY ALARM LOAD (A)	4.15	0.25	1.04
STANDBY AND ALARM SUBTOTAL (AMP HOURS)		2.72	
DERATING FACTOR		1.25	
SECONDARY LOAD REQUIREMENTS (AMP HOURS)		3.40	

PROVIDE (2) 12V 7AH BATTERIES

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.5413
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Molecular Bioscience Building
Phase 2
MSU

APEX FIRE ALARM DESIGN, LLC

DRAWN BY: **BSM**
REVIEWED BY: **BSM**

REV.	DESCRIPTION	DATE

NICET
Bryan Moss
FIRE ALARM SYSTEMS
LEVEL IV
110772 Exp Aug 1, 2026

PPA# 22-0045
A/E# 00-00-00
APEX# 25035

SHEET TITLE
FIRE ALARM CALCS (BATTERY)

SHEET
FA701

DATE
05/28/2026

FIRE SPRINKLER LEGEND

SYMBOL	DESCRIPTION
*ALTERNATE SPRINKLER TEMPERATURES MAY BE NOTED NEXT TO SYMBOL (I.E. INT = INTERMEDIATE; HIGH = HIGH TEMPERATURE)	
	STANDARD SPRAY PENDENT SPRINKLER ON - DROP
	STANDARD SPRAY PENDENT SPRINKLER ON - 2PC EXTENDED DROP
	EXTENDED COVERAGE PENDENT SPRINKLER ON - DROP
	STANDARD SPRAY PENDENT SPRINKLER ON - LINE
	STANDARD SPRAY PENDENT SPRINKLER ON - DROP, SMALL ORIFICE
	STANDARD SPRAY PENDENT SPRINKLER ON - LINE
	STANDARD SPRAY PENDENT SPRINKLER ON - LINE
	STANDARD SPRAY DRY PENDENT SPRINKLER
	STANDARD SPRAY UPRIGHT SPRINKLER ON - LINE
	STANDARD SPRAY UPRIGHT SPRINKLER ON - SPRIG
	STANDARD SPRAY UPRIGHT SPRINKLER ON - LINE, LARGE ORIFICE
	STANDARD SPRAY UPRIGHT SPRINKLER ON - LINE, EXTRA LARGE ORIFICE
	EXTENDED COVERAGE UPRIGHT SPRINKLER ON - LINE
	EXTENDED COVERAGE UPRIGHT SPRINKLER ON - SPRIG
	STANDARD SPRAY SIDEWALL SPRINKLER HEAD
	STANDARD SPRAY SIDEWALL SPRINKLER HEAD
	EXTENDED COVERAGE SIDEWALL SPRINKLER HEAD
	STANDARD SPRAY DRY SIDEWALL SPRINKLER HEAD
	BACK-TO-BACK ATTIC SPRINKLER
	EXISTING PENDENT SPRINKLER
	EXISTING UPRIGHT SPRINKLER
	LATERAL OR LONGITUDINAL SWAY BRACE
	COMBINATION LATERAL AND LONGITUDINAL SWAY BRACE
FS	FLOW SWITCH
TS	TAMPER SWITCH
LAA	LOW AIR ALARM
PRV	PRESSURE REDUCING VALVE
PS	PRESSURE SWITCH
CHECK	CHECK VALVE
BUTTERFLY	BUTTERFLY VALVE (GROOVED OR THREADED)
GLOBE	GLOBE VALVE
FHC	FIRE HOSE CABINET (LENGTH OF HOSE NOTED)
FHVC	FIRE HOSE VALVE CABINET
	OUTSIDE STEM & YOKE GATE VALVE
	POST INDICATOR VALVE
	HOSE VALVE
	HOSE ANGLE VALVE
H	HORN/STROBE ASSEMBLY
	ELECTRIC BELL
	SINGLE OUTLET FIRE DEPARTMENT CONNECTION
	FREE STANDING FIRE DEPARTMENT CONNECTION
	FLUSH MOUNTED FIRE DEPARTMENT CONNECTION
	FIRE DEPARTMENT CONNECTION
X-X	PIPE CENTERLINE FROM FINISHED FLOOR
X	HYDRAULIC NODE POINT
XXX	CEILING HEIGHT
	RISER
	DISTANCE PIPE FROM DECK
	FLANGE
	GROOVED ELBOW UP
	GROOVED ELBOW DOWN
	GROOVED COUPLING
	SCREWED ELBOW DOWN
	SCREWED ELBOW UP
	HANGER SYMBOL - SEE DETAIL FOR TYPE
	HANGER SYMBOL - SEE DETAIL FOR TYPE
	HANGER SYMBOL - SEE DETAIL FOR TYPE
	HANGER SYMBOL - SEE DETAIL FOR TYPE
	HANGER SYMBOL - SEE DETAIL FOR TYPE
	SEISMIC RESTRAINT #1
	SEISMIC RESTRAINT #2
HEADS	HEAD BOX
	TAPPING VALVE
	THRUST BLOCKING/PLUG
	NEW WET SPRINKLER PIPE
	NEW DRY SPRINKLER PIPE
	NEW PREACTION SPRINKLER PIPE
	EXISTING SPRINKLER PIPE
	DEMO SPRINKLER PIPE
	NEW UNDERGROUND FIRE SERVICE
	EXISTING UNDERGROUND WATER MAIN/FIRE MAIN
	1-HOUR FIRE BARRIER (SEE ARCHITECTURAL FOR DETAILS)
	2-HOUR FIRE BARRIER (SEE ARCHITECTURAL FOR DETAILS)
AFF	ABOVE FINISHED FLOOR
ATR	ALL THREAD ROD
A.S.	AUTOMATIC SPRINKLER
CIF	CUT IN FIELD
DN	DOWN
FG	FINISHED GRADE
GALV	GALVANIZED
GBE	GROOVE BOTH ENDS
GOE	GROOVE ONE END
GMI	GALVANIZED MALLEABLE IRON
OS&Y	OUTSIDE STEM & YOKE
RN	RISER NIPPLE
TBE	THREAD BOTH ENDS
TOE	THREAD ONE END
T&G	THREAD AND GROOVE
U/ON	UNLESS OTHERWISE NOTED
W/	WITH

SEISMIC CLEARANCE REQUIREMENTS

PROVIDE CLEARANCE AT ALL PIPING EXTENDING THROUGH WALLS, FLOORS, FOUNDATIONS. NO CLEARANCE REQUIRED AT GYPSUM BOARD OR EQUALLY FRANGIBLE CONSTRUCTION THAT IS NOT REQUIRED TO HAVE A FIRE RESISTANCE RATING.

NOMINAL PIPE SIZE		CORE DRILL HOLE OR PIPE SLEEVE SIZE	
INCH	MM	INCH	MM
1	25	3	80
1¼	32	4	100
1½	40	4	100
2	50	4	100
2½	65	6	150
3	80	6	150
4	100	8	200
6	150	10	250

AT CONTRACTORS OPTION FLEXIBLE COUPLINGS MAY BE INSTALLED WITHIN 12" OF THE WALL SURFACE ON EACH SIDE, OR WITHIN 12" ABOVE FLOOR AND 24" BELOW FLOOR, AND THE CLEARANCES NOTED ARE NOT REQUIRED.

FIRE CAULK HOLE AND PROVIDE SPLIT CHROME WALL PLATES AT ALL EXPOSED WALL LOCATIONS.

(NOTE THAT AT NON-RATED FRANGIBLE GYPSUM BOARD WALLS NO CLEARANCE IS REQUIRED)

BRANCHLINE RESTRAINT REQUIREMENTS

SEISMIC COEFFICIENT, C_P = X.XXX	STEEL BRANCH LINE SIZE			
SEE SEISMIC CALCULATIONS FOR C_P VALUES	1"	1¼"	1½"	2"
MAXIMUM SPACING OF BRANCH LINE RESTRAINTS $C_P \leq 0.50$	43'	46'	49'	53'

WHERE NOT REQUIRED:
-NO RESTRAINT REQUIRED IF HANGER ROD IS LESS THAN 6" LONG MEASURED BETWEEN THE TOP OF THE PIPE AND THE POINT OF ATTACHMENT TO THE BUILDING STRUCTURE
WHERE REQUIRED:
-ON ALL BRANCH LINES (WITH HANGER ROD >6") AT INTERVALS NOT EXCEEDING THOSE SPECIFIED IN TABLE ABOVE BASED ON BRANCH LINE DIAMETER AND THE VALUE OF C_P.
-SPRIG-UPS 4'-0" OR LONGER SHALL BE RESTRAINED AGAINST LATERAL MOVEMENT.

-RESTRAINT SHALL BE PROVIDED BY USE OF ONE OF THE FOLLOWING:
1) A LISTED SWAY BRACE ASSEMBLY
2) #12, 440-LB WIRE INSTALLED AT LEAST 45° FROM THE VERTICAL PLANE AND ANCHORED ON BOTH SIDES OF THE PIPE
3) A HANGER NOT LESS THAN 45° FROM VERTICAL INSTALLED WITHIN 6" OF THE VERTICAL HANGER ARRANGED FOR RESTRAINT AGAINST UPWARD MOVEMENT, PROVIDED IT IS UTILIZED SUCH THAT L/R DOES NOT EXCEED 300, WHERE THE ROD SHALL EXTEND TO THE PIPE OR HAVE A SURGE CLIP RESTRAINT.
5) OTHER APPROVED MEANS

-WIRES USED FOR PIPING RESTRAINTS SHOULD BE ATTACHED TO THE BRANCH LINE WITH TWO TIGHT TURNS AROUND THE PIPE AND FASTENED WITH FOUR TIGHT TURNS WITHIN 1-1/2"(SEE DETAIL), AND ATTACHED TO THE STRUCTURE WITH MEANS APPROVED BY NFPA.

-RESTRAINT SHALL BE LOCATED WITHIN 2 FT OF A HANGER. THE HANGER CLOSEST TO THE RESTRAINT SHALL BE OF A TYPE THAT RESISTS UPWARD MOVEMENT OF A BRANCH LINE SUCH AS A SURGE CLIP.

SEISMIC BRACING REQUIREMENTS

EARTHQUAKE BRACING SHALL CONFORM WITH N.F.P.A. #13 , INTERNATIONAL BUILDING CODE, NEHRP, AND ASCE/SEI 7 CRITERIA.

DESCRIPTION OF SITE CONDITIONS	
MAPPED SPECTRAL ACCELERATION FOR SHORT PERIODS	S_S = X.XXX
MAPPED SPECTRAL ACCELERATION FOR A 1-SECOND PERIOD	S_1 = X.XXX
SITE CLASS	X
SEISMIC OCCUPANCY CATEGORY OF BUILDING	X
MAXIMUM SPECTRAL RESPONSE ACCELERATION AT SHORT PERIODS	S_{DS} = X.XXX
MAXIMUM SPECTRAL RESPONSE ACCELERATION AT 1-SECOND PERIODS	S_{D1} = X.XXX
SEISMIC DESIGN CATEGORY BASED ON S_{DS}	X
SEISMIC DESIGN CATEGORY BASED ON S_{D1}	X
SEE CALCULATIONS BELOW FOR DETERMINATION OF FORCE FACTOR FOR SEISMIC DESIGN CATEGORY 'C' & 'D'.	
COMPONENT IMPORTANCE FACTOR	I_P = 1.50
COMPONENT RESPONSE MODIFICATION FACTOR	R_P = 4.50
COMPONENT AMPLIFICATION FACTOR	A_P = 2.50
HEIGHT IN STRUCTURE OF POINT OF ATTACHMENT W/ RESPECT TO THE BASE	Z = XX
AVERAGE ROOF HEIGHT OF STRUCTURE WITH RESPECT TO THE BASE	H = XX
$F_P = \frac{0.4 * A_P * S_{DS} * W_P * (1+2*\frac{Z}{H})}{\frac{R_P}{I_P}}$	F_P = SEISMIC DESIGN FORCE, C_P = FORCE FACTOR W_P = 1.15 TIMES WEIGHT OF WATER FILLED PIPE $F_P = C_P * W_P$ F_P = X.XXX* W_P ASCE 7-05 ALLOWS A REDUCTION FACTOR OF 1.4 FOR STRESS BASED DESIGN: F_P = X.XXX* W_P

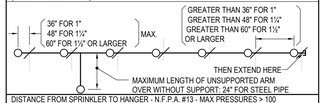
HANGER SPACING REQUIREMENTS

MAXIMUM DISTANCE BETWEEN HANGERS (FT-IN.) - N.F.P.A. #13

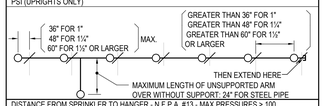
NOMINAL PIPE SIZE	¾"	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"
STEEL PIPE	N/A	12-0	12-0	15-0	15-0	15-0	15-0	15-0	15-0	15-0

NOTE:
TYPICAL HANGER SYMBOLS AS SHOWN ON PIPING PLAN MAY NOT REFLECT ACTUAL FIELD INSTALLATION. FINAL HANGER INSTALLATION SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF N.F.P.A. #13.

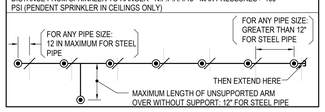
DISTANCE FROM SPRINKLER TO HANGER - N.F.P.A. #13 - MAX PRESSURES ≤ 100 PSI (ALL SPRINKLER TYPES)



DISTANCE FROM SPRINKLER TO HANGER - N.F.P.A. #13 - MAX PRESSURES > 100 PSI (UPRIGHTS ONLY)



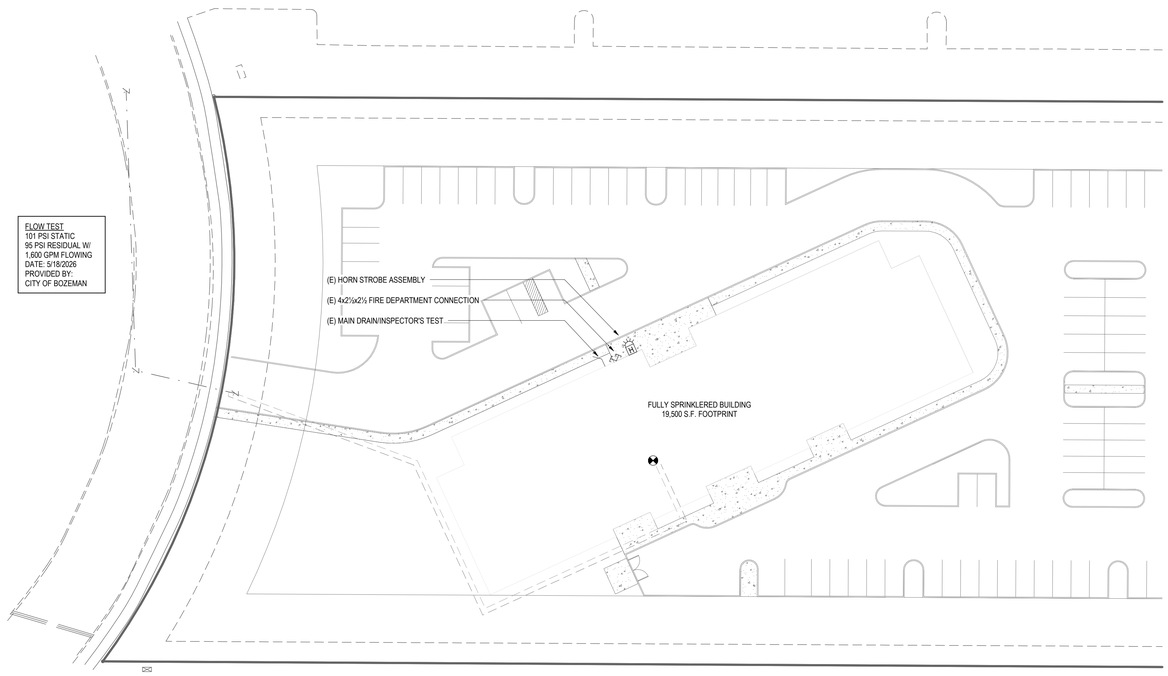
DISTANCE FROM SPRINKLER TO HANGER - N.F.P.A. #13 - MAX PRESSURES > 100 PSI (PENDENT SPRINKLER IN CEILINGS ONLY)



SPRINKLER PIPE AND FITTINGS TABLE

MATERIALS MAY BE OF DOMESTIC OR IMPORT ORIGIN
ALL MATERIALS SHALL BE OF "DOMESTIC" OR "DESIGNATED COUNTRY" ORIGIN (FEDERAL PROJECT)

PIPE SIZE	PIPE	FITTINGS AND OUTLETS
1" TO 2"	CRR >= 1.0	BLACK CLASS-125 CAST IRON THREADED FITTINGS (175 PSI RATED)
2½" TO 4"	SCH-7 OR GREATER	WELDED OUTLETS WITH GROOVED ENDS AND PAINTED DUCTILE IRON GROOVED FITTINGS (300 PSI RATED)(STANDARD TAKEOUT-I.E. 4" ELL = 5")
1" TO 3"	CPVC	CPVC SLIP FITTINGS WITH SOLVENT CEMENT INSTALLED PER THE MANUFACTURER'S RECOMMENDATIONS (175 PSI RATED) - CONTRACTOR TO VERIFY THAT ALL SEALANTS, ANTIFREEZE, FIRESTOPPING, MIC COATINGS, OIL, LUBRICANT, FOAM, ETC ARE COMPATIBLE PER THE MANUFACTURER.



1 FX001 FIRE SPRINKLER REFERENCE SITE PLAN
1" = 30'-0"

30' 0 30' 60'
SCALE: 1" = 30'

Hydraulically Calculated System

This system as shown on COFFMAN ENGINEERS company print no. FX102 dated TBD for MECH 302 at MSU M.B. REMODEL contract no. 251967 is designed to discharge at a rate of 0.15 gpm (l/min) per sq ft (m2)of floor area over a max area of 1,170 SQ. FT. sq ft (m2)when supplied with water at the rate of 288.3 + 250 gpm (l/min) at 69.6 psi (bars) at the base of the riser
Hose stream allowance 250 gpm (l/min) is included in the above.
Occupancy classification: ORDINARY HAZARD 1
Commodity classification: N/A
Maximum storage height: N/A
Installed by: CONTRACTOR T.B.D.

Hydraulically Calculated System

This system as shown on COFFMAN ENGINEERS company print no. FX102 dated TBD for LAB 234 at MSU M.B. REMODEL contract no. 251967 is designed to discharge at a rate of 0.15 gpm (l/min) per sq ft (m2)of floor area over a max area of 900 SQ. FT. sq ft (m2)when supplied with water at the rate of 106.2 + 250 gpm (l/min) at 23.9 PSI psi (bars) at the base of the riser
Hose stream allowance 250 gpm (l/min) is included in the above.
Occupancy classification: ORDINARY HAZARD 1
Commodity classification: N/A
Maximum storage height: N/A
Installed by: CONTRACTOR T.B.D.

SPRINKLER HEADS - PROJECT TOTAL

Phase Created	MANUFACTURER	MODEL	TYPE	S.I.N.	FINISH	THREAD	K-FACTOR	CANOPY	ESCUTCH	TEMP	WRENCH	SYMBOL	QUANTITY
New Construction	VICTAULIC	V27	SSP	V2708	WHT	1/2"	5.6	WHT REC'D	V27	200 F	V27-2	⦿	88
New Construction	VICTAULIC	V27	SSU	V2704	BR	1/2"	5.6	N/A	N/A	200 F	V27	○	26
New Construction	VICTAULIC	V27 REC'D	SSW	V2710		1/2"	5.6	WHT REC'D	V27	200 F	RA	◀	2
New Construction	VICTAULIC	V27	SSW	V2710	BR	1/2"	5.6	N/A	N/A	155 F	V27	◁	2
TOTAL													118

GENERAL FIRE SUPPRESSION SYSTEM NOTES

1. SCOPE OF WORK: CONTRACTOR SHALL PROVIDE A COMPLETE HYDRAULICALLY CALCULATED AUTOMATIC SPRINKLER SYSTEM THROUGHOUT THE FACILITY AS SHOWN ON THE DRAWINGS. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT, LABOR, AND MATERIAL FOR AN ACCEPTED AUTOMATIC SPRINKLER SYSTEM, INCLUDING WATER FLOW ALARM SWITCHES, VALVE SUPERVISORY SWITCHES, CHECK VALVES, CONTROL VALVES, FIRE PROTECTION PIPING, HANGERS, EARTHQUAKE BRACING, SPRINKLERS, DRAINS, AND ALL OTHER ASSOCIATED EQUIPMENT INDICATED OR NOT ON THESE DRAWINGS AND THE SPECIFICATIONS, FOR A COMPLETE FIRE SUPPRESSION SYSTEM COMPLYING WITH NFPA 13 AND ANY OTHER LISTED CODES OR REFERENCE.
2. THE FIRE PROTECTION SYSTEMS SHALL BE DESIGNED, INSTALLED, TESTED, AND FLUSHED IN ACCORDANCE WITH THE FOLLOWING:
   A. INTERNATIONAL BUILDING CODE (IBC) - 2021 EDITION WITH LOCALLY ADOPTED MODIFICATIONS
   B. NFPA 13 (STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS) - 2019 EDITION
   C. PROJECT SPECIFICATIONS
3. THE FIRE SUPPRESSION SYSTEM SHOWN ON THE PLANS IS CONCEPTUAL ONLY AND PROVIDED TO CONVEY DESIGN INTENT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING COMPLETE, COORDINATED, AND APPROVED SHOP DRAWINGS PER NFPA 13. THE CONTRACTOR SHALL INSTALL THE SYSTEM IN ACCORDANCE WITH ALL APPLICABLE CODES, THE MANUFACTURER'S RECOMMENDATIONS, AND PER THE EQUIPMENT'S LISTING.
4. DRAWINGS AND REFLECTED CEILING PLANS ARE PROVIDED FOR REFERENCE ONLY. SEE ARCHITECTURAL, ELECTRICAL, MECHANICAL, AND STRUCTURAL DRAWINGS FOR CEILING TYPES AND HEIGHTS, LIGHTING FIXTURE LOCATIONS, DUCTS, BEAMS, AND OTHER OBSTRUCTIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY ALL JOB CONDITIONS AND DIMENSIONS ON DRAWINGS PRIOR TO EXECUTION OF THIS CONTRACT AND COORDINATE WITH ALL TRADES.
5. FIRE SPRINKLER PIPING SHALL COMPLY WITH NFPA 13 AND THE PROJECT SPECIFICATIONS. ALL PIPING IN FINISHED AREAS SHALL BE CONCEALED UNLESS OTHERWISE NOTED ON THE PLANS OR IN THE SPECIFICATIONS. DRY PIPE AND PREACTION SYSTEM PIPING SHALL BE PITCHED TO A DRAIN IN ACCORDANCE WITH NFPA 13.
6. ALL SPRINKLERS SHALL BE INSTALLED IN THE CENTER OF TILE IN AREAS WITH 2'x2' SUSPENDED CEILING TILES. SPRINKLERS SHALL BE INSTALLED IN QUARTER POINTS OR IN THE CENTER OF CEILING TILE IN AREAS WITH 2'x4' SUSPENDED CEILING TILES.
7. ALL SPRINKLERS SHALL BE QUICK RESPONSE UNLESS OTHERWISE NOTED OR REQUIRED BY CODE. COLORS, FINISHES, MANUFACTURERS AND SPRINKLER TYPES SHALL BE COORDINATED WITH EXISTING SPRINKLERS AND THE ARCHITECT.
8. IT IS THE INTENT OF THIS DESIGN TO NOT CORE DRILL STRUCTURAL MEMBERS EXCEPT WHERE INDICATED FOR FLOOR SLABS AND CMU WALLS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CORE DRILLING. ALL PENETRATIONS IN WALLS SHALL BE SEALED TO THE FULL THICKNESS OF THE PENETRATION WITH APPROVED FIRE STOPPING MATERIAL OF EQUAL OR GREATER FIRE RESISTANCE. SEE ARCHITECTURAL PLANS FOR LOCATION OF SMOKE AND FIRE BARRIER WALLS.
9. PROVIDE HANGERS, BRANCHLINE RESTRAINT, AND SEISMIC BRACING THROUGHOUT THE BUILDING IN ACCORDANCE WITH NFPA 13. ADDITIONALLY, PROVIDE PROPER CLEARANCES, SLEEVES, OR FLEXIBLE COUPLINGS AROUND PIPING WHERE REQUIRED IN ACCORDANCE WITH NFPA 13.
10. SPARE SPRINKLERS SHALL BE PROVIDED IN ACCORDANCE WITH NFPA 13. HYDRAULIC DATA PLATES SHALL BE PROVIDED FOR EACH HYDRAULIC CALCULATION AND LOCATED AT THE RESPECTIVE SPRINKLER SYSTEM RISER.
11. ALL FIRE PROTECTION SYSTEM CONTROL VALVES SHALL BE EQUIPPED WITH APPROVED VALVE SUPERVISORY SWITCHES. ALL ELECTRICAL WIRING OF FIRE ALARM SYSTEM AND FIRE SPRINKLER ELECTRICAL COMPONENTS TO BE PERFORMED BY OTHER TRADE DIVISIONS.
12. PROVIDE LABEL TAG INDICATING "NORMALLY OPEN" OR "NORMALLY CLOSED" ON ALL VALVES INCLUDING AND NOT LIMITED TO ALL RISER AND TRIM, SECTIONAL VALVES, INSPECTOR'S TEST VALVES, AND DRAINS.
13. ALL FIRE PROTECTION DEVICES AND EQUIPMENT SHALL BE UL LISTED OR FM APPROVED AND INSTALLED PER THE LISTING AND MANUFACTURER'S INSTALLATION REQUIREMENTS.
14. PROVIDE AUXILIARY LOW POINT DRAINS FOR THE WET PIPE AND DRY PIPE SYSTEM IN ACCORDANCE WITH NFPA 13. WHERE AUXILIARY DRAINS ARE INSTALLED BEHIND A HARD-LID CEILING, PROVIDE AN ACCESS PANEL DIRECTLY BENEATH THE DRAIN. LOCATIONS OF AUXILIARY DRAINS SHALL BE CLEARLY INDICATED ON THE WORKING DRAWINGS. ALL MAIN DRAIN AND TEST CONNECTIONS SHALL BE TERMINATED TO THE EXTERIOR OF THE FACILITY U.O.N.
15. THE FIRE SUPPRESSION SYSTEM SHALL BE SUPERVISED IN ACCORDANCE WITH THE INTERNATIONAL BUILDING CODE AND NFPA 72. ALL FIRE PROTECTION SYSTEM WATER FLOW AND CONTROL VALVE SUPERVISORY SWITCHES SHALL BE MONITORED BY THE BUILDING'S FIRE ALARM SYSTEM. COORDINATE WITH THE FIRE ALARM CONTRACTOR SUCH THAT ELECTRICAL CONNECTIONS CAN BE MADE BETWEEN THESE DEVICES AND THE BUILDING'S FIRE ALARM SYSTEM.
16. IT IS THE OWNER'S RESPONSIBILITY TO PROVIDE ADEQUATE HEAT TO PREVENT FREEZING THROUGHOUT WET PIPE SPRINKLER SYSTEM AREAS AND IN ENCLOSURES FOR DRY PIPE AND OTHER TYPES OF VALVES CONTROLLING WATER SUPPLIES TO SPRINKLER SYSTEMS.
17. PROVIDE INSPECTION AND TESTING IN ACCORDANCE WITH NFPA 13 AND THE PROJECT SPECIFICATIONS.
18. NO INSTALLATION OF ANY PIPING OR EQUIPMENT IS TO BEGIN PRIOR TO APPROVAL OF PLANS BY THE AUTHORITY HAVING JURISDICTION AND THE OWNER'S REPRESENTATIVE.

FIRE PROTECTION DESIGN CRITERIA

THE FIRE SUPPRESSION SYSTEMS SHALL BE HYDRAULICALLY DESIGNED AND INSTALLED IN ACCORDANCE WITH THE FOLLOWING CRITERIA FROM NFPA 13. HAZARDS FOR INDIVIDUAL AREAS ARE NOTED ON THE DRAWINGS.

AUTOMATIC WET PIPE FIRE SPRINKLER SYSTEM
A. LIGHT HAZARD AREAS
   - DESIGN DENSITY: 0.10 GPM / SQ FT
   - DESIGN AREA: 1,500 SQ FT
   - HOSE ALLOWANCE: 100 GPM
B. ORDINARY HAZARD GROUP 1 AREAS
   - DESIGN DENSITY: 0.15 GPM / SQ FT
   - DESIGN AREA: 1,500 SQ FT
   - HOSE ALLOWANCE: 250 GPM

General Information Sign

1. Name & Location of Facility: MSU - MOLECULAR BIOSCIENCE REMODEL BOZEMAN, MT	9. Flow Test Data: 101 PSI STATIC, 95 PSI RES @ 1,600 GPM
2. Occupancy Classification: BUSINESS	10. Presence of Flammable/Combustible Liquids: NO
3. Commodity Classification: N/A	11. Presence of Hazardous Materials: NO
4. Presence of High-piles and/or Rack Storage: NO	12. Presence of Other Special Storage: NO
5. Maximum Height of Storage Planned: N/A	13. Location of Aux. Drains & Low Point Drains on Dry and Preaction Systems: SEE DRAWINGS
6. Aisle Width Planned: N/A	14. Original Results of Main Drain Flow Test: TBD
7. Encapsulation of Pallet Loads: NO	15. Name of Installing Contractor or Designer: TBD
8. Presence of Solid Shelving: NO	16. Indications of Presence and Location of Antifreeze or Other Auxiliary Systems: N/A

FIRE PROTECTION SHEET LIST

Sheet Number	Sheet Name
FX001	FIRE SPRINKLER COVER
FX101	LEVEL 1 FIRE SPRK PLAN
FX102	LEVEL 2/3 FIRE SPRK PLANS
FXD01	LEVEL 1 FIRE DEMO PLAN
FXD02	LEVEL 2/3 FIRE DEMO PLANS
FXD04	RISER AND DEMO SECTIONS

100% CONSTRUCTION DOCUMENTS

MOLECULAR BIOSCIENCE REMODEL

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
FAX: 406.994.5665

BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: RWB		
REVIEWED BY: JAA		
REV.	DESCRIPTION	DATE

STATE OF MONTANA
JASON A. ANDERSON
No. 11805PE
REGISTERED PROFESSIONAL ENGINEER

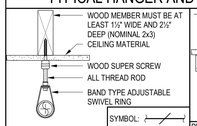
PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
FIRE SPRINKLER COVER

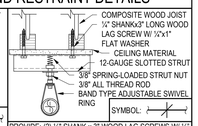
SHEET
FX001

DATE
MAY 28, 2026

TYPICAL HANGER AND RESTRAINT DETAILS



PROVIDE: ¼" SHANK x 3" LONG WOOD SUPER SCREW - ITW-BUILDEX MODEL GST-30, MIN. 2" EMBEDMENT INTO BASE MATERIAL. 3/8"xO/F (XX" AVERAGE LENGTH FOR LISTING) ATR AND PIPE RING.



PROVIDE: (2) ¼" SHANK x 3" WOOD LAG SCREWS W/ ½" x1" FLAT WASHERS, 12-GAUGE SLOTTED STRUT (SEE HANGER NOTES FOR SIZE), 3/8" SPRING-LOADED STRUT NUT, 3/8" HEX NUT & WASHER, 3/8"xO/F (XX" AVERAGE LENGTH FOR LISTING) ATR AND PIPE RING.

GENERAL HANGER NOTES

INSTALL A SWIVEL ATTACHMENT TO ANY ASSEMBLY SHOWN ABOVE, NOTED:

12-GAUGE SLOTTED STRUT FOR X" PIPE. X"xX"xX" LONG ANVIL-STRUT AS-XXXEH (OR EQUIVALENT), SECTION MODULUS OF X.XXX IN^3, MAXIMUM X" PIPE WITH XX-FOOT TRAPEZE SPAN PER NFPA 13-2016 TABLE 9.1.1.7.1(A).

* ALL-THREAD-ROD SHALL BE CADMIUM-ZINC PLATED OR EQUAL.
* SEND ATR IN FULL 10' LENGTHS (I.E. NOT CUT AT FABRICATOR)
* SEND STRUT IN FULL 20' LENGTHS (IE. NOT CUT AT FABRICATOR)
* ALL BRANCH LINE HANGER THREAD ROD LENGTHS ARE LESS THAN 6" FROM POINT OF ATTACHMENT TO STRUCTURE TO TOP OF PIPE, NO BRANCHLINE RESTRAINT REQUIRED U.O.N.

GENERAL NOTES

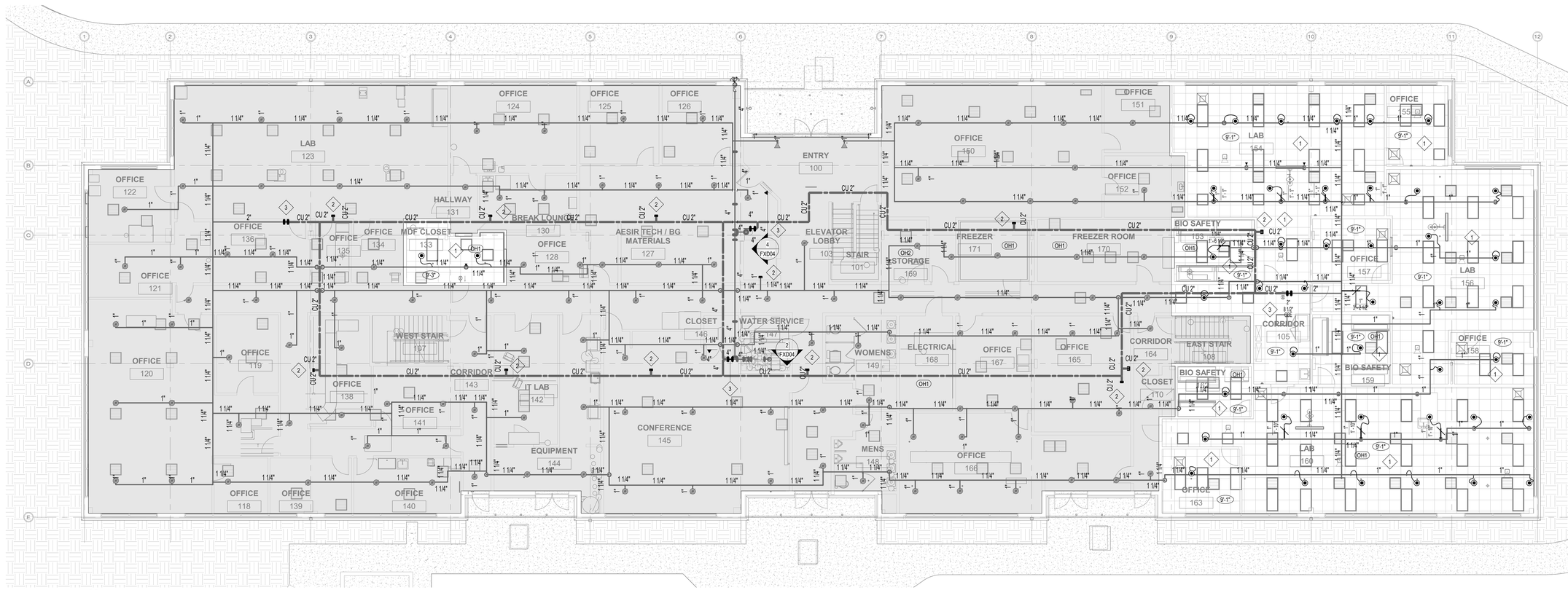
1. ALL GROOVED COUPLINGS SHALL BE ZERO FLEX/RIGID U.O.N. AND/OR REQUIRED BY CODE.
2. ALL PENDENT SPRINKLERS IN SUSPENDED ACOUSTICAL TILE CEILINGS SHALL BE INSTALLED ON A 48" LONG FLEX DROP.
3. FIRE STOPPING PENETRATIONS OF FIRE-RATED WALLS IS PROVIDED BY OTHERS.
4. PROVIDE SPLIT CHROME WALL PLATES AT ALL EXPOSED WALL PENETRATIONS IN FINISHED ROOMS.
5. **ALL SEISMIC BRACING IS EXISTING.**
6. ALL ROOMS ARE CLASSIFIED AS LIGHT HAZARD OCCUPANCY (0.10 GPM/SQ FT OVER REMOTE AREA - 100 GPM HOSE) PER NFPA 13 UNLESS OTHERWISE NOTED WITH SYMBOLS BELOW. SEE REMOTE AREA NOTES FOR REMOTE AREA MODIFICATIONS AS APPLICABLE.

   (OH1) ORDINARY HAZARD GROUP 1 - 0.15 GPM/SQ FT OVER REMOTE AREA - 250 GPM HOSE

   (OH2) ORDINARY HAZARD GROUP 2 - 0.20 GPM/SQ FT OVER REMOTE AREA - 250 GPM HOSE

FIRE PROTECTION KEY NOTES (XX)

1 ROUTE NEW FLEXIBLE DROPS FROM EXISTING OUTLETS TO NEW SPRINKLER LOCATIONS AS SHOWN.
2 INSTALL NEW THREADED CAP.
3 INSTALL NEW FILLER PIPING IN FORMER CHECK VALVE LOCATION.



1 FX101 FIRST FLOOR FIRE SPRINKLER PLAN
1/8" = 1'-0"

8' 0 8' 16'
SCALE: 1/8" = 1' - 0"

100% CONSTRUCTION DOCUMENTS

MOLECULAR BIOSCIENCE REMODEL

MONTANA STATE UNIVERSITY

MSU-CAMPUS PLANNING, DESIGN, AND CONSTRUCTION
MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
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DRAWN BY: RWB		
REVIEWED BY: JAA		
REV.	DESCRIPTION	DATE

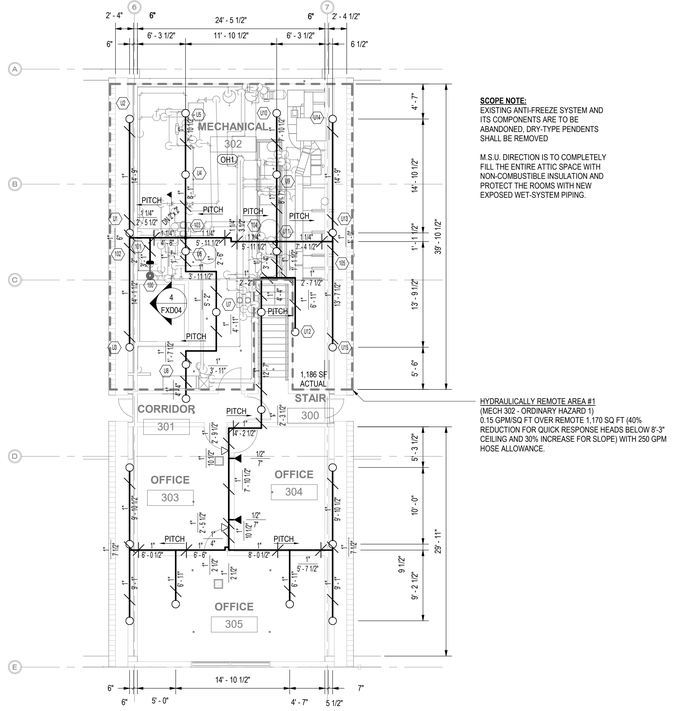
JASON ANDERSON No. 11805PE LICENSED PROFESSIONAL ENGINEER

PPA#22-0045
A/E#00-00-00
BA# 2236

SHEET TITLE
LEVEL 1 FIRE SPRK PLAN

SHEET
FX101

DATE
MAY 28, 2026



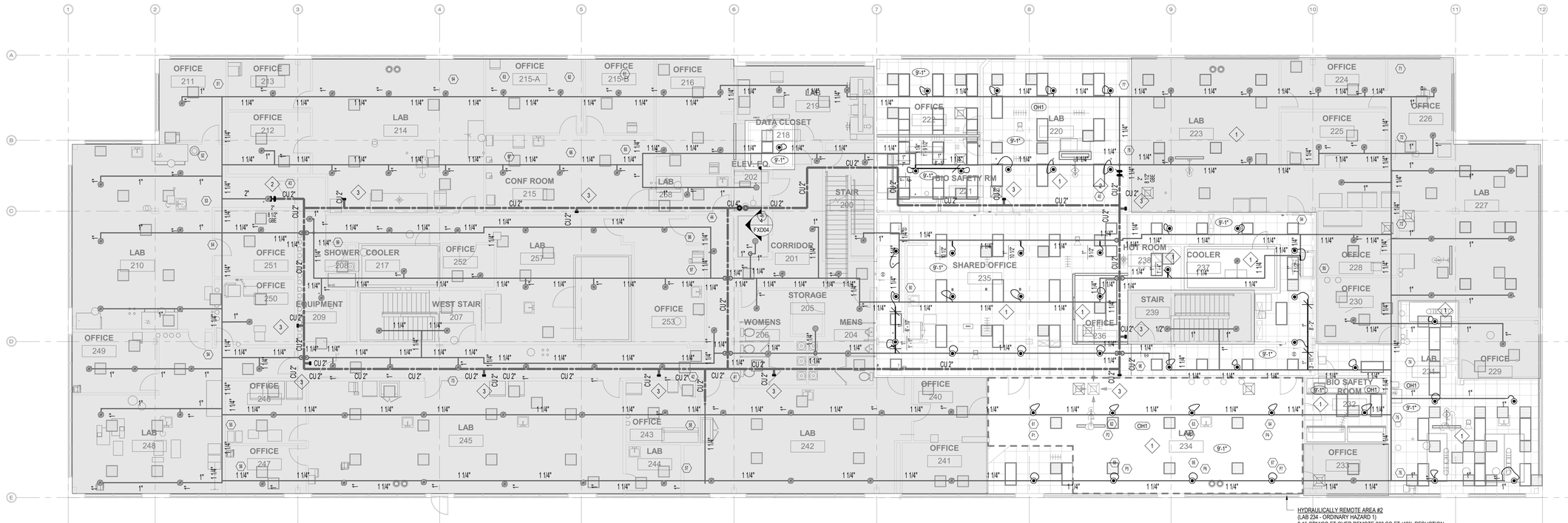
SCOPE NOTE:
EXISTING ANTI-FREEZE SYSTEM AND ITS COMPONENTS ARE TO BE ABANDONED, DRY-TYPE PENDENTS SHALL BE REMOVED

M.S.U. DIRECTION IS TO COMPLETELY FILL THE ENTIRE ATTIC SPACE WITH NON-COMBUSTIBLE INSULATION AND PROTECT THE ROOMS WITH NEW EXPOSED WET-SYSTEM PIPING.

HYDRAULICALLY REMOTE AREA #1
(MECH 302 - ORDINARY HAZARD 1)
0.15 GPM/SQ FT OVER REMOTE 1,170 SQ FT (40% REDUCTION FOR QUICK RESPONSE HEADS BELOW 8'-3" CEILING AND 30% INCREASE FOR SLOPE) WITH 250 GPM HOSE ALLOWANCE.

2 FX102 THIRD FLOOR FIRE SPRINKLER PLAN
1/8" = 1'-0"

SCALE: 1/8" = 1' - 0"

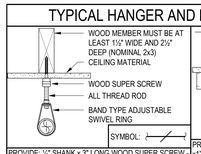


HYDRAULICALLY REMOTE AREA #2
(LAB 234 - ORDINARY HAZARD 1)
0.15 GPM/SQ FT OVER REMOTE 900 SQ FT (40% REDUCTION FOR QUICK RESPONSE HEADS BELOW 9'-1" CEILING) WITH 250 GPM HOSE ALLOWANCE.

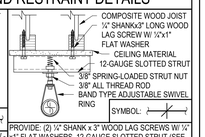
1 FX102 SECOND FLOOR FIRE SPRINKLER PLAN
1/8" = 1'-0"

SCALE: 1/8" = 1' - 0"

TYPICAL HANGER AND RESTRAINT DETAILS



PROVIDE: ¼" SHANK x 3" LONG WOOD SUPER SCREW - ITW-BUILDEX MODEL GST-30, MIN. 2" EMBEDMENT INTO BASE MATERIAL. 3/8"xO/F (XX" AVERAGE LENGTH FOR LISTING) ATR AND PIPE RING.



PROVIDE: (2) ¼" SHANK x 3" WOOD LAG SCREWS W/ ½" x1" FLAT WASHERS, 12-GAUGE SLOTTED STRUT (SEE HANGER NOTES FOR SIZE), 3/8" SPRING-LOADED STRUT NUT, 3/8" HEX NUT & WASHER, 3/8"xO/F (XX" AVERAGE LENGTH FOR LISTING) ATR AND PIPE RING.

GENERAL HANGER NOTES

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* SEND ATR IN FULL 10' LENGTHS (I.E. NOT CUT AT FABRICATOR)
* SEND STRUT IN FULL 20' LENGTHS (IE. NOT CUT AT FABRICATOR)
* ALL BRANCH LINE HANGER THREAD ROD LENGTHS ARE LESS THAN 6" FROM POINT OF ATTACHMENT TO STRUCTURE TO TOP OF PIPE, NO BRANCHLINE RESTRAINT REQUIRED U.O.N.

GENERAL NOTES

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3. FIRE STOPPING PENETRATIONS OF FIRE-RATED WALLS IS PROVIDED BY OTHERS.
4. PROVIDE SPLIT CHROME WALL PLATES AT ALL EXPOSED WALL PENETRATIONS IN FINISHED ROOMS.
5. **ALL SEISMIC BRACING IS EXISTING.**
6. ALL ROOMS ARE CLASSIFIED AS LIGHT HAZARD OCCUPANCY (0.10 GPM/SQ FT OVER REMOTE AREA - 100 GPM HOSE) PER NFPA 13 UNLESS OTHERWISE NOTED WITH SYMBOLS BELOW. SEE REMOTE AREA NOTES FOR REMOTE AREA MODIFICATIONS AS APPLICABLE.

OH1 ORDINARY HAZARD GROUP 1 - 0.15 GPM/SQ FT OVER REMOTE AREA - 250 GPM HOSE

OH2 ORDINARY HAZARD GROUP 2 - 0.20 GPM/SQ FT OVER REMOTE AREA - 250 GPM HOSE

FIRE PROTECTION KEY NOTES XX

1 ROUTE NEW FLEXIBLE DROPS FROM EXISTING OUTLETS TO NEW SPRINKLER LOCATIONS AS SHOWN.
2 INSTALL NEW FILLER PIPING IN FORMER CHECK VALVE LOCATION.
3 INSTALL NEW THREADED CAP.

100% CONSTRUCTION DOCUMENTS

MOLECULAR BIOSCIENCE REMODEL

MONTANA STATE UNIVERSITY

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MONTANA STATE UNIVERSITY
BOZEMAN, MONTANA
PHONE: 406.994.3413
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BECHTLE ARCHITECTS
4515 Valley Commons Drive #201
Bozeman, MT 59718
406.585.4161 ph 406.585.6919 fax

DRAWN BY: RWB		
REVIEWED BY: JAA		
REV.	DESCRIPTION	DATE

MONTANA
JASON A. ANDERSON
No. 11805PE
LICENSED PROFESSIONAL ENGINEER

PPA#22-0045
A/E#00-00-00
BA# 2236

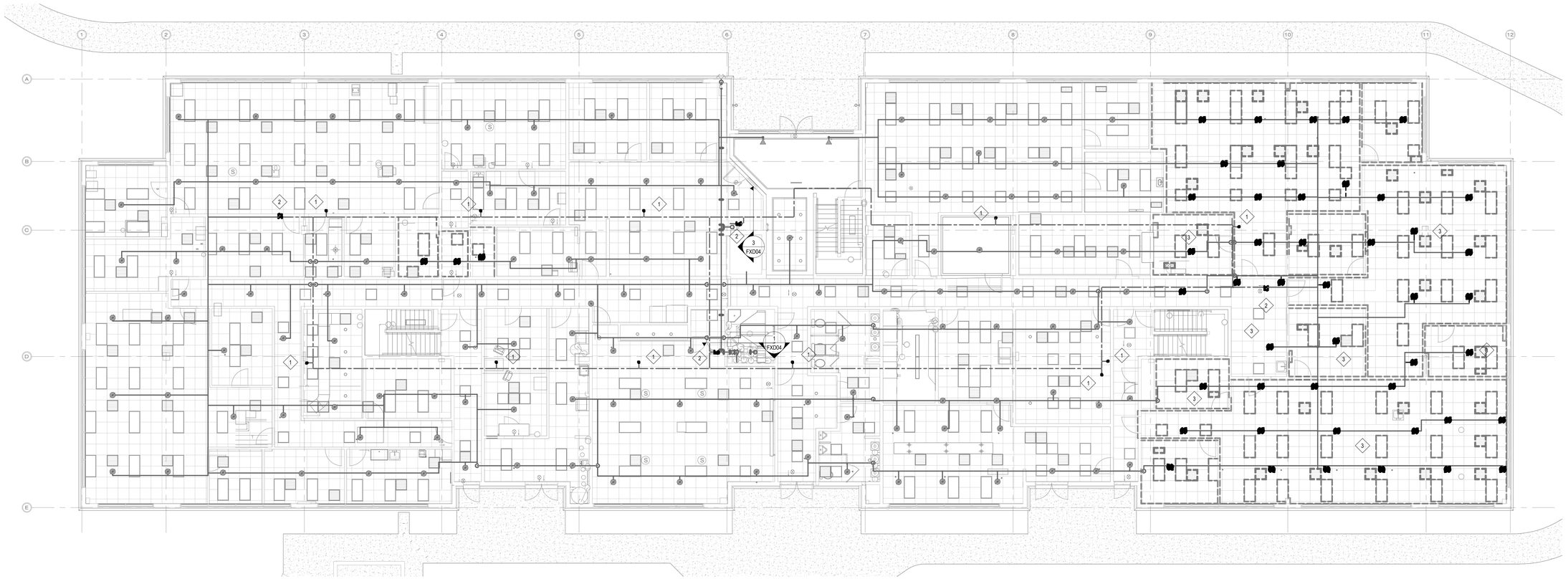
SHEET TITLE
LEVEL 2/3 FIRE SPRK PLANS

SHEET
FX102

DATE
MAY 28, 2026

FIRE PROTECTION DEMO NOTES

1 REMOVE AND CAP EXISTING CONTROL VALVE AND CONNECTION TO HVAC FAN-COIL UNIT.
2 REMOVE EXISTING CHECK VALVE BETWEEN (E) CHILLER PIPING AND (E) SPRINKLER PIPING.
3 DEMO ALL EXISTING SPRINKLERS AND BRANCH LINES BACK TO EXISTING OUTLETS IN THIS ROOM AS SHOWN.



1 FXD01 FIRST FLOOR FIRE SPRINKLER DEMO PLAN
1/8" = 1'-0"

8' 0 8' 16'
SCALE: 1/8" = 1' - 0"

100% CONSTRUCTION DOCUMENTS

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STATE OF MONTANA
JASON A. ANDERSON
No. 11806PE
LICENSED PROFESSIONAL ENGINEER

PPA#22-0045
A/E#00-00-00
BA# 2236

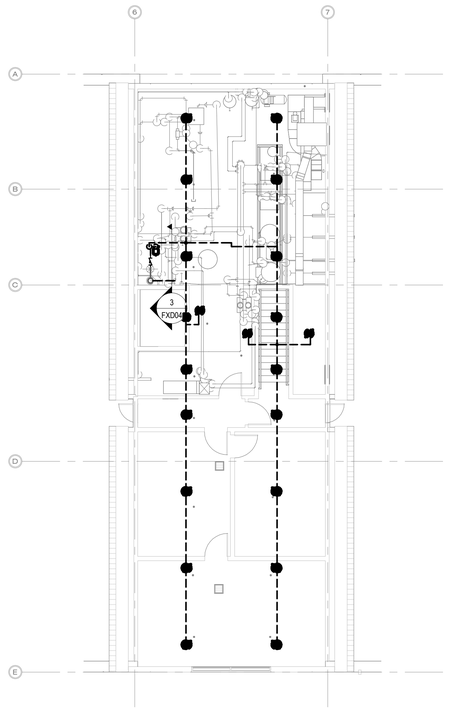
SHEET TITLE
LEVEL 1 FIRE DEMO PLAN

SHEET
FXD01

DATE
MAY 28, 2026

FIRE PROTECTION DEMO NOTES

1 REMOVE AND CAP EXISTING CONTROL VALVE AND CONNECTION TO HVAC FAN-COIL UNIT.
2 REMOVE EXISTING CHECK VALVE BETWEEN (E) CHILLER PIPING AND (E) SPRINKLER PIPING.
3 DEMO ALL EXISTING SPRINKLERS AND BRANCH LINES BACK TO EXISTING OUTLETS IN THIS ROOM AS SHOWN.

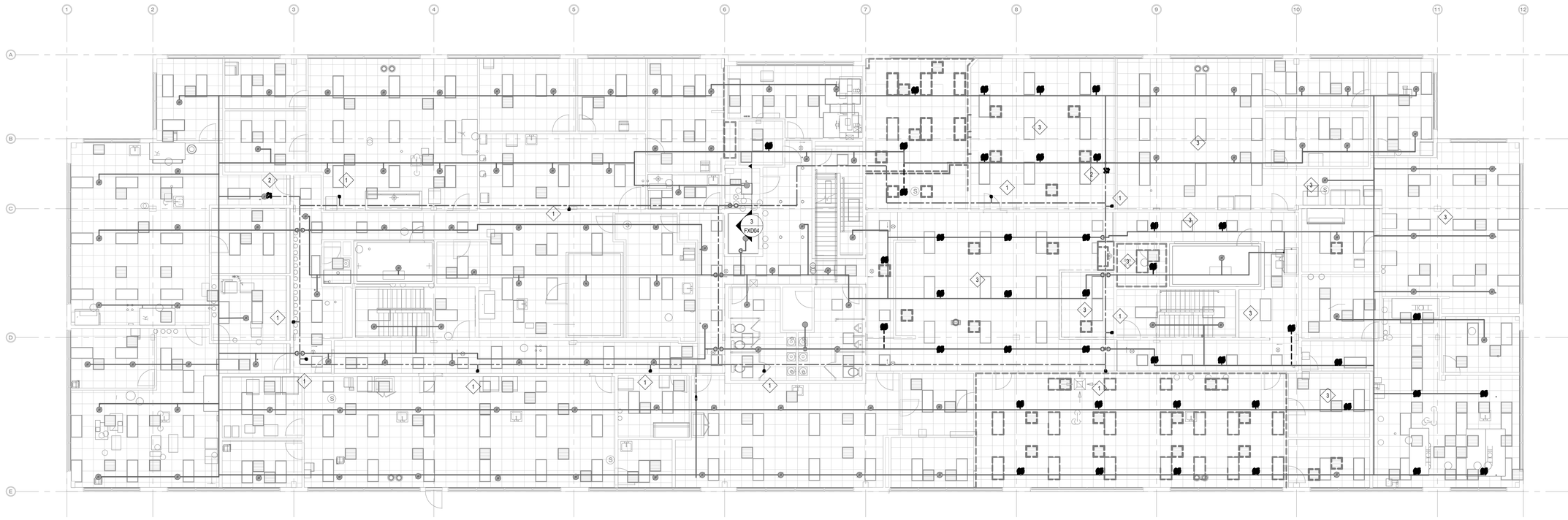


SCOPE NOTE:
EXISTING ANTI-FREEZE SYSTEM AND ITS COMPONENTS ARE TO BE ABANDONED, DRY-TYPE PENDENTS SHALL BE REMOVED

M.S.U. DIRECTION IS TO COMPLETELY FILL THE ENTIRE ATTIC SPACE WITH NON-COMBUSTIBLE INSULATION AND PROTECT THE ROOMS WITH NEW EXPOSED WET-SYSTEM PIPING.

2 FXD02 THIRD FLOOR FIRE SPRINKLER DEMO PLAN
1/8" = 1'-0"

8' 0 8' 16'
SCALE: 1/8" = 1' - 0"



1 FXD02 SECOND FLOOR FIRE SPRINKLER DEMO PLAN
1/8" = 1'-0"

8' 0 8' 16'
SCALE: 1/8" = 1' - 0"

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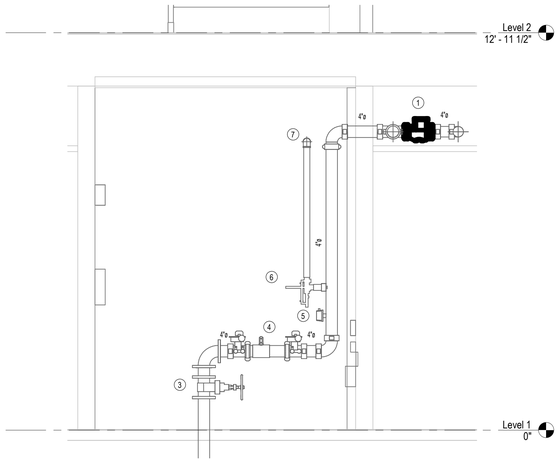
No. 11805PE
LICENSED PROFESSIONAL ENGINEER

PPA#22-0045
A/E#00-00-00
BA# 2236

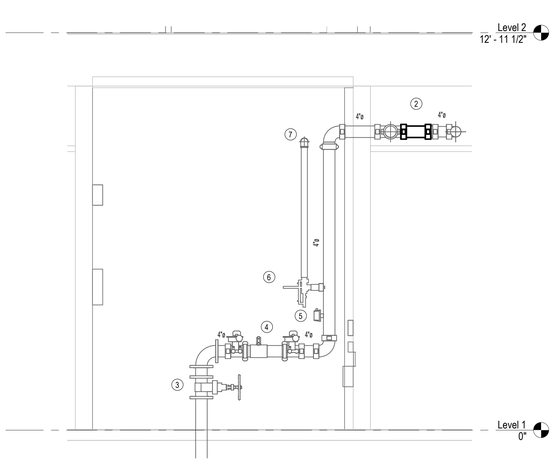
SHEET TITLE
LEVEL 2/3 FIRE DEMO PLANS

SHEET
FXD02

DATE
MAY 28, 2026



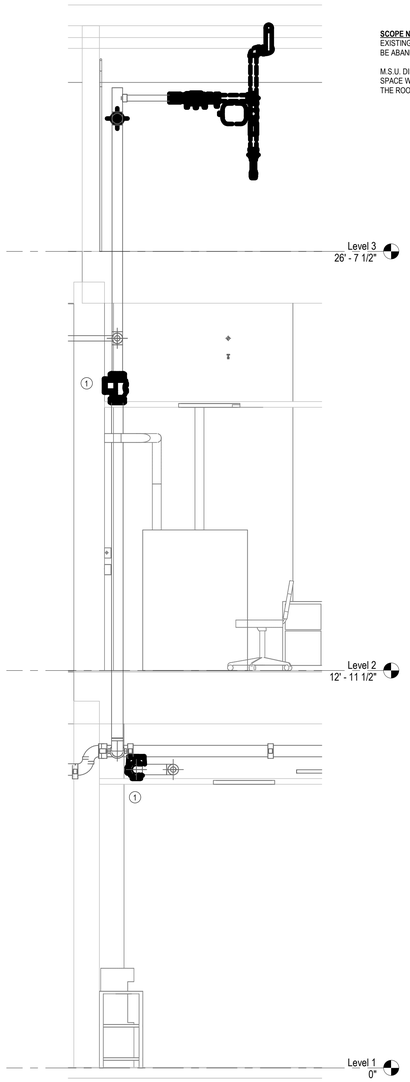
1 FXD04 FIRE SPRINKLER RISER SECTION DEMO
1/2" = 1'-0"



2 FXD04 FIRE SPRINKLER RISER SECTION NEW
1/2" = 1'-0"

EXISTING RISER LEGEND (X) (XX)

1 REMOVE EXISTING CHECK VALVE BETWEEN (E) CHILLER PIPING AND (E) SPRINKLER PIPING.
2 INSTALL NEW FILLER PIPING IN FORMER CHECK VALVE LOCATION.
3 (E) 4" FLANGED OS&Y GATE VALVE
4 (E) 4" DOUBLE CHECK VALVE ASSEMBLY WITH GROOVED BUTTERFLY VALVES AND BUILT-IN TAMPER SWITCHES
5 (E) PADDLE TYPE FLOW SWITCH
6 (E) 2" TEST-AND-DRAIN VALVE WITH PRESSURE RELIEF VALVE
7 (E) MAIN DRAIN TERMINATES THROUGH EXTERIOR WALL



SCOPE NOTE:
EXISTING ANTI-FREEZE SYSTEM AND ITS COMPONENTS ARE TO BE ABANDONED, DRY-TYPE PENDENTS SHALL BE REMOVED

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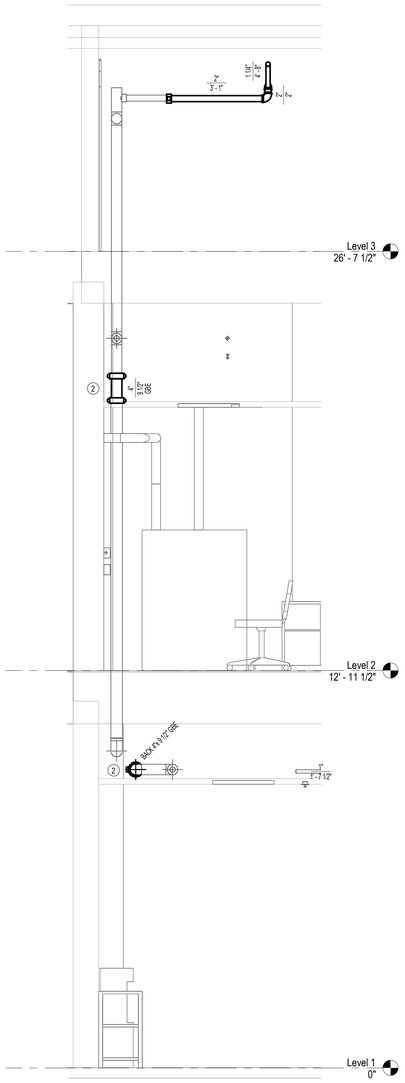
3 FXD04 VERTICAL PIPING SECTION DEMO
1/2" = 1'-0"



4 FXD04 VERTICAL PIPING SECTION NEW
1/2" = 1'-0"

2' 0 2' 4'
SCALE: 1/2" = 1' - 0"

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SHEET TITLE
RISER AND DEMO SECTIONS

SHEET
FXD04

DATE
MAY 28, 2026