Michigan State University

Engineering Research Complex
Renovate D115, Cryo-EM Expansion

East Lansing, Michigan

Capital Project Number - CP23116

Issued for Bids and Construction May 16, 2024

Project Number: 240252

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Grand Rapids, Michigan

DRAWING INDEX

GENERAL ABBREVIATIONS

ACM	ALUMINUM COMPOSITE MATERIAL	EF	EXHAUST FAN	IN	INCH/INCHES	NTS	NOT TO SCALE	SF	SQUARE FOOT
AFF	ABOVE FINISHED FLOOR	EL	ELEVATION	INSUL	INSULATION	OC	ON CENTER	SGT	STRUCTURAL GLAZED TILE
AHU	AIR HANDLING UNIT	EJ	EXPANSION JOINT	LAV	LAVATORY	OD	OUTSIDE DIAMETER	SIM	SIMILAR
AL	ALUMINUM	EQ	EQUAL	LED	LIGHT EMITTING DIODE	OF/CI	OWNER FURNISHED / CONTRACTOR INSTALLED	SP	SPACE/SPACING
ALT	ALTERNATE	EWC	ELECTRIC WATER COOLER	LLH	LONG LEG HORIZONTAL			SQ	SQUARE
BF	BARRIER FREE	FD	FLOOR DRAIN	LLV	LONG LEG VERTICAL	OF/OI	OWNER FURNISHED / OWNER INSTALLED	SS	STAINLESS STEEL
BRG	BEARING	FRT	FIRE RETARDANT TREATED	LP	LOW POINT	OH	OVERHEAD	STD	STANDARD
CJ	CONTROL JOINT	FT	FOOT/FEET	MFR	MANUFACTURER	OPP	OPPOSITE	TAN	TANGENT
CL	CENTERLINE	GA	GUAGE/GAGE	MAX	MAXIMUM	ORD	OVERFLOW ROOF DRAIN	TYP	TYPICAL
CW	CURTAINWALL	GALV	GALVANIZED	MEZZ	MEZZANINE	OS	OUTSIDE	UL	UNDERWRITER'S LABORATORY
CLG	CEILING	GC	GENERAL CONTRACTOR	MIN	MINIMUM	PERP	PERPENDICULAR	UNO	UNLESS NOTED OTHERWISE
CMU	CONCRETE MASONRY UNIT	HB	HOSE BIBB	MO	MASONRY OPENING	PL	PLATE	VERT	VERTICAL
CO	CLEANOUT	HP	HIGH POINT	MTD	MOUNTED	PSF	POUNDS PER SQUARE FOOT	VTR	VENT THROUGH ROOF
CONC	CONCRETE	HORIZ	HORIZONTAL	N/A	NOT APPLICABLE	PSI	POUNDS PER SQUARE INCH	W/	WITH
CONST	CONSTRUCTION	HVAC	HEATING VENTILATING AIR CONDITIONING	NC	NOISE CRITERIA	PVC	POLYVINYL CHLORIDE	WC	WATER CLOSET
CONT	CONTINUOUS			NIC	NOT IN CONTRACT	R	RADIUS	WH	WATER HEATER
DIA	DIAMETER	ID	INSIDE DIAMETER	NO	NUMBER	REQD	REQUIRED	W/O	WITHOUT
DN	DOWN	IE	INVERT ELEVATION	NRC	NOISE REDUCTION COEFFICIENT	RD	ROOF DRAIN	WP	WEATHERPROOF
DS	DOWNSPOUT	IMP	INSULATED METAL PANEL			SCH	SCHEDULE	WT	WEIGHT

GRAPHIC SYMBOLS

SECTION CUT LINE

ELEVATION, SECTION, AND DETAIL DESIGNATION

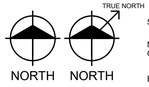
PLAN DESIGNATION

LEVEL CALLOUT — FIRST FLOOR 100'-0"

EXTERIOR ELEVATION TAG

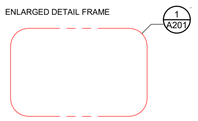
INTERIOR ELEVATION / PHOTO TAG

NORTH ARROW DESIGNATION



ROOM NAME AND NUMBER — ROOM NAME 101

ENLARGED DETAIL FRAME



ELEVATION TARGET

SPOT ELEVATION — EL. 100'-0"

NEW CONSTRUCTION GRID — 000

EXISTING GRID — 000

REVISION CLOUD

SIGNAGE TAG — 1

FINISH TAG — 2b1

BULLETIN IDENTIFICATION — B1

ADDENDUM IDENTIFICATION — A1

SKETCH IDENTIFICATION — S1

BARRIER FREE LOCATION

KEY NOTE TAG — 1

DEMOLITION NOTE TAG — 1

fishbeck

Proj. No.:	240252
Dwg. By:	CEB
Designer:	CLF
Reviewer:	MTV
Manager:	TSP

BUILDING CODE INFORMATION

THE DRAWINGS HAVE BEEN PREPARED IN ACCORDANCE WITH THE FOLLOWING CODES. NOTIFY THE ARCHITECT OF ANY CONFLICTS.

CODES

2015	MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS (AS AMENDED)
2021	MICHIGAN MECHANICAL CODE (AS AMENDED)
2021	MICHIGAN PLUMBING CODE
2017	NATIONAL ELECTRIC CODE (NEC)(AS AMENDED - MICHIGAN AMENDMENTS PART 8 RULES)
2015	MICHIGAN ENERGY CODE INTERNATIONAL ENERGY CONSERVATION CODE - 2015, SECTION 501.1 ANSI / ASHRAE / IESNA STANDARD - 2013, 90.1 (AS AMENDED)
2015	INTERNATIONAL FIRE CODE

ITEM		CODE SECTION (INCL. AMENDMENTS)
CLASSIFICATION OF WORK		
WORK WITHIN THE FIRST FLOOR OF THE EXISTING ENGINEERING RESEARCH COMPLEX BUILDING IS TO BE CLASSIFED AS AN **ALTERATION LEVEL 2** SINCE THEY INVOLVE THE RECONFIGURATION OF SPACE, RECONFIGURATION OR EXTENSION OF SYSTEM AND THE INSTALLATION OF ADDITIONAL EQUIPMENT FOR LESS THAN 50% OF THE AGGREGATE AREA.		(MRC-SEC. 504.1)
BUILDING USE GROUP		
BUILDING USE GROUP:	B (BUSINESS) (NO CHANGE IN THIS PROJECT)	(MBC - SEC. 312)
TYPE OF CONSTRUCTION		
CONSTRUCTION TYPE:	5B (SPRINKLED) (NO CHANGE IN THIS PROJECT)	(MBC - SEC. 602)
BUILDING HEIGHT		
ALLOWABLE HEIGHT: ACTUAL HEIGHT:	3 STORIES; 60 FT 1 STORY, EXISTING (NO CHANGE IN THIS PROJECT)	(MBC - TBL. 504.3 & 504.4)
BUILDING AREA		
ALLOWABLE AREA:	63,000 SQ.FT.	(MBC - TBL. 506.2 & MBC - SEC. 506.2)
ACTUAL AREA:	EXISTING (NO CHANGE IN THIS PROJECT)	

BUILDING OCCUPANCY

NO ADDTIONAL BUILDING AREA OR OCCUPANCY CHANGE PROPOSED IN THIS PROJECT WHICH WOULD CAUSE AN INCREASE TO BUILDING OCCUPANCY.
NO CHANGE IN THIS PROJECT.

EGRESS COMPONENTS:

MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS, SECTION 805, RECONFIGURATION WORK, SHALL COMPLY WITH THIS SECTION.
MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS, SECTION 704, WORK OTHER THAN RECONFIGURATION WORK SHALL BE DONE IN A MANNER THAT MAINTAINS THE LEVEL OF PROTECTION PROVIDED FOR THE MEANS OF EGRESS.

ACCESSIBILITY

MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS, SECTION 806, RECONFIGURATION WORK, SHALL COMPLY WITH THIS SECTION.
MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS, SECTION 705, WORK OTHER THAN RECONFIGURATION WORK SHALL BE DONE IN A MANNER THAT MAINTAINS THE LEVEL OF ACCESSIBILITY THE BUILDING OR ELEMENT.

PLUMBING FIXTURE COUNT

MICHIGAN REHABILITATION CODE FOR EXISTING BUILDINGS, SECTION 810, THERE IS NO INCREASE TO THE OCCUPANT LOAD. LIKEWISE NO WORK OCCURS IN EXISTING TOILET OR PLUMBING FACILITIES. NO CHANGE IN THIS PROJECT.

FIRE RESISTANCE RATINGS OF STRUCTURAL ELEMENTS

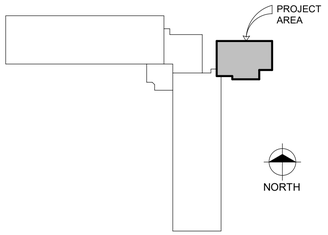
ITEM	RATING	UL NO.	REMARKS
STRUCTURAL FRAME	0	--	(TABLE 601)
BEARING WALLS - EXT.	0	--	(TABLE 601 & 602)
BEARING WALLS - INT.	0	--	(TABLE 601)
NONBEARING WALLS - EXT.	0	--	(TABLE 601 & 602)
NONBEARING WALLS - INT.	0	--	(TABLE 601)
FLOOR CONSTRUCTION	0	--	(TABLE 601)
ROOF CONSTRUCTION	0	--	(TABLE 601)

INTERIOR FINISHES

PER MICHIGAN BUILDING CODE TABLE 803.11:

- CORRIDORS AND ENCLOSURE FOR EXIT ACCESS:	CLASS C
- ROOMS AND ENCLOSED SPACES:	CLASS C

KEY PLAN



Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP23116

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ARCH.	D. LAUNSTEIN
MECH.	A. VANDERSTELT
ELEC.	G. HALSEY
CIVIL	
L.A.	
INT. DES.	D. WHITBECK
CONST. REP.	
APPR.	
DATE	
SCALE	AS SHOWN
REVISIONS	
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COVER SHEET/SHEET INDEX/CODE TABLE

G-001

CODE LEGEND

EXIT ACCESS TRAVEL: X'-X"
MAX. ALLOWABLE = 300'-0"

EXIT ACCESS TRAVEL : DISTANCE FROM THE MOST REMOTE POINT TO AN EXIT (INCLUDES COMMON PATH OF TRAVEL)

MAXIMUM ALLOWABLE DISTANCE PER CODE

COMMON PATH OF TRAVEL: X'-X"
MAX. ALLOWABLE = 100'-0"

COMMON PATH OF TRAVEL - DISTANCE TO REACH A POINT WHERE TWO SEPARATE PATHS TO EXITS ARE AVAILABLE.

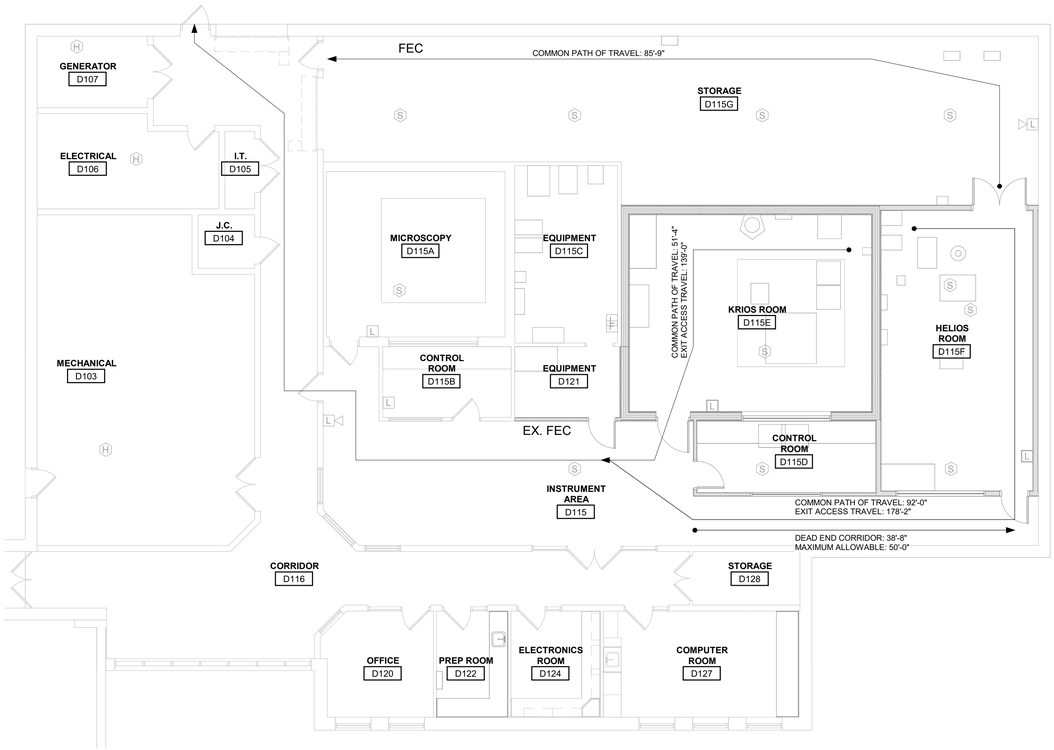
MAXIMUM ALLOWABLE DISTANCE PER CODE

FEC

LOCATION OF WALL MOUNTED FIRE EXTINGUISHER CABINET WITH EXTINGUISHER.
VERIFY IN FIELD WITH FIRE MARSHAL, 75'-0" ,MAXIMUM TRAVEL DISTANCE BETWEEN CABINETS / EXTINGUISHERS. FIRE EXTINGUISHERS TO BE TYPE 2-A:10-B:C (VERIFY FIRE EXTINGUISHER TYPE AND LOCATION WITH FIRE MARSHAL).
FIRE EXTINGUISHER BRACKET TO BE STEEL, PAINTED BLACK, SIZE BRACKET AS REQUIRED FOR SPECIFIED FIRE EXTINGUISHER.

EX. FEC

RELOCATED FIRE EXTINGUISHER WITH CABINET

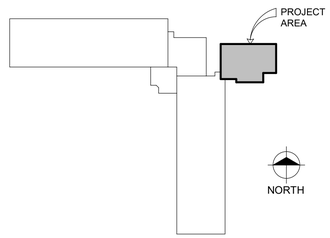


NORTH

LIFE SAFETY PLAN

SCALE: 1/8" = 1'-0"

KEY PLAN



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APPR.	
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SCALE	AS SHOWN

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LIFE SAFETY PLAN

G-002

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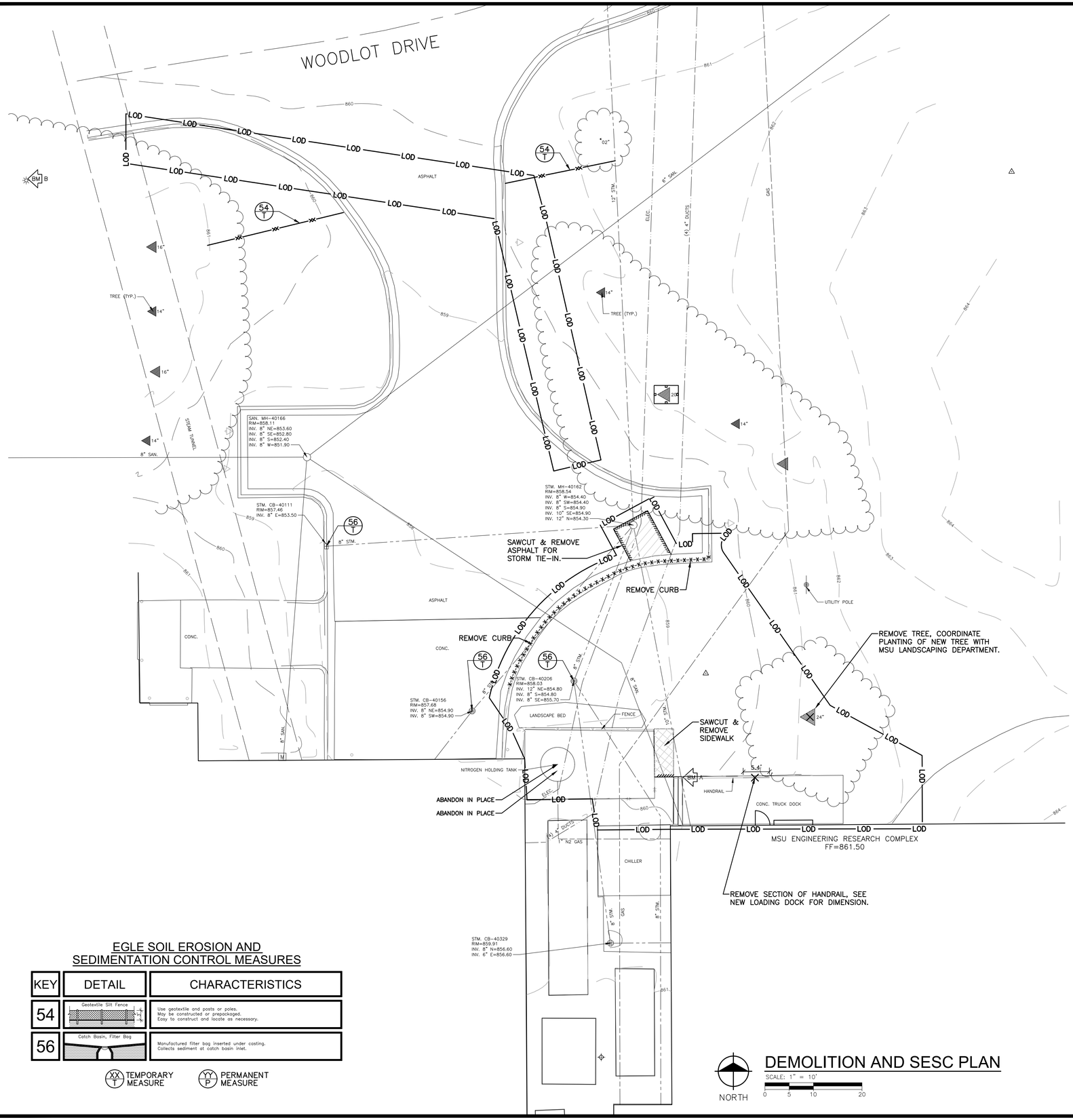
PLOT INFO: 6/17/2024 2:38:54 PM



EGLE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES

KEY	DETAIL	CHARACTERISTICS
54	Geotextile Silt Fence	Use geotextile and posts or poles. May be constructed or prepackaged. Easy to construct and locate as necessary.
56	Catch Basin, Filter Bag	Manufactured filter bag inserted under casting. Collects sediment at catch basin inlet.

(XX T) TEMPORARY MEASURE (YY P) PERMANENT MEASURE

DEMOLITION AND SESC PLAN

SCALE: 1" = 10'

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Dwg. By: BEV
Designer: BEV
Reviewer: NB
Manager: TSP

BENCHMARKS

BENCH MARK A ELEVATION: 861.29
NW CORNER OF TOP STEP AT ENTRANCE TO EAST BUILDING OF CRYO-EM FACILITY

BENCH MARK B ELEVATION: 861.09
NORTHEAST BOLT ON LIGHT POLE BASE, WEST OF DRIVE WAY TO CRYO-EM BUILDING

SYMBOL LEGEND

- LOD — LIMITS OF DISTURBANCE
- SILT FENCE
- 725 — EXISTING MAJOR CONTOUR
- 724 — EXISTING MINOR CONTOUR
- SAWCUT
- CURB REMOVAL
- REMOVE PIPE
- REMOVE OBJECT
- REMOVE BITUMINOUS PAVEMENT FULL DEPTH
- REMOVE CONCRETE PAVEMENT

DEMOLITION NOTES

1. FIELD VERIFY THE EXTENT OF REMOVALS AND DEMOLITION PRIOR TO CONSTRUCTION. NOTIFY ENGINEER OF ANY DEVIATIONS FROM INFORMATION SHOWN.
2. PRIOR TO CONSTRUCTION ALL FENCING, BARRICADES, ENCLOSURES, ETC., MUST BE INSTALLED AND APPROVED BY OWNER OR CONSTRUCTION MANAGER.
3. DISPOSE OF DEMOLITION AND EXCAVATION MATERIALS IN ACCORDANCE WITH CONTRACT DOCUMENTS.
4. SOIL EROSION AND SEDIMENTATION CONTROL MEASURES MUST BE IN PLACE PRIOR TO STARTING REMOVALS AND DEMOLITION.
5. UNLESS SPECIFICALLY NOTED FOR REMOVAL ON THE PLANS, PROTECT ALL SIDEWALKS, DRIVES, CULVERTS, DRAINAGE STRUCTURES, AND ABOVE AS WELL AS BELOW GRADE UTILITIES. REMOVE AND REPLACE ALL SUCH ITEMS DAMAGED OR DESTROYED DURING CONSTRUCTION WITH NEW AT NO ADDITIONAL COST TO THE OWNER.
6. PROTECT EXISTING TREES TO REMAIN WITH TEMPORARY FENCING.
7. COORDINATE REMOVAL OR REPLACEMENT OF ELECTRICAL, TELEPHONE, CABLE TV, WATER, FIBER OPTIC CABLE AND/OR GAS LINES WITH THE AFFECTED UTILITY COMPANY. ADEQUATE TIME SHALL BE PROVIDED FOR RELOCATION AND CLOSE COORDINATION WITH THE UTILITY COMPANY TO PROVIDE A SMOOTH TRANSITION IN UTILITY SERVICE. PAY CLOSE ATTENTION TO EXISTING UTILITIES WITHIN THE CONSTRUCTION LIMITS. GIVE NOTICE TO ALL UTILITY COMPANIES REGARDING DESTRUCTION AND REMOVAL OF ALL SERVICE LINES AND CAP ALL LINES BEFORE PROCEEDING WITH THE WORK.
8. PERFORM CLEARING, GRUBBING, TREE AND STUMP REMOVAL, TOPSOIL REMOVAL AND STOCKPILING IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
9. BEFORE REMOVING OR ABANDONING ANY UTILITY PIPES, VERIFY NEW UTILITY PIPE HAS BEEN INSTALLED, TESTED AND IS OPERATIONAL.
10. THE LOCATIONS OF ALL EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN DETERMINED FROM THE BEST INFORMATION AVAILABLE AND ARE GIVEN FOR THE CONVENIENCE OF THE CONTRACTOR. VERIFY CRITICAL INVERT INFORMATION PRIOR TO BEGINNING CONSTRUCTION.
11. SAWCUT AND REPLACE DAMAGE CAUSED TO SURROUNDING AREA PAVEMENT OUTSIDE THE CONSTRUCTION LIMITS AT NO ADDITIONAL COST TO THE OWNER.
12. COORDINATE SEQUENCING AND PHASING OF DEMOLITION WITH CONSTRUCTION MANAGER.
13. SEE OTHER DRAWINGS FOR ADDITIONAL SITE DEMOLITION WORK.
14. SAWCUT CURB AND GUTTER AND SIDEWALKS TO NEAREST JOINT.

SESC NOTES

1. MAINTAIN A COPY OF THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) ON THE SITE FOR THE DURATION OF CONSTRUCTION, IF REQUIRED. ADHERE TO THE SWPPP DURING CONSTRUCTION OPERATIONS.
2. MAINTAIN AND REPAIR ALL SESC BEST MANAGEMENT PRACTICES BMPS DURING CONSTRUCTION UNTIL ALL VEGETATION IS ESTABLISHED, (ALL DISTURBED SOIL SURFACES ARE UNIFORMLY COVERED IN PERMANENT VEGETATION WITH A DENSITY OF 70% OR GREATER, OR AS DEFINED BY PERMIT.)
3. PERFORM ALL EARTH-DISTURBING CONSTRUCTION ACTIVITIES WITHIN THE LIMITS OF DISTURBANCE AS INDICATED ON THE DRAWINGS.
4. REVIEW THE LIMITS OF DISTURBANCE SHOWN ON THE DRAWINGS AND FIELD-STAKING THE LIMIT OF DISTURBANCE LINE PRIOR TO THE START OF CONSTRUCTION AND/OR CONTRACTORS OPERATIONS AT NO ADDITIONAL COST TO OWNER.
5. INSTALL PERIMETER EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO THE START OF ANY LAND CLEARING OR GRADING ACTIVITIES.
6. APPLY TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES AS SHOWN ON THE DRAWINGS AND/OR AS REQUIRED BY SESC PERMIT AND IMPLEMENT ADDITIONAL MEASURES AS DICTATED BY SITE CONDITIONS.
7. ENSURE THAT ANY SEDIMENTATION RESULTING FROM WORK ON THIS SITE IS CONTAINED ON THE SITE AND NOT ALLOWED TO COLLECT ON ANY OFF-SITE AREAS OR IN WATERWAYS.
8. LEAVE SLOPES IN A ROUGHENED CONDITION DURING THE GRADING PHASE TO REDUCE RUNOFF VELOCITIES AND EROSION.
9. LOCATE LAY DOWN, STAGING AND STOCKPILE AREAS WITHIN THE PERMITTED LIMITS OF DISTURBANCE.
10. INSTALL SILT FENCE AROUND THE PERIMETER OF ON-SITE SOIL STOCKPILE AREAS IF RUNOFF CAN IMPACT A STABILIZED PART OF THE SITE, OR LEAVE THE SITE. ADDITIONALLY, INACTIVE PORTIONS OF THE STOCKPILE AREAS ARE TO BE STABILIZED AS REQUIRED BY PERMIT.
11. IMPLEMENT TEMPORARY STABILIZATION MEASURES ON ANY DISTURBED AREAS WHERE CONSTRUCTION ACTIVITIES WILL NOT RESUME FOR 14 DAYS OR MORE. IMPLEMENTATION OF TEMPORARY STABILIZATION MEASURES MUST BE INITIATED IMMEDIATELY AND COMPLETED WITHIN SEVEN (7) DAYS FROM WHEN CONSTRUCTION ACTIVITIES TEMPORARILY CEASED ON ANY PORTION OF THE SITE. APPLY 3-5 LBS/1000 SFT. TEMPORARY SEED AND STRAW MULCH OVER DISTURBED AREA.
12. TOPSOIL AND SEED ALL EXPOSED AREAS WITHIN SEVEN (7) CALENDAR DAYS FOLLOWING THE CONCLUSION OF FINAL GRADING IN THAT AREA.
13. REGULARLY CHECK SEEDED AREAS TO SEE THAT A GOOD STAND OF VEGETATION IS "ESTABLISHED". VEGETATION WILL NOT BE CONSIDERED "ESTABLISHED" UNTIL 100% OF THE SOIL SURFACE IS UNIFORMLY COVERED WITH PERMANENT VEGETATION WITH A DENSITY OF 70% OR GREATER. FERTILIZE, WATER, RESEED AND MULCH AS NEEDED.
14. MINIMIZE TRACKING OF SOIL AND SEDIMENT ONTO OFF-SITE ROADWAYS THROUGH THE USE OF APPROPRIATE MEASURES. IMMEDIATELY REMOVE ANY SOIL OR SEDIMENT TRACKED ONTO THE ROADWAYS.
15. NO VEHICLES AND EQUIPMENT CLEANING IS ALLOWED AT LOCATIONS WHERE RUNOFF COULD FLOW DIRECTLY INTO A WATER COURSE OR DOWNSTREAM STORM SEWER.
16. CONTRACTOR TO USE APPROPRIATE MEASURES DURING CONSTRUCTION TO CONTROL AIRBORNE SEDIMENTATION INCLUDING WATERING EXPOSED SOILS, PLACING WIND FENCING, PLANTING TEMPORARY VEGETATION, ETC.
17. SITE SOILS: SPINKS LOAMY SAND
18. LIMITS OF DISTURBANCE: < 1 ACRE
19. PROXIMITY TO NEAREST BODY OF WATER: 900 FEET (BIEBESHIEMER DRAIN)

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APPR.	
DATE	
SCALE	AS SHOWN

REVISIONS
5/16/2024 Bids & Construction

DEMOLITION AND SESC PLAN

DC-001

3 OF 42

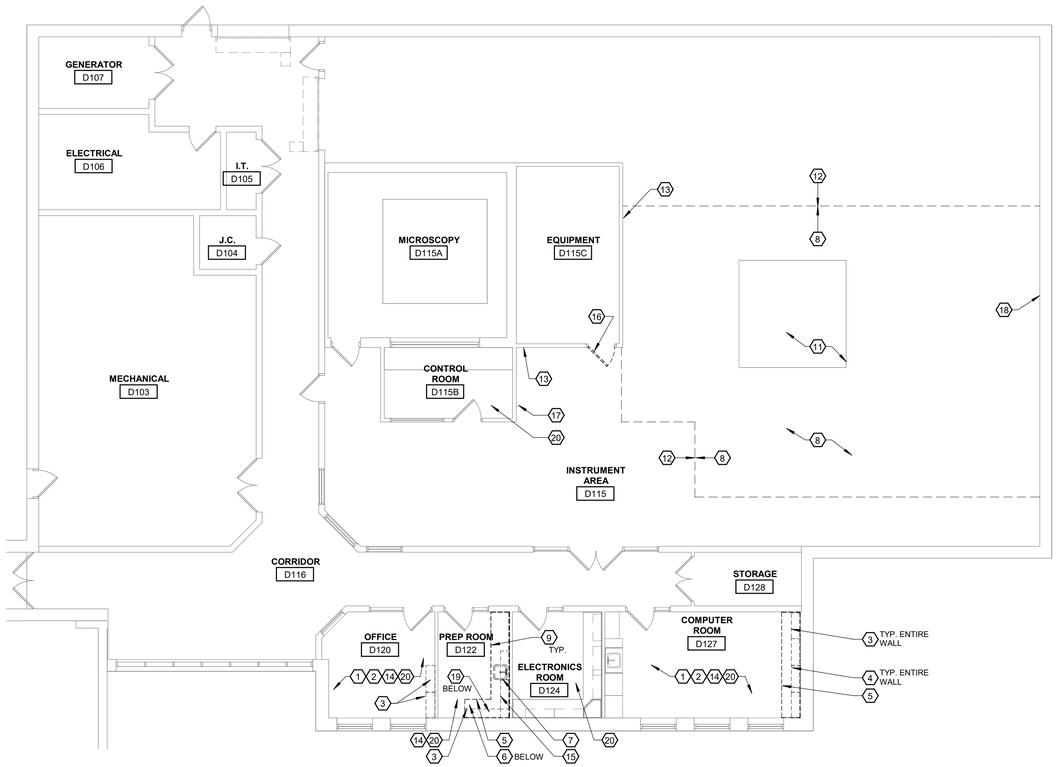
PLOT INFO: Z:\2024\240252\CAD\CD\DC-001_240252.DWG LAYOUT: DC-001 DATE: 6/17/2024 TIME: 12:60:14 PM USER: BVEINE

DEMOLITION SYMBOL LEGEND

- EXISTING WALLS TO REMAIN
- EXISTING ITEM TO BE REMOVED
- EXISTING DOOR TO REMAIN
- EXISTING DOOR TO BE REMOVED, EXISTING FRAME TO REMAIN

GENERAL DEMOLITION NOTES

1. GENERAL DEMOLITION NOTES, KEYED DEMOLITION NOTES AND SPECIFICATIONS (SECTION II - DEMOLITION) APPLY TO ARCHITECTURAL DEMOLITION PLANS INCLUDED WITHIN THIS DOCUMENT SET.
2. THESE DEMOLITION NOTES AND PLANS DO NOT FULLY REPRESENT ALL DEMOLITION WORK REQUIRED TO INSTALL NEW WORK IN ACCORDANCE WITH CONTRACT DOCUMENTS, BUT ARE INTENDED TO SERVE AS GENERAL DEMOLITION GUIDELINES.
3. COORDINATE AND PHASE DEMOLITION IN ACCORDANCE WITH PLANS AND SPECIFICATIONS IN ORDER TO MAINTAIN BUILDING SECURITY, WEATHER TIGHTNESS, AND CONTINUING OPERATIONS FOR OWNER.
4. COORDINATE ALL DEMOLITION WORK WITH ALL OTHER CONSTRUCTION TRADES, INCLUDING STRUCTURAL, MECHANICAL, AND ELECTRICAL.
5. ALL WORK INDICATED WITH SOLID LINES IS EXISTING TO REMAIN, UNLESS OTHERWISE NOTED.
6. WHERE ITEMS ARE REMOVED, REFER TO NEW WORK DOCUMENTS FOR PATCH AND REPAIR REQUIREMENTS.
7. ALL ITEMS NOT PART OF THE SCOPE OF DEMOLITION ARE TO BE PRESERVED AND PROTECTED THROUGHOUT THE DURATION OF DEMOLITION AND CONSTRUCTION.



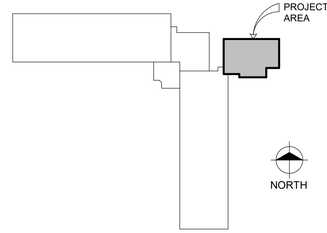
ARCHITECTURAL DEMOLITION PLAN

SCALE: 1/8" = 1'-0"

DEMOLITION KEY NOTES

#	
1	REMOVE EX. CARPET IN ITS ENTIRETY FROM ROOM / AREA.
2	REMOVE EX. WALL BASE IN ITS ENTIRETY FROM ROOM / AREA.
3	REMOVE EX. UPPER CABINET, INCLUDING ALL SUPPORTS / BRACKETS IN ITS ENTIRETY.
4	REMOVE EX.OPEN SHELVING UNITS (ABOVE WALL CABINETS), INCLUDING AIL SUPPORTS / BRACKETS IN ITS ENTIRETY.
5	REMOVE EX. COUNTERTOP WITH BACKSPLASHES AND SUPPORTS / BRACKETS IN ITS ENTIRETY.
6	REMOVE AND SALVAGE EX. FLAMMABLE CABINET AND TURN OVER TO OWNER (TO LOCATION TBD BY OWNER WITHIN ENGINEERING RESEARCH COMPLEX) REFER TO PLUMB.
7	REMOVE EX. SINK, REFER TO PLUMB.
8	REMOVE EX. RESILIENT FLOORING, FLOORING TO BE REMOVED SO NEW WALLS / STUDS ARE DIRECTLY ON EX. CONCRETE FLOOR SLAB, REFER TO NEW WORK PLAN FOR LAYOUT.
9	REMOVE EX. DRAWERS, FILLER PANELS AND COUNTER SUPPORTS IN THEIR ENTIRETY.
11	REMOVE EX. RESILIENT FLOORING AND TRANSITION STRIP FROM ISOLATION PAD, EX. CONCRETE ISOLATION PAD TO REMAIN.
12	EX. RESILIENT FLOORING TO REMAIN.
13	AT EX. WALL TO REMAIN, REMOVE EX. WALL BASE, TO FIRST NATURAL BREAK IN WALL PAST AREA WHERE FLOORING IS TO BE REMOVED.
14	OWNER TO REMOVE ALL FREESTANDING FURNITURE AND EQUIPMENT FROM ROOM / AREA PRIOR TO CONSTRUCTION. ANY FREESTANDING FURNITURE AND EQUIPMENT REMAINING AT THE START OF CONSTRUCTION IS TO BE REMOVED AND DISCARDED BY CONTRACTOR.
15	REMOVE EX.OPEN SHELVING UNITS, INCLUDING ALL SUPPORTS / BRACKETS IN ITS ENTIRETY.
16	REMOVE EX. DOOR AND HARDWARE IN ITS ENTIRETY. REMOVE AND SALVAGE CARD READER AND MAGNETIC CONTACT FOR RELOCATION. EX. DOOR FRAME TO REMAIN.
17	REMOVE AND SALVAGE SEMI-RECESSED EX. FIRE EXTINGUISHER W/ CABINET FOR RELOCATION.
18	REMOVE EX. WALL MOUNTED ACOUSTICAL PANEL (3 IN TOTAL, DIAMONDS SHAPE).
19	REMOVE EX. BASE CABINET, INCLUDING ALL SUPPORTS / BRACKETS IN ITS ENTIRETY.
20	REMOVE AND SALVAGE EX. CEILING PADS AND GRID AS REQUIRED FOR ANY INCIDENTAL ABOVE CEILING WORK; REFER TO MECH., ELECT. AND PLUMB. DRAWINGS.

KEY PLAN



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APPR.	
DATE	
SCALE	AS SHOWN
REVISIONS	

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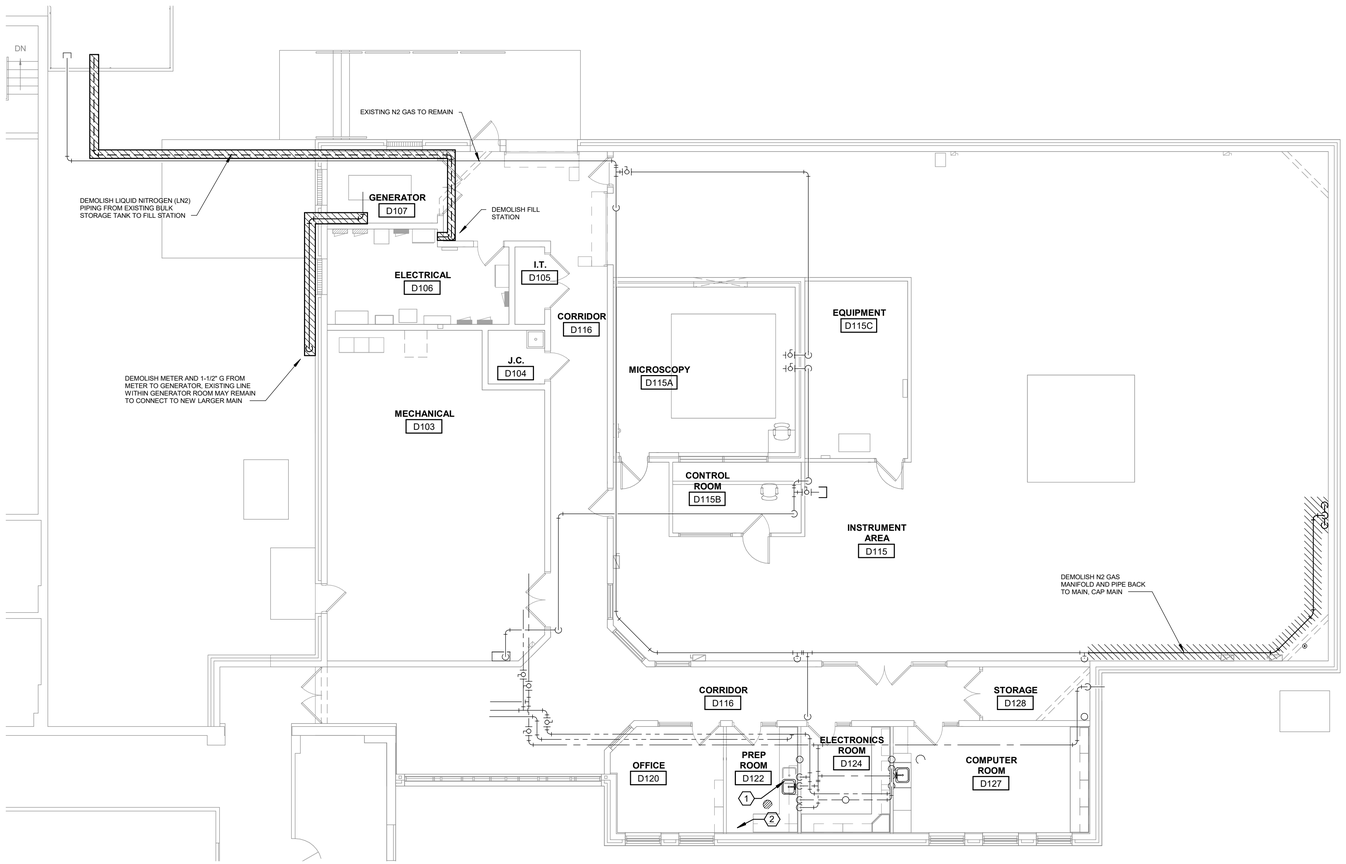
ARCHITECTURAL DEMOLITION PLAN

DA-001

PLOT INFO: 6/17/2024 2:38:53 PM



PLUMBING DEMOLITION PLAN

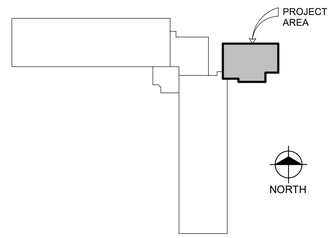
SCALE: 1/8" = 1'-0"

NORTH

DEMOLITION KEY NOTES

1. DEMOLISH SINK, FAUCET, EYEWASH, HW/CW, AND SANITARY TO SINK. SALVAGE HW, CW, AND SANITARY LINES TO REMAIN FOR CONNECTION TO NEW SINK.
2. DEMOLISH FLAMMABLE STORAGE CABINET AND 2" PVC PIPE. CAP PVC PIPE AT WALL.

KEY PLAN



fishbeck

Proj. No.: 240252
Dwg. By: CEB
Designer: DDL
Reviewer: GWL
Manager: TSP

Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP23116

PR. MGR.	Z. KIEFER
ARCH.	D. LAUNSTEIN
MECH.	A. VANDERSTELT
ELEC.	G. HALSEY
CIVIL	
L.A.	
INT. DES.	D. WHITBECK
CONST. REP.	
APPR.	
DATE	
SCALE	AS SHOWN

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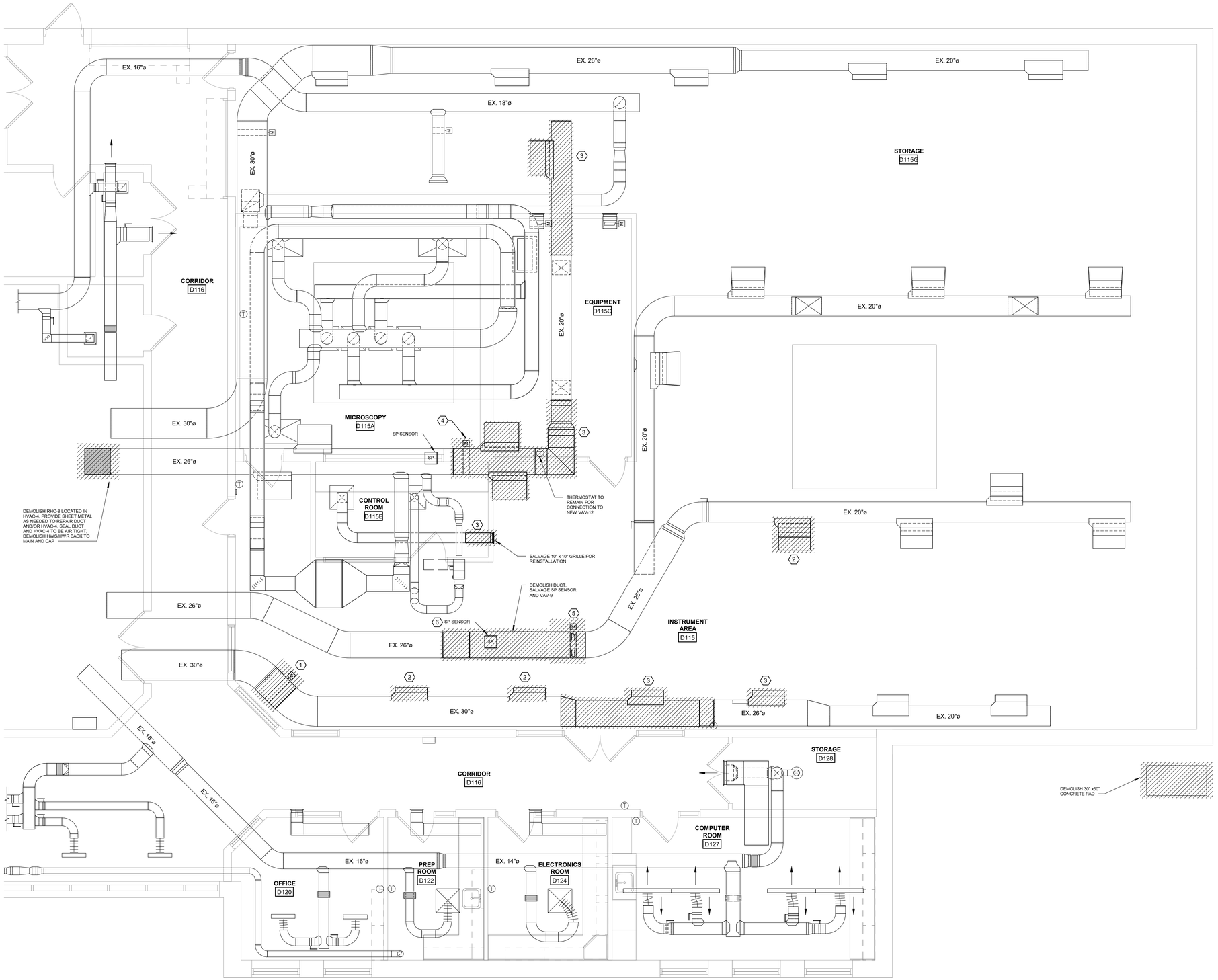
PLUMBING DEMOLITION PLAN

DP-001

PLOT INFO: 6/17/2024 12:40:15 PM



HVAC DEMOLITION PLAN

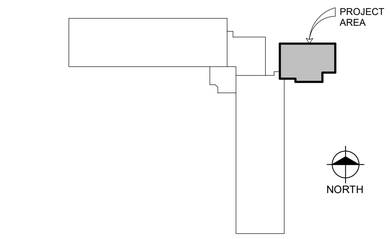
SCALE: 1/4" = 1'-0"

NORTH

DEMOLITION KEY NOTES

1. REMOVE AND SALVAGE EVAV-3 FOR REINSTALLATION. REMOVE PORTION OF DUCT AS NEEDED. COORDINATE REINSTALLATION OF DUCT SECTION WITH NEW WORK SEE SHEET M-002 FOR NEW WORK. PATCH, SEAL, AND PAINT DUCTWORK TO MATCH EXISTING.
2. DEMOLISH DIFFUSER/GRILLE, PATCH, PAINT, AND SEAL DUCTWORK TO MATCH EXISTING.
3. DEMOLISH, SEE SHEET M-002 FOR NEW WORK.
4. DEMOLISH VAV-8, SALVAGE THERMOSTAT WIRE TO BE REROUTED TO NEW VAV-12.
5. REMOVE AND SALVAGE VAV-9 FOR REINSTALLATION.
6. REMOVE AND SALVAGE DUCT STATIC PRESSURE SENSOR FOR REINSTALLATION.

KEY PLAN



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Proj. No.:	240252
Dwg. By:	CEB
Designer:	DDL
Reviewer:	GWL
Manager:	TSP

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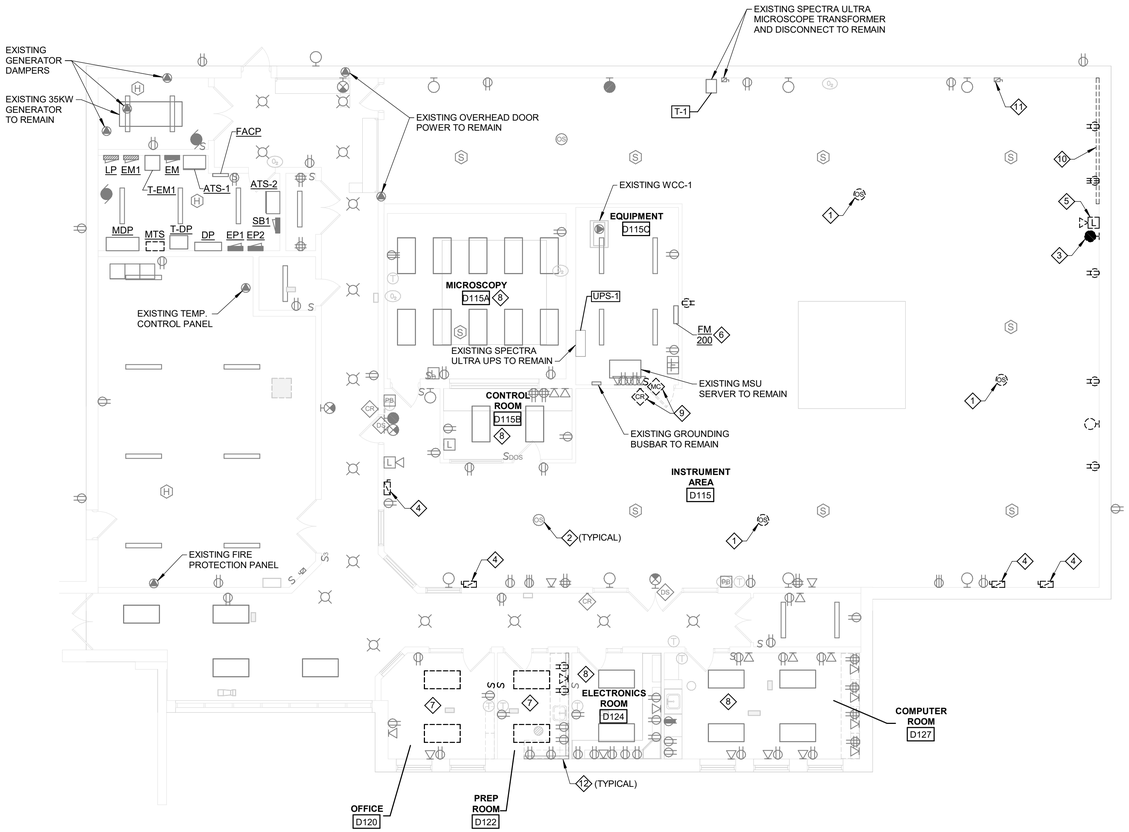
HVAC DEMOLITION PLAN

DM-001

6 OF 42

PLOT INFO: 6/17/2024 9:34:08 AM



FIRST FLOOR ELECTRICAL DEMOLITION PLAN

SCALE: 1/8" = 1'-0"

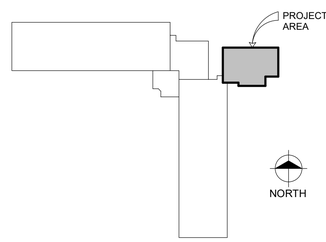
NOTES

1. DASHED OR DARK LINETYPES INDICATED DEVICES/LIGHTING FIXTURES TO BE REMOVED. REMOVE CONDUIT BACK TO SOURCE IF IT WILL NOT BE REUSED FOR NEW WORK. GRAYSCALE LINES INDICATED EQUIPMENT TO REMAIN.
2. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
3. SALVAGE DEMOLISHED LIGHT FIXTURES AND TURN OVER TO MICHIGAN STATE UNIVERSITY SURPLUS.

KEY NOTES

1. REMOVE AND SALVAGE OCCUPANCY SENSOR FOR REINSTALLATION. REFER TO E-005 FOR NEW LOCATION.
2. REMOVE AND SALVAGE ALL OCCUPANCY SENSORS LOCATED IN D115. REFER TO E-005.
3. REMOVE AND SALVAGE EXISTING WALL MOUNTED LIGHT FIXTURE FOR REINSTALLATION. REFER TO E-005 FOR NEW LOCATION.
4. DEMOLISH EXISTING DISCONNECT SWITCH.
5. REMOVE AND SALVAGE FIRE ALARM DEVICE FOR REINSTALLATION. REFER TO E-006 FOR NEW LOCATION.
6. EXISTING FM200 PANEL TO REMAIN. TIE IN NEW FM 200 SYSTEM DEVICES TO EXISTING FM200 PANEL. FIELD VERIFY EXACT REQUIREMENTS.
7. DEMOLISH EXISTING LIGHTING AND SWITCH IN SPACE. SALVAGE LIGHTING CIRCUIT FOR REUSE.
8. NO ELECTRICAL SCOPE IN SPACE.
9. REMOVE AND SALVAGE FOR NEW DOOR LOCATION. REFER TO E-007 FOR NEW LOCATION.
10. DEMOLISH EXISTING RACEWAY AND ACCOSIATED DEVICES AND WIRING. REMOVE CONDUCTORS AND CONDUIT BACK TO SOURCE.
11. REUSE EXISTING 60A DICSONNECT SWITCH. REFER TO ONE LINE DIAGRAM ON SHEET E-008 FOR MORE INFORMATION.
12. EXISTING WIREMOLD TO REMAIN.

KEY PLAN



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Proj. No.: 240252
Dwg. By: ACF
Designer: ACF
Reviewer: RMM
Manager: TSP

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MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

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ELEC.	G. HALSEY
CIVIL	
L.A.	
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DATE	
SCALE	AS SHOWN

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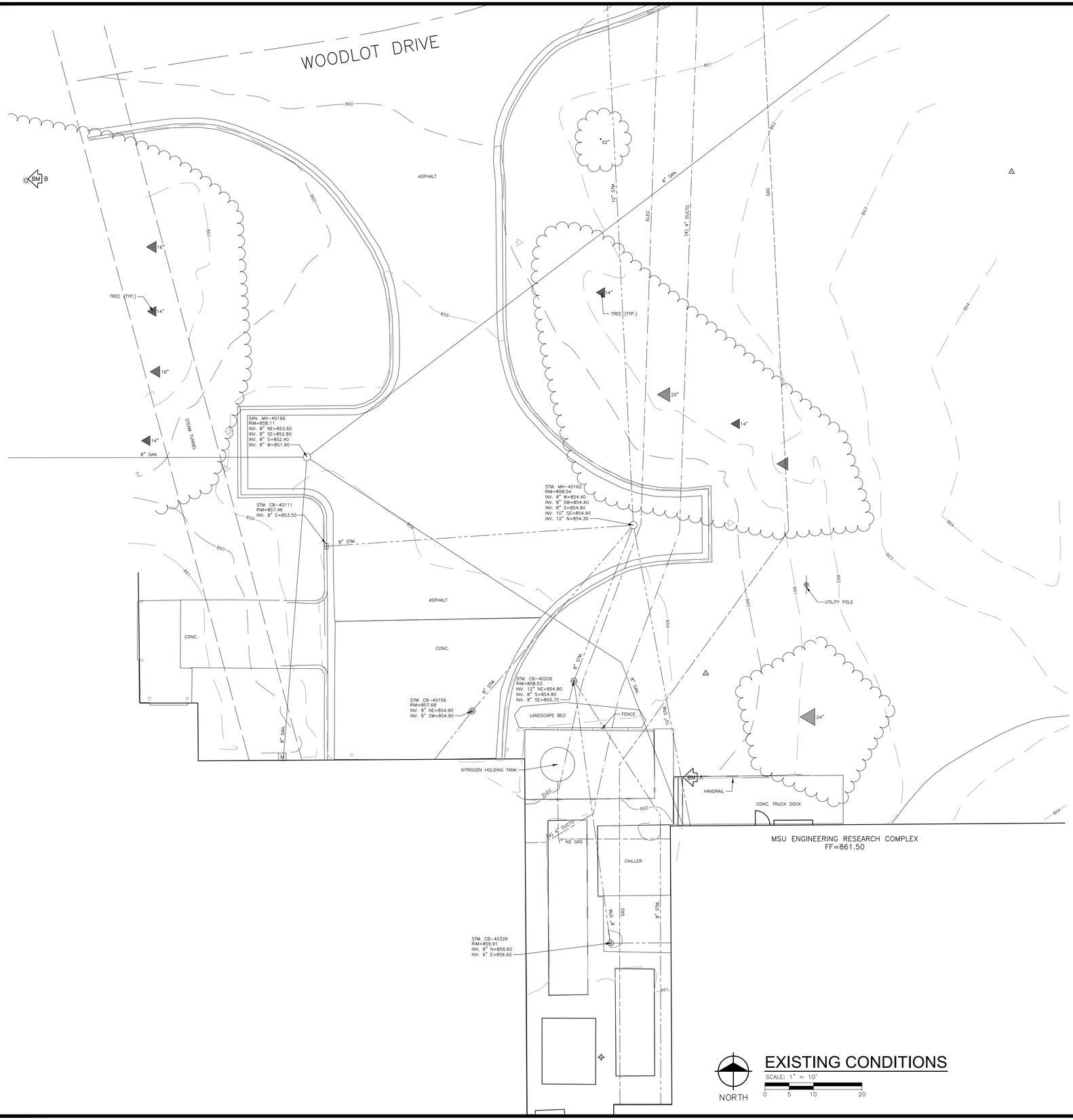
FIRST FLOOR ELECTRICAL DEMOLITION PLAN

DE-001

7 OF 42

PLOT INFO: 6/17/2024 11:17:19 AM



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Dwg. By: BEV
Designer: BEV
Reviewer: NB
Manager: TSP

BENCHMARKS

BENCH MARK A ELEVATION: 861.29
NW CORNER OF TOP STEP AT ENTRANCE TO EAST BUILDING OF CRYO-EM FACILITY

BENCH MARK B ELEVATION: 861.09
NORTHEAST BOLT ON LIGHT POLE BASE, WEST OF DRIVE WAY TO CRYO-EM BUILDING

SYMBOL LEGEND

- BENCH MARK
- PROPERTY LINE
- ROW LINE
- EASEMENT LINE
- SOIL BORING
- SHRUBS
- CONIFEROUS TREE
- DECIDUOUS TREE
- TREE LINE
- WETLAND
- EDGE OF WATER
- CONTOUR MAJOR
- CONTOUR MINOR
- LIGHT
- UTILITY POLE
- SIGN
- MAIL BOX
- GUARD RAIL
- FENCE LINE
- GRAVEL SURFACE
- PAVED SURFACE
- EXISTING CURB & GUTTER
- BARRIER FREE MARKING
- 8" SAN. SANITARY SEWER & MANHOLE
- 12" STM. STORM SEWER & MANHOLE
- CATCH BASIN CURB AND LAWN TYPE
- VALVE
- HYDRANT
- 6" WTR. WATER MAIN
- PLUG
- 4" FM FORCE MAIN
- 2" GAS GAS MAIN
- ELEC. UNDERGROUND ELECTRIC
- OP FIBER OPTICS
- TEL UNDERGROUND TELEPHONE
- CATV CABLE TELEVISION
- TELEPHONE PEDESTAL

SURVEY NOTES

1. THE LOCATIONS OF UNDERGROUND UTILITIES AS SHOWN HEREON ARE BASED ON ABOVEGROUND STRUCTURES AND RECORD DRAWINGS. LOCATIONS OF UNDERGROUND UTILITIES/STRUCTURES MAY VARY FROM LOCATIONS SHOWN HEREON. ADDITIONAL BURIED UTILITIES/STRUCTURES MAY BE ENCOUNTERED. NO EXCAVATIONS WERE MADE DURING THE PROGRESS OF THIS SURVEY TO LOCATE BURIED UTILITIES/STRUCTURES. BEFORE EXCAVATIONS BEGIN, MISS DIG SHOULD BE CONTACTED FOR VERIFICATION OF UTILITY TYPE AND FOR FIELD LOCATIONS.
2. VERTICAL DATUM: NAVD88 (GPS DERIVED)
   HORIZONTAL DATUM: MICHIGAN STATE PLANE, SOUTH ZONE, INTERNATIONAL FEET (NAD 83)
3. DATE OF SURVEY: FEBRUARY 2024

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ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

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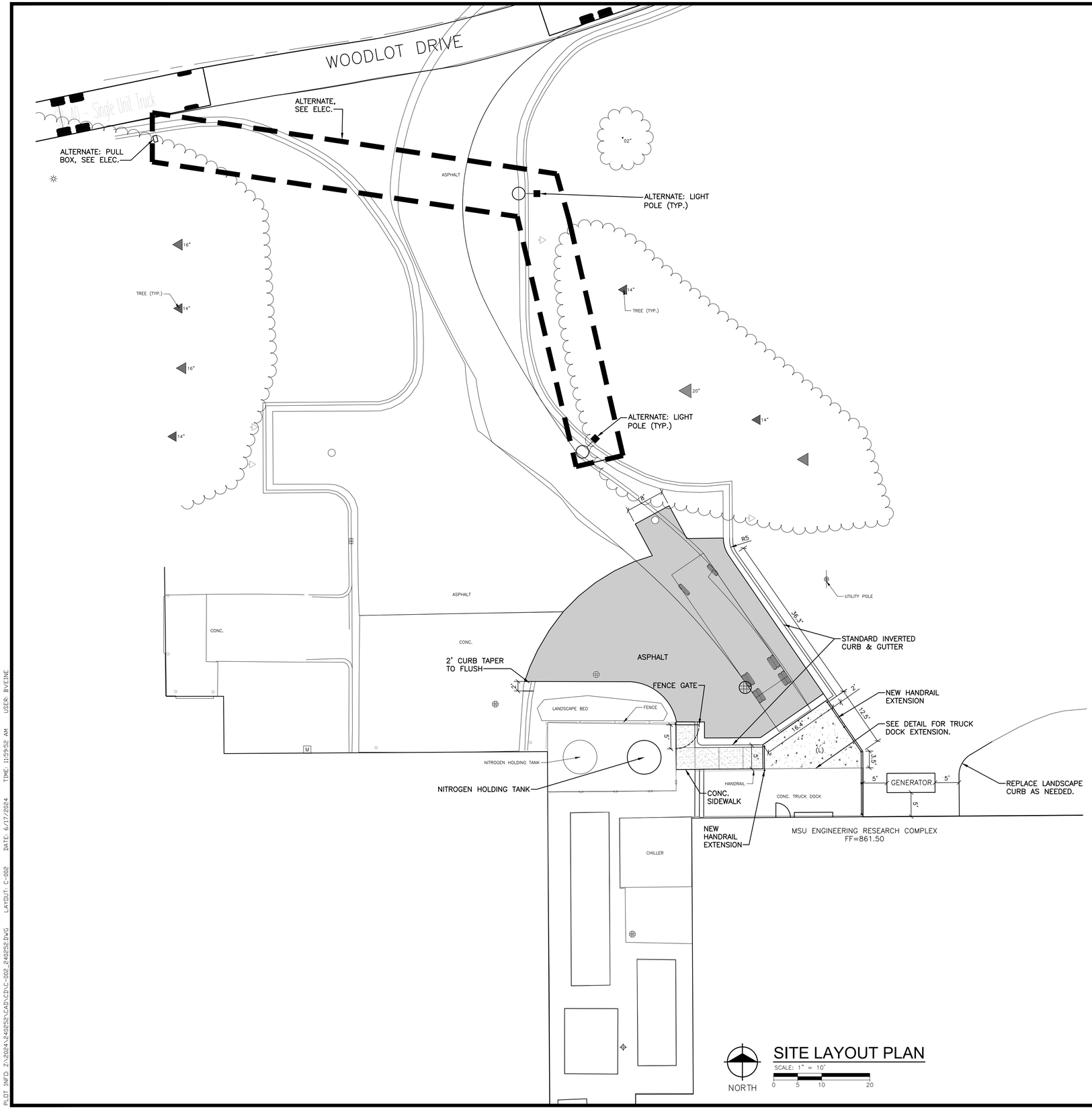
EXISTING CONDITIONS

C-001

8 OF 42

PLOT INFO: Z:\2024\240252\CAD\CIVIL\C-001_240252.DWG LAYOUT: C-001 DATE: 6/17/2024 TIME: 11:59:20 AM USER: BVENE



SITE LAYOUT PLAN

SCALE: 1" = 10'

NORTH

0 5 10 20

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Dwg. By: BEV
Designer: BEV
Reviewer: NB
Manager: TSP

SYMBOL LEGEND

- ASPHALT PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- 6" THICK CONCRETE SIDEWALK
- STANDARD INVERTED CURB AND GUTTER
- (L) LANDING (2% MAX. SLOPE ALL DIRECTIONS)
- (R) RAMP (8.33% MAX. RUNNING SLOPE)

NOTES

1. DIMENSIONS ARE TO BACK OF CURB, OUTSIDE FACE OF BUILDING, AND EDGE OF PAVEMENT UNLESS NOTED OTHERWISE.
2. KEEP THE APPROVED AND/OR MOST CURRENT SET OF PROJECT DRAWINGS ON SITE AT ALL TIMES. CONTRACTOR TO CONFIRM THEY ARE IN POSSESSION OF THE MOST CURRENT DRAWING FILES.

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DATE	
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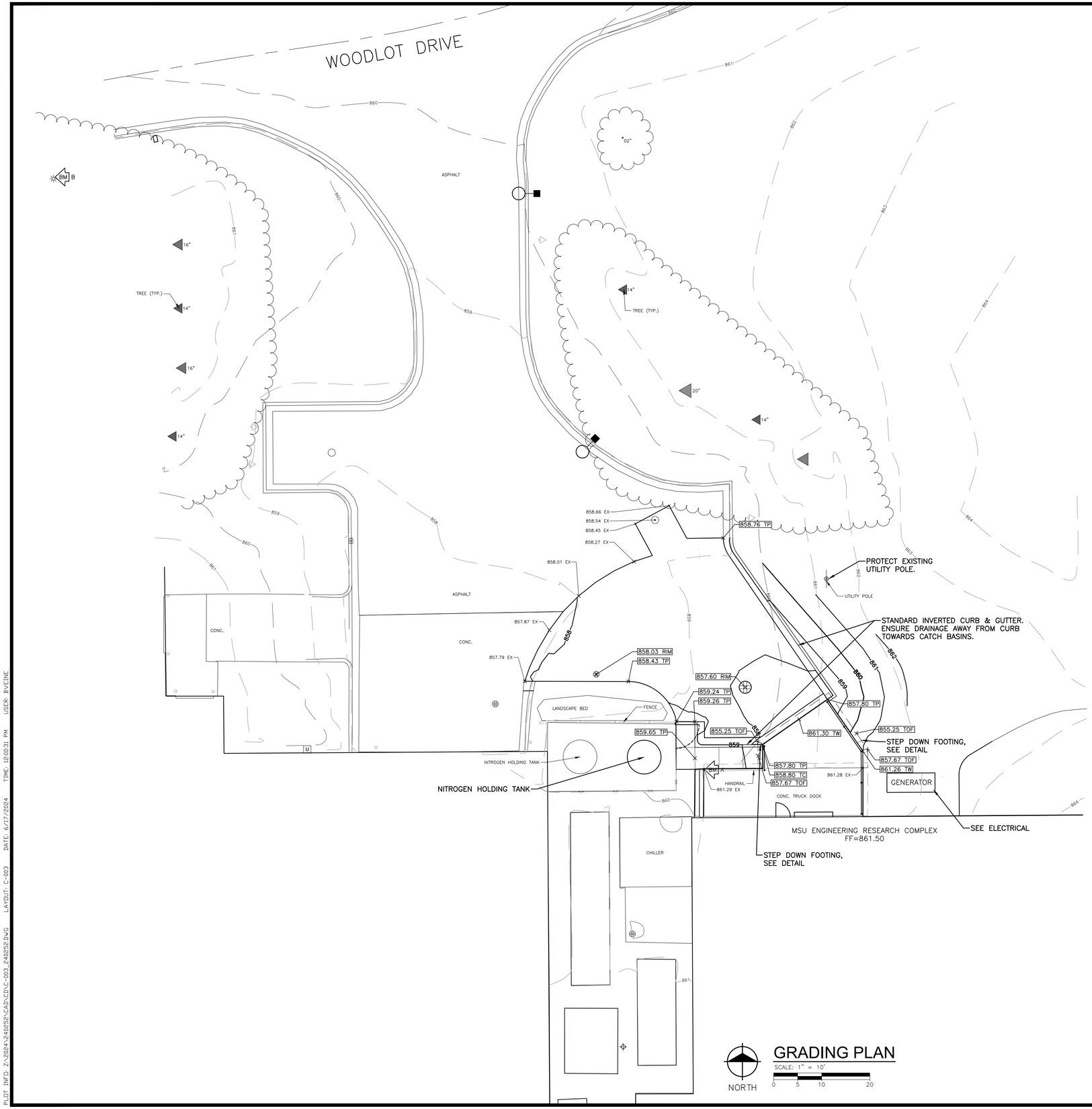
SITE LAYOUT PLAN

C-002

9 OF 42

PLOT INFO: Z:\2024\240252\CAD\CDs\C-002_240252.DWG LAYOUT: C-002 DATE: 6/17/2024 TIME: 11:59:52 AM USER: BVEINE



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Proj. No.:	240252
Dwg. By:	BEV
Designer:	BEV
Reviewer:	NB
Manager:	TSP

BENCHMARKS

BENCH MARK A ELEVATION: 861.29
NW CORNER OF TOP STEP AT ENTRANCE TO EAST BUILDING OF CRYO-EM FACILITY

BENCH MARK B ELEVATION: 861.09
NORTHEAST BOLT ON LIGHT POLE BASE, WEST OF DRIVE WAY TO CRYO-EM BUILDING

SYMBOL LEGEND

725	EXISTING MAJOR CONTOUR
724	EXISTING MINOR CONTOUR
725	PROPOSED MAJOR CONTOUR
724	PROPOSED MINOR CONTOUR
(L)	LANDING (2% MAX. SLOPE ALL DIRECTIONS)
(R)	RAMP
724.50 XX	SPOT ELEVATION
EM	EDGE OF METAL
EW	EDGE OF WALK
FF	FINISH FLOOR
GP	GUTTER PAN
GR	GRADE ELEVATION
HP	HIGH POINT
LP	LOW POINT
TC	TOP OF CURB
TP	TOP OF PAVEMENT
TOF	TOP OF FOOTING

GRADING NOTES

1. FINISH GRADE OF SOIL EDGES ALONG PAVEMENT TO MATCH EDGE OF PAVEMENT.
2. STRIP AND STOCKPILE TOPSOIL FROM GRADING AREAS.. USE STOCKPILED TOPSOIL AND IMPORTED TOPSOIL AS NECESSARY FOR SURFACE RESTORATION.
3. GRADES SHOWN ARE FINAL SURFACE GRADES AFTER COMPLETION OF SURFACE IMPROVEMENTS AND PLACEMENT OF TOPSOIL.
4. ADA PARKING AREAS NOT TO EXCEED 2.0% SLOPE IN ALL DIRECTIONS.
5. GRADE AREAS AT SITE PERIMETER TO MATCH GRADES OF ADJACENT PARCELS.
6. REMOVE EXCESS SOIL FROM SITE AND DISPOSE OF PROPERLY IN ACCORDANCE WITH APPLICABLE REGULATIONS.
7. PROVIDE TEMPORARY GRADING FEATURES SUCH AS BERMS, SWALES, SUMPS AND BASINS TO MANAGE INTERIM STORM WATER RUNOFF DURING CONSTRUCTION PROCESS. STORM WATER RUNOFF LEAVING THE SITE SHALL MEET ALL FEDERAL, STATE AND LOCAL QUALITY REQUIREMENTS.

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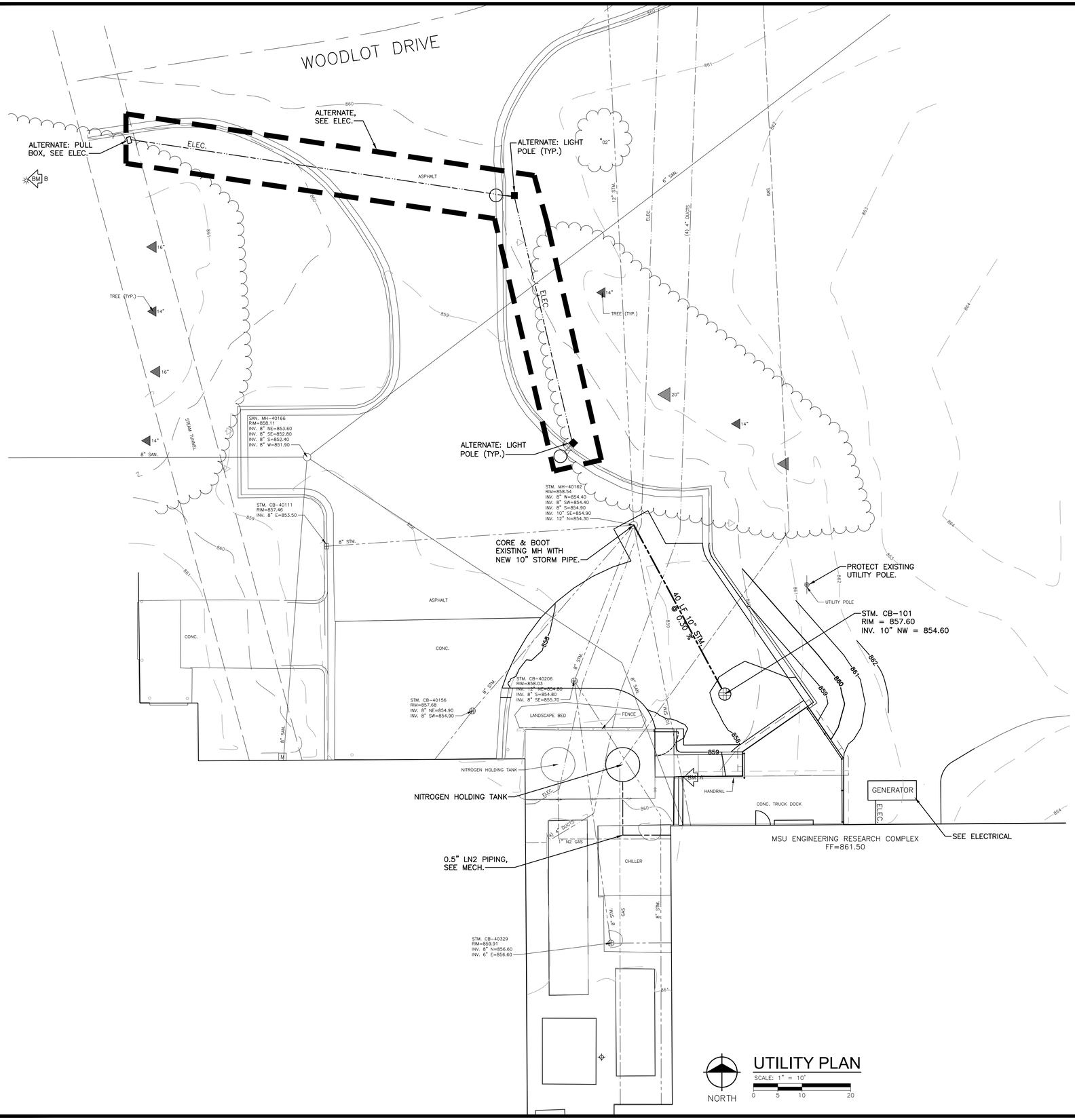
GRADING PLAN

C-003

10 OF 42

PLOT INFO: Z:\2024\240252\CAD\CD\C-003_240252.DWG LAYOUT: C-003 DATE: 6/17/2024 TIME: 12:09:31 PM USER: BVEINE



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BENCHMARKS

BENCH MARK A ELEVATION: 861.29
NW CORNER OF TOP STEP AT ENTRANCE TO EAST BUILDING OF CRYO-EM FACILITY

BENCH MARK B ELEVATION: 861.09
NORTHEAST BOLT ON LIGHT POLE BASE, WEST OF DRIVE WAY TO CRYO-EM BUILDING

SYMBOL LEGEND

- 725 — EXISTING MAJOR CONTOUR
- 724 — EXISTING MINOR CONTOUR
- 725 — PROPOSED MAJOR CONTOUR
- 724 — PROPOSED MINOR CONTOUR
- 12" STM — STORM SEWER & MANHOLE
- CATCH BASIN
- UNDERDRAIN
- ALTERNATE SCOPE OF WORK

NOTES

1. EXISTING UTILITIES LOCATIONS SHOWN ARE APPROXIMATE.
2. VERIFY THE HORIZONTAL AND VERTICAL LOCATION OF EXISTING UTILITIES PRIOR TO EXCAVATION WHERE NECESSARY.
3. PROTECT AND MAINTAIN SERVICE OF OTHER UTILITIES AT CROSSINGS.
4. DO NOT CONNECT ROOF DRAINS, FOUNDATION DRAINS, AND OTHER CLEAN WATER SERVICES TO THE SANITARY SEWER.
5. PROVIDE AND MAINTAIN INLET FILTERS AT ALL CATCH BASIN INLETS, DURING CONSTRUCTION.
6. PROVIDE A MINIMUM OF EIGHTEEN (18) INCHES OF VERTICAL SEPARATION AND TEN (10) FEET OF HORIZONTAL SEPARATION BETWEEN THE WATER MAIN AND ALL SANITARY AND STORM SEWERS.
7. ADJUST ALL CASTINGS TO FINISH GRADES.
8. PIPE LENGTHS ARE TO CENTER OF STRUCTURES UNLESS NOTED OTHERWISE. ALL PIPE LENGTHS ARE FOR THE CONVENIENCE OF THE CONTRACTOR.
9. UTILITY ELEVATIONS INDICATED REPRESENT INVERT ELEVATIONS UNLESS OTHERWISE NOTED.

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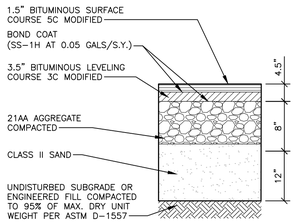
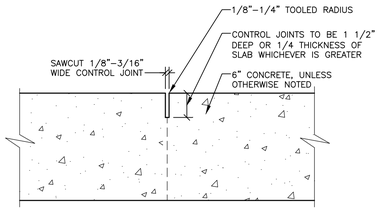
UTILITY PLAN

C-004

11 OF 42



HEAVY DUTY ASPHALT DETAIL
NO SCALE



CONTROL JOINT SECTION
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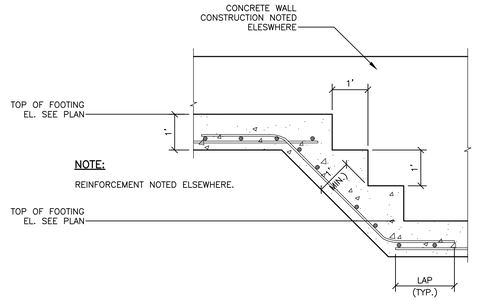

STEP FOOTING FOR CONCRETE WALL
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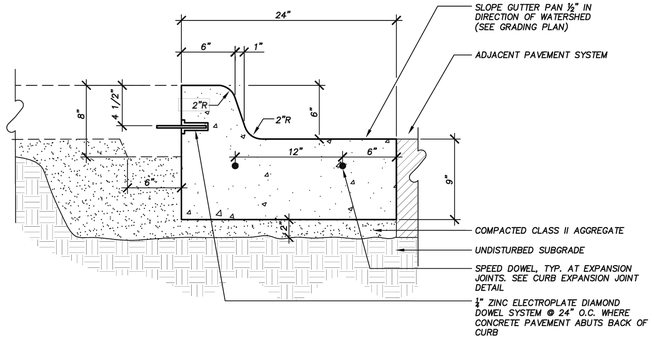

CURB & GUTTER
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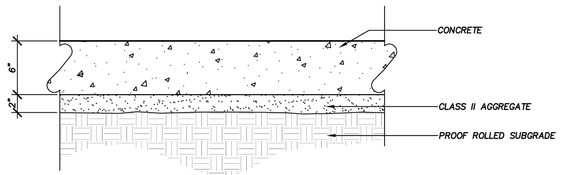

6" CONCRETE
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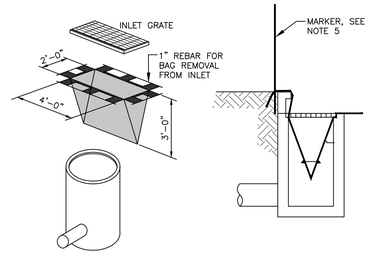


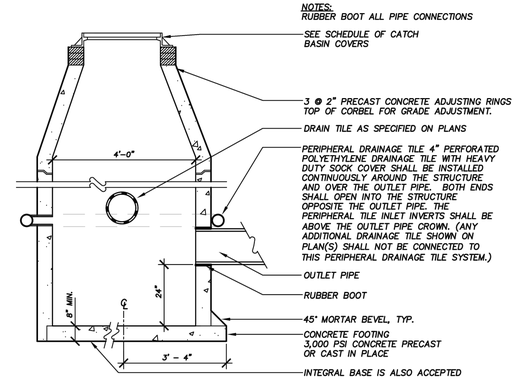
ISOMETRIC VIEW

INSTALLATION DETAIL

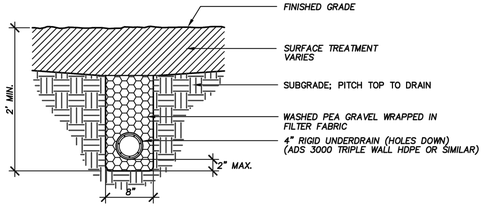
NOTES:

1. PLACE FILTER FABRIC BAG INSIDE THE INLET BENEATH THE GRATE.
2. REPLACE GRATE, WHICH WILL HOLD BAG IN PLACE.
3. ANCHOR FILTER BAG SO IT WILL NOT DROP INTO CATCH BASIN.
4. EXTEND FLAPS OF BAG BEYOND THE BAG. BURY IN SOIL IN EARTH AREAS.
5. IF CATCH BASIN IS IN A LOW DEPRESSION – MARK CB LOCATION WITH A MARKER TO ASSIST LOCATING CATCH BASIN IF FLOODING OCCURS.
6. INSPECT DROP INLET FILTERS ROUTINELY AND AFTER EACH RAIN EVENT.
7. REPLACE DAMAGED FILTER BAGS IMMEDIATELY.
8. CLEAN AND/OR REPLACE FILTER BAG WHEN 1/2 FULL. REPLACE CLOGGED FABRIC IMMEDIATELY.
9. VACUUM OUT CATCH BASIN SUMP IF FILTER BAG TEARS.
10. REMOVE ENTIRE PROTECTIVE MECHANISM WHEN UPGRADIENT AREAS ARE STABILIZED AND STREETS HAVE BEEN SWEPT AND/OR DIRECTECTED BY ENGINEER/OWNER.

56 INLET PROTECTION – FABRIC DROP
NO SCALE SE-056



CATCH BASIN – PRECAST
NO SCALE



UNDERDRAIN
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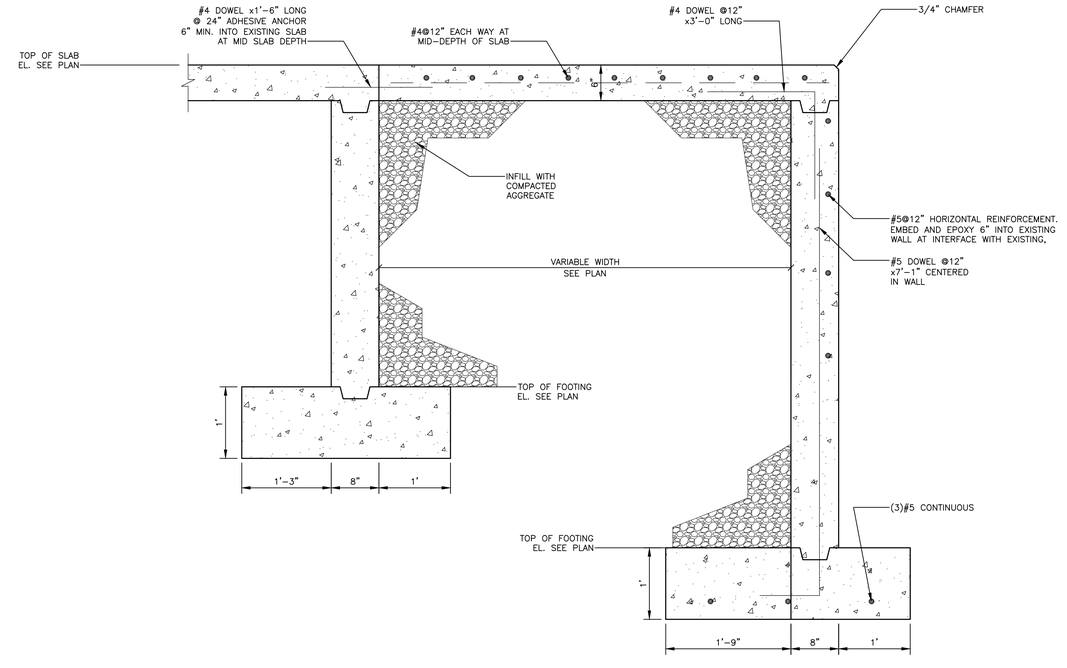
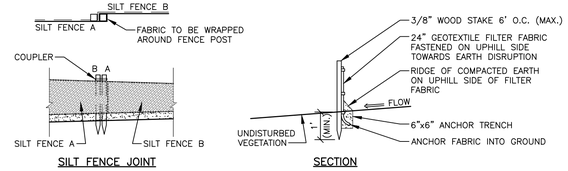


TRUCK DOCK FOOTING DETAIL
NO SCALE



SILT FENCE JOINT

SECTION

NOTES:

1. CONSTRUCT SILT FENCE BEFORE UPSLOPE GROUND COVER IS REMOVED. CLEARING, GRUBBING, AND STUMPING CAN OCCUR BEFORE SILT FENCE INSTALLATION IF GROUND COVER IS NOT REMOVED.
2. PLACE ALL SILT FENCE PARALLEL TO THE SLOPE AS POSSIBLE SO THAT WATER WILL NOT CONCENTRATE AT LOW POINTS IN THE FENCE AND SO THAT SMALL SWALES OR DEPRESSIONS THAT MAY CARRY SMALL CONCENTRATED FLOWS TO THE SILT FENCE ARE DISSIPATED ALONG ITS LENGTH.
3. INSTALL ENDS OF THE SILT FENCES UPSLOPE 12" IN ELEVATION SO THAT WATER PONDED BY THE SILT FENCE WILL BE PREVENTED FROM FLOWING AROUND THE ENDS.
4. INSTALL THE TRENCH WITH A TRENCHER, CABLE LAYING MACHINE, SLICING MACHINE, OR OTHER SUITABLE DEVICE THAT WILL ENSURE AN ADEQUATELY UNIFORM TRENCH DEPTH.
5. WHERE TWO SECTIONS OF PREFABRICATED SILT FENCE ARE COMBINED INTO ONE RUN, THE END POSTS SHALL BE CONNECTED TOGETHER, NOT SIMPLY OVERLAPPED.
6. SILT FENCE SHALL ALLOW RUNOFF TO PASS ONLY AS DIFFUSE FLOW THROUGH THE GEOTEXTILE. IF RUNOFF OVERTOPS THE SILT FENCE, FLOWS AROUND THE ENDS, OR IN ANY OTHER WAY BECOMES A CONCENTRATED FLOW, ONE OF THE FOLLOWING SHALL BE PERFORMED, AS APPROPRIATE: A) AN ADDITIONAL RUN OF SILT FENCE SHALL BE PLACED UPSTREAM, B) THE LAYOUT OF THE SILT FENCE SHALL BE CHANGED, C) ACCUMULATED SEDIMENT SHALL BE REMOVED, OR D) OTHER BEST MANAGEMENT PRACTICES SHALL BE IMPLEMENTED.
7. INSPECT FREQUENTLY AND IMMEDIATELY AFTER EACH STORM EVENT. CHECK SEVERAL TIMES DURING PROLONGED STORM EVENTS. IF NECESSARY, REPAIR IMMEDIATELY.
8. REMOVE SEDIMENT DEPOSITS WHEN THE DEPOSIT REACHES APPROXIMATELY ONE–HALF OF THE HEIGHT OF THE SILT FENCE.
9. REMOVE SILT FENCE ONLY WHEN ALL UPSTREAM VEGETATION IS FULLY ESTABLISHED AND DIRECTED BY ENGINEER/OWNER.

54 SILT FENCE DETAIL
NO SCALE SE-054

fishbeck
Engineers | Architects | Scientists | Constructors

Proj. No.: 240252
Dwg. By: BEV
Designer: BEV
Reviewer: NB
Manager: TSP

Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX
RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP NUMBER

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ARCH.	D. LAUNSTEIN
MECH.	A. VANDERSTELT
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CIVIL	
L.A.	
INT. DES.	D. WHITBECK
CONST. REP.	-
APPR.	-
DATE	
SCALE	AS SHOWN

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DETAILS

C-005

12 OF 42

PLOT INFO: Z:\2024\240252\CAD\CD\C-005_240252.DWG LAYOUT: C-005 DATE: 6/17/2024 TIME: 12:01:41 PM USER: BVENE

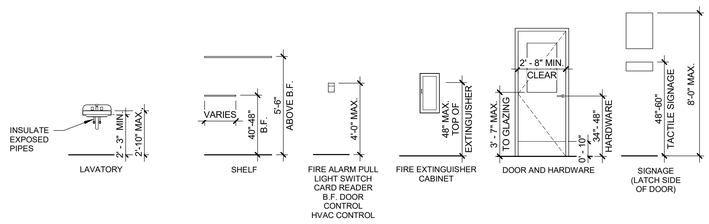
fishbeck

Proj. No.:	240252
Dwg. By:	IO
Designer:	CLF
Reviewer:	MTV
Manager:	TSP

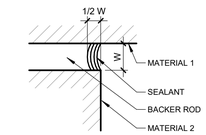
GENERAL NEW WORK NOTES

1. COORDINATE ALL WORK INDICATED PER THE PROJECT MANUAL AND DRAWINGS - NOTE: THE MOST STRINGENT REQUIREMENT OR MORE COSTLY WORK SHALL GOVERN WHERE CONFLICTS OCCUR.
2. COORDINATE PHASING AND SEQUENCING OF THE WORK TO MAINTAIN BUILDING SECURITY AND WEATHER TIGHTNESS.
3. COORDINATE ALL CUT, PATCH, AND REPAIR WORK WITH ALL OTHER TRADES, INCLUDING MECHANICAL AND ELECTRICAL DRAWINGS. PATCHING OF FINISHES TO EXTEND TO NEAREST NATURAL BREAK OR SURFACE TERMINATION FOR A CLEAN, UNBLEMISHED APPEARANCE AT THE END OF CONSTRUCTION.
4. PROVIDE INTERIOR AND/OR EXTERIOR SHORING, BRACING, OR SUPPORT AS REQUIRED TO PREVENT MOVEMENT, SETTLEMENT, DAMAGE, OR COLLAPSE OF THE STRUCTURE WHERE WORK OCCURS.
5. VERIFY ALL DIMENSIONS INDICATED ON DRAWINGS PRIOR TO CONSTRUCTION; COMMENCEMENT OF WORK CONSTITUTES ACCEPTANCE OF CONDITIONS.
6. AREAS WITHIN THE BUILDING ARE TO REMAIN OCCUPIED. PROVIDE AND MAINTAIN CONSTRUCTION BARRIER BETWEEN CONSTRUCTION AND OCCUPIED AREA.
7. REFER TO REFLECTED CEILING PLANS FOR CEILING HEIGHTS. ALL CEILING ELEVATIONS ARE ABOVE FINISH FLOOR.
8. ALL DIMENSIONS ON FLOOR PLANS ARE SHOWN TO FINISHED FACE OF WALL, UNLESS OTHERWISE NOTED. REFER TO ENLARGED FLOOR PLANS, SECTIONS, AND DETAILS FOR OTHER DIMENSIONS.
9. REFER TO ROOM FINISH SCHEDULE, ELEVATIONS, REFLECTED CEILING PLAN AND FLOOR FINISH PLANS FOR FINISHES.
10. TOP OF SIDEWALK / CONCRETE OUTSIDE OF EXIT DOORS TO BE HELD 1/4" BELOW FINISHED FLOOR.
11. MECHANICAL AND ELECTRICAL FIXTURES ARE SHOWN FOR REFERENCE AND COORDINATION ONLY. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS FOR TYPES, LOCATIONS AND QUANTITIES REQUIRED.
12. REFER TO MECHANICAL, PLUMBING, AND ELECTRICAL DRAWINGS FOR COMPLETE LISTING OF ALL PENETRATIONS.
13. ALL BLOCKING / SHEATHING TO BE FIRE RETARDANT TREATED (FRT), EXCEPT NON-STRUCTURAL BLOCKING IN INTERIOR WALLS SUCH AS FOR HANDRAILS, MILLWORK, CABINETS, AND WINDOW AND DOOR FRAMES; OR AS OTHERWISE INDICATED.
14. FOR WALL TYPES, REFER TO DRAWING A-007.
15. FOR DOOR SCHEDULES AND DETAILS, REFER TO DRAWING A-005.
16. FOR ROOM FINISH SCHEDULE AND LEGEND, REFER TO DRAWING A-005.

BARRIER FREE DETAILS



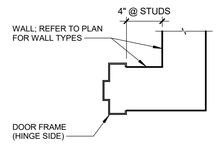
STANDARD DETAILS



NOTE:
CLEAN AND PREPARE SURFACE TO RECEIVE SEALANT. TEST JOINT TO ENSURE PROPER BONDING.

TYPICAL SEALANT JOINT BETWEEN DISSIMILAR MATERIALS

NOT TO SCALE



TYPICAL DOOR LOCATION

NOT TO SCALE

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GENERAL NOTES / BF DETAILS

A-001

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PLOT INFO: 6/17/2024 2:38:45 PM

FLOOR PLAN SYMBOL LEGEND

1IS	INTERIOR WALL TYPE; REFER TO SHEET A201
101	DOOR NUMBER
	METAL STUD WALL
	EXISTING DOOR
	NEW DOOR

GENERAL NEW WORK NOTES

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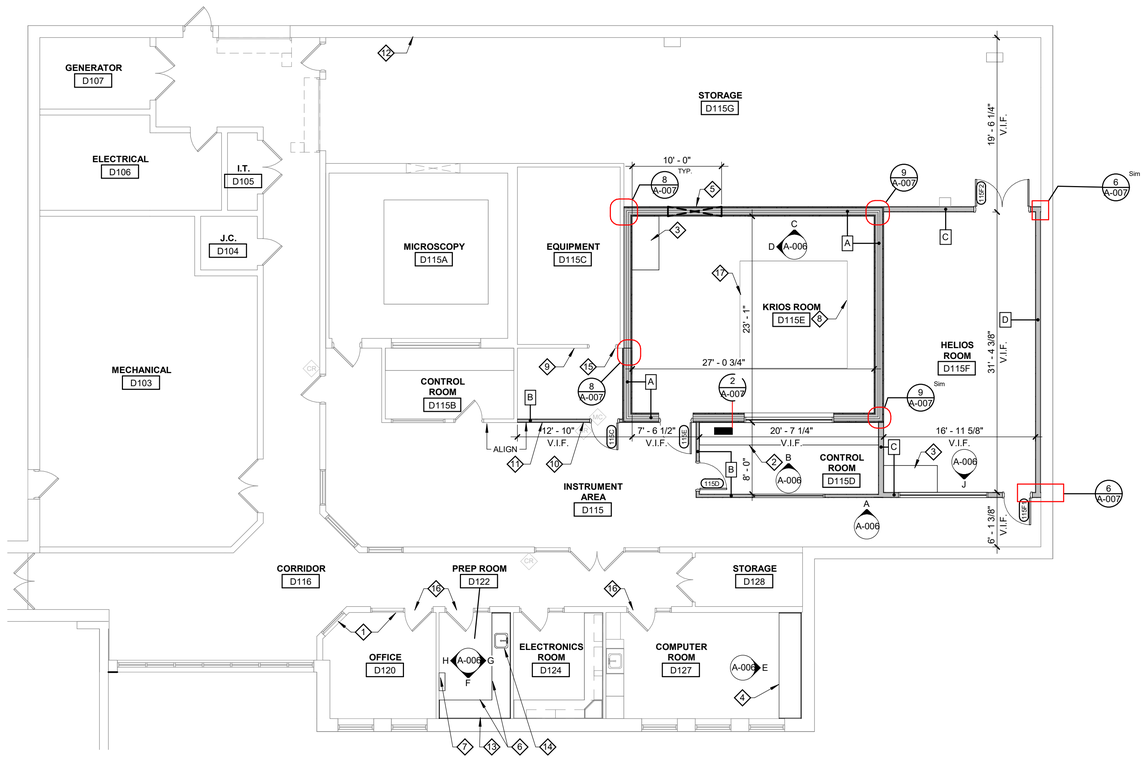


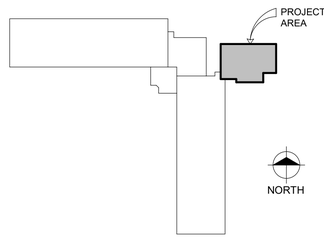
ARCHITECTURAL FLOOR PLAN

SCALE: 1/8" = 1'-0"

NEW WORK KEY NOTES

1	NEW MANUAL ROLLER SHADES, WT1, REFER TO SCHEDULES, SHADE TO BE MOUNTED TO EXISTING STUD FRAMING AND / OR BLOCKING AT WALL HEAD. DO NOT MOUNT SHADES TO WINDOW FRAMING. NOTIFY ARCHITECT IF EXISTING STUD FRAMING AND / OR BLOCKING IS INSUFFICIENT.
2	30" DEEP, SOLID SURFACE COUNTER.
3	36" DEEP X 72" LONG X 1" THICK, EPOXY RESIN COUNTER / WORKTOP, WITH BACK AND SIDE SPLASHES.
4	30" DEEP, SOLID SURFACE COUNTER, WITH BACK AND SIDE SPLASHES.
5	6'-0" WIDE X 8'-0" HIGH FRAMED 'KNOCK-OUT' OPENING, FOR 'FUTURE' EQUIPMENT REMOVAL.
6	25" DEEP 'L' SHAPED COUNTER WITH SEAMLESS CORNER, BACK AND SIDE SPLASHES.
7	(2) STAINLESS STEEL 8" DEEP X 24" LONG SHELVES.
8	EXISTING CONCRETE ISOLATION PAD TO REMAIN.
9	PROVIDE BLANK-OFF PLATE (SATIN NICKEL) WHERE EX. CARD READER WAS REMOVED.
10	RELOCATED CARD READER AND MAGNETIC CONTACT, REFER TO ELECT.
11	RELOCATED SEMI - RECESSED FIRE EXTINGUISHER W/ CABINET, MOUNT FIRE EXTINGUISHER ACTION AS REQUIRED BY ACCESSIBILITY CODE.
12	NEW WALL MOUNTED FIRE EXTINGUISHER W/ BRACKET, MOUNT BOTTOM OF FIRE EXTINGUISHER ACTION AS REQUIRED BY ACCESSIBILITY CODE AND HOLD 5' MIN. FROM HOLLOW METAL DOOR.
13	PROVIDE INFILL WALL BASE (AS REQ'D., TO MATCH EX. ADJACENT WALL BASE) WHERE EX. BASE CABINET WAS REMOVED.
14	EPOXY RESIN DROP IN SINK, REFER TO PLUMB.
15	EX. HOLLOW METAL DOOR FRAME TO REMAIN.
16	PROVIDE RESILIENT FLOOR TRANSITION, TA1, REFER TO SCHEDULES.
17	PROVIDE RESILIENT FLOOR TRANSITION, TA2, AT ISOLATION PAD TO CONCRETE FLOOR TRANSITION. MAINTAIN EXISTING JOINT TO ALLOW MOVEMENT BETWEEN PAD AND SLAB, REFER TO SCHEDULES.

KEY PLAN



fishbeck

Proj. No.:	240252
Dwg. By:	IO
Designer:	CLF
Reviewer:	MTV
Manager:	TSP

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ARCHITECTURAL FLOOR PLAN

A-002

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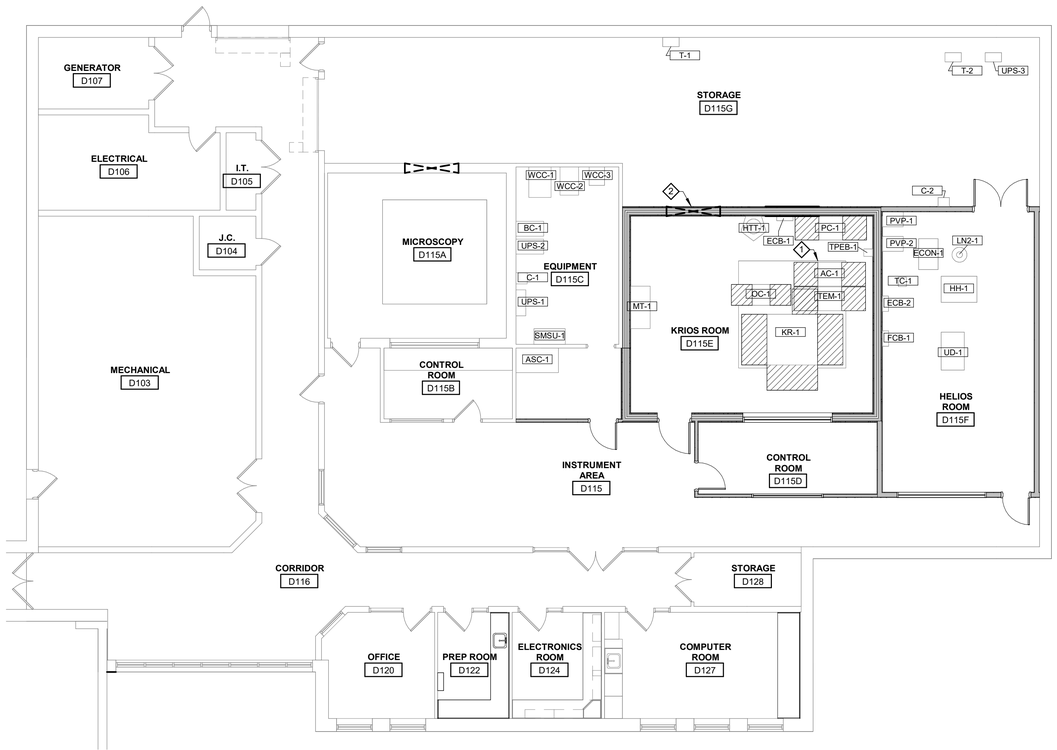
PLOT INFO: 6/17/2024 2:38:46 PM

LAB EQUIPMENT SCHEDULE

MARK	DESCRIPTION	RESPONSIBILITY
AC-1	ACCESSORIES CABINET	OF/OI
ASC-1	ACOUSTIC SERVER CABINET (WITH DEPTH EXTENSION)	OF/OI
BC-1	BATTERY CABINET	OF/OI
C-1	COMPRESSOR	OF/OI
C-2	COMPRESSOR	OF/OI
ECB-1	eCONNECTION BOX	OF/OI
ECB-2	eCONNECTION BOX	OF/OI
ECON-1	E-CONSOLE	OF/OI
FCB-1	FACILITIES CONNECTION BOX	OF/OI
HH-1	HELIOS HYDRA	OF/OI
HTT-1	HT TANK	OF/OI
KR-1	KRIOS	OF/OI
MT-1	MOVABLE TABLE	OF/OI
OC-1	OPTICS CABINET	OF/OI
PC-1	POWER CABINET	OF/OI
PVP-1	PVP ACOUSTIC ENCLOSURE	OF/OI
PVP-2	PVP ACOUSTIC ENCLOSURE	OF/OI
SMSU-1	SERVER (TO MSU NETWORK)	EXISTING
T-1	TALOS ARTICA TRANSFORMER	EXISTING
T-2	HELIOS TRANSFORMER	OF/OI
TC-1	THERMO CUBE	OF/OI
TEM-1	TEM CABINET	OF/OI
TPEB-1	TPEB	OF/OI
UD-1	USER DESK	OF/OI
UPS-1	TALOS ARCTICA UPS	EXISTING
UPS-2	KRIOS UPS AND TRANSFORMER	OF/OI
UPS-3	HELIOS UPS	OF/OI
WCC-1	TALOS ARTICA WATER CHILLER	EXISTING
WCC-2	COOLING UNIT	OF/CI
WCC-3	COOLING UNIT	OF/CI

EQUIPMENT PLAN SYMBOL LEGEND

EQUIPMENT CLEAR FLOOR SPACE / AREA



EQUIPMENT PLAN

SCALE: 1/8" = 1'-0"

NORTH

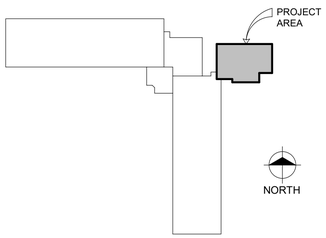
GENERAL EQUIPMENT PLAN NOTES

1. ALL OWNER PROVIDED AND OWNER INSTALLED EQUIPMENT IS BY OWNER'S EQUIPMENT CONTRACTOR 'THERMO FISHER SCIENTIFIC', CONTACT ZAHID CHISHTY, 714.271.6217, ZAHID.CHISHTY@THERMOFISHER.COM
2. EQUIPMENT WILL BE REQUIRED TO BE MOVED IN AND STORED WITHIN MICROSCOPY COORDINATE SEQUENCING OF EQUIPMENT MOVE IN AND STORAGE WITHIN KRIOS ROOM D115E PRIOR TO CONSTRUCTION OF THE 'FUTURE EQIPMENT REMOVAL' WALL SECTION. CONTRACTOR TO COORDINATE SEQUENCING OF WORK AND EQUIPMENT PROTECTION WITH OWNER.

EQUIPMENT PLAN KEY NOTES

1 EX. CONCRETE ISOLATION PAD TO REMAIN.
2 6'-0" WIDE X 8'-0" HIGH FRAMED 'KNOCK-OUT' OPENING, FOR 'FUTURE' EQUIPMENT REMOVAL.

KEY PLAN



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EQUIPMENT PLAN

A-003

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RCP SYMBOL LEGEND

- 2x4 LIGHT FIXTURE
- 2x2 LIGHT FIXTURE
- INDUSTRIAL OR STRIP LIGHT FIXTURE
- SURFACE OR RECESSED LIGHT FIXTURE
- CEILING MOUNTED EXIT SIGN
- CEILING MOUNTED SPEAKER
- FIRE ALARM SMOKE DETECTOR
- FIRE ALARM HEAT DETECTOR
- RETURN OR EXHAUST AIR GRILLE
- SUPPLY AIR DIFFUSER
- SLOT DIFFUSER
- GYP. BOARD SOFFIT OR CEILING (P-3)
- 24x24 CEILING TILE AND GRID (ACP-1)
- CEILING HEIGHT ELEVATION

GENERAL REFLECTED CEILING PLAN NOTES

1. ALL CEILING ELEVATIONS ARE ABOVE FINISH FLOOR
2. ALL CEILING GRIDS ARE TO BE CENTERED ON ROOM / AREA U.N.O

REFLECTED CEILING PLAN

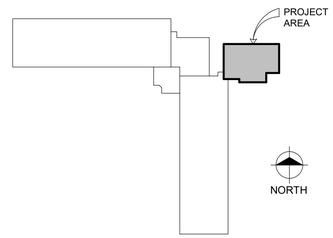
SCALE: 1/8" = 1'-0"

NORTH

REFLECTED CEILING PLAN KEY NOTES

1. EX. LAY-IN CEILING TO REMAIN.
2. EX. EXPOSED TO VIEW CEILING / STRUCTURE TO REMAIN.
3. EXPOSED TO VIEW CEILING / STRUCTURE.
4. EX. HOLLOW METAL DOOR FRAME TO REMAIN.
5. EX. PAINTED GYPSUM BOARD CEILING TO REMAIN.
6. REINSTALL EX. CEILING PADS AND GRID WHICH WERE REMOVED FOR ANY INCIDENTAL ABOVE CEILING WORK, REFER TO MECH., ELECT. AND PLUMB. DRAWINGS.

KEY PLAN



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REFLECTED CEILING PLAN

A-004

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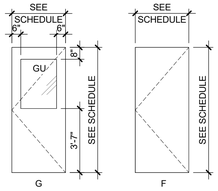
FINISH MATERIAL LEGEND								
MATERIAL	TAG	MANUFACTURER	STYLE	COLOR	SIZE	FINISH	INSTALLATION	NOTES
FLOORS								
EXISTING TO REMAIN	EX	--	--	--	--	--	--	--
RESILIENT SHEET FLOORING	RSF1	TARKETT	iQ GRANIT SD	T.B.D.	SHEET	--	--	STATIC-DISSIPATIVE FLOORING, HEAT WELDED SEAMS
VINYL COMPOSITION TILE	VCT1	ARMSTRONG	VINYL COMPOSITION TILE	T.B.D.	12" X 12"	--	ASHLAR	0.125" THICK
BASE								
RUBBER BASE	RB1	--	--	--	--	--	--	MATCH EX. BASE FROM COMPUTER ROOM D127
RUBBER BASE	RB2	--	--	--	--	--	--	MATCH EX. BASE FROM INSTRUMENT AREA D115
WALLS								
PAINT	P1	SHERWIN WILLIAMS	SUPER PAINT ACRYLIC LATEX	--	--	--	--	MATCH EX. PAINT COLOR AND SHEEN, REFER TO ROOM FINISH NOTES FOR ADDTIONAL INFORMATION
PAINT	P2	SHERWIN WILLIAMS	PRO INDUSTRIAL PRE-CATALYZED WATER BASED EPOXY PAINT	--	--	--	--	MATCH EX. PAINT COLOR AND SHEEN, REFER TO ROOM FINISH NOTES FOR ADDTIONAL INFORMATION
CEILINGS								
ACOUSTIC CEILING PANEL	ACP1	USG	CLIMAPLUS	WHITE	24" X 24"	SQUARE	--	--
ACOUSTIC CEILING GRID	ACP1	USG	DONN DX	WHITE	15/16"	--	--	--
PAINT	P3	SHERWIN WILLIAMS	PRO INDUSTRIAL PRE-CATALYZED WATER BASED EPOXY PAINT	--	--	--	--	MATCH EX. PAINT COLOR AND SHEEN, REFER TO ROOM FINISH NOTES FOR ADDTIONAL INFORMATION
COUNTERTOPS								
EPOXY	EP1	KEWAUNEE SCIENTIFIC	KEMRESIN	--	36" X 72" X 1"	--	--	MATCH EX. COLOR FROM MICROSCOPY D115A
SOLID SURFACE	SS1	--	--	--	--	--	--	MATCH EX. COLOR AND THICKNESS FROM COMPUTER ROOM D127
SOLID SURFACE	SS2	--	--	--	--	--	--	MATCH EX. COLOR AND THICKNESS FROM ELECTRONICS ROOM D124
SOLID SURFACE	SS3	--	--	--	--	--	--	MATCH EX. COLOR AND THICKNESS FROM CONTROL ROOM D115B
MISCELLANEOUS								
PAINT	P4	SHERWIN WILLIAMS	--	--	--	--	--	TO MATCH PAINT COLOR AND SHEEN OF DOOR FRAMES IN SUITE
TRANSITION STRIP	TA1	TARKETT	SLT	TO MATCH WALL BASE	--	--	--	LVT TO EX. RESILIENT FLOOR TRANSITION
TRANSITION STRIP	TA2	TARKETT	SLT	TO MATCH WALL BASE	--	--	--	RESILIENT FLOOR TO EX. RESILIENT FLOOR TRANSITION
WOOD STAIN	WS1	--	--	--	--	--	--	TO MATCH STAIN COLOR AND SHEEN OF WOOD DOORS IN SUITE
WINDOW TREATMENT	WT1	DRAPER	CLUTCH-OPERATED FLEXSHADE	FABRIC: MERMET E SCREEN 5%, WHITE	TO MATCH WINDOW WIDTH	HARDWARE: CLEAR ANODIZED	TOP MOUNTED	SINGLE ROLLER, RIGHT CLUTCH, STEEL CHAIN, "P"-CLIP, REGULAR ROOL, CLOSED POCKET, ENDCAPS W/ FASCIA

ROOM FINISH SCHEDULE									
		FLOORS		WALLS					
NO.	NAME	FLOOR	BASE	NORTH	EAST	SOUTH	WEST	COUNTERTOPS	FINISH REMARKS
D115	INSTRUMENT AREA	EX	RB2	P1	P1	--	--	--	3
D115C	EQUIPMENT	EX	RB2	P1	P1	P1	P1	--	3
D115D	CONTROL ROOM	RSF1	RB2	P1	P1	P1	P1	SS3	2
D115E	KRIOS ROOM	RSF1	RB2	P2	P2	P2	P2	EP1	1
D115F	HELIOS ROOM	RSF1	RB2	P2	P2	P2	P2	EP1	1
D115G	STORAGE	EX	RB2	--	P1	P1	P1	--	3
D120	OFFICE	LVT1	RB1	P1	P1	P1	P1	--	3
D122	PREP ROOM	EX	RB1	P1	P1	P1	P1	SS2	3
D127	COMPUTER ROOM	LVT1	RB1	P1	P1	P1	P1	SS1	3

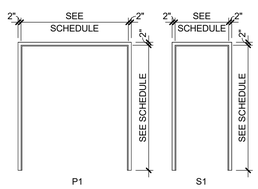
ROOM FINISH NOTES:
1. PAINT COLOR AND SHEEN TO MATCH PAINT COLOR AND SHEEN FROM MICROSCOPY D115A.
2. PAINT COLOR AND SHEEN TO MATCH PAINT COLOR AND SHEEN FROM CONTROL ROOM D115B.
3. PAINT COLOR AND SHEEN TO MATCH PAINT COLOR AND SHEEN FROM EXISTING WALLS WITHIN ROOM / AREA.

DOOR SCHEDULE																	
		DOOR								FRAME							
		PANEL SIZE															
NO.	LOCATION	QTY	W	H	T	TYPE	MATERIAL	PANEL FINISH	GLASS	TYPE	MATERIAL	FRAME FINISH	HEAD	JAMB	LABEL	HDW	NOTES
115C	EQUIPMENT	1	3'-0"	7'-0"	1 3/4"	F	WD	WS1	--	S1	HM	P4	H-3	J-3	--	04	2,3,4
115D	CONTROL ROOM	1	3'-0"	7'-0"	1 3/4"	G	WD	WS1	TEMP	S1	HM	P4	H-3	J-3	--	02	3,4
115E	KRIOS ROOM	1	3'-6"	7'-0"	1 3/4"	F	WD	WS1	--	S1	HM	P4	H-1	J-1	--	05	1,3,4
115F1	HELIOS ROOM	1	3'-0"	7'-0"	1 3/4"	F	WD	WS1	--	S1	HM	P4	H-3	J-3	--	01	3,4
115F2	HELIOS ROOM	2	6'-0"	8'-0"	1 3/4"	F	WD	WS1	--	P1	HM	P4	H-3	J-3	--	03	3,4

DOOR SCHEDULE NOTES:
1. DOOR TO BE AN ACOUSTIC DOOR WITH SEALS DESIGNED TO MEET THE ACOUSTIC PERFORMANCE. THE DOOR NEEDS TO HAVE A SURFACE WEIGHT OF AT LEAST 8 LBS./SQ.FT. AND HAVE DOOR QUALITY, FULL PERMITER DOOR SELAS TO ACHIEVE AN STL PERFORMANCE OF 20 dB AT 50 Hz. THE DOOR NEEDS TO MEET THE DOORS LISTED BELOW OR EQUAL:
   A. IAC ACOUSTICS: MODEL SINGLE SWING DOOR; ACOUSTICAL RATING: STC 51.
   B. OVERLY: MODEL 479725 WOOD DOOR; ACOUSTICAL RATING: STC 47.
   C. KREIGER: MODEL NC6-15-8944; ACOUSTICAL RATING: STC 44.
2. CARD READER, RELOCATED FROM DEMOLISHED EQUIPMENT ROOM DOOR.
3. REFER TO DRAWING A-006 FOR HEAD AND JAMB DETAILS.
4. PROVIDE RESILIENT FLOOR TRANSITION, TA1, REFER TO SCHEDULES.



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



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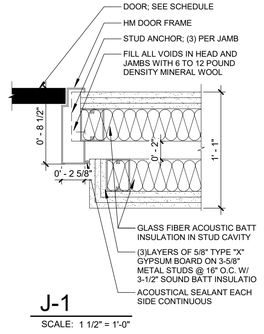

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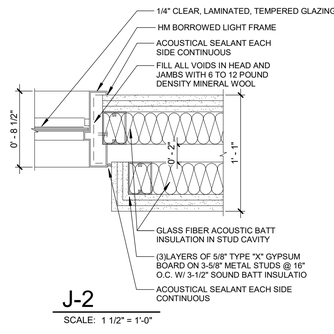

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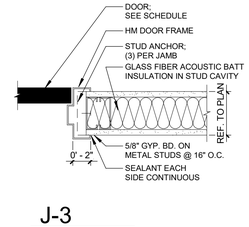

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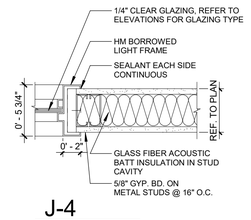

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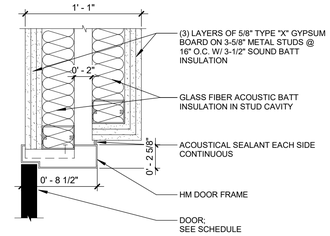
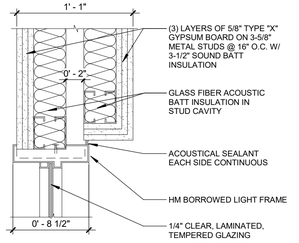


H-1
SCALE: 1 1/2" = 1'-0"



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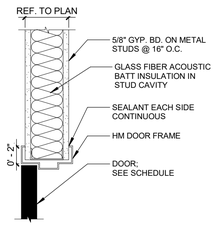

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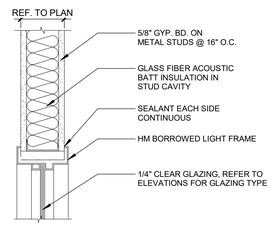

H-4
SCALE: 1 1/2" = 1'-0"

fishbeck

Proj. No.: 240252
Dwg. By: IO
Designer: CLF
Reviewer: MTV
Manager: TSP

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CP23116

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L.A.	
INT. DES.	D. WHITBECK
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SCHEDULES AND DETAILS

A-005

17 OF 42

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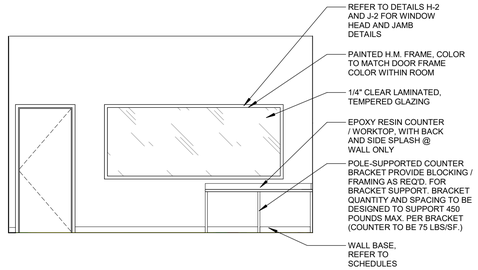
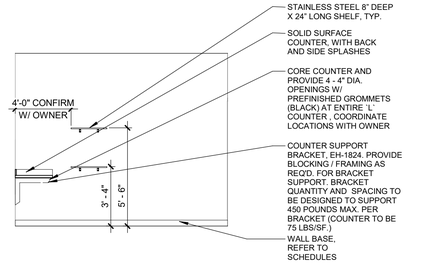
Proj. No.:	240252
Dwg. By:	IO
Designer:	CLF
Reviewer:	MTV
Manager:	TSP



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



H ELEVATION
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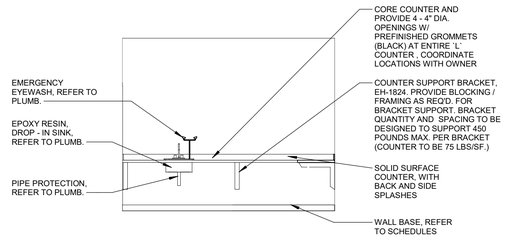

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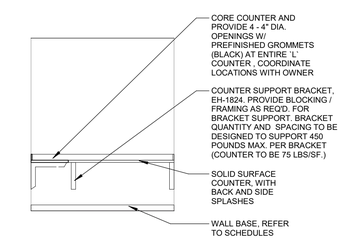

F ELEVATION
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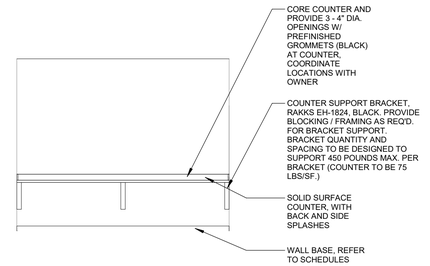

E ELEVATION
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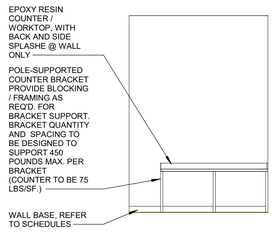

D ELEVATION
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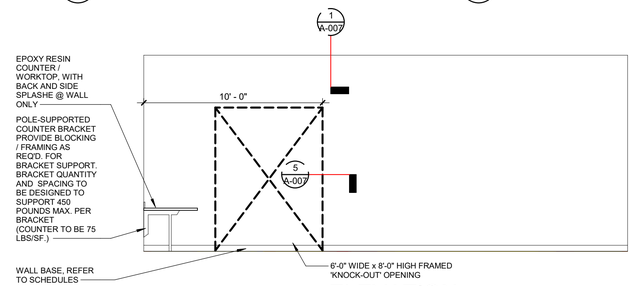

C ELEVATION
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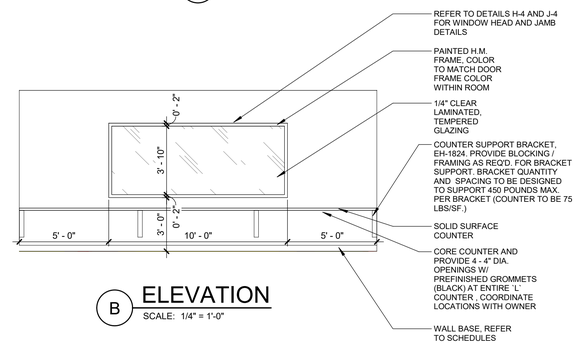
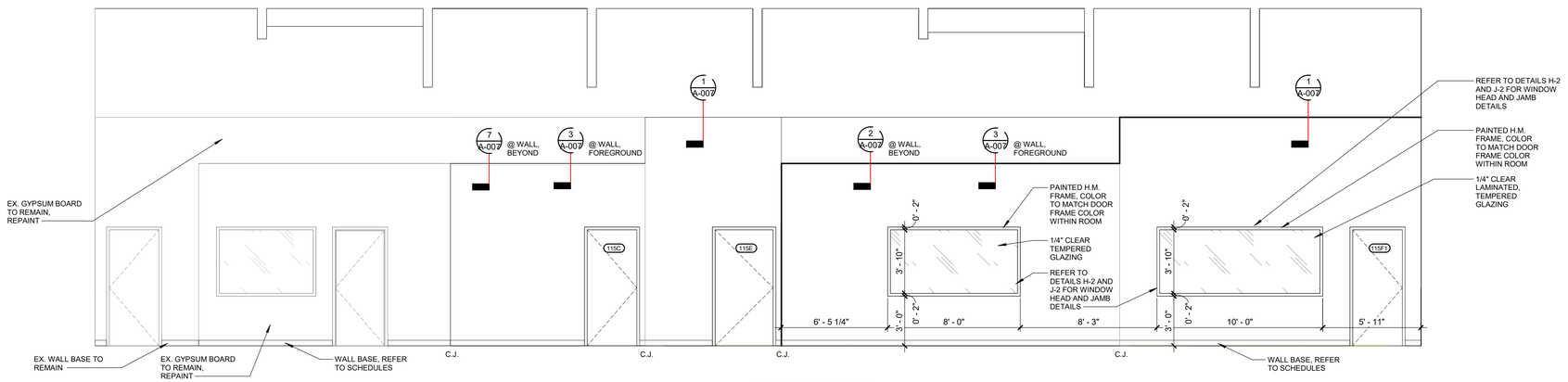


B ELEVATION
SCALE: 1/4" = 1'-0"



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

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ELEVATIONS

A-006

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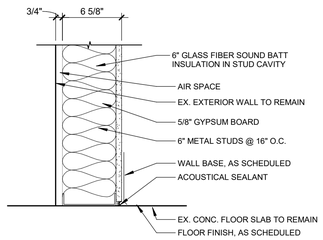
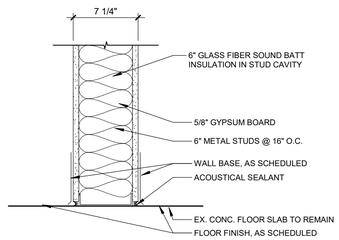


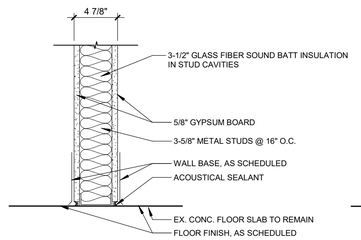
WALL TYPE D

SCALE: 1 1/2" = 1'-0"



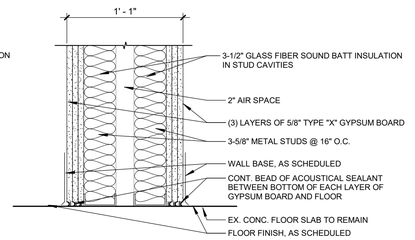
WALL TYPE C

SCALE: 1 1/2" = 1'-0"



WALL TYPE B

SCALE: 1 1/2" = 1'-0"



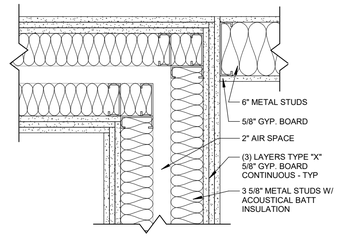
NOTE: WALL TYPE IS DESIGNED TO MEET THE REQUIREMENTS OF 27 dB SOUND TRANSMISSION LOSS (STL) PERFORMANCE AT 50 HZ

WALL TYPE A

SCALE: 1 1/2" = 1'-0"

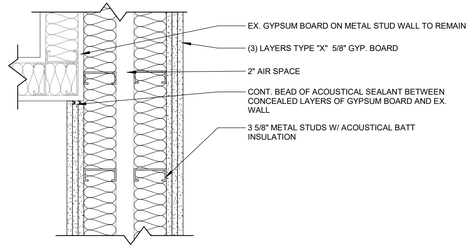
WALL TYPE NOTES

1. PROVIDE DEFLECTION TRACKS OR CLIPS FOR ALL PARTITIONS ABUTTING STRUCTURE ABOVE.
2. EXTEND RATED PARTITIONS THROUGH THE INTERIOR FACE OF EXTERIOR WALL GYPSUM BOARD AND SEAL TO THE INSIDE FACE OF THE EXTERIOR BUILDING WALL SHEATHING.
3. INTERIOR METAL STUD PARTITIONS ARE DIMENSIONED FROM FACE OF GYPSUM BOARD OR TILE BACKER BOARD.
4. WHERE THICKNESS VARIES BETWEEN TWO PARTITIONS IN AN UNINTERRUPTED CONTINUOUS WALL PLANE -OFFSET STUDS AND ALIGN FACE OF PARTITIONS.
5. METAL STUD FRAMING: MIN. 20 GAGE @ 16" O.C., U.N.O.
6. EXTEND ALL WALLS TIGHT TO DECK ABOVE UNLESS NOTED OR DETAILED OTHERWISE.
7. OFF-SET ALL RECESSED DEVICES BY MINIMUM OF ONE STUD CAVITY. DO NOT INSTALL BACK TO BACK OR WITHIN SAME STUD CAVITY.
8. PROVIDE BLOCKING IN WALL REQ'D TO SUPPORT BUILT-IN ITEMS, FIXTURES, MILLWORK, AND OTHER WALL SUPPORTED ITEMS.
9. PROVIDE ABUSE RESISTANT GYP. BOARD FROM FLOOR TO 8'-0" AFF IN LIEU OF TYPICAL GYP. BOARD ON WALLS WITHIN CORRIDORS, CLASSROOMS, LABS AND SEMINAR ROOMS.



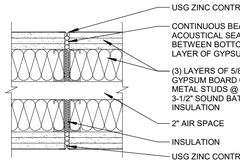
9 PLAN DETAIL

SCALE: 1 1/2" = 1'-0"



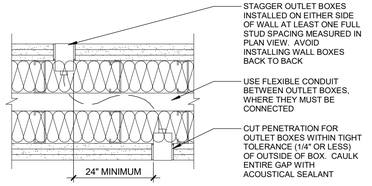
8 PLAN DETAIL

SCALE: 1 1/2" = 1'-0"



5 PLAN DETAIL

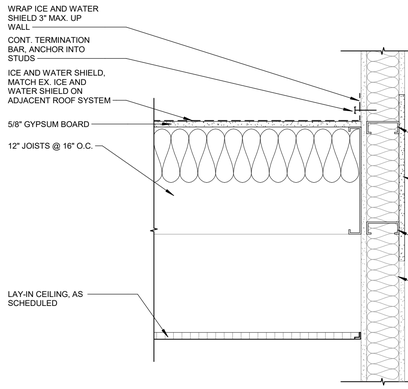
SCALE: 1 1/2" = 1'-0"



NOTE: DETAIL IS TYPICAL FOR ALL WALL TYPE 'A' WALLS.

4 PLAN DETAIL-TYPICAL

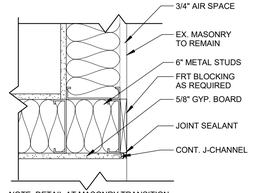
SCALE: 1 1/2" = 1'-0"



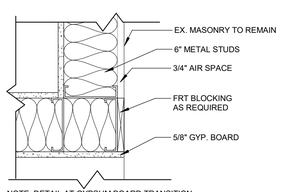
NOTE:
1. ROOF / CEILING HEIGHT TO ALIGN AND MATCH HEIGHT AND SLOPE OF EXISTING ROOF / CEILING AT CONTROL ROOM D115B.

7 SECTION DETAIL

SCALE: 1 1/2" = 1'-0"



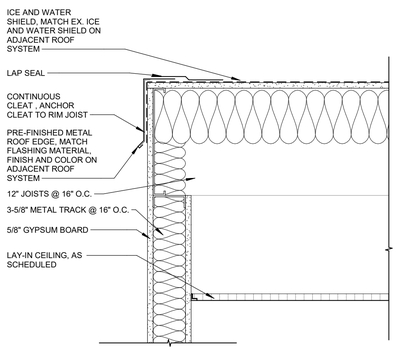
NOTE: DETAIL AT MASONRY TRANSITION



NOTE: DETAIL AT GYPSUM BOARD TRANSITION

6 PLAN DETAIL

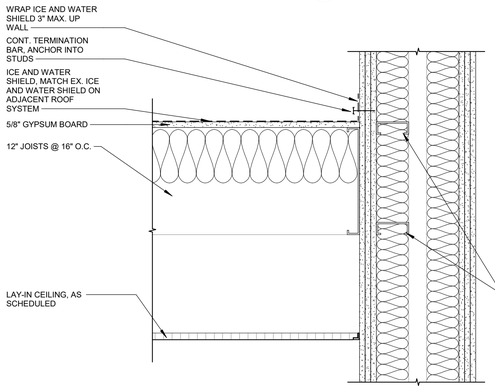
SCALE: 1 1/2" = 1'-0"



NOTE:
1. ROOF / CEILING HEIGHT TO ALIGN AND MATCH HEIGHT AND SLOPE OF EXISTING ROOF / CEILING AT CONTROL ROOM D115B.

3 SECTION DETAIL

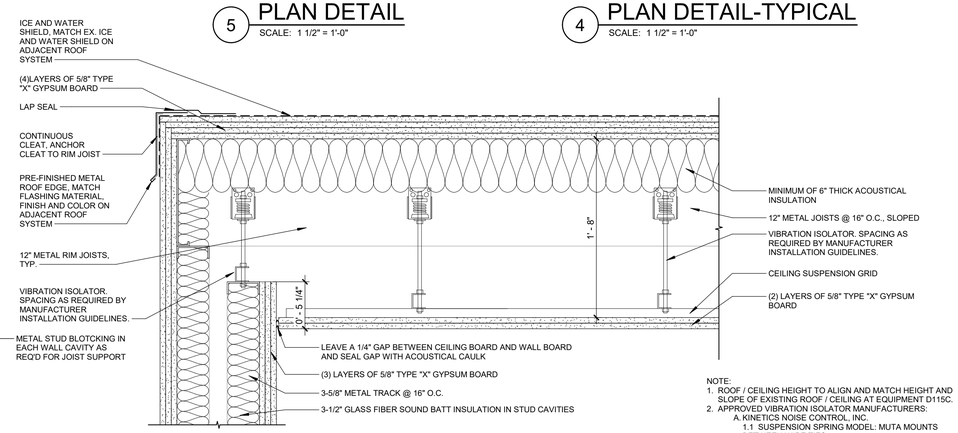
SCALE: 1 1/2" = 1'-0"



NOTE:
1. ROOF / CEILING HEIGHT TO ALIGN AND MATCH HEIGHT AND SLOPE OF EXISTING ROOF / CEILING AT CONTROL ROOM D115B.

2 SECTION DETAIL

SCALE: 1 1/2" = 1'-0"



NOTE:
1. ROOF / CEILING HEIGHT TO ALIGN AND MATCH HEIGHT AND SLOPE OF EXISTING ROOF / CEILING AT EQUIPMENT D115C.
2. APPROVED VIBRATION ISOLATOR MANUFACTURERS:
   A. KINETICS NOISE CONTROL, INC.
      1.1. SUSPENSION SPRING MODEL: MUTA MOUNTS BETWEEN WIRE TIES.
   B. MASON INDUSTRIES
      2.1. SUPENSION SPRING MODEL W30 MOUNTS BETWEEN WIRE TIES
      2.2. SUSPENSION SPRING MODEL W30SM MOUNTS TO SIDE OF JOISTS AND WIRE TIES

1 SECTION DETAIL

SCALE: 1 1/2" = 1'-0"

fishbeck

Proj. No.:	240252
Dwg. By:	IO
Designer:	CLF
Reviewer:	MTV
Manager:	TSP

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CONST. REP.	
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DATE	
SCALE	AS SHOWN

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DETAILS

A-007

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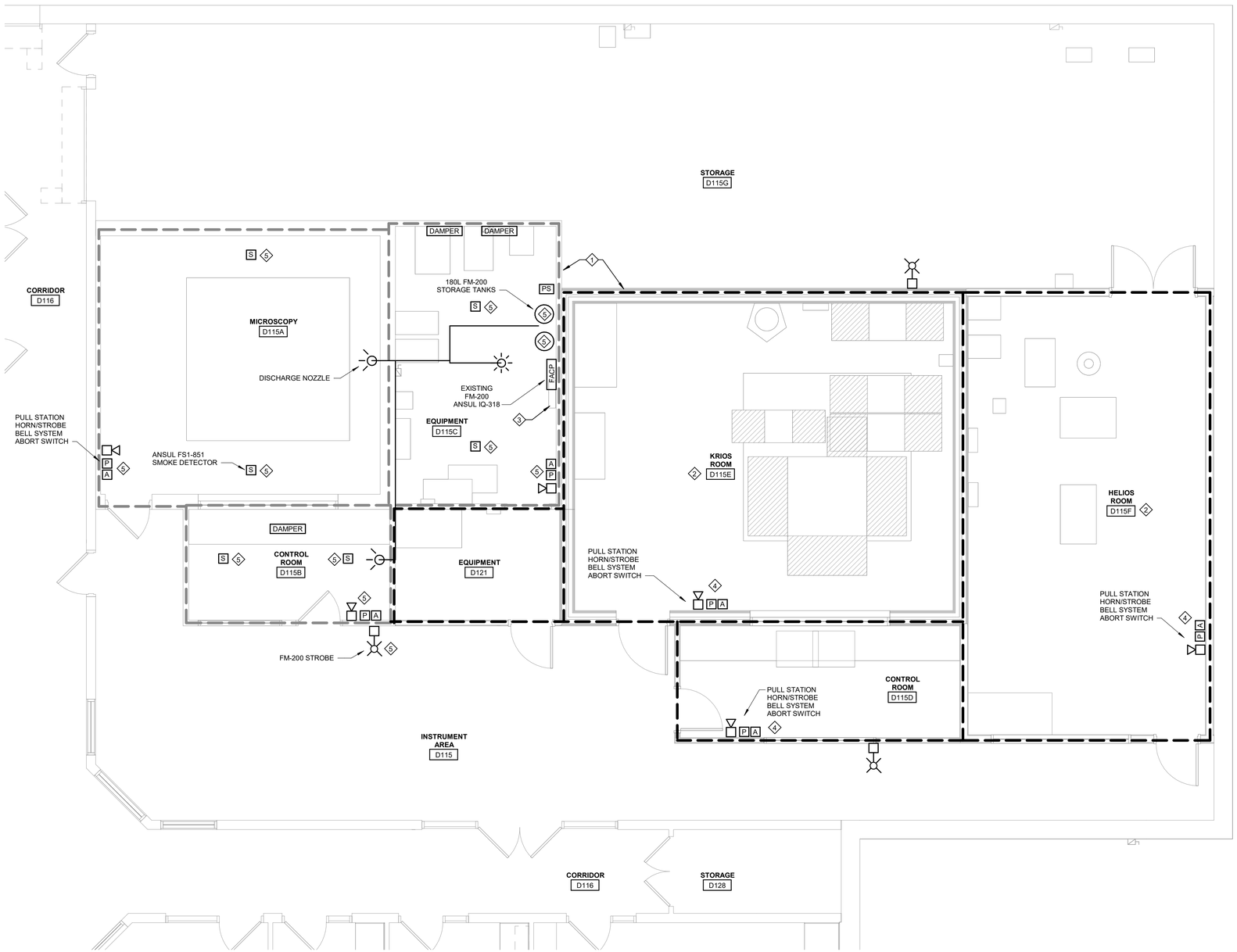


NORTH

FIRE PROTECTION PLAN

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

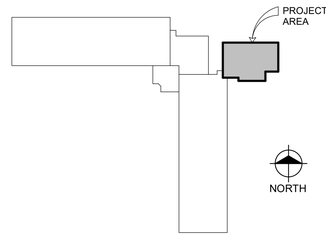
NOTES

1. CONTRACTOR SHALL BE RESPONSIBLE FOR SYSTEM DESIGN CALCULATIONS AND FINAL PIPE SIZES AND FOR COMPLIANCE WITH ALL STATE AND LOCAL CODES.
2. ALL AREAS SERVED BY FM-200 SYSTEM SHALL BE PART OF ONE ZONE. PROVIDE PULL STATIONS, ABORT SWITCHES, AND HORNS AND STROBES AS REQUIRED.
3. FIRE STOP SHALL BE PROVIDED IN NEW AND EXISTING HOLES AND PENETRATIONS IN RATED WALLS. REFER ALSO TO ACOUSTIC PENETRATION DETAILS.
4. COORDINATE PIPE ROUTING WITH OTHER TRADES BEFORE PROCEEDING. DUCTWORK SHALL TAKE PRECEDENCE OVER FIRE PROTECTION PIPING.
5. ADEQUATE ACCESS TO VALVES AND SPRINKER HEADS SHALL BE PROVIDED. REQUIREMENTS SHALL BE COORDINATED.
6. NO SURFACE CONDUIT OR WIREMOLD ALLOWED WITHOUT ARCHITECT PRE-APPROVAL.
7. PROVIDE NECESSARY PROGRAMMING SO THAT CONTROLLED FUNCTIONS SUCH AS REQUIRED FOR HVAC-4 TO RESPOND ACCORDINGLY WHEN THE FM-200 SYSTEM IS ACTIVATED.
8. WHERE NEW CONNECTIONS TO EXISTING PIPE ARE REQUIRED, SYSTEM SERVICE INTERUPTION IS TO BE MINIMIZED AND COORDINATED WITH OWNER. TIE-IN METHODS TO INCLUDE HOT TAP AS REQUIRED.
9. EXISTING OVERHEAD WET SPRINKLER SYSTEM TO REMAIN. MODIFY EXISTING SYSTEM, AND PROVIDE NEW SPRINKLER HEADS TO PROVIDE FULL COVERAGE PER NFPA 13. DO NOT REUSE EXISTING SPRINKLER HEADS. COORDINATE NEW SPRINKLER LOCATIONS WITH NEW WALLS, CEILINGS, CEILING COMPONENTS, ETC. THIS INCLUDES REMOVAL OF EXISTING HEADS. SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR COORDINATION.
10. FIELD VERIFY EXISTING PIPE SIZE AND CAPACITIES. PROVIDE NEW PIPING AS NEEDED TO ACCOMMODATE INCREASED NUMBER OF SPRINKLER HEADS AND FLOW RATE.

KEY NOTES

1. LIGHT BOLD DASHED LINE INDICATES BOUNDARY OF EXISTING AREA AND DARK BOLD DASHED LINE INDICATES BOUNDARY OF NEW SYSTEM SERVED BY CLEAN AGENT FM-200 FIRE PROTECTION SYSTEM. DESIGN AND INSTALL NEW SYSTEM TO MATCH EXISTING. GENERAL LOCATIONS FOR PULL STATION, HORN/STROBE, BELL, AND ABORT SWITCH ARE SHOWN. PROVIDE ALL ADDITIONAL DEVICES OFR A COMPELTE SYSTEM.
2. CLEAN AGENT FIRE PROTECTION SYSTEM TO INCORPORATE "VERY EARLY SMOKE DETECTION APPARATUS" FOR KRIOS AND HYDRA ROOMS.
3. LOCATE NEW FIRE PROTECTION PANEL AND TANKS NEXT TO EXISTING. PROVIDE A COMPLETE INTEGRATED SYSTEM TO FUNCTION WITH EXISTING. COORDINATE FINAL LOCATION IN EQUIPMENT ROOM WITH OWNER.
4. NEW DEVICES TO CONNECT TO FM-200 PANEL.
5. EXISTING, FOR REFERENCE ONLY.

KEY PLAN



fishbeck

Proj. No.:	240252
Dwg. By:	CEB
Designer:	DDL
Reviewer:	GWL
Manager:	TSP

Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

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CP23116

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FIRE PROTECTION PLAN

FP-001

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PLOT INFO: 6/17/2024 12:40:16 PM

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Proj. No.:	240252
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GENERAL NOTES

PLUMBING PIPING NOTES

1. CLOSELY COORDINATE THE INSTALLATION OF ALL PIPING WITH NEW SHEET METAL, HVAC PIPING, ELECTRICAL, AND STRUCTURAL CONDITIONS. PROVIDE REQUIRED OFFSETS AND FITTINGS WHETHER INDICATED OR NOT. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS FOR CLEARANCES. THE LOCATION OF SANITARY, STORM, AND VENT LINES TAKE PRECEDENCE OVER HVAC AND FIRE PROTECTION PIPING, AND ELECTRICAL CONDUIT AND CABLE TRAY.
2. RELOCATE ALL EXISTING DUCT, PIPING AND CONDUIT HANGERS THAT ARE IN CONFLICT WITH NEW PIPING.
3. PIPING AND EQUIPMENT SHOWN LIGHTLY IS EXISTING TO REMAIN.
4. AT RENOVATED AREAS THE INDICTED ROUTING OF PIPING SYSTEMS IS INTENDED TO INDICATE REUSE OF AS MUCH OF THE EXISTING SYSTEMS AS POSSIBLE. THE ROUTE SHOWN AND INFORMATION GIVEN IS NOT INTENDED TO REPRESENT EXACTLY WHERE AND HOW TO INSTALL THESE SYSTEMS. IT HAS BEEN DETERMINED THAT ADEQUATE SPACE EXISTS BUT NO ATTEMPT HAS BEEN MADE TO INDICATE THE LOCATION AND IDENTIFY EVERY INTERFERENCE, NOR THE RESULTANT REQUIRED RESOLUTION OF INTERFERENCES. INCLUDE ADDITIONAL PIPE, MATERIAL, LABOR, AND LAYOUT TIME REQUIRED TO RESOLVE INTERFERENCES AND THEIR REROUTING.
5. PIPE ROUTING INDICATED IS SCHEMATIC IN CONCEPT. FIELD LOCATE EXACT TIE-IN-POINTS TO EXISTING PIPING. FINAL ROUTING SHALL BE COORDINATED WITH SHEET METAL, ELECTRICAL, AND STRUCTURAL SYSTEMS. PROVIDE ALL NECESSARY OFFSETS. COORDINATE TIME OF EXISTING PIPING REROUTING WITH OWNER TO MINIMIZE DOWNTIME.
6. PROVIDE SHUTOFF VALVES ON ALL RUNOUT PIPING SERVING MULTIPLE FIXTURES.
7. REMOVE AND REPLACE CEILING GRID AND TILES AS REQUIRED TO ACCESS THE WORK. REPLACE DAMAGED GRID AND TILES TO MATCH EXISTING.
8. SLEEVE AND SEAL EXTERIOR WALL AND ROOF PENETRATIONS TO A WEATHER TIGHT CONDITION. SLEEVE AND SEAL INTERIOR FLOOR PENETRATIONS TO A WATERTIGHT CONDITION.
9. PROVIDE FIRESTOP IN NEW AND EXISTING HOLES AND PENETRATIONS IN RATED WALLS.
10. SAWCUT CONCRETE AS REQUIRED TO INSTALL NEW PIPING. FINISH CONCRETE PATCH TO RECEIVE NEW SURFACE FINISH AS REQUIRED.
11. CORE DRILL OPENINGS IN WALLS AND SLABS AS REQUIRED FOR NEW PIPING. COORDINATE LOCATION OF REINFORCING STEEL TO AVOID DAMAGE.
12. MINIMIZE SYSTEM SERVICE INTERRUPTION AND COORDINATE WITH OWNER WHERE NEW CONNECTIONS TO EXISTING PIPE ARE INDICATED. TIE-IN METHODS TO INCLUDE HOT TAP AS REQUIRED.
13. NEW PIPING ROUTED OVER ELECTRICAL GEAR MUST MEET CLEARANCE REQUIREMENTS OF THE NEC.
14. VALVE INDICATIONS ARE GENERIC. REFER TO SPECIFICATION FOR ACCEPTABLE VALVE TYPES PER APPLICATION.
15. PRIOR TO MAKING CONNECTIONS TO EXISTING PIPING FOR REUSE, CONFIRM THAT EXISTING PIPING BEING TIED INTO IS ACTIVE FOR REUSE.

LEGEND

PIPE/FITTING SYMBOLS

- EXISTING PIPE
- EXISTING PIPE TO BE REMOVED
- NEW PIPE
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- UNION
- CAP

PIPING DESIGNATION

- CHWS — PIPE CONTENTS SEE ABBREVIATIONS

GENERAL DESIGNATION

- DEMO 1 / NEW 1 — KEY NOTE SYMBOLS (REFER TO SHEET NOTES)
- NEW TO EXISTING CONNECTION

VALVE SYMBOLS

- GENERIC VALVE (REFER TO SPEC FOR TYPE)
- BALL VALVE
- GLOBE VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- GAS COCK
- SWING CHECK VALVE
- PRESSURE REDUCING VALVE
- PRESSURE RELIEF VALVE
- 2-WAY VALVE
- 3-WAY VALVE
- BACKFLOW PREVENTER
- CIRCUIT SETTER

MISC. PIPING SYMBOLS

- PUMP (LIQUID)
- PUMP (AIR)
- STRAINER
- EXPANSION JOINT & PIPE GUIDE
- FLEX CONNECTION
- STEAM TRAP
- PIPE ANCHOR
- PIPE GUIDE
- MANUAL AIR VENT (MV)
- AUTOMATIC AIR VENT (AV)
- VACUUM BREAKER (VB)
- CO — CLEANOUT LOCATED IN FLOOR
- CO — CLEANOUT LOCATED IN WALL. PIPE COMING UP FROM BELOW.
- CO — HORIZONTAL CLEANOUT (LOCATED BELOW FLOOR AND ABOVE CEILING OF FLOOR BELOW)
- F.I. — FLOW INDICATOR
- P — PRESSURE GAGE
- P — PRESSURE TAP WITH NEEDLE VALVE
- T — THERMOMETER
- T — THERMOWELL
- "X" — WATER HAMMER ARRESTER WITH P.D.I. DESIGNATION

CONTROLS

- TS — TAMPER SWITCH
- FS — FLOW SWITCH

GENERAL ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	MC	MECHANICAL CONTRACTOR
AI	ACOUSTICAL INSULATION	MD	MOTORIZED DAMPER
AL	ACOUSTICAL LINING	NIC	NOT IN CONTRACT
AP	ACCESS PANEL	OA	OUTSIDE AIR
BD	BALANCING DAMPER	RA	RETURN AIR
BDD	BACKDRAFT DAMPER	RF	RETURN FAN
CI	CAST IRON	RAG	RETURN AIR GRILLE
CS	CLINIC SINK	RC	RAIN CONDUCTOR
DF	DRINKING FOUNTAIN	RD	ROOF DRAIN
EA	EXHAUST AIR	S	SINK
EF	EXHAUST FAN	SA	SUPPLY AIR
EAG	EXHAUST AIR GRILLE	SF	SUPPLY FAN
EC	ELECTRICAL CONTRACTOR	SH	SHOWER
EM SH	EMERGENCY SHOWER	SS	SERVICE SINK
EW	EYEWASH	TCC	TEMPERATURE CONTROL CONTRACTOR
EWC	ELECTRIC WATER COOLER	UR	URINAL
FC	FLEXIBLE CONNECTION	VAV	VARIABLE AIR VOLUME
FD	FLOOR DRAIN	VI	VIBRATION ISOLATOR
FS	FLOOR SINK	VTR	VENT THRU ROOF
GC	GENERAL CONTRACTOR	WC	WATER CLOSET
HB	HOSE BIBB	W.C.	WATER COLUMN
IE	INVERT ELEVATION	WH	WALL HYDRANT
L	LOUVER	YA	YARD HYDRANT
LAV	LAVATORY		

PIPE CONTENTS ABBREVIATIONS

AR	ARGON GAS
AV	ACID VENT
AW	ACID WASTE
BF	BOILER FEED
CA	COMPRESSED AIR
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
COND	CONDENSATE
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
CW	DOMESTIC COLD WATER
DWR	DEIONIZED WATER RETURN
DWS	DEIONIZED WATER SUPPLY
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FP	FIRE PROTECTION WATER SUPPLY
G	GAS SUPPLY
HPS	HIGH PRESSURE STEAM
HW	DOMESTIC HOT WATER
HWR	DOMESTIC HOT WATER RETURN
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
LA	LABORATORY AIR
LPS	LOW PRESSURE STEAM
LV	LABORATORY VACUUM
MA	MEDICAL AIR
MPS	MEDIUM PRESSURE STEAM
N2	NITROGEN
N2O	NITROUS OXIDE
NPW	NON-POTABLE WATER
OSTM	OVERFLOW STORM SEWER
OXY	OXYGEN
PC	PUMPED CONDENSATE
PHWR	PRIMARY HEATING WATER RETURN
PHWS	PRIMARY HEATING WATER SUPPLY
PW	POTABLE WATER
ROR	REVERSE OSMOSIS WATER RETURN
ROS	REVERSE OSMOSIS WATER SUPPLY
SAN	SANITARY
SCW	SOFT COLD WATER
SM	STEAM
STM	STORM SEWER
V	SANITARY VENT
VAC	VACUUM
WWR	WELL WATER RETURN
WWS	WELL WATER SUPPLY

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GENERAL NOTES AND LEGEND

P-001

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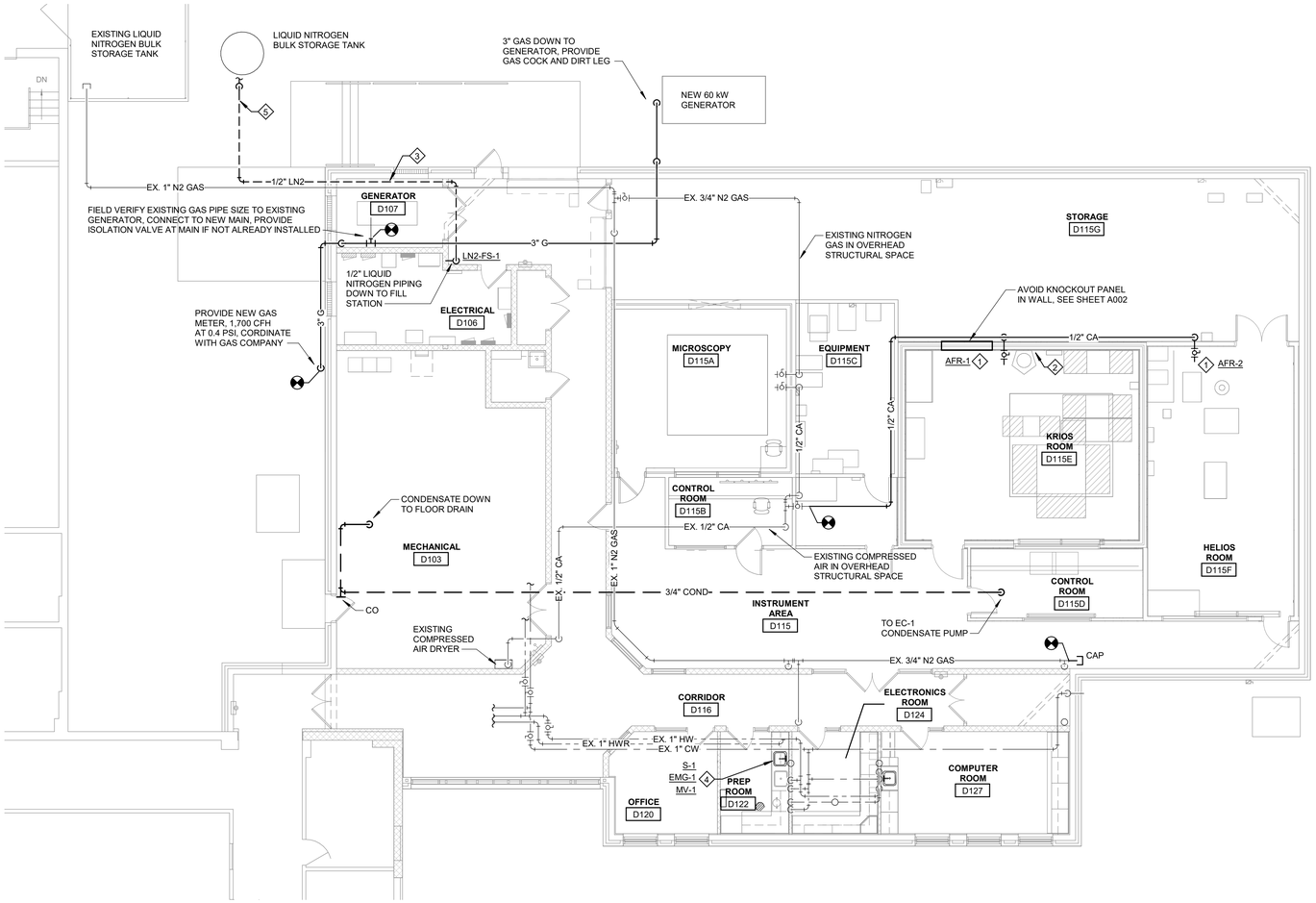
PLOT INFO: 6/17/2024 12:40:16 PM

PLUMBING SCHEDULE	
ID TAG	**DESCRIPTION**
AFR-1	AIR FILTER-REGULATOR, MODEL P39344-610, 1/2" NPT THREAD, 5.0-MICRON FILTER, 0-140 PSIG FLUSH-MOUNT GAUGE, METAL RELIEVING BOWL WITH SIGHT GLASS, STANDARD KNOB PRESSURE CONTROL WITH MANUAL DRAIN.
AFR-2	AIR REGULATOR FILTER, MODEL P39343-610, 1/2" NPT THREAD, 0.3-MICRON FILTER, 0-140 PSIG FLUSH-MOUNT GAUGE, METAL RELIEVING BOWL WITH SIGHT GLASS, STANDARD KNOB PRESSURE CONTROL WITH MANUAL DRAIN.
S-1	LAB SINK: 18"x15"x8" EPOXY RESIN DROP-IN • BOWL: SIMMONS MODEL #25 • FAUCET: CHICAGO MODEL LWM1, WITH VACUUM BREAKER, PRESSURE COMPENSATING LAMINAR FLOW, 4" WRISTBLADE HANDLE • SUPPLIES: CHICAGO MODEL 1017 • DRAIN: INTEGRAL TO BOWL
EMG-1	EMERGENCY EYEWASH: DECK MOUNTED, GUARDIAN MODEL G5028VB, PROVIDE WITH MIXING VALVE MV-1
MV-1	MIXING VALVE: TEPID WATER SUPPLY: 1/2" HAWS AXION MODEL 9201EW
LN2-FS-1	LIQUID NITROGEN DEWAR FILLING STATION, CHART ADF105, MANUAL START, AUTOMATIC SHUTOFF, 115V / 3A / 1PH, MIN/MAX OPERATING PRESSURE 22-125 PSI



PLUMBING PLAN

SCALE: 1/8" = 1'-0"

NORTH

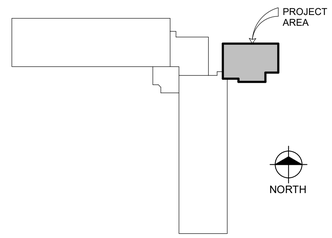
NOTES

1. LIQUID NITROGEN PIPING MUST NOT BE INSTALLED IN ANY ROOM WHERE OXYGEN DETECTION ALARM SYSTEM IS NOT OPERATIONAL. PRIOR TO INSTALLATION OF LIQUID NITROGEN PIPING, OXYGEN DETECTION ALARM SYSTEM MUST BE INSTALLED, FULLY FUNCTIONAL.
2. ALL LIQUID NITROGEN (LN2) PIPING TO BE VACUUM JACKETED (VACCUM INSULATED). SEE SPECIFICATIONS.
3. COORDINATE CONNECTION OF UTILITIES FOR MICROSCOPE INSTRUMENT WITH EQUIPMENT MANUFACTURER.

KEY NOTES

1. 1/2" COMPRESSED AIR THROUGH WALL 4 FEET ABOVE FINISHED FLOOR. PROVIDE ISOLATION VALVE AND AIR FILTER/REGULATOR. COORDINATE LOCATION WITH OWNER AND CHILLED WATER PENETRATION (SAME LOCATION). SEE DETAIL.
2. PROVIDE PIPE SLEEVE THROUGH WALL FOR LIQUID N2 (LN2) AND N2 GAS. SEE NOISE CRITICAL WALL PENETRATION DETAIL. LN2 AND N2 GAS PIPE FROM DEWAR THROUGH WALL BY OTHERS, COORDINATE SLEEVE SIZE.
3. VACUUM JACKETED (VJ) LIQUID NITROGEN (LN2) PIPING EQUAL TO ACME CRYOGENICS VJP.
4. REROUTE 3/4" HW/CW AND SAN TO NEW SINK. INSTALL MIXING VALVE AND TEPID WATER TO NEW EYEWASH. INSTALL SWING CHECK VALVES ON THE SUPPLIES TO THE MIXING VALVE. MOUNT EYEWASH NO MORE THAN 12" FROM COUTER EDGE.
5. ROUTE LN2 PIPING FROM BUILDING OVER WALKWAY TO BULK STORAGE TANK. MAINTAIN PIPE ELEVATION FROM BUILDING TO TANK OVER WALKWAY TO NOT OBSTRUCT PASSAGE. LN2 DOWN TO TANK WITHIN GATED SERVICE AREA. SEE DETAIL.

KEY PLAN



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PLUMBING PLAN

P-002

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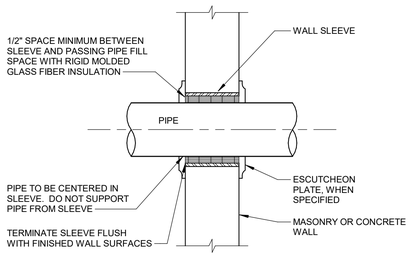
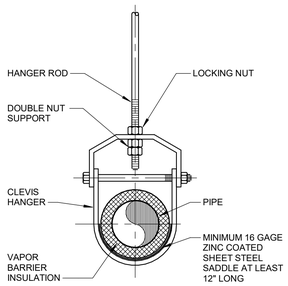


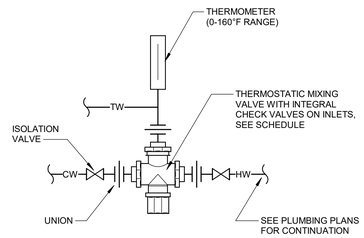
NOTE
USE FOR ALL PIPING PASSING THROUGH NEW INTERIOR NON-FIRE RATED AND NON-NOISE CRITICAL WALLS.

WALL SLEEVE DETAIL
NO SCALE



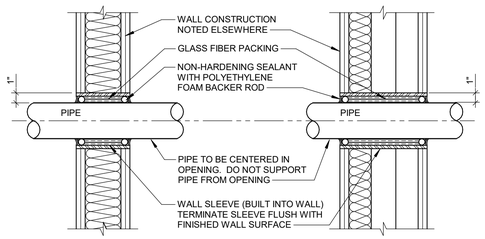
SINGLE HORIZONTAL RUNS WITH VAPOR BARRIER INSULATION

TYPICAL CLEVIS HANGER
NO SCALE



PROVIDE CHECK VALVES FOR SUPPLIES AS INDICATED ON FLOORPLANS

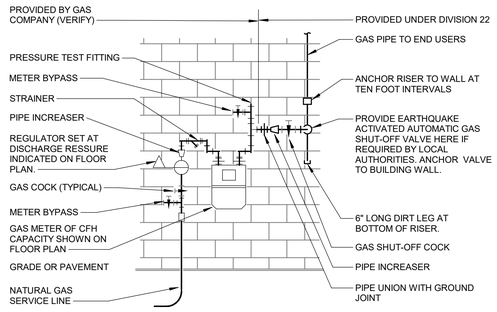
MIXING VALVE INSTALLATION DETAIL
NO SCALE



NOTE

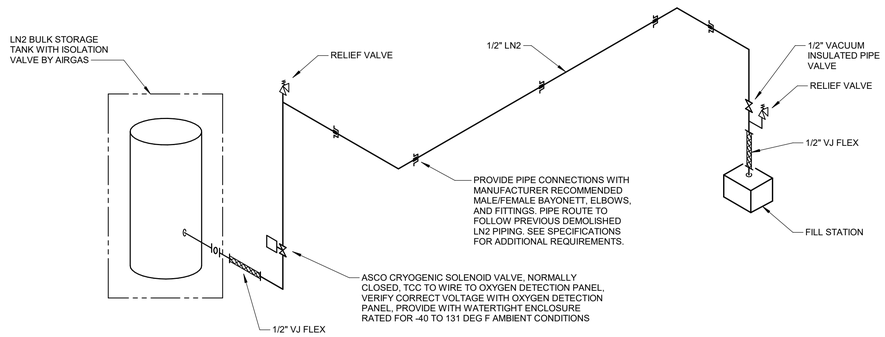
USE THIS DETAIL FOR ALL PIPE OR CONDUIT PENETRATIONS THROUGH SINGLE AND DOUBLE GYPSUM/STUD NOISE CRITICAL WALLS. SEAL ALL PENETRATIONS PER THIS DETAIL.

NOISE CRITICAL WALL PENETRATION DETAIL
NO SCALE



VERIFY REQUIREMENTS FOR METERING AND PIPING WITH GAS COMPANY. COORDINATE WITH GAS COMPANY WITH REGARD TO INSTALLATION OF OTHER PLUMBING UTILITIES IN VICINITY, IF ANY. APPLY FOR AND PAY GAS COMPANY FEES FOR INSTALLATION. USE WELDED OR SCREWED PIPE AND FITTINGS PER PLUMBING SPECIFICATIONS.

GAS METER DETAIL
NO SCALE



LIQUID NITROGEN PIPING DETAIL
NO SCALE

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DETAILS

P-003

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GENERAL NOTES

SHEET METAL NOTES

1. COORDINATE THE INSTALLATION OF ALL DUCTWORK WITH NEW PLUMBING, ELECTRICAL AND STRUCTURAL CONDITIONS. PROVIDE REQUIRED OFFSETS AND FITTINGS WHETHER INDICATED OR NOT. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS FOR CLEARANCES. OBTAIN APPROVAL OF ALTERNATE DUCT ROUTING BEFORE PROCEEDING IN ORDER TO ENSURE THAT THE AVAILABLE STATIC PRESSURE REMAINS ADEQUATE. DUCTWORK LOCATION TAKES PRECEDENCE OVER HVAC AND FIRE PROTECTION PIPING, AND ELECTRICAL CONDUIT AND CABLE TRAY.
2. REFER TO DUCT TAKEOFF DETAILS. SPIN-IN TYPE WITH SCOOPS IS NOT ACCEPTABLE. PROVIDE A MINIMUM OF 2 FEET BETWEEN RUNOUT TAKEOFFS FROM TRUNK DUCTS.
3. VERIFY THERMOSTAT, SENSOR, AND HUMIDISTAT LOCATIONS WITH ARCHITECT AND ENGINEER BEFORE ROUGH-IN.
4. RELOCATE ALL EXISTING DUCTWORK, PIPING, CONDUIT AND HANGERS THAT ARE IN CONFLICT WITH NEW DUCT.
5. EXISTING DUCTWORK AND EQUIPMENT SHOWN LIGHTLY IS EXISTING TO REMAIN.
6. MOUNT RUNOUT BALANCING DAMPERS AS CLOSE TO MAIN DUCT AS POSSIBLE.
7. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR DIFFUSER LOCATIONS.
8. DUCTWORK LAYOUT HAS BEEN DESIGNED TO ABSORB NOISE. PROVIDE ALL FITTINGS AS INDICATED.
9. NEW DUCTWORK AND PIPE ROUTING AS INDICATED ARE SCHEMATIC IN CONCEPT. FIELD LOCATE EXACT TIE-IN-POINTS TO EXISTING DUCTWORK AND COORDINATE FINAL ROUTING WITH EXISTING CONDITIONS AND NEW EQUIPMENT. PROVIDE ALL NECESSARY OFFSETS. COORDINATE TIME OF EXISTING DUCTWORK REROUTING WITH OWNER TO MINIMIZE DOWNTIME.
10. AT RENOVATED AREAS THE INDICATED ROUTING OF DUCTWORK SYSTEMS IS INTENDED TO INDICATE REUSE OF AS MUCH OF THE EXISTING SYSTEMS AS POSSIBLE. THE ROUTE SHOWN AND INFORMATION GIVEN IS NOT INTENDED TO REPRESENT EXACTLY WHERE AND HOW TO INSTALL THESE SYSTEMS. IT HAS BEEN DETERMINED THAT ADEQUATE SPACE EXISTS BUT NO ATTEMPT HAS BEEN MADE TO INDICATE THE LOCATION AND IDENTITY OF EVERY INTERFERENCE, NOR THE RESULTANT REQUIRED RESOLUTION OF INTERFERENCES. INCLUDE ADDITIONAL DUCT MATERIAL, LABOR, AND LAYOUT TIME REQUIRED TO RESOLVE INTERFERENCES AND THEIR REROUTING.
11. MOUNT TERMINAL UNITS TO NOT IMPAIR ACCESS TO FILTERS, COILS, AND CONTROLS.
12. REPAIR AND SEAL EXISTING DAMAGED DUCT LINING AND INSULATION WHERE ACCESSIBLE. FIELD VERIFY LOCATIONS.
13. REMOVE AND REPLACE CEILING GRID AND TILE AS REQUIRED TO ACCESS THE WORK. REPLACE DAMAGED GRID AND TILE TO MATCH EXISTING.
14. REBALANCE ALL NEW AND EXISTING DIFFUSERS AND GRILLES TO CFM INDICATED.
15. TO REDUCE NOISE, PROVIDE A MAXIMUM OF 5' OF INSULATED FLEX DUCT AT RUNOUTS TO DIFFUSERS.

HVAC PIPING NOTES

1. CLOSELY COORDINATE THE INSTALLATION OF ALL PIPING WITH NEW SHEET METAL, PLUMBING, ELECTRICAL, AND STRUCTURAL CONDITIONS. PROVIDE REQUIRED OFFSETS AND FITTINGS, WHETHER INDICATED OR NOT. REFER TO ARCHITECTURAL AND STRUCTURAL PLANS FOR CLEARANCES.
2. RELOCATE ALL EXISTING DUCTWORK, PIPING, AND CONDUIT HANGERS THAT ARE IN CONFLICT WITH NEW PIPING.
3. DUCT, PIPING AND EQUIPMENT SHOWN LIGHTLY IS EXISTING TO REMAIN.
4. AT RENOVATED AREAS THE INDICATED ROUTING OF PIPING SYSTEMS IS INTENDED TO INDICATE REUSE OF AS MUCH OF THE EXISTING SYSTEMS AS POSSIBLE. THE ROUTE SHOWN AND INFORMATION GIVEN IS NOT INTENDED TO REPRESENT EXACTLY WHERE AND HOW TO INSTALL THESE SYSTEMS. IT HAS BEEN DETERMINED THAT ADEQUATE SPACE EXISTS BUT NO ATTEMPT HAS BEEN MADE TO INDICATE THE LOCATION AND IDENTITY OF EVERY INTERFERENCE, NOR THE RESULTANT REQUIRED RESOLUTION OF INTERFERENCES. INCLUDE ADDITIONAL PIPE MATERIAL, LABOR, AND LAYOUT TIME REQUIRED TO RESOLVE INTERFERENCES AND THEIR REROUTING.
5. PIPE ROUTING AS INDICATED IS SCHEMATIC IN CONCEPT. FIELD LOCATE EXACT TIE-IN-POINTS TO EXISTING PIPING. COORDINATE FINAL ROUTING WITH SHEET METAL, ELECTRICAL, AND STRUCTURAL SYSTEMS. PROVIDE ALL NECESSARY OFFSETS. COORDINATE TIMING OF EXISTING PIPING REROUTING WITH OWNER TO MINIMIZE DOWNTIME.
6. PROVIDE SHUTOFF VALVES ON ALL RUNOUT PIPING SERVING MULTIPLE COILS.
7. INSTALL ALL PIPING TO CLEAR COIL REMOVAL AND ACCESS PANELS.
8. INSTALL MAINS AS HIGH AS POSSIBLE. PROVIDE VENTS AT ALL PIPING HIGH POINTS. PROVIDE DRAINS AT ALL LOW POINTS. SEE PIPING DETAILS.
9. REMOVE CEILING GRID AND TILES AND REPLACE AS REQUIRED TO ACCESS WORK. REPLACE DAMAGED GRID AND TILE TO MATCH EXISTING.
10. PROVIDE PIPE ANCHORS, EXPANSION LOOPS, AND JOINTS AND GUIDES AS REQUIRED. REFER TO SPECIFICATIONS.
11. BALANCE ALL NEW AND EXISTING COILS WHERE FLOW IS INDICATED.
12. SLEEVE AND SEAL WALL AND ROOF PENETRATIONS WHERE INDICATED TO A WEATHER TIGHT CONDITION SLEEVE AND SEAL INTERIOR FLOOR PENETRATIONS TO A WATERTIGHT CONDITION.
13. PROVIDE FIRESTOP IN NEW AND EXISTING HOLES AND PENETRATIONS IN RATED WALLS.
14. OPENINGS IN WALLS AND SLABS SHALL BE CORE DRILLED AS REQUIRED FOR NEW PIPING. LOCATION OF REINFORCING STEEL SHALL BE COORDINATED TO AVOID DAMAGE.
15. PROVIDE ISOLATION, DRAIN AND FILLING OF EXISTING PIPING SYSTEMS AS REQUIRED TO PERFORM THE WORK.
16. WHERE NEW CONNECTIONS TO EXISTING PIPE ARE INDICATED, SYSTEM SERVICE INTERRUPTION IS TO BE MINIMIZED AND COORDINATED WITH OWNER. TIE-IN METHODS TO INCLUDE HOT TAP AS REQUIRED.
17. NEW PIPING ROUTED OVER ELECTRICAL GEAR MUST MEET CLEARANCE REQUIREMENTS OF THE NEC.
18. VALVE INDICATIONS ARE GENERIC. REFER TO SPECIFICATION FOR ACCEPTABLE VALVE TYPES PER APPLICATION.
19. PRIOR TO MAKING CONNECTIONS TO EXISTING PIPING FOR REUSE, CONFIRM THAT EXISTING PIPING BEING TIED INTO IS ACTIVE FOR REUSE.

LEGEND

PIPE/FITTING SYMBOLS

- EXISTING PIPE
- EXISTING PIPE TO BE REMOVED
- NEW PIPE
- ELBOW UP
- ELBOW DOWN
- TEE UP
- TEE DOWN
- UNION
- CAP

PIPING DESIGNATION

- CHWS — PIPE CONTENTS SEE ABBREVIATIONS

GENERAL DESIGNATION

- DEMO 1 / NEW 1 — KEY NOTE SYMBOLS (REFER TO SHEET NOTES)
- NEW TO EXISTING CONNECTION

VALVE SYMBOLS

- GENERIC VALVE (REFER TO SPEC FOR TYPE)
- BALL VALVE
- GLOBE VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- GAS COCK
- SWING CHECK VALVE
- PRESSURE REDUCING VALVE
- PRESSURE RELIEF VALVE
- 2-WAY VALVE
- 3-WAY VALVE
- BACKFLOW PREVENTER
- CIRCUIT SETTER

MISC. PIPING SYMBOLS

- PUMP (LIQUID)
- PUMP (AIR)
- STRAINER
- EXPANSION JOINT & PIPE GUIDE
- FLEX CONNECTION
- T — STEAM TRAP
- PIPE ANCHOR
- PIPE GUIDE
- MANUAL AIR VENT (MV)
- AUTOMATIC AIR VENT (AV)
- VACUUM BREAKER (VB)
- CO — CLEANOUT LOCATED IN FLOOR
- CO — CLEANOUT LOCATED IN WALL PIPE COMING UP FROM BELOW.
- CO — HORIZONTAL CLEANOUT (LOCATED BELOW FLOOR AND ABOVE CEILING OF FLOOR BELOW)

- F.I. — FLOW INDICATOR
- P — PRESSURE GAGE
- P — PRESSURE TAP WITH NEEDLE VALVE
- T — THERMOMETER
- T — THERMOWELL
- WATER HAMMER ARRESTER WITH P.D.I. DESIGNATION

CONTROLS

- T — THERMOSTAT
- H — HUMIDISTAT
- S — SENSOR
- CO — CARBON MONOXIDE SENSOR
- CO_2 — CARBON DIOXIDE SENSOR
- NO_x — NITROGEN DIOXIDE SENSOR
- FS — FLOW SWITCH
- SD — DUCT SMOKE DETECTOR
- CONTROL WIRE

HVAC DUCTWORK SYMBOLS

- EXISTING DUCT
- EXISTING DUCT TO BE REMOVED
- NEW DUCT
- CAPPED DUCT
- SUPPLY AIR DUCT UP
- SUPPLY AIR DUCT DOWN
- EXHAUST OR RETURN AIR DUCT UP
- EXHAUST OR RETURN AIR DUCT DOWN
- ROUND DUCT UP
- ROUND DUCT DOWN
- FLAT OVAL DUCT DOWN
- FLAT OVAL DUCT UP

- FLEXIBLE DUCT
- BALANCING DAMPER
- M — MOTORIZED DAMPER
- TURNING VANES
- SIDE WALL DIFFUSER/GRILLE
- S-X / XXX CFM — SUPPLY AIR DIFFUSER WITH TAG NUMBER (SEE SCHEDULE) AND CFM. ARROWS INDICATE AIR FLOW DIRECTION.
- E-X XXX CFM OR R-X XXX CFM — EXHAUST AIR OR RETURN AIR GRILLE WITH TAG NUMBER (SEE SCHEDULE) AND CFM
- 10"ø — ROUND DUCT SIZE
- 24"x10" — RECTANGULAR DUCT SIZE
- 24"/10" — FLAT OVAL DUCT SIZE

- EXISTING FIRE DAMPER HORIZONTAL INSTALLATION
- EXISTING FIRE DAMPER VERTICAL INSTALLATION
- FIRE DAMPER HORIZONTAL INSTALLATION
- FIRE DAMPER VERTICAL INSTALLATION
- FIRE/SMOKE DAMPER HORIZONTAL INSTALLATION
- FIRE/SMOKE DAMPER VERTICAL INSTALLATION
- SMOKE DAMPER
- SUPPLY AIR DIFFUSER WITH RADIATION DAMPER AND THERMAL BLANKET.
- EXHAUST AIR OR RETURN AIR GRILLE WITH RADIATION DAMPER.
- M — MOTOR

GENERAL ABBREVIATIONS

AFF	ABOVE FINISHED FLOOR	MC	MECHANICAL CONTRACTOR
AI	ACOUSTICAL INSULATION	MD	MOTORIZED DAMPER
AL	ACOUSTICAL LINING	NIC	NOT IN CONTRACT
AP	ACCESS PANEL	OA	OUTSIDE AIR
BD	BALANCING DAMPER	RA	RETURN AIR
BDD	BACKDRAFT DAMPER	RF	RETURN FAN
CI	CAST IRON	RAG	RETURN AIR GRILLE
CS	CLINIC SINK	RC	RAIN CONDUCTOR
DF	DRINKING FOUNTAIN	RD	ROOF DRAIN
EA	EXHAUST AIR	S	SINK
EF	EXHAUST FAN	SA	SUPPLY AIR
EAG	EXHAUST AIR GRILLE	SF	SUPPLY FAN
EC	ELECTRICAL CONTRACTOR	SH	SHOWER
EM SH	EMERGENCY SHOWER	SS	SERVICE SINK
EW	EYEWASH	TCC	TEMPERATURE CONTROL CONTRACTOR
EWC	ELECTRIC WATER COOLER	UR	URINAL
FC	FLEXIBLE CONNECTION	VAV	VARIABLE AIR VOLUME
FD	FLOOR DRAIN	VI	VIBRATION ISOLATOR
FS	FLOOR SINK	VTR	VENT THRU ROOF
GC	GENERAL CONTRACTOR	WC	WATER CLOSET
HB	HOSE BIBB	W.C.	WATER COLUMN
IE	INVERT ELEVATION	WH	WALL HYDRANT
L	LOUVER	WS	WASTE STACK
LAV	LAVATORY	YH	YARD HYDRANT

PIPE CONTENTS ABBREVIATIONS

AR	ARGON GAS
AV	ACID VENT
AW	ACID WASTE
BF	BOILER FEED
CA	COMPRESSED AIR
CHWR	CHILLED WATER RETURN
CHWS	CHILLED WATER SUPPLY
COND	CONDENSATE
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
CW	DOMESTIC COLD WATER
DWR	DEIONIZED WATER RETURN
DWS	DEIONIZED WATER SUPPLY
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FP	FIRE PROTECTION WATER SUPPLY
G	GAS SUPPLY
HPS	HIGH PRESSURE STEAM
HW	DOMESTIC HOT WATER
HWR	DOMESTIC HOT WATER RETURN
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
LA	LABORATORY AIR
LPS	LOW PRESSURE STEAM
LV	LABORATORY VACUUM
MA	MEDICAL AIR
MPS	MEDIUM PRESSURE STEAM
N2	NITROGEN
N2O	NITROUS OXIDE
NPW	NON-POTABLE WATER
OSTM	OVERFLOW STORM SEWER
OXY	OXYGEN
PC	PUMPED CONDENSATE
PHWR	PRIMARY HEATING WATER RETURN
PHWS	PRIMARY HEATING WATER SUPPLY
PW	POTABLE WATER
ROR	REVERSE OSMOSIS WATER RETURN
ROS	REVERSE OSMOSIS WATER SUPPLY
SAN	SANITARY
SCW	SOFT COLD WATER
SM	STEAM
STM	STORM SEWER
V	SANITARY VENT
VAC	VACUUM
WWR	WELL WATER RETURN
WWS	WELL WATER SUPPLY

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GENERAL NOTES AND LEGEND

M-001

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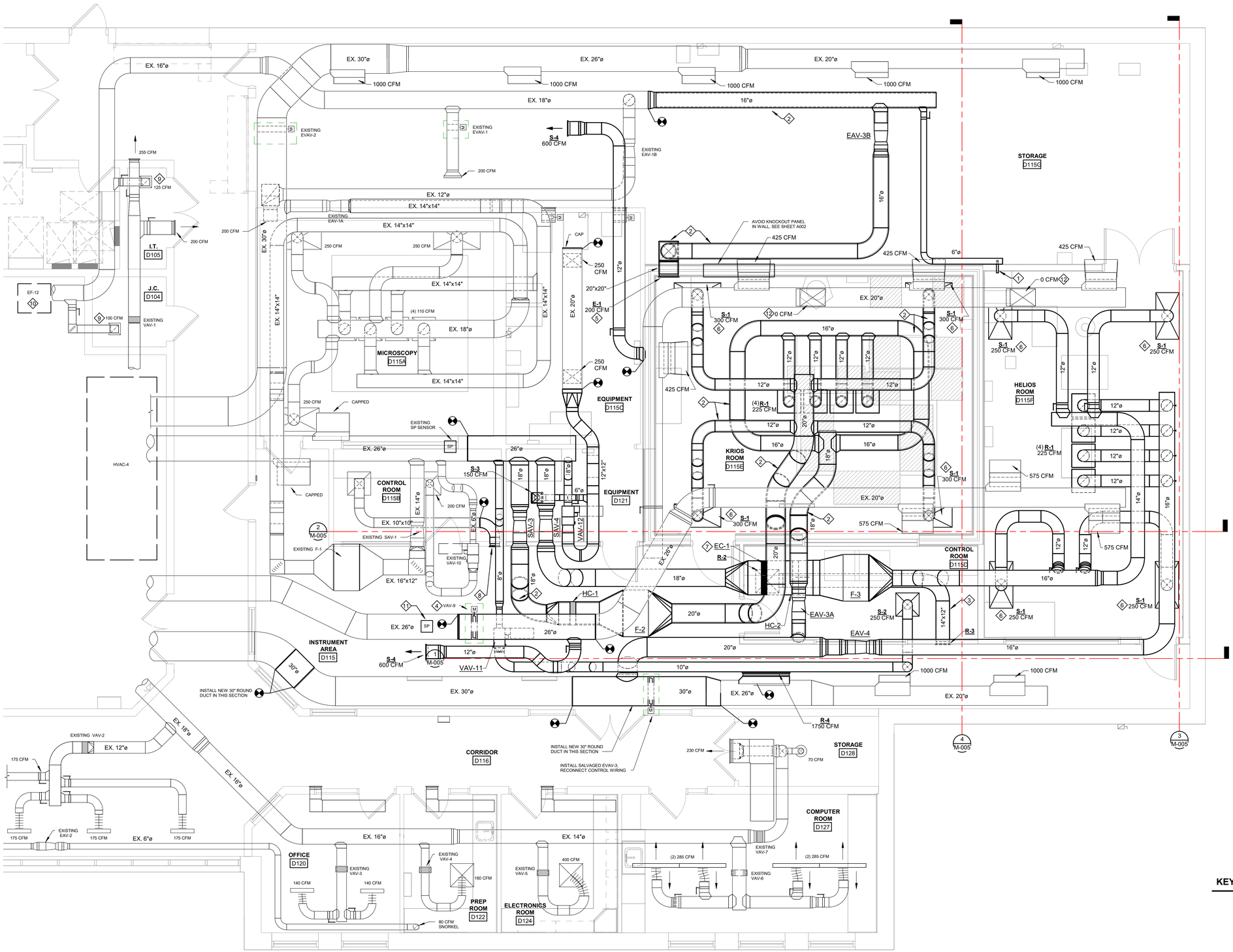


HVAC SHEET METAL PLAN

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

NORTH

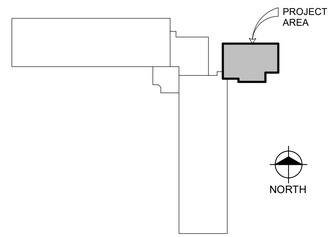
NOTES

1. SEAL ALL PENETRATIONS OF INTERIOR ROOF TO BE WATER TIGHT.
2. REFER TO DETAILS FOR SOUND/VIBRATION PROOF INSTALLATION OF KRIOS ROOM D155E PENETRATIONS.
3. DUCTWORK HAS BEEN ROUTED FOR ACOUSTICAL PERFORMANCE. MAINTAIN ROUTING AS SHOWN WITH ELBOWS AND OFFSETS.
4. DO NOT INSTALL BALANCE DAMPERS FOR KRIOS ROOM D155E. INSTALL DUCTWORK TO ACHIEVE EQUAL PRESSURE LOSS FROM MAIN TO DIFFUSER/GRILLE AND A BALANCED AIR SYSTEM.
5. BALANCE EXISTING AND NEW DIFFUSERS/GRILLES TO CFM SHOWN ON FLOORPLAN. PROGRAM VAV AND AIR VALVE SETPOINTS ACCORDING TO AIRFLOW BALANCE SCHEDULE ON SHEET M-008. USE EXISTING BRANCH DAMPERS PRIOR TO DIFFUSER DAMPERS TO BALANCE VAV-9.

KEY NOTES

1. 2" ROUND STAINLESS STEEL PIPE THROUGH WALL 3' AFF. PROVIDE WITH THREADED END CAP AT POINT OF USE. BALANCE TO 25 CFM. COORDINATE EXACT LOCATION WITH MSU.
2. 1" ACOUSTICALLY LINED DOUBLE-WALL DUCTWORK, TYPICAL OF ALL DUCTWORK FROM KRIOS ROOM D115E DIFFUSER/GRILLE TO AIR VALVE AND AS INDICATED.
3. INSTALL TRANSFER AIR DUCT IN CEILING PLENUM SPACE ABOVE CONTROL ROOM.
4. INSTALL SALVAGED VAV-9 AND 26" ROUND DUCT TO CONNECT TO EXISTING.
5. INSTALL BOTTOM OF GRILLE 7" ABOVE FINISHED FLOOR. LOCATE UNDER COUNTER. COORDINATE LOCATION WITH COUNTER CONSTRUCTION.
6. INSTALL 1-WAY THROW DIFFUSER WITH AIR PATTERN DIRECTED DOWN AND TOWARDS PERIMETER OF ROOM, AWAY FROM MICROSCOPE.
7. ADAPT DUCT SIZE TO MATCH COIL. SEE DETAIL AND SCHEDULE.
8. INSTALL SALVAGED 10"x10" GRILLE.
9. PROVIDE SHEET METAL BLANK OFF OR ADDITIONAL DAMPER AS NEEDED TO REDUCE AND BALANCE AIRFLOW INDICATED. LOCATE BLANK OFF OR DAMPER AT DUCT MAIN TO REDUCE NOISE.
10. ADJUST/CHANGE EF-12 SHEAVES AS REQUIRED TO ACHIEVE MAX AIRFLOW DURING PURGE MODE (2300 CFM). ADJUST STATIC PRESSURE SETPOINT AND PROGRAMING AS NEEDED TO ACHIEVE MIN/MAX AIRFLOW. SEE AIRFLOW BALANCE SCHEDULE SHEET M-008.
11. INSTALL SALVAGED DUCT STATIC PRESSURE SENSOR, RECONNECT WIRING, AND TEST CONNECTION.
12. DAMPER TO REMAIN CLOSED ON DIFFUSER FACING ROOF.

KEY PLAN



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Designer:	DDL
Reviewer:	GWL
Manager:	TSP

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HVAC SHEET METAL PLAN

M-002

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NOTES

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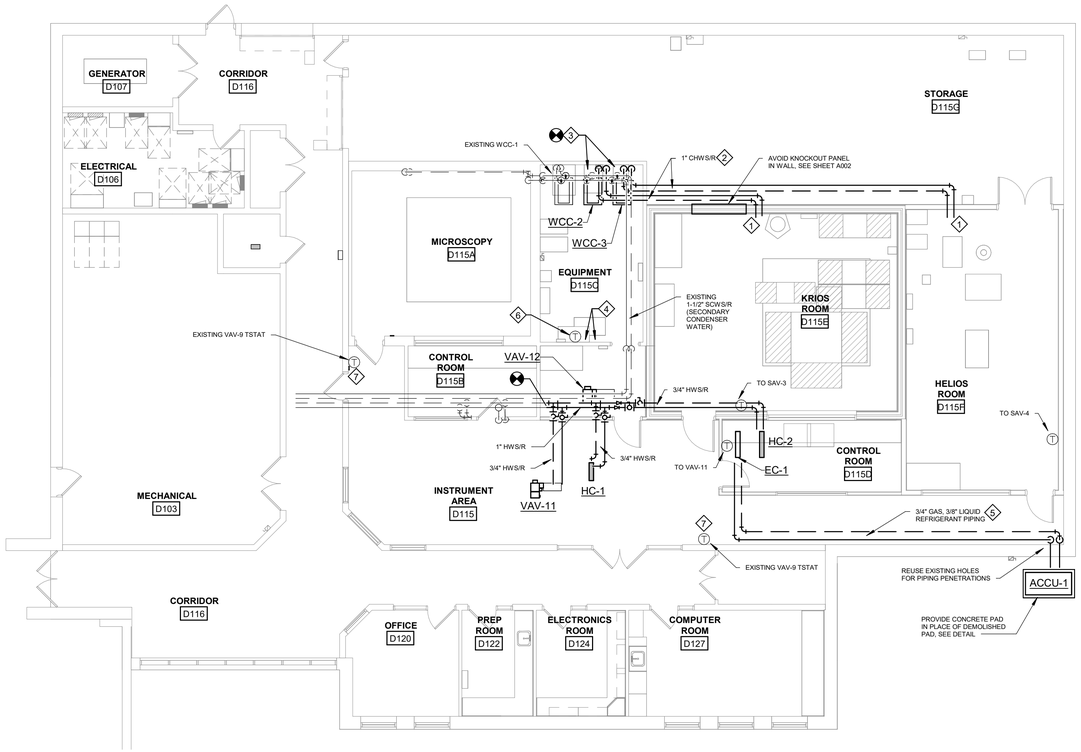
2. REFER TO DETAILS FOR SOUND/VIBRATION PROOF INSTALLATION OF KRIOS ROOM D155E PENETRATIONS.



NORTH

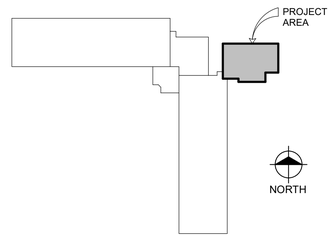
HVAC PIPING PLAN

SCALE: 1/8" = 1'-0"

KEY NOTES

1. CONNECT CHWS/R TO MICROSCOPE MANUFACTURER PROVIDED WALL MOUNTED PANEL. COORDINATE LOCATION WITH OWNER.
2. MOUNT PIPING TO WALL, ROUTE BEHIND EXHAUST AIR DUCT.
3. CONNECT WATER COOLED CHILLER WWC-2 AND WWC-3 TO EXISTING 1" SECONDARY CONDENSER WATER SUPPLY/RETURN (SCWS/R) DROPS. SEE PIPING DETAIL.
4. MOUNT F-2 AND F-3 PRE FILTER AND HEPA FILTER MAGNAHELIC DIFFERENTIAL PRESSURE GAUGES NEXT TO EXISTING F-1 GAUGES, LABEL ACCORDINGLY. ROUTE COPPER TUBING FROM FILTER HOUSING TO GAUGES.
5. REFRIGERANT PIPE SIZES ARE APPROXIMATE BASED ON PRELIMINARY MANUFACTURER SIZING RECOMMENDATIONS. ADAPT PIPE SIZE BASED ON INSTALLED ROUTE AND VERIFY WITH MANUFACTURER.
6. CONNECT EXISTING THERMOSTAT TO VAV-12. ROUTE NEW CONTROL WIRING FROM SALVAGED WIRE TO VAV.
7. CONNECT THERMOSTAT CONTROL WIRING TO RELOCATED VAV-9. VAV-9 TO USE AVERAGE OF TWO THERMOSTATS FOR TEMPERATURE CONTROL.

KEY PLAN



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HVAC PIPING PLAN

M-003

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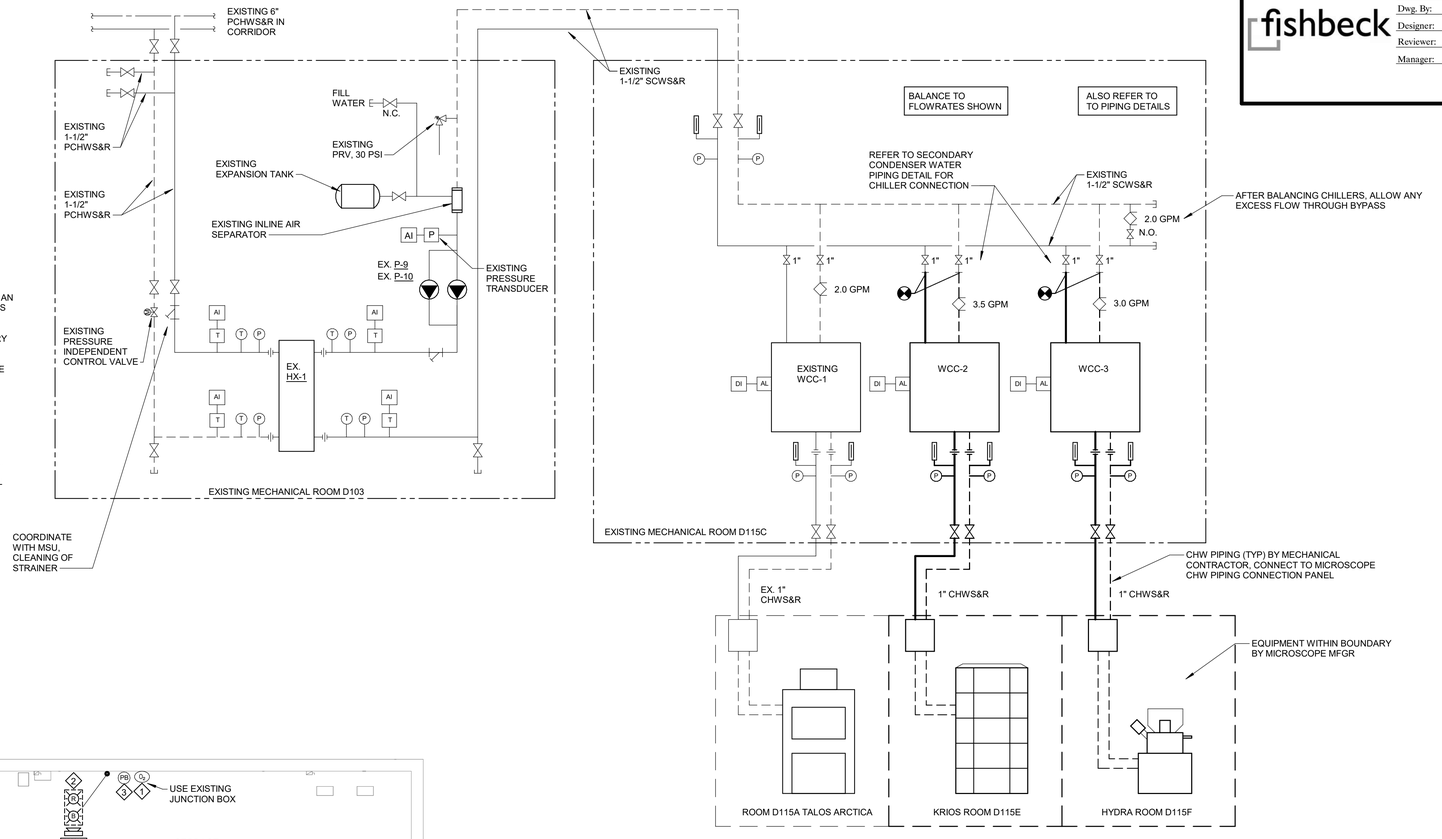
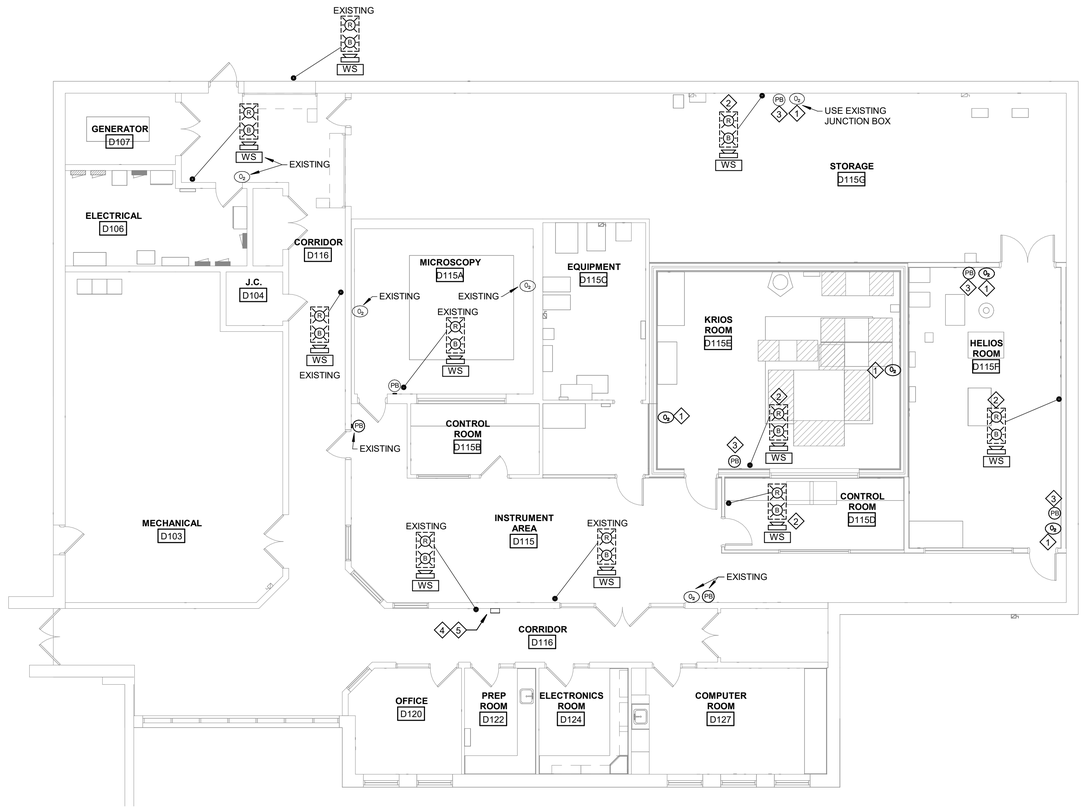
EXISTING PROCESS CHILLED WATER SEQUENCE OF OPERATION

THE FOLLOWING IS PROVIDED FOR REFERENCE ONLY. NO PROGRAMMING IS NEEDED.

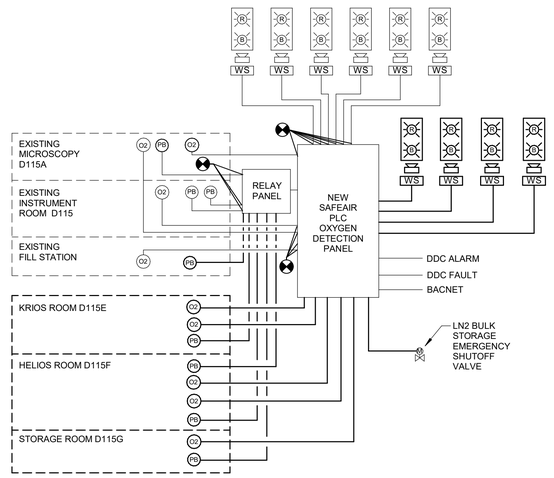
1. THE MICROSCOPES ARE COOLED BY A WATER COOLED CHILLER, WHICH REJECTS HEAT INTO AN ISOLATED WATER LOOP. SECONDARY CONDENSER WATER. SECONDARY CONDENSER LOOP IS COOLED BY THE MAIN PROCESS CHILLED WATER LOOP.
2. THE PRESSURE INDEPENDENT CONTROL VALVE SHALL MODULATE TO MAINTAIN A SECONDARY CONDENSER WATER SUPPLY TEMPERATURE SETPOINT OF 67°F (ADJ.).
3. THE SECONDARY CONDENSER WATER LOOP IS CONSTANT VOLUME AND PUMPED BY A SINGLE LEAD PUMP WITH A FULLY REDUNDANT STANDBY PUMP.
4. THE LEAD PUMP SHALL BE ENABLED BY THE BMS TO RUN CONTINOUSLY. LEAD PUMP DESIGNATION SHALL SWITCH MONTHLY.
5. ON A PUMP FAILURE AS INDICATED BY A CURRENT SENSING RELAY FOR EACH PUMP, THE STANDBY PUMP SHALL START AND RUN WITH NO INTERRUPTION TO CHILLER OPERATION.
6. A PRESSURE TRANSDUCER IN THE SECONDARY WATER LOOP SHALL BE SET BELOW NORMAL OPERATING CONDITIONS. IF THE PRESSURE DROPS BELOW SETPOINT FOR MORE THAN 5 MINUTES, BOTH PUMPS TURN OFF AND REMAIN OFF, AND ALARM IS GENERATED AT BMS UNTIL AUTOMATIC RESET OCCURS.



PROCESS CHILLED WATER PIPING SCHEMATIC
NO SCALE



GAS DETECTION AND ALARM PLAN
SCALE: 1/8" = 1'-0"



NOTES:

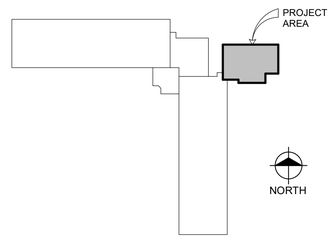
1. PUSH BUTTON SHALL BE ROUTED THROUGH A RELAY PANEL, SIMILAR TO EXISTING.
2. FOR OUTPUT TO A/V ALARMS, ALARMING OF ANY ONE OXYGEN SENSOR SHALL RESULT IN ACTIVATION OF ALL A/V ALARMS REGARDLESS OF LOCATION.
3. PROVIDE BACNET TO CENTAL BMS FOR ALARM MONITORING.
4. SEE CONTROL DIAGRAMS AND SEQUENCES FOR ADDITIONAL SEQUENCE OF OPERATION REQUIREMENTS.
5. POSITION OF EMERGENCY SHUTOFF VALVE SHALL BE MONITORED BY BOTH OXYGEN DETECTION PANEL AND BMS.

OXYGEN DETECTION PANEL
NO SCALE

⑨ OXYGEN DETECTION KEY NOTES

1. MOUNT NEW OXYGEN SENSOR 48" AFF. TIE SENSOR INTO ALARM SYSTEM. COORDINATE FINAL LOCATION OF SENSOR WITH EQUIPMENT LAYOUT.
2. NEW RED AND BLUE ALARM LIGHTS WITH HORN AND WARNING SIGN TO MATCH EXISTING.
3. PURGE BUTTON: RED BUTTON, PUSH-PULL OPERATION WITH BUILT-IN INDICATOR LIGHT TO INDICATE WHEN BUTTON IS DEPRESSED. PROVIDE CLEAR COVER AND PLASTIC LAMINATE LABEL READING "PUSH FOR INCREASED EXHAUST".
4. REMOVE EXISTING DRAGER 3900 PANEL AND REPLACE WITH NEW SAFEAIR PLC AND RELAY PANEL. CONNECT NEW AND EXISTING OXYGEN SENSOR INPUTS AND CONTROLLED OUTPUT DEVICES TO NEW PANEL. PROVIDE ALL WORK REQUIRED FOR FULLY FUNCTIONAL SYSTEM. TEST ALL CONTROL SEQUENCES AND DEVICES NEW AND EXISTING. ENSURE ALL ALARMS ARE ACTIVATED FOR A FAULT IN ANY ONE LOCATION, INCLUDING NEW AND EXISTING.
5. IN ADDITION TO RED AND BLUE ALARM LIGHTS, ADD A GREEN READY LIGHT AT OXYGEN DETECTION PANEL.

KEY PLAN



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GAS DETECTION AND ALARM PLAN

M-004

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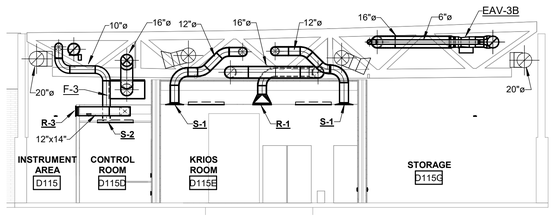

4 SECTION
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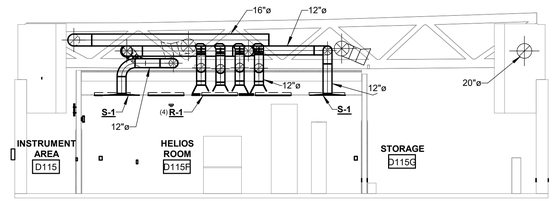

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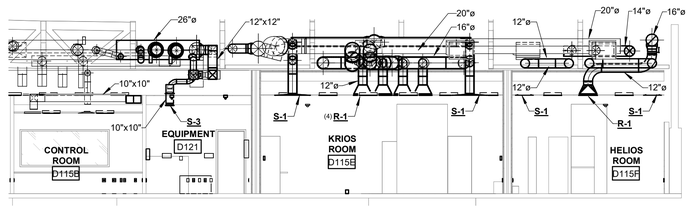

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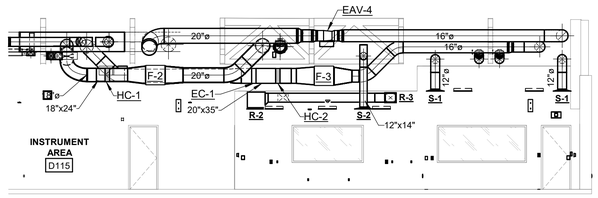

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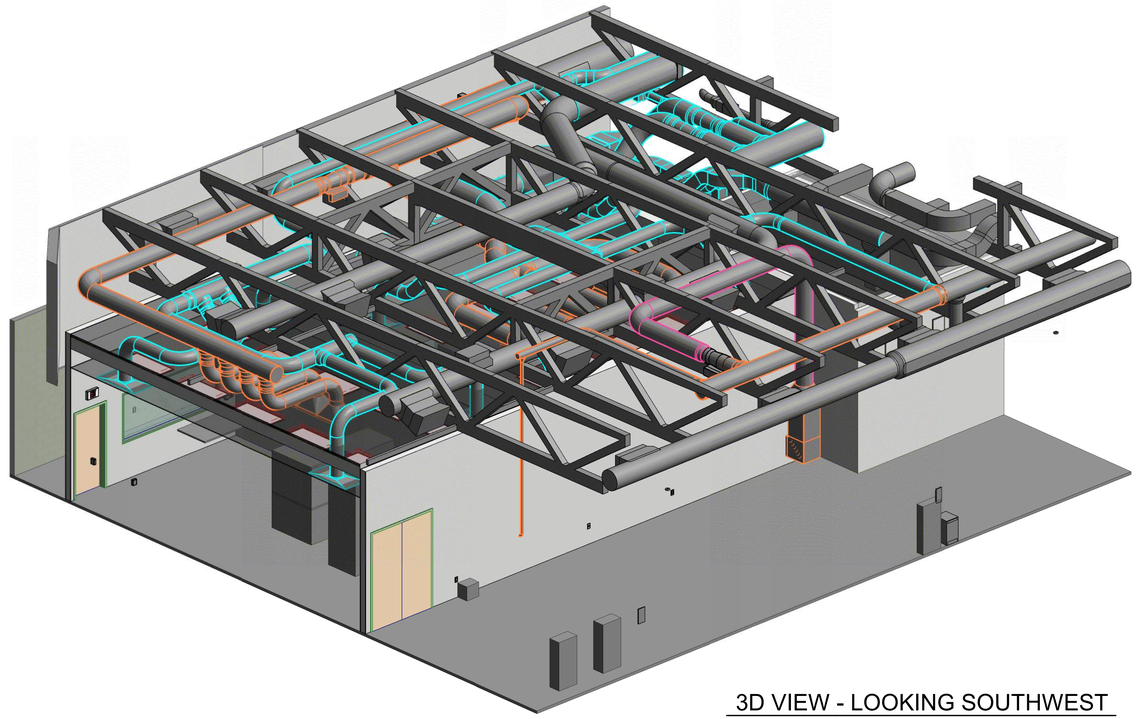

3D VIEW - LOOKING SOUTHWEST
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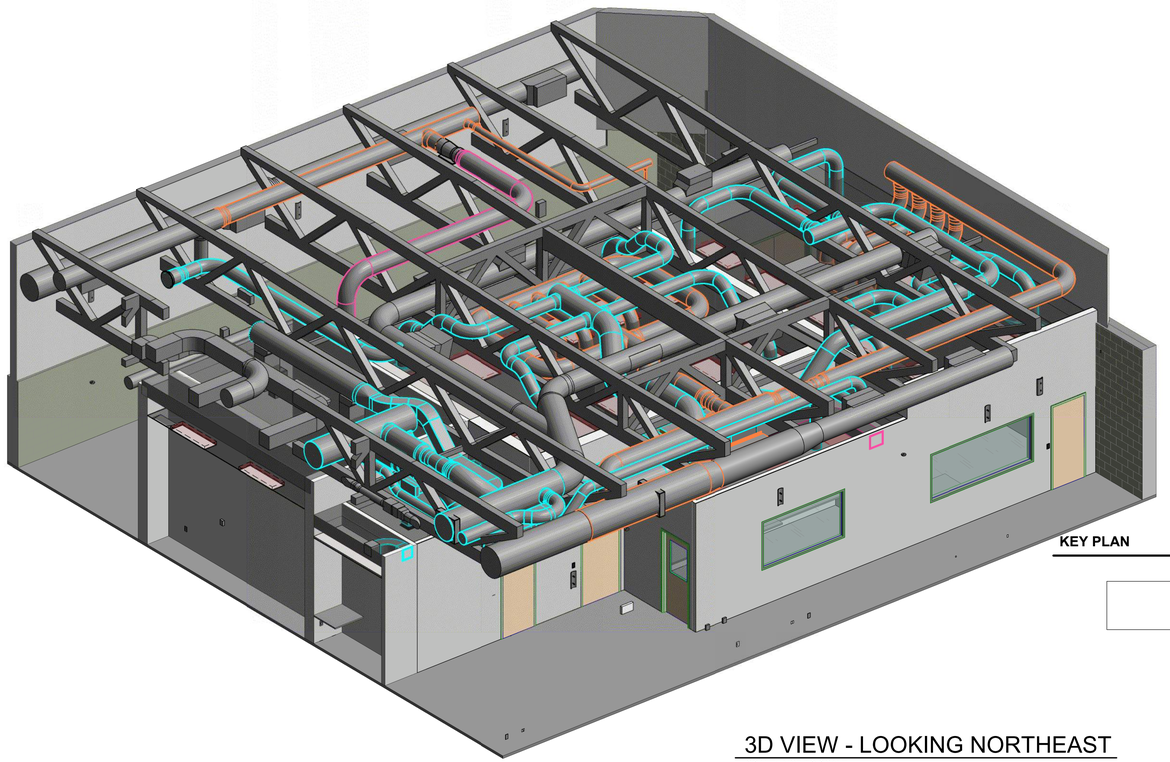
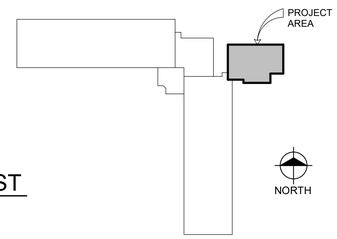


3D VIEW - LOOKING NORTHEAST
SCALE: NOT TO SCALE

KEY PLAN



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HVAC 3D VIEW AND SECTIONS

M-005

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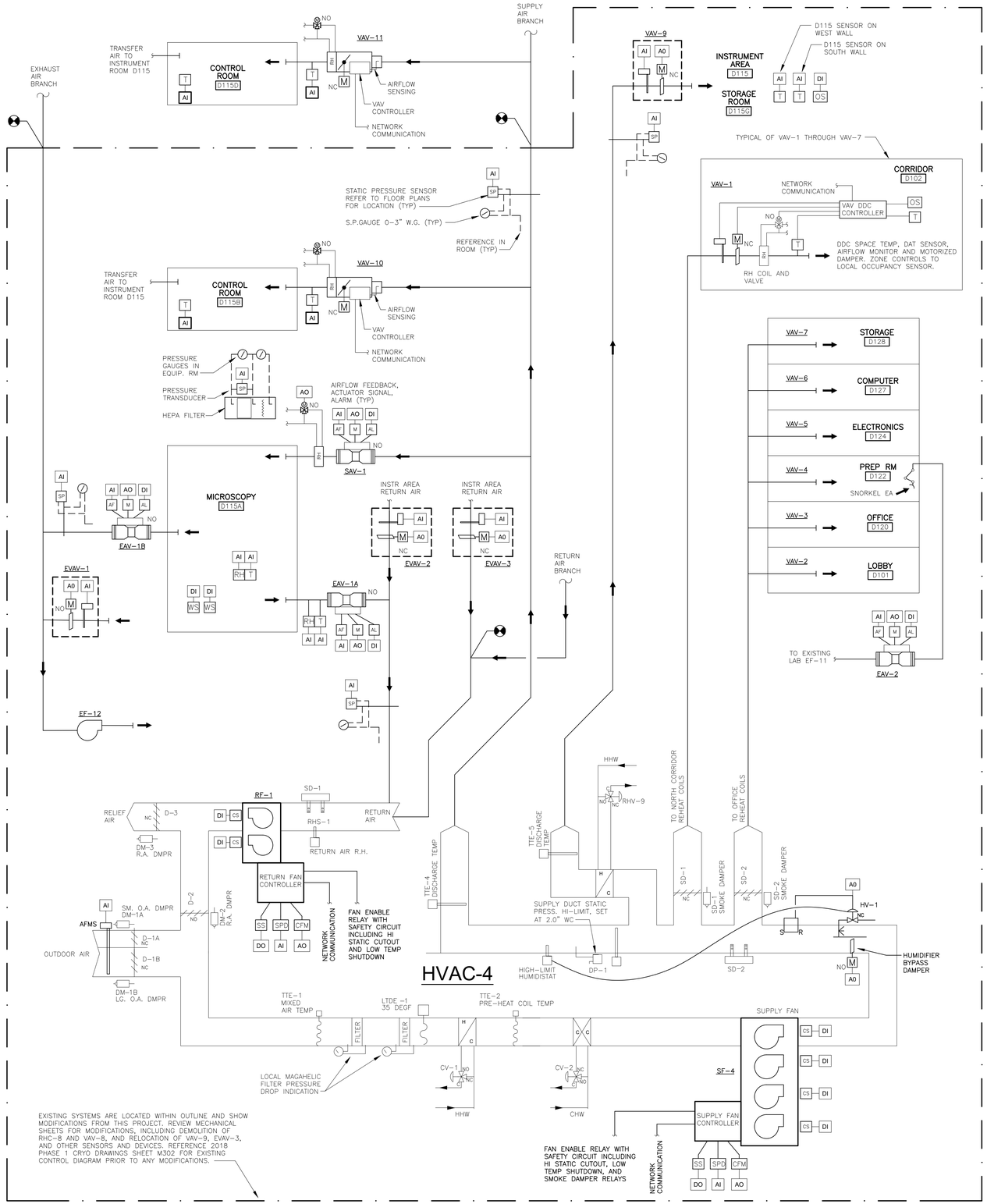
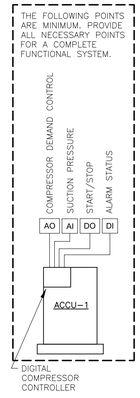
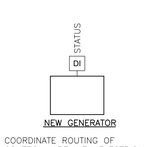


CONTROL DIAGRAM

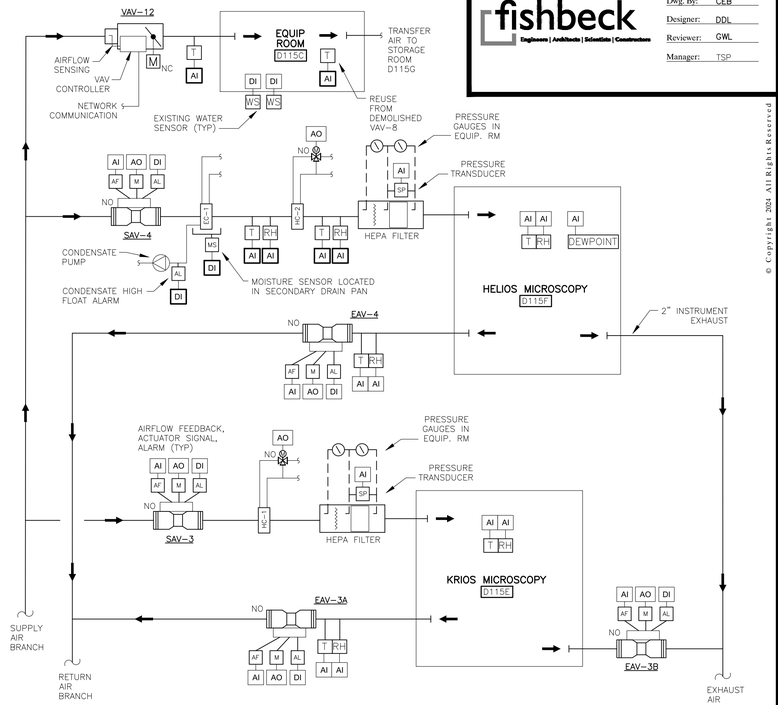
NO SCALE

THE FOLLOWING POINTS ARE MINIMUM. PROVIDE ALL NECESSARY POINTS FOR A COMPLETE FUNCTIONAL SYSTEM.





COORDINATE ROUTING OF CONTROL WIRE WITH ELECTRICAL FOR SHARED CONDUIT



KRIOS MICROSCOPY ROOM D115E CONTROLS

GENERAL PERFORMANCE REQUIREMENTS:

1. THE SPACE TEMPERATURE SETPOINT SHALL BE 69°F, NOT ADJUSTABLE FROM WITHIN THE SPACE. ALARMS THROUGH CENTRAL CONTROL SHALL BE GENERATED IF SPACE DEVIATES FROM SPECIFIED CONDITIONS.
2. ALL TEMPERATURE CONTROLS AFFECTING MICROSCOPY TEMPERATURE AND HUMIDITY SHALL BE FINE TUNED TO ACHIEVE THE FOLLOWING PERFORMANCE REQUIREMENTS:
   - 2.1. SPACE TEMPERATURE CHANGE SHALL BE LESS THAN 0.8°C (1.5°F) PER 24 HOURS. SPACE RELATIVE HUMIDITY SHALL BE LESS THAN 70% AT ALL TIMES.
   - 2.2. SUPERVISORY CONTROLLER SHALL CONTROL SAV-3, EAV-3A, AND EAV-3B. CONTROLLER OPERATES CENTRAL EQUIPMENT INCLUDING COOLING, FANS, AND REHEAT COILS TO MAINTAIN TIGHT SPACE TEMPERATURE.

NORMAL MODE:

1. SUPPLY, RETURN, AND EXHAUST AIR VALVES SHALL PROVIDE CONSTANT AIRFLOW AT ALL TIMES IN NORMAL OPERATION (100 CFM POSITIVE SPACE OFFSET):
   - SAV-3 = 1,200 CFM (SUPPLY)
   - EAV-3A = 900 CFM (RETURN)
   - EAV-3B = 200 CFM (EXHAUST)
2. SAV-3 REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE IN ACCORDANCE WITH REQUIREMENTS ABOVE.

PURGE MODE:

1. WHEN AN OXYGEN SENSOR IN KRIOS ROOM D115E DETECTS OXYGEN BELOW 20.0% (ADJ.) OR A HIGH EXHAUST PUSH BUTTON IN THE SPACE IS PRESSED, HVAC-4 SHALL ENTER PURGE MODE SEQUENCE OF OPERATION AND AIR VALVES MODULATE TO THE DESIGNATED AIRFLOWS (100 CFM NEGATIVE SPACE OFFSET):
   - SAV-3 = 1,200 CFM (SUPPLY)
   - EAV-3A = 200 CFM (RETURN)
   - EAV-3B = 1,100 CFM (EXHAUST)
2. THE OXYGEN DETECTION CONTROL PANEL PROVIDES AN ALARM SIGNAL TO CENTRAL CONTROL. AN ENHANCED ALARM IS DISPLAYED AT THE BMS.

HELIOS MICROSCOPY ROOM D115F CONTROLS

GENERAL PERFORMANCE REQUIREMENTS:

1. THE SPACE TEMPERATURE SETPOINT SHALL BE 69°F, NOT ADJUSTABLE FROM WITHIN THE SPACE. ALARMS THROUGH CENTRAL CONTROL SHALL BE GENERATED IF SPACE DEVIATES FROM SPECIFIED CONDITIONS.
2. ALL TEMPERATURE CONTROLS AFFECTING MICROSCOPY TEMPERATURE AND HUMIDITY SHALL BE FINE TUNED TO ACHIEVE THE FOLLOWING PERFORMANCE REQUIREMENTS:
   - 2.1. SPACE TEMPERATURE CHANGE SHALL BE LESS THAN 1.0°C (1.8°F) PER 24 HOURS. SPACE RELATIVE HUMIDITY SHALL BE LESS THAN 40% AT ALL TIMES.
   - 2.2. SUPERVISORY CONTROLLER SHALL CONTROL SAV-4 AND EAV-4. CONTROLLER OPERATES CENTRAL EQUIPMENT INCLUDING COOLING, FANS, AND REHEAT COILS TO MAINTAIN TIGHT SPACE TEMPERATURE/HUMIDITY.
   - 2.3. SUPERVISORY CONTROLLER SHALL CONTROL ACCU-1. CONTROLLER OPERATES COMPRESSOR TO MAINTAIN SPACE HUMIDITY BELOW 40% RH, UPON A CALL FOR DEHUMIDIFICATION, EC-1 SHALL MAINTAIN LEAVING AIR TEMPERATURE OF 40 °F (ADJUSTABLE). THE CONTROLLER SHALL BE FINE TUNED AND MONITOR REFRIGERANT SYSTEM PRESSURE AND TEMPERATURE TO PREVENT FREEZING, FROST BUILD-UP, AND NUISANCE SHUTDOWNS. CONSULT MANUFACTURER FOR PROGRAMMING.
   - 2.4. AN ENHANCED ALARM SHALL BE MADE VISIBLE TO THE BMS FOR HIGH CONDENSATE FLOAT. OR WHEN MOISTURE IS SENSED IN THE EC-1 SECONDARY DRAIN PAN.

NORMAL MODE:

1. SUPPLY AND RETURN AIR VALVES SHALL PROVIDE CONSTANT AIRFLOW AT ALL TIMES IN NORMAL OPERATION (100 CFM POSITIVE SPACE OFFSET):
   - SAV-4 = 1,000 CFM (SUPPLY)
   - EAV-4 = 900 CFM (RETURN)
2. ACCU-1 SHALL CYCLE ON/OFF AND MODULATE COMPRESSOR SPEED TO MAINTAIN SPACE AT 40% RH IN ACCORDANCE WITH THE REQUIREMENTS ABOVE.
3. SAV-4 REHEAT COIL VALVE SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE IN ACCORDANCE WITH REQUIREMENTS ABOVE.

PURGE MODE:

1. WHEN AN OXYGEN SENSOR IN HELIOS ROOM D115F DETECTS OXYGEN BELOW 20.0% (ADJ.) OR A HIGH VENTILATION PUSH BUTTON IN THE SPACE IS PRESSED, HVAC-4 SHALL ENTER PURGE MODE SEQUENCE OF OPERATION.
2. THE OXYGEN DETECTION CONTROL PANEL PROVIDES AN ALARM SIGNAL TO CENTRAL CONTROL. AN ENHANCED ALARM IS DISPLAYED AT THE BMS.

INSTRUMENT ROOM D115 AND STORAGE ROOM D115G

ADJUST MIN/MAX/PURGE AIRFLOW SETPOINTS ACCORDING TO THE AIRFLOW BALANCE SCHEDULE ON SHEET M-008. VAV-9 SHALL CONTROL TO THE AVERAGE OF TWO SPACE TEMPERATURE SENSORS WITH ONE COMMON TEMPERATURE SETPOINT.

PURGE MODE:

WHEN AN OXYGEN SENSOR IN INSTRUMENT ROOM D115 OR STORAGE ROOM D115G DETECTS OXYGEN BELOW 20.0% (ADJ.) OR A HIGH VENTILATION PUSH BUTTON IN THE SPACE IS PRESSED, VAV-9 SHALL MODULATE TO THE PURGE AIRFLOW SETPOINT AND HVAC-4 ENTER PURGE MODE SEQUENCE OF OPERATION. AN ENHANCED ALARM IS VISIBLE AT THE BMS.

ADJUSTMENT TO EXISTING PROGRAMMING

AIR HANDLING UNIT HVAC-4

PURGE MODE:

IF THE OUTDOOR AIRFLOW IS LESS THAN 40% OF SUPPLY, THE OUTDOOR AIR DAMPER SHALL MODULATE OPEN TO ACHIEVE 40% OF SUPPLY AIRFLOW (ADJ). HVAC-4 SHALL CONTINUE TO MAINTAIN DISCHARGE AIR TEMPERATURE SETPOINT, MIXED AIR LOW LIMIT, AND OTHER CONSTRAINTS TO MAINTAIN SPACE TEMPERATURE AND STABLE OPERATION. PROPER TIME DELAYS AND PID LOOP PROGRAMMING SHALL BE IN PLACE TO PREVENT TRIPPING OF VARIOUS SAFETY SWITCHES/RELAYS. THIS SEQUENCE OF OPERATION SHALL REPLACE THE PREVIOUS SEQUENCE FOR OUTDOOR AIR DURING PURGE MODE. REFER TO THE 2018 PHASE 1 CRYO EM DRAWINGS, SHEET M302 SCHEMATICS AND CONTROLS.

SUPPLY FAN SP RESET:

1. SUPPLY DUCT STATIC PRESSURE SETPOINT SHALL BE RESET BASED ON ALL ASSOCIATED TERMINAL UNIT DAMPER POSITIONS.
2. STATIC PRESSURE SETPOINT SHALL BE RESET TO MAINTAIN MOST OPEN TERMINAL UNIT DAMPER AT 95% OPEN.
3. AS MOST OPEN DAMPER POSITION FALLS BELOW 95% OPEN, GRADUALLY REDUCE DUCT STATIC PRESSURE SETPOINT.
4. AS MOST OPEN DAMPER RISES ABOVE 95% OPEN, GRADUALLY INCREASE DUCT STATIC PRESSURE SETPOINT. DUCT STATIC PRESSURE SETPOINT SHALL HAVE AN ADJUSTABLE HIGH LIMIT (DETERMINED BY TAB AS REQUIRED TO ACHIEVE DESIGN AIRFLOW) AND AN ADJUSTABLE LOW LIMIT.

RETURN FAN SP CONTROL:

RF-1 SHALL OPERATE TO MAINTAIN A RETURN DUCT STATIC PRESSURE SETPOINT OF 0.5 IN WC (ADJ.)

TERMINAL UNIT TAGS:

UPDATE ALL EXISTING VAV TERMINAL UNIT TAGS PER MSU PROVIDED NAMES.

MINIMUM OUTDOOR AIR:

THE SMALL OUTDOOR AIR DAMPER SHALL MAINTAIN MINIMUM OUTDOOR AIR OF 1,000 CFM.

RETURN AIR EVAV-2 AND EVAV-3:

ADJUST RETURN AIR EVAV-2 AND EVAV-3 MIN/MAX SETPOINTS ACCORDING TO THE AIRFLOW BALANCE SCHEDULE ON SHEET M-008. FUNCTIONAL TEST THE EXISTING SEQUENCE OF OPERATION: EVAV-2 AND EVAV-3 OPERATE TOGETHER TO PROVIDE THE CALCULATED RETURN AIRFLOW. THE CALCULATED AIRFLOW IS BASED ON THE TOTAL SUPPLY AIRFLOW LESS THE EXHAUST AIR FROM THE SPACES. TEST THAT RETURN AIRFLOW TRACKING IS ACCURATE AND BUILDING PRESSURE IS MAINTAINED 0.001 TO 0.025 IN WC FOR ALL MODES OF OPERATION.

TERMINAL AIRFLOW UNITS:

REMOVE VAV-8 AND RHC-8 PROGRAMMING, PHYSICAL DEVICES TO BE DEMOLISHED. BALANCE AIRFLOW AND COMMISSION NEW AND EXISTING VAVS AND AIR VALVES. ADJUST AIRFLOW SETPOINTS ACCORDING TO AIRFLOW BALANCE SCHEDULE ON SHEET M-008.

CHILLER C-1

CHILLER ENABLE:

CHILLER C-1 SHALL ENABLE WHEN THERE IS A CALL FOR CHILLED WATER AND WHEN HVAC-4 COOLING MODE OF OPERATION IS IN TRANSITION FOR ECONOMIZE TO CHILLED WATER. INCLUDE TIME DELAYS TO ALLOW CHILLED WATER TO REACH TEMPERATURE SETPOINT BEFORE TRANSITIONING FROM ECONOMIZE MODE.

EXHAUST FAN EF-12

SP CONTROL:

ADJUST STATIC PRESSURE SETPOINT TO CONTROL FAN SPEED BASED ON NEW SETPOINT DETERMINED BY TAB CONTRACTOR. SETPOINT SHALL BE SET TO THE LOWEST SP TO ACHIEVE DESIGN AIRFLOW AT EACH MODE OF OPERATION (NORMAL AND AT EACH SCENARIO OF PURGE).

OXYGEN DEPLETION DETECTION AND ALARMS

WHEN ANY OXYGEN SENSOR SENSES OXYGEN LEVELS LESS THAN 20.0% (ADJ.), OR WHEN A HIGH-EXHAUST PUSH BUTTON IS PRESSED, THE RED FLASHERS SHALL BE ACTIVATED (ALL LOCATIONS). IF THE LOW OXYGEN REPORTING SENSOR IS THE ONE LOCATED AT THE NITROGEN FILL STATION, THE LIQUID NITROGEN AUTOMATIC SHUT-OFF VALVE SHALL BE CLOSED. THE ALARM CONDITIONS SHALL BE MAINTAINED UNTIL OXYGEN LEVELS EXCEED 20.0%. TCC TO PROVIDE WIRING TO SHUT-OFF VALVE. OXYGEN DETECTION PANEL TO CONTROL VALVE.

WHEN ANY OXYGEN SENSOR SENSES OXYGEN LEVELS LESS THAN 19.5% (ADJ.), THE RED FLASHERS SHALL BE ACTIVATED, THE AUDIBLE ALARM SHALL BE SOUNDED, AN ALARM SIGNAL SHALL BE SENT TO MSU POLICE, AND THE SMOKE DAMPERS IN THE DUCTS SERVING THE OFFICE AREAS SHALL BE CLOSED. THE ALARM CONDITIONS SHALL BE MAINTAINED UNTIL OXYGEN LEVELS EXCEED 19.5%. ALL ALARMS RELATED TO LOW OXYGEN SHALL BE DISPLAYED AT THE BMS AS ENHANCED ALARMS.

WHEN THERE IS A SYSTEM MALFUNCTION, THE BLUE LIGHTS ARE ACTIVATED, AND AN ENHANCED ALARM MADE VISIBLE TO THE BMS.

EMERGENCY GENERATOR

FOR NEW 60kW GENERATOR, PROVIDE GENERATOR STATUS POINT FOR REPORTING THROUGH CENTRAL CONTROL.

fishbeck
Engineers | Architects | Scientists | Constructors

Proj. No.: 240252
Dwg. By: CEB
Designer: DDL
Reviewer: GWL
Manager: TSP

MICHIGAN STATE UNIVERSITY
Infrastructure Planning and Facilities

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RENOVATE D115, CRYO-EM EXPANSION

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DATE	
SCALE	AS SHOWN

REVISIONS
5/16/2024 Bids & Construction

CONTROL DIAGRAMS

M-006

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PLOT INFO: Z:\2024\240252\CAD\CIVIL-006_240252.DWG LAYOUT: M-006 DATE: 6/17/2024 TIME: 9:39:17 AM USER: CEBAKER

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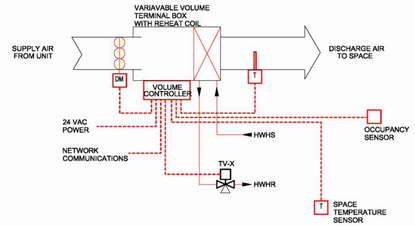

VAV TERMINAL BOX W/ REHEAT COIL CONTROL DIAGRAM No. 4

GENERAL

1. THE OPERATING MODE OF THE VAV SHALL BE AUTOMATICALLY CYCLED FROM THE OCCUPIED MODE TO THE UNOCCUPIED MODE OF OPERATION BASED ON A TIME CLOCK SCHEDULE AND THE SPACE MOUNTED OCCUPANCY SENSOR.
2. HEATING AND COOLING SETPOINTS SHALL NOT BE ADJUSTABLE AT THE SPACE THERMOSTAT, BUT SHALL BE ADJUSTABLE THROUGH THE BAS.

OCCUPIED MODE: (SCHEDULED OCCUPIED AND OCCUPANCY SENSOR INDICATING SPACE(S) OCCUPIED)

3. IN OCCUPIED MODE THE SPACE HEATING SETPOINT SHALL BE TO DEG F AND THE COOLING SETPOINT SHALL BE 75 DEG F WITH A MINIMUM SPACE TEMPERATURE SETPOINT OF 69 DEG F AND A MAXIMUM SPACE TEMPERATURE SETPOINT OF 76 DEG F.
4. IF THE SPACE TEMPERATURE DROPS BELOW 71 DEG F, THE TERMINAL BOX DAMPER SHALL MAINTAIN THE MINIMUM DESIGN FLOW.
   a. AS THE SPACE TEMPERATURE DECREASES FROM 71 DEG F TO 70.5 DEG F, THE REHEAT COIL CONTROL VALVE, TV-1, SHALL MODULATE OPEN TO INCREASE THE TERMINAL BOX DISCHARGE TEMPERATURE FROM 55 DEG F TO 70 DEG F.
   b. UPON A FURTHER DECREASE IN SPACE TEMPERATURE FROM 70.5 DEG F TO 70 DEG F, THE TERMINAL BOX SHALL MAINTAIN MINIMUM DESIGN AIRFLOW AND TV-X SHALL MODULATE OPEN TO INCREASE THE TERMINAL BOX DISCHARGE FROM 70 DEG F TO 85 DEG F.
   c. BELOW 70 DEG F, THE TERMINAL BOX SHALL MAINTAIN MINIMUM DESIGN AIRFLOW AND TV-X SHALL MODULATE TO MAINTAIN THE TERMINAL BOX DISCHARGE AIR TEMPERATURE AT 85 DEG F.
5. WHEN THE SPACE TEMPERATURE IS BETWEEN THE HEATING AND COOLING SETPOINTS, THE TERMINAL BOX SHALL MAINTAIN THE MINIMUM DESIGN FLOW OF AIR TO THE SPACE AND TV-X SHALL BE FULLY CLOSED.
6. THE SPACE TEMPERATURE SENSOR SHALL RESET THE TERMINAL BOX VOLUME CONTROLLER FROM MINIMUM DESIGN FLOW TO MAXIMUM DESIGN FLOW CFM, TO MAINTAIN THE MAXIMUM SPACE TEMPERATURE.

STANDBY MODE: (SCHEDULED OCCUPIED AND OCCUPANCY SENSOR INDICATING SPACE(S) NOT OCCUPIED)

7. STANDBY MODE IS DEFINED AS THE CONDITION IN WHICH THE SPACE MOTION SENSOR DOES NOT INDICATE ACTIVITY IN THE SPACE AND THE VAV IS OTHERWISE IN THE OCCUPIED MODE.
8. IN STANDBY MODE THE SPACE HEATING SETPOINT SHALL RESET TO 2 DEG F BELOW THE HEATING SETPOINT AND THE COOLING SETPOINT SHALL BE RESET TO 2 DEG F ABOVE THE COOLING SETPOINT WITH A MINIMUM SPACE TEMPERATURE OF 67 DEG F AND A MAXIMUM SPACE TEMPERATURE OF 78 DEG F. THE VAV VOLUME AND VALVE CONTROL SHALL MIRROR THE OCCUPIED MODE USING THE STANDBY SETPOINTS.
9. IF AT ANY TIME THE OCCUPANCY SENSORS INDICATE THAT THE ROOM SERVED BY THIS VAV BOX IS OCCUPIED, THE VAV BOX REVERTS TO THE OCCUPIED SEQUENCE OF OPERATION (SCHEDULED OCCUPIED AND OCCUPANCY SENSOR INDICATING OCCUPIED).

UNOCCUPIED MODE: (SCHEDULED UNOCCUPIED)

10. IN THE UNOCCUPIED MODE THE TERMINAL BOX DAMPER SHALL NORMALLY BE CLOSED, TV-X SHALL NORMALLY REMAIN FULLY CLOSED.

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ENGINEERING RESEARCH COMPLEX

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CONTROL DIAGRAMS

M-007

30 OF **42**

PLOT INFO:: 6/17/2024 9:35:16 AM

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Infrastructure Planning and Facilities

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SUPPLY AIR VALVE SCHEDULE

ID TAG	SERVICE	MANUFACTURER	MODEL	INLET SIZE	ACTUATION SPEED (HIGH/LOW)	OCCUPIED		PURGE CFM	HEATING COIL								NOTES
						MAX AIRFLOW	MIN AIRFLOW		CFM	EAT (F DB)	LAT (F DB)	MBH	GPM	HEATING EWT (F)	HEATING LWT (F)	WPD (FT HD)	
SAV-3	KRIOS D115E SUPPLY AIR	PHOENIX	CELERIS	14"	LOW	1200	1200	1200	1200	55	80	35	2.5	160	130	0.3	1,3
SAV-4	HELIOS D115F SUPPLY AIR	PHOENIX	CELERIS	14"	LOW	1000	1000	1000	1000	40	80	45	3	160	130	0.3	2,3

NOTES:
1. SEE HEATING COIL HC-1 ON FLOORPLAN SERVING KRIOS D155E, BASED ON AEROFIN, 2-ROW, 24"x18" COIL DIMENSIONS, MAX APD 0.09 IN WC. PROVIDE WITH 3-WAY CONTROL VALVE.
2. SEE HEATING COIL HC-2 ON FLOORPLAN SERVING HELIOS D155F, BASED ON AEROFIN, 2-ROW, 35"x20" COIL DIMENSIONS, MAX APD 0.09 IN WC. PROVIDE WITH 3-WAY CONTROL VALVE.
3. AIR VALVE BASED ON PHOENIX LOW PRESSURE MODEL, BxV CONTROL OPTION FOR INTEGRATION TO EXISTING CONTROL SYSTEM.

EXHAUST AIR VALVE SCHEDULE

ID TAG	SERVICE	MANUFACTURER	MODEL	INLET SIZE	ACTUATION SPEED (HIGH/LOW)	OCCUPIED		PURGE CFM
						MAX CFM	MIN CFM	
EAV-3A	KRIOS D115E RETURN AIR	PHOENIX	CELERIS	14"	LOW	900	900	200
EAV-3B	KRIOS D115E EXHAUST AIR	PHOENIX	CELERIS	14"	LOW	200	200	1100
EAV-4	HELIOS D115F RETURN AIR	PHOENIX	CELERIS	14"	LOW	900	900	900

NOTES:
1. ALL AIR VALVES BASED ON PHOENIX LOW PRESSURE MODEL, BxV CONTROL OPTION FOR INTEGRATION TO EXISTING CONTROL SYSTEM.

AIR BALANCE SCHEDULE

TAG	SERVICE	NEW/EXISTING	SERVED BY	TYPE	MIN CFM	MAX CFM	PURGE CFM
VAV-1	CORRIDOR	EXISTING	HVAC-4	SUPPLY AIR	140	455	---
VAV-2	LOBBY D101	EXISTING	HVAC-4	SUPPLY AIR	220	700	---
VAV-3	OFFICE D120	EXISTING	HVAC-4	SUPPLY AIR	100	280	---
VAV-4	PREP D122	EXISTING	HVAC-4	SUPPLY AIR	100	160	---
VAV-5	ELECTRONICS D124	EXISTING	HVAC-4	SUPPLY AIR	225	400	---
VAV-6	COMPUTER D127	EXISTING	HVAC-4	SUPPLY AIR	350	1,140	---
VAV-7	STORAGE D128	EXISTING	HVAC-4	SUPPLY AIR	90	300	---
VAV-9	INSTRUMENT D115	EXISTING (MOVED)	HVAC-4	SUPPLY AIR	1,850	4,625	4,625
VAV-10	CONTROL ROOM D115B	EXISTING	HVAC-4	SUPPLY AIR	80	200	---
VAV-11	CONTROL ROOM D115D	NEW	HVAC-4	SUPPLY AIR	110	250	---
VAV-12	EQUIPMENT D115C	NEW	HVAC-4	SUPPLY AIR	150	650	---
SAV-1	MICROSCOPY D115A	EXISTING	HVAC-4	SUPPLY AIR	750	750	750
SAV-3	KRIOS D115 E	NEW	HVAC-4	SUPPLY AIR	1,200	1,200	1,200
SAV-4	HELIOS D115F	NEW	HVAC-4	SUPPLY AIR	1,000	1,000	1,000
EAV-1A	MICROSCOPY D115A	EXISTING	HVAC-4 / RF-1	RETURN AIR	450	450	100
EVAV-2	NORTH INST. D115 / D115G	EXISTING	HVAC-4 / RF-1	RETURN AIR	2,330	5,000	---
EVAV-3	SOUTH INSTRUMENT D115	EXISTING (MOVED)	HVAC-4 / RF-1	RETURN AIR	1,750	3,750	---
EAV-3A	D115E KRIOS RETURN AIR	NEW	HVAC-4 / RF-1	RETURN AIR	900	900	200
EAV-4	D115F HELIOS RETURN AIR	NEW	HVAC-4 / RF-1	RETURN AIR	900	900	900
---	JC D104	EXISTING	EF-12	EXHAUST AIR	100	100	---
---	TECH D105	EXISTING	EF-12	EXHAUST AIR	125	125	---
EVAV-1	STORAGE D115G	EXISTING	EF-12	EXHAUST AIR	200	200	---
EAV-1B	MICROSCOPY D115A	EXISTING	EF-12	EXHAUST AIR	200	200	750
EAV-3B	KRIOS D115E	NEW	EF-12	EXHAUST AIR	200	200	1,100
---	HELIOS D115F	NEW	EF-12	EXHAUST AIR	25	25	---
EAV-2	PREP D122 SNORKEL	EXISTING	EF-11	EXHAUST AIR	80	80	---

NOTES:
1. BALANCE AIRFLOW AND PROGRAM MIN/MAX/PURGE SETPOINTS AS SHOWN.
2. BALANCE DIFFUSER/GRILLES TO VALUES SHOWN ON HVAC SHEET METAL PLAN M-002

VAV TERMINAL UNIT SCHEDULE

ID TAG	MANUFACTURER	MODEL	SIZE	CFM MAX	CFM MIN	HEATING COIL									VALVE		NOTES
						CFM	MBH	EAT (F DB)	LAT (F DB)	GPM	NUMBER OF ROWS	APD (IN WC)	WPD (FT)	HEATING EWT (F)	HEATING LWT (F)	2-WAY	3-WAY	
VAV-11	TITUS	DESV	6"	250	110	110	4.5	55	90	0.5	1	0.05	0.1	180	155	No	Yes	
VAV-12	TITUS	DESV	8"	650	150	0	0	0	0	0	0	0	0	0	0	No	No	1

NOTES:
1. NO REHEAT COIL.

AIR COOLED CONDENSING UNIT SCHEDULE

ID TAG	SERVICE	MANUFACTURER	MODEL	TOTAL COOLING MBH	# OF COMPRESSORS	VOLTAGE (V/PH/Hz)	FLA	DISCONNECT SWITCH (Y/N)	MOCP	MCA	REFRIGERANT
ACCU-1	HELIOS D115F / EC-1	AAON	CFA-004-A-A-8-DA00H:A-H0-00-D0-AN0-1-N000-00H0G00-CA000DB	48	1	208/3/60	19	Y	35	23	R-410A

NOTES:
1. CONTROLLED BY TCC THROUGH MODULATION OF COMPRESSOR SPEED. SEE CONTROL DIAGRAM AND SEQUENCE OF OPERATION FOR ADDITIONAL REQUIRMENTS.
2. VARIABLE SPEED DIGITAL SCROLL COMPRESSOR.
3. FIELD INSTALLED DDC CONTROLS.
4. PHASE & BROWNOUT PROTECTION.
5. SUCTION PRESSURE TRANSDUCER.
6. COMPRESSOR SOUND BLANKET.
7. SERVICE RECEPTICLE AND REMOTE UNIT START/STOP.
8. ECM CONDENSER FAN, CONDENSER COIL GAURD, AND HEAD PRESSURE CONTROL.
9. EXTENDED 5-YEAR WARRANTY.

DX COOLING COIL SCHEDULE

ID TAG	SERVICE	MANUFACTURER	MODEL	CFM	EAT (F DB)	EAT (F WB)	LAT (F DB)	LAT (F WB)	REFRIGERANT	FIN HEIGHT	FINNED WIDTH	# ROWS	FIN STYLE	FINS/ INCH	MAX FACE VELOCITY (FPM)	MAX APD (IN WC)	TOTAL MBH
EC-1	HELIOS D115F	AAON	DR516L10S12-20x35-RH	1000	59	58	39	39	R-410A	1' - 8"	2' - 11"	10	LANCED	12	206	0.3	48

NOTES:
1. PROVIDE CONDENSATE PUMP. SEE PLUMBING FLOORPLAN FOR CONDENSATE PIPING.
2. SEE DETAIL FOR INSTALLATION REQUIREMENTS.
3. COIL BY AAON OR AS RECOMMENDED FOR ACCU-1.

REGISTER, GRILLE AND DIFFUSER SCHEDULE

ID TAG	MANUFACTURER	MODEL	NECK SIZE (IN)	FACE SIZE (IN)	MAX CFM	MAX APD (IN WC)	MAX NC	THROW PATTERN	MATERIAL	FINISH	NOTES
E-1	TITUS	350RL-SS	20 x 20	22 x 22	1100	0.04	30	NA	SS	SS	1
R-1	TITUS	50R-SS	22 x 22	24 x 24	225	0.01	0	NA	SS	SS	1
R-2	TITUS	350FL	22 x 22	24 x 24	250	0.00	14	NA	ALUMINUM	WHITE	
R-3	TITUS	350FL	14 x 12	16 x 14	250	0.00	21	NA	ALUMINUM	WHITE	
R-4	TITUS	3FL	48 x 18	50 x 20	1750	0.04	27	NA	ALUMINUM	WHITE	
S-1	TITUS	RADIATEC-SS	12-ROUND	48 x 24	300	0.05	0	1-WAY	SS	SS	1,2
S-2	TITUS	TDC-AA	10-ROUND	24 x 24	250	0.05	15	4-WAY	ALUMINUM	WHITE	
S-3	TITUS	300RS	8 x 8	10 x 10	150	0.01	0	4-WAY	STEEL	WHITE	
S-4	TITUS	R-300F	14-ROUND	16-ROUND	500	0.01	0	4-WAY	ALUMINUM	ALUMINUM	

NOTES:
1. 316 STAINLESS STEEL
2. 1-WAY THROW PATTERN

MISCELLANEOUS EQUIPMENT SCHEDULE

ID TAG	DESCRIPTION
F-2 F-3	HEPA FILTER AND PREFILTER MODULE. HEPA FILTERS TO BE EQUAL TO ABSOLUTE MODEL V-G, SIZE 24x48x12, (2) FILTERS PER FILTER UNIT. AIR PRESSURE DROP PER FILTER OF 0.20" WC AT 500 CFM, 99.97% EFFICIENCY AT 0.3 MICRON IEST TYPE A. PREFILTERS TO BE 24x48x2, 30% EFFICIENT PER ASHRAE 52. HOUSING SHALL HAVE HINGED DOORS AND PREFILTER RACK. REMOTE MOUNT MAGNAHELIC GAUGES IN EQUIPMENT ROOM TO READ PRESSURE DROP ACROSS BOTH SETS OF FILTERS.
WCC-2	OWNER FURNISHED, CONTRACTOR INSTALLED, WATER COOLED-CHILLER SERVING KRIOS ELECTRON MICROSCOPE. HASKRIS MODEL LX3 23.543 MBH (6.9 KW), 407C REFRIGERANT, 19"x30"x33", 254 LBS, 208V/1PH/60HZ, 16.6 MCA, 25 MOCP
WCC-3	OWNER FURNISHED, CONTRACTOR INSTALLED, WATER COOLED-CHILLER SERVING HELIOS ELECTRON MICROSCOPE. HASKRIS MODEL LX1 6.824 MBH (2.0 KW), 407C REFRIGERANT, 15"x30"x27", 185 LBS, 115V/1PH/60HZ, 13 MCA, 15 MOCP

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP23116

PR. MGR.	Z. KIEFER
ARCH.	D. LAUNSTEIN
MECH.	A. VANDERSTELT
ELEC.	G. HALSEY
CIVIL	
L.A.	
INT. DES.	D. WHITBECK
CONST. REP.	
APPR.	
DATE	
SCALE	AS SHOWN

REVISIONS

5/16/2024 Bids & Construction

SCHEDULES

M-008

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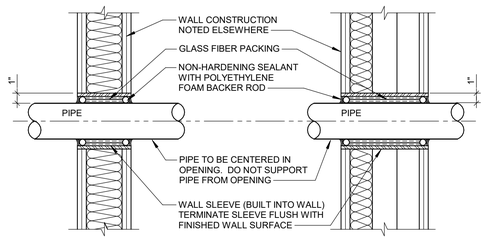
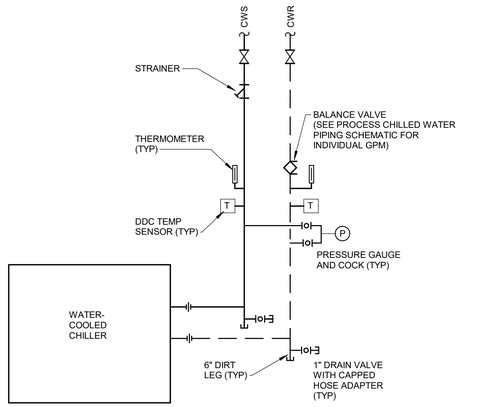
PLOT INFO: 6/17/2024 9:35:19 AM



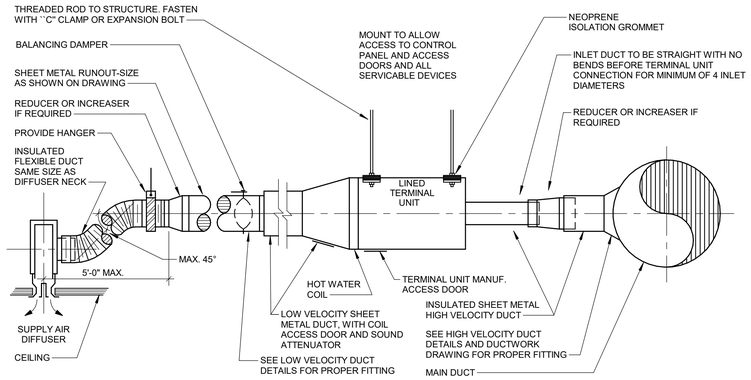
NOTE

USE THIS DETAIL FOR ALL PIPE OR CONDUIT PENETRATIONS THROUGH SINGLE AND DOUBLE GYPSUM/STUD NOISE CRITICAL WALLS. SEAL ALL PENETRATIONS PER THIS DETAIL.

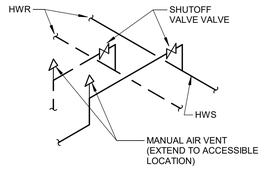
NOISE CRITICAL WALL PENETRATION DETAIL
NO SCALE



SECONDARY CONDENSER WATER PIPING CONNECTION DETAIL
NO SCALE



TYPICAL TERMINAL UNIT AND DUCT INSTALLATION
NO SCALE

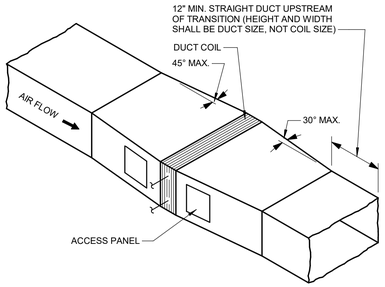


UP FEED

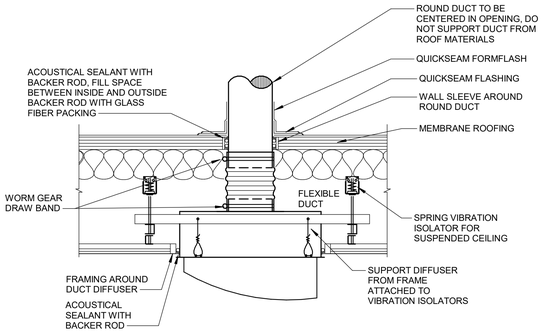
NOTES

1. MAKE ALL TAKE OFFS WITH SWING JOINTS.
2. DOWN FEED NOT ALLOWED.

PIPING TAKE OFF DETAILS
NO SCALE



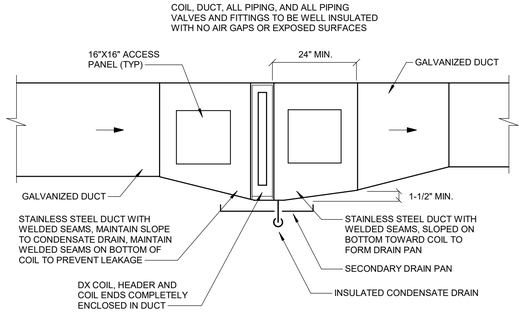
DUCT MOUNTED HOT WATER COIL DETAIL
NO SCALE

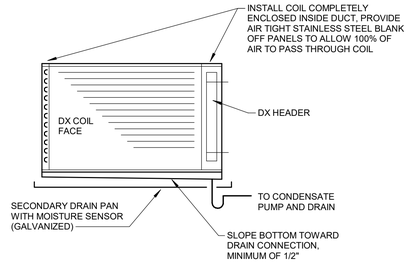


NOTES:

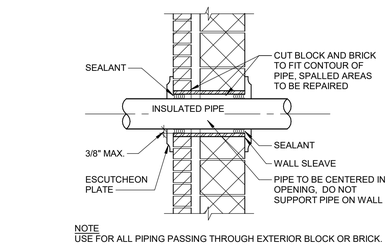
1. RADIA-TEC DIFFUSER SHOWN. DETAIL APPLIES TO DIFFUSERS AND GRILLES IN MICROSCOPY D115A.

NOISE CRITICAL ROOF & CEILING PENETRATION DETAIL
NO SCALE





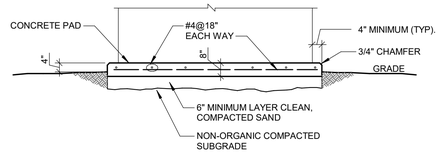
EC-1 DUCT MOUNTED DX EVAPORATOR COIL DETAIL
NO SCALE



NOTE

USE FOR ALL PIPING PASSING THROUGH EXTERIOR BLOCK OR BRICK.

WALL PENETRATION DETAIL - TYPE 3
NO SCALE

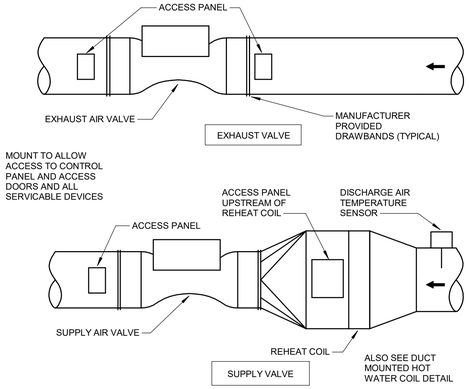


SECTION A-A

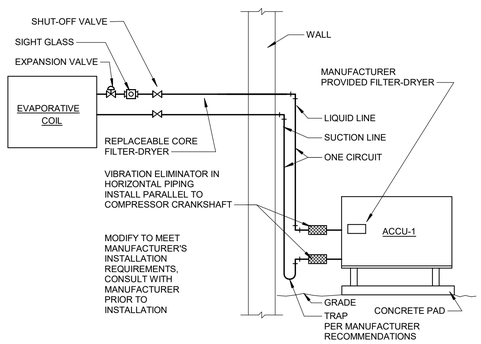
NOTE

FOLLOW MANUFACTURERS DRAWINGS FOR SIZE AND ANCHOR BOLT SETTINGS

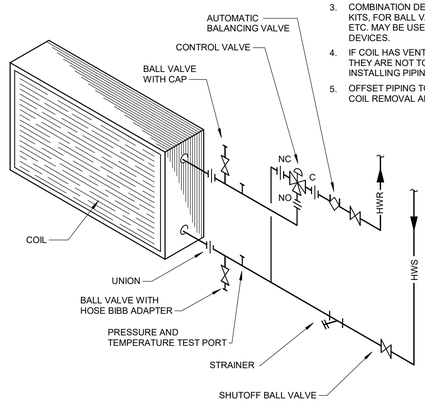
EQUIPMENT PAD DETAIL
NO SCALE



PHOENIX AIR VALVE DETAIL
NO SCALE



REFRIGERANT PIPING SCHEMATIC
NO SCALE

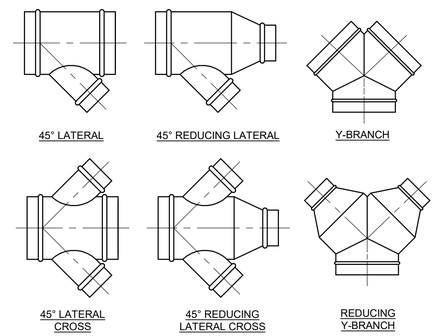


(3-WAY VALVE)

HOT WATER COIL PIPING DETAIL
NO SCALE

NOTES

1. ISOLATION VALVES SHALL BE LOCATED WITHIN 10' OF COIL AND AS SHOWN ON DRAWINGS.
2. PROVIDE ISOLATION NIPPLE (VICTAULIC WATERWAYS OR EQUAL) BETWEEN DISSIMILAR METALS. DIELECTRIC UNIONS ARE NOT ALLOWED.
3. COMBINATION DEVICES, SUCH AS COIL HOOK-UP KITS, FOR BALL VALVES, STAINERS, P/T PORTS, ETC. MAY BE USED IN LIEU OF SEPERATE DEVICES.
4. IF COIL HAS VENT AND/OR DRAIN CONNECTIONS, THEY ARE NOT TO BE USED IN LIEU OF INSTALLING PIPING AS INDICATED.
5. OFFSET PIPING TO PROVIDE CLEARANCE FOR COIL REMOVAL AND ACCESS PANELS.



ROUND DUCT FITTINGS
(UP TO 2-INCH STATIC PRESSURE)
NO SCALE

fishbeck

Proj. No.:	240252
Dwg. By:	CEB
Designer:	DDL
Reviewer:	GWL
Manager:	TSP

Infrastructure
Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX
RENOVATE D115, CRYO-EM EXPANSION

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SCALE	AS SHOWN
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5/16/2024 Bids & Construction

DETAILS

M-009

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PLOT INFO: 6/17/2024 9:35:20 AM

ELECTRICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
S	SINGLE POLE MANUAL LIGHTING SWITCH
S_2	TWO POLE MANUAL LIGHTING SWITCH
S_3	THREE-WAY MANUAL LIGHTING SWITCH
S_4	FOUR-WAY MANUAL LIGHTING SWITCH
S_{4X}	SINGLE POLE MANUAL LIGHTING SWITCH WITH NEMA 4X COVER
S_D	MANUAL DIMMER LIGHTING SWITCH
S_P	SINGLE POLE MANUAL LIGHTING SWITCH WITH PILOT LIGHT
S_T	MANUAL TIMER LIGHTING SWITCH
S_F	SINGLE POLE MANUAL FUSED SWITCH
S_M	SINGLE POLE MANUAL MOTOR STARTER
S_{MP}	SINGLE POLE MANUAL MOTOR STARTER WITH PILOT LIGHT
S_{LV}	SINGLE POLE LOW VOLTAGE SWITCH
S_{OC}	OCCUPANCY SENSOR WALL SWITCH
OS	CEILING MOUNTED OCCUPANCY SENSOR
WOS	WALL MOUNTED OCCUPANCY SENSOR
PP	POWER PACK FOR OCCUPANCY SENSOR
RP	RELAY PACK FOR OCCUPANCY SENSOR
ELU	UL 924 EMERGENCY LIGHTING CONTROL UNIT
PS	CLG MTD DAYLIGHT HARVESTING PHOTO SENSOR
	SIMPLEX RECEPTACLE
	DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE (ABOVE COUNTER)
	DOUBLE DUPLEX RECEPTACLE
	DOUBLE DUPLEX RECEPTACLE (ABOVE COUNTER)
	SPECIAL RECEPTACLE (AS NOTED)
C	CEILING MOUNTED SIMPLEX RECEPTACLE
C	CEILING MOUNTED DUPLEX RECEPTACLE
C	CEILING MOUNTED DOUBLE DUPLEX RECEPTACLE
C	CEILING MOUNTED SPECIAL RECEPTACLE
	SIMPLEX RECEPTACLE (CONTROLLED)
	DUPLEX RECEPTACLE (CONTROLLED)
	DUPLEX RECEPTACLE (CONTROLLED - ABOVE COUNTER)
	DOUBLE DUPLEX RECEPTACLE (CONTROLLED)
	DOUBLE DUPLEX RECEPT (CONTROLLED - ABOVE COUNTER)
C	CEILING MOUNTED SIMPLEX RECEPTACLE (CONTROLLED)
C C	CEILING MOUNTED DUPLEX RECEPTACLE (CONTROLLED)
C C	CLG MTD DOUBLE DUPLEX RECEPTACLE (CONTROLLED)
	POWER AND DATA POKE-THRU FLOOR DEVICE
FB	POWER AND DATA FLOOR BOX
TV	VIDEO MONITOR POWER AND DATA WALL BOX
C	CONTACTOR
J	CEILING MOUNTED JUNCTION BOX
WJ	WALL MOUNTED JUNCTION BOX
J	FLOOR MOUNTED JUNCTION BOX
PC	PHOTOCELL
PB	PUSHBUTTON
TC	TIME CLOCK
XL	LOW VOLTAGE TRANSFORMER
T	THERMOSTAT
H	HUMIDISTAT
	SPECIAL CONNECTION (AS NOTED)
	PANELBOARD (480Y/277V) OR (480V)
	PANELBOARD (208Y/120V) OR (120/240V)
	SINGLE PHASE MOTOR CONNECTION
	THREE PHASE MOTOR CONNECTION
	NON FUSIBLE DISCONNECT SWITCH
ZPX/Y	FUSIBLE DISCONNECT SWITCH (Z=No. POLES; X=SWITCH SIZE; Y=FUSE SIZE; MOUNT AT 5'-0" AFF, UNO)
X N	MOTOR STARTER N=STARTER SIZE; X=STARTER TYPE, (RV: REDUCED VOLTAGE; BLANK: FULL VOLTAGE); MOUNT AT 5'-0" AFF, UNO
X N	COMBINATION MOTOR STARTER / DISCONNECT SWITCH N=STARTER SIZE; X=STARTER TYPE, (RV: REDUCED VOLTAGE; BLANK: FULL VOLTAGE); MOUNT AT 5'-0" AFF, UNO
	GROUND ROD
	CONDUIT UNDER FLOOR
	CONDUIT ABOVE FLOOR
	SURFACE OR RECESSED LUMINAIRE
	SURFACE OR RECESSED DIRECTIONAL LUMINAIRE
	WALL MOUNTED LUMINAIRE
	TRACK MOUNTED LUMINAIRE
	EMERGENCY LUMINAIRE
	NIGHT LIGHT LUMINAIRE
	EMERGENCY NIGHT LIGHT LUMINAIRE
	BATTERY POWERED EMERGENCY LIGHTING UNIT
	CEILING MOUNTED EXIT SIGN
	WALL MOUNTED EXIT SIGN
	SITE LUMINAIRE AND POLE

FIRE ALARM SYMBOL LEGEND

SYMBOL	DESCRIPTION
FACP	MAIN FIRE ALARM CONTROL PANEL
FAAP	FIRE ALARM REMOTE ANNUNCIATOR PANEL
NACP	NOTIFICATION APPLIANCE CONTROL PANEL
F	MANUAL PULL STATION
H	HEAT DETECTOR; CEILING MOUNTED
H	HEAT DETECTOR; WALL MOUNTED
S	SMOKE DETECTOR; CEILING MOUNTED
SH	SMOKE DETECTO; WALL MOUNTED
SEL	ELEVATOR SMOKE DETECTOR
D	DUCT-TYPE SMOKE DETECTOR
BSH	BEAM-TYPE SMOKE DETECTOR; WALL MOUNTED
RT	REMOTE TEST STATION; CEILING MOUNTED
RTH	REMOTE TEST STATION; WALL MOUNTED
CO	CARBON MONOXIDE DETECTOR; CEILING MOUNTED
COH	CARBON MONOXIDE DETECTOR; WALL MOUNTED
A	AUDIO DEVICE, CEILING MOUNTED
	AUDIO DEVICE; WALL MOUNTED
L	VISUAL DEVICE; CEILING MOUNTED
L	VISUAL DEVICE; WALL MOUNTED
AV	COMBINATION AUDIO/VISUAL DEVICE; CEILING MOUNTED
L	COMBINATION AUDIO/VISUAL DEVICE; WALL MOUNTED
SD	SMOKE DAMPER
FS	FIRE PROTECTION SPRINKLER FLOW SWITCH
TS	FIRE PROTECTION SPRINKLER TAMPER SWITCH
PIV	FIRE PROTECTION POST INDICATOR VALVE
CFS	FIRE PROTECTION CO2 SYSTEM FLOW SWITCH
P	FIRE FIGHTER'S PHONE OUTLET
B	FIRE ALARM BELL
M	MAGNETIC DOOR HOLDER
	FIRE ALARM INTERLOCK / CONTROL CONNECTION

SYSTEMS SYMBOL LEGEND

SYMBOL	DESCRIPTION
	VOICE / DATA OUTLET
W	OUTLET FOR WALL MOUNTED TELEPHONE
	DATA OUTLET; CEILING MOUNTED
WAP	WIRELESS ACCESS POINT OUTLET; CEILING MOUNTED
HM	MICROPHONE OUTLET; WALL MOUNTED
M	MICROPHONE OUTLET; CEILING MOUNTED
PD	POWER / DATA POLE
FB	POWER / DATA FLOOR BOX
S	SPEAKER OUTLET; CEILING MOUNTED
HS	SPEAKER OUTLET; WALL MOUNTED
TV	VIDEO MONITOR OUTLET; WALL MOUNTED
H	CLOCK OUTLET; WALL MOUNTED
HI	INTERCOM OUTLET; WALL MOUNTED
HV	VOLUME CONTROL OUTLET; WALL MOUNTED
	CABLE TRAY
	VERTICAL CONDUIT SLEEVE; THROUGH FLOOR
	HORIZONTAL CONDUIT SLEEVE; IN ACCESSIBLE CEILING SPACE

SECURITY SYMBOL LEGEND

SYMBOL	DESCRIPTION
C	CAMERA OUTLET; CEILING OR PENDANT MOUNTED
HC	CAMERA OUTLET; WALL MOUNTED
KP	KEYPAD CONTROLLER OUTLET
CR	PROXIMITY CARD READER OUTLET
PB	PANIC BUTTON OUTLET
MD	MOTION DETECTOR OUTLET
GB	GLASS BREAK SENSOR OUTLET
S	SECURITY SIREN OUTLET
PA	DOOR PROP ALARM OUTLET
MC	DOOR MAGNETIC CONTACTS
DS	ELECTRIC DOOR STRIKE
DL	ELECTRIC DOOR LATCH
EH	ELECTRIC POWER TRANSFER HINGE
RE	REQUEST-TO-EXIT DEVICE OUTLET

GENERAL ELECTRICAL ABBREVIATIONS

A, AMP	AMPERES	KW	KILOWATT
AC	ALTERNATING CURRENT	KWHR	KILOWATT-HOUR
ACP	ACOUSTICAL CEILING PANEL	LED	LIGHT-EMITTING DIODE
ADA	AMERICANS WITH DISABILITIES ACT	LS	LIGHT SWITCH OR LIMIT SWITCH
AFF	ABOVE FINISHED FLOOR	LT	LIGHT OR LEVEL TRANSDUCER
AHJ	AUTHORITY HAVING JURISDICTION	LTFMC	LIQUID-TIGHT FLEXIBLE METAL CONDUIT
AIC	AMPERE-INTERRUPTING CURRENT	LTG	LIGHTING
AL	ALUMINUM	LV	LOW VOLTAGE
ATM	AUTOMATIC TELLER MACHINE	M	METER
ATS	AUTOMATIC TRANSFER SWITCH	MANUF	MANUFACTURER
BMS	BUILDING MANAGEMENT SYSTEM	MCA	MINIMUM CIRCUIT AMPACITY
BRKR	BREAKER	MCB	MAIN CIRCUIT BREAKER
C	CONDUIT OR CELSIUS	MCC	MOTOR CONTROL CENTER
CB	CIRCUIT BREAKER	MCP	MOTOR CIRCUIT PROTECTOR
CATV	CABLE TELEVISION	MH	MANHOLE
CIP	CAST-IN-PLACE	MLO	MAIN LUGS ONLY
CJ	CONTROL JOINT	MT	MOUNT
CKT	CIRCUIT	MTD	MOUNTED
CLG	CEILING	MV	MEDIUM VOLTAGE
CM	CONSTRUCTION MANAGER	N, NEUT	NEUTRAL
CMU	CONCRETE MASONRY UNIT	NC	NORMALLY CLOSED
COAX	COAXIAL	NEC	NATIONAL ELECTRICAL CODE
CONC	CONCRETE	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
CP	CONTROL PANEL		
CT	CURRENT TRANSFORMER	NL	NIGHT LIGHT
CU	COPPER	NO	NORMALLY OPEN
Cx	COMMISSIONING	NOM	NOMINAL
CxA	COMMISSIONING AGENT	NTS	NOT TO SCALE
DB	DECIBEL	OD	OUTSIDE DIAMETER
DC	DIRECT CURRENT	OH	OVERHEAD
DEM	DEMOLISH	OHD	OVERHEAD DOOR
DEMO	DEMOLISH OR DEMOLITION	OL	OVERLOAD
DF	DRINKING FOUNTAIN	PA	PUBLIC ADDRESS
DISC	DISCONNECT	PB	PULL BOX OR PUSHBUTTON
DPDT	DOUBLE POLE DOUBLE THROW	PFC	POWER FACTOR CORRECTION
DPST	DOUBLE POLE SINGLE THROW	PH	PHASE
EC	ELECTRICAL CONTRACTOR	PNL	PANEL OR PANELBOARD
EJ	EXPANSION JOINT	PT	POTENTIAL TRANSFORMER
ELEC	ELECTRICAL	PTZ	PAN-TILT-ZOOM
ELEV	ELEVATOR OR ELEVATION	PWR	POWER
EM	EMERGENCY	RCP	REFLECTED CEILING PLAN
EMT	ELECTRICAL METALLIC TUBING	REBAR	REINFORCING BAR
ENCL	ENCLOSURE	RECEPT	RECEPTACLE
ETR	EXISTING TO REMAIN	RM	ROOM
EWC	ELECTRIC WATER COOLER	RNMC	RIGID NON-METALLIC CONDUIT
EWH	ELECTRIC WATER HEATER	ROW	RIGHT-OF-WAY
EXIST	EXISTING	RMC	RIGID METAL CONDUIT
F	FUSE OR FAHRENHEIT	SEC	SECONDARY
FA	FIRE ALARM	SPD	SURGE PROTECTIVE DEVICE
FAAP	FIRE ALARM ANNUNCIATOR PANEL	SPDT	SINGLE POLE DOUBLE THROW
FACP	FIRE ALARM CONTROL PANEL	SPECS	SPECIFICATIONS
FF&E	FIXTURES, FURNISHINGS & EQUIPMENT	SPST	SINGLE POLE SINGLE THROW
FIXT	FIXTURE	SQ	SQUARE
FLA	FULL LOAD AMPERES	SS	STAINLESS STEEL
FM	FACTORY MUTUAL	SV	SOLENOID VALVE
FMC	FLEXIBLE METAL CONDUIT	SWBD	SWITCHBOARD
FO	FIBER OPTIC	SWGR	SWITCHGEAR
FRT	FIRE RETARDANT	TCC	TEMPERATURE CONTROL CONTRACTOR
GC	GENERAL CONTRACTOR	TCP	TEMPERATURE CONTROL PANEL
GEN	GENERATOR	TRANS	TRANSFORMER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER	TS	TIME SWITCH
GFI	GROUND FAULT INTERRUPTER	TYP	TYPICAL
GND, G	GROUND	UL	UNDERWRITERS LABORATORIES
GYP BD	GYPSUM BOARD	UNO	UNLESS NOTED OTHERWISE
HH	HANDHOLE	UPS	UNINTERRUPTIBLE POWER SUPPLY
HOA	HAND-OFF-AUTO	V	VOLTS
HP	HORSE POWER	VA	VOLT-AMPERE
HV	HIGH VOLTAGE	VAC	VOLTS-ALTERNATING CURRENT
ID	INSIDE DIAMETER	VDC	VOLTS-DIRECT CURRENT
JB	JUNCTION BOX	VFD	VARIABLE FREQUENCY DRIVE
KO	KNOCKOUT	W	WATTS
KVA	KILOVOLT AMPERE	WH	WATER HEATER
		WP	WEATHERPROOF

GENERAL NOTES

1. SYMBOLS AND GENERAL DESCRIPTIONS IN SYMBOL LEGENDS ARE INDICATED FOR GENERAL REFERENCE ONLY. NOT ALL SYMBOLS ARE USED ON THIS PROJECT. SEE SCHEDULES, SPECIFICATIONS, AND PLANS FOR ADDITIONAL INFORMATION INCLUDING MOUNTING HEIGHTS.
2. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC AND REPRESENT ELECTRICAL DESIGN INTENT. PROVIDE ALL WORK AND MATERIALS REQUIRED FOR COMPLETE AND FUNCTIONAL ELECTRICAL SYSTEMS THAT FULLY MEET ELECTRICAL DESIGN INTENT. ELECTRICAL WORK TO BE CONFORM TO LATEST EDITION OF NEC AS ADOPTED BY AUTHORITY HAVING JURISDICTION. SEE SPECIFICATIONS FOR ADDITIONAL INSTALLATION REQUIREMENTS AND ITEMS THAT MAY BE REQUIRED ABOVE AND BEYOND MINIMUM REQUIREMENTS THAT ARE OUTLINED IN NATIONAL ELECTRICAL CODE (NEC).
3. THOROUGHLY AND CAREFULLY REVIEW ALL DRAWINGS, SPECIFICATIONS, AND WORK SCOPES IN CONTRACT DOCUMENTS PRIOR TO BIDS AND CONSTRUCTION. WHERE THERE ARE CONFLICTS AMONG DRAWINGS, SPECIFICATIONS, AND WORK SCOPES, MORE STRINGENT OR GREATER QUANTITY REQUIREMENTS APPLY.
4. ALL ELECTRICAL EQUIPMENT TO BE UL LISTED.
5. SEE INDIVIDUAL SPECIFICATION SECTIONS FOR SPECIFIC REQUIREMENTS RELATED TO TESTING, MANUFACTURER STARTUP, TRAINING, ETC. ALL APPLICABLE TESTING AND MANUFACTURER STARTUP REPORTS TO BE SUBMITTED AND APPROVED PRIOR TO DEVELOPMENT OF ELECTRICAL PUNCH LISTS.
6. ALL CONDUCTORS, INCLUDING GROUNDED CONDUCTORS (NEUTRALS), TO BE LABELED AT ALL ENDS AND JOINTS WITH CORRESPONDING PANELBOARD NAME AND CIRCUIT NUMBER, OR OTHERWISE IDENTIFIED TO CORRESPOND WITH ASSOCIATED EQUIPMENT MANUFACTURER'S IDENTIFICATION SYSTEM.
7. AT A MINIMUM, PROVIDE 1#12, 1#12N, 1#12G FOR 20A BRANCH CIRCUITING, UNO. MINIMUM CONDUIT SIZE IS 3/4", UNO. NO MORE THAN NINE CURRENT CARRYING CONDUCTORS ALLOWED IN A RACEWAY, UNO. EQUIPMENT GROUNDING CONDUCTORS TO BE SIZED IN ACCORDANCE WITH NEC AND MAY BE SHARED. ALL GROUNDED CONDUCTORS (NEUTRALS) TO BE TREATED AS CURRENT CARRYING CONDUCTORS.
8. PROVIDE A DEDICATED GROUNDED CONDUCTOR (NEUTRAL) FOR EACH BRANCH CIRCUIT. SHARED NEUTRALS ARE NOT ALLOWED.
9. INSTALL GREEN, INSULATED, COPPER EQUIPMENT GROUNDING CONDUCTORS IN RACEWAYS INCLUDING FLEXIBLE METAL CONDUITS AND NON-METALLIC RACEWAYS. GREEN, INSULATED, COPPER EQUIPMENT GROUNDING CONDUCTORS TO BE INSTALLED WITH ALL FEEDERS AND BRANCH CIRCUITS.
10. PROVIDE FIRESTOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN FIRE RATINGS. SEE ARCHITECTURAL FOR FIRE RATINGS OF FLOORS, WALLS, AND CEILINGS.
11. LIMIT VOLTAGE DROP IN CONDUCTORS TO 2% FOR FEEDERS AND 3% FOR BRANCH CIRCUITS ASSUMING FULL LOAD CONDITIONS. VOLTAGE DROP NOT TO EXCEED 5% FROM ELECTRICAL SERVICE TO FURTHEST ELECTRICAL DEVICE.
12. CALCULATE AND APPLY APPROPRIATE NEC DERATING FACTOR FOR CONDUCTORS INSTALLED IN ROOF MOUNTED CONDUITS.
13. PROVIDE THERMAL SEALS IN ALL CONDUITS THAT RUN FROM CONDITIONED SPACES TO UNCONDITIONED SPACES.
14. ALL WIRING FOR INTERIOR LED LUMINAIRES THAT ARE REQUIRED TO BE DIMMED TO INCLUDE (2) #18 AWG WIRES FROM EACH LUMINAIRE TO ASSOCIATED LIGHTING CONTROLLER FOR 0-10V LIGHTING CONTROL. ALL CONTROL WIRES TO BE LABELED.
15. SEE ARCHITECTURAL REFLECTED CEILING PLANS AND ELEVATIONS FOR LOCATIONS OF CEILING AND WALL MOUNTED DEVICES.
16. ALL LUMINAIRES TO BE SUPPORTED FROM BUILDING STRUCTURE.
17. ALL JUNCTION BOXES SERVING BRANCH CIRCUIT WIRING TO BE LABELED TO IDENTIFY CIRCUIT(S) ROUTED THROUGH EACH RESPECTIVE JUNCTION BOX BY UTILIZING BRADY LABELS.
18. WHERE PLENUMS ARE UTILIZED FOR HVAC AIR DISTRIBUTION, PROVIDE PLENUM RATED CABLES AND CONDUCTORS IN PLENUMS. SEE MECHANICAL FOR LOCATIONS OF HVAC PLENUMS.
19. ELECTRICAL EQUIPMENT INSTALLED ABOVE CEILINGS TO BE INSTALLED IN READILY ACCESSIBLE LOCATIONS, SUCH AS, BUT NOT LIMITED TO, ABOVE DOORWAYS TO ROOMS. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS WITH OTHER EQUIPMENT AND NEED FOR EXCESSIVELY LONG LADDER REQUIREMENTS TO ACCESS EQUIPMENT AND DIFFICULT AND AWKWARD CLIMBING AND/OR UNNECESSARY BENDING DURING SERVICING OF EQUIPMENT.
20. CONDUCTORS INSTALLED IN WIREWAYS THAT CONTAIN MORE THAN 30 CURRENT CARRYING CONDUCTORS TO BE DERATED IN ACCORDANCE WITH NEC.
21. DO NOT USE LOAD CENTERS, PANELBOARDS, SWITCHBOARDS, MOTOR CONTROL CENTERS, AND OTHER POWER DISTRIBUTION EQUIPMENT AS RACEWAYS.
22. SEE SPECIFICATION SECTION 26 05 34, RACEWAYS FOR ELECTRICAL SYSTEMS, FOR PROJECT SPECIFIC RACEWAY INSTALLATION REQUIREMENTS.
23. SEE SPECIFICATION SECTION 26 05 53, IDENTIFICATION FOR ELECTRICAL SYSTEMS, FOR PROJECT SPECIFIC IDENTIFICATION REQUIREMENTS.
24. NEMA 4X EQUIPMENT, WHERE IDENTIFIED, TO BE 316 STAINLESS STEEL UNLESS NOTED OTHERWISE.
25. EXISTING ELECTRICAL ITEMS INDICATED IN DRAWINGS ARE BASED ON OWNER'S LIMITED RECORD DRAWINGS AND ENGINEER'S LIMITED FIELD OBSERVATIONS. VISIT SITE TO UNDERSTAND COMPLETELY CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE DEMOLITION WORK OF OTHER TRADES AT NO ADDITIONAL COST TO OWNER.
26. DRAWINGS DO NOT INDICATE ALL ELECTRICAL EQUIPMENT AND DEVICES INTENDED TO BE REMOVED OR MODIFIED. DRAWINGS INDICATE MAJOR ELECTRICAL EQUIPMENT, FIXTURES, AND DEVICES THAT ARE REQUIRED TO BE REMOVED OR MODIFIED. REMOVE, OR RELOCATE ELECTRICAL EQUIPMENT, FIXTURES, AND DEVICES AS NECESSARY FOR A COMPLETE AND PROFESSIONAL INSTALLATION. SEE LIGHTING, POWER, SYSTEMS, ARCHITECTURAL, PLUMBING, AND MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
27. UNLESS NOTED OTHERWISE, DISPOSE OF ALL REMOVED MATERIALS OFF SITE AND INCLUDE ALL COSTS FOR DISPOSAL IN BID. DISPOSAL OF MATERIALS TO COMPLY WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS INCLUDING TCLP TESTING.

GENERAL DEMOLITION NOTES

1. EXISTING ELECTRICAL ITEMS INDICATED IN DRAWINGS ARE BASED ON OWNER'S LIMITED RECORD DRAWINGS AND ENGINEER'S LIMITED FIELD OBSERVATIONS. VISIT SITE TO UNDERSTAND COMPLETELY CONDITIONS UNDER WHICH WORK IS TO BE PERFORMED. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION OF DEVICES AND EQUIPMENT REQUIRED TO FACILITATE DEMOLITION WORK OF OTHER TRADES AT NO ADDITIONAL COST TO OWNER.
2. DRAWINGS DO NOT INDICATE ALL ELECTRICAL EQUIPMENT AND DEVICES INTENDED TO BE REMOVED OR MODIFIED. DRAWINGS INDICATE MAJOR ELECTRICAL EQUIPMENT, FIXTURES, AND DEVICES THAT ARE REQUIRED TO BE REMOVED OR MODIFIED. REMOVE, OR RELOCATE ELECTRICAL EQUIPMENT, FIXTURES, AND DEVICES AS NECESSARY FOR A COMPLETE AND PROFESSIONAL INSTALLATION. SEE LIGHTING, POWER, SYSTEMS, ARCHITECTURAL, PLUMBING, PROCESS, AND MECHANICAL PLANS FOR ADDITIONAL REQUIREMENTS.
3. ALL ELECTRICAL DEMOLITION WORK MAY NOT NECESSARILY BE INDICATED ON ELECTRICAL DRAWINGS. REVIEW DEMOLITION DRAWINGS OF OTHER TRADES (ARCHITECTURAL, PROCESS, AND MECHANICAL) FOR EQUIPMENT TO BE DEMOLISHED.
4. FIELD VERIFY EXISTING CONDITIONS TO DETERMINE EXTENT OF WORK AND INCLUDE ALL COSTS ASSOCIATED WITH DEMOLITION IN BASE BID.
5. COORDINATE DEMOLITION WORK WITH OTHER TRADES (ARCHITECTURAL, PROCESS, AND MECHANICAL). DISCONNECT AND REMOVE ALL CONDUIT, CONDUCTORS, AND DEVICES ASSOCIATED WITH EQUIPMENT BEING DEMOLISHED. EXPOSED CONDUIT, JUNCTION BOXES, AND DEVICES TO BE DISCONNECTED AND REMOVED. CONCEALED CONDUIT, JUNCTION BOXES, AND DEVICES MAY BE ABANDONED IN PLACE. ALL CONDUCTORS TO BE COMPLETELY REMOVED BACK TO SOURCE OR LAST ACTIVE DEVICE. PROVIDE BLANK COVERS FOR ANY BOXES ABANDONED IN PLACE.
6. COORDINATE AND SEQUENCE DEMOLITION WORK SUCH THAT PLANT REMAINS IN CONTINUOUS OPERATION THROUGHOUT CONSTRUCTION. PLAN ALL INTERRUPTIONS TO ELECTRICAL SERVICE WITH OWNER A MINIMUM OF 72 HOURS IN ADVANCE.
7. PROVIDE TEMPORARY POWER, LIGHTING, AND CONTROLS AS REQUIRED TO KEEP EXISTING EQUIPMENT TO REMAIN IN SERVICE.
8. FOR ELECTRICAL EQUIPMENT TO BE REUSED, FIELD VERIFY EQUIPMENT CONFIGURATION AND ADVISE ENGINEER IF CIRCUITING REQUIREMENTS ARE DIFFERENT FROM THAT INDICATED ON PLANS. RECIRCUIT EQUIPMENT AS REQUIRED TO FACILITATE REUSE.
9. ELECTRICAL EQUIPMENT NOT SPECIFICALLY IDENTIFIED TO BE DISCONNECTED AND REMOVED IS TO MAINTAINED.
10. CROSSHATCHING IDENTIFIES DEVICES/EQUIPMENT TO BE DISCONNECTED AND REMOVED. DEMOLISH ASSOCIATED CONDUIT AND CONDUCTORS BACK TO SOURCE OR LAST ACTIVE DEVICE, UNLESS NOTED OTHERWISE.
11. SEE SUGGESTED SEQUENCE OF CONSTRUCTION ON DRAWINGS FOR SEQUENCING OF DEMOLITION AND INSTALLATION. COORDINATE SEQUENCING WITH OTHER TRADES. SEQUENCING IS ONLY A SUGGESTION, ADJUST SEQUENCE AS REQUIERED FOR FIELD CONDITIONS WHILE MAINTAINING REQUIRED OWNER OPERATIONS.

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Dwg. By: ACF
Designer: ACF
Reviewer: RMM
Manager: TSP

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ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP23116

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MECH.	A. VANDERSTELT
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LEGENDS AND GENERAL NOTES

E-001

33 OF **42**

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LUMINAIRE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	CATALOG NO.	OR EQUAL BY	LUMINAIRE DATA						REMARKS
					VOLTAGE	LOAD	LUMENS	CCT	CRI	DIMMING	
A	2'x4' LED FLAT PANEL	LITHONIA	EPANL2X4-4000LM-80CRI -40K-MIN10-2T-MVOLT	CREE, METALUX	277 V	38 VA	4,000 lm	4000 K	80	0-10V	
B	2'x4' LED SURFACE MOUNT VOLUMETRIC TROFFER	CREE	ZR24-D-50L-840-CV-UNV-10 V5 WITH SMK-FLX24	-	277 V	35 VA	5,000 lm	4000 K	80	0-10V	
C	2'x4' LED GRID MOUNT VOLUMETRIC TROFFER	CREE	ZR24-D-50L-840-CV-UNV-10 V5	-	277 V	35 VA	5,000 lm	4000 K	80	0-10V	
D	4' LED LENSED STRIP WITH ADJUSTABLE LOOP CABLE KIT	CREE	LS4-40L-840-R-UL-10V WITH AC-48-Q14B-JB	-	277 V	31 VA	4,000 lm	4000 K	80	0-10V	MATCH MOUNTING HEIGHT OF ADJACENT FIXTURES IN EQUIPMENT ROOM D115C.
U	"ROOM IN USE" SIGN	DUAL LITE	SE-SG-BN-SW30	-	277 V	12 VA					
W	EXTERIOR WALL MOUNTED LUMINAIRE	COOPER	ASWPLED2S	-	277 V	50 VA	5,000 lm	4000 K	70	-	MATCH MOUNTING HEIGHT OF ADJACENT EXTERIOR WALL MOUNTED FIXTURE.
X	SINGLE FACE LED EXIT SIGN, BACK MOUNTED, GREEN LETTERING	SURE-LITES	CX 6 1 G	LITHONIA, LIGHTOLIER	120 V	6 VA					CHEVRONS AS INDICATED ON PLANS

FIRE ALARM DEVICES SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NO.	REMARKS
L	VISUAL STROBE SIGNAL, WALL MOUNTED	(SEE SPECIFICATIONS)	(SEE SPECIFICATIONS)	MOUNT AT 80-INCHES AFF TO BOTTOM OF BOX, UNO. PROVIDE BACKBOX AS RECOMMENDED BY FIRE ALARM SYSTEM MANUFACTURER.

SECURITY DEVICE SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NO.	REMARKS
©	PENDANT MOUNTED SECURITY CAMERA WITH ONE DATA DROP	(SEE SPECIFICATIONS)	(SEE SPECIFICATIONS)	PROVIDED BY DIVISION 28, 1 DATA DROP TO CAMERA

DATA DEVICE SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NO.	REMARKS
▽ 2D	DATA OUTLET WITH 2 DATA DROPS	(SEE SPECIFICATION)	(SEE SPECIFICATIONS)	MOUNT AT 18" AFF, UNO. PROVIDE EXTRA DEEP TWO GANG STEEL BOX WITH A SINGLE GANG PLASTER RING.

WIRING DEVICES - MANUAL LIGHTING SWITCH SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NO.	REMARKS
S	20A, 120-277V, SINGLE POLE MANUAL SWITCH	HUBBELL	HBL 1221W	MOUNT AT 46" AFF, UNO
S D	20A, 120-277V, MANUAL DIMMER SWITCH	LEVITON	IP-710-LFZ-WH	MOUNT AT 46" AFF, UNO.
S D3	20A, 120-277V, 3-WAY MANUAL DIMMER SWITCH	LEVITON	IP-710-LFZ-WH	MOUNT AT 46" AFF, UNO.
S DOS	20A, 120-277V, MANUAL DIMMER SWITCH	LUTRON	MS-Z-101W	MOUNT AT 46" AFF, UNO.

WIRING DEVICES - OCCUPANCY SENSOR AND LOW VOLTAGE LTG CONTROL DEVICE SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NO.	REMARKS
(DS)	DUAL TECHNOLOGY OCCUPANCY SENSOR - CEILING MOUNTED			REFER TO LIGHTING CONTROL DIAGRAM ON SHEET E-010.
(PP)	OCCUPANCY SENSOR POWER PACK			REFER TO LIGHTING CONTROL DIAGRAM ON SHEET E-010.
(EU)	EMERGENCY LIGHTING CONTROL UNIT	LEVITON	ECS00-DDW	

WIRING DEVICES - RECEPTACLE SCHEDULE

SYMBOL	DESCRIPTION	MANUFACTURER	CATALOG NO.	REMARKS
⊖	DUPLEX RECEPTACLE	HUBBELL	HBL5362	MOUNT 18" AFF, UNO
⊖ GFI	GFCI DUPLEX RECEPTACLE	LEVITON	GFPL2-PL	MOUNT 18" AFF, UNO
⊖ WP	WEATHERPROOF, GFCI DUPLEX RECEPTACLE WITH WEATHERPROOF WHILE-IN-USE, EXTRA DUTY COVER	LEVITON	GFLP2-PL, 5990 COVER	MOUNT 18" AFF, UNO
⊖	SPECIAL RECEPTACLE, 208V, NEMA 6-15R	HUBBELL	HBL60W49	MOUNT 18" AFF, UNO

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SCHEDULES

E-002

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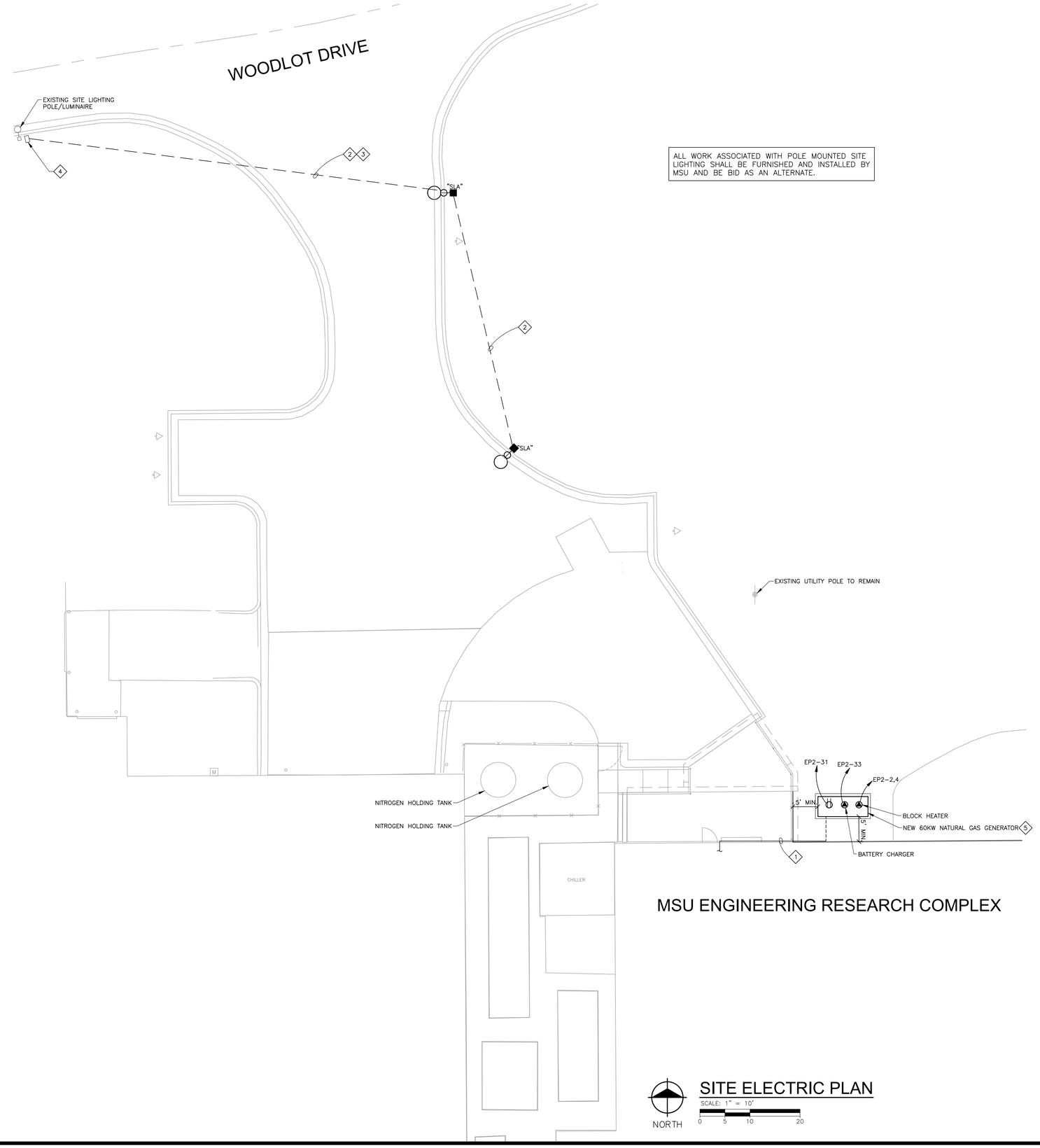

ALL WORK ASSOCIATED WITH POLE MOUNTED SITE LIGHTING SHALL BE FURNISHED AND INSTALLED BY MSU AND BE BID AS AN ALTERNATE.

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SITE ELECTRIC PLAN

SCALE: 1" = 10'

0 5 10 20

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SYMBOL LEGEND

- SITE LIGHTING POLE/LUMINAIRE
- EXISTING SITE LIGHTING POLE/LUMINAIRE

NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
2. PROVIDE FIRE STOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN EXISTING FIRE RATINGS.
3. UNLESS NOTED OTHERWISE, ALL CONDUIT AND WIRING SHALL BE CONCEALED. ELECTRICAL CONNECTIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC AND ARE USED TO ILLUSTRATE CIRCUITING AND WIRING REQUIREMENTS ONLY.
4. REFER TO BUILDING ELECTRICAL PLANS FOR EXTERIOR BUILDING MOUNTED CONDUIT.
5. REFER TO BUILDING ELECTRICAL PLANS FOR EXTERIOR BUILDING MOUNTED LIGHTING.

KEY NOTES

1. REFER TO ONE LINE DIAGRAM FOR CONDUCTORS AND CONDUIT SIZES. ROUTE ALL CONDUIT UNDERGROUND FROM GENERATOR TO EXTERIOR BUILDING WALL. SURFACE MOUNT RIGID METAL CONDUIT ON EXTERIOR OF BUILDING. PAINT CONDUIT TO MATCH ADJACENT SURFACE(S). ROUTE ALL CONDUITS FROM GENERATOR TO BUILDING ALONG THE SAME PATH.
2. CONDUCTORS FURNISHED BY MSU. CONTRACTOR SHALL INSTALL.
3. CONNECT TO EXISTING LIGHTING CIRCUIT AND CONTROLS. FIELD VERIFY.
4. PROVIDE PULL BOX NEAR POLE IN ACCORDANCE WITH MSU STANDARDS. FIELD VERIFY. REFER TO DETAILS ON SHEET E-004.
5. REFER TO ONE LINE DIAGRAM FOR ADDITIONAL REQUIREMENTS. VERIFY EXACT REQUIREMENTS WITH EQUIPMENT SUPPLIER.

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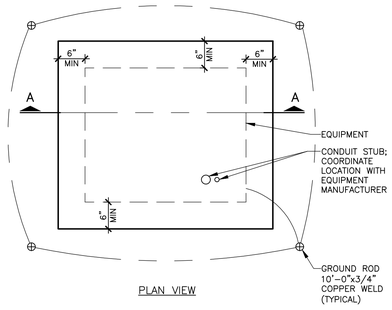
SITE ELECTRICAL PLAN

E-003

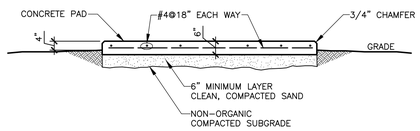
35 OF 42

PLOT INFO: Z:\2024\240252\CAD\CDs\E-003_240252.DWG LAYOUT: E-003 DATE: 6/17/2024 TIME: 11:15:04 AM USER: CEBAKER



PLAN VIEW

NOTE: PROVIDE GROUNDING TO EQUIPMENT



SECTION A–A

NOTE: FOLLOW MANUFACTURERS DRAWINGS FOR SIZE AND ANCHOR BOLT SETTINGS

EQUIPMENT PAD DETAIL
NO SCALE

LUMINAIRE SCHEDULE

MARK	DESCRIPTION	MANUFACTURER	CATALOG NO.	LUMINAIRE DATA						REMARKS
				VOLTAGE	LOAD	LUMENS	CCT	CRI	DIMMING	
SLA	LED STREET LUMINAIRE WITH 25' POLE, TYPE III WITH FIELD ADJUSTABLE OUTPUT (FAO) MODULE	FIXTURE: AEL POLE: NOTE 1 ARM: NOTE 1	FIXTURE: ATB2–P601 –MVOLT–R3–NR–AO POLE: NOTE 1 ARM: NOTE 1	240V	175 VA	26,196 lm	4000K	70	N/A	NOTE 1.

NOTES

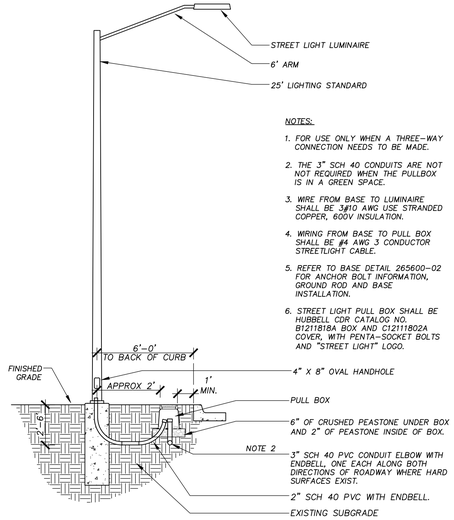
UNO = UNLESS NOTED OTHERWISE

1. MSU SHALL FURNISH AND INSTALL LIGHT POLES, LIGHT FIXTURES, AND CONDUCTORS.

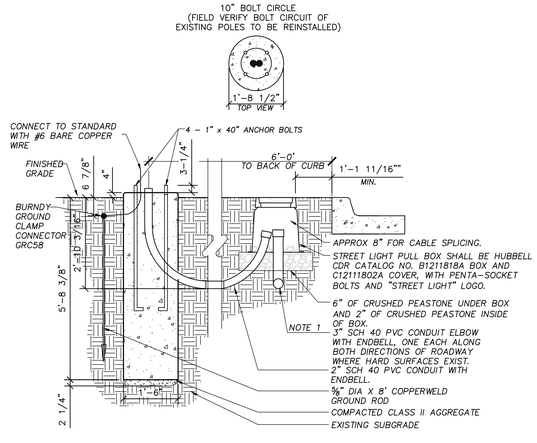
ALL WORK ASSOCIATED WITH POLE MOUNTED SITE LIGHTING SHALL BE FURNISHED AND INSTALLED BY MSU AND BE BID AS AN ALTERNATE.

NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.

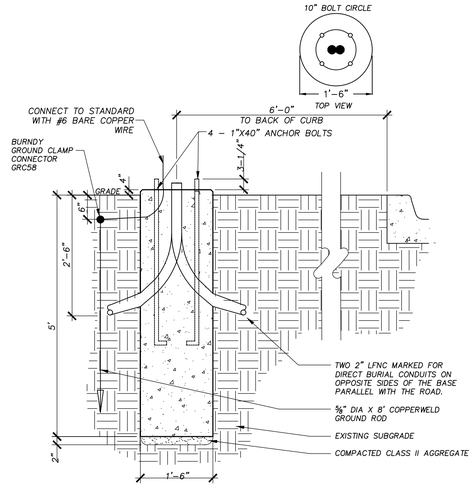


4 STREET LIGHT WITH PULL BOX
NOT TO SCALE

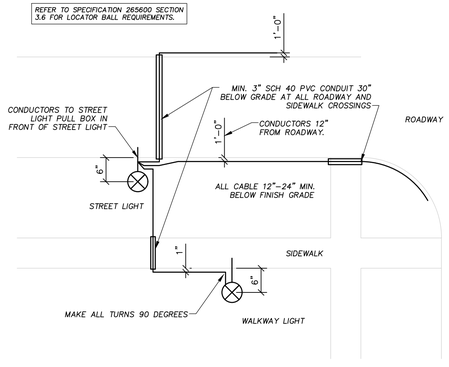


3 STREET LIGHT BASE WITH PULL BOX
NOT TO SCALE

NOTES:
1. THE 3" SCH 40 CONDUITS ARE NOT REQUIRED WHEN THE PULLBOX IS IN GREEN SPACE.



2 STREET LIGHT BASE WITHOUT PULL BOX
NOT TO SCALE



1 SITE LIGHTING TYPICAL CONDUIT ROUTING DETAIL
NOT TO SCALE

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SITE PLAN DETAILS

E-004

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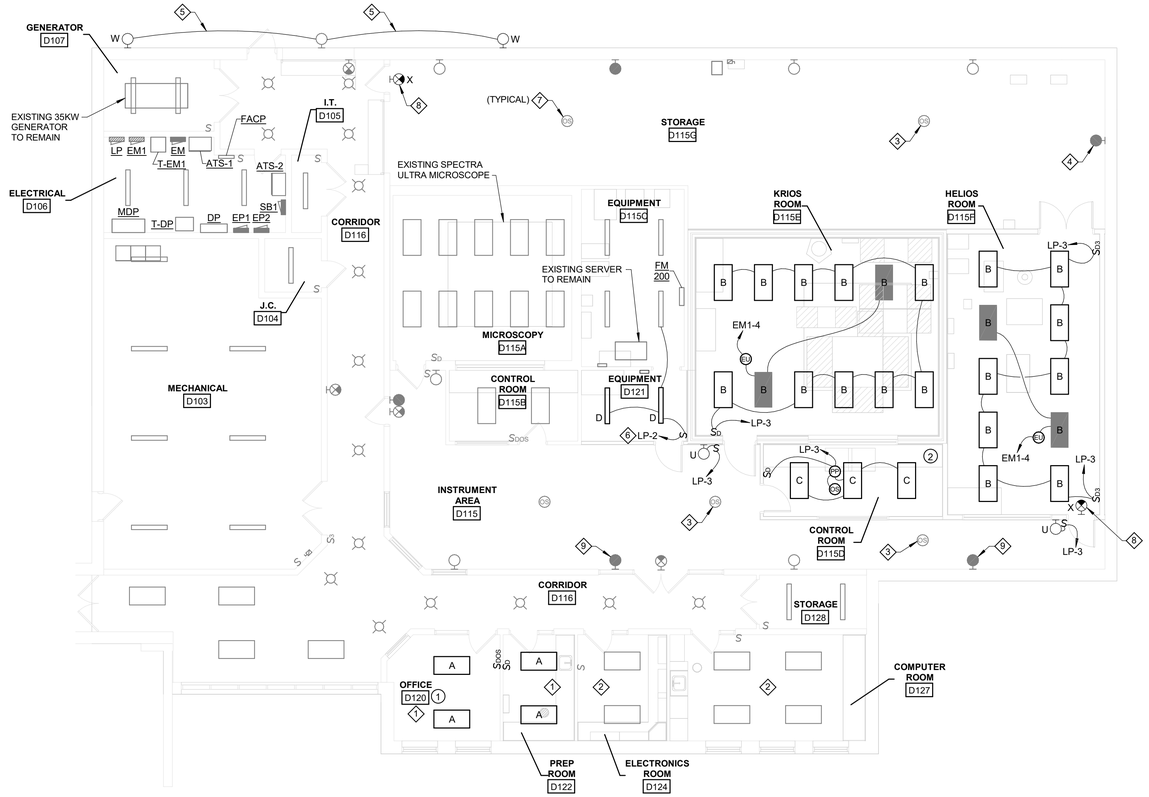


LIGHTING PLAN

SCALE: 1/8" = 1'-0"

NORTH

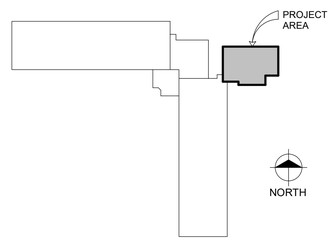
NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
2. PROVIDE FIRE STOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN EXISTING FIRE RATINGS.
3. UNLESS NOTED OTHERWISE, ALL CONDUIT AND WIRING SHALL BE CONCEALED. ELECTRICAL CONNECTIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC AND ARE USED TO ILLUSTRATE CIRCUITING AND WIRING REQUIREMENTS ONLY.

KEY NOTES

1 REPLACE LIGHTING FIXTURES 1-FOR-1. REUSE EXISTING LIGHTING CIRCUIT. REUSE EXISTING SWITCH LOCATION.
2 NO ELECTRICAL SCOPE IN THIS ROOM.
3 RELOCATED OCCUPANCY SENSOR.
4 RELOCATED LUMINAIRE.
5 CONNECT NEW WALL MOUNTED LUMINAIRE TO EXISTING EXTERIOR LIGHTING CIRCUIT AND CONTROLS. SURFACE MOUNT CONDUIT ON EXTERIOR OF BUILDING. PAINT CONDUIT TO MATCH ADJACENT SURFACE.
6 TIE INTO EXISTING EQUIPMENT ROOM LIGHTING CIRCUIT.
7 REINSTALL OCCUPANCY SENSORS BELOW STRUCTURAL JOISTS.
8 CONNECT TO EM LIGHTING CIRCUIT IN ROOM AHEAD OF ALL SWITCHING.
9 CONNECT EXISTING LUMINAIRE TO EMERGENCY LIGHTING CIRCUIT EM1-2.

KEY PLAN



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LIGHTING PLAN

E-005

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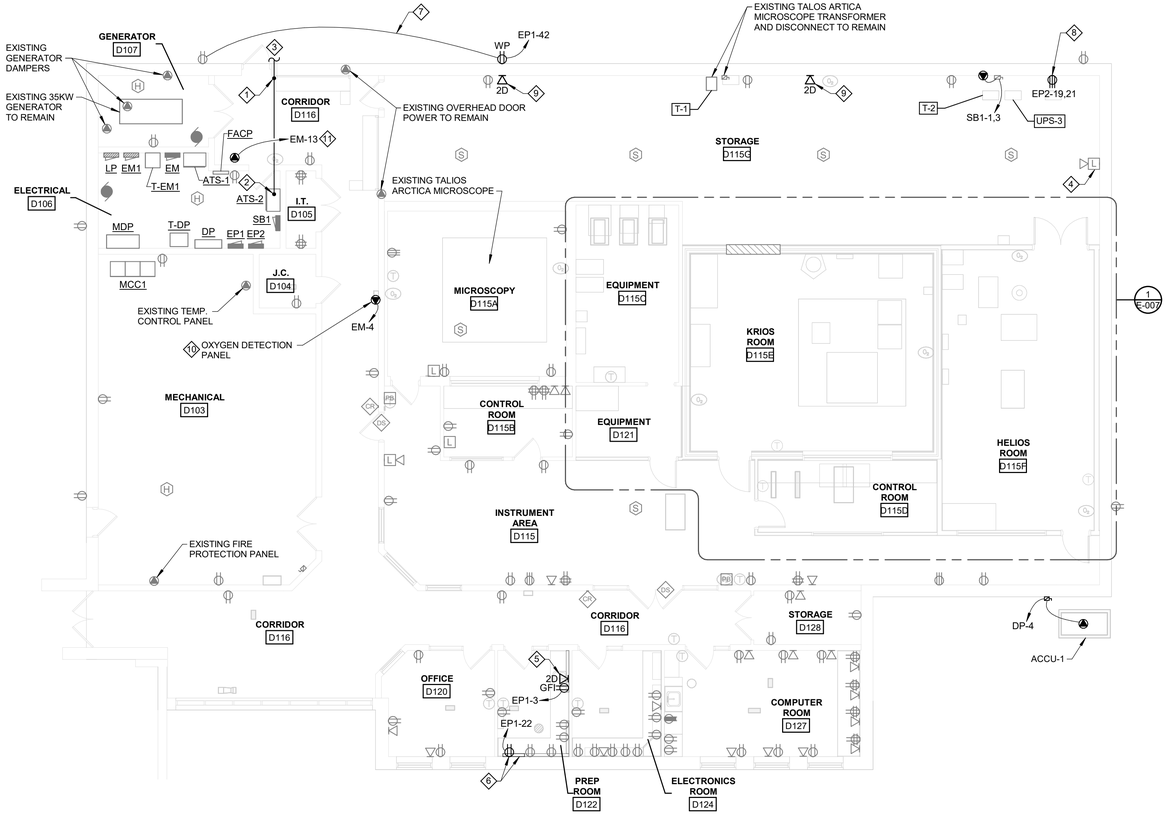


POWER AND SYSTEMS PLAN

SCALE: 1/8" = 1'-0"

NORTH

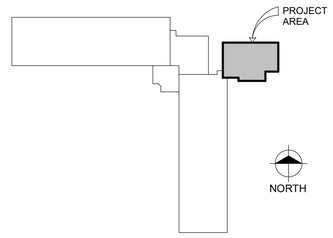
NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
2. PROVIDE FIRE STOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN EXISTING FIRE RATINGS.
3. UNLESS NOTED OTHERWISE, ALL CONDUIT AND WIRING SHALL BE CONCEALED. ELECTRICAL CONNECTIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC AND ARE USED TO ILLUSTRATE CIRCUITING AND WIRING REQUIREMENTS ONLY.

KEY NOTES

1. UPON ENTERING BUILDING, ROUTE CONDUIT UP TO CORRIDOR CEILING. KEEP CONDUIT AS HIGH AS POSSIBLE.
2. ROUTE CONDUIT THROUGH ELECTRICAL ROOM WALL TO REFEED ATS-2.
3. REFER TO SHEET E-003 FOR EXTERIOR CONDUIT ROUTING.
4. RELOCATED FIRE ALARM DEVICE.
5. PROVIDE CAT6A CABLE TO ACOUSTIC SERVER CABINET.
6. EXTEND SURFACE MOUNTED WIREMOLD. MATCH EXISTING. MOUNT DUPLEX RECEPTACLE IN WIREMOLD.
7. EXTEND EXTERIOR RECEPTACLE CIRCUIT. PROVIDE SURFACE MOUNTED CONDUIT. ROUTE CONDUIT ABOVE DOOR. PAINT TO MATCH ADJACENT SURFACE.
8. PROVIDE NEMA 6-15 RECEPTACLE FOR FUTURE EQUIPMENT.
9. PROVIDE CAT6A DATA CABLE TO EXISTING SERVER IN EQUIPMENT ROOM D115C.
10. REUSE EXISTING 120V CIRCUIT FOR NEW OXYGEN DETECTION PANEL. FIELD VERIFY.
11. PROVIDE 120V CIRCUIT AS INDICATED FOR LN2-FS-1 CONNECTION. COORDINATE EXACT REQUIREMENTS WITH MECHANICAL TRADES.

KEY PLAN



fishbeck

Proj. No.:	240252
Dwg. By:	ACF
Designer:	ACF
Reviewer:	RMM
Manager:	TSP

Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP23116

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DATE	
SCALE	AS SHOWN

REVISIONS

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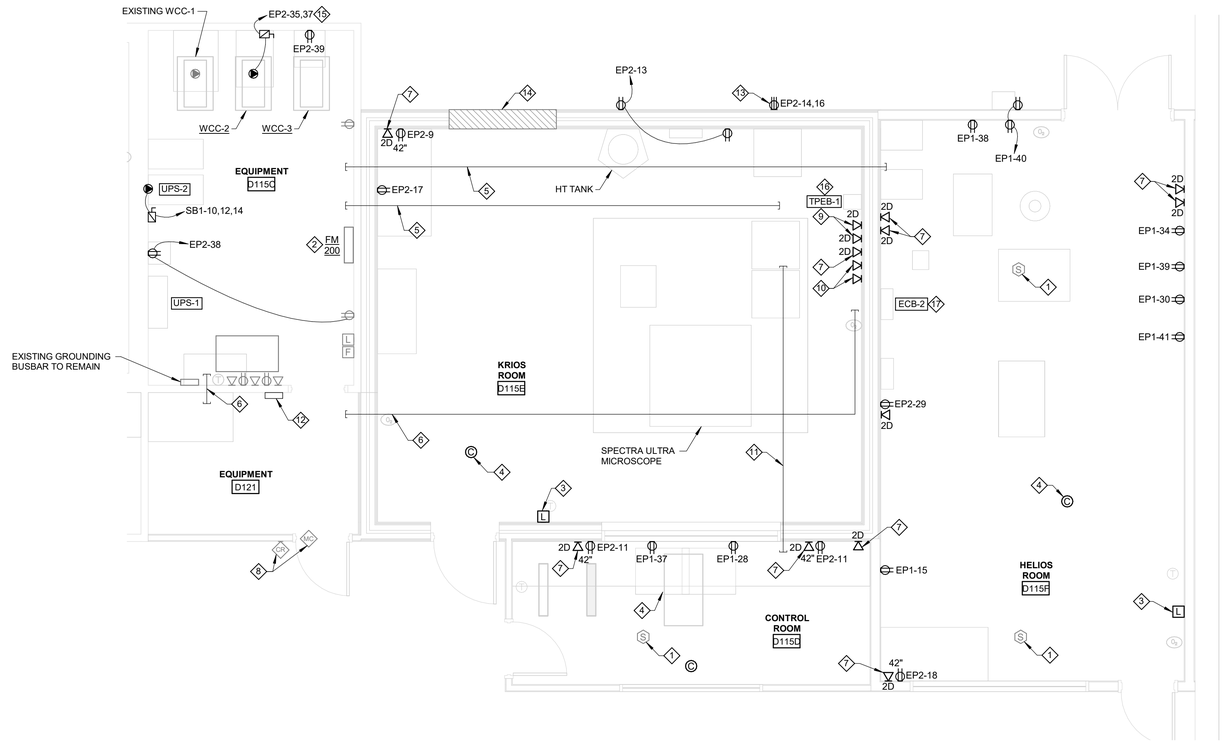
POWER AND SYSTEMS PLAN

E-006

38 OF **42**

PLOT INFO: 6/17/2024 11:17:27 AM



1 ENLARGED POWER AND SYSTEMS PLAN

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

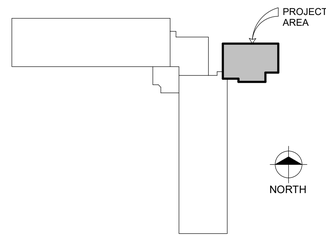
NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
2. PROVIDE FIRE STOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN EXISTING FIRE RATINGS.
3. UNLESS NOTED OTHERWISE, ALL CONDUIT AND WIRING SHALL BE CONCEALED. ELECTRICAL CONNECTIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC AND ARE USED TO ILLUSTRATE CIRCUITING AND WIRING REQUIREMENTS ONLY.

KEY NOTES

1 EXISTING FIRE ALARM DEVICE TO REMAIN ABOVE ROOM.
2 EXISTING FM200 CONTROL PANEL TO REMAIN.
3 TIE INTO EXISTING NATIONAL TIME AND SIGNAL BUILDING FIRE ALARM PANEL.
4 PROVIDE CAT6A CABLE TO ACOUSTIC SERVER CABINET. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH OWNER AND EQUIPMENT SUPPLIER.
5 PROVIDE (1) 2" CONDUIT BETWEEN MICROSCOPE ROOMS AND EQUIPOMENT ROOM D115C FOR CONNECTION TO MSU NETWORK. COORDINATE EXACT LOCATIONS AND REQUIREMENTS WITH OWNER.
6 PROVIDE (1) 2" CONDUIT BETWEEN ROOMS FOR DATA CONNECTIONS BETWEEN ACOUSTIC SERVER CABINET AND EXISTING MSU SERVER.
7 PROVIDE CAT6A DATA CABLE TO EXISTING SERVER IN EQUIPMENT ROOM D115C.
8 RELOCATED DEVICES FROM EQUIPMENT ROOM.
9 PROVIDE CAT6A DATA CABLE TO NEW ACOUSTIC SERVER CABINET.
10 PROVIDE (2) FIBER OPTIC CABLES TO NEW ACOUSTIC SERVER CABINET. COORDINATE EXACT FIBER CABLE REQUIREMENTS WITH OWNER AND EQUIPMENT SUPPLIER. ROUTE FIBER OPTIC CABLES IN 2" CONDUIT.
11 PROVIDE (1) 2" CONDUIT FROM KRIOS TEM CABINET TO CONTROL ROOM D115C. CABLES PROVIDED BY THERMO FISHER.
12 GROUNDING BUSBAR, SEE MSU STANDARD SPECIFICATIONS. PROVIDE 2/0 GROUNDING CONDUCTOR TO BUSSBAR IN ELECTRICAL ROOM D106.
13 PROVIDE NEMA 6-15 RECEPTACLE FOR FUTRUE EQUIPMENT.
14 REMOVABLE WALL. DO NOT MOUNT ANYTHING ON THIS SECTION OF WALL.
15 REFER TO ONE LINE DIAGRAM.
16 EC TO PROVIDE POWER UP TO TPEB-1. ALL CONNECTIONS AFTER TPEB-1 PROVIDED AND INSTALLED BY OTHERS.
17 EC TO PROVIDE POWER UP TO ECB-2. ALL CONNECTIONS AFTER ECM-2 PROVIDED AND INSTALLED BY OTHERS.

KEY PLAN



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Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

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DATE	
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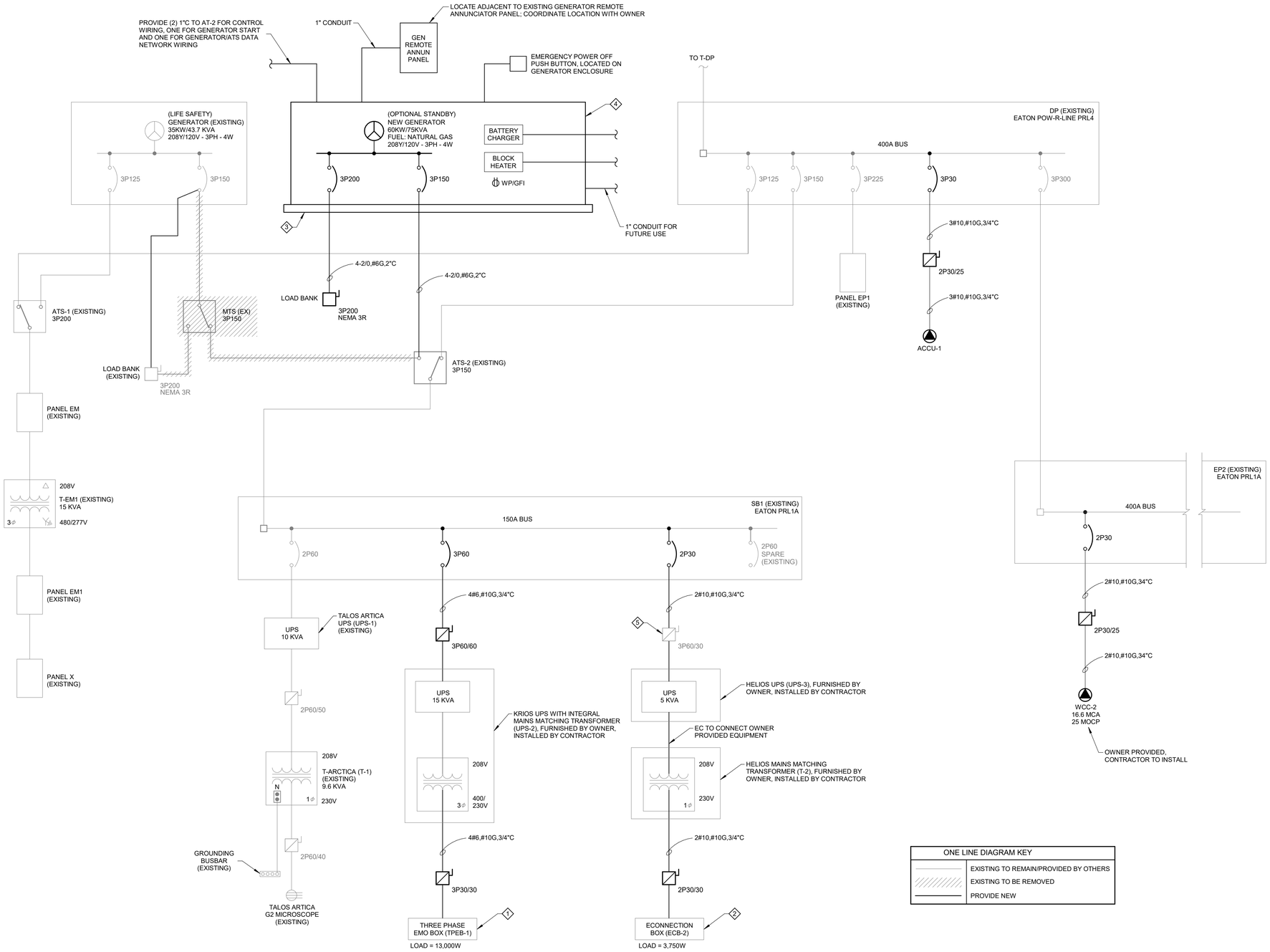
ENLARGED POWER PLANS

E-007

39 OF **42**

PLOT INFO: 6/17/2024 11:17:29 AM



ONE LINE DIAGRAM KEY

	EXISTING TO REMAIN/PROVIDED BY OTHERS
	EXISTING TO BE REMOVED
	PROVIDE NEW

PARTIAL ONE LINE DIAGRAM - EXISTING AND NEW

480V-3PH-3W, 208Y/120V-3PH-4W, 230V-1PH-W

NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
2. PROVIDE FIRE STOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN EXISTING FIRE RATINGS.
3. UNLESS NOTED OTHERWISE, ALL CONDUIT AND WIRING SHALL BE CONCEALED. ELECTRICAL CONNECTIONS SHOWN ON DRAWINGS ARE DIAGRAMMATIC AND ARE USED TO ILLUSTRATE CIRCUITING AND WIRING REQUIREMENTS ONLY.

KEY NOTES

1 EC TO PROVIDE POWER UP TO TPEB. ALL CONNECTIONS AFTER TPEB PROVIDED AND INSTALLED BY OTHERS.
2 EC TO PROVIDE POWER UP TO SPEB. ALL CONNECTIONS AFTER SPEB PROVIDED AND INSTALLED BY OTHERS.
3 PROVIDE 6" CONCRETE PAD. REFER TO EQUIPMENT PAD DETAIL ON SHEET E-004.
4 ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR GENERATOR POWER AT SUBSTANTIAL COMPLETION. GENERATOR LEAD TIME IS LIKELY AFTER SUBSTANTIAL COMPLETION. ELECTRICAL CONTRACTOR TO PROVIDE TEMPORARY GENERATOR UNTIL PERMANENT GENERATOR IS AVAILABLE. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL LABOR AND MATERIAL COSTS RELATED TO TEMPORARY AND PERMANENT GENERATOR.
5 PROVIDE 30A FUSES IN EXISTING 60A DISCONNECT.

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Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

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ONE LINE DIAGRAM

E-008

PLOT INFO: 6/17/2024 11:17:30 AM

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Infrastructure
Planning and Facilities

MICHIGAN STATE UNIVERSITY

LP — EXISTING PANELBOARD

Location: Space 11 | Voltage: 480/277 Wye | A.I.C. Rating: -
Supply From: | Phase: 3 | Mains Type: MLO
Mounting: SURFACE | Wires: 4 | Rating: 250 A
Enclosure: NEMA 1 | No. of Poles: 42 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	Rev. No.	CKT
1		SPARE	60 A	2	0 VA / 360 VA			1	20 A	EX. LIGHTING		2
3	--	--	--	--		0 VA / 500 VA		1	20 A	OXYGEN SENSOR PANEL		4
5		SPARE	60 A	2			0 VA / 720 VA	1	20 A	EX. TELECOM RECEPT		6
7	--	--	--	--	0 VA / 100 VA			1	20 A	EX. FIRE PROTECTION PANEL		8
9		EX. GENERATOR DAMPERS	20 A	1		300 VA / 500 VA		1	20 A	EX. TEMP. CONTROL PANEL		10
11		EX. GENERATOR ALERT SYSTEM	20 A	1			100 VA / 100 VA	1	20 A	EX. SPRINKLER REACT SYSTEM		12
13		LN2-FS-1	20 A	1	100 VA / 100 VA			1	20 A	EX. SW SECURE DOOR		14
15		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		16
17		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		18
19		EX. SPARE	20 A	1	0 VA / 0 VA			1	20 A	EX. SPARE		20
21		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		22
23		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		24
25		EX. SPARE	20 A	1	0 VA / 0 VA			1	20 A	EX. SPARE		26
27		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		28
29		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		30
31		EX. SPARE	20 A	1	0 VA / 0 VA			1	20 A	EX. SPARE		32
33		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		34
35		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		36
37		EX. SPARE	20 A	3	0 VA / 0 VA			1	20 A	EX. SPARE		38
39	--	--	--	--		0 VA / 0 VA		1	20 A	EX. SPARE		40
41	--	--	--	--			0 VA / 0 VA	1	20 A	EX. SPARE		42
			Total Load:		1608 VA	759 VA	0 VA					
			Total Amps:		6 A	3 A	0 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	2367 VA	125.00%	2959 VA		
				Total Connected Load:	2367 VA
				Total Estimated Demand:	2959 VA
				Total Connected Current.:	3 A
				Total Est. Demand Current:	4 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

EM — EXISTING PANELBOARD

Location: Space 11 | Voltage: 208/120 Wye | A.I.C. Rating: 18K
Supply From: | Phase: 3 | Mains Type: MCB
Mounting: SURFACE | Wires: 4 | Rating: 400 A
Enclosure: NEMA 1 | No. of Poles: 42 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	Rev. No.	CKT
1		SPARE	60 A	2	0 VA / 360 VA			1	20 A	EX. ELEC RM/GEN RM RECEPT		2
3	--	--	--	--		0 VA / 500 VA		1	20 A	OXYGEN SENSOR PANEL		4
5		SPARE	60 A	2			0 VA / 720 VA	1	20 A	EX. TELECOM RECEPT		6
7	--	--	--	--	0 VA / 100 VA			1	20 A	EX. FIRE PROTECTION PANEL		8
9		EX. GENERATOR DAMPERS	20 A	1		300 VA / 500 VA		1	20 A	EX. TEMP. CONTROL PANEL		10
11		EX. GENERATOR ALERT SYSTEM	20 A	1			100 VA / 100 VA	1	20 A	EX. SPRINKLER REACT SYSTEM		12
13		LN2-FS-1	20 A	1	100 VA / 100 VA			1	20 A	EX. SW SECURE DOOR		14
15		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		16
17		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		18
19		EX. SPARE	20 A	1	0 VA / 0 VA			1	20 A	EX. SPARE		20
21		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		22
23		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		24
25		EX. T-EM1	20 A	3	1105 VA / 0 VA			1	20 A	EX. SPARE		26
27	--	--	--	--		665 VA / 0 VA		1	20 A	EX. SPARE		28
29	--	--	--	--			333 VA / 0 VA	1	20 A	EX. SPARE		30
31		EX. SPACE	--	1	0 VA / 0 VA			1	--	EX. SPACE		32
33		EX. SPACE	--	1		0 VA / 0 VA		1	--	EX. SPACE		34
35		EX. SPACE	--	1			0 VA / 0 VA	1	--	EX. SPACE		36
37		EX. SPACE	--	1	0 VA / 0 VA			1	--	EX. SPACE		38
39		EX. SPACE	--	1		0 VA / 0 VA		1	--	EX. SPACE		40
41		EX. SPACE	--	1			0 VA / 0 VA	1	--	EX. SPACE		42
			Total Load:		1765 VA	1965 VA	1253 VA					
			Total Amps:		15 A	17 A	10 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	1104 VA	125.00%	1380 VA		
RECEPT	1080 VA	100.00%	1080 VA	Total Connected Load:	4984 VA
Equip.	2800 VA	100.00%	2800 VA	Total Estimated Demand:	5260 VA
				Total Connected Current.:	14 A
				Total Est. Demand Current:	15 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

EP1 — EXISTING PANELBOARD

Location: Space 11 | Voltage: 208/120 Wye | A.I.C. Rating: -
Supply From: DP | Phase: 3 | Mains Type: MLO
Mounting: SURFACE | Wires: 4 | Rating: 225 A
Enclosure: NEMA 1 | No. of Poles: 42 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	Rev. No.	CKT
1		EX. D-120 OFFICE RECEPT	20 A	1	540 VA / 540 VA			1	20 A	EX. D-120,122,124 RECEPT		2
3		D-122 VIRTOBOT RECEPT	20 A	1		180 VA / 360 VA		1	20 A	EX. D-122 WIREMOLD RECEPT		4
5		EX. D-122 WIREMOLD RECEPT	20 A	1			360 VA / 360 VA	1	20 A	EX. D-124 WIREMOLD RECEPT		6
7		EX. D-124 WIREMOLD RECEPT	20 A	1	360 VA / 360 VA			1	20 A	EX. D-124 WIREMOLD RECEPT		8
9		EX. D-124 WIREMOLD RECEPT	20 A	1		360 VA / 540 VA		1	20 A	EX. D-127 WIREMOLD RECEPT		10
11		EX. D-127 WIREMOLD RECEPT	20 A	1			360 VA / 720 VA	1	20 A	EX. D-127 WIREMOLD RECEPT		12
13		EX. D-124 WIREMOLD RECEPT	20 A	1	540 VA / 360 VA			1	20 A	EX. D-127 WIREMOLD RECEPT		14
15		HELIOS ROOM RECEPT	20 A	1		180 VA / 540 VA		1	20 A	EX. INST RM SOUTH RECEPT		16
17		EX. MECH ROOM RECEPT	20 A	1			720 VA / 360 VA	1	20 A	EX. INST RM NW RECEPT		18
19		EX. D-128 RECEPT	20 A	1	540 VA / 360 VA			1	20 A	EX. INST RM NE RECEPT		20
21		EX. D-127 WIREMOLD RECEPT	20 A	1		360 VA / 180 VA		1	20 A	D-122 MINI FRIDGE RECEPT		22
23		EX. D-127 WIREMOLD RECEPT	20 A	1			180 VA / 720 VA	1	20 A	EX. LOBBY RECEPT		24
25		EX. INST RM OVERHEAD DOOR	20 A	3	167 VA / 360 VA			1	20 A	EX. WP EXTERIOR RECEPT		26
27	--	--	--	--		167 VA / 1800 VA		1	20 A	HELIOS ROOM RECEPT		28
29	--	--	--	--			167 VA / 180 VA	1	20 A	HELIOS ROOM RECEPT		30
31		EX. OUTSIDE OVERHEAD DOOR	20 A	3	167 VA / 500 VA			1	20 A	EX. ELEC RM EXHAUST FAN		32
33	--	--	--	--		167 VA / 180 VA		1	20 A	HELIOS ROOM RECEPT		34
35	--	--	--	--			167 VA / 500 VA	1	20 A	EX. UNIT HEATERS		36
37		CONTROL ROOM RECEPT	20 A	1	1800 VA / 180 VA			1	20 A	CONTROL ROOM RECEPT		38
39		HELIOS ROOM RECEPT	20 A	1		180 VA / 360 VA		1	20 A	HELIOS ROOM RECEPT		40
41		HELIOS ROOM RECEPT	20 A	1			180 VA / 720 VA	1	20 A	EX. WP EXTERIOR RECEPT		42
			Total Load:		6773 VA	5553 VA	5693 VA					
			Total Amps:		57 A	46 A	48 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Motor	500 VA	125.00%	625 VA		
RECEPT	16020 VA	81.21%	13010 VA	Total Connected Load:	18020 VA
Equip.	1500 VA	100.00%	1500 VA	Total Estimated Demand:	15135 VA
				Total Connected Current.:	50 A
				Total Est. Demand Current:	42 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

EP2 — EXISTING PANELBOARD

Location: Space 11 | Voltage: 208/120 Wye | A.I.C. Rating: -
Supply From: DP | Phase: 3 | Mains Type: MLO
Mounting: SURFACE | Wires: 4 | Rating: 400 A
Enclosure: NEMA 1 | No. of Poles: 42 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	Rev. No.	CKT
1		EX. INST RM WM RECEPT SE	20 A	2	500 VA / 2500 VA			2	20 A	*GENERATOR BLOCK HEATER		2
3	--	--	--	--		500 VA / 2500 VA		--	--	--	--	4
5		EX. SPARE	20 A	1			0 VA / 360 VA	1	20 A	EX. INST RM WM RECEPT SW		6
7		EX. SPARE	20 A	1	0 VA / 180 VA			1	20 A	EX. RECEPT FOR IT RACK		8
9		*KRIOS ROOM RECEPT	20 A	1		180 VA / 180 VA		1	20 A	EX. RECEPT FOR IT RACK		10
11		*KRIOS ROOM RECEPT	20 A	1			360 VA / 360 VA	1	20 A	EX. INST RM WM RECEPT SE		12
13		*KRIOS ROOM RECEPT	20 A	1	360 VA / 624 VA			2	20 A	FUTURE EQUIPMENT		14
15		EX. RECEPT	20 A	1		360 VA / 624 VA		--	--	--	--	16
17		KRIOS ROOM RECEPT	20 A	1			180 VA / 1800 VA	1	20 A	HELIOS ROOM RECEPT		18
19		FUTURE EQUIPMENT	20 A	2	624 VA / 333 VA			3	60 A	EX. 900 HE COMP		20
21	--	--	--	--		624 VA / 333 VA		--	--	--	--	22
23		EX. DISCONNECT	60 A	3			0 VA / 333 VA	--	--	--	--	24
25	--	--	--	--	0 VA / 333 VA			3	30 A	EX. 600 HE COMP		26
27	--	--	--	--		0 VA / 333 VA		--	--	--	--	28
29		HYDRA RM RECEPT USER DESK	20 A	1			1800 VA / 333 VA	--	--	--	--	30
31		GENERATOR RECEPTACLE	20 A	1	100 VA / 100 VA			1	20 A	EX. FM 200 CONTROL PANEL		32
33		GEN BATTERY CHARGER	20 A	1		100 VA / 0 VA		2	20 A	EX. WCC-1		34
35		*KRIOS CHILLER (WCC-2)	30 A	2			2080 VA / 0 VA	--	--	--	--	36
37	--	--	--	--	2080 VA / 540 VA			1	20 A	EX. RECEPT		38
39		HELIOS HYDRA CHILLER (WCC-3)	20 A	1		180 VA / 900 VA		1	20 A	EX. RECEPT		40
41		SPARE	20 A	1			0 VA / 900 VA	1	20 A	EX. RECEPT		42
			Total Load:		8275 VA	6815 VA	8507 VA					
			Total Amps:		71 A	57 A	73 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
RECEPT	8640 VA	100.00%	8640 VA		
Equip.	14956 VA	100.00%	14956 VA	Total Connected Load:	23596 VA
				Total Estimated Demand:	23596 VA
				Total Connected Current.:	65 A
				Total Est. Demand Current:	65 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

EM1 — EXISTING PANELBOARD

Location: Space 11 | Voltage: 480/277 Wye | A.I.C. Rating: -
Supply From: T-EM1 | Phase: 3 | Mains Type: MCB
Mounting: SURFACE | Wires: 4 | Rating: 25 A
Enclosure: NEMA 1 | No. of Poles: 20 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	Rev. No.	CKT
1		EX. SPARE	20 A	1	0 VA / 772 VA			1	20 A	EX. EMERGENCY LIGHTING		2
3		EX. COORIDOR EM LIGHTING	20 A	1		192 VA / 140 VA		1	20 A	EM LIGHTING D115E, D115F		4
5		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		6
7		EX. SPARE	20 A	1	0 VA / 0 VA			1	20 A	EX. SPARE		8
9		EX. SPARE	20 A	1		0 VA / 0 VA		1	20 A	EX. SPARE		10
11		EX. SPARE	20 A	1			0 VA / 0 VA	1	20 A	EX. SPARE		12
13		EX. SPARE	20 A	1	0 VA / 0 VA			1	20 A	EX. SPARE		14
15		EX. PANEL X ENG. RESEARCH	20 A	3		333 VA / 0 VA		3	20 A	EX. SPARE		16
17	--	--	--	--			333 VA / 0 VA	--	--	--	--	18
19	--	--	--	--	333 VA / 0 VA			--	--	--	--	20
			Total Load:		1105 VA	665 VA	333 VA					
			Total Amps:		4 A	3 A	1 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Lighting	1104 VA	125.00%	1380 VA		
Equip.	1000 VA	100.00%	1000 VA	Total Connected Load:	2104 VA
				Total Estimated Demand:	2380 VA
				Total Connected Current.:	3 A
				Total Est. Demand Current:	3 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

DP

Location: Space 11 | Voltage: 208/120 Wye | A.I.C. Rating: -
Supply From: | Phase: 3 | Mains Type: MCB
Mounting: SURFACE | Wires: 4 | Mains Rating: 400 A
Enclosure: NEMA 1 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	# of Poles	Trip Rating	Load	Remarks
1		EX. ATS-1	3	125 A	20810 VA	
2		EX. PANEL EP1	3	225 A	18020 VA	
3		EX. ATS-2	3	150 A	28000 VA	
4		*ACCU-1	3	30 A	6845 VA	
5		EX. SPACE	1	--	--	
6		EX. SPACE	1	--	--	
7		EX. SPACE	1	--	--	
8		EX. SPACE	1	--	--	
9		EX. PANEL EP2	3	300 A	23596 VA	
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

	PHASE A	PHASE B	PHASE C	TOTAL AMPS
	36 kVA	28 kVA	33 kVA	270 A

Load Classification	Connected Load	Demand Factor	NEC Calc. Load	Panel Totals	
Equip.	72111 VA	100.00%	72111 VA		
Motor	500 VA	125.00%	625 VA	Total Connected Load:	97 kVA
RECEPT	24660 VA	70.28%	17330 VA	Total NEC Calc. Load:	90 kVA
				Total Connected Current:	270 A
				Total NEC Calc. Current:	250 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

SB1 — EXISTING PANELBOARD

Location: Space 11 | Voltage: 208/120 Wye | A.I.C. Rating: -
Supply From: DP | Phase: 3 | Mains Type: MLO
Mounting: SURFACE | Wires: 4 | Rating: 225 A
Enclosure: NEMA 1 | No. of Poles: 30 | Bussing: COPPER

CKT	Rev. No.	Circuit Description	Trip	Poles	A	B	C	Poles	Trip	Circuit Description	Rev. No.	CKT
1		*HELIOS MICROSCOPE	30 A	2	2500 VA / 0 VA			1	--	EX. SPACE		2
3	--	--	--	--		2500 VA / 0 VA		--	--	EX. SPACE		4
5		EX. SPARE	60 A	2			0 VA / 5000 VA	2	60 A	EX. TALOS ARTICA MICROSCOPE		6
7	--	--	--	--	0 VA / 5000 VA			--	--	--	--	8
9		EX. SPACE	--	1		0 VA / 4333 VA		3	60 A	*SPECTRA ULTRA MICROSCOPE		10
11		EX. SPACE	--	1			0 VA / 4333 VA	--	--	--	--	12
13		EX. SPACE	--	1	0 VA / 4333 VA			--	--	--	--	14
15		EX. SPACE	--	1		0 VA / 0 VA		1	--	EX. SPACE		16
17		EX. SPACE	--	1			0 VA / 0 VA	1	--	EX. SPACE		18
19		EX. SPACE	--	1	0 VA / 0 VA			1	--	EX. SPACE		20
21		EX. SPACE	--	1		0 VA / 0 VA		1	--	EX. SPACE		22
23		EX. SPACE	--	1			0 VA / 0 VA	1	--	EX. SPACE		24
25		EX. SPACE	--	1	0 VA / 0 VA			1	--	EX. SPACE		26
27		EX. SPACE	--	1		0 VA / 0 VA		1	--	EX. SPACE		28
29		EX. SPACE	--	1			0 VA / 0 VA	1	--	EX. SPACE		30
			Total Load:		11833 VA	6833 VA	9333 VA					
			Total Amps:		102 A	57 A	81 A					

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
Equip.	28000 VA	100.00%	28000 VA		
				Total Connected Load:	28000 VA
				Total Estimated Demand:	28000 VA
				Total Connected Current.:	78 A
				Total Est. Demand Current:	78 A

Notes:
EX. INDICATES EXISTING CIRCUITS TO REMAIN.
* = PROVIDE NEW BREAKER IN EXISTING PANEL.
BOLD = WORK RELATED TO PHASE 2.

ENGINEERING RESEARCH COMPLEX
RENOVATE D115, CRYO-EM EXPANSION

CAPITAL PROJ. NO.
CP23116

PR. MGR.	Z. KIEFER
ARCH.	D. LAUNSTEIN
MECH.	A. VANDERSTELT
ELEC.	G. HALSEY
CIVIL	
L.A.	
INT. DES.	D. WHITBECK
CONST. REP.	
APPR.	
DATE	
SCALE	AS SHOWN

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PANELBOARD SCHEDULES

E-009

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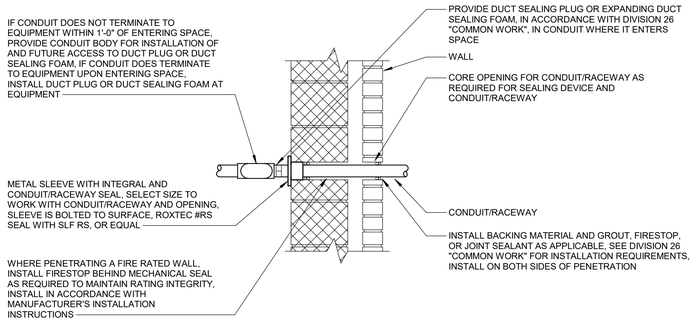
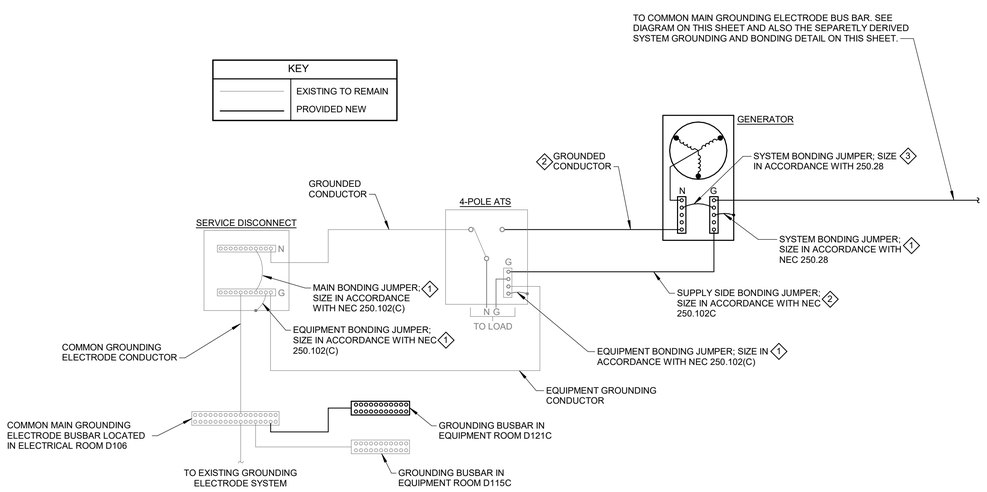


NOTES:
1. DETAIL APPLIES TO ABOVE GRADE EXTERIOR CONDUIT AND CONDUIT INSTALLED BETWEEN SPACES OF DIFFERENT TEMPERATURES. CONDUIT INSTALLATION TO COMPLY WITH THIS DETAIL AND REQUIREMENTS OF NEC 300.5 AND 300.7.
2. PENETRATION DETAIL APPLIES WHERE WALL CONSTRUCTION DOES NOT FACILITATE CORE DRILLING OR INSTALLATION OF A SLEEVE FOR PROPER ROUTING AND SEALING OF CONDUIT/CABLE.
3. WHEN ENTERING TOP OF EQUIPMENT, A CONDUIT BODY OR JUNCTION BOX MUST BE PROVIDED PRIOR TO ENTERING EQUIPMENT FOR INSTALLATION OF DUCT SEALING PLUG OR FOAM. DO NOT INSTALL PLUG OR FOAM DIRECTLY AT EQUIPMENT.

ABOVE GRADE EXTERIOR HOLLOW/THIN CONSTRUCTION

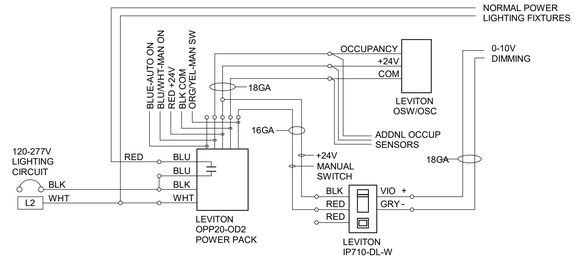
CONDUIT WALL PENETRATION

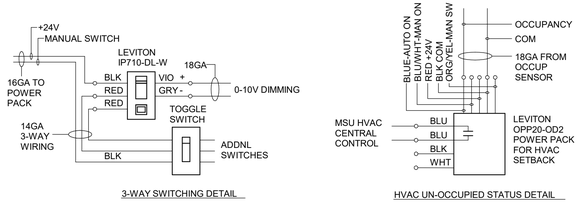
NO SCALE



4-WIRE ELECTRICAL SERVICE AND GENERATOR WITH 3-POLE TRANSFER SWITCHES GROUNDING AND BONDING DETAIL

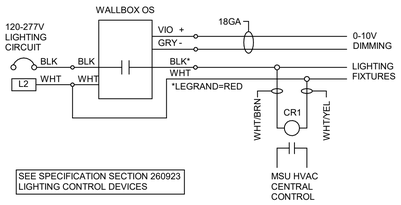
NO SCALE





3-WAY SWITCHING DETAIL

HVAC UN-OCCUPIED STATUS DETAIL



NOTES:
1. CONTROL IS MANUAL ON/AUTO OFF WITH DIMMING.
2. WHEN REQUIRED PROVIDE RELAY FOR HVAC UN-OCCUPIED STATUS.
   P/N: FUNCTIONAL DEVICES ESR2401B-120V/ESR2402B-277V.
   VERIFY WIRING WITH MSU HVAC CENTRAL CONTROL.

LUTRON MS-Z101-W
1. SET TO 30 MINS.
2. SET TO VACANCY MODE.
LEGRAND DW-311-W.
1. SET SW 2,3 TO
2. SET SW 4,5 TO OPTION A.
3. SET SW 6,7,8,9 TO DISABLE AUDIBLE ALERT.
ALL OTHER SETTINGS ARE DEFAULT.

LIGHTING CONTROL NOTE 1 - MSU LIGHTING DETAIL 03A

NOTES:
1. CONTROL IS MANUAL ON/AUTO OFF.
2. FOR NEW CONSTRUCTION PROVIDE EXTRA DEEP SINGLE GANG BOX.
3. WHEN REQUIRED PROVIDE 3-WAY SWITCHING.
4. WHEN REQUIRED PROVIDE POWER PACK FOR HVAC UN-OCCUPIED STATUS.
5. PROVIDE EMERGENCY LIGHTING BATTERY PACK.
6. SET DIP SWITCHES AS SHOWN. ALL OTHER SETTINGS ARE DEFAULT.

OCCUPANCY SENSOR/POWER PACK:
P/N: LEVITON OSW12-M0W WALL/CORNER MOUNT (OS-A), OSC20-M0W CEILNG MOUNT (OS-B) & OPP20-OD2 POWER PACK.
1. CHANGE TIME DELAY TO 20 MINUTES.
2. SET DIP SW A3 ON TO DISABLE AUTO-ADAPTING.
3. SET DIP SW A4 ON TO DISABLE WALK THRU.
4. IN PARALLEL FOR UP TO (8) OCCUP SENSORS.
   (2) OCCUP SENSOR MAX FOR EACH POWER PACK. PROVIDE 2ND POWER PACK WITH THE +24VDC AND COM WIRED
5. CAP UNUSED POWER PACK LEADS.

COMMISSIONING NOTES:
USE THE FOLLOWING PROCEDURE FOR CHECKOUT. VERIFY WITH THE LATEST MFG LITERATURE.
1. TURN DIP SWITCH B3 ON AND THEN OFF TO INITIATE THE TEST MODE. THE OCCUPANCY SENSOR WILL BE IN TEST MODE WITH A 6 SECOND TIMEOUT FOR 15 MINUTES. THE UNIT WILL GO BACK TO AUTO MODE AFTER 15 MINUTES.
2. LEAVE THE ROOM AND CLOSE THE DOOR. WAIT 10 SECONDS AND VERIFY THE LIGHTING IS OFF.
3. ENTER THE ROOM, TURN ON THE LIGHT SWITCH, AND VERIFY THE LIGHTING TURNS ON.
4. WALK AROUND THE PERIMETER OF ROOM FOR APPROX. 60 SEC. TO VERIFY THE LIGHTING STAYS ON.
5. INITIAL SETTINGS OF 50% INFRARED AND 75% ULTRASONIC. ADJUST THE INFRARED SETTING HIGHER IF OCCUPANCY IS NOT DETECTED WHEN WALKING INTO THE ROOM. ADJUST THE ULTRASONIC HIGHER IF THE LIGHTING IS NOT STAYING ON WHEN WALKING AROUND THE PERIMETER IF THE ROOM. OCCUPANCY SENSOR RED LIGHT = INFRARED DETECTION & GREEN LIGHT = ULTRASONIC DETECTION.

LIGHTING CONTROL NOTE 2 DIAGRAM - MSU LIGHTING DETAIL 08

NOTES

1. PERFORM ALL WORK IN ACCORDANCE WITH THE NEC AND MICHIGAN STATE UNIVERSITY CONSTRUCTION STANDARDS.
2. PROVIDE FIRE STOPPING FOR ALL CONDUIT AND OTHER ELECTRICAL EQUIPMENT PENETRATIONS THROUGH FLOORS, WALLS, AND CEILINGS TO MAINTAIN EXISTING FIRE RATINGS.
3. ALL GROUNDING ELECTRODE AND BONDING CONDUCTORS EXPOSED ABOVE GRADE ARE TO BE INSTALLED IN RIGID METAL CONDUIT.
4. COMMON GROUND BARS SHALL NOT BE LESS THAN 1/4" THICK X 2" WIDE AND OF A LENGTH TO ACCOMMODATE THE NUMBER OF TERMINATIONS NECESSARY FOR THE INSTALLATION. THE BUS BAR SHALL BE SECURELY FASTENED AND SHALL BE INSTALLED IN AN ACCESSIBLE LOCATION. CONNECTIONS SHALL BE MADE BY A LISTED CONNECTOR OR BY THE EXOTHERMIC WELDING PROCESS. IF NUT AND BOLT TERMINATIONS ARE TO BE USED TWO BOLTS PER TERMINATION WILL BE REQUIRED AND ONE CONDUCTOR PER TERMINATION.
5. ALL CONDUCTORS ARE TO COPPER AND BE LABELED WITH THEIR PURPOSE.
6. ALL CONNECTIONS ARE TO BE LISTED AND BE EITHER EXOTHERMIC WELDED OR IRREVERSIBLE CONNECTION.

KEY NOTES

1 TYPICALLY THIS IS PROVIDED BY THE MANUFACTURER OF THE EQUIPMENT BUT MAY NEED TO BE PROVIDED BY THE INSTALLING CONTRACTOR IF MISSING.
2 SEE ONE LINE DIAGRAM FOR CONDUCTOR SIZE.
3 ALL CONDUCTORS ARE TO BE COPPER AND BE LABELED WITH THEIR PURPOSE.

fishbeck

Proj. No.:	240252
Dwg. By:	ACF
Designer:	ACF
Reviewer:	RMM
Manager:	TSP

Infrastructure Planning and Facilities

MICHIGAN STATE UNIVERSITY

ENGINEERING RESEARCH COMPLEX

RENOVATE D115, CRYO-EM EXPANSION

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ELECTRICAL DETAILS

E-010

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