

I2C MRI INSTALLATION - LAB 5 FIT-OUT
ADDRESS: 461 BURROUGHS ST.
DETROIT, MI. 48202

Wayne State University



I2C MRI Installation -
Lab 5 Fit-Out

461 Burroughs St.
Detroit, MI 48202

Bids / Permits

08/12/2019

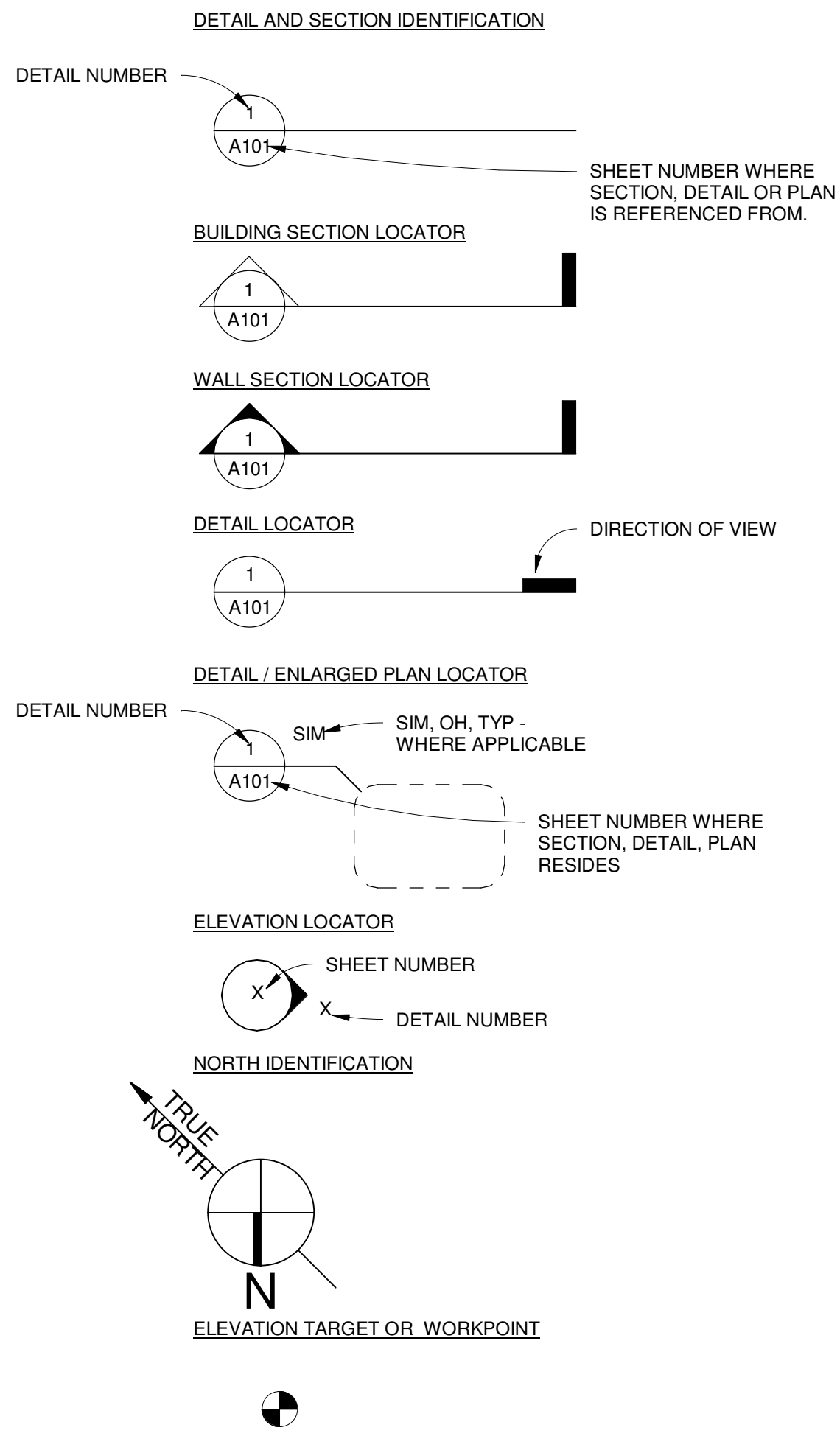
HED

2017-03497-000
Client's Project Number: 212-313128

MATERIAL DESIGNATION LEGEND

MATERIAL	
EARTH	
SAND FILL	
FILL	
CONCRETE	
BRICK	
CONCRETE MASONRY UNIT	
SOLID CONCRETE MASONRY UNIT WITH FILLED CORES	
STONE	
METALS	
WOOD BLOCKING, NAILER ETC. (CONTINUOUS)	
WOOD BLOCKING, INTERRUPTED OR SHIMS	
FINISH WOOD	
PLYWOOD OR PARTICLE BOARD	
PLASTIC LAMINATE ON PLYWOOD	
RIGID INSULATION	
BLANKET OR BATT INSULATION	
SPRAYED-ON INSULATION OR FIREPROOFING	
GASKET MATERIAL OR JOINT FILLER	
SEALANT W/ BOND BREAK TAPE	
SEALANT W/ BACKER ROD	
GYPSUM BOARD OR PLASTER	

REFERENCE SYMBOLS



TENANT SPACE OCCUPANT LOAD PER AREA/USE

EXISTING BUILDING SQUARE FOOTAGE	
(E) MEZZANINE	4,833 S.F.
(E) BUSINESS (OFFICE + SHOWROOM)	8,238 + 4'535 = 12,773 S.F.
(E) AUDITORIUM (ASSEMBLY)	3,695 S.F.
(E) LABORATORY (FACTORY)	23,522 S.F.
TOTAL FLOOR AREA	44,823 S.F. (NO CHANGE TO (E) FLOOR AREA)
USE GROUP CLASSIFICATION	
MIXED USE "A-3 / B / F-1"	
TYPE OF CONSTRUCTION	
IIB (FULLY SPRINKLERED)	
HEIGHT & STORY	
1-STORY W/ MEZZANINE	
TOTAL (E) OCCUPANTS	
500 OCCUPANTS (NO CHANGE OF USE, NO CHANGE TO EXISTING OCCUPANT LOAD)	
AREA OF SCOPE OF WORK	
LAB - 5	909 S.F. / 100 = 9 OCCUPANTS (NO CHANGE OF USE)

PLAN REVIEW DATA - EXISTING LAB 5 - 105

BUILDING CODE 2015 MICHIGAN REHABILITATION FOR EXISTING BUILDINGS	FIRE ALARM 2013 NFPA 72	ALTERATION LEVEL 2015 MICHIGAN REHABILITATION BUILDING CODE FOR EXISTING BUILDINGS
PLUMBING CODE 2015 MICHIGAN PLUMBING CODE INCORPORATING THE 2015 EDITION OF THE INTERNATIONAL PLUMBING CODE.	FIRE SUPPRESSION SYSTEM 2013 NFPA 13 - FULLY SPRINKLERED	ALTERATION LEVEL 2 (SECTION 504.1): LEVEL 2 ALTERATIONS INCLUDE THE RECONFIGURATION OF SPACE, THE ADDITION OR ELIMINATION OF ANY DOOR OR WINDOW, THE RECONFIGURATION OR EXTENSION OF ANY SYSTEM, OR THE INSTALLATION OF ANY ADDITIONAL EQUIPMENT.
MECHANICAL CODE 2015 MICHIGAN MECHANICAL CODE INCORPORATING THE 2015 EDITION OF THE INTERNATIONAL MECHANICAL CODE.	ACCESSIBILITY ICC/ANSI A117.1-2009 ADA STANDARD FOR ACCESSIBILITY DESIGN 2010	PLUMBING FIXTURE COUNT PER 2015 MICHIGAN REHABILITATION BUILDING CODE FOR EXISTING BUILDINGS SECTION 810 PLUMBING: WHERE THE OCCUPANT LOAD OF THE STORY IS INCREASED BY MORE THAN 20 PERCENT, PLUMBING FIXTURES FOR THE STORY SHALL BE PROVIDED IN QUANTITIES SPECIFIED IN THE INTERNATIONAL PLUMBING CODE BASED ON THE INCREASED OCCUPANT LOAD.
ELECTRICAL CODE 2014 NATIONAL ELECTRICAL CODE AS AMENDED BY MICHIGAN BUREAU OF CONSTRUCTION CODE RULES, ELECTRICAL CODE RULES PART 8, 2014.	ENERGY 2015 MICHIGAN ENERGY CODE ANSI/ASHRAE/IES STANDARD 90.1-2013	OCCUPANT LOAD OF THE STORY UNDER PROJECT SCOPE (WITHIN EXISTING 1ST FLOOR AREA) REMAINS NO CHANGE. NO CHANGE TO THE PLUMBING FIXTURE COUNT.
LIFE SAFETY CODE STATE OF MICHIGAN, DEPARTMENT OF CONSUMERS AND INDUSTRY SERVICES, BUREAU OF FIRE SERVICES STATE FIRE SAFETY BOARD NEW AND EXISTING SCHOOL, COLLEGE AND UNIVERSITY FIRE SAFETY RULES USING THE 2012 EDITION OF NFPA 101 LIFE SAFETY CODE WITH MICHIGAN AMENDMENTS		

GENERAL DRAWING LIST		
Sheet Number	Sheet Name	Sheet Issued For
G-000	Title Sheet	Bids / Permits
G-001	Drawing List	Bids / Permits

ARCHITECTURAL DRAWING LIST		
Sheet Number	Sheet Name	Sheet Issued For
A-101	Detail Demolition, Lab Fit-Out and RCP plans	Bids / Permits
A-161	Equipment and Finishes Plan	Bids / Permits
A-571	Gypsum Board Partition Types	Bids / Permits
A-581	Casework/Millwork Details	Bids / Permits
A-601	Door Schedule / Types and Details	Bids / Permits

STRUCTURAL DRAWING LIST		
Sheet Number	Sheet Name	Sheet Issued For
S-101	Framing Plan & Details	Bids / Permits
S-102	Roof Framing Plan & Details	Bids / Permits

MECHANICAL DRAWING LIST		
Sheet Number	Sheet Name	Sheet Issued For
M-1	Mechanical Combined Plans Demo + New Work	Bids / Permits
M-2	Mechanical Details	Bids / Permits
M-3	Mechanical Specifications	Bids / Permits
M-4	Mechanical Specifications	Bids / Permits

ELECTRICAL DRAWING LIST		
Sheet Number	Sheet Name	Sheet Issued For
E-001	Electrical Symbols	Bids / Permits
E-011	Electrical General Notes & Composite Plan	Bids / Permits
E-012	Electrical Specifications	Bids / Permits
E-021	Electrical One-Line / Riser Diagrams	Bids / Permits
E-041	Panel & Lighting Schedules	Bids / Permits
E-101	Electrical Demo & Lighting Plans	Bids / Permits
E-102	Electrical Power and Misc. Systems Plans	Bids / Permits



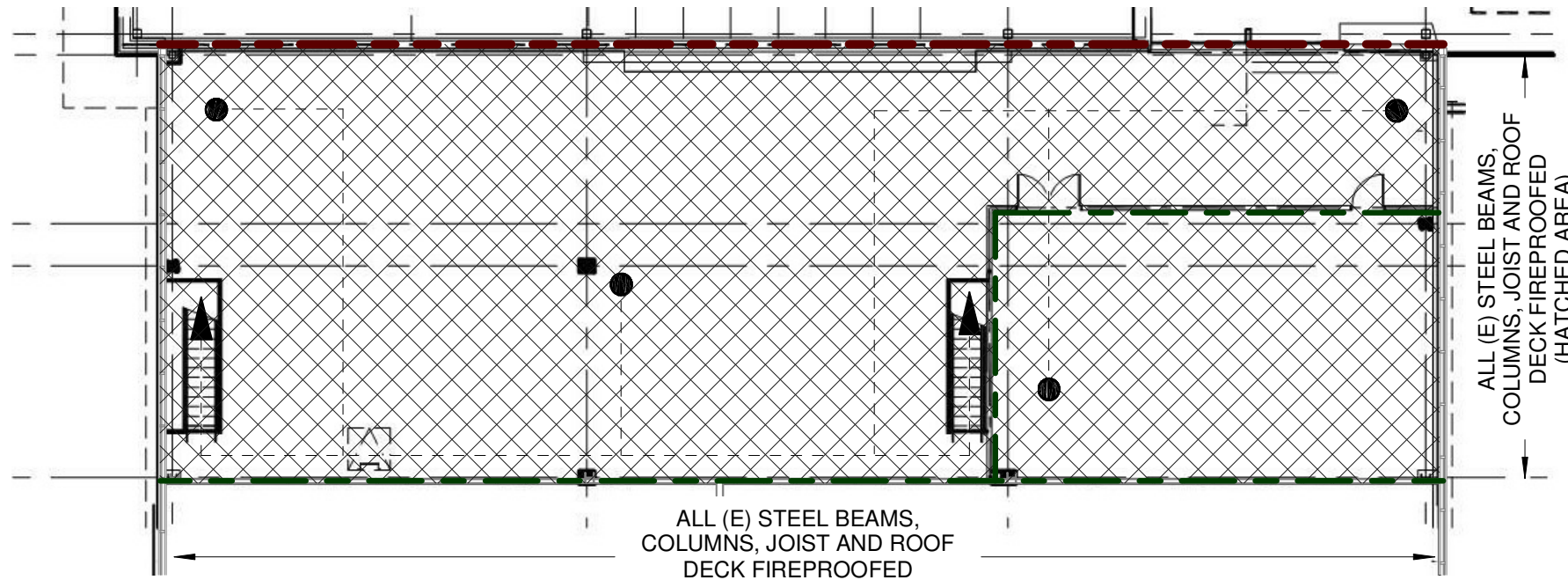
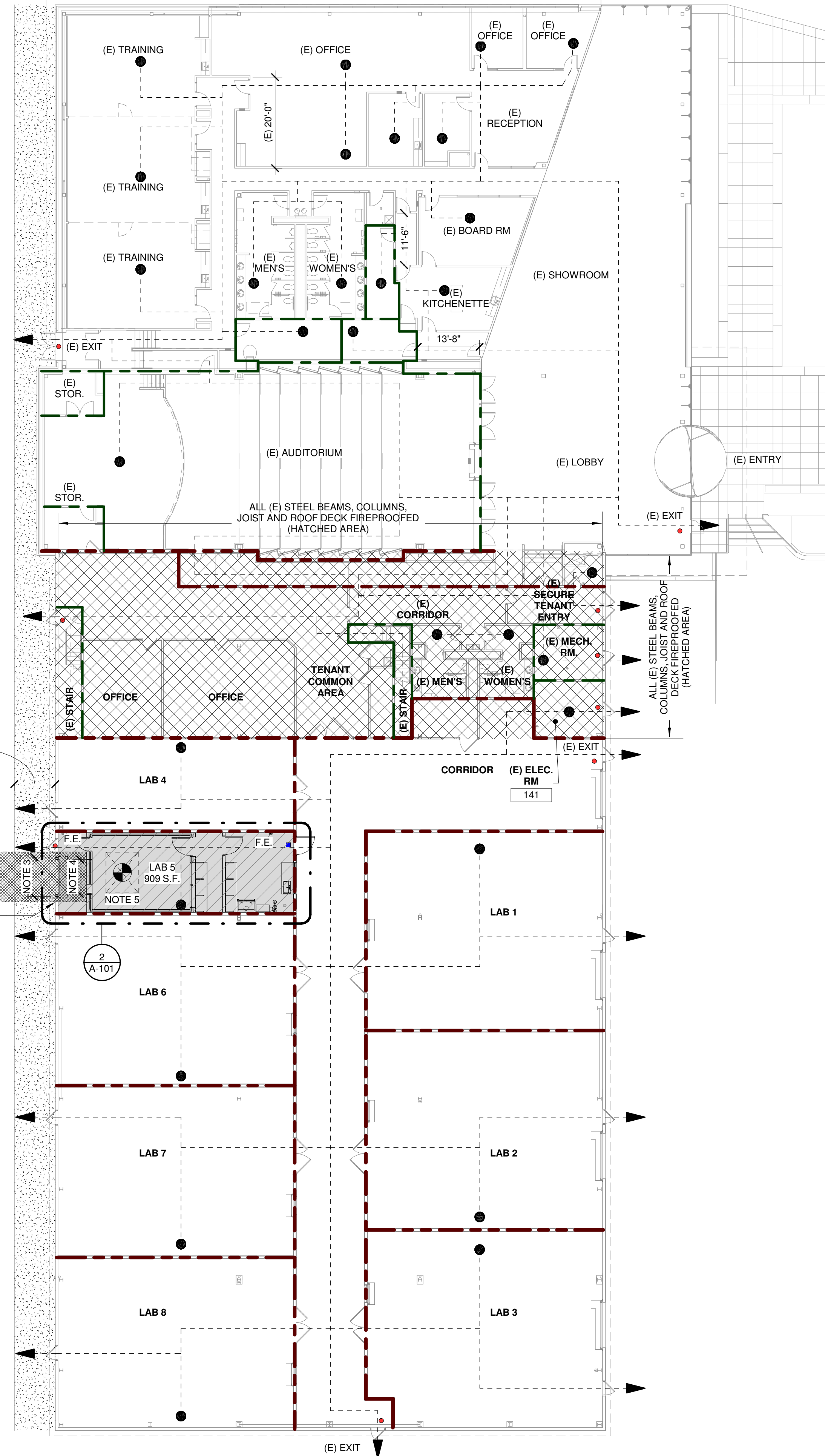
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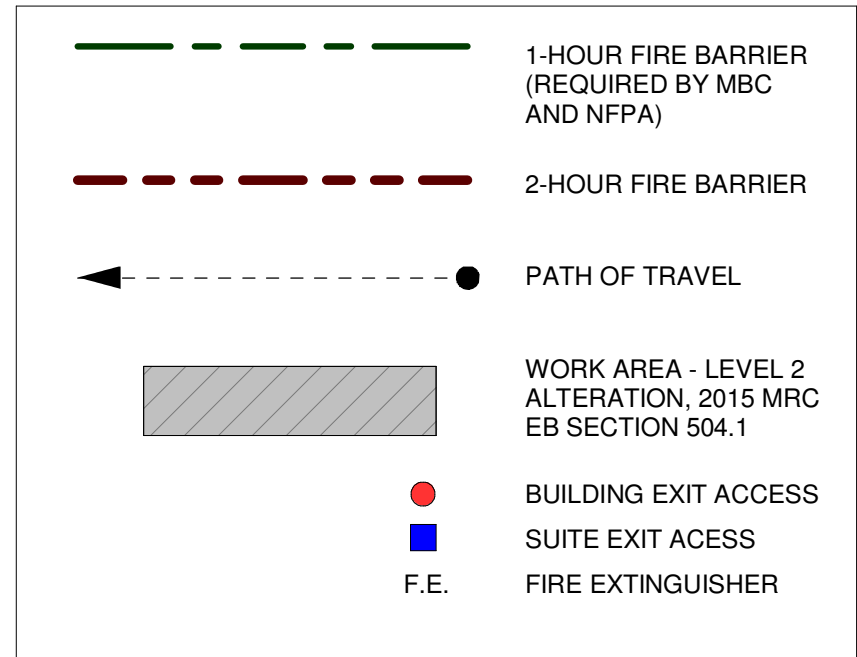
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(E) MEZZANINE FIRE LIFE SAFETY PLAN
SCALE: 1/16" = 1'-0"

LIFE SAFETY PLAN LEGEND



FIRST FLOOR LIFE SAFETY PLAN
SCALE: 1/16" = 1'-0"

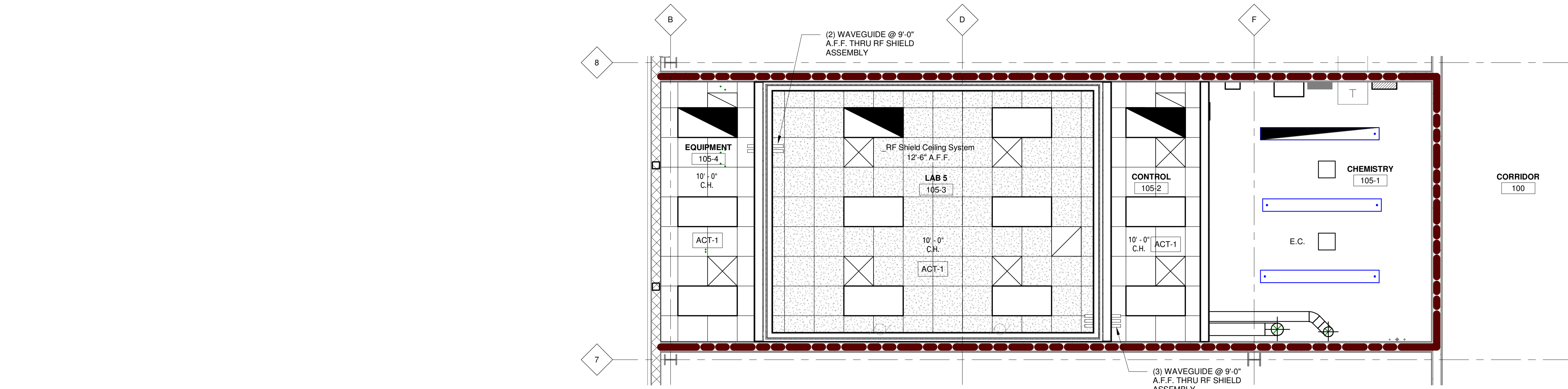
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Suite 200
Southfield, Michigan
48033 USA
(248) 262-1500
WWW.HED.DESIGN

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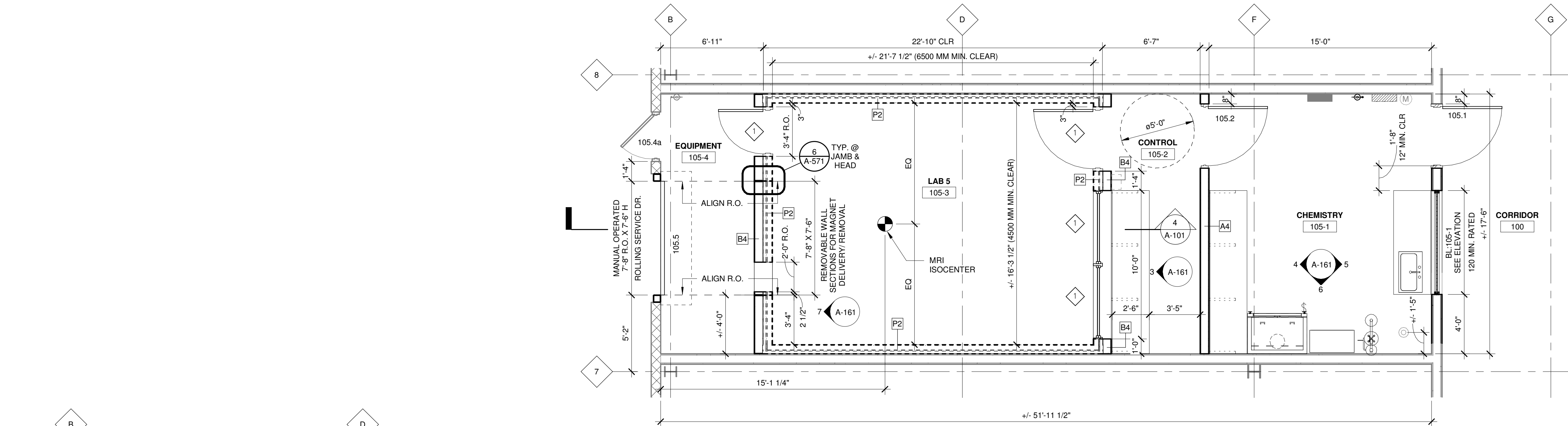
Drawing List

G-001



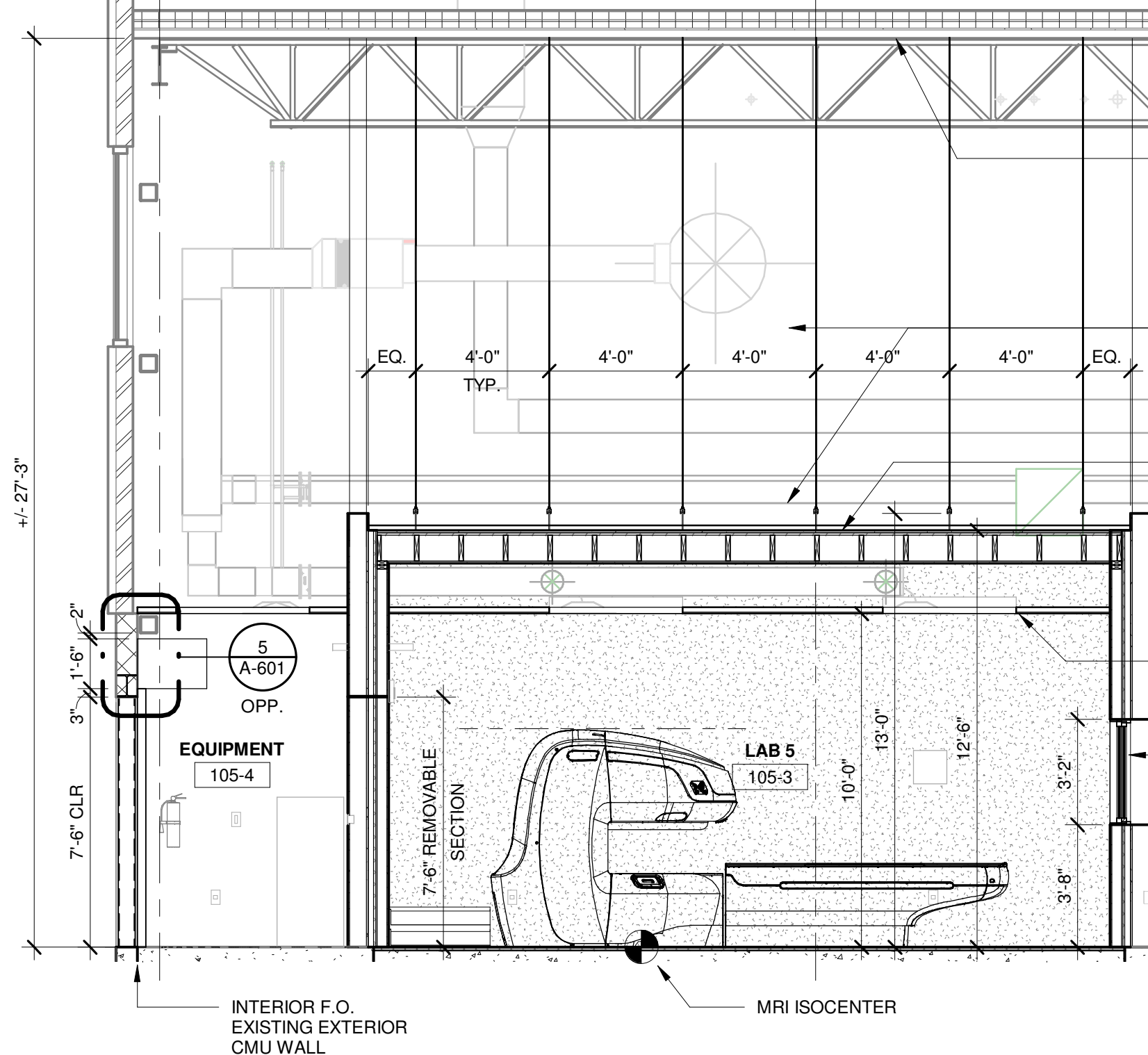
DETAIL REFLECTED CEILING PLAN - LAB 5

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



DETAIL FIT-OUT PLAN - LAB 5

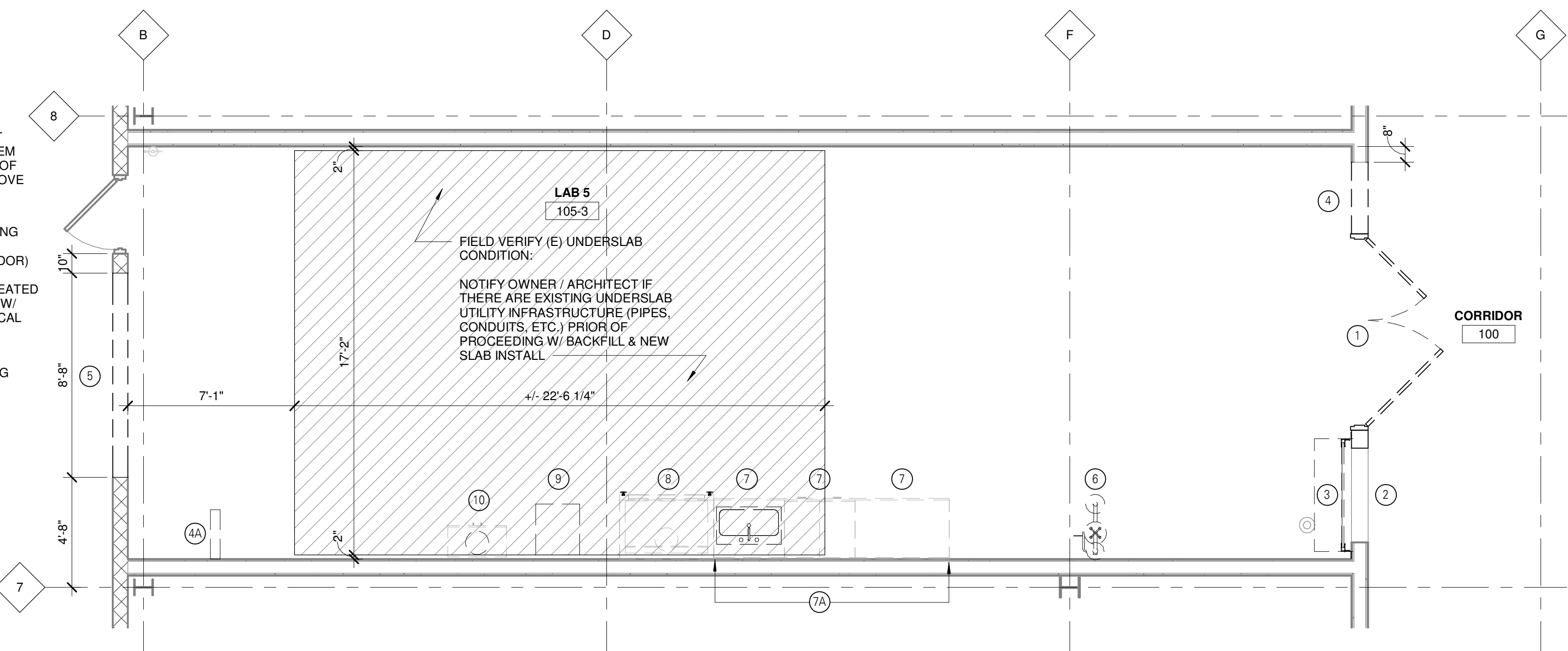
SCALE: 1/4" = 1'-0"



WALL PROFILE THRU LAB 5 - 105-3

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

4
A-101



DETAIL DEMOLITION PLAN - LAB 5

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

CEILING PLAN GENERAL NOTES

- COORDINATE FINAL SIZE AND FINAL LOCATION OF ALL ACCESS PANELS WITH TRADE REQUIRING SAME.
- COORDINATE CEILING SUSPENSION SYSTEMS WITH OTHER CEILING SPACE EQUIPMENT SUPPORTING DEVICES.
- SEE SHEET A-571 FOR PARTITION TYPES.
- ALL EXISTING WALLS IN PROJECT AREA TO MEET FIRE RATINGS INDICATED ON REFLECTED CEILING PLAN.
- CEILING GRID SYSTEM TO BE CENTERED IN ROOM IN BOTH DIRECTIONS UNLESS OTHERWISE NOTED.
- NO CEILING PANEL TO BE CUT TO LESS THAN 6" WIDTH AT CEILING PANEL INSTALLATION TYPICAL.
- AT CONDITIONS WHERE CEILING TILE PADS EXCEED 2'-0" TRIM 2" X 4" CEILING PADS AS REQUIRED TO FIT.
- SPRINKLER HEADS TO BE LOCATED IN THE CENTER OF CEILING PANELS (TYPICAL).
- PAINT ALL EXPOSED (VISUAL) CONSTRUCTION ABOVE CEILINGS INCLUDING, BUT NOT LIMITED TO MECH. & ELECTRICAL ITEMS. SEE NOTES ON REFLECTED CEILING SHEETS FOR EXTENT OF SCOPE.
- VERIFY EXACT LOCATIONS OF SOFFIT AND CEILING CONTROL JOINTS WITH THE ARCHITECT'S REPRESENTATIVE IN THE FIELD.
- REFER TO A-161 SERIES DRAWINGS FOR LOCATIONS OF CEILING MOUNTED EQUIPMENT.
- COORDINATE THE LOCATION OF ESCUTCHEON PLATES AT CEILING PANEL PENETRATIONS WITH ELECTRICAL AND MECHANICAL TRADES.
- SEE ELECTRICAL DRAWINGS FOR FIXTURE TYPES.
- REPAIR (OR REPLACE WITH NEW) EXISTING CEILING PANELS AND GRID WHERE WALLS WERE REMOVED.
- CONTRACTOR SHALL MAINTAIN THE FIRE RATING INTEGRITY OF ALL EXISTING PARTITIONS INDICATED AS FIRE RESISTANCE RATED. ADVISE THE ARCHITECT OF ANY PRE-EXISTING BREACHES DISCOVERED IN THE COURSE OF THE WORK.

CEILING PLAN LEGEND

2-HOUR FIRE BARRIER

24" X 24" ACOUSTIC TILE CEILING ON ALUM. GRID CEILING SUSPENSION SYSTEM

S

SMOKE DETECTORS

FLUORESCENT FIXTURE (REFER ELEC. DWGS)

SUPPLY AIR DIFFUSER

RETURN AIR DIFFUSER

LINEAR DIFFUSER

FLOOR PLAN GENERAL NOTES

- ALL PARTITION TYPES () ARE "A2" (TYP.) UNLESS OTHERWISE NOTED. - SEE SHEET A-571 FOR PARTITION TYPES.
- COORDINATE PARTITION FIRE RATING REQUIREMENTS AS INDICATED ON REFLECTED CEILING PLAN SHEET (A-101)
- SEE EQUIPMENT PLANS (A-161) FOR EQUIPMENT AND RELATED WALL REINFORCEMENT.
- CONTRACTOR SHALL VERIFY ALL BUILDING DIMENSIONS, PARTITION AND WALL LOCATIONS AND FLOOR ELEVATIONS AND NOTIFY THE ARCHITECT/ ENGINEER OF ANY DISCREPANCIES BEFORE START OF WORK.
- DIMENSIONS FOLLOWED BY +/- SHALL BE REVIEWED AND ALL NECESSARY ADJUSTMENTS MADE PRIOR TO FABRICATION AND/OR INSTALLATION OF WORK.
- ALL EXISTING CONSTRUCTION REMAINING BUT AFFECTED BY THE WORK UNDER THIS CONTRACT SHALL BE RESTORED AND REFINISHED TO MATCH THE MATERIALS, FINISH AND ALIGNMENT OF THE EXISTING ADJACENT CONSTRUCTION.
- VERIFY QTY, SIZE AND LOCATION OF ALL FLOOR, ROOF AND WALL OPENINGS FOR MECHANICAL AND ELECTRICAL WORK WITH THE APPROPRIATE TRADE. PROVIDE ALL OPENINGS SHOWN OR REQUIRED FOR COMPLETION OF WORK.
- COORDINATE SIZE AND LOCATION OF ALL ACCESS PANELS WITH APPROPRIATE TRADES.
- ALL DIMENSIONS LOCATING STUD PARTITIONS ARE TO FINISH FACE OF PARTITION.
- PROVIDE TRANSITIONS AT FLOORING MATERIALS PER DETAILS ON INTERIOR FINISH PLANS (A-161)
- WHERE FIRE RATED PARTITIONS TERMINATE AT EXTERIOR WALLS, PROVIDE FIRE SAFING INSULATION FROM END OF PARTITION TO INTERIOR FACE OF EXTERIOR SHEATHING - 5" DEPTH X FULL HEIGHT OF CONSTRUCTION (TYPICAL).
- WHERE RECESSED ITEMS ARE LOCATED IN FIRE RATED PARTITIONS, PROVIDE GYPSUM BOARD OF EQUIVALENT THICKNESS AND LAYERS BEHIND RECESSED ITEM TO MAINTAIN FIRE RATING OF PARTITION ASSEMBLY.
- PATCH AND REPAIR EXISTING PARTITIONS AT REMOVED RECESSED ITEMS AND AT NEW DOOR OPENINGS. CUT BACK EXISTING GYPSUM BOARD TO NEXT STUD. JOINT BETWEEN NEW AND EXISTING GYPSUM BOARD SHALL BE SECURED TO A COMMON EXISTING STUD.
- PATCH AND REPAIR EXISTING CONCRETE SLAB AT REMOVED FLOOR DRAINS, WATER CLOSETS, DUCT PENETRATIONS AND OTHER REMOVED UTILITIES. PROVIDE CONCRETE IN THICKNESS REQUIRED TO MAINTAIN FIRE RATING OF FLOOR SLAB.
- LEVEL AND SCARIFY EXISTING SLABS TO PROVIDE ACCEPTABLE SUBSTRATE FOR SCHEDULED FLOORING.

FLOOR PLAN LEGEND

COL EXISTING COLUMN LINE

INDICATES ROOM NUMBER SUFFIX KEYNOTES NUMBER OF ADDITIONAL DOOR IN ROOM

NEW DOOR

5" TO DOOR OPENING - TYP (U.O.N.)

EXISTING DOOR TO REMAIN

ROOM NAME ROOM NAME & NUMBER

FLOOR PLAN KEYNOTES

RF DOOR AND OBSERVATION WINDOW BY RF SHIELDING VENDOR

DEMOLITION GENERAL NOTES

- THE ARCHITECT HAS NO RESPONSIBILITY FOR THE DISCOVERY, PRESENCE, HANDLING, REMOVAL, OR DISPOSAL OF, OR EXPOSURE OF PERSONS TO, HAZARDOUS MATERIALS OR TOXIC SUBSTANCES IN ANY FORM AT THE PROJECT SITE, INCLUDING BUT NOT LIMITED TO ASBESTOS ASBESTOS PRODUCTS, POLYCHLORINATED BIPHENYL (PCB), LEAD PAINT OR OTHER TOXIC SUBSTANCES. THE FACT THAT THESE DOCUMENTS DO NOT INDICATE THE PRESENCE OF OR REMOVAL OR CONTAINMENT OF THE FOREGOING IS NOT INTENDED TO INDICATE THAT THESE MATERIALS OR SUBSTANCES, AMONG OTHERS, ARE NOT PRESENT AND ARE NOT REQUIRED TO BE REMOVED OR CONTAINED IN COMPLIANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS.
- THE OWNER'S NORMAL OPERATIONS WILL BE CONTINUED DURING DEMOLITION. DEMOLITION CONTRACTOR SHALL NOT INTERFERE WITH THESE OPERATIONS IN ANY WAY WITHOUT THE OWNER'S EXPRESSED CONSENT.
- OWNER WILL OCCUPY PORTIONS OF THE BUILDING IMMEDIATELY ADJACENT TO AREAS OF SELECTIVE DEMOLITION. CONDUCT SELECTIVE DEMOLITION WORK IN MANNER THAT WILL MINIMIZE NEED FOR DISRUPTION OF OWNER'S NORMAL OPERATIONS. PROVIDE MINIMUM OF 72 HOURS ADVANCE NOTICE TO OWNER OF DEMOLITION ACTIVITIES THAT WILL AFFECT OWNER'S NORMAL OPERATIONS.
- PROVIDE TEMPORARY BARRICADES AND OTHER FORMS OF PROTECTION TO PROTECT OWNER'S PERSONNEL AND GENERAL PUBLIC FROM INJURY DUE TO SELECTIVE DEMOLITION WORK.
- PROTECT FROM DAMAGE EXISTING FINISH WORK THAT IS TO REMAIN IN PLACE AND BECOMES EXPOSED DURING DEMOLITION OPERATIONS.
- PROTECT FLOORS WITH SUITABLE COVERING WHEN NECESSARY.
- COVER AND PROTECT FURNITURE, EQUIPMENT, AND FIXTURES FROM SOILING OR DAMAGE WHEN DEMOLITION WORK IS PERFORMED IN AREAS WHERE SUCH ITEMS HAVE NOT BEEN REMOVED.
- PRIOR TO CUTTING EXISTING CONSTRUCTION, LOCATE AND IDENTIFY SERVICES TO REMAIN IN OPERATION, INCLUDING ALL FLOOR PENETRATIONS, UNDOCUMENTED CONDITIONS, UTILITY RISERS, ETC. AND ANY WALLS THAT CONTAIN LIFE SAFETY VERTICAL RISERS THAT MUST REMAIN IN OPERATION DURING THE DEMOLITION WORK.
- CONTRACTOR SHALL VERIFY ALL EXISTING BUILDING DIMENSIONS, PARTITION AND WALL LOCATIONS AND FLOOR ELEVATIONS IN FIELD AND NOTIFY THE OWNER'S REPRESENTATIVE OF ANY DISCREPANCIES BEFORE THE START OF WORK.
- WHEN UNANTICIPATED MECHANICAL, ELECTRICAL, OR STRUCTURAL ELEMENTS THAT CONTRADICT INTENDED FUNCTION OF DESIGN ARE ENCOUNTERED, INVESTIGATE AND MEASURE BOTH NATURE AND EXTENT OF THE CONFLICT AND NOTIFY OWNER'S REPRESENTATIVE.
- MAINTAIN EXISTING UTILITIES INDICATED TO REMAIN IN SERVICE AND PROTECT THEM AGAINST DAMAGE DURING DEMOLITION OPERATIONS. DO NOT INTERRUPT UTILITIES SERVING OCCUPIED OR USED FACILITIES, EXCEPT WHEN AUTHORIZED IN WRITING BY AUTHORITIES HAVING JURISDICTION. PROVIDE TEMPORARY SERVICES DURING INTERRUPTIONS TO EXISTING UTILITIES, AS ACCEPTABLE TO GOVERNING AUTHORITIES.
- WHERE DEMOLITION IS REQUIRED BEYOND THE LIMITS OF THE CONTRACT TO ROUTE NEW DUCTWORK, PIPING, CONDUITS ETC., RATED WALLS AND SMOKE BARRIERS SHALL BE PATCHED BY CONTRACTOR REQUIRING PENETRATIONS. ALL FINISHES DAMAGED BY THE WORK SHALL BE RESTORED TO THEIR ORIGINAL CONDITION.
- REPAIR DEMOLITION PERFORMED IN EXCESS OF THAT REQUIRED. RETURN ELEMENTS OF CONSTRUCTION AND SURFACES TO REMAIN TO THE CONDITION EXISTING PRIOR TO START OF OPERATIONS. REPAIR ADJACENT CONSTRUCTION OR SURFACES SOILED OR DAMAGED BY SELECTIVE DEMOLITION.
- PROVIDE SHORING, BRACING AND ANY OTHER MEANS REQUIRED TO PROTECT AND MAINTAIN THE SAFETY, INTEGRITY AND STABILITY OF ALL EXISTING AND NEW CONSTRUCTION.
- WHEN ROOFING, GLAZING, FLASHING, COPING OR PORTIONS OF EXTERIOR WALLS ARE REMOVED OR OPENED, SUITABLE WEATHER PROTECTION SHALL BE PROVIDED AND MAINTAINED FOR THE DURATION OF WORK AND SECURED AND SEALED WEATHERTIGHT DAILY.
- ERECT AND MAINTAIN 1 HOUR FIRE RESISTANCE RATED TEMPORARY PARTITIONS WHERE REQUIRED TO PROTECT EXISTING CONSTRUCTION AND OWNER'S OPERATIONS.
- REMOVAL OF ITEMS NOTED INCLUDES REMOVAL OF ANCHORS, ADHESIVES, HARDWARE, CONDUIT, WIRE, PIPING, ETC. FOR A COMPLETE REMOVAL OF THE ITEMS OR SYSTEMS.
- WHERE NEW CEILINGS ARE SHOWN OR NOTED, COMPLETELY REMOVE EXISTING CEILING AND SUSPENSION SYSTEM. SUSPEND NEW CEILING FROM CONSTRUCTION ABOVE.
- WHEREVER WATER CLOSETS, FLOOR SINKS OR OTHER EQUIPMENT AND RELATED PIPING ARE TO BE REMOVED, PATCH FLOOR SLAB WITH CONCRETE AS REQUIRED.
- ALL DEMOLITION WORK REQUIRED IS NOT LIMITED TO WHAT IS SHOWN ON THE DEMOLITION PLANS. THE INTENT IS TO REMOVE ALL MECHANICAL, ELECTRICAL AND ARCHITECTURAL ITEMS AS REQUIRED TO FACILITATE NEW CONSTRUCTION. SEE MECHANICAL AND ELECTRICAL DEMOLITION DRAWINGS FOR ADDITIONAL SCOPE OF DEMOLITION WORK.
- REFER TO FINISH SCHEDULE FOR ADDITIONAL FINISH WORK REQUIRED IN OTHER AREAS THAT ARE NOT DOCUMENTED TO RECEIVE DEMOLITION/ REMOVAL WORK (TYPICAL).
- REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

NOTES:
REMOVE WALL COVERING AND RESILIENT BASE AT EXISTING WALLS TO REMAIN THAT ARE SCHEDULED TO RECEIVE NEW FINISHES. PREPARE WALL TO RECEIVE NEW FINISHES. COORDINATE EXTENT OF DEMOLITION WITH ROOM FINISH SCHEDULE TO ACCOMMODATE NEW MECHANICAL AND ELECTRICAL WORK. FIELD VERIFY EXISTING CONDITIONS. PATCH AND REPAIR WALLS TO MATCH EXISTING. MAINTAIN EXISTING FIRE RATINGS.

DEMOLITION LEGEND

EXISTING TO BE REMOVED

EXISTING TO REMAIN

FOR ENTIRE FLOOR IN SHADED AREA - SAWCUT AND COMPLETELY REMOVE ALL EXISTING SLAB-ON-GRADE. PREPARED AREA FOR NEW DEPRESSED SLAB ON GRADE.

ALL DEMOLITION WORK REQUIRED IS NOT NECESSARILY LIMITED TO WHAT IS SHOWN ON THE DEMOLITION PLANS. THE INTENT IS TO REMOVE ALL MECHANICAL, ELECTRICAL AND ARCHITECTURAL ITEMS AS REQUIRED TO FACILITATE NEW CONSTRUCTION.

REFER TO FINISH SCHEDULE FOR ANY ADDITIONAL FINISH WORK REQUIRED IN OTHER AREAS THAT ARE NOT DOCUMENTED TO RECEIVE ANY DEMOLITION/ REMOVAL WORK AS INDICATED ON DEMOLITION PLANS (TYPICAL).

DEMOLITION KEYNOTES

- REMOVE EXISTING DOUBLE DOOR AND FRAME. PATCH WALL OPENING TO MATCH (E) PARTITION.
- REMOVE EXISTING BORROWED LITE AND FRAME. PATCH WALL OPENING TO MATCH (E) PARTITION.
- REMOVE EXISTING ROLLING SERVICE DOOR AND FRAME. PATCH WALL OPENING TO MATCH (E) PARTITION.
- REMOVE PORTION OF EXISTING PARTITION. PATCH AND PREPARE WALL OPENING FOR NEW DOOR.
- REMOVE PORTION OF EXISTING PARTIAL HEIGHT PARTITION. PATCH AND REPAIR EXISTING WALL AS REQUIRED.
- REMOVE PORTION OF EXISTING EXTERIOR CONC. MASONRY WALL. PREPARE WALL OPENING TO RECEIVE NEW WORK.
- DISCONNECT & SALVAGE (E) EMERGENCY EYEWASH / SHOWER UNIT. REFER TO SHEET A-161 "EQUIPMENT LIST" AND PLAN FOR RE-USE / NEW LOCATION.
- REMOVE & SALVAGE (E) BASE CABINET. REFER TO SHEET A-161 "EQUIPMENT LIST" AND PLAN FOR RE-USE / NEW LOCATION.
- REMOVE (E) SOLID SERVICE COUNTER AND SINK / FAUCET.
- REMOVE, DISCONNECT & SALVAGE (E) BASE CABINET AND FUMEHOOD. REFER TO SHEET A-161 "EQUIPMENT LIST" AND PLAN FOR RE-USE / NEW LOCATION.
- REMOVE (E) SERVICE SINK AND FAUCET.
- DISCONNECT & SALVAGE (E) GAS CABINET. REFER TO SHEET A-161 "EQUIPMENT LIST" AND PLAN FOR RE-USE / NEW LOCATION.



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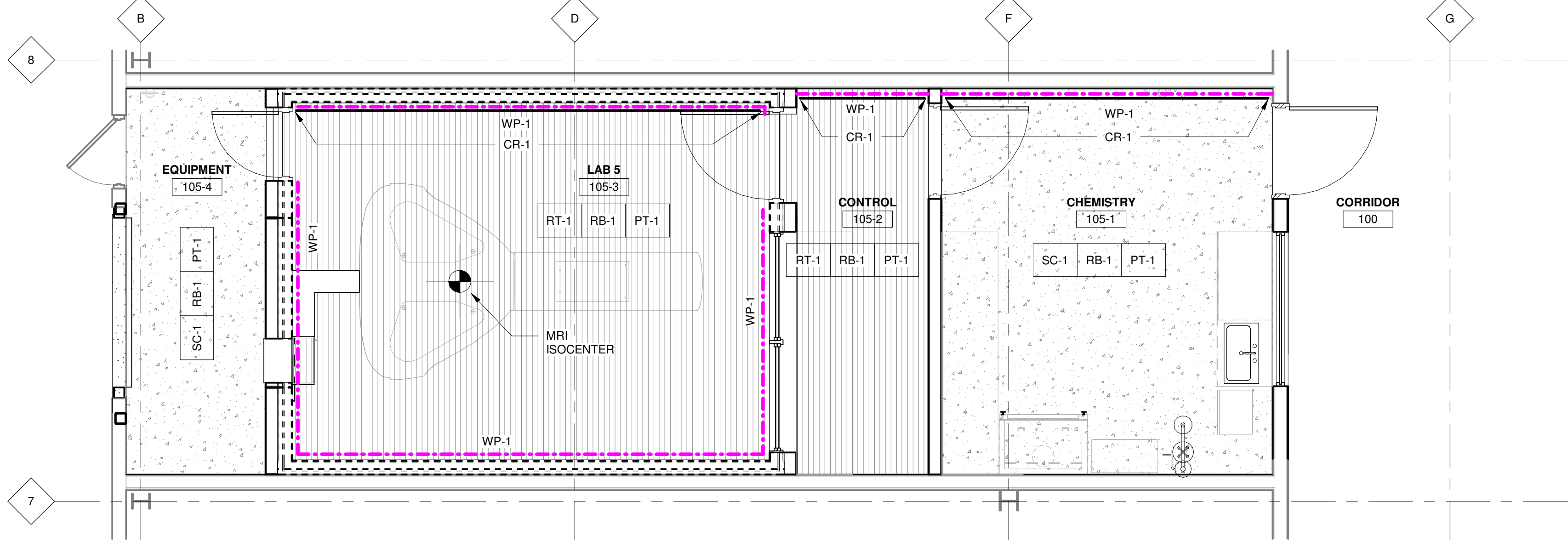
FINISH MATERIALS LIST									
Number	Material	Manufacturer	Style	Product #	Color	Fire Performance - Flame Spread / Smoke Index	Comments	Location	Rep Contact
CEILING									
ACT-1	ACOUSTIC CEILING TILE	ARMSTRONG	ULTIMA, SQUARE LAY-IN 24"x24"x3/4"	1900	WHITE	ASTM E1264 CLASS A / ASTM E84 25/50	GRID: CLEAN ROOM SYSTEMS, 15/16" WHITE	SEE RCP	JANICE BAYS: 877-276-7876, JABAYS@ARMSTRONG.COM
FLOORING									
RT-1	RESILIENT TILE FLOORING	JOHNSONITE	IQ OPTIMA, RESILIENT TILE FLOORING	3077261	OPTIMA KETTLE BLACK 0261	ASTM E 648 CLASS 1 / 0.45	24" X 24", INSTALL MONOLITHIC	SEE FINISH PLAN	JIM HAGOOD: 734-260-2177, JHAGOOD@BISHOPDISTRIBUTING.COM
SC-1	SEALED CONCRETE		SEALED CONCRETE				PATCH AND REPAIR / RESEAL EXISTING CONCRETE FLOOR FINISH	SEE FINISH PLAN	
MILLWORK									
PL-1	PLASTIC LAMINATE	PIONITE	PLASTIC LAMINATE, TEXTURED/SUEDE	AW300-SD	LOVE LETTERS	ASTM E84 25/50	LOCATION: ALL MILLWORK	ALL MILLWORK THROUGHOUT PROJECT	BETH GWYN: BGGWYN@BONDPLY.COM
SS-1	SOLID SURFACE	CORIAN	CORIAN		VENARO WHITE	CLASS A / ASTM E84 25/25	LOCATION: ALL COUNTER TOPS	ALL COUNTERS THROUGHOUT PROJECT	SABRINA KASSAB: 586-497-7520, SKASSAB@OLDENKAMP.COM
PAINT									
PT-1	PAINT	SHERWIN WILLIAMS	INTERIOR LATEX PAINT, SEE FINISH NOTES FOR TYPE	SW 7070	SITE WHITE	-	GENERAL PAINT	THROUGHOUT	DAWN CENOWA: 248-660-3067, DAWN.M.CENOWA@SHERWIN.COM
RUBBER BASE									
RB-1	RUBBER BASE	JOHNSONITE	COVE BASE 4" H X 120" L X 1/8" THICK	29 MOONROCK WG		ASTM 848 CLASS 1 / ASTM E662 <450		SEE FINISH PLAN	JIM HAGOOD: 734-260-2177, JHAGOOD@BISHOPDISTRIBUTING.COM
WALL COVERING/PROTECTION									
CR-1	CRASH RAIL	CS ACROVYN	CRASH RAIL, SHADOWGRAIN TEXTURE	SCR-40N	265 FOG	-	TOP AT 36" AFF 3/4" D X 4" H	ALL WALLS RECEIVING WP-1	DAN GROFF: 908-849-4069, DGROFF@C-SGROUP.COM
WP-1	WALL PROTECTION	CS ACROVYN	WALL PROTECTION 4" W X 10" H, SUEDE TEXTURE	SEE SPEC	265 FOG	CLASS A / ASTM 84 25/5	FULL HEIGHT WALL PROTECTION (10') 6" THICK	SEE FINISH PLAN	DAN GROFF: 908-849-4069, DGROFF@C-SGROUP.COM

FINISH PLAN LEGEND/NOTES

- ROOM FINISHES TAG
- XXX XXX XXX
- WALL FINISH
- WALL BASE
- FLOOR FINISH
- WP-1 (REFER TO MATERIALS FINISH KEY IN SPECIFICATIONS)
- REFER TO MATERIALS FINISH KEY IN SPECIFICATIONS.
 - SEE DETAIL 7/A-161 FOR FLOOR FINISH TRANSITIONS.
 - PROVIDE CONTINUOUS EXTRUDED ALUMINUM CAP MOLD AT WP-1 SIMILAR TO DETAIL X/A-XXX.

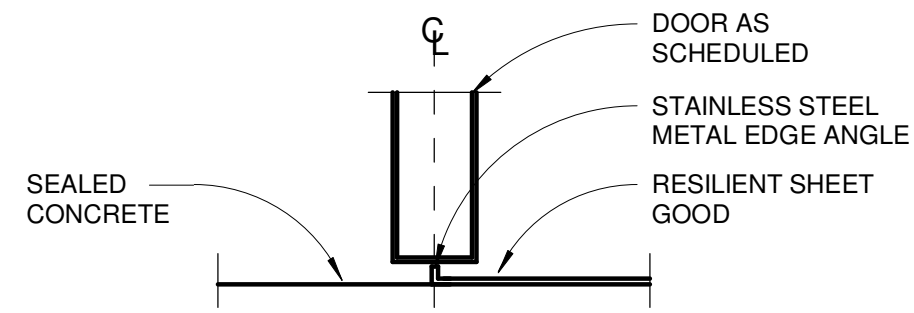
FINISH PLAN GENERAL NOTES

- TRANSITION AND REDUCER STRIPS TO MATCH COLOR OF FLOORING, UNLESS OTHERWISE NOTED.
- TRANSITION ALL FLOOR FINISHES AT EDGE OF DOOR, UNLESS OTHERWISE NOTED.
- ALL DOOR FRAMES TO BE PAINTED PT-1, UNLESS OTHERWISE NOTED. REFER TO DOOR / WINDOW SCHEDULE FOR ADDITIONAL FINISH INFORMATION.
- WHERE TWO OR MORE FINISHES APPEAR IN THE FINISH SCHEDULE FOR ONE SURFACE, REFER TO PLANS, DETAILS, AND ELEVATIONS FOR ADDITIONAL INFORMATION.
- RECESSED WIREWAYS, ACCESS PANELS, GRILLES, FIRE EXTINGUISHER CABINETS, ELECTRICAL PANELS, AND ALL OTHER SUCH ARCHITECTURAL, ELECTRICAL, AND MECHANICAL DEVICES SHALL BE FINISHED TO MATCH ADJACENT WALL OR CEILING SURFACE, UNLESS OTHERWISE NOTED.
- REFER TO ARCHITECTURAL DETAILS AND ELEVATIONS FOR HANDRAIL, CRASH RAIL, WALL PROTECTION, CORNER GUARD, AND END GUARD MOUNTING HEIGHTS AND DETAILS.
- ALL PAINT FINISHES:
ALL PAINT TO BE LOW VOC
ALL HARD CEILINGS AND SOFFITS: FLAT FINISH
ALL GYP. WALLS & COLUMNS: EGGSHELL FINISH U.N.O
ALL METAL & WOOD SURFACES: SEMI-GLOSS FINISH U.N.O
ALL INTERIOR GRILLES, LOUVERS & INTERIOR DOOR FRAMES: SPRAYED SEMI-GLOSS FINISH U.N.O



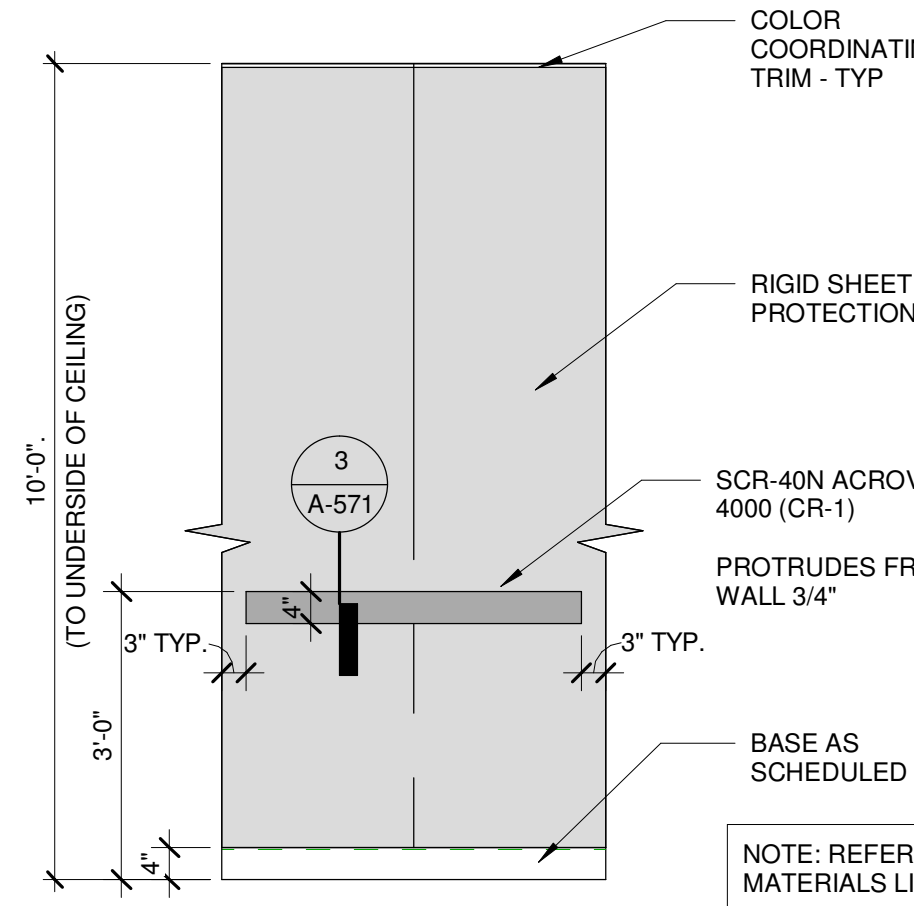
DETAIL FINISHES PLAN - LAB 5

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



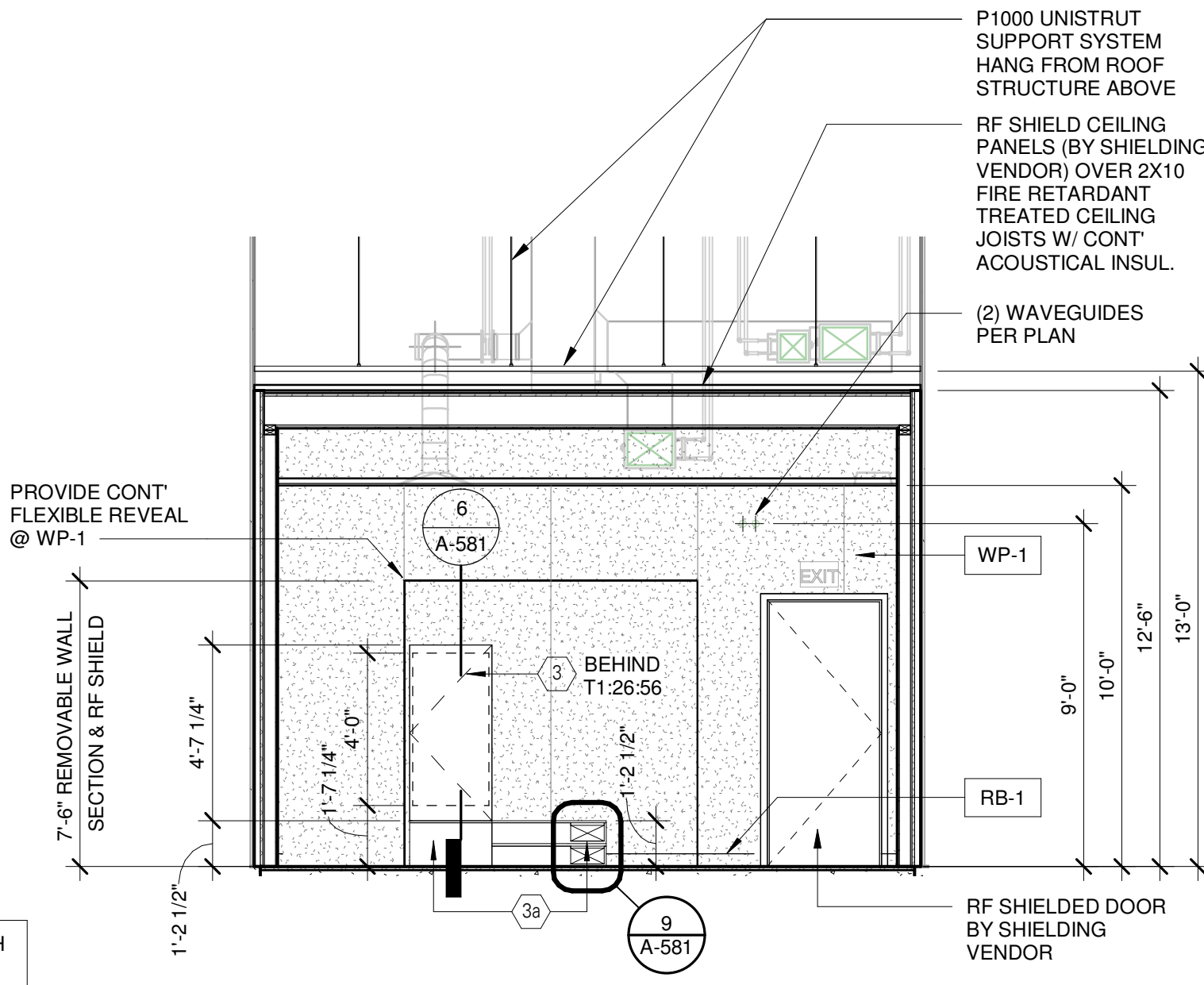
SC TO RS TRANSITION

SCALE: 3" = 1'-0"



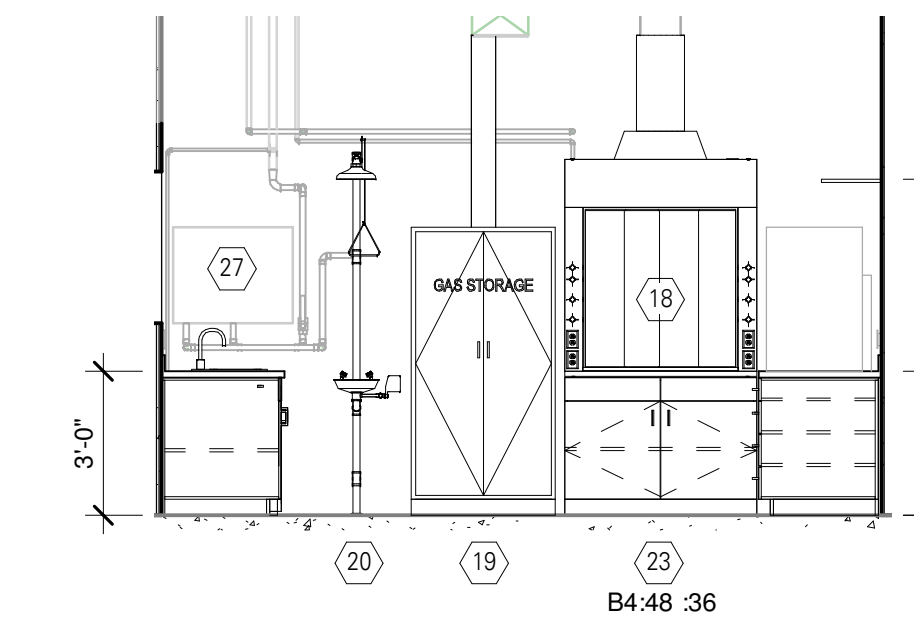
CRASH RAIL DETAIL

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



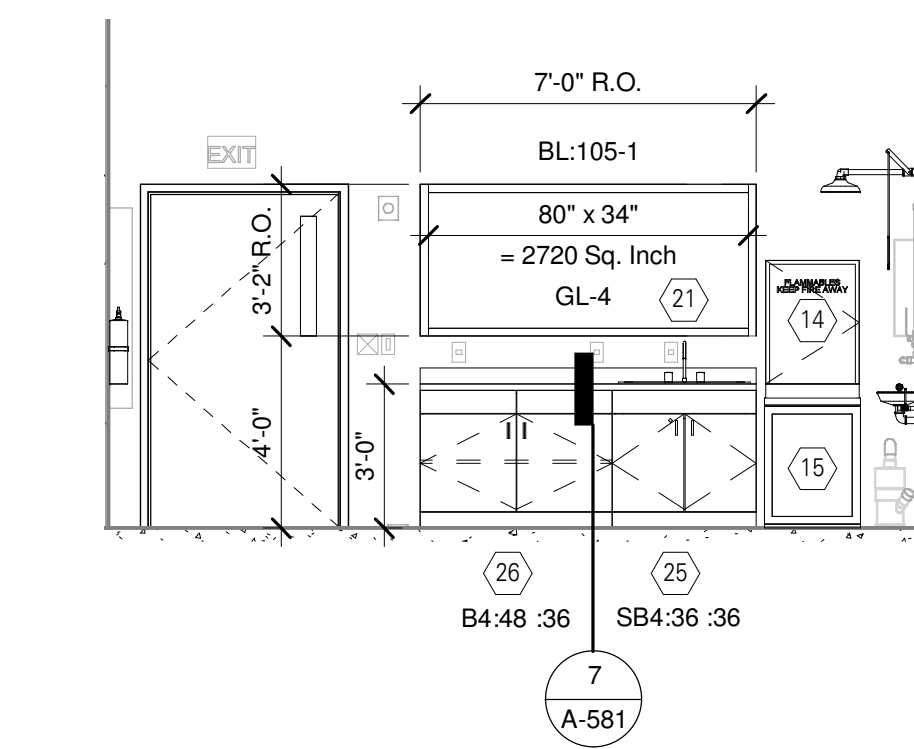
INTERIOR ELEVATION @ CONTROL WINDOW 1

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



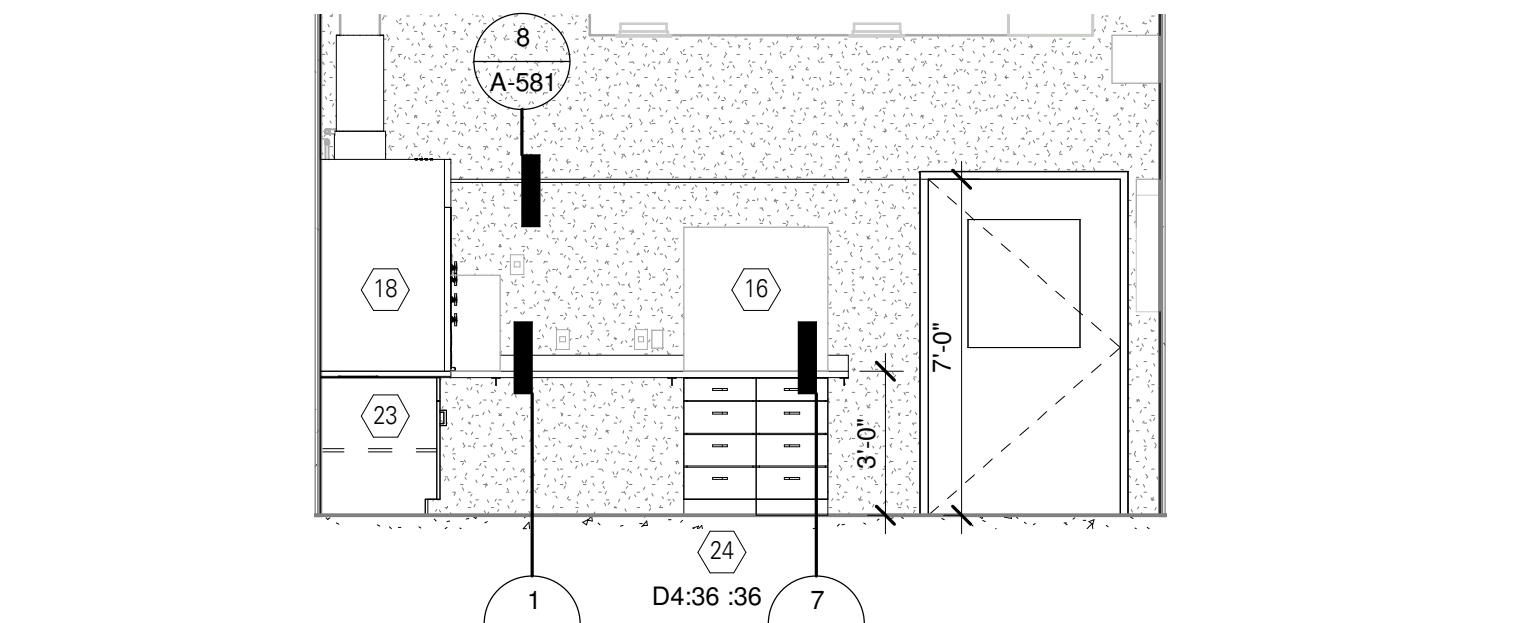
INTERIOR ELEVATION @ CHEMISTRY FUME HOOD

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



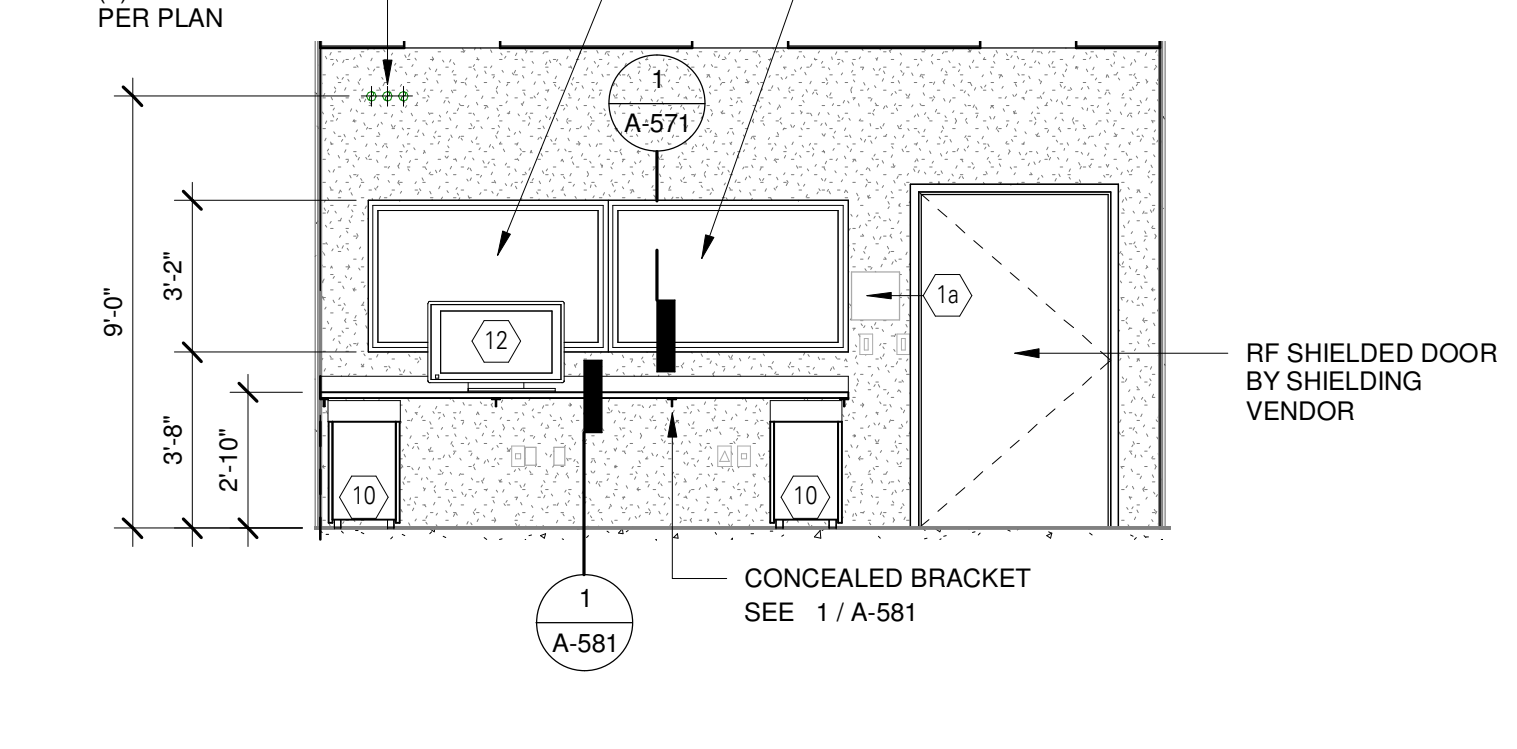
INTERIOR ELEVATION @ CHEMISTRY SINK COUNTER

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



INTERIOR ELEVATION @ CHEMISTRY WORK COUNTER

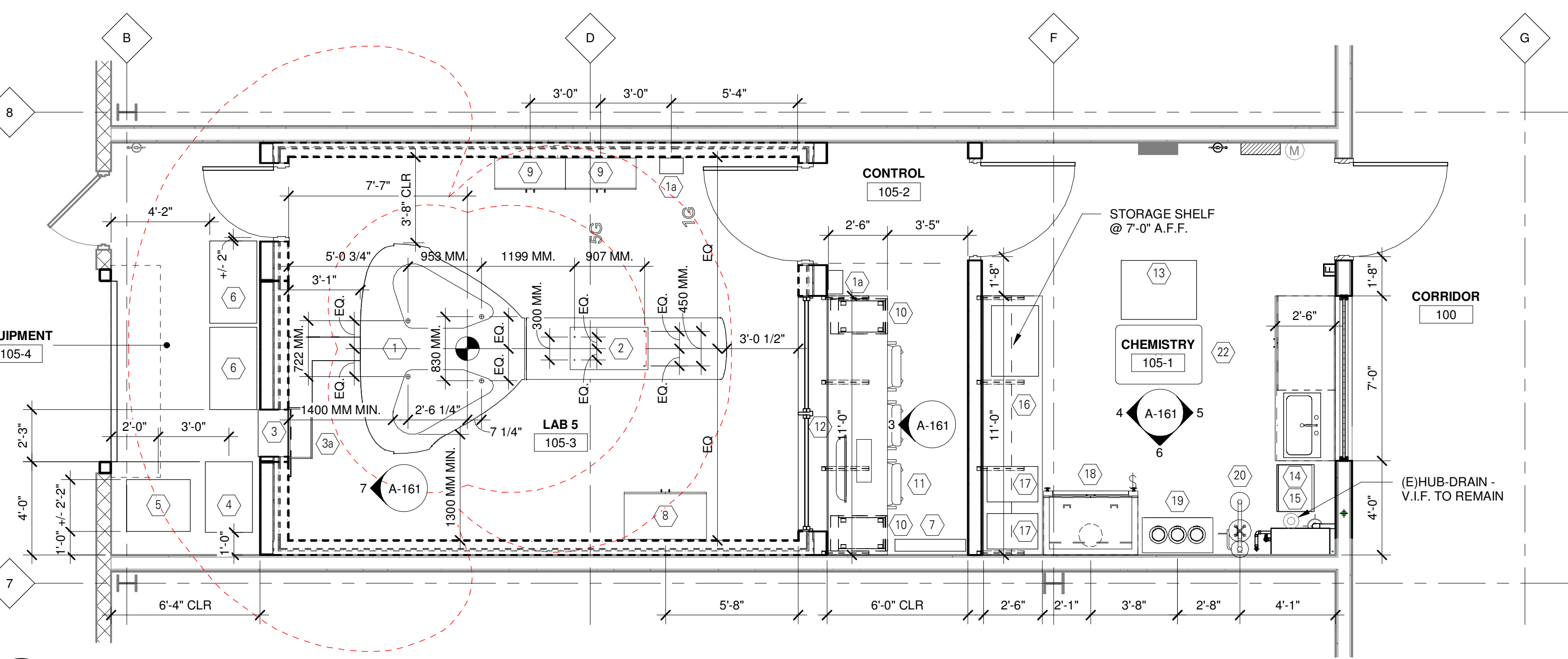
SCALE: 1/4" = 1'-0"



INTERIOR ELEVATION @ CONTROL WINDOW

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

EQUIPMENT LIST																																		
Project ID	Shown on...																				Dimensions			Location			Status	Installation						
		AG245	Manufacturer/ Model Number	Used by:	Current Location	New Location	Electrical Requirements (voltage: 10, 120, 220)	Electrical Requirements (Amps/Watts)	Special Plug/Outlet (Type)	Network Connection	Floor Loading (lbs)	Exhaust (E)	Hot Water (HW)	Cold Water (CW)	Steam (St)	DI Water (DI)	Drain (Dr)	Comp. Air (A)	Vacuum (V)	Nat. Gas (G)	Length / Depth (inch)	Width (inch)	Height (inch)	Floor	Bench	Wall	Ceiling	Existing	Future	OFCI	OFCI	CFCI	Special Requirements/ Comments	
1	Y	MRI - Magnet Unit + Cover	Time Medical	Chekmenov	105-3	Magnet					37840	Exhaust (E)										83.5"	108"	78.58"	F						X			
1a	Y	MRI - Magnet Unit Emergency Stop	Time Medical	Chekmenov	105-3	Magnet																83.5"	108"	78.58"	F						X			
2	Y	MRI - Patient Table	Time Medical	Chekmenov	105-3	Magnet					1034	Exhaust (E)										103"	31.25"	30.7"	F						X			
3	Y	MRI - Penetration panel	Time Medical	Chekmenov	105-3	Magnet																--	24"	48"			W				X			
3a	Y	MRI - Cable Trunk		Chekmenov	105-3	Magnet																Site Specific	12"	14.5"	F							X		Above Floor Cable Truck, w/ Access Cabinet Type "1" CFCI
4	Y	MRI - Imaging Cabinet	Time Medical	Chekmenov	105-4	M Eq	Fed From #5				937											36"	24"	68.4"	F						X			
5	Y	MRI - Iso. Power Cabinet	Time Medical	Chekmenov	105-4	M Eq	480V-3PH	63A			858											26.4"	32.4"	38.4"	F						X			
6	Y	PHIP Polarizer x 2	By Owner	Chekmenov	105-4	M Eq	(2) Circuits @ 120V	20A/ea		Yes												24"	42"	54"	F				E		X			
7	Y	Propane Polarizer	By Owner	Chekmenov	105-3	Magnet	120V	20A	Nema 5-20 5'-AFF													36"	36"	6"			W				X			2 pieces
8	Y	RF Coil Storage Cabinet (Non-Ferrous)		Chekmenov	105-3	Magnet																24"	42"	84"	F						X		See Detail 5/A-581 @ Type "T2"	
9	Y	RF Coil Storage Cabinet (Non-Ferrous)		Chekmenov	105-3	Magnet																16"	36"	84"	F						X			
10	Y	Mobile Under-Counter Cabinet	Charcoal + White Stow 3-Drawer File Cabinet	Chekmenov	105-2	Control																20"	15.75"	24"	F						X		FLAGSHIP SHOWROOM: 16 Madison Square West, 3rd Fl. New York, NY 10010 www.poppin.com	
11	Y	Control Desk Chair x 3	Max Task Chair (Dark Grey w/ White Frame)	Chekmenov	105-2	Control																25"	27"	44"	F						X			
12	Y	Control Desk MRI Scanner Monitor/Desktop Terminal	Time Medical	Chekmenov	105-2	Control	(2) Circuits @ 120V	20A/ea		Yes, Hard wired																B					X			
13	Y	Xenon Polarizer 129Xe	By Owner	Chekmenov	105-1	Chemistry	208V 1PH (by UPS)	20A	(1) Nema L6-20 (by UPS)													30"	38.5"	54"	F				E		X			
14	Y	Flammable Storage Cabinet	By Owner	Chekmenov	105-1	Chemistry																18"	24"	36"???	F						E		X	
15	Y	Mini Refridgator	By Owner	Chekmenov	105-1	Chemistry	120V	20A														18"	24"	36"???	F	B					E		X	
16	Y	Bench-Top NMR	By Owner	Chekmenov	105-1	Chemistry	120V	20A		Yes, Hard wired												24"	36"	36"???	F	B					E		X	
17	Y	Bench-Top PH Generator x3	By Owner	Chekmenov	105-1	Chemistry	(2) @ 208V-1PH; (1) @ 120V; (by UPS)	23 FLA @ 208V 19 FLA @ 208V 20A @ 120V	(2) Nema L6-30													12"	28"	18"		B					E		X	
																						20"	24"	22"										
																						24"	30"	30"										
18	Y	Bench-Top Fume Hood	Re-Use Existing	Chekmenov	105-1	Chemistry	(1) @ 208V-1PH (1) @ 120V	20A @ 208V 20A @ 120V														28.5"	48"	54"	B						E		X	
19	Y	Gas Cabinet H / N	Re-Use Existing	Chekmenov	105-1	Chemistry	120V for Gas Monitor															16"	30"	65"	F						E		X	
20	Y	Emergency Eyewash / Shower	Re-Use Existing	Chekmenov	105-1	Chemistry							Y	Y		Y									F								X	
21	Y	Sink / Faucet		Chekmenov	105-1	Chemistry							Y	Y		Y									B								X	
22	Y	Portable Tabletop		Chekmenov	105-1	Chemistry																30"	48"	36"	F									X
23	Y	Existing Base Cabinet for Fume Hood	Re-Use Existing	Chekmenov	105-1	Chemistry																30"	48"	34.5"	F									X
24	Y	Existing Base Drawer Cabinet	Re-Use Existing	Chekmenov	105-1	Chemistry																30"	36"	34.5"	F									X
25	Y	Existing Sink Base Cabinet	Re-Use Existing	Chekmenov	105-1	Chemistry																30"	36"	34.5"	F									X
26	Y	Existing Base Cabinet	Re-Use Existing	Chekmenov	105-1	Chemistry																30"	48"	34.5"	F									X
27	Y	Tankless Water Heater		Chekmenov	105-1	Chemistry	480V-3PH	87A / 72kW														17"	30"	36"			W					X		



DETAIL EQUIPMENT PLAN - LAB 5

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

EQUIPMENT PLAN GENERAL NOTES

- FOR CASEWORK TYPES, SEE INTERIOR ELEVATIONS AND CABINET TYPES ON DWG. A-581.
- PROVIDE REINFORCEMENT IN WALLS OR PARTITIONS PER DETAIL 2/A-571 AT ALL WALL MOUNTED ACCESSORIES, EQUIPMENT, CASEWORK, SHELVING, MARKER AND TACKBOARDS, CLOCKS, MIRRORS, ETC.
- WHERE EQUIPMENT IS MOUNTED ON EXISTING WALLS OR PARTITIONS, CUT AND REMOVE GYPSUM BOARD TO INSTALL REINFORCEMENT IN WALLS PER DETAIL 2/A-571. FINISH WALL TO MATCH ADJACENT FINISH AND FIRE RATING.
- REFER "ROOM X ROOM" EQUIPMENT LIST AS INDICATED FOR EQUIPMENT INFORMATION AND RESPONSIBILITY. WHERE EQUIPMENT IS OWNER FURNISHED, CONTRACTOR INSTALLED AND OWNER FURNISHED, OWNER INSTALLED. CONTRACTOR SHALL PROVIDE ALL UTILITY AND SUPPORT REQUIREMENTS AS NECESSARY.
- WHERE EQUIPMENT AND CASEWORK/ MILLWORK INFORMATION IS NOT INDICATED ON EQUIPMENT PLANS, REFER INTERIOR ELEVATIONS FOR ADDITIONAL INFORMATION.
- ALL FURNITURE SHALL BE OWNER FURNISHED - CONTRACTOR INSTALLED, UNLESS NOTED OTHERWISE.
- VERIFY LOCATIONS OF MOBILE FILE PEDESTALS (C.F.C.I.) IN FIELD WITH OWNER. COORDINATE LOCATIONS OF COUNTERTOP SUPPORT BRACKETS, POWER AND DATA RECEPTACLES AND GROMMETS WITH FINAL MOBILE PEDESTAL LOCATIONS. SUBMIT MILLWORK/CASEWORK SHOP DRAWINGS AFTER CONFIRMING LOCATIONS WITH OWNER.
- ALL EQUIPMENT, MILLWORK, HARDWARE AND ACCESSORIES MUST BE NON FERRO-MAGNETIC AND MRI COMPATIBLE WITHIN ROOM LAB-5 105-3.
- SEE SITE SPECIFIC MRI EQUIPMENT PLANS FOR MORE INFORMATION.



Wayne State University

461 Burroughs St.
Detroit, MI 48202

I2C MRI
Installation -
Lab 5 Fit-Out

461 Burroughs St.
Detroit, MI 48202

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08/12/2019 Bids / Permits

HED

26913 Northwestern Hwy
Suite 200
Southfield, Michigan
48033 USA

(248) 262-1500

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2017-03497-000
CLIENT'S PROJECT NUMBER: 212-313128

Equipment and
Finishes Plan

A-161

6" METAL STUD (16 GA. BETWEEN VERTICAL STUDS) (TYPICAL)

16 GA. 6 IN. WIDE PLATE SPANNING 2 STUDS (TYPICAL)

SECURE METAL PLATE TO STUDS WITH 1/8" POP RIVETS OR SELF-TAPPING FLAT HEAD SCREWS (MIN. THREE)

METAL STUDS

6"



Diagram illustrating the cross-section of a fire-rated wall assembly (UL 253) showing various layers and components:

- UNDERSIDE OF STRUCTURE / METAL DECK
- NOTE: PROVIDE GYP. BD. CLOSURE CUT TO STRUCTURE / DECK PROFILE AND FILL VOIDS W/ FIRE SAFING INSULATION
- CEILING (AS SCHEDULED)
- METAL STUDS (SIZE AND SPACING AS SCHEDULED)
- CONTINUOUS ACOUSTIC SEALANT (EACH SIDE)
- WALL DEPTH
- FIRESTOP SEALANT
- DEFLECTION AND FIRESTOP TRACK FASTENED TO SLAB
- (2) LAYERS 5/8" TYPE "X" GYP. BOARD
- NOTE: HEAD-OF-WALL DETAIL PER UL Des. No. HW-D-0060
- (2) LAYERS 5/8" TYPE "X" GYP. BOARD (TYP. EA. SIDE)
- SOUND ATTENUATING INSULATION (TYPE "J" WHERE SCHEDULED)
- METAL RUNNER CHANNEL SECURE TO FLOOR
- 2 HOUR RATED UL Des. U411

TYPE	STUD SIZE	STUD SPACING	ACOUST INSUL THK	STC	WALL DEPTH	REMARKS
B1	3 5/8"	16" O.C.	N.A.		4 7/8"	
B2	3 5/8"	16" O.C.	3 1/2"	40	4 7/8"	
B3	6"	16" O.C.	N.A.		7 1/4"	
B4	6"	16" O.C.	6 1/4"	40	7 1/4"	
B5	6"	16" O.C.	N.A.		9 1/4"	

[illegible]

Diagram illustrating the cross-section of a wall assembly, showing the following components and details:

- UNDERSIDE OF STRUCTURE / METAL DECK
- PROVIDE FULL HEIGHT STUDS AT 4'-0" O.C.
- PROVIDE TRACK BETWEEN FULL HEIGHT STUDS
- CEILING (AS SCHEDULED)
- METAL STUDS (SIZE AND SPACING AS SCHEDULED)
- CONTINUOUS ACOUSTIC SEALANT (EACH SIDE)
- 3" HIGH LEG METAL TRACK FASTENED TO SLAB
- 6" MIN.
- WALL DEPTH
- 5/8" GYPSUM BOARD (TYPE EA, SIDE)
- SOUND ATTENUATING INSULATION (TYPE 'J' WHERE SCHEDULED)
- METAL RUNNER CHAN SECURE TO FLOOR

19/32" FIRE RETARDANT TREATED PLYWD SHEATHING W/ 3/4" GYPSUM FLOOR TOPPING POURED OVER 1/4" SOUND REDUCTION MAT

CORNER CLAMP & CAP

2X10 FIRE RETARDANT TREATED CEILING FRAMING @ 24" O.C. W/ 3 1/2" SOUND ATTENUATING INSULATION (TYPE 'J')

1/2" GYP BD OVER RESILIENT FURRING CHANNELS @ 16" O.C.

FIRE RETARDANT 2X4 WOOD STUDS AT 16" O.C. SOUND ATTENUATING INSULATION (TYPE 'J')

2" (NOV.) ISOLATION

LAY-IN CEILING (AS SCHEDULED)

5/8" GYPSUM BOARD

RF CELL WALL PANEL SYSTEM

2X4 SILL PLATE GLUED IN PLACE (DO NOT FASTEN TO RF FLOOR)

FINISHED FLOORING (AS SCHEDULED)

RF CELL FLOOR SYSTEM

(2) LAYERS (4 MIL. EA.) ETHYLENE UNDEFLAMENT NEW DEPRESSED CONC. S.O.G. PER STRUCTL

PARENT WALL - (E) 2-HR RATED PARTITION OR (N) GYPSUM BOARD AND METAL STUD PARTITION (AS SCHEDULED)

PARENT WALL

(E) S.O.G.

VERIFY RECESSED DEP AT NEW SOG WITH RF SHIELD VENDER / SUPPLY

CONT' COMPRESSION FILLER, ALL SIDES

Dimensions: 12", 4 1/8", 3/4", 7 1/2", 2"

TYPE	STUD SIZE	STUD SPACING	ACCOUST INSUL THK	STC	WALL DEPTH	REMARKS
A1	3 5/8"	16" O.C.	N.A.		4 7/8"	
A2	3 5/8"	16" O.C.	3 1/2"	4 0	4 7/8"	
A3	6"	16" O.C.	N.A.		7 1/4"	
A4	6"	16" O.C.	6 1/4"	40	7 1/4"	
A5	8"	16" O.C.	N.A.		9 1/4"	

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IT'S PROJECT NUMBER: 212-313128

Gypsum Board Partition Types

A-571

A GYPSUM BOARD PARTITION
SCALE: 1 1/2" = 1'-0"



Wayne State
University

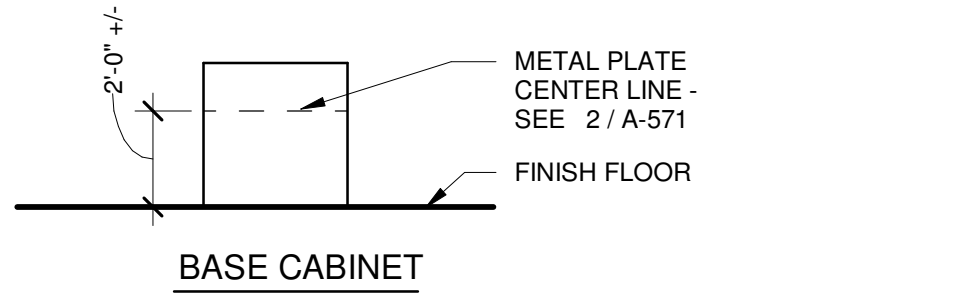
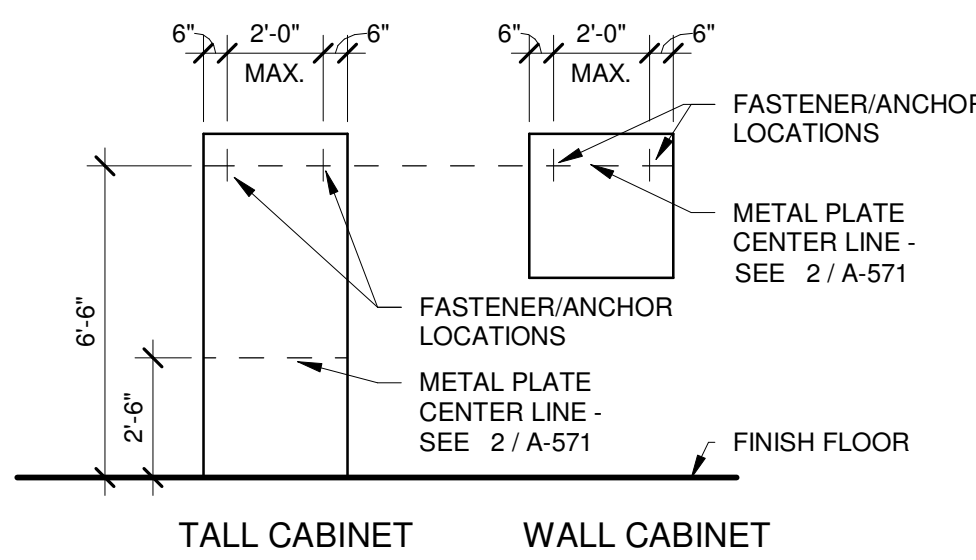
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TYPICAL STUD WALL REINFORCEMENT



TYPICAL SPACING U.N.O.
ELEVATIONS

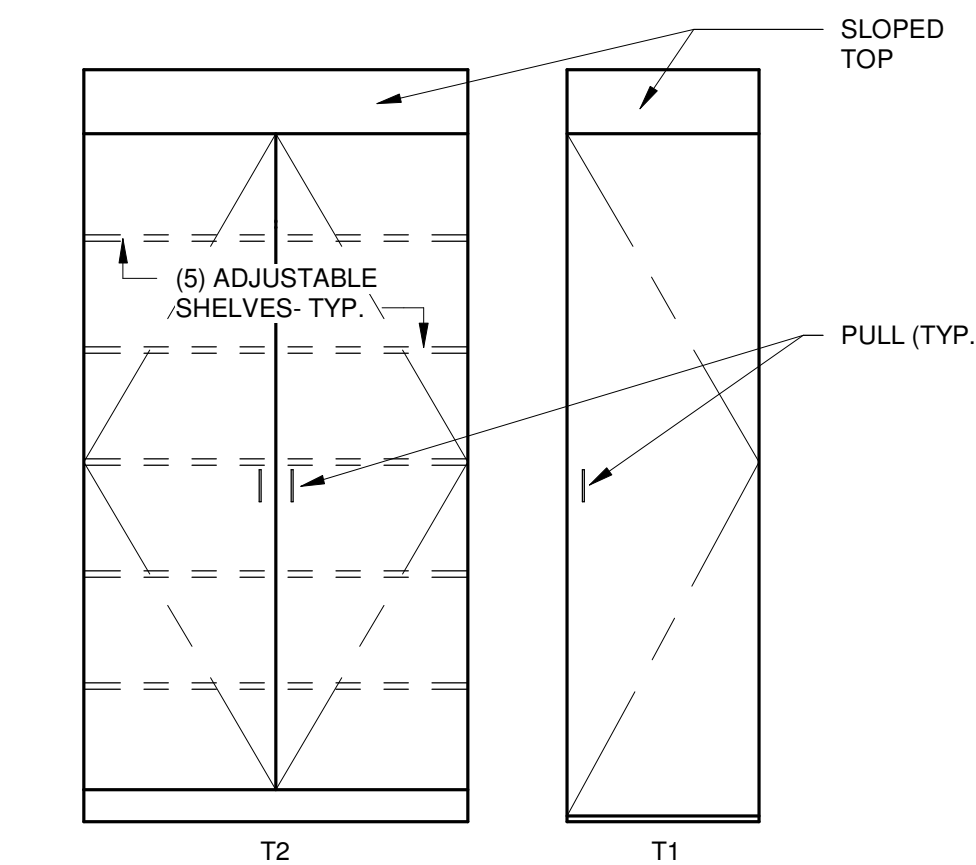
CASEWORK IDENTIFICATION LEGEND

IF NOT DENOTED ON THIS SHEET,
REFER TO INTERIOR ELEVATIONS

- B1:24:34:24:1
- (L) HERE DENOTES CABINET DOOR AND DRAWERS TO BE PROVIDED WITH KEYS LOCK.
 - INDICATES DEPTH OF CABINET (IN INCHES) PROVIDE STANDARD DEPTH IF NOT SHOWN
 - INDICATES HEIGHT OF CABINET (IN INCHES) PROVIDE STANDARD HEIGHT IF NOT SHOWN (HEIGHT TO T.O. COUNTER AT BASE CABINET)
 - INDICATES WIDTH OF CABINET (IN INCHES)
 - CABINET TYPE SEE SCHEDULE ON SHEET A-581

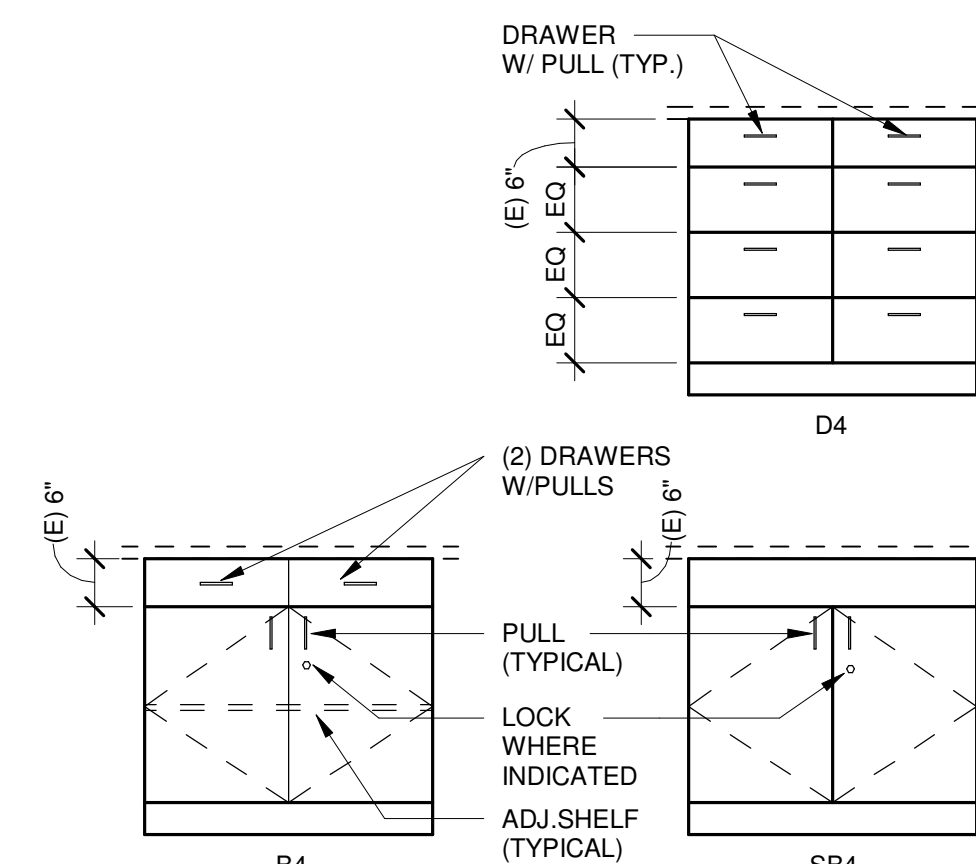
CASEWORK GENERAL NOTES

- CASEWORK & ARCHITECTURAL WOODWORK CONTRACTOR(S) SHALL CAREFULLY EXAMINE THE DRAWINGS AND SPECIFICATIONS TO PROPERLY DETERMINE CONTRACTUAL RESPONSIBILITIES.
- FOR ACTUAL ROOM DIMENSIONS REFER TO FLOOR A- SERIES PLANS. CONTRACTOR SHALL FIELD CHECK ALL DIMENSIONS BEFORE FABRICATION.
- OVERALL LENGTH OF TOPS SHALL BE DETERMINED BY CASEWORK DIMENSIONS AS INDICATED ON PLANS. SUCH LENGTHS SHALL REMAIN CONSTANT REGARDLESS OF SUCCESSFUL BIDDER'S STANDARDS. TOPS SHALL OVERHANG 1" AT EACH END AND 1" FROM THE FRONT OF BASE CABINET WHEN OVERALL DIMENSIONS ARE GIVEN. 1" OVERHANG IS NOT INCLUDED.
- OVERALL HEIGHT OF BASE CABINET TOPS MUST BE MAINTAINED AS SHOWN ON CABINET SCHEDULE.
- INSTALLATION OF CASEWORK SHALL BEGIN AT THE HIGH POINT OF THE ROOM WITH THE LEVELERS IN AS FAR AS POSSIBLE.
- COUNTERTOPS AND SPLASHES SHALL BE SCRIBED TO MATCH IRREGULARITIES AND CONTOURS OF WALLS.
- CASEWORK SHALL BE INSTALLED ON TOP OF FINISHED VCT, OR WELDED SHEET FLOORING WHERE THESE FLOOR FINISHES ARE SCHEDULED.
- PROVIDE FINISHED BACK & END PANELS TO COMPLETE THE ENCLOSURE OF ALL CABINETRY TO WALLS AND ADJACENT CABINETRY.
- REFER TO ELECTRICAL GENERAL NOTES, FOR ADDITIONAL INFORMATION.
- PROVIDE BRACKET AT ANY COUNTER OR SHELF SPANNING MORE THAN 4'-0" UNSUPPORTED REFER TO DETAIL 38.7/A-582.
- ALL SHELVING OVER 36" WIDE SHALL BE 1" THICK.
- DOORS IN TALL CABINETS SHALL BE 1 1/4" THICK.
- SEE INTERIOR ELEVATIONS AND CASEWORK LEGEND FOR LOCKING CONFIGURATIONS AND LOCATIONS.
- ALL EXPOSED, SEMI-EXPOSED AND CONCEALED WOOD (NOT COVERED BY PLASTIC LAMINATE) SHALL BE SEALED WITH A PIGMENTED SEALER.

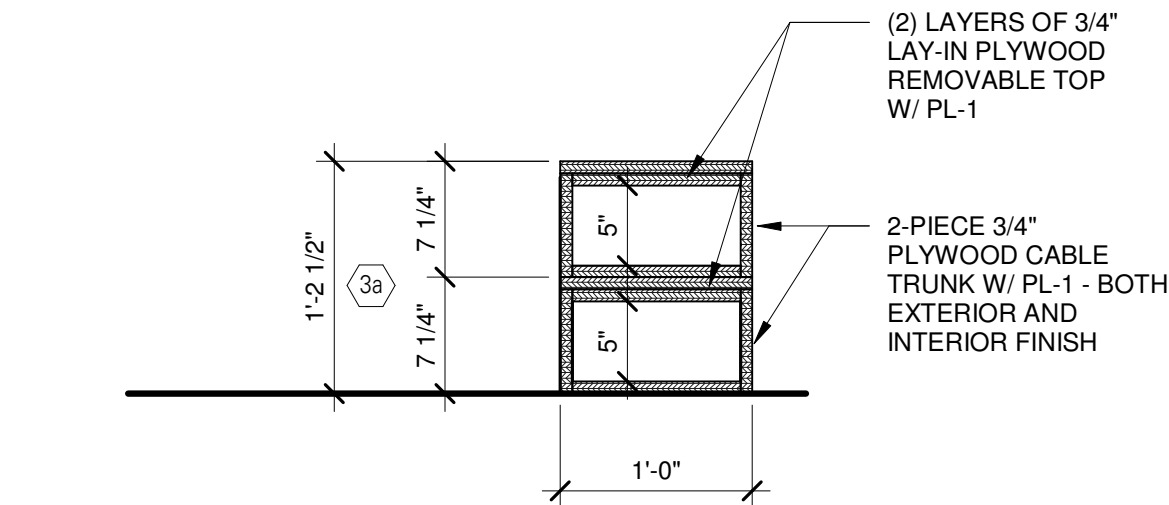


TYPICAL TALL UNIT - TYPE "T"

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

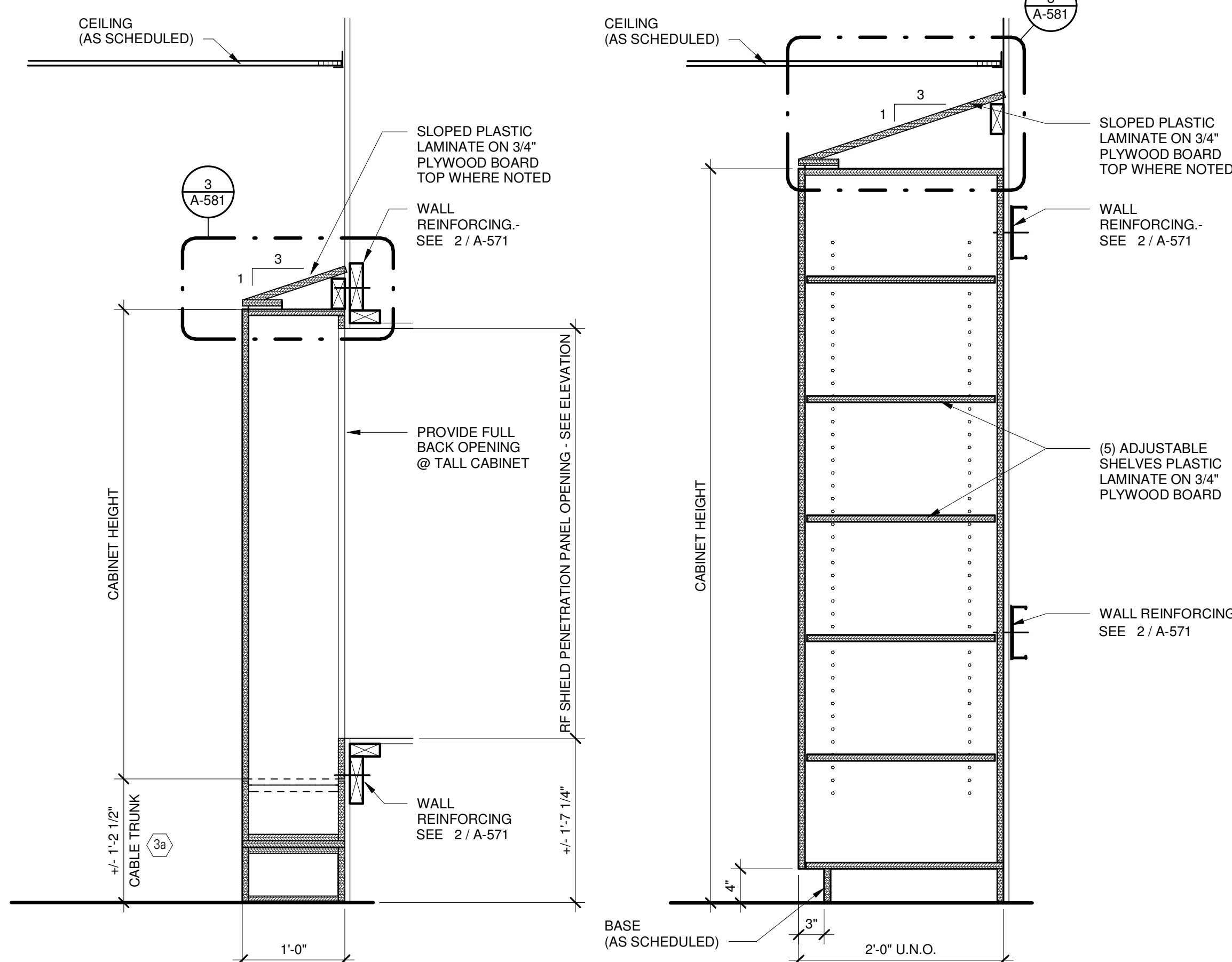


EXISTING BASE UNIT - TYPE "B" AND "D"



9 TYPICAL SECTION @ CABLE TRUNK

A-161 SCALE: 1" = 1'-0"

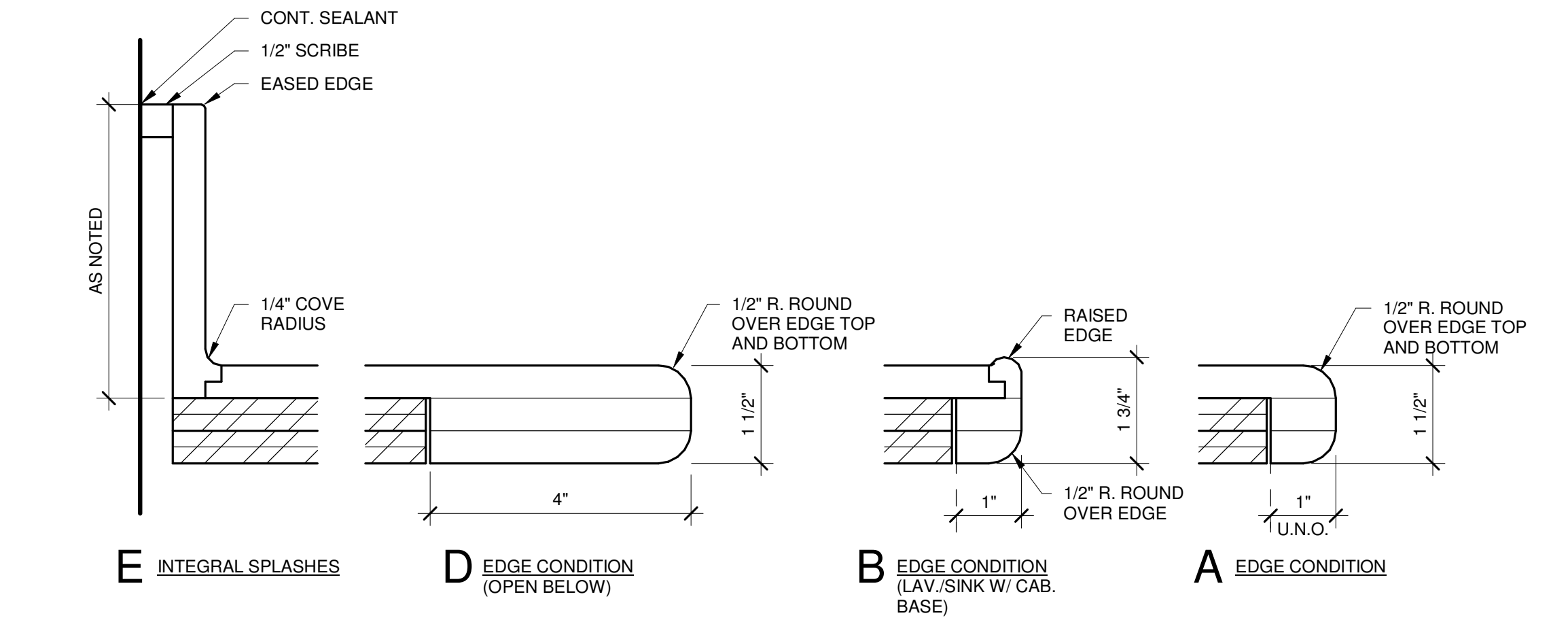


6 TYPICAL SECTION @ T1

A-161 SCALE: 1" = 1'-0"

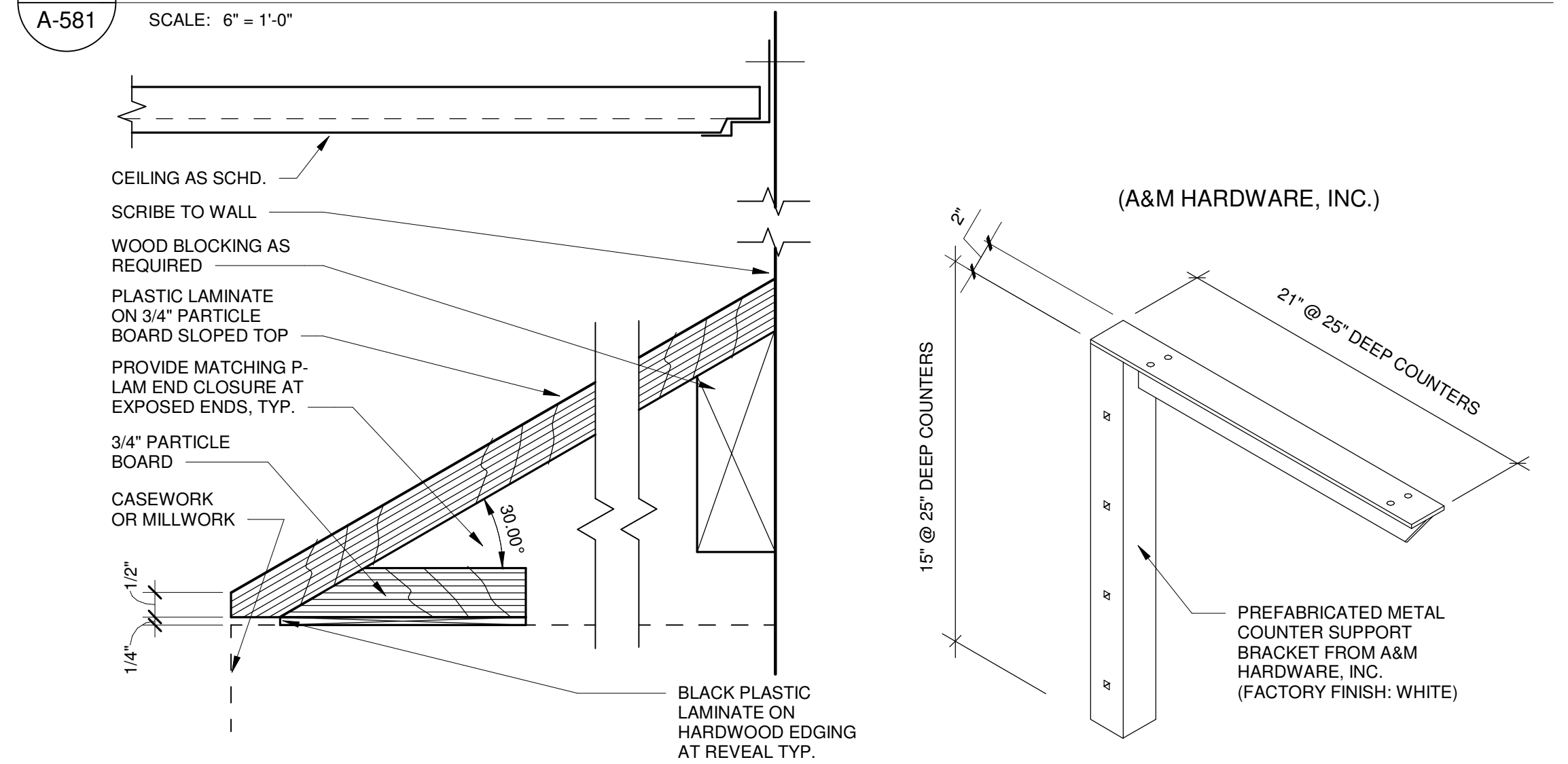
5 TYPICAL SECTION @ T2

SCALE: 1" = 1'-0"



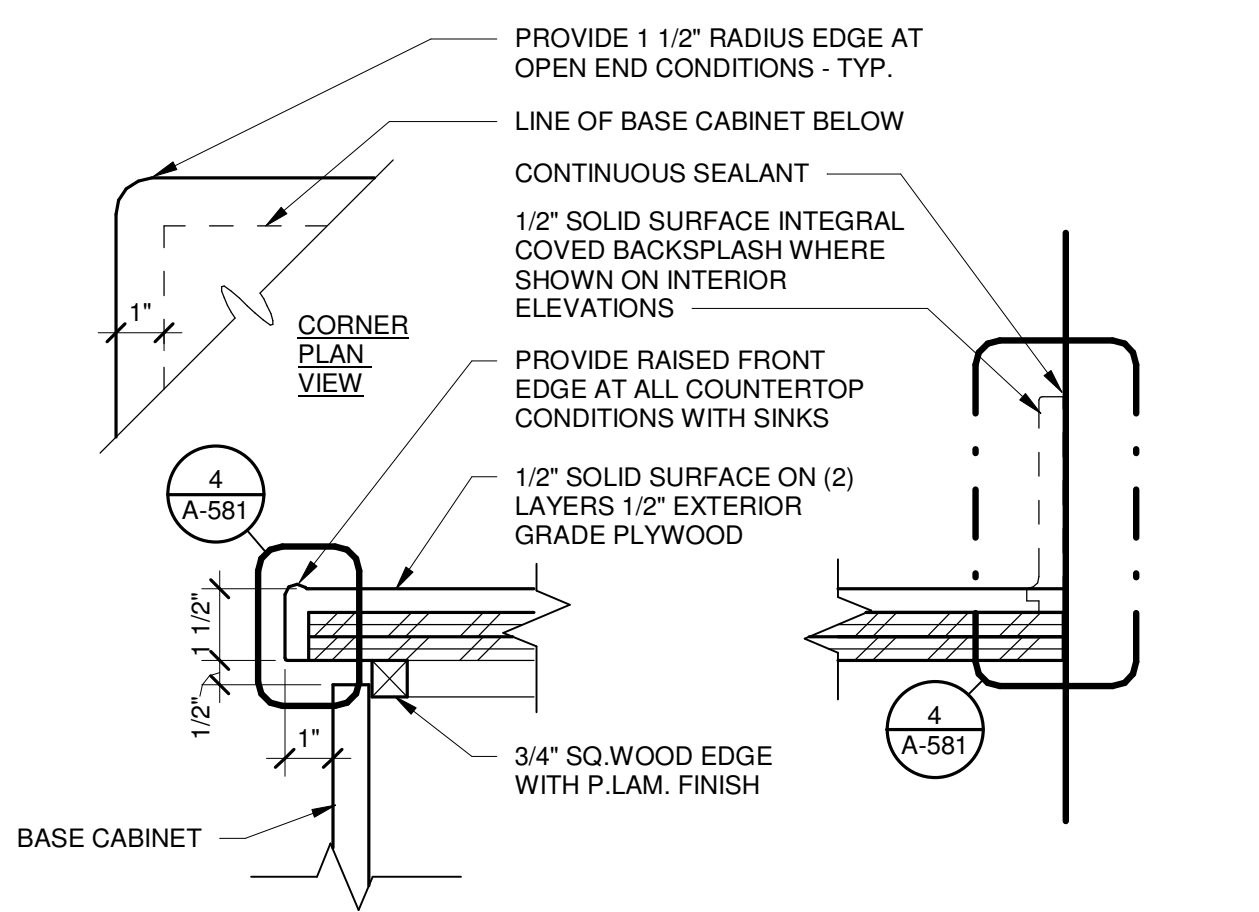
4 SOLID SURFACE EDGE DETAILS

A-581 SCALE: 6" = 1'-0"



3 WALL CABINET SLOPED TOP DETAIL

A-581 SCALE: NONE

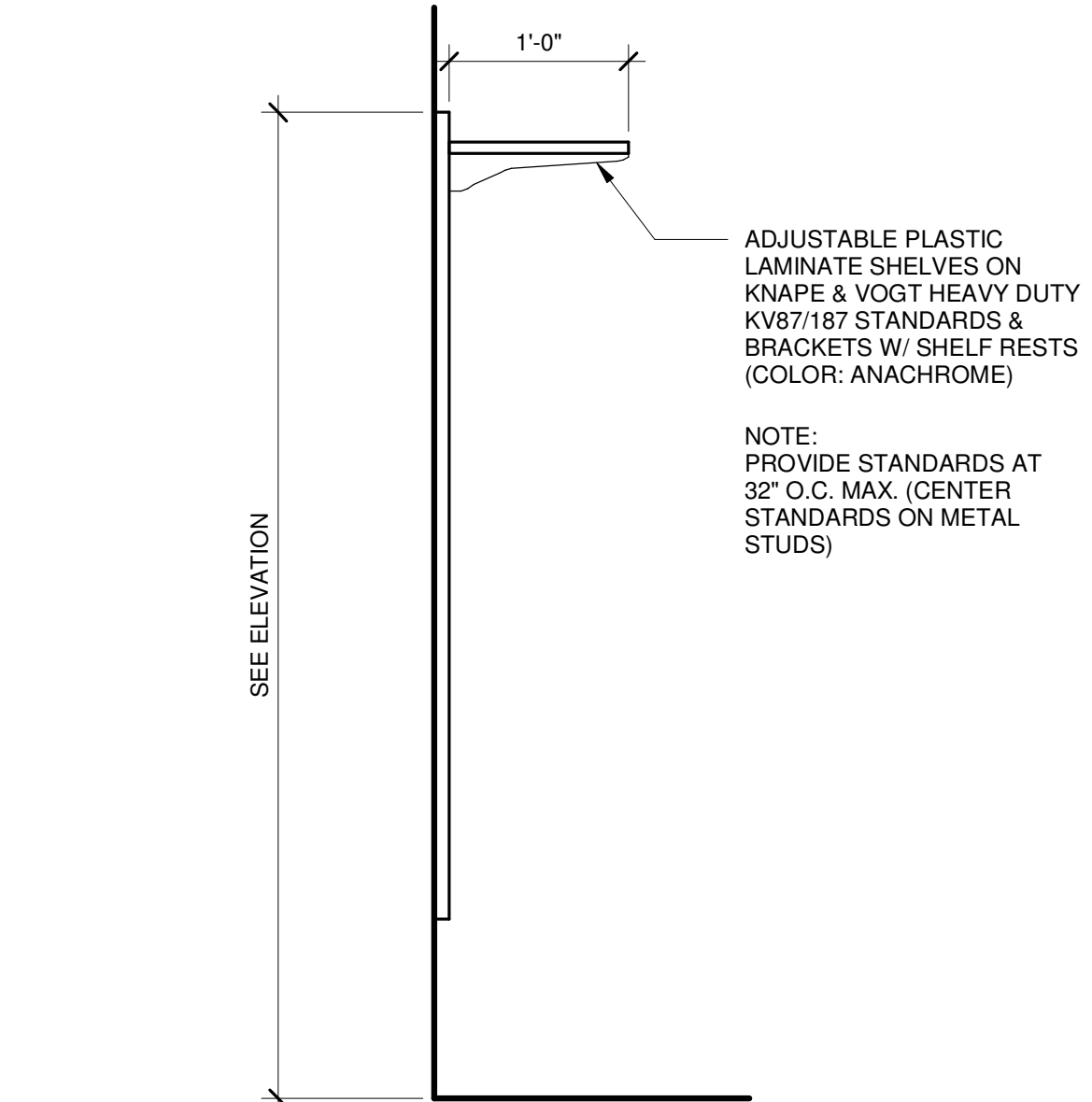


2 SOLID SURFACE COUNTERTOP DETAILS

A-581 SCALE: 3" = 1'-0"

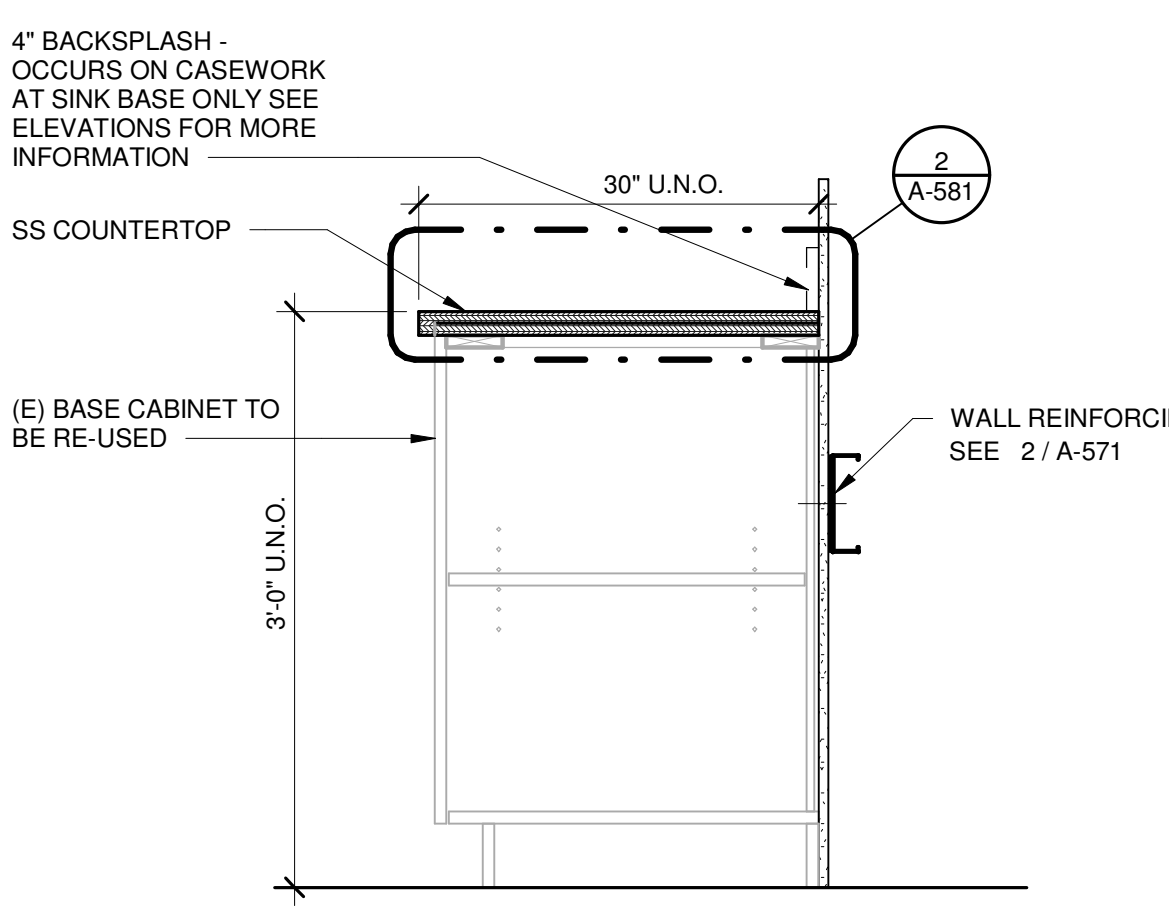
1 CONCEALED BRACKET DETAIL

A-161 SCALE: 1 1/2" = 1'-0"



8 ADJUSTABLE SHELVES

A-161 SCALE: 1" = 1'-0"



7 TYPICAL SECTION @ BASE CABINET / COUNTER

A-161 SCALE: 1" = 1'-0"

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Casework/Millwork
Details

A-581



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DOOR SCHEDULE													
DOOR NO.	DOOR OPENING SIZE			DOOR			FRAME			DETAILS		HW SET No.	LL
	W	X	H	TYPE	MATL	FINISH	TYPE	MATL	FINISH	HEAD	JAMB		
105.1	4'-0"		7'-0"	N	WD	PT-1	1	HM	PT-1	3/A-601	3/A-601	01	B
105.2	4'-0"		7'-0"	G	WD	PT-1	1	HM	PT-1	3/A-601	3/A-601	02	
105.4a	3'-0"		7'-0"	F	HM	(E)	(E)	HM	(E)	(E)	(E)	03	
105.5	7'-8"		7'-6"	OH	STL	PT-1			PT-1	5/A-601	4/A-601	-	

LEGEND:

(MATL.) MATERIALS

AL ALUMINUM
EX EXISTING
GL GLASS
HM HOLLOW METAL
SS STAINLESS STEEL
ST STEEL
WD WOOD
RF RF SHIELDED DOOR

(LL) LL LABELS

A 3 HR. "A" LABEL
B 1-1/2 HR. "B" LABEL
B.1 1 HR. "B.1" LABEL
C 3/4 HR. "C" LABEL
D 20 MIN. "D" LABEL
S SMOKE AND DRAFT CONTROL

NOTE: PROVIDE "S" LABEL ON ALL A, B, B.1, C, D LABELED DOORS

FINISH

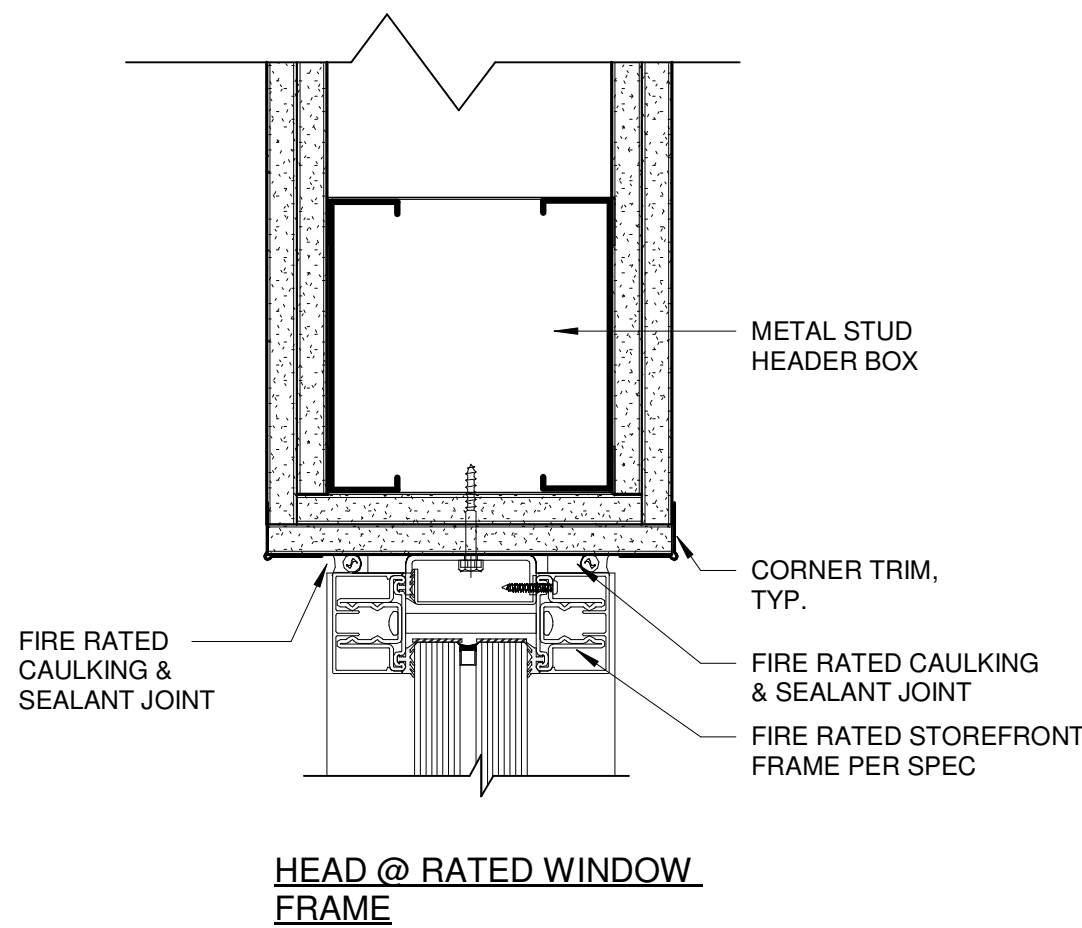
FF FACTORY FINISH
PNT PAINT (AS SCHEDULED)
CLR ANO CLEAR ANODIZED ALUMINUM
PLAM PLASTIC LAMINATE

REMARKS

CR CARD READER
ALM ALARM
PH PANIC HARDWARE

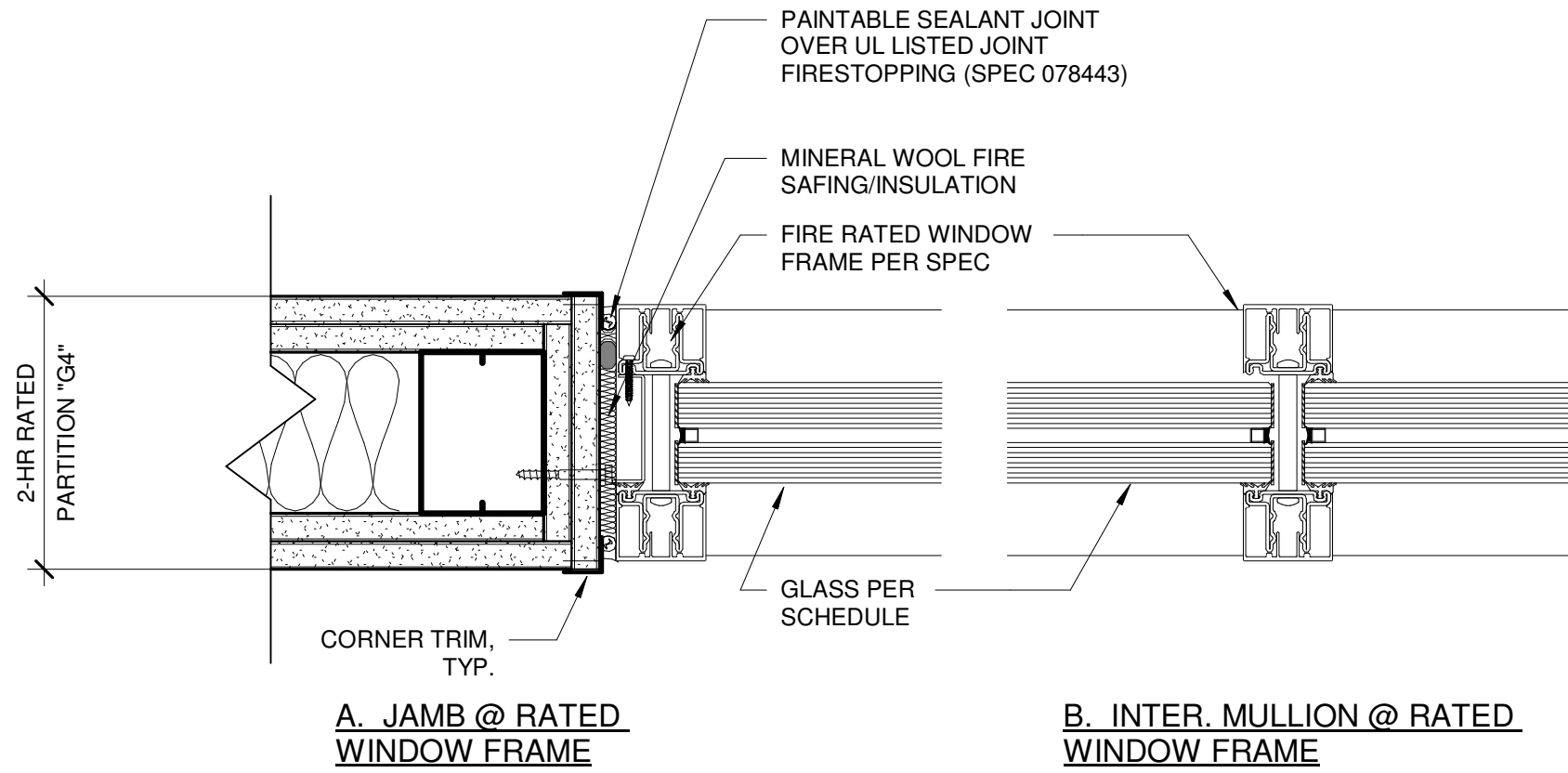
NOTE: ALL DOORS ARE 1 3/4" THICK AND UNDERCUT 5/8".

DOOR SCHEDULE ABBREVIATIONS



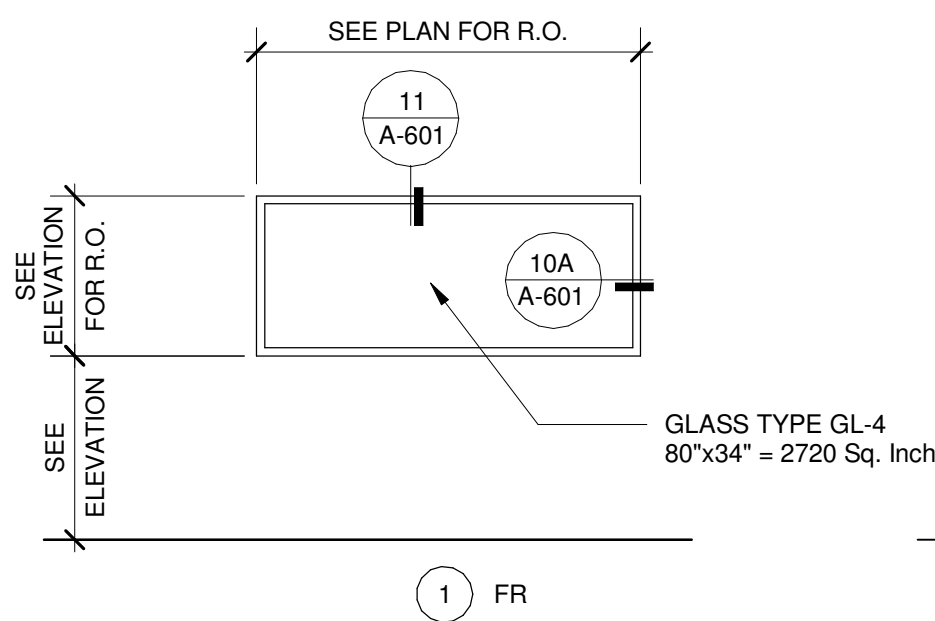
11 FIRE RATED WINDOW FRAME & GLAZING - SECTION DETAILS

SCALE: 3" = 1'-0"



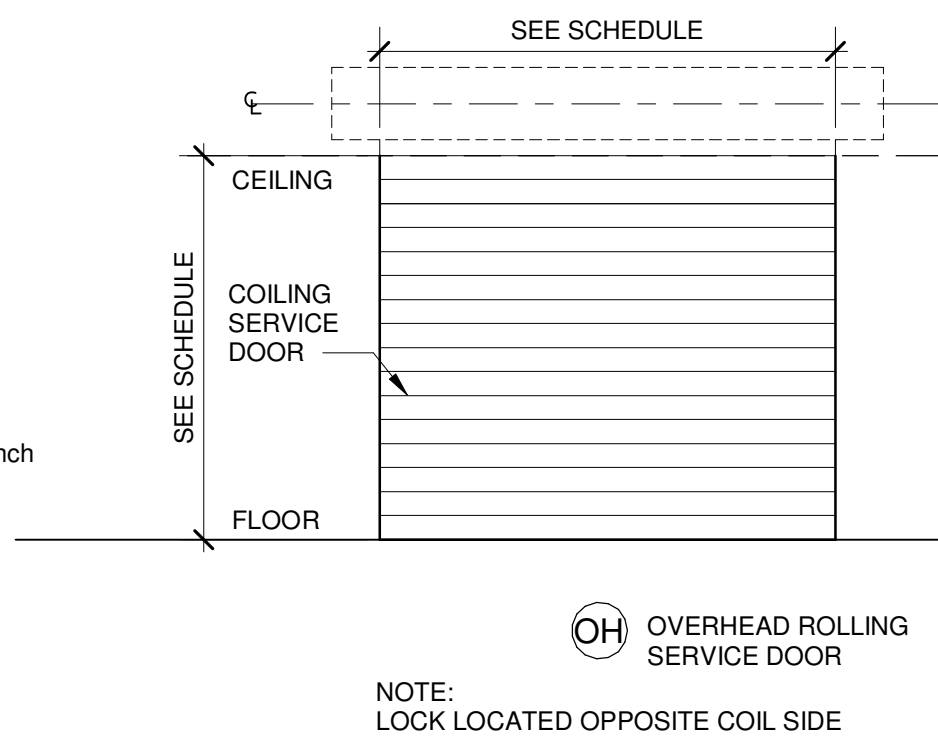
10 FIRE RATED BORROWED LIGHT WINDOW FRAME AND GLAZING - PLAN DETAILS

SCALE: 3" = 1'-0"



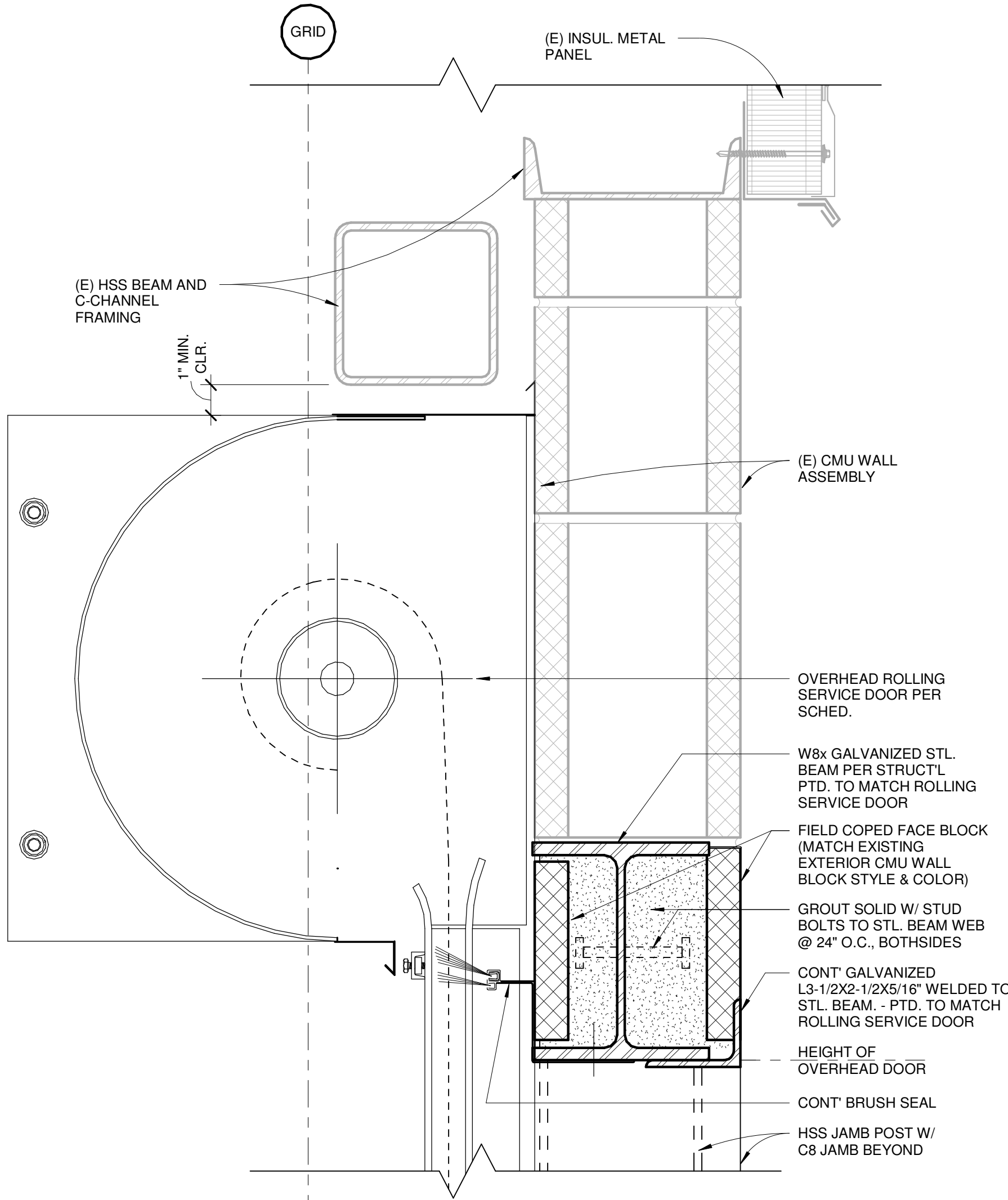
BORROWED-LITE TYPES

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



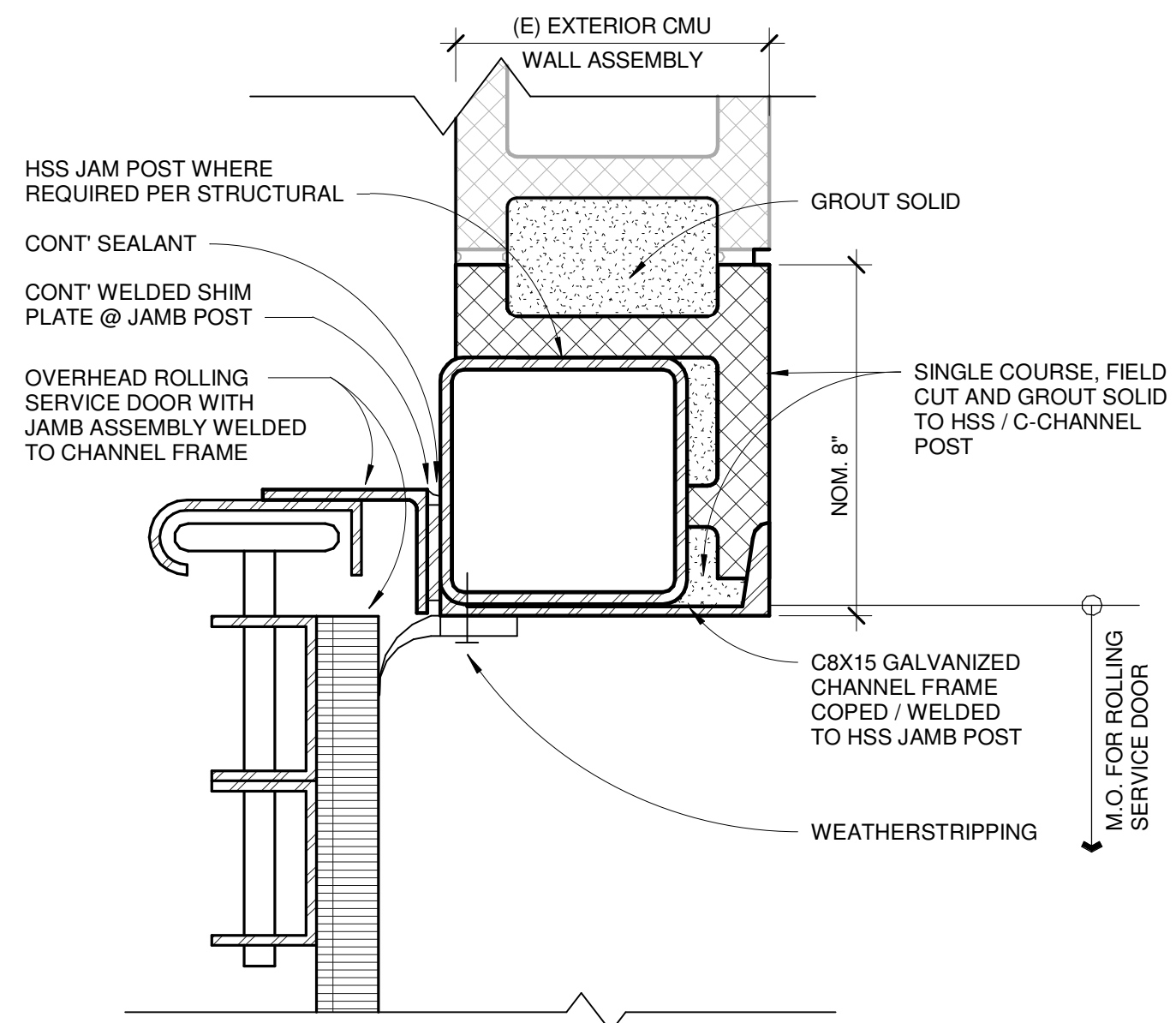
DOOR / FRAME TYPES

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



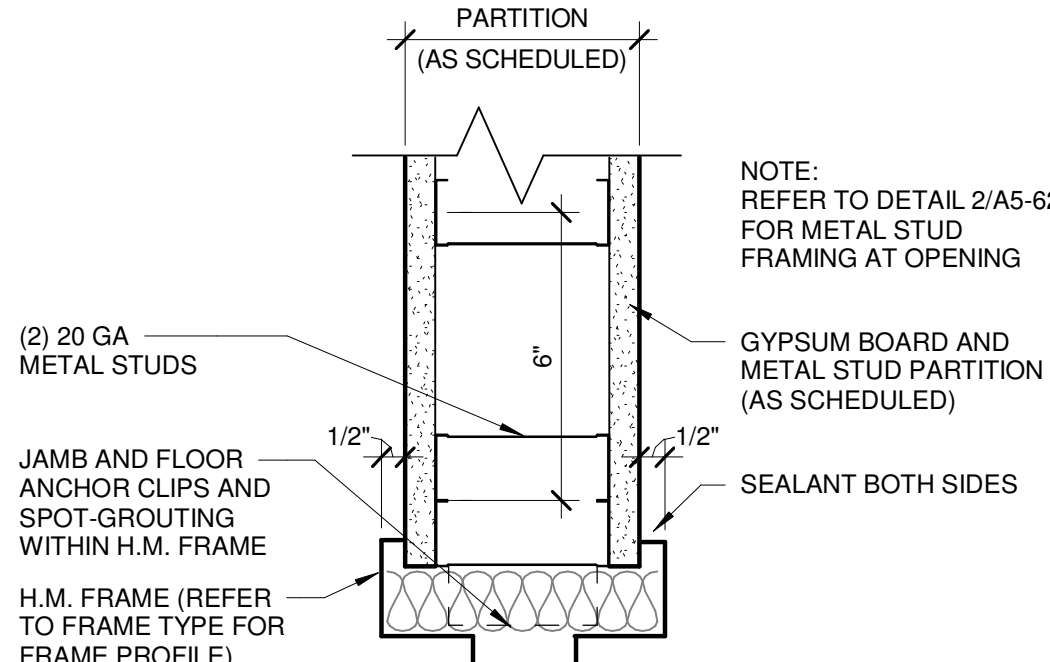
5 ROLLING SERVICE DOOR HEAD DETAIL

SCALE: 3" = 1'-0"



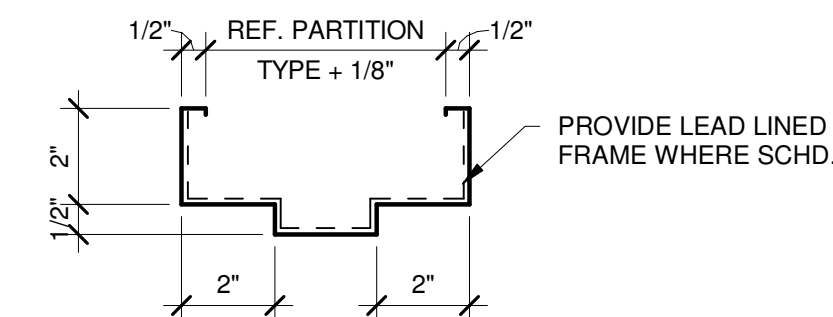
4 ROLLING SERVICE DOOR JAMB @ EXISTING BLOCK WALL

SCALE: 3" = 1'-0"



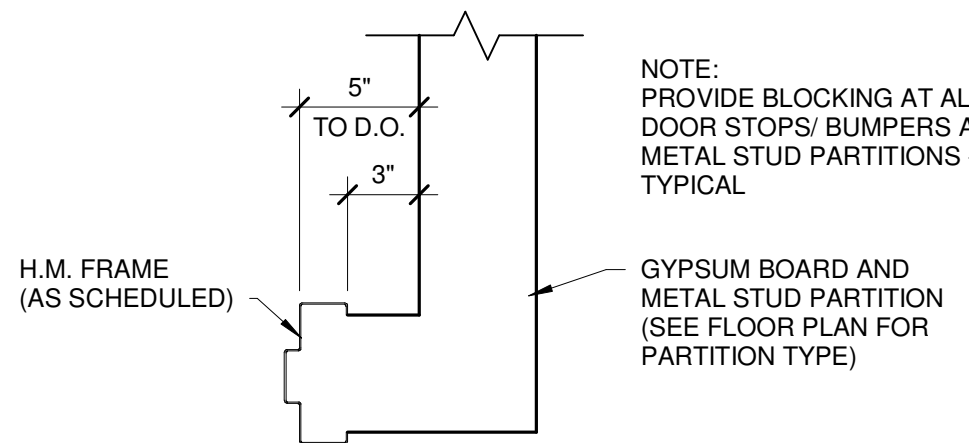
3 H.M. DOOR FRAME-JAMB (HEAD SIM.)

SCALE: 3" = 1'-0"



2 H.M. FRAME

SCALE: 3" = 1'-0"



1 TYPICAL DOOR LOCATION PLAN

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

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Door Schedule /
Types and Details

A-601



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I2C MRI
Installation -
Lab 5 Fit-Out

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GENERAL NOTES

- TYPICAL DETAILS APPLY TO ALL DRAWINGS. USE THROUGHOUT EXCEPT WHERE OTHERWISE SHOWN OR NOTED.
- TOP OF SLAB REFERENCE ELEVATION = 100'-00" UON.
- EXISTING CONCRETE SLAB ON GRADE: 8" THICK NORMAL WEIGHT CONCRETE. REINFORCING: 4X4 W2.9XW2.9 WWF.
- NEW CONCRETE SLAB ON GRADE: 8" THICK NORMAL WEIGHT CONCRETE. REINFORCING: 4 PCY MACRO-SYNTHETIC FIBERS.
- REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL FOR FLOOR PENETRATIONS OF CONDUIT AND PIPING. COORDINATE LOCATIONS WITH TRADES.
- REFER TO ARCHITECTURAL FOR SLAB EDGE LOCATIONS.

-  MRI TRAVEL PATH
-  NEW 8" THICK SLAB W/ 1 1/4" SLAB DEPRESSION

CONCRETE SPECIFICATIONS

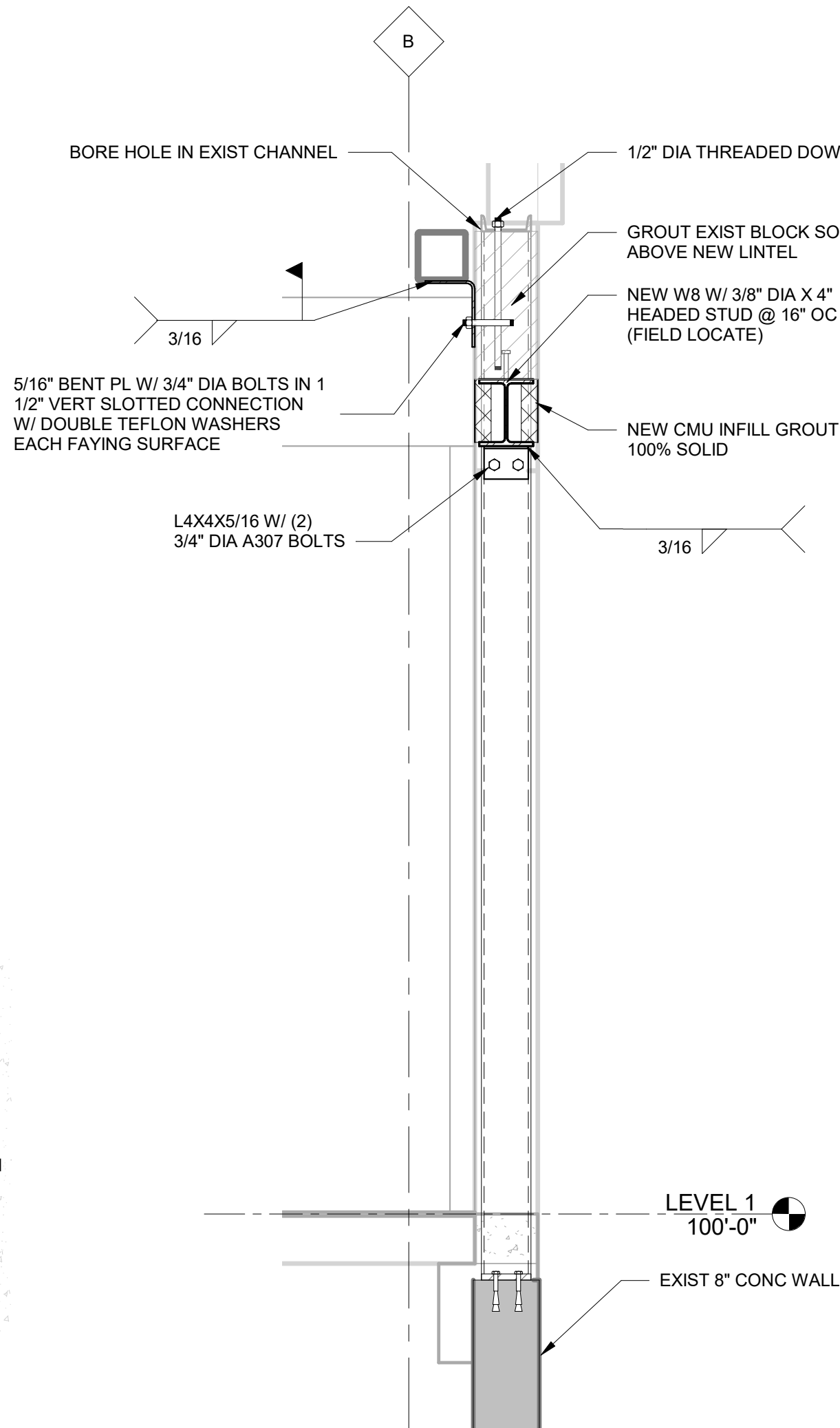
- CONCRETE (NORMAL WEIGHT), UNLESS OTHERWISE NOTED ON DRAWING, SHALL DEVELOP A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI AT 28 DAYS. WATER TO CEMENT RATIO SHALL NOT EXCEED .44. SLUMP SHALL NOT EXCEED THREE INCHES.
- UNLESS OTHERWISE NOTED, CONCRETE WORK SHALL CONFORM TO THE ACI STANDARD "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE".
- CONCRETE SLABS SHALL BE CAST SO THAT THE SLAB THICKNESS IS AT NO POINT LESS THAN THAT INDICATED ON THE DRAWINGS. THIS REQUIRES THAT THE SLAB NOT BE CAST DEAD LEVEL WHERE SUPPORTING BEAMS, GIRDERS OR TRUSSES HAVE AN UPWARD CAMBER.
- SUBMITTALS:
 - PRODUCT DATA FOR REINFORCEMENT ADMIXTURES, CURING COMPOUNDS, AND NON-SHRINK GROUT.
 - LABORATORY TEST REPORTS OR EVALUATION REPORTS FOR CONCRETE MATERIALS AND CONCRETE MIX DESIGNS IN ACCORDANCE WITH ACI 318-11 FIFTEEN DAYS PRIOR TO DESIRED START OF CONCRETE PLACEMENT.
- MATERIALS:
 - PORTLAND CEMENT: ASTM C 150, TYPE I
 - FLY ASH: ASTM C 618, TYPE F (NOT MORE THAN 25 PERCENT)
 - LOSS ON IGNITION: LESS THAN 1.5 PERCENT
 - CHLORIDE CONTENT: LESS THAN 1.5 PERCENT
 - AGGREGATES: ASTM C 33
 - WATER: POTABLE
 - ADMIXTURES, WATER REDUCING: ASTM C 494
 - MEMBRANE FORMING CURING COMPOUND: ASTM C 309, TYPE I (MOISTURE LOSS NOT MORE THAN .55 KILOGRAM PER SQUARE METER WHEN APPLIED AT A RATE OF 200 SQUARE FOOT PER GALLON)
- CONCRETE FINISHING:
 - FLOAT FINISH: APPLY FLOAT FINISH WHEN SURFACE WATER HAS DISAPPEARED AND WHEN CONCRETE HAS STIFFENED SUFFICIENTLY TO PERMIT OPERATION OF POWER-DRIVEN FLOATS. CONSOLIDATE SURFACE WITH POWER-DRIVEN FLOATS OR BY HAND-FLOATING. CHECK LEVEL SURFACE PLANE TO TOLERANCE OF 5 MM IN 3 M. IMMEDIATELY AFTER LEVELING, RE-FLOAT SURFACE TO A UNIFORM, SMOOTH, GRANULAR TEXTURE.
 - TROWEL FINISH: AFTER FLOATING, BEGIN FIRST TROWEL-FINISH OPERATION USING A POWER-DRIVEN TROWEL. BEGIN FINAL TROWELING WHEN SURFACE PRODUCES A RINGING SOUND AS TROWEL IS MOVED OVER SURFACE. CONSOLIDATE CONCRETE SURFACE BY FINAL HAND-TROWELING OPERATION. FREE OF TROWEL MARKS, UNIFORM IN TEXTURE AND APPEARANCE, AND WITH SURFACE LEVELED TO TOLERANCES OF 3/16" IN TEN FEET. GRIND SMOOTH SURFACE DEFECTS THAT WOULD TELEGRAPH THROUGH APPLIED FLOOR COVERING SYSTEM.
- CONCRETE CURING:
 - PROTECT FRESHLY PLACED CONCRETE FROM PREMATURE DRYING. BEGIN INITIAL CURING AS SOON AS FREE WATER HAS DISAPPEARED. APPLY MEMBRANE FORMING CURING COMPOUND AS SOON AS FINISHING OPERATIONS ARE COMPLETE. APPLY UNIFORMLY ACCORDING TO MANUFACTURER'S DIRECTIONS. USE MEMBRANE-FORMING CURING COMPOUNDS THAT WILL NOT AFFECT SURFACES TO BE COVERED WITH FINISH MATERIALS APPLIED DIRECTLY TO CONCRETE. DO NOT USE A CURING COMPOUND UNLESS COMPATIBILITY OF FLOOR FINISHES IS VERIFIED, IN WRITING, BY MANUFACTURER.
- SEALER AT INTERIOR SLABS:
 - ACRYLIC, HIGH SOLIDS LIQUID MEMBRANE SEALER.
 - MINIMUM SOLIDS CONTENT: 20%
 - NON-YELLOWING TO ULTRAVIOLET EXPOSURE.
 - PROVIDE GLOSSY FINISH.
 - CURE-AND-SEAL COMPLYING WITH ASTM C-1315.

POST-INSTALLED ANCHORS

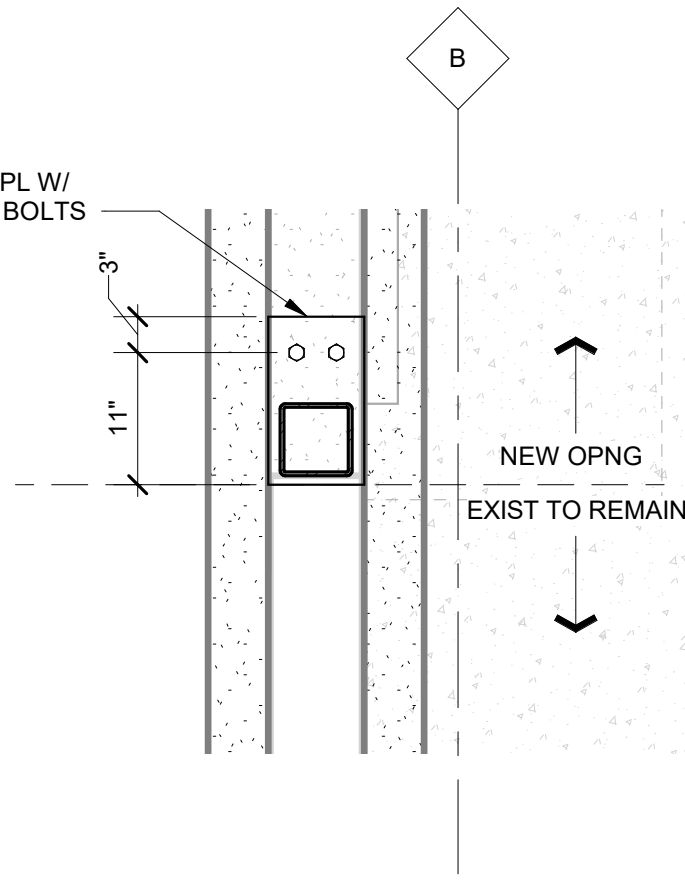
- WHERE SPECIFIC ANCHOR MANUFACTURER, TYPE, SIZE, AND EMBED REQUIREMENTS ARE SHOWN ON DETAILS, DRAWINGS, OR SPECIFICATIONS, SUBSTITUTIONS ARE NOT ACCEPTABLE.
- FOR SUBSTITUTION PURPOSES, AT THE CONTRACTORS OPTIONS, SIGNED AND SEALED CALCULATIONS SHALL BE PROVIDED, INDICATING THE SUBSTITUTED ANCHOR MEETS THE CAPACITY REQUIREMENTS OF THE DETAILED ANCHOR. INCLUDE APPROPRIATE LOAD ADJUSTMENT FACTORS APPLICABLE TO ALL LOADING CONDITIONS INCLUDING BUT NOT LIMITED TO: ANCHOR GEOMETRY, EMBEDMENT DEPTH, ANCHOR SPACING, EDGE DISTANCE, CRACKED CONCRETE, SATURATED CONCRETE, AND OTHER SPECIFIED CONCRETE PROPERTIES. ASSUME DETAILED ANCHOR REQUIRES 100% OF ITS CAPACITY.
- HOLES FOR THROUGH BOLTS SHALL BE FILLED WITH EPOXY TO ENSURE UNIFORM BEARING OF THE BOLT ON THE SUBSTRATE. THE VOLUME OF EPOXY SHALL BE SUFFICIENT TO FILL THE ANNULAR SPACE BETWEEN THE BOLT AND THE HOLE THROUGH THE ENTIRE WIDTH OF THE SUPPORTING ELEMENT.
- HOLES FOR POST INSTALLED ANCHORS (MECHANICAL OR EPOXY) SHALL BE DRILLED WITH HAMMER OR ROTARY DRILLS ONLY. CONTRACTOR SHALL NOT SUBSTITUTE WITH CORE-DRILLED HOLES UNLESS SPECIFICALLY INDICATED ON THE CONTRACT DOCUMENTS.
- ALLOWABLE ANCHORS LISTED BELOW:
 - HILTI KWIK-CON II
 - HILTI KWIK BOLT-TZ
 - HILTI HUS-EZ
 - HILTI HUS-EZ-INOTE: ALL ANCHORS SHALL BE RATED FOR CRACKED CONCRETE

STRUCTURAL STEEL

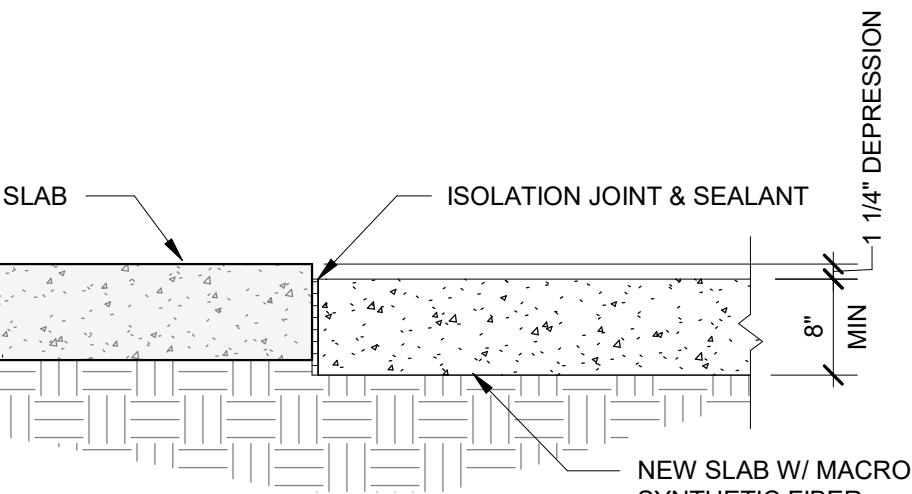
- SHOP DETAILS, FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF CURRENT "SPECIFICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS", AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES", AND AISC "DETAILING FOR STEEL CONSTRUCTION".
- STRUCTURAL STEEL SHALL CONFORM TO THE YIELD STRENGTH (Fy) LISTED BELOW:
 - W, WT SHAPES 50 KSI
 - HSS SQUARE AND RECTANGULAR 50 KSI
 - HSS ROUND 46 KSI
 - ALL OTHER PLATES AND SHAPES, U.O.N. 36 KSI
- ANCHOR RODS SHALL BE ASTM F-1554 GRADE 36 U.O.N.
- ANCHOR RODS, BASE PLATES OR BEARING PLATES SHALL BE LOCATED AND BUILT INTO CONNECTING WORK, PRE-SET BY TEMPLATES OR SIMILAR METHOD. PLATES SHALL BE SET IN FULL BEDS OF NON-SHRINK MORTAR OR GROUT.
- WELDING SHALL BE DONE WITH APPROPRIATE E70 SERIES ELECTRODES COMPATIBLE WITH THE NEW AND EXISTING STEEL AND SHALL CONFORM TO THE REQUIREMENTS OF THE "CODE FOR WELDING IN BUILDING CONSTRUCTION" OF THE AMERICAN WELDING SOCIETY.
- REFER TO ARCHITECTURAL DRAWINGS FOR STEEL PLATES, ANGLES, ETC., ATTACHED TO BEAMS, FRAMES, ETC., FOR SUPPORT OF FASCIA AND OTHER CONSTRUCTION.
- THE LENGTH DIMENSION AND THE CONNECTION DETAIL FROM NEW STRUCTURAL MEMBER TO THE EXISTING STRUCTURE SHALL BE FIELD VERIFIED BEFORE FABRICATION. NO FIELD MODIFICATION TO THE FABRICATED MEMBER OR CONNECTION IS ALLOWED WITHOUT PRIOR APPROVAL BY THE ARCHITECT/ENGINEER OF CONTRACTOR'S SKETCHES OR SHOP DRAWINGS REFLECTING THESE MODIFICATIONS.
- ANGLES ASSUMED LONG LEG VERTICAL (LLV) UNLESS OTHERWISE NOTED.
- THE CONTRACTOR IS RESPONSIBLE FOR THE ERECTION SAFETY OF STEEL CONNECTIONS, INCLUDING BUT NOT LIMITED TO: CONFIGURATION, SEQUENCE, USE OF: BLOCKING, EXTENDED CLIP ANGLES, CLAMPS, ETC.
- SHOP DRAWING REVIEW IS ONLY TO VERIFY LOAD CARRYING CAPACITY.
- STEEL AND CONNECTIONS BELOW THE ROOF STRUCTURE (NOT EXPOSED TO WEATHER) SHALL BE CLEANED PER SSPC-SP3 AND SHOP PRIME PAINTED WITH TNEMC #99 PRIMER. FIELD FINISH PAINT WITH TWO COATS OF TNEMC SERIES 23 ENDURATONE SEMI-GLOSS, COLOR PER OWNER'S STANDARD.



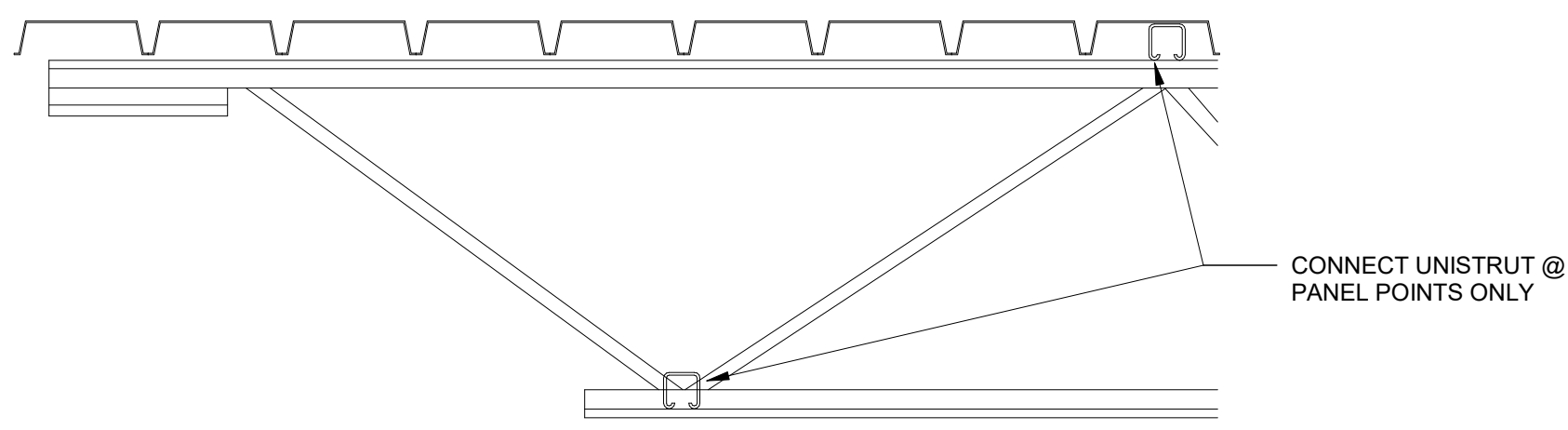
2 SECTION
SCALE: 3/4" = 1'-0"

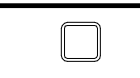
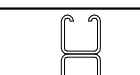

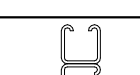


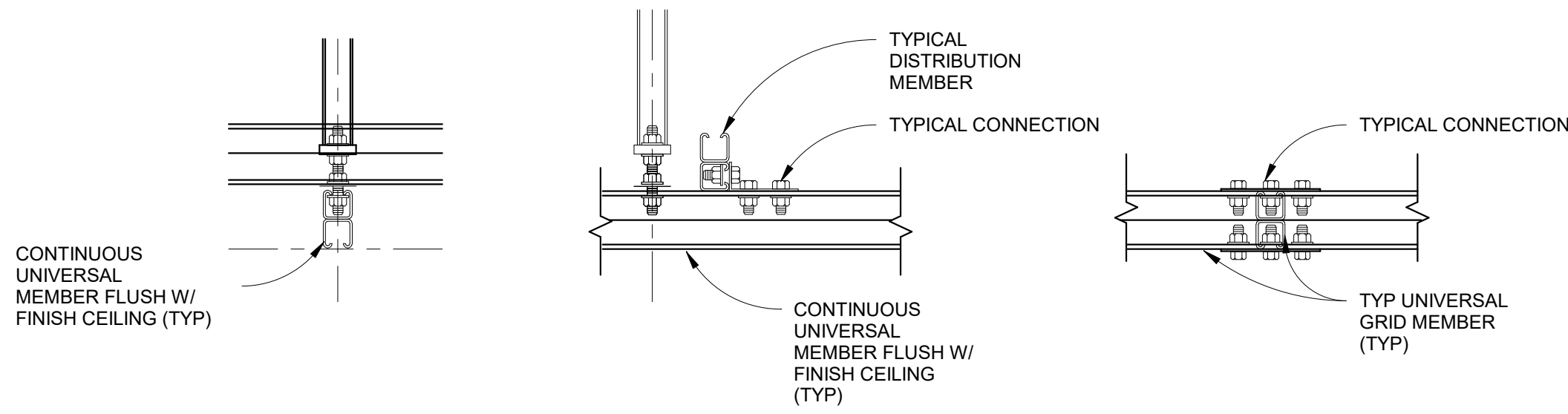
3 SECTION
SCALE: 3/4" = 1'-0"



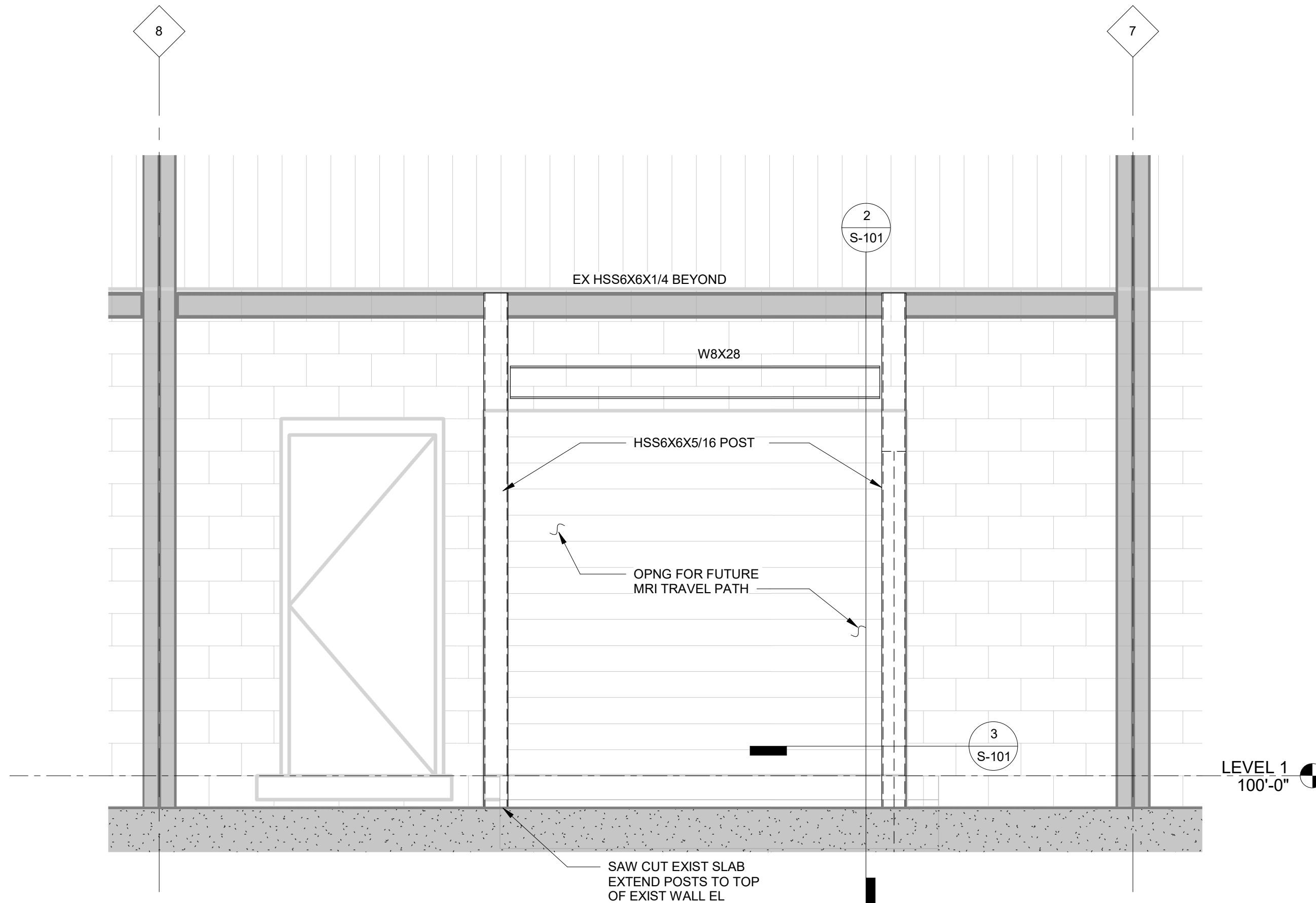
5 TYPICAL BUTTING OF
NEW SLAB TO EXISTING
SCALE: 3/4" = 1'-0"



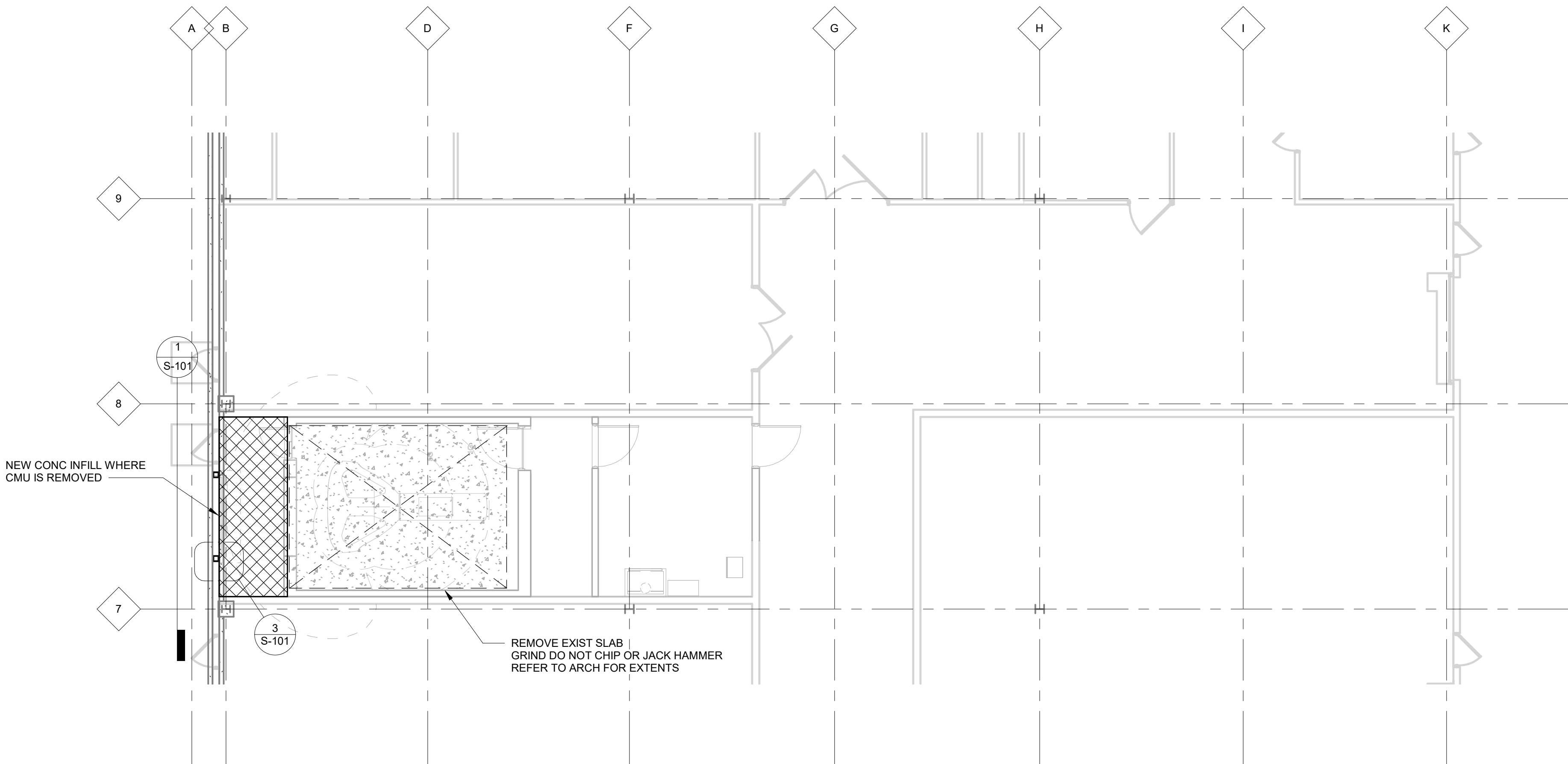
MEMBER	TYP UNISTRUT EQUIVALENT	SHAPE
VERT SUPPORT	P90000/9200 TELESTRUT	
UNIVERSAL GRID MEMBER	P1001, U.O.N.	
DIAGONAL BRACE	P1000, U.O.N.	
DISTRIBUTION MEMBER	P1000C, U.O.N.	



4 TYPICAL SLOTTED CHANNEL FRAMING
SCALE: 1 1/2" = 1'-0"



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



N
FIRST FLOOR TRAVEL PATH
SCALE: 1/8" = 1'-0"

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Framing Plan &
Details

S-101

ROOF FRAMING PLAN NOTES

- 1. REFER TO DRAWING S-101 FOR GENERAL NOTES.
- 2. TYPICAL DETAILS APPLY TO ALL DRAWINGS. USE THROUGHOUT EXCEPT WHERE OTHERWISE SHOWN OR NOTED.
- 3. MEMBERS ARE EQUALLY SPACED UNON.
- 4. CONTRACTOR TO VERIFY EXISTING BEAM LOCATIONS AND SIZES PRIOR TO GENERATION OF SHOP DRAWINGS.



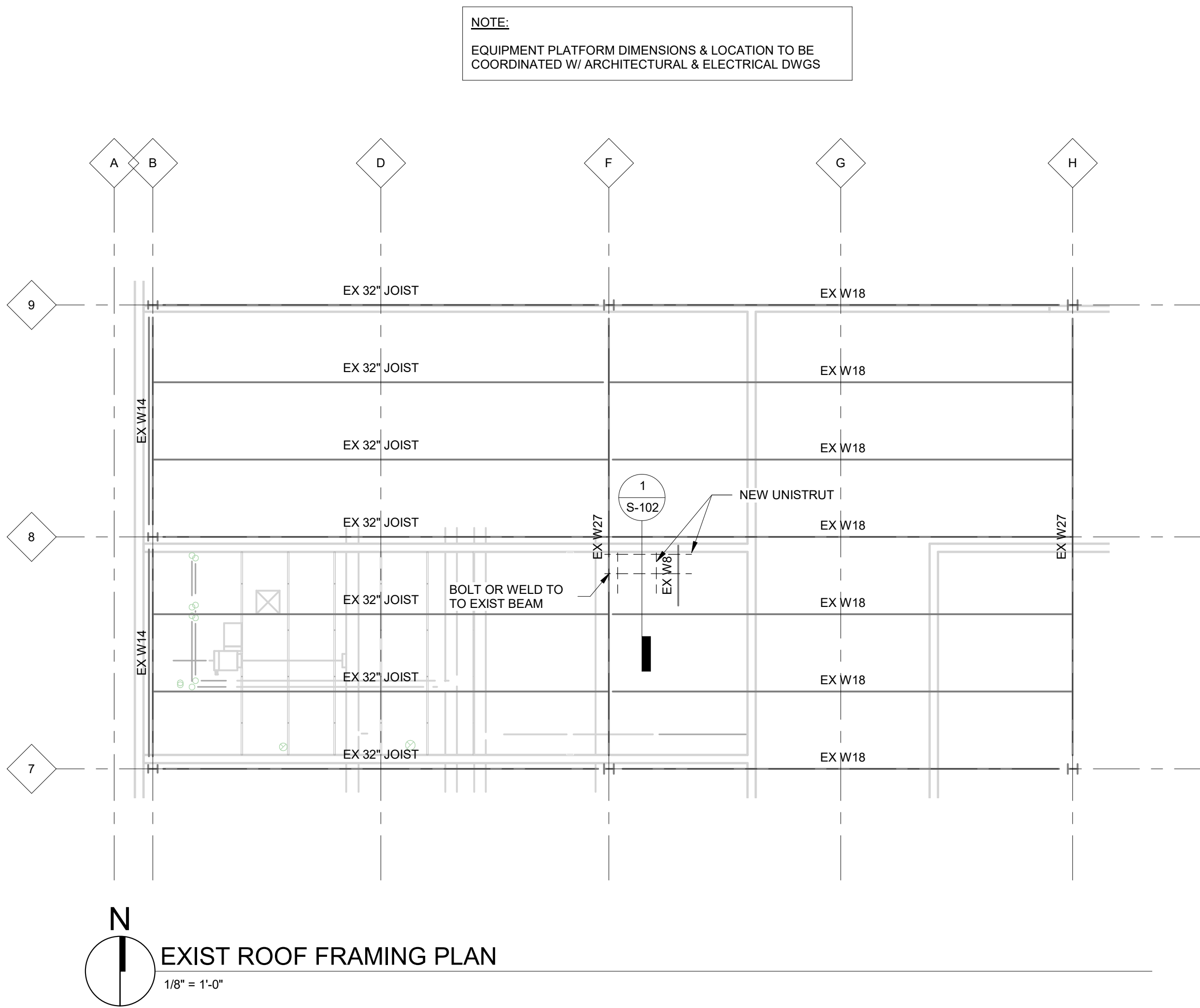
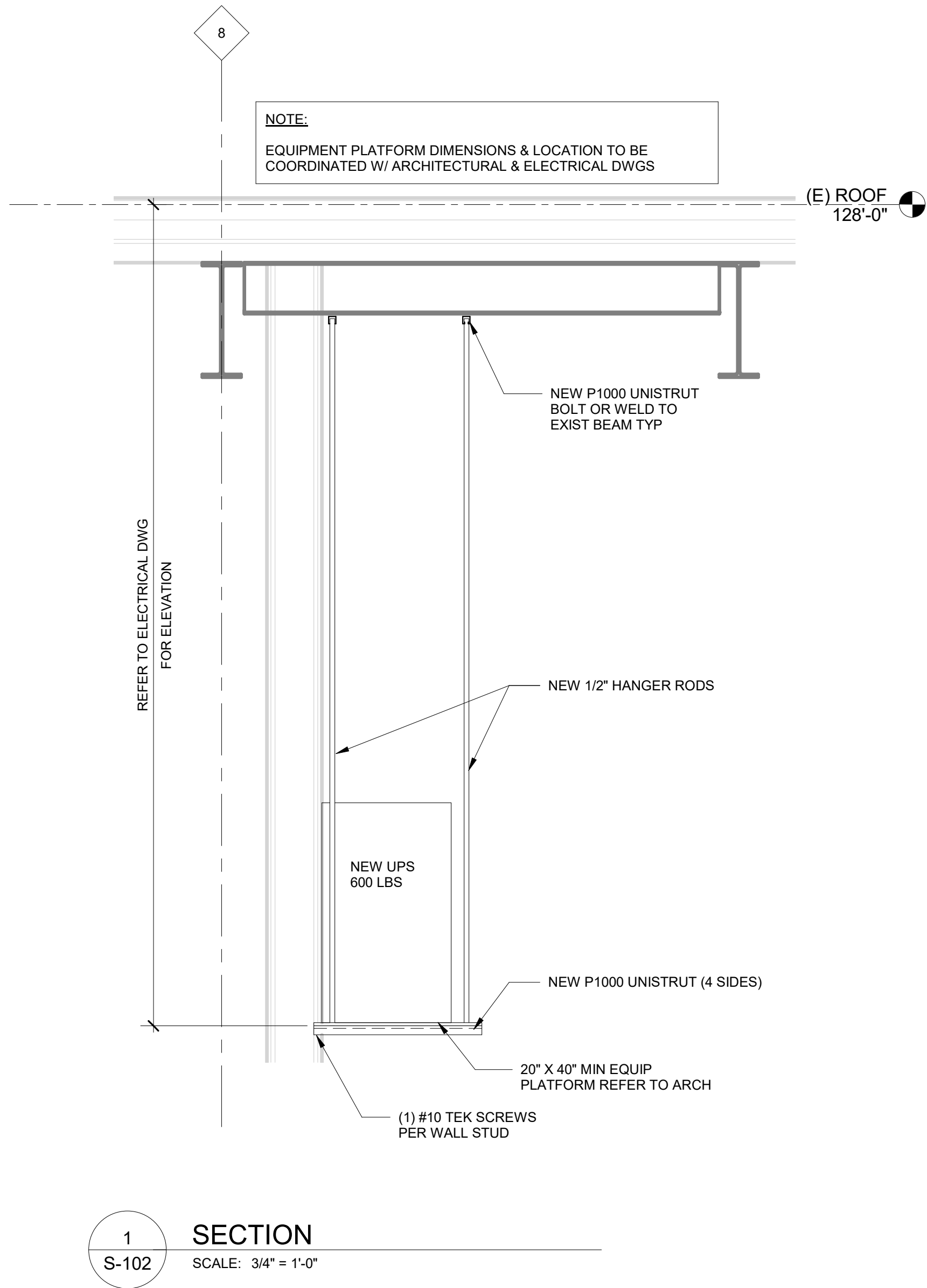
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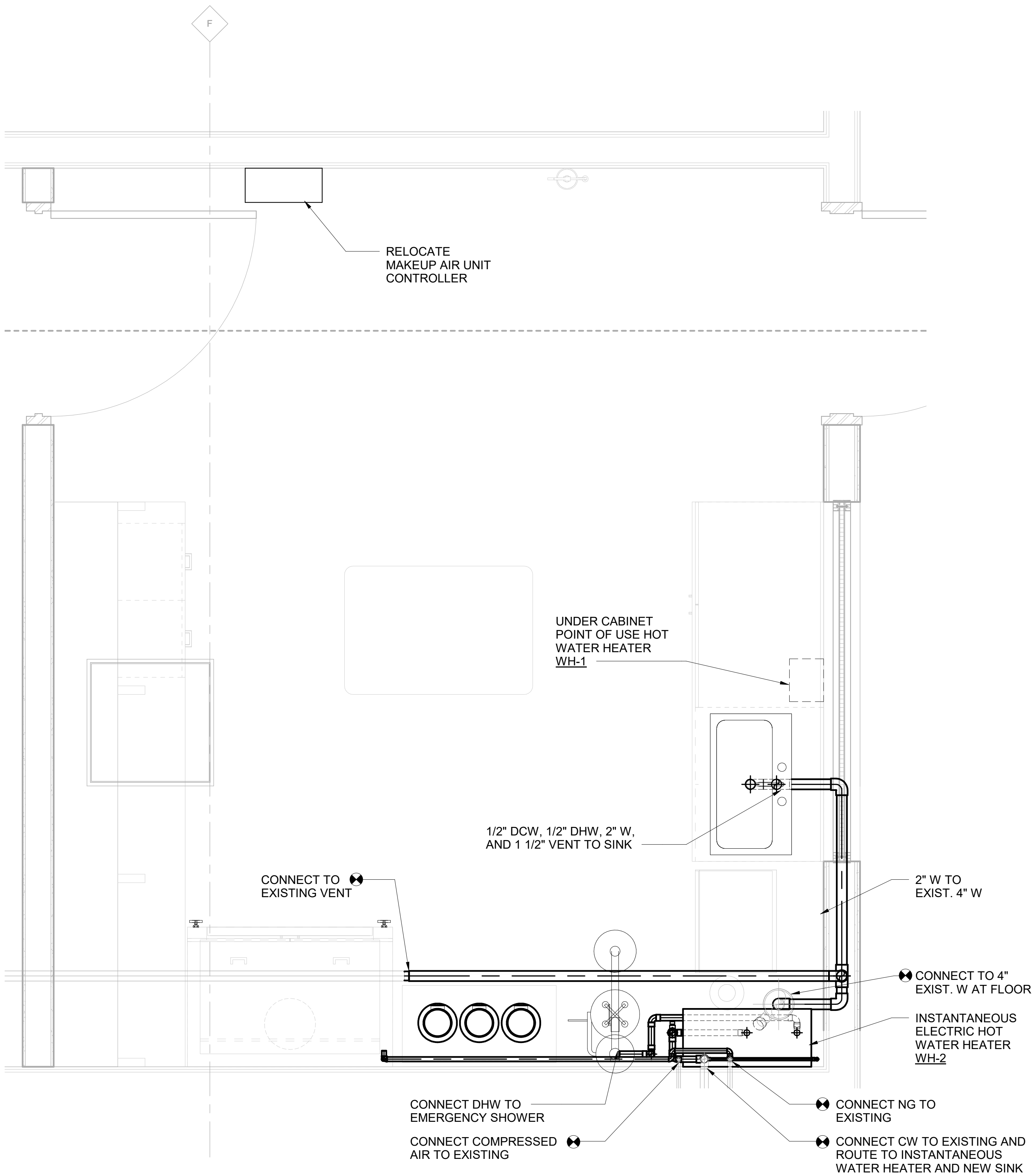
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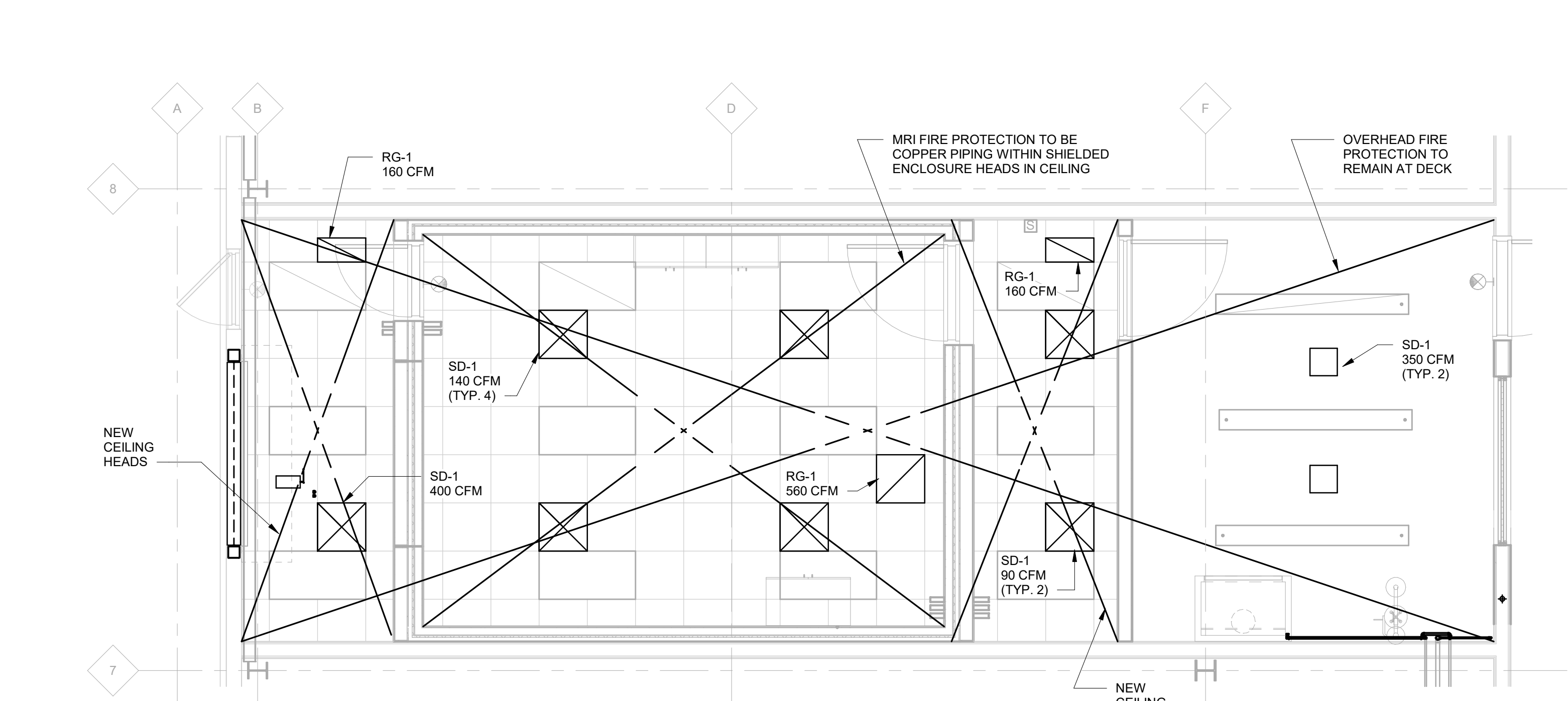
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Roof Framing
Plan & Details

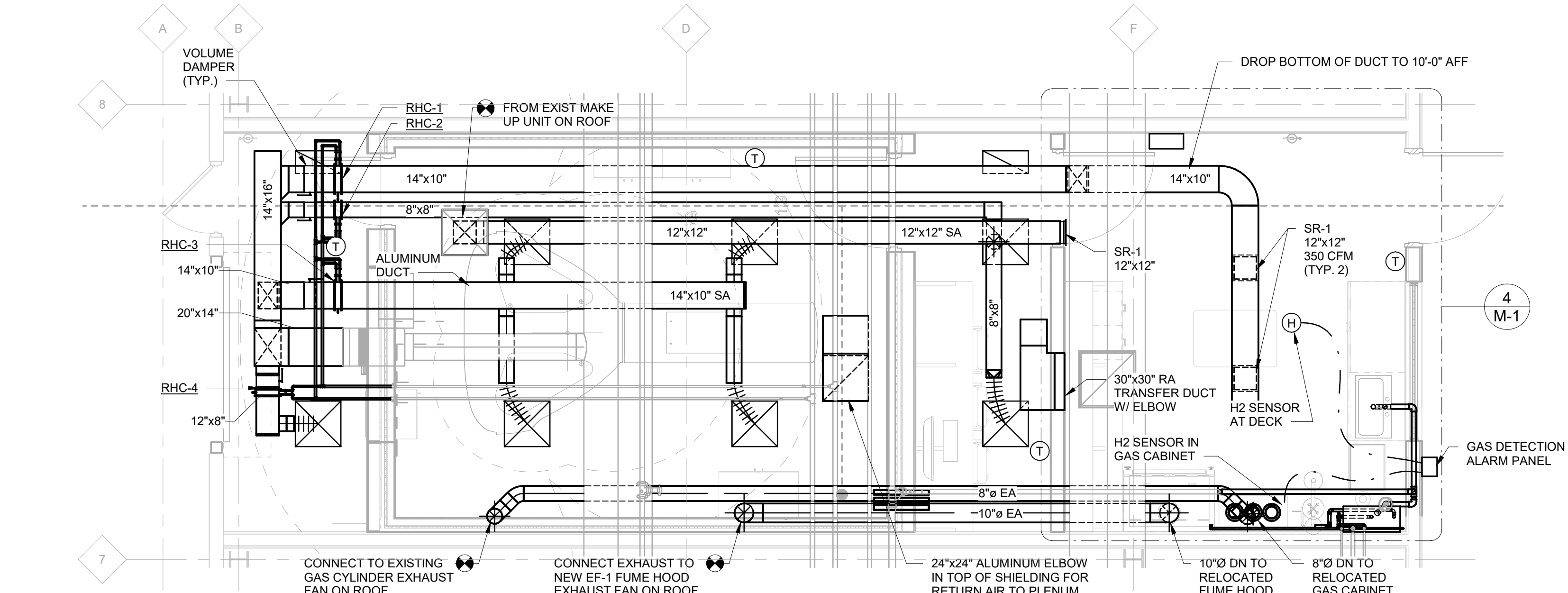
S-102



CHEMISTRY ENLARGED PLUMBING PLAN
SCALE: 3/4" = 1'-0"

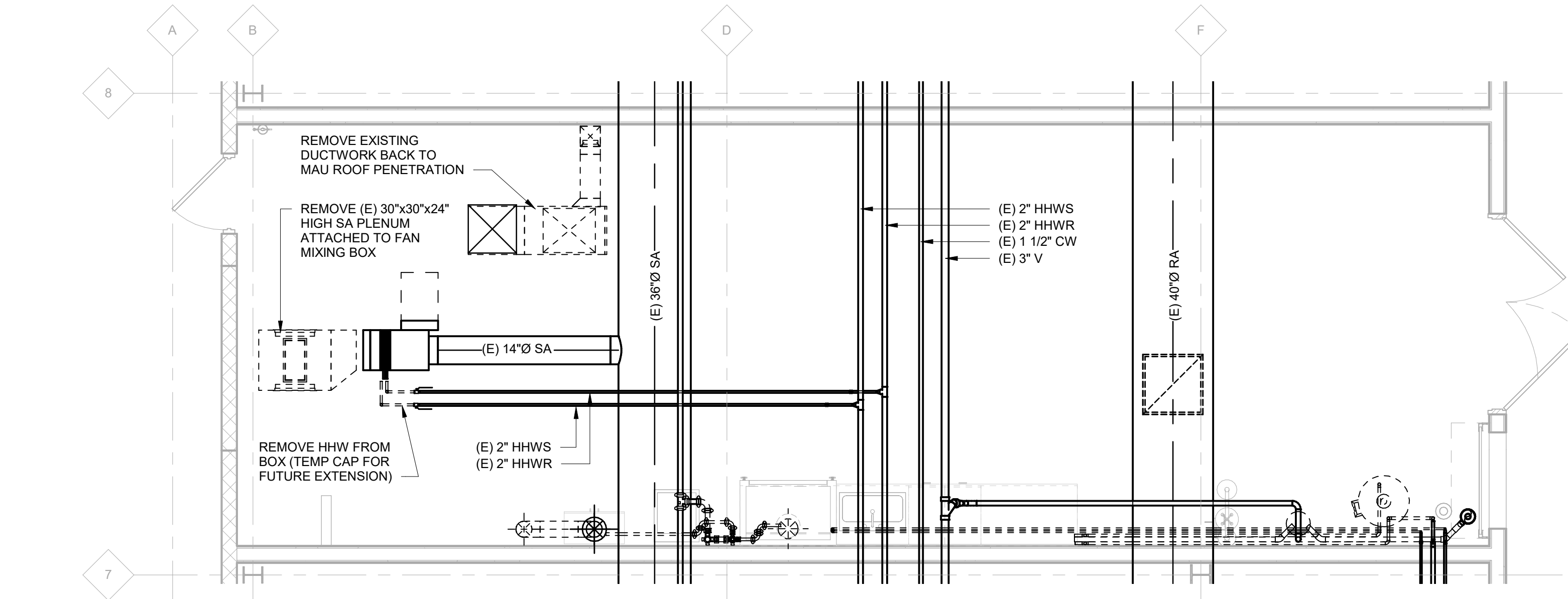


FIRST FLOOR REFLECTED CEILING PLAN/FIRE PROTECTION
SCALE: 1/4" = 1'-0"



FIRST FLOOR COMBINED NEW WORK PLAN
SCALE: 1/4" = 1'-0"

- NOTE 1:**
GAS DETECTION BY CORITECH CONSISTING OF
• QTY: 1 MSA ULTIMA X3 TRANSMITTER
• QTY: 2 MSA ULTIMA X H₂ SENSOR
• QTY: 1 MSA ULTIMA X O₂ SENSOR
• QTY: 1 CORITECH GAS DETECTION CONTROL PANEL
• QTY: 3 RAB AUDIBLE/VISUAL ALARM BEACON
• 2 AT INGRESS LOCATION; 1 INSIDE ROOM
- NOTE 2:**
REPLACE BELT ON GAS CABINET EXHAUST FAN
- NOTE 3:**
PERFORM WINTER HEATING VERIFICATION OF EXISTING MAKE UP AIR UNIT



FIRST FLOOR COMBINED DEMO PLAN
SCALE: 1/4" = 1'-0"



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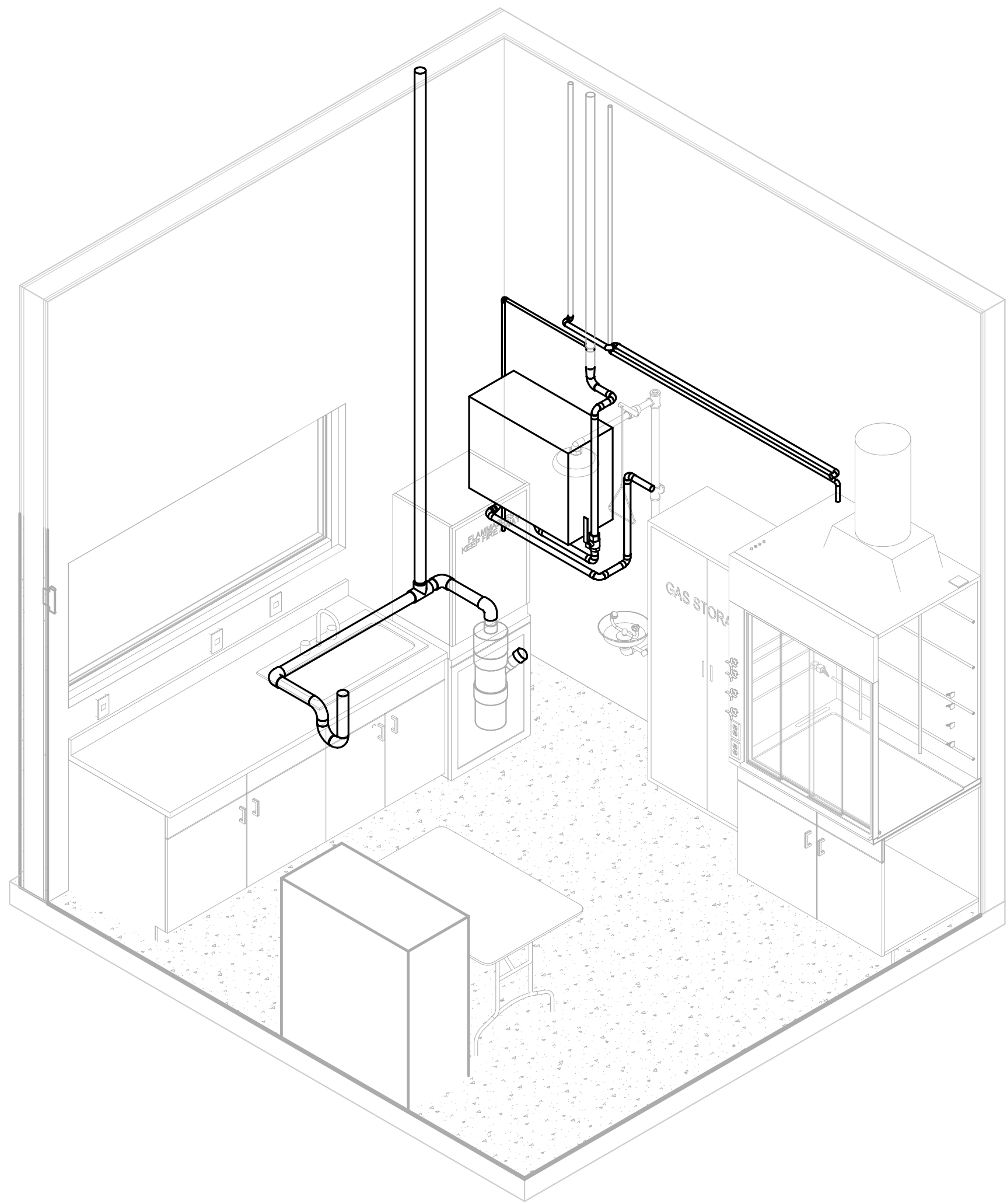
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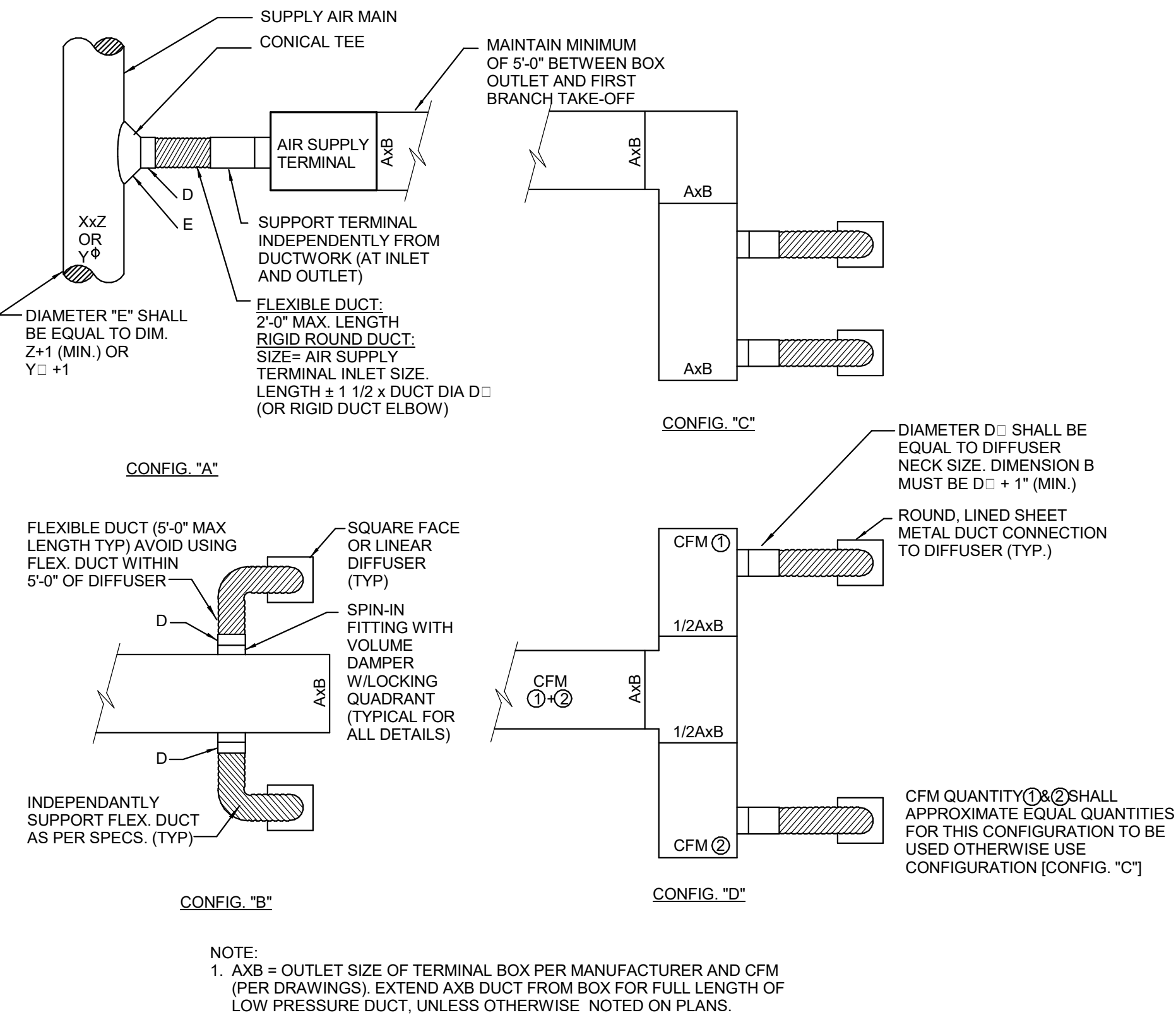
Mechanical
Combined Plans
Demo + New
Work

M-1



Domestic Water Iso
SCALE: NO SCALE

TYPICAL REHEAT COIL PIPING DIAGRAM
SCALE: NO SCALE



SUPPLY AIR TERMINAL DUCT CONNECTIONS
SCALE: NO SCALE

REHEAT COIL SCHEDULE - HOT WATER

MARK	SYSTEM SERVED	CAPACITY (MBH)	WATER SIDE				AIR SIDE				COIL			MANUFACTURER AND MODEL NUMBER	REMARKS
			FLOW (GPM)	EWT DEG. F	LWT DEG. F	MAX. P.D. FT. W.C.	FLOW (CFM)	EAT (DEG. F)	LAT (DEG F)	MAX. P.D. IN. W.C.	ROWS	COIL SIZE INCH x INCH			
RHC-1	LAB	20	2.5	180	160	NA	700	55	85	0.1	1	14X10			
RHC-2	CONTROL ROOM	6	0.6	180	160	NA	160	55	85	0.1	1	8X8			
RHC-3	MRI	20	2.5	180	160	NA	800	55	85	0.1	1	14X10			
RHC-4	EQUIP RM	10	1.0	180	160	NA	160	55	85	0.1	1	12X8			

ELECTRIC INSTANTANEOUS WATER HEATER SCHEDULE

MARK	WATER					GPM	ELECTRICAL		MANUFACTURER AND MODEL NUMBER	REMARKS
	ENTERING (DEG. F)	TEMP RISE (DEG. F)	RECOVERY RATE (GPH)	CAPACITY (GAL)	STORAGE CAPACITY GALLONS		INPUT (KW)	VOLTS/ PHASE		
WH-1	60	45	NA	NA	NA	1	7.5	120/1	EEMAX	
WH-2	60	25	NA	NA	NA	21	72	480/3	HAWS 9236	W/ FUSED DISCONNECT

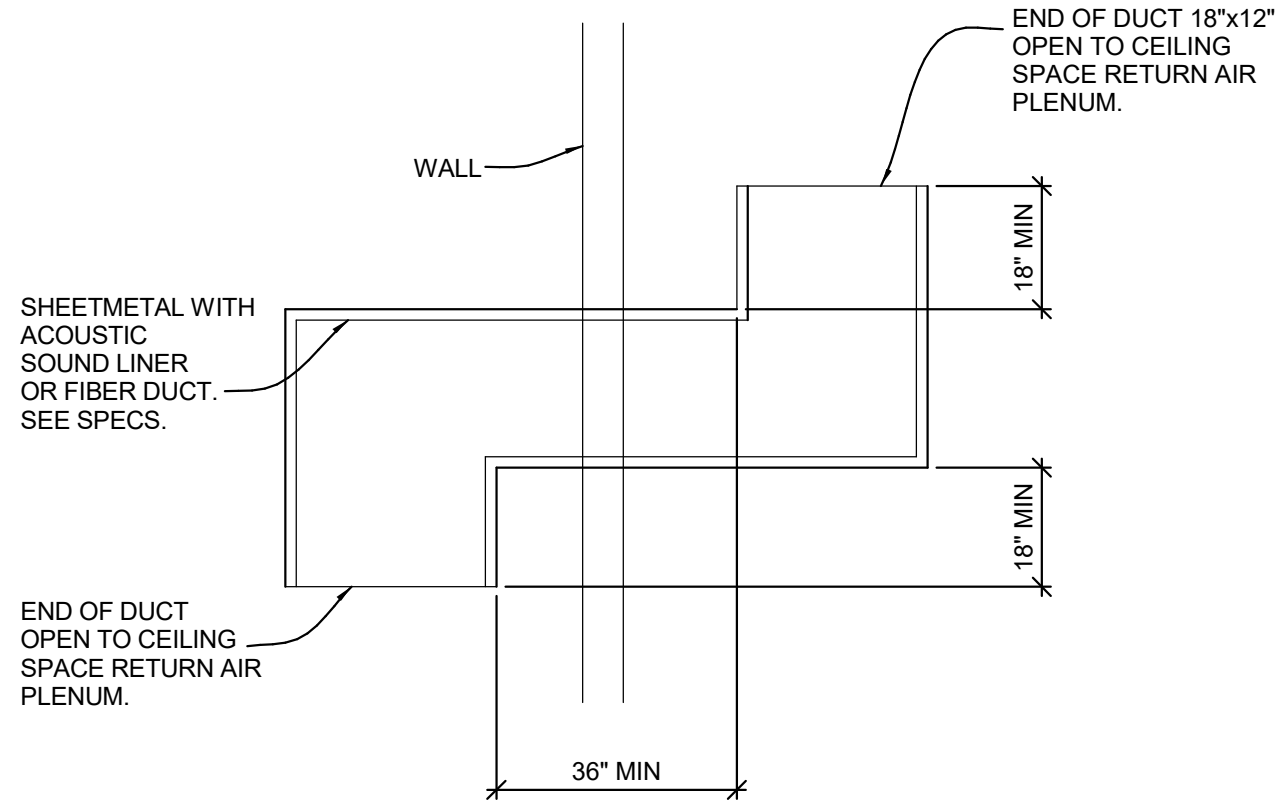
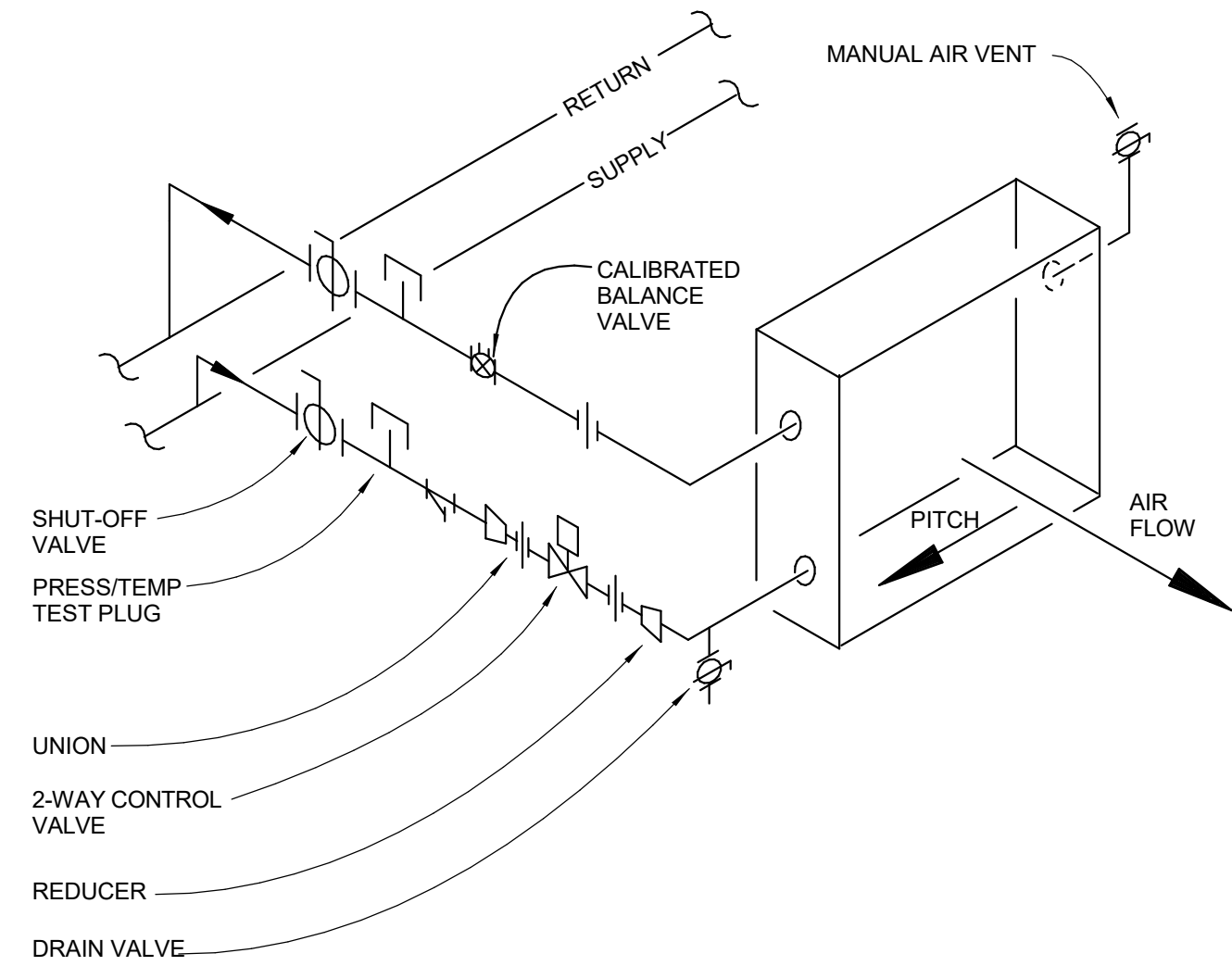
GRILLE, REGISTER AND DIFFUSER SCHEDULE

MARK	MANUFACTURER AND MODEL NUMBER	MAX. NC	REMARKS	REFER TO PLAN DRAWINGS FOR CFM, NECK SIZE, AND THROW PATTERN
SD-1	TITUS OMNI-AA	36		
RG-1	TITUS 50F	30		
SR-1	TITUS 300RS	30		

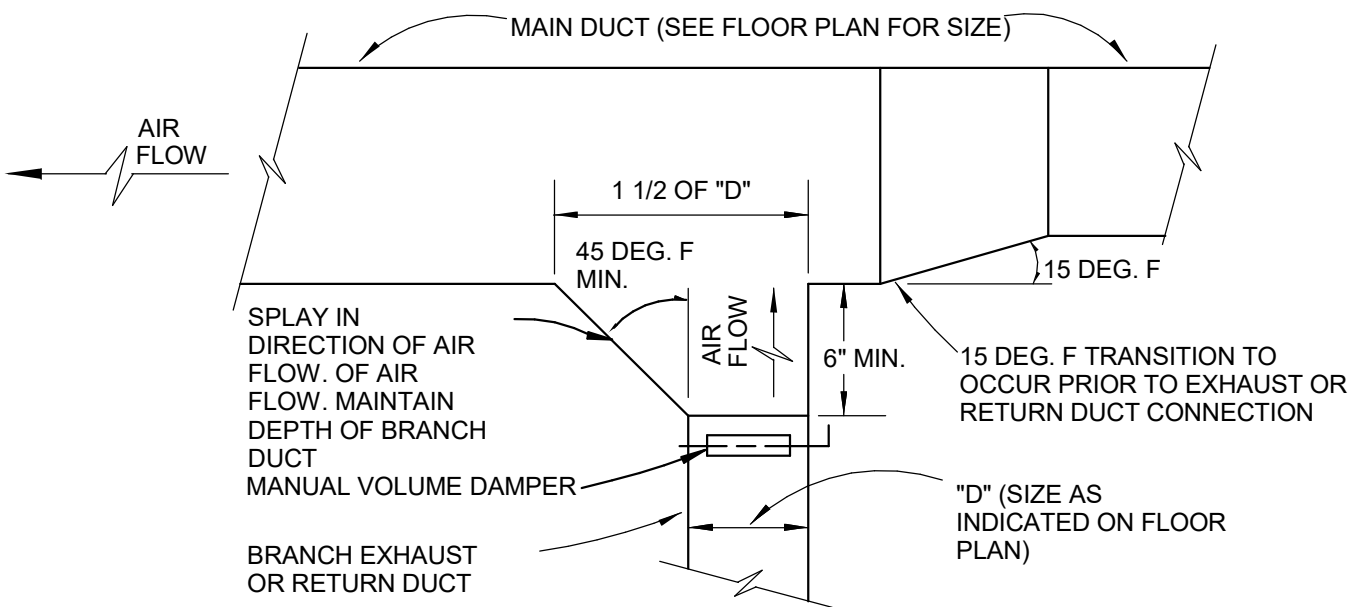
FAN SCHEDULE

MARK	TYPE	SYSTEM SERVED	FLOW (CFM)	S.P. (IN. W.G.)	CLASS	MIN DIA. (IN.)	DRIVE	MAX. BHP	MOTOR HP	VOLTS/ PHASE	MANUFACTURER AND..	REMARKS
EF-1	FUME EXHAUST	LAB HOOD	700	1.2	1	12	BELT	0.26	1/3	120/1	GREENHECK FJC 312	

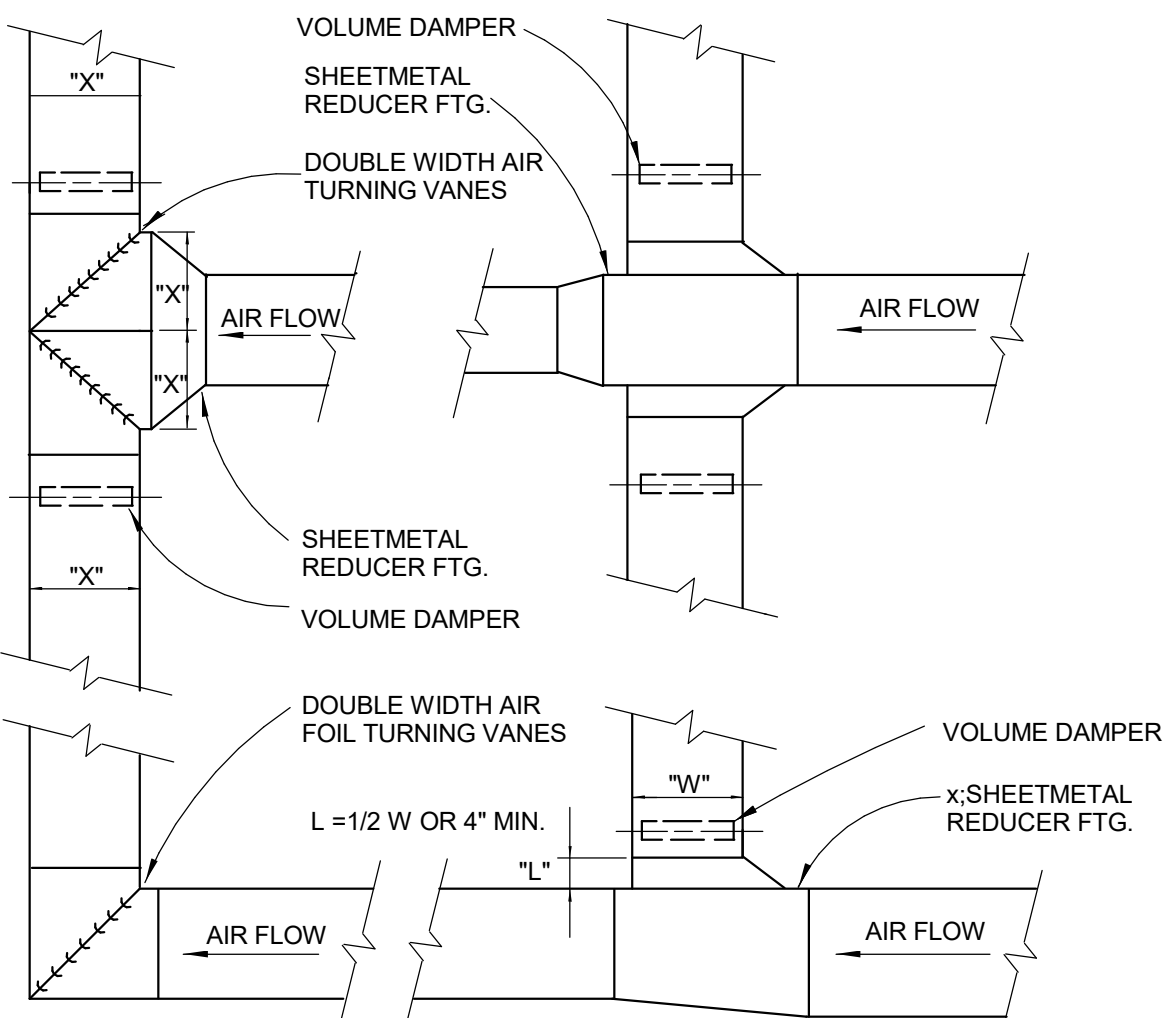
NOTES: WITH CURB CAP INLET CONNECTION



ACOUSTIC Z-BEND TRANSFER DUCT ABOVE CEILING DETAIL
SCALE: NO SCALE



EXHAUST OR RETURN AIR BRANCH DUCT CONNECTION DETAIL
SCALE: NO SCALE



NOTE: BRANCH TAKE-OFFS TO BE LOCATED IN CENTER OF REDUCER FITTINGS.

SUPPLY AIR DUCT CONNECTION DETAILS
SCALE: NO SCALE



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Mechanical
Details

M-2

1.1	GENERAL NOTES																																																																						
A.	Drawings and general provisions of the contract, including General and Supplementary Conditions, and Division -1 Specification Sections, apply to this Section refer to Project Manual.																																																																						
1.2	SCOPE OF WORK																																																																						
A.	Provide labor, including field erection and supervision, materials, equipment and ancillaries, and coordinate, procure, fabricate, deliver, erect or install, interface with existing work, start, debug and test all systems as necessary to provide the Owner with a complete operating facility in conformance with the Contract Documents.																																																																						
B.	The Work shall include, but not be limited to, the following:																																																																						
1.	Demolition of existing plumbing work including, but not limited to: domestic water piping, sanitary drain waste, and vent piping, plumbing fixtures as indicated on Drawings, including valves, accessories and supports.																																																																						
2.	Demolition of existing HVAC work including, but not limited to: medium pressure ductwork, low pressure ductwork, air inlets and outlets, and controls as indicated on Drawings, including system accessories and supports. Existing air terminal units intended to remain in service shall re-use existing controls, space thermostats shall be re-installed in new location as indicated on Drawings.																																																																						
3.	Modification of existing wet pipe sprinkler system including removal, relocation, and addition of sprinkler heads required to provide full sprinkler coverage of Project area within revised floor plan arrangement.																																																																						
4.	New plumbing work necessary to accommodate the installation of new fixtures, coffee makers, and ice makers, including piping, pipe supports, insulation, domestic water heaters, and backflow prevention devices.																																																																						
5.	New HVAC work including ductwork, supports, insulation, air inlets and outlets, equipment room air conditioning systems, air terminal units, duct cleaning, and cleaning/recalibration of existing air terminal units to remain in service.																																																																						
6.	Testing, adjusting, and balancing of HVAC air distribution systems.																																																																						
7.	Electric control work including control devices, and control wiring, and testing adjusting and calibration of existing (re-installed) controls.																																																																						
1.3	CODES, ORDINANCES, STANDARDS, PERMITS, TESTS, APPROVALS																																																																						
A.	In addition to the requirements shown or specified, comply with all applicable State, County, City, Township and local Codes, Rules, Regulations, Ordinances, and Standards.																																																																						
B.	Comply with the requirements shown or specified when those requirements are in excess of that required hereinafter.																																																																						
C.	Advise the Architect/Engineer of changes required to conform to State, County, and Local regulations, ordinances and codes prior to the time that contract is awarded.																																																																						
D.	Secure and pay for all required permits, inspections, tests and approvals.																																																																						
E.	Perform all tests required under applicable codes, rules, regulations, and ordinances.																																																																						
F.	All parts of each system and associated equipment shall be tested and adjusted to work properly and be left in good operating condition.																																																																						
G.	Provide all testing instruments, gauges, pumps and other equipment required or necessary for tests.																																																																						
H.	Notify the Owner's Representative in advance of all tests and conduct all tests to his entire satisfaction.																																																																						
I.	Correct all defects disclosed in the work by tests or otherwise without additional cost to the Owner.																																																																						
J.	Repeat tests after any defects disclosed thereby have been corrected.																																																																						
K.	Arrange and pay the cost of all utilities used in any tests.																																																																						
L.	Blank off all equipment prior to tests which could be damaged by the test pressure.																																																																						
M.	Listing of Referenced Associations, Codes, Standards and abbreviations, not all of the following Codes, Standards, and abbreviations may apply to this Project:																																																																						
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1.4	DELIVERY, STORAGE AND HANDLING
A.	Protection: Protect materials and equipment from damage during shipping, storage and handling. Remove from the site any wet or damaged duct liner or insulation.
B.	Storage: Where possible, store materials and equipment inside and protect from the weather. Where necessary to store outside, store above grade and enclose with waterproof wrapping.
1.5	CONTRACT DRAWINGS
A.	Contract Drawings for Mechanical Work are diagrammatic, intended to convey the scope of the work and indicate general arrangement of equipment, ducts, piping and approximate sizes and locations of equipment and outlets. Do not scale drawings for measurements.
B.	Consult Mechanical, Architectural, and Electrical Contract Drawings and Specifications to become familiar with all conditions affecting the Work, coordinate interconnecting work with other Trades affected, and verify all spaces in which the work will be installed.
C.	Where job conditions require reasonable changes in order to coordinate installation with other trades such as provision of ductwork and piping elbows and offsets to coordinate installation with other trades and the building structure shall be made without extra cost to the Owner.
D.	The Contract Drawings and Specifications are to be cooperative, and whatever is called for by either shall be binding as if called for by both.
1.6	SUBMITTALS
A.	General:
1.	Submit each item in this Article according to the Conditions of the Contract.
B.	All required submittals for an item shall be submitted in a complete single package.
C.	Required submittals are listed herein. Submittals not required by these Specifications will not be reviewed and will not be returned.
D.	After development and acceptance of the Contractor's construction schedule, submit a complete schedule of submittals.

E.	The following submittals are required:
1.	Plumbing Fixtures and accessories.
2.	Electric domestic water heaters.
3.	Air terminal units.
4.	Controls.
5.	Control diagrams.
F.	Shop Drawings:
1.	Submit manufacturer's technical product data, including rated capacities of selected model with clearly indicated, weights (shipping, installed, and operation), dimensions, required clearances, and methods of assembly of components, furnished specialties and accessories; and installation and start-up instructions.
2.	Submit ladder-type wiring diagrams for power and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed.
3.	Submit maintenance data and parts list for all mechanical equipment; including "trouble shooting" maintenance guide; plus servicing, and preventative maintenance procedures and schedule. Include this data and product data in maintenance manual; in accordance with requirements of Division 1.
1.7	DEMOLITION
A.	General:
1.	Demolish, remove, demolnt, and disconnect abandoned mechanical materials and equipment indicated to be removed and not indicated to be salvaged or saved.
2.	Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.
3.	Locate, identify, and protect mechanical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.
4.	Materials and Equipment to be Salvaged. Remove, demolnt, and disconnect existing mechanical materials and equipment indicated to be removed and salvaged, and deliver materials and equipment to the location designated for storage.
5.	Disposal and Cleanup: Remove from the site and legally dispose of demolished materials and equipment not indicated to be salvaged.
6.	Clean area after demolition of work to satisfaction of Owner's Representative.
7.	Repair or replace equipment or materials damaged during demolition to satisfaction of Owner's Representative.
8.	Remove, reconnect, cap, plug and replace existing piping and ductwork only where indicated in the Contract Documents.
9.	Remove and/or replace existing equipment, valves, controls, etc., only where indicated in the Contract Documents.
B.	Existing Active Piping and Ductwork:
1.	When encountered protect, brace, and support existing active piping and ductwork where required for proper execution of the work. If existing active piping and ductwork is encountered that is not indicated or noted in the Contract Documents and that requires relocation, make request in writing to the Owner's Representative for a determination. Do not proceed with the work until written directions are received from the Owner's Representative. Do not prevent or disturb the operation of the active piping and ductwork that is to remain.
C.	Existing Inactive Piping and Ductwork:
1.	When encountered in the Work, remove protect, cap or plug existing inactive piping or ductwork. If existing inactive piping and ductwork is encountered that is not indicated or noted in the Contract Documents and that interfere with the Work, make request in writing to the Owner's Representative for a determination.
D.	Interruption of Existing Active Piping:
1.	Where the Work makes temporary shut-down of services unavoidable, shut down at such time as approved by the Owner, which will cause least interference with established operating routine. Arrange to work continuously, including overtime, if required to make necessary connection to existing work.
E.	Scheduling:
1.	Submit schedules indicating proposed methods and sequence of operations for demolition prior to commencement of Work. Include coordination for shut-off of utility services and details for dust and noise control.
1.8	EXAMINATION OF SITE
A.	A visit shall be made to the job site before Bids are submitted. During this visit actual job conditions shall be examined and a check shall be made for any interferences between the work of various trades and for any apparent violations of local and state codes, laws, ordinances and regulations. If any interferences or violations appear and departure from the design intent of any Contract Documents is required, notify the Architect/Engineer before entering into the Contract with the Owner. Failure to provide the Architect/Engineer with the aforementioned notification will result in the Contractor being held responsible to complete all work to meet the intent of the Contract Drawings with no additional expense ("extras") being incurred by the Owner.
1.9	WARRANTY
A.	Maintain the premises neat and orderly and thoroughly clean-upon completion of the work.
B.	All systems, components, parts, assemblies and labor furnished under this contract shall be warranted against defects in materials and workmanship in accordance with the General Conditions, refer to Project Manual. Any manufacturing or component defects arising during this warranty period shall be corrected without cost to the Owner including cost of labor to make the necessary corrections.
C.	Additional warranty requirements, included in the individual specification sections, shall be considered requirements in addition to those of the General Conditions. In all instances, the most stringent requirements shall apply.
1.10	BASIC MECHANICAL MATERIALS AND METHODS
A.	Joint Sealers: Comply with Architectural Specifications.
B.	Access Doors and Frames: Comply with Architectural Specifications.
1.	Size shall be not less than 24" x 24".
C.	Piping Specialties:
1.	Escutcheons:
a.	Chrome-plated, stamped steel, solid or hinged split-ring escutcheon, with set screw. Inside diameter shall closely fit pipe outside diameter, or outside of pipe insulation where pipe is insulated. Outside diameter shall completely cover the opening in floors, walls, or ceilings.
b.	Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following: Chicago Specialty Mfg. Co., Sanitary-Dash Mfg. Co., Grinnell Co.
2.	Unions:
a.	Malleable-iron, Class 150 for low pressure service and class 250 for high pressure service; hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces; female threaded ends.
b.	Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following: Grinnell Co., Epco Sales, Inc., Eclipse, Inc., Perfection Corp., Watts
3.	Dielectric Unions:
a.	Provide dielectric unions with appropriate end connections for the pipe materials in which installed (screwed, soldered, or flanged), which effectively isolate dissimilar metals, prevent galvanic action, and stop corrosion.
b.	Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following: Epco Sales Inc., Eclipse Inc., Perfection Corp., Watts
4.	Y-Type Strainers:
a.	General:
1)	Provide strainers full line size of connecting piping, with ends matching piping system materials. Screens shall be Type 304 stainless steel, with 3/64" perforations at 233 per square inch.
2)	Provide strainers with 125 psi working pressure rating for low pressure applications, and 250 psi pressure rating for high pressure application.
3)	Use Threaded Ends, 2" and Smaller: Cast-iron body, screwed screen retainer with centered blowdown fitted with pipe plug.
D.	Acceptable Manufacturers: Subject to compliance with requirements, provide products of one of the following: Grinnell Gruvlok Co., Watts Reg. Co., Hayward Industrial Products Inc., Trane Co., Armstrong Machine Works, Hoffman Specialty ITT, Victaulic Co. of America (low pressure applications only), Mueller Ind., Spirax Sarco.
E.	Installation:
1.	Use fittings for all changes in direction and all branch connections.
2.	Remake leaking joints using new materials.
3.	Install strainers where indicated on the drawings and upstream of all control valves.
4.	Install unions adjacent to each valve, and at the final connection to each piece of equipment and plumbing fixture having 2" and smaller connections, and where indicated on the drawings.

F.	Sleeves:
1.	Sheet-Metal Sleeves: 10 gage, galvanized sheet metal, round tube closed with welded longitudinal joint.
2.	Steel Sleeves: Schedule 40 galvanized, welded steel pipe, ASTM A 53, Grade A.
3.	Fire Barrier Sleeves, Sealers, Etc.: Comply with applicable requirements of Architectural Specifications.
4.	Installation:
a.	Provide and set sleeves to accommodate piping passing through walls, floors, and partitions.
1)	Interior Wall Penetrations: Provide steel pipe sleeves for all piping 6 inch diameter and smaller and sheet metal sleeves for piping larger than 6 inch diameter. Terminate sleeves flush with walls.
b.	Interior Fire Rated wall and Floor Penetrations: Provide steel pipe sleeves. Terminate floor sleeves flush with the bottom of the floor slab and extend sleeve 1-1/2 inches above the top of floor slabs.
1)	Uninsulated Piping: Provide firestop material and sealant in accordance with Architectural Specifications.
2)	Insulated Piping: Extend insulation through sleeve and provide firestop material and sealant in accordance with Architectural Specifications.
1.11	SUPPORTS AND HANGERS
A.	Provide all supports, framing, etc., for the proper installation of pipe, equipment, etc., fabricated from structural steel shapes.
B.	Provide pipe hangers in accordance with Manufacturers Standardization Standards SP-58, SP-69 and SP-89, except as noted below:
1.	The use of "C" clamp style building attachments is allowed only for piping 2 inch and smaller when attaching to steel beams.
2.	The use of "C" clamp style building attachments is prohibited when attaching piping 2-1/2 inch and larger to steel beams.
C.	Provide sheet metal or threaded rod duct hangers in accordance with SMACNA.
1.	Friction clamps shall be permitted on low pressure ductwork up to 12" wide only.
2.	"C" clamps with retainer clip and lock nut shall be permitted on low pressure ductwork up to 36 inches wide only.
3.	Low pressure ductwork 37 inches wide and larger shall be concentric beam clamps. No friction or "C" clamps will be permitted.
4.	For both rectangular and round medium and high pressure ductwork, friction clamp and/or "C" clamp upper attachment devices shall not be permitted.
1.12	ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT
A.	Extent of electrical requirements for mechanical equipment is indicated on Drawings and by the requirements hereinafter.
B.	Types of items specified include the following:
1.	Factory installed motors.
2.	Factory installed control/power panels for factory assembled package units.
3.	Factor installed starters.
4.	Factory installed disconnect switches.
C.	This section includes, but is not limited to, basic electrical materials and methods, which are part of packaged mechanical equipment. These components include, but are not limited to factory installed motors, starters, and disconnect switches furnished as an integral part of packaged mechanical equipment.
D.	Specific electrical requirements (i.e. horsepower and electrical characteristics) for mechanical equipment are scheduled or otherwise indicated on the Drawings.
E.	Refer to Electrical documents for the following work; not work of this Section:
1.	Power supply wiring from power source to power connection on mechanical equipment. Division 16 work includes starters, disconnects, variable frequency drives, and required electrical devices, except where specified as furnished or factory installed by equipment manufacturer.
F.	References:
1.	NEMA Standards MG 1: Motors and Generators.
2.	NEMA Standard ICS 2: Industrial Control Devices, Controllers, and Assemblies.
3.	NEMA Standard 250: Enclosures for Electrical Equipment.
4.	NEMA Standard KS 1: Enclosed Switches.
5.	National Electrical Code (NFPA 70).

1.13	QUALITY ASSURANCE
A.	UL Compliance: Electrical components and materials shall be UL labeled.
B.	IEEE Compliance: Comply with applicable requirements of IEEE pertaining to motors and related supports equipment (i.e. enclosed switches, starters, variable frequency drives, control panels, and control devices).
C.	NEMA Compliance: Comply with applicable requirements of NEMA pertaining to motors and related support equipment (i.e. enclosed switches, starters, variable frequency drives, control panels, and control devices).
D.	Motors:
1.	General:
a.	Motor characteristics (voltage-phase-hertz) shall be as indicated on Drawings.
b.	Unless indicated otherwise, the motor horsepower specified shall be the minimum acceptable. Motor speed shall be 1750 RPM. Motors and accessories shall comply in all respects with ANSI, NEC and NEMA Standards.
c.	Unless otherwise required, all motors shall be open dripproof squirrel cage induction, "T" frame.
d.	Torque characteristics shall be sufficient to satisfactorily accelerate the driven loads.
e.	Motor sizes shall be large enough so that the driven load will not require the motor to operate in the service factor range.
2.	Temperature Rating:
a.	Constant speed motors shall be rated for 40 deg. C environment with maximum 90 deg. C temperature rise for continuous duty at full load (Class F insulation with Class B temperature rise).
b.	Motors for reduced voltage start-up shall conform to manufacturer's standard.
3.	Starting Capability:
a.	Frequency of starts as indicated by automatic control system, and not less than 5 evenly time spaced starts per hour for manually controlled motors. Accelerating time shall not exceed 15 seconds.
4.	Service Factor:
a.	1.15 for three phase motors and 1.35 for single phase motors.
5.	Motor Construction:
a.	NEMA Standard MG1, general purpose, continuous duty, Design "B", except "C" where required for high starting torque.
b.	Frames:
1)	Unless otherwise noted, all motors shall have a NEMA Standard T frame.
c.	Bearings:
1)	Ball or roller bearings with inner and outer shaft seals.
2)	Re-greassable, except permanently sealed where motor is normally inaccessible for regular maintenance. Provide grease fittings for re-greassable bearings.
3)	Designed to resist thrust loading where belt drives or other drives produce lateral or axial thrust in motor.
4)	Sleeve type bearings are permitted for motors less than 1/2 hp.
d.	Enclosure Type:
1)	Open drip-proof motors for indoor use where satisfactorily housed or remotely located during operation.
2)	Guarded drip-proof motors where exposed to contact by employees or building occupants.
3)	Weather Protected Type I for outdoor use, Type II where not housed.
e.	Overload Protection:
1)	Built-in thermal overload protection and, Architectural Specifications internal sensing device suitable for signalling and stopping motor at starter.
6.	Efficiency:
a.	Motors shall meet or exceed the efficiencies listed in per NEMA MG1 Table 12-10; however motor efficiency shall not be less than that listed that listed the ASHRAE/IES Standard 90.1 - latest edition.
b.	Inverter-duty motors shall be type 12.B design.

7.	Nameplate:				
	a.	Indicate the full identification of manufacturer, ratings, characteristics, construction, special features and similar information.			
8.	Approved Manufacturers:				
	a.	Subject to compliance with requirements, provide products of one of the following:			
		1)	Century Electric Division of Gould Corp.		
		2)	General Electric		
		3)	Reliance Electric.		
		4)	Marathon		
		5)	U.S. Electrical Motors		
		6)	Siemens		
E.	Disconnect Switches:				
	1.	Disconnect switches shall be in accordance with Electrical documents.			
14.	PLUMBING SYSTEMS				
A.	General:				
	1.	Drainage lines shall be laid to a minimum pitch of 1/8" per foot, unless otherwise noted, within the building and below grade.			
	2.	Connections and changes in direction of drainage lines shall be made with Y's and long quarter bends. Changes in direction shall be made by special fittings and be securely braced and blocked in an approved manner.			
	3.	Verify invert elevation of existing sewer at points of connection before starting construction.			
	4.	Coordinate installation of all new piping with existing piping and building interferences.			
	5.	Flush and chlorinate all domestic cold water, hot water and recirculating hot water piping in accordance with all code requirements.			
	6.	Support plumbing piping in accordance with Section 1.12 Supports and Hangers.			
B.	Piping shall be as follows:				
	1.	Sanitary and Vent Piping:			
		a.	All sizes aboveground:		
			1) Pipe	-	Type CISP-SV service weight cast iron soil pipe ASTM A74.
			2) Fittings	-	"No-Hub" joints CIPA Std. 301.
	2.	Domestic Cold Water and Hot Water:			
		a.	All sizes:		
			1) Pipe	-	Type L drawn copper tube.
			2) Joints	-	ASTM B32-95TA Soder, or "Pro-Press".
			3) Fittings	-	Wrought copper solder fittings, conforming to ANSI B16.22.
C.	Valves:				
	1.	Approved Manufacturers: Nibco, Crane and Apollo.			
		a.	All Sizes Check	-	200 lb. bronze, bronze disc, swing check and regrindable seat; Crane No. 36.
		b.	All Sizes Ball	-	150 lb. bronze body and bonnet, 2-piece construction with chrome-plated brass ball, standard port for 1/2 inch size and smaller; full port for 3/4 inch and larger size. ASTM B564; solder or screwed connections.
D.	Plumbing Accessories:				
	1.	Supplies and Stops for Lavatories and Sinks:			
		a.	Polished chrome-plated, loose-keyed angle stop having 1/2" inlet and 3/8" O.D. flexible tubing risers 1/2" chrome plated brass nipple to wall and wall escutcheon. Subject to compliance with requirements, provide supplies and stops of one of the following:		
			Chicago Faucet Model Nos. 1000 thru 1018 T&S Brass Series 1300 Kohler K-7676		
		2.	Traps:		
		a.	Chrome plated cast brass adjustable "P" trap with cleanout and chrome plated cast brass waste to wall.		
	3.	Escutcheons:			
		a.	Chrome plated sheet steel wit friction clips.		
E.	Plumbing Fixture Rough-In Schedule:				
		FIXTURE Sink	HOT WATER 1/2"	COLD WATER 1/2"	WASTE 1-1/2" VENT 1-1/2"
F.	Plumbing Equipment:				
	1.	Electric Water Heaters:			
		a.	General: Provide residential electric water heaters of sizes, capacities, and electrical characteristics as indicated on drawings and equipment list.		

1.15

PIPING SYSTEMS

A.

Hydronic Piping:

1.

Pipe All Sizes

ASTM B88 Type "L" hard drawn copper tube.

2.

Fittings

ANSI B16.22 copper, streamlined pattern.

3.

Joints

ASTM BCup-5 Sil-Fos Clean-N-Brite 6, 6% silver brazing alloy, or "Pro-Press".

B.

Refrigerant Piping:

1.

Pipe All Sizes

ASTM B280 type ACR hard drawn copper tube.

2.

Fittings

ANSI B16.22 copper, streamlined pattern.

3.

Joints

Brazed, AWS A5.8 Classification BAg-1 (silver).

1.16

PAINING AND IDENTIFICATION

A.

Flow arrows and system label shall be placed on all new ductwork and piping at valves, elbows, and not greater than 20 ft. on center on straight runs with a minimum of one (1) marker in all ceiling spaces surrounded by walls extending up to deck above. Duct markers shall be adhesive type with system identification and flow direction arrow. Piping markers shall be semi-rigid plastic which snap completely around pipe and protected with a plastic coating with system identification and flow direction arrow. Markers shall be equal to Seton Name Plate Corporation.

1.17

INSULATION

A.

Approved Manufacturers: Johns-Manville, Owens-Corning Fiberglas, CertainTeed, Knauf.

B.

Insulation shall be applied by experienced pipe coverers as per best trade practice, guided by manufacturer's printed installation directions.

C.

Insulation shall be applied to pipe lines and equipment only after they have been tested, inspected and all surfaces thoroughly cleaned of all foreign materials, grease and rust.

D.

All insulation covering which is to be painted shall have a satisfactory surface condition in order to receive paint.

E.

Insulation shall be fiberglass with an average thermal conductivity not exceeding .11 BTU&ln./Sq.Ft./degrees F. per hour at mean temperature of 75 degrees F., (ASTM C335-69). Piping insulation and coverings shall have a flame spread rating of <28 and a smoke developed rating of <50.

F.

Provide a jacket on all insulation. Provide vapor barrier jackets on all pipe and duct insulation which operate below ambient temperature; jackets shall overlay a minimum of 3" and shall be pasted down with adhesive. Adhesive shall be vapor type with vapor barrier jackets.

G.

Jackets for all insulation shall be fire-retardant type.

H.

Fittings and valves shall be insulated and jacketed similar to that for the pipe. Laps on longitudinal and butt joints shall be pasted down with a vapor barrier adhesive equal to Benjamin Foster 82-07. Fittings shall be wrapped with presized glass cloth and coated with vapor barrier mastic.

I.

Insulation thickness shall be equal or greater than that recommended in the latest edition of ASHRAE Standard 90.1.

J.

Insulate the following systems:

1.

Domestic cold water.

2.

Domestic hot water.

3.

Heating hot water.

K.

The following do not require insulation.

1.

Lined ductwork.

2.

Exposed, chrome plated piping, except at handicapped fixtures.

3.

Domestic, hot water valves and unions.

4.

Exposed ductwork and ductwork concealed within return air plenum.



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I2C MRI
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NOT FOR CONSTRUCTION

HED

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Suite 200
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48033 USA

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WWW.HED.DESIGN

Mechanical
Specifications

M-3

FOR REFERENCE ONLY

1.18 HEATING, VENTILATING AND AIR CONDITIONING

A. Duct Construction:

1. All ductwork shall be constructed and supported in accordance with the requirements of the latest SMACNA's issue of "HVAC Metal Duct Standards". At Contractor's option, Ductmate Industries "26" duct connector may be provided in lieu of any SMACNA joint "F" or lighter class joint; and Ductmate Industries "35" duct connector may be provided in lieu of any SMACNA "J" or lighter class joint. All joints and seams of all ductwork shall be sealed.
2. All ductwork shall be constructed air-tight. After installation, ductwork shall be tested following a procedure as hereinafter specified.
3. New medium pressure supply ductwork shall be factory fabricated, spiral wound round, or flat oval, internally insulated duct with perforated inner liner.
4. It is essential that all ductwork be kept free of dirt and foreign matter. Therefore, after and during assembly of ducts, clean all dirt, grease, rubbish, etc., from both the interior and exterior ductwork.
5. All sheet metal shall be best grade, prime sheets. Ducts 19" and over shall be cross broken or beaded.
6. In general, ductwork shall have a neat workmanlike appearance and shall be installed straight and level as the location requires.
7. All sheet metal sections shall be identified with U.S. Std. or Alum B & S gauges.
8. All duct hangers, supports, and spacing for low and medium round and rectangular ductwork shall conform to the latest SMACNA Standards unless otherwise indicated. Sound absorbers and other items such as dampers that add to the weight of the ductwork shall be supported from the building structure by supplemental hangers. Tie wires are not acceptable duct supports.
9. Support ductwork in accordance with Section "Supports and Hangers".
10. Ductwork located in exposed areas (no ceiling) shall be suitable to receive field applied finish. Coordinate requirements for application of finish with Architectural Trades. New exposed ductwork in areas without ceilings unless otherwise noted shall be factory fabricated, spiral wound round, or flat oval as indicated with no dents, scratches, or other visible or non-visible damage.
11. Duct sizes indicated shall be carried full size to equipment served. Any change of size to match equipment connection shall be made immediately adjacent to the equipment.
12. Install all dampers, air flow measuring stations, etc. that are provided under other sections of these Specifications.
13. Duct Sealing System:
 - a. General: Seal all seams, joints, ductwall penetrations, and fitting connections shall be sealed.
 - b. Indoor Galvanized Duct Sealant: Hardcast Iron Grip 601 vinyl acrylic, water based, brush-on duct sealant or hardcast gypsum impregnated #DT tape with #RTA50 activator/adhesive applied according to manufacturer's directions.
 - c. All sealants shall be U.L. rated and shall conform with NFPA 90A.
14. Low Pressure and High Pressure Insulated Flexible Duct:
 - a. All low pressure and high pressure flexible duct shall be Flexmaster USA, Inc. Type #3 insulated flexible duct consisting of a factory fabricated assembly of a trilaminate of aluminum foil, fiberglass and polyester. It shall be mechanically locked without adhesives into a formed aluminum helix on the ducts outside surfaces. The duct material shall be factory wrapped in a thick blanket of fiberglass insulation with a C factor of 2.3 or less. The insulation shall be encased in a fire retardant polyethylene protective vapor barrier with a perm rating of not over .1 grains per square ft. per hour per inch of mercury. The flexible duct shall be U.L. listed 181 Class I air duct and comply with NFPA 90A and 90B and have a flame spread of not over 25 and a smoke developed of not over 50. The flexible duct shall have a minimum pressure rating of 12" W.C. through a temperature range of -20°F to +250°F.

B. Accessories:

1. Manual Volume Dampers
 - a. General: Factory fabricated with required hardware and accessories. Stiffen damper blades for stability. Include locking device to hold single-blade dampers in a fixed position without vibration. Close duct penetrations for damper components to seal duct consistent with pressure class.
 - b. Single Blade Round Volume Dampers: SMACNA construction not less than two (2) gauges heavier than duct with continuous 3/8" diameter shaft with dual pivots, non-ferrous bearings, and quadrant lock. All materials other than bearings shall be galvanized steel.
 - c. Rectangular Volume Dampers: Provide multiple opposed-blade design with standard leakage rating, with linkage outside airstream, and suitable for horizontal or vertical applications. SMACNA construction not less than two (2) gauges heavier than duct with continuous 3/8" diameter shaft with dual pivots, non-ferrous bearings, and quadrant lock. All materials other than bearings shall be galvanized steel.
 - d. Manufacturer: Subject to compliance with requirements, provide manual volume dampers of one of the following:
 - 1) Air Balance, Inc.
 - 2) Airguide Corp.
 - 3) American Warming & Ventilating, Inc.
 - 4) Arrow Louver and Damper; Div. of Arrow United Industries, Inc.
 - 5) Louvers and Dampers, Inc.
 - 6) Penn Ventilator Co.
 - 7) Ruskin Mfg. Co.
2. Turning Vanes:
 - a. Airfoil shaped, double thickness type to comply with SMACNA's "HVAC Duct Construction Standards--Metal and Flexible."
 - b. Construction material shall be same as ductwork wherein they are to be installed.
 - c. Manufacturer: Subject to compliance with requirements. Provide turning vanes of one of the following:
 - 1) Aero Dyne Co.
 - 2) Aisan Corp.
 - 3) Anemostat Products Div.; Dynamics Corp. of America
 - 4) Duro-Dyne
3. Duct Mounted Access Doors and Panels:
 - a. General: Fabricate doors and panels airtight and suitable for duct pressure class.
 - b. Frame: Galvanized, sheet steel, with bend-over tabs and foam gaskets.
 - c. Door: Double-wall, galvanized, sheet metal construction with insulation fill and thickness, and number of hinges and locks as indicated for duct pressure class. Include vision panel where indicated. Include 1-by-1-inch butt or piano hinge and cam latches.
 - d. Seal around frame attachment to duct and door to frame with neoprene or foam rubber.
 - e. Insulation: 1-inch thick, fibrous-glass or polystyrene-foam board.
 - f. Manufacturers: Subject to compliance with requirements. Provide duct mounted access doors and panels of one of the following:
 - 1) Air Balance Inc.
 - 2) Air Filter Co.
 - 3) Duro Dyne Corp.
 - 4) Ruskin Mfg. Co.
 - 5) Ventfabrics Inc.

C. Duct Liner:

1. All new concealed rectangular low pressure ductwork (downstream of air terminal unit) shall be internally lined with acoustical insulation. Round low pressure concealed ductwork shall be externally insulated, round exposed ductwork does not require insulation.
2. Duct liner shall be 1" thick (unless otherwise noted on drawings), Type 300, glass fiber in accordance with SMACNA Duct Liner Application Standard; and shall be coated to prevent fiber erosion. Duct liner shall have a flame spread rating of less than 50 in accordance with ASTM C 1071, ASTM E-84 and UL 723 Standards.
3. Duct liner shall be Certain-Teed Toughguard, Knauf Fiberglass EN, Schuller Permacote HP or Mason Insulation, Inc. Akousti-Liner.

D. Air Outlets and Inlets:

1. General: Except as otherwise indicated, provide manufacturer's standard ceiling air diffusers where shown; of size, shape, capacity and type indicated; constructed of materials and components as indicated, and as required for complete installation. Refer to equipment list.
2. Provide all registers with key-operated opposed blade dampers.
3. Provide frames for all grilles and registers mounted on walls and ceilings. All grilles and registers shall be secured with concealed fasteners and shall have 3/4" borders unless otherwise indicated. Spring clip type concealed fasteners will not be permitted.
4. Ceiling diffusers shall be provided with equalizing grid.
5. All registers and diffusers shall be sponge rubber gasketed at the flanges to prevent air leakage.
6. Grilles, registers and diffusers installed in ceilings shall be located as indicated on the reflected ceiling plans.
7. All dampers, vanes, deflectors, blank off plates, equalizing grids shall be finished in flat black enamel.
8. All other grilles, registers and diffusers shall be factory painted with a white satin finish.
9. Performance: Provide ceiling air diffusers that have, as minimum, temperature and velocity traverses, throw and drop, and noise criteria ratings for each size device as listed in manufacturer's current data.
10. Ceiling Compatibility: Provide diffusers with border styles that are compatible with adjacent ceiling systems, and that are specifically manufactured to fit into ceiling module with accurate fit and adequate support. Refer to general construction drawings and specifications for types of ceiling systems which will contain each type of ceiling air diffuser.
11. Types: Provide ceiling diffusers of type, capacity, and with accessories as indicated on the drawings.
12. Manufacturer: Subject to compliance with requirements, provide diffusers of one of the following:
 - a. Anemostat Products Div.; Dynamics Corp. of America
 - b. Carnes
 - c. Krueger Mfg. Co.
 - d. Metal-aire.
 - e. Titus Products Div.; Philips Industries, Inc.
 - f. Tuttle and Bailey.
 - g. Price
 - h. Nallor Industries

1.19 LEAK TESTING

- A. Leak test all supply and all exhaust ductwork and plenums, in accordance with the SMACNA HVAC Air Duct Leakage Test Manual with the rate of air leakage (CL) less than or equal to 6.0 as determined in accordance with the following equation:
$$CL = F \times PO.65$$

Where:

$$F = \text{The measured leakage rate in CFM per 100 square feet of duct surface.}$$
$$P = \text{The static pressure of the test (which shall be equal to or greater than the associated fan static pressure rating which is scheduled on the drawings).}$$

1.20 FIRE SUPPRESSION

- A. General:
 1. Design and build the fire suppression system(s) in accordance with the following requirements described herein.
 2. Drawings describe general building arrangement including architectural features, structure, mechanical, and electrical features, and spaces to be protected.
 3. Secure design approval of State and/or local Fire Marshal, and Owner's Underwriter prior to start of construction.
 4. Provide all fire protection system design, engineering, installation, documentation flushing, testing, certification and approval as required by the Michigan Department of Consumer and Industry Services - Office of Fire Safety, and/or local Fire Marshal, and Owner's Underwriter.
 5. Fire suppression systems shall comply with all applicable codes, NFPA requirements, State and Local Fire Marshal requirements, and Owner's Underwriter requirements.
 6. Working plans shall be coordinated with reflected ceiling plans. In all locations, sprinklers shall be located on a grid system.
 7. All sprinkler heads in areas with ceilings shall be flush mounted concealed.
 8. All sprinkler heads in lay-in ceilings shall be located in the center of ceiling tiles in both directions.
 9. Sprinkler heads in hard ceilings shall be arranged to provide symmetrical appearance. Final approval of sprinkler head layout is subject to approval by Architect. Contractor may be required to provide additional heads.
 10. Provide a double interlock pre-action fire suppression system for the new Data Center. Locate pre-action valve and control panel in Fire Protection Room located in Garage area.
- B. System Description:
 1. Fire protection system is a "Wet-Pipe" system employing automatic sprinklers attached to a piping system containing water and connected to a water supply so that water discharges immediately from sprinklers opened by fire.
- C. Scope of Work:
 1. The entire existing Project area is fully protected by a system of automatic sprinklers. New work shall include relocation of existing sprinklers, removal of existing sprinklers, or the addition of new sprinklers necessary to accommodate new floor plan arrangement. When complete, all Project areas shall be fully sprinklered.
- D. System Design Criteria:
 1. All spaces unless superseded by Code or Owners Insurance Underwriter: Light hazard, 0.10 GPM/square foot over 1500 square feet.
 2. Where allowed by Code, hydraulic calculations may include ceiling height capacity reduction allowance for use of "Quick Response" type heads.
- E. Submittals:
 1. Submit shop drawings prepared in accordance with NFPA 13 identified as "Working Plans", including hydraulic calculations where applicable, and which have been approved by the authorities having jurisdiction and the Owner's Insurance Underwriter.
 2. Submit test reports and certificates including "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping" as described in NFPA 13.
- F. Quality Assurance:
 1. Installer Qualifications: Installation and alterations of fire protection piping, equipment, specialties, and accessories, and repair and servicing of equipment shall be performed only by a qualified installer. The term qualified means experienced in such work (experienced shall mean having a minimum of 5 previous projects similar in size and scope to this project), familiar with all precautions required, and has complied with all the authority having jurisdiction. Upon request, submit evidence of such qualifications to the Architect. Refer to Division-1 Section: "Quality Requirements" for definitions for "Installers".
 2. Qualifications for Welding Processes and Operators: Comply with the requirements of AWS D10.9, "Specifications for Qualifications of Welding Procedures and Welders for Piping and Tubing, Level AR-3".
 3. Regulatory Requirements: Comply with the requirements of the following codes:
 - a. NFPA 13 - Standard for the Installation of Sprinkler Systems.
 - b. UL and FM Compliance: Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, and Factory Mutual approved for the application anticipated.
- G. Acceptable Manufacturers:
 1. Valves:
 - a. Milwaukee
 - b. Nilco
 - c. Kennedy Valve, Div. of Grinnell Valve Co., Inc.
 2. Grooved Mechanical Couplings:
 - a. Stockham
 - b. Victaulic Company of America
 - c. Grinnell Gruvlok
 3. Water Flow Indicators:
 - a. System Sensor
 - b. Potter

4. Sprinkler Heads:

- a. Automatic Sprinkler Corp. of America
 - b. Central Sprinkler Corp.
 - c. Firematic Sprinkler Devices, Inc.
 - d. Globe Fire Equipment Co.
 - e. Guardian Automatic Sprinkler Co., Inc.
 - f. Grinnell
 - g. Reliable Automatic Sprinkler Co., Inc.
 - h. Star Sprinkler Corp.
 - i. Viking Corp.
5. Factory Mutual Research Corporation-Approved (FMAC-Approved) Flexible Sprinkler Connections:
 - a. Flexhead Industries, Inc.
 - H. Pipe and Tubing Materials:
 1. General: Piping, tubing, joints and fittings shall be in accordance with NFPA 13 and NFPA 14, with the following exception: use of any non-metallic pipe is prohibited.
 - I. Valves:
 1. Gate Valves - 2 inch and Smaller: Body and bonnet of cast bronze, 175 pound cold water working pressure - non-shock, threaded ends, solid wedge, outside screw and yoke, rising stem, screw-in bonnet, and malleable iron handwheel. Valves shall be capable of being repacked under pressure, with valve wide open.
 2. Gate Valves - 2-1/2 Inch and Larger: Iron body; bronze mounted, 175 pound cold water working pressure - non-shock. Valves shall have solid taper wedge; outside screw and yoke, rising stem; flanged bonnet, with body and bonnet conforming to ASTM A 126 Class B; replaceable bronze wedge facing rings; flanged ends; and a packing assembly consisting of a cast iron gland flange, brass gland, packing, bonnet, and bronze bonnet bushing. Valves shall be capable of being repacked under pressure, with valve wide open.
 3. Swing Check Valves: MSS SP-71; Class 175, cast iron body and bolted cap conforming to ASTM A 126, Class B; horizontal swing, with a bronze disc or cast iron disc with bronze disc ring, and flanged ends. Valve shall be capable of being refitted while the valve remains in the line.
 - J. Automatic Sprinklers:
 1. Sprinkler Heads: fusible link type, and style as indicated or required by the application. Unless otherwise indicated, provide heads with nominal 1/2 inch discharge orifice, for "Ordinary" temperature range.
 2. Sprinkler Head Finishes: Provide heads with the following finishes:
 - a. Upright, Pendent, and Sidewall Styles: Chrome plated in finish spaces, exposed to view; rough bronze finish for heads in unfinished spaces and not exposed to view. Heads shall be wax-coated where installed exposed to acids, chemicals, or other corrosive fumes.
 - b. Recessed Style: Bright chrome, with bright chrome escutcheon plate.
 3. All new sprinkler heads shall be "Quick Response" type. All existing drops that are to remain shall have heads replaced with "Quick Response" type.
 - K. Fire Suppression Piping Installations:
 1. Locations and Arrangements: Drawings (plans, schematics, and diagrams) indicate the general location and arrangement of piping systems. So far as practical, install piping as indicated.
 - a. Deviations from approved "Working Plans" for sprinkler piping, require written approval of the authority having jurisdiction. Written approval shall be on file with the Architect prior to deviating for the approved "Working Plans".
 2. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.
 3. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
 4. Install unions in pipes 2 inch and smaller, adjacent to each valve. Unions are not required on flanged devices or in piping installations using grooved mechanical couplings.
 5. Install flanges or flange adapters on valves, apparatus, and equipment having 2-1/2 inch and larger connections.
 6. Hangers and Supports: Unless otherwise noted on Drawings or specified herein, comply with the requirements of NFPA-13, and NFPA-14.
 - a. The use of "C" clamp style building attachments is allowed only for piping 2 inch and smaller when attaching to steel beams, provided point load limitations indicated in Structural Drawings is not exceeded.
 - b. The use of "C" clamps style building attachments is prohibited when attaching piping 2-1/2 inch and larger to steel beams.
 - c. Hanger and support spacing for piping joined with grooved mechanical couplings shall be in accordance with the grooved mechanical coupling system manufacturers published instructions for "rigid" systems.
 7. All heads shall be centered in both directions in 2 x 2 portion of 2 x 4 ceiling tiles. Refer to Architectural documents.

1.21 TESTING, ADJUSTING AND BALANCING

- A. Balance each air terminal unit to indicated total air quantity. Set air terminal unit maximum air quantity to total zone air flow indicated on plans. All air terminal units shall have minimum primary airflow position set to "Zero" (0) airflow. Set fan powered air terminal units to indicated total supply air quantity, set minimum primary airflow position to "Zero" (0) airflow.
- B. Balance each air inlet and outlet to air quantity indicated on Drawings.
- C. System testing, balance, and adjusting shall be completed by a NEBB, or AABC certified agency.
- D. Submit final balancing report on NEBB, or AABC standard forms.
- E. Pre-construction air balance shall include recording airflow from each existing air terminal unit prior to start of demolition. Existing airflow readings may be taken from existing building Tridium DDC control system. Report shall include current design airflow, manufacturers minimum airflow, and manufacturers maximum airflow for each fan powered and variable volume air terminal unit. Provide plan indicating location of existing air terminal units in building along with the current terminal unit tag.

1.22 TEMPERATURE CONTROLS

- A. Temperature control work includes relocation and reconnection of existing space thermostats to existing air terminal units, and the provision of new space thermostats for new air terminal units.
- B. New reheat coil control valves and room sensors interconnected with existing building DDC control system

1.23 GAS DETECTION

- A. Hydrogen sensor shall be Honeywell XCD type or equal
- B. Remote monitor shall be Honeywell Toughpoint Plus or equal.



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2017-03497-000
CLIENT'S PROJECT NUMBER: 212-313128

Mechanical
Specifications

M-4

ONE-LINE DIAGRAM SYMBOLS

	CAPACITOR
	CIRCUIT BREAKER
	PRIMARY DRAW OUT CIRCUIT BREAKER
	DRAW OUT CIRCUIT BREAKER
	DISCONNECT SWITCH UNFUSED
	DISCONNECT SWITCH FUSED
	MOTOR STARTER, OVERLOADS AND HAND-OFF-AUTO (H-O-A) SWITCH, RED (R) AND GREEN (G) PILOT LIGHTS (SIZE X = NEMA STARTER SIZE) KIRK KEY INTERLOCK
	LIGHTNING ARRESTER AND GROUNDING
	PANELBOARD
	POTHEAD
	STRESS CONE
	SHUNT TRIP RELAY
	POTENTIAL TRANSFORMER
	CURRENT TRANSFORMER
	DELTA - DELTA TRANSFORMER
	DELTA - WYE TRANSFORMER
	CM = CUSTOM METER A = AMMETER PF = POWER FACTOR V = VOLT W = WATT KWH = KILOWATT HOUR
	GROUND
	NORMALLY OPEN RELAY
	NORMALLY CLOSED RELAY

MOTORIZED AND MECHANICAL RELATED SYMBOLS

	SINGLE PHASE MANUAL MOTOR STARTER
	SINGLE PHASE MAGNETIC STARTER NEMA SIZE 1, UNLESS OTHERWISE NOTED
	THREE PHASE MAGNETIC STARTER, SIZE AS INDICATED
	THREE PHASE COMBINATION STARTER, SIZE AS INDICATED
	ADJUSTABLE SPEED DRIVE
	SINGLE PHASE MOTOR
	THREE PHASE MOTOR
	WATER HEATER
	THERMOSTAT
	CONTROL PANEL
	TEMPERATURE CONTROL PANEL
	PUSHBUTTON STATION
	DOUBLE PUSHBUTTON STATION - ON/OFF
	THREE FUNCTION PUSHBUTTON STATION - UP/DOWN/STOP
	FREEZESTAT
	PNEUMATIC/ELECTRIC SWITCH
	ELECTRIC/PNEUMATIC SWITCH
	SPECIAL MECHANICAL EQUIPMENT AS NOTED
	IRRIGATION CONTROL PANEL

GROUNDING SYMBOLS

	GROUND ROD
	GROUND WIRE
	CADWELD CONNECTION
	BUILDING GROUND MAT

CONDUCTOR SYMBOLS

	CONDUIT ABOVE CEILING OR IN WALL IN FINISHED AREAS
	CONDUIT EXPOSED IN UNFINISHED AREAS
	CONDUIT IN FLOOR OR BELOW GRADE
	EXISTING CONDUIT TO BE REMOVED
	HOME RUN TO POWER PANEL OR MCC
	CONDUIT DOWN
	CONDUIT UP
	BREAK SYMBOL
	CONDUIT STUB TERMINATE WITH BUSHING
	CONDUIT SLEEVE
	FLEXIBLE CONDUIT
	CIRCUIT HOMERUN TO POWER PANEL OR MCC (2 HOTS, 2 NEUTRALS & 1 GROUND)
	1 HOT, 1 NEUTRAL & 1 GROUND (3/4\"/>
	2 HOT, 1 NEUTRAL & 1 GROUND (3/4\"/>
	3 HOT, 1 NEUTRAL & 1 GROUND (3/4\"/>
	1 HOT, 1 NEUTRAL & 1 GROUND & 1 ISOLATED GROUND (3/4\"/>
	2 HOT, 1 NEUTRAL & 1 GROUND & 1 ISOLATED GROUND (3/4\"/>
	3 HOT, 1 NEUTRAL & 1 GROUND & 1 ISOLATED GROUND (3/4\"/>
	X = WIRE CHART NOTATION
	X = WIRE CHART NOTATION

LUMINAIRE SYMBOLS

(REFER TO LUMINAIRE SCHEDULE)

	2' X 4' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - NIGHT LIGHT
	2' X 4' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - EMERGENCY
	1' X 4' OR 1' X 8' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED
	1' X 4' OR 1' X 8' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - NIGHT LIGHT
	1' X 4' OR 1' X 8' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - EMERGENCY
	1' X 1' OR 2' X 2' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED
	1' X 1' OR 2' X 2' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - NIGHT LIGHT
	1' X 1' OR 2' X 2' LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - EMERGENCY
	4' OR 8' STRIP LUMINAIRE - CEILING SURFACE OR COVE MOUNTED
	4' OR 8' STRIP LUMINAIRE - CEILING SURFACE OR COVE MOUNTED - NIGHT LIGHT
	4' OR 8' STRIP LUMINAIRE - CEILING SURFACE OR COVE MOUNTED - EMERGENCY
	4' OR 8' STRIP LUMINAIRE - WALL MOUNTED
	4' OR 8' STRIP LUMINAIRE - WALL MOUNTED - NIGHT LIGHT
	4' OR 8' STRIP LUMINAIRE - WALL MOUNTED - EMERGENCY

	LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - DIRECTIONAL
	LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - DIRECTIONAL - NIGHT LIGHT
	LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - DIRECTIONAL - EMERGENCY
	TRACK LUMINAIRE, LENGTH AND NUMBER OF FIXTURES AS INDICATED ON DRAWINGS
	LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED
	LUMINAIRE - CEILING RECESSED OR SURFACE MOUNTED - NIGHT LIGHT
	LUMINAIRE - WALL RECESSED OR SURFACE MOUNTED
	LUMINAIRE - WALL RECESSED OR SURFACE MOUNTED - NIGHT LIGHT
	LUMINAIRE - WALL RECESSED OR SURFACE MOUNTED - EMERGENCY
	LUMINAIRE - EMERGENCY BATTERY OPERATED
	LUMINAIRE - EMERGENCY BATTERY OPERATED REMOTE HEADS

	EXIT LUMINAIRE - CEILING MOUNTED - SHADING INDICATES ILLUMINATED FACE
	EXIT LUMINAIRE - CEILING MOUNTED WITH DIRECTION ARROWS - SHADING INDICATES ILLUMINATED FACE
	EXIT LUMINAIRE - WALL MOUNTED - SHADING INDICATES ILLUMINATED FACE
	EXIT LUMINAIRE - WALL MOUNTED WITH DIRECTION ARROWS - SHADING INDICATES ILLUMINATED FACE

SWITCHES AND SENSORS

	SINGLE POLE SWITCH
	DOUBLE POLE SWITCH
	THREE WAY SWITCH
	FOUR WAY SWITCH
	KEY OPERATED SWITCH
	KEY OPERATED SWITCH WITH PILOT LIGHT
	SWITCH WITH PILOT LIGHT
	MOMENTARY CONTACT SWITCH
	MOMENTARY CONTACT SWITCH (KEY OPERATED)
	DIMMER SWITCH (WATTAGE AS INDICATED)
	THREE-WAY DIMMER SWITCH (WATTAGE AS INDICATED)
	SPECIAL SWITCH AS NOTED
	LOW VOLTAGE SWITCH
	TIMER SWITCH
	SINGLE POLE SWITCH - WEATHER PROOF
	DIMMER SWITCH - 1000 W UNLESS OTHERWISE NOTED
	OCCUPANCY SENSOR - CEILING MOUNTED
	OCCUPANCY SENSOR - WALL MOUNTED
	SWITCH (1 PUSHBUTTON) WITH INTEGRAL OCCUPANCY SENSOR
	SWITCH (2 PUSHBUTTONS) WITH INTEGRAL OCCUPANCY SENSOR
	DIMMER SWITCH WITH INTEGRAL OCCUPANCY SENSOR
	PHOTO CELL

POWER DISTRIBUTION SYMBOLS

	TRANSFORMER
	RECEPTACLE PANEL OR LIGHTING PANEL
	POWER PANEL OR DISTRIBUTION PANEL
	RECEPTACLE PANEL OR LIGHTING PANEL ON EMERGENCY POWER
	POWER PANEL OR DISTRIBUTION PANEL ON EMERGENCY POWER
	MOTOR CONTROL CENTER
	CURRENT TRANSFORMER CABINET
	GENERATOR - SIZE AS NOTED
	METER - SINGLE
	METER AND SOCKET
	TRANSFER SWITCH, TS = MANUAL TRANSFER SWITCH
	TRANSFER SWITCH - AUTOMATIC
	DISCONNECT SWITCH - NON FUSED, XXA INDICATES AMPERAGE
	DISCONNECT SWITCH - FUSED, XXAS INDICATES AMPERAGE RATING, XXAF INDICATES FUSE SIZE
	ENCLOSED CIRCUIT BREAKER - XXAF INDICATES BREAKER FRAME SIZE, XXAT INDICATES BREAKER TRIP SIZE
	CAPACITOR BANK
	NEW EQUIPMENT OR WORK
	EXISTING EQUIPMENT OR WORK

RECEPTACLE SYMBOLS - WALL MOUNTED

	20A, 120V, 2P, 3W DUPLEX CONVENIENCE RECEPTACLE - GROUNDED X = RECEPTACLE NOTATION
	20A, 120V, 2P, 3W EMERGENCY DUPLEX RECEPTACLE - (1-6\"/>
	20A, 120V, 2P, 3W UPS DUPLEX RECEPTACLE - (1-6\"/>
	20A, 120V, 2P, 3W HALF-CONTROLLED DUPLEX CONVENIENCE RECEPTACLE - GROUNDED X = RECEPTACLE NOTATION
	20A, 120V, 2P, 3W FULLY CONTROLLED DUPLEX RECEPTACLE - (1-6\"/>
	20A, 120V, 2P, 3W SINGLE CONVENIENCE RECEPTACLE - GROUNDED X = RECEPTACLE NOTATION
	20A, 120V, 2P, 3W EMERGENCY SINGLE RECEPTACLE - (1-6\"/>
	20A, 120V, 2P, 3W DOUBLE DUPLEX CONVENIENCE RECEPTACLE - GROUNDED (1-6\"/>
	20A, 120V, 2P, 3W EMERGENCY DOUBLE DUPLEX RECEPTACLE - (1-6\"/>
	20A, 120V, 2P, 3W UPS DOUBLE DUPLEX RECEPTACLE - (1-6\"/>
	20A, 120V, 2P, 3W HALF-CONTROLLED DOUBLE DUPLEX CONVENIENCE RECEPTACLE - GROUNDED (ONE FULLY CONTROLLED DUPLEX RECEPTACLE & ONE STANDARD DUPLEX RECEPTACLE) (1-6\"/>
	20A, 120V, 2P, 3W FULLY CONTROLLED DOUBLE DUPLEX RECEPTACLE - GROUNDED (1-6\"/>
	SPECIAL RECEPTACLE - TYPE AS NOTED ON DRAWINGS
	SPECIAL RECEPTACLE - TYPE AS NOTED ON DRAWINGS
	ELECTRICAL CONNECTION
	MULTI-OUTLET ASSEMBLY WITH OUTLETS ON CENTERS AS INDICATED
	MULTI-OUTLET RACEWAY SYSTEM (DEVICES AS INDICATED)

TYPICAL RECEPTACLE NOTATION

(SEE ABBREVIATIONS LIST FOR OTHER RECEPTACLE NOTATIONS)

"a"	SWITCHED OUTLET, "a" - INDICATES SWITCH CONTROL
"AFCI"	ARC FAULT CIRCUIT INTERRUPTER
"B"	PEDESTAL MOUNTED ON BENCH TOP
"BF"	BELOW FLOOR
(D)	DEMOLISH AND REMOVE IN ITS ENTIRETY
"D"	DEDICATED DEVICE ON INDIVIDUAL BRANCH CIRCUIT
"E"	EMERGENCY
(EX)	EXISTING DEVICE/EQUIPMENT TO REMAIN
"F"	FLUSH FLOOR BOX WITH FIRE/SMOKE RATED PENETRATION
"GFCI"	GROUND FAULT CIRCUIT INTERRUPTER, PERSONAL PROTECTION
"GFPE"	GROUND FAULT PROTECTION OF EQUIPMENT
"H"	HORIZONTALLY MOUNTED
"IG"	ISOLATED GROUND RECEPTACLE WITH SEPARATE GREEN GROUND CONDUCTOR TO ISOLATED GROUND BUS IN PANEL
"M"	MODULAR FURNITURE SERVICE - PROVIDE FLEXIBLE CONNECTION, COORDINATE EXACT LOCATION WITH FURNITURE PLANS
(N)	NEW DEVICE/EQUIPMENT
"PED"	PEDESTAL MOUNTED WITH TWO HOUR FIRE/SMOKE RATED PENETRATION
"PT"	POKE THRU WITH TWO-HOUR FIRE/SMOKE RATED PENETRATION
(R)	REMOVE AND RELOCATE
"S"	SURFACE MOUNTED FLOOR BOX
"SP"	SURGE PROTECTION RECEPTACLE
"T"	TAMPER RESISTANT SAFETY RECEPTACLE
"W"	WALL MOUNTED DEVICE AT 48" AFF UNLESS OTHERWISE INDICATED
"WP"	WEATHERPROOF RECEPTACLE WITH "NRTL" LISTED COVERPLATE FOR WET LOCATION WITH PLUG INSTALLED. MTD 48" AFF UNLESS OTHERWISE INDICATED
+ XX	DIMENSIONED HEIGHT

MISCELLANEOUS SYMBOLS

	JUNCTION BOX IN CEILING OR WALL
	JUNCTION BOX IN FLOOR
	PULLBOX
	RELAY
	CONTACTOR
	BATTERY CHARGER
	POWER POLE WITH DEVICES INDICATED P = POWER T = TELECOM
	P/T = POWER AND TELECOM
	FURNITURE FEED FLOORBOX / POKE-THRU WITH DEVICES AS INDICATED P = POWER T = TELECOM P/T = POWER AND TELECOM

















TELEPHONE AND DATA SYMBOLS

	TELEPHONE OUTLET X = QUANTITY OF TELEPHONE (VOICE) CONNECTIONS
	TELEPHONE PHONE OUTLET - PUBLIC PAY STATION
	TELEPHONE OUTLET - WALL MOUNTED
	TELEPHONE FLOOR OUTLET
	TELEPHONE CABINET
	COMPUTER DATA OUTLET Y = QUANTITY OF DATA CONNECTIONS
	COMPUTER DATA TERMINAL FLOOR OUTLET Y = QUANTITY OF DATA CONNECTIONS
	TELE/DATA OUTLET X = QUANTITY OF TELEPHONE (VOICE) CONNECTIONS Y = QUANTITY OF DATA CONNECTIONS
	TELE/DATA FLOOR OUTLET X = QUANTITY OF TELEPHONE CONNECTIONS Y = QUANTITY OF DATA CONNECTIONS
	WIRELESS ACCESS POINT DATA OUTLET

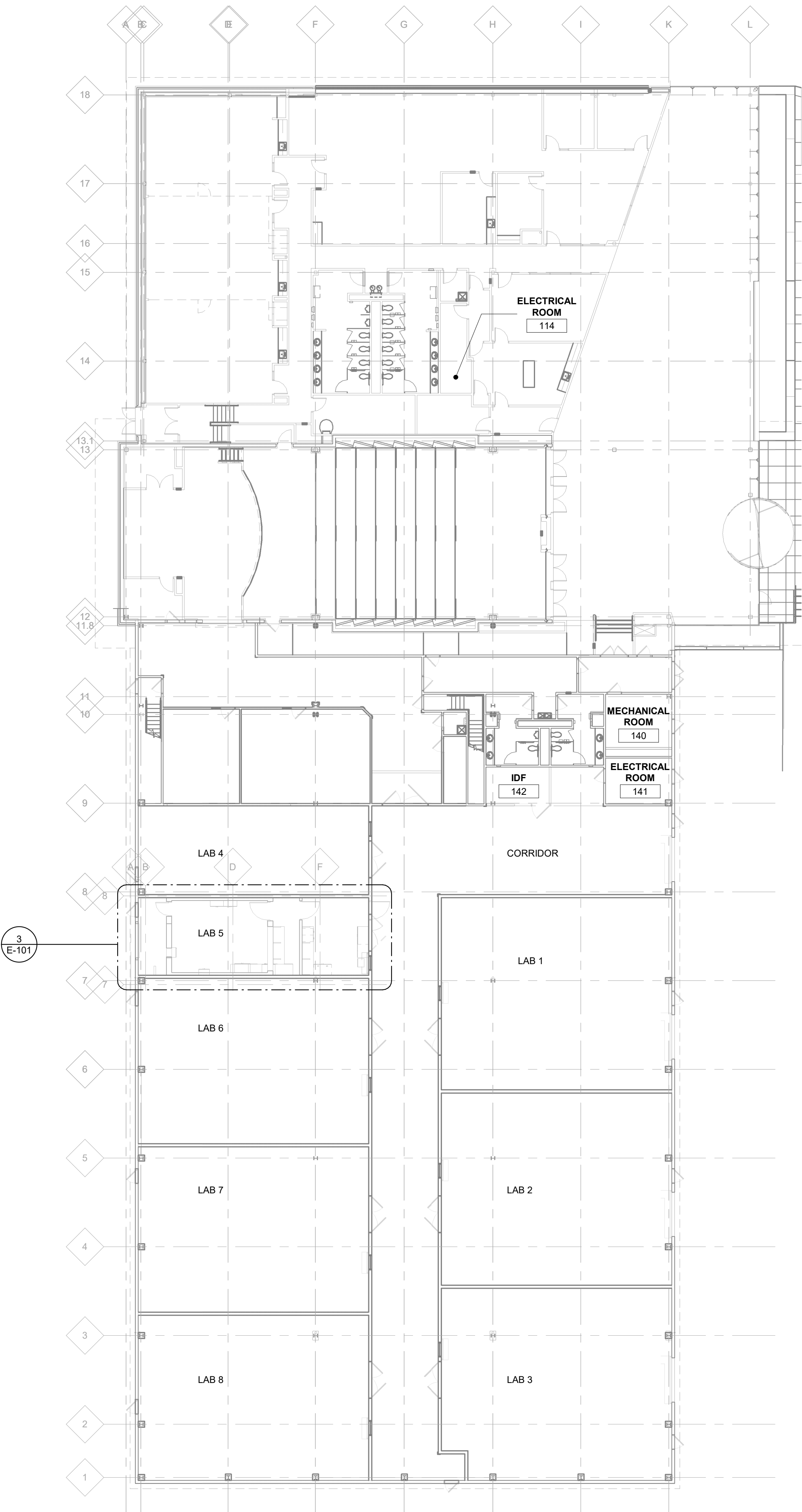
FIRE ALARM SYSTEM SYMBOLS

	FIRE ALARM ANNUNCIATOR
	FIRE ALARM PANEL
	SMOKE DETECTOR
	SMOKE DETECTOR WITH RELAY BASE FOR ELEVATOR RECALL
	FLAME DETECTOR
	HEAT OR THERMAL DETECTOR
	MANUAL PULL STATION
	HORN OR HORN/STROBE DEVICE
	SPEAKER/STROBE DEVICE
	FIRE ALARM STROBE
	FIRE SPRINKLER FLOW SWITCH
	FIRE ALARM DUCT DETECTOR
	TAMPER SWITCH
	POST INDICATOR VALVE
	MAGNETIC FIRE DOOR CLOSING DEVICE
	FIRE FIGHTERS PHONE
	DRILL KEY SWITCH
	END-OF-LINE RESISTOR
	VOICE EVACUATION PANEL
	FIRE ALARM TERMINAL CABINET
	BATTERY PACK
	INDIVIDUAL ADDRESSABLE MODULE
	ZONE ADAPTER MODULE
	DOOR HOLD OPEN
	REMOTE TEST SWITCH
	SELF CONTAINED SMOKE DETECTOR - SINGLE STATION
	BEAM SMOKE DETECTOR - S = SENDING R = RECEIVING CARBON MONOXIDE DETECTOR

SECURITY SYSTEM SYMBOLS

	CCTV CAMERA - "WP" INDICATES WEATHER PROOF	FLA	FIRE ALARM
	CCTV COAXIAL CABLE OUTLET AND POWER OUTLET	FCU	FAN COIL UNIT
	CCTV MONITOR OUTLET	FCL	FULL LOAD AMPERES
	DOORBELL	FLR	FLOOR
	DOOR BUZZER	FMT	FLEXIBLE METALLIC TUBING
	ELECTRIC DOOR OPERATOR	FT	FEET, FOOT
	ELECTRIC DOOR STRIKE	FU	FUSE
	INTERCOM UNIT	GA	GAUGE
	MASTER INTERCOM UNIT	GFCI	GROUND FAULT CIRCUIT INTERRUPTOR
	MOTION SENSOR	GND	GROUND
	SECURITY DOOR ALARM MAGNETIC LOCK	GYP BD	GYPSUM WALLBOARD
	CARD READER	HH	HANDHOLE
	SECURITY CONTROL PANEL	HDA	HAND-OFF-AUTO
	DOOR CONTACT	HP	HORSE POWER
	SECURITY EXIT PUSHBUTTON	HTR	HEATER
	SECURITY KEYPAD	IAW	IN ACCORDANCE WITH
		IBC	INTERNATIONAL BUILDING CODE
		IN	INCH, INCHES
		IG	ISOLATED GROUND
		IMC	INTERMEDIATE METAL CONDUIT
		IP	INTERNET PROTOCOL
		JB	JUNCTION BOX
		JC	JANITOR CLOSET
		KVA	KILOVOLT AMPERE
		KW	KILOWATT
		KWH	KILOWATT HOUR
		LAN	LOCAL AREA NETWORK
		LCP	LIGHTING CONTROL PANEL
		Lg	LONG OR LENGTH
		LJ	LIGHTING PANEL
		LRA	LOCKED ROTOR AMPERE
		LTG	LIGHTING

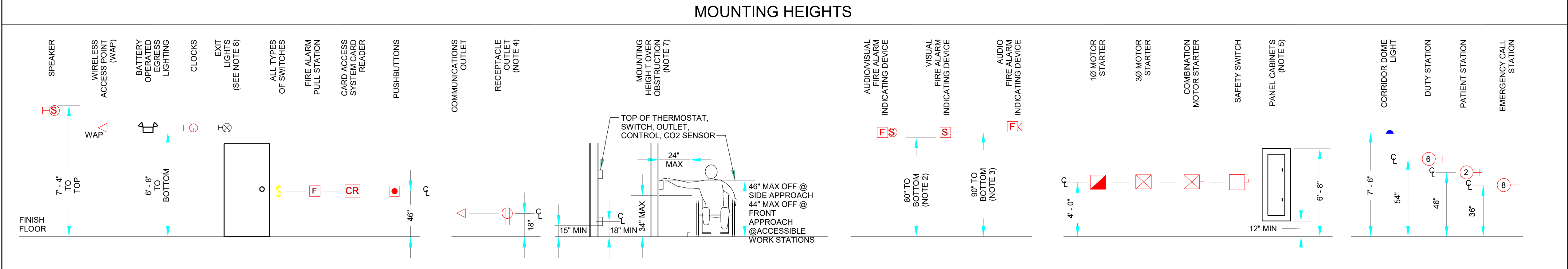
THIS IS A GENERAL SYMBOL LIST SHEET. SOME SYMBOLS MAY NOT BE USED ON THIS SPECIFIC PROJECT.



1ST FLOOR COMPOSITE PLAN
SCALE: 1/16" = 1'-0"

MOUNTING HEIGHT NOTES:

1. MOUNTING HEIGHTS ARE TYPICAL, UNLESS OTHERWISE INDICATED ON ARCHITECTURAL OR ELECTRICAL DRAWINGS.
2. FIRE ALARM VISUAL AND COMBINATION AUDIO VISUAL DEVICES INSTALLED ON WALLS SHALL BE MOUNTED PER NFPA 72, SUCH THAT THE ENTIRE LENS IS NOT LESS THAN 80 INCHES AND NOT GREATER THAN 96 INCHES ABOVE FINISH FLOOR.
3. FIRE ALARM AUDIO DEVICES INSTALLED ON WALLS SHALL BE MOUNTED PER NFPA 72, SUCH THAT THE TOP OF THE DEVICES IS NOT LESS THAN 90 INCHES ABOVE FINISH FLOOR AND NOT LESS THAN 6 INCHES BELOW FINISH CEILING.
4. RECEPTACLES MOUNTING HEIGHTS IN UNFINISHED AREAS SHALL BE 36 INCHES ABOVE FINISH FLOOR TO CENTERLINE OF OUTLET BOX.
5. WHERE REQUIRED, 12" MINIMUM SHALL BE MAINTAINED BETWEEN THE FLOOR AND BOTTOM OF PANELBOARD. PANEL SHALL BE ADJUSTED AS NECESSARY TO ACHIEVE THE 12" FROM THE FLOOR. ALL PANELS SHALL HAVE OPERATING HANDLES OF SWITCHES AND CIRCUIT BREAKERS, WHEN IN THE HIGHEST POSITION, NO MORE THAN 6" - 7" ABOVE FINISH FLOOR.
6. COORDINATE ADDITIONAL MOUNTING REQUIREMENTS WITH ARCHITECTURAL TRADES.
7. ELECTRICAL OUTLETS, SWITCHES, AND SIMILAR CONTROLS SHALL BE MOUNTED A MAXIMUM OF 48" ABOVE FINISHED FLOOR, MEASURED TO THE TOP OF THE ELECTRICAL BOX RATHER THAN THE CENTERLINE. THE MINIMUM MOUNTING HEIGHT FOR SWITCHES AND OUTLETS IS 15" ABOVE FINISHED FLOOR, MEASURED TO THE BOTTOM OF THE ELECTRICAL BOX RATHER THAN THE CENTER LINE. (CBC SECTION 1117B.6.5)
8. FOR BRACKET EXIT SIGNS, MOUNT 6'-8" TO BOTTOM OF LUMINAIRE FOR CEILINGS UP TO 9'-0" AFF. MOUNT AT 8'-0" TO BOTTOM FOR CEILINGS HIGHER THAN 9'-0" AFF. FOR RECESSED EXIT SIGNS, WHEN ABOVE DOOR LOCATE MIDWAY BETWEEN TOP OF DOOR FRAME AND CEILING IF CEILING HEIGHT IS 8'-0" AFF OR 9'-0" AFF. FOR HIGHER CEILINGS, MOUNT 12" ABOVE DOOR.



GENERAL NOTES

1. ELECTRICAL OUTLET BOXES INSTALLED IN RATED WALLS SHALL NOT BE LESS THAN 24" FROM OUTLETS IN THE OPPOSITE WALL SURFACE. BACK AND SIDE OF BOXES SHALL BE COMPLETELY WRAPPED BY LOWERY #10 PUTTY PADS. BOXES SHALL BE CAULKED AT THE PERIMETER OF THE BOX WHERE IT MATES WITH THE DRYWALL.
2. ALL OPENINGS AROUND CONDUITS PASSING THROUGH FIRE RATED WALLS, CEILINGS, FLOORS, ETC. SHALL BE PACKED AND SEALED TO CONFORM WITH THE FIRE RATING OF THE PENETRATED STRUCTURE.
3. THE MECHANICAL, ELECTRICAL AND PLUMBING CONTRACTORS SHALL COORDINATE THEIR INSTALLATIONS PRIOR TO THE PERMANENT INSTALLATION OF ANY DUCTWORK, CONDUIT OR PIPING. UNLESS DECIDED BY THE GENERAL CONTRACTOR, DUCTWORK SHALL TAKE PRECEDENCE. COSTS TO CORRECT CONFLICTS SHALL BE NO COST TO THE OWNER.
4. ANY FEEDERS AND BRANCH CIRCUITS SHALL CARRY A GROUND WIRE, SIZED PER N.E.C ARTICLE 250.
5. FIELD VERIFY EXISTING CONDITIONS AND ACTUAL DIMENSIONS PRIOR TO START OF WORK.
6. THOROUGHLY COORDINATE ELECTRICAL WORK WITH OTHER TRADES TO AVOID PHYSICAL CONFLICTS AND CONFLICTS WITH WORK SEQUENCE.
7. REFER TO ARCHITECTURAL DRAWINGS FOR WALLS WITH SPECIAL WALL FINISHES AND MILLWORK. COORDINATE OVERALL WALL COVERING THICKNESS AND MILLWORK DEPTH AND PROVIDE PLASTER RING WITH APPROPRIATE DEPTH. COORDINATE CUTTING OF MILLWORK PANELS WITH MILLWORK TRADES AND INSTALL DEVICE COVERPLATES ON MILLWORK SURFACE.
8. COORDINATE WITH ARCHITECTURAL TRADES FOR WALLS TO BE PROVIDED WITH INSULATION FOR ACOUSTICAL PURPOSES.
9. ALL CONDUIT AND WIRING SHALL BE CONCEALED IN WALL OR CEILING CAVITY EXCEPT WHERE NOTED OTHERWISE ON THE DRAWINGS.
10. MOUNTING HEIGHTS OF ELECTRICAL DEVICES ARE TO CENTER OF DEVICE UNLESS OTHERWISE NOTED.
11. IN GENERAL, ELECTRICAL DEVICES, WHICH ARE INDICATED ON THE PLAN MAY BE SCALED AND MOUNTED TO THE NEAREST STUD EXCEPT WHERE DIMENSIONED OR ADDITIONAL LAYOUT CRITERIA IS INDICATED AT CRITICAL LOCATIONS. DEVICES SHOWN ON ARCHITECTURAL ELEVATIONS SHALL BE POSITIONED AT THE LOCATIONS INDICATED (PROVIDE DOUBLE STUD ADJUSTABLE BRACKETS WHERE NECESSARY).
12. ELECTRICAL DEVICE OUTLETS SHALL NOT BE LOCATED BACK TO BACK WITHIN THE SAME STUD SPACE IN INTERIOR WALLS, WHICH ARE INSULATED. THE DEVICES IN ONE ROOM SHALL BE OFFSET TO THE NEXT STUD SPACE.
13. MULTI GANG DEVICES SHALL BE GANGED UNDER SINGLE MULTI GANG COVER PLATE.
14. WHERE ELECTRICAL DEVICES ARE INDICATED ON A COLUMN, THE DEVICE SHALL BE CENTERED ON THE COLUMN SURFACE.
15. WHERE GFCI PROTECTION IS INDICATED, A GFCI TYPE RECEPTACLE SHALL BE PROVIDED AT EACH LOCATION. LOAD SIDE PROTECTION OF DOWN STREAM DEVICES WILL NOT BE ACCEPTABLE.
16. MINIMUM WIRE SIZE SHALL BE #12 AWG. BRANCH CIRCUITS OF 120 VOLTS EXCEEDING 75'-0", OR 277 VOLTS EXCEEDING 150'-0" IN LENGTH SHALL BE #10 AWG MINIMUM.
17. REFER TO ONE LINE DIAGRAM(S) FOR FEEDER CONDUIT AND WIRE SIZES.
18. ALL EMPTY CONDUITS SHALL BE DE-BURRED, CLEANED, TAGGED AND PROVIDED WITH A NYLON PULL STRING. PROVIDE CONDUIT CONNECTOR OR BUSHING ON END OF CONDUIT FOR ALL CONDUIT STUB OFFS.
19. ELECTRICAL LAYOUT AND DESIGN HAVE BEEN BASED ON PRELIMINARY INFORMATION FROM "DESIGN BASIS" MANUFACTURERS OF MAJOR EQUIPMENT. ELECTRICAL TRADES SHALL OBTAIN FINAL EQUIPMENT INSTALLATION INFORMATION FROM APPROVED SHOP DRAWINGS PRIOR TO SYSTEM INSTALLATION. WHERE SUBSTITUTION OF OTHER LISTED APPROVED MANUFACTURERS ARE PROVIDED BY THE CONTRACTOR, THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONSTRUCTION OR DESIGN REVISIONS FROM ALL DISCIPLINES OR TRADES NECESSARY TO ACCOMMODATE THE SUBSTITUTED EQUIPMENT.
20. VERIFY DIRECT LINE HORIZONTAL DISTANCE OF RECEPTACLES TO EDGE OF SINK & PROVIDE GFCI DEVICE WHERE LOCATED WITHIN 6'-0".
21. PROVIDE FIRESTOP PUTTY PADS AROUND THE BACK BOXES IN FIRE RATED WALLS TO MAINTAIN WALL FIRE RATING. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATION OF FIRE RATED WALLS.
22. ELECTRICAL CONTRACTOR TO COORDINATE FINAL EQUIPMENT AND PANEL NAMES FROM THE OWNER'S REPRESENTATIVE PRIOR TO IDENTIFICATION AND LABELING IN FIELD AND FABRICATION OF NAMEPLATES.

MECHANICAL AND PLUMBING EQUIP. NOTES

1. FIELD COORDINATE EXACT LOCATION OF ALL MECHANICAL EQUIPMENT PRIOR TO THE ROUGH-IN OF THE ELECTRICAL WORK FOR MECHANICAL EQUIPMENT.
2. ALL OVERCURRENT PROTECTIVE DEVICES AND FEEDER AMPACITIES FOR THE MECHANICAL EQUIPMENT SHALL BE VERIFIED WITH APPROVED MECHANICAL SHOP DRAWINGS PRIOR TO ROUGH-IN OF THE ELECTRICAL WORK AND ORDERING OF MATERIALS FOR MECHANICAL WORK. ALL DISCREPANCIES SHALL BE BROUGHT UP TO THE ATTENTION OF THE ENGINEER AND ARCHITECT PRIOR TO ROUGH-IN OF ELECTRICAL WORK.
3. INCLUDE ALL COST FOR ANY REVISIONS IN MECHANICAL EQUIPMENT, OVERCURRENT PROTECTIVE DEVICES AND FEEDER AMPACITIES, CONTROL WIRING, RELAYS, OUTLETS, ETC., WHERE THE SPECIFIED MECHANICAL EQUIPMENT ARE SUBSTITUTED WITH EQUIPMENT WITH DIFFERENT ELECTRICAL REQUIREMENTS.
4. FURNISH AND INSTALL ALL LINE AND LOW VOLTAGE CONDUIT, CONDUCTORS, DEVICES, OUTLETS FOR HEATING, VENTILATING, AIR CONDITIONING AND PLUMBING EQUIPMENT PER MECHANICAL DRAWINGS AND SPECIFICATIONS.



Wayne State
University

461 Burroughs St.
Detroit, MI 48202

I2C MRI
Installation -
Lab 5 Fit-Out

461 Burroughs St.
Detroit, MI 48202

Date Issued For
06/07/2019 Design Development
07/12/2019 Owner Review
08/12/2019 Bids / Permits

HED

26913 Northwestern Hwy
Suite 200
Southfield, Michigan
48033 USA
(248) 262-1500
WWW.HED.DESIGN

ELECTRICAL SPECIFICATIONS:

- 1 **GENERAL NOTES:**
- READ AND BE BOUND BY OTHER TRADES SPECIFICATIONS AS SAME APPLY.
- 2 **SCOPE OF WORK:**
- INCLUDE ALL ELECTRICAL WORK REQUIRED FOR A COMPLETE INSTALLATION AS OUTLINED ON THESE DRAWINGS AND SPECIFIED HEREINAFTER OR AS REQUIRED TO COMPLETE THE WORK.
- 3 **ORDINANCES AND CODES:**
- THE ENTIRE INSTALLATION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF APPLICABLE FEDERAL, STATE AND LOCAL CODES, ORDINANCES AND REGULATIONS. INSTALLATION SHALL MEET ALL THE STANDARDS AND REQUIREMENTS OF THE OWNER.
- WHEN DRAWINGS AND SPECIFICATIONS CONFLICT WITH SUCH LAWS AND ORDINANCES, NOTIFY THE ARCHITECT BEFORE SUBMISSION OF THE BID. AFTER ENTERING INTO THE CONTRACT, THE CONTRACTOR WILL BE HELD RESPONSIBLE TO COMPLETE ALL WORK IN STRICT ACCORDANCE WITH ALL GOVERNING REGULATIONS, CODES, AND ORDINANCES WITHOUT ADDITIONAL COST TO THE OWNER.

- 4 **PERMITS:**
- CONTRACTOR IS RESPONSIBLE TO OBTAIN AND PAY FOR ALL REQUIRED PERMITS.
- 5 **INSPECTIONS:**
- GIVE ALL REQUIRED NOTICES OF INSPECTIONS REQUIRED BY THE LAW OR OTHER REGULATIONS AND PAY ALL FEES IN CONNECTION THEREWITH.
- FINAL ELECTRICAL INSPECTION IS REQUIRED BY THE LOCAL OR STATE INSPECTION AUTHORITY. FORWARD A COPY OF THE FINAL APPROVAL TO THE FIRE MARSHALL DIVISION, LOCAL FIELD OFFICE.

- 6 **STANDARDS:**
- ALL EQUIPMENT SHALL BE NEW AND SHALL CONFORM IN ALL RESPECTS TO THE LATEST APPROVED STANDARDS OF THE IEEE, ANSI, NEMA, IEC, UNDERWRITERS' LABORATORIES, INC. AND, IF APPLICABLE, OWNER ELECTRICAL STANDARDS.
- PROVIDE MATERIALS LISTED BY THE UNDERWRITERS' LABORATORIES, INC. AND BEARING THEIR LABEL WHERE SUCH SERVICE IS AVAILABLE FOR THE TYPE OF EQUIPMENT SPECIFIED.

- 7 **COOPERATION WITH OTHER TRADES:**
- PRIOR TO PROCEEDING WITH INSTALLATION OF WORK, CHECK WITH OTHER TRADES AND PROJECT DRAWINGS TO COORDINATE WORK AND AVOID INTERFERENCE.
- WHEN INTERFERENCES EXIST WITH THE WORK OF OTHER TRADES, NOTIFY THE OWNER BEFORE PROCEEDING WITH THE INSTALLATION OF THE WORK. IF ADDITIONAL WORK IS REQUIRED TO REARRANGE, INTERFERING EQUIPMENT OR SYSTEM AND THE CONTRACTOR HAS FAILED TO NOTIFY THE OWNER OF THE INTERFERENCE, THEN THE CORRECTIVE WORK REQUIRED TO MODIFY THE INTERFERENCE WILL BE DONE AT NO ADDITIONAL EXPENSE TO THE OWNER.

- NO EXTRAS WILL BE ALLOWED FOR ANY ADDITIONAL LABOR AND/OR MATERIALS NECESSARY DUE TO CONDITIONS WHICH CAREFUL EXAMINATION OF THE DRAWINGS OF ALL TRADES COULD HAVE AVOIDED.

- 8 **EQUIPMENT CONNECTIONS:**
- MAKE CONNECTIONS TO EQUIPMENT, FIXTURES, ETC., IN ACCORDANCE WITH SHOP DRAWINGS AND ROUGH-IN MEASUREMENTS FURNISHED BY THE MANUFACTURERS.
- 9 **EQUIPMENT BY OWNER AND OTHERS:**
- CERTAIN ITEMS OF EQUIPMENT WILL BE PURCHASED BY THE OWNER OR OTHERS BUT SET AND INSTALLED IN PLACE WITH CONDUIT, WIRING AND ALL CONNECTIONS PROVIDED AS PART OF THE ELECTRICAL SCOPE OF WORK. PROVIDE ALL LABOR AND MATERIAL REQUIRED TO RECEIVE, UNLOAD, UNCRATE, HANDLE, ASSEMBLE, INSTALL AND CONNECT THE OWNERS OR OTHERS' FURNISHED EQUIPMENT.

- 10 **DRAWINGS:**
- THE DRAWINGS SHOW THE GENERAL ARRANGEMENT, GENERAL DESIGN AND EXTENT OF THE VARIOUS ELECTRICAL SYSTEMS AND ARE DIAGRAMMATIC. THEY ARE NOT INTENDED TO BE SCALED FOR ROUGH-IN MEASUREMENTS NOR TO SERVE AS SHOP DRAWINGS.
- THE CONDUIT RUNS OF FEEDERS AND BRANCH CIRCUITS AS SHOWN ON THE DRAWINGS ARE SCHEMATIC ONLY AND ARE NOT INTENDED TO SHOW THE EXACT ROUTING. FINAL DETERMINATION AS TO ROUTING SHALL BE GOVERNED BY STRUCTURAL CONDITIONS, INTERFERENCES, CIRCUITING, ETC.
- 11 **OMISSIONS:**
- THE DRAWINGS AND SPECIFICATIONS ARE INTENDED TO INCLUDE ALL WORK AND MATERIAL FOR THE ENTIRE COMPLETION OF THE WORK. ANY ITEM OF MATERIAL OR LABOR REQUIRED FOR THE PROPER EXECUTION AND COMPLETION OF THE WORK AND OMITTED FROM EITHER THE DRAWINGS OR SPECIFICATIONS, OR BOTH, BUT OBVIOUSLY REQUIRED, SHALL BE FURNISHED AS PART OF THE CONTRACT WITHOUT ADDITIONAL COST.

- 12 **DAMAGE TO OTHER WORK:**
- REPAIR AND PAY FOR ALL DAMAGE DONE TO EXISTING OR NEW WORK BY ELECTRICAL TRADES WORKMEN.
- 13 **CUTTING AND PATCHING:**
- FOR ALL ELECTRICAL WORK, ALL CUTTING AND PATCHING OF NON-STRUCTURAL PARTS SHALL BE DONE BY THE ELECTRICAL TRADES.

- 14 **CLEANING:**
- CLEAN UP ALL ELECTRICAL WORK AT COMPLETION.
- 15 **PROJECT RECORD DOCUMENTS:**
- PROVIDE A COMPLETE SET OF AS-BUILT DRAWINGS ON ALL WORK DONE. PROJECT RECORD DOCUMENTS ARE REQUIRED UPON COMPLETION OF THE WORK AND BEFORE FINAL PAYMENT IS MADE.
- 16 **CHARACTER OF WORK:**
- THE INSTALLATION SHALL BE SO MADE THAT ITS MANY COMPONENT PARTS WILL FUNCTION TOGETHER AS A WORKABLE SYSTEM. IT SHALL BE COMPLETE WITH ALL ACCESSORIES NECESSARY FOR ITS OPERATION, AND SHALL BE LEFT WITH ALL EQUIPMENT PROPERLY ADJUSTED AND IN WORKING ORDER.

- EXECUTE THE WORK IN CONFORMITY WITH THE BEST PRACTICES, SO AS TO CONTRIBUTE TO EFFICIENCY OF OPERATION, MINIMIZE MAINTENANCE, PROVIDE ACCESSIBILITY, AND NOT BE OBTRUSIVE OR UNSIGHTLY. EXECUTE SO THAT THE INSTALLATION WILL CONFORM AND ACCOMMODATE ITSELF TO THE BUILDING STRUCTURE, THE AREA OR ROOM, ITS EQUIPMENT AND ITS USAGE.

- 17 **GUARANTEE:**
- THE COMPLETE ELECTRICAL SYSTEM OR SYSTEMS FURNISHED AND INSTALLED SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF FINAL ACCEPTANCE OF THE WORK AGAINST DEFECTIVE MATERIALS AND/OR WORKMANSHIP. UPON RECEIPT OF NOTICE OF FAILURE OF ANY PART OF THE WORK DURING THE GUARANTEE PERIOD, THE AFFECTED PART OR PARTS SHALL BE REPLACED PROMPTLY AT NO ADDITIONAL COST TO THE OWNER, INCLUDING ANY DAMAGE DONE TO THE WORK OF OTHERS CAUSED BY THE FAILURE OF THE ELECTRICAL SYSTEM OR SYSTEMS.

- 18 **EXAMINATION OF SITE:**
- THIS CONTRACTOR MUST EXAMINE EXISTING SITE AND BE THOROUGHLY AWARE OF CONDITIONS UNDER WHICH HE MUST WORK. ADVISE ENGINEERS OF ANY CONTINGENCIES BEFORE SUBMITTING BIDS. NO EXTRAS OR ALLOWANCES WILL BE MADE FOR ANY CHANGES THAT MAY BE REQUIRED DUE TO FAILURE OR NEGLECT TO MAKE SUCH EXAMINATION OF EXISTING CONDITIONS.

- 19 **SUBMITTALS:**
- PRIOR TO RELEASING ANY ORDER FOR MATERIAL FOR THIS PROJECT, THE CONTRACTOR SHALL SUBMIT FOR REVIEW, DETAILED SHOP DRAWINGS AND/OR EQUIPMENT CUT SHEETS, INDICATING DIMENSIONS, SIZES, WEIGHTS, ELECTRICAL RATINGS AND OPERATING CHARACTERISTICS, CAPACITIES, MATERIALS, COLORS, AND ROUGH-IN REQUIREMENTS, FOR ALL LUMINAIRES, DISTRIBUTION EQUIPMENT, MOTOR CONTROL, ALARM AND COMMUNICATION SYSTEMS AND COMPONENTS, AND POWER GENERATION SYSTEMS. SUBMITTALS SHALL BE MADE SUFFICIENTLY IN ADVANCE OF THE REQUIRED ORDER RELEASE DATE, TO ALLOW THE ENGINEER AMPLE TIME TO REVIEW SUCH INFORMATION. MULTIPLE COMPONENTS INTENDED TO FUNCTION AS A SYSTEM SHALL BE COORDINATED AND SUBMITTED AS A UNIT. UPON AWARD OF THE CONTRACT, THE CONTRACTOR SHALL PROVIDE A SCHEDULE FOR SUBMISSION OF THE SHOP DRAWINGS TO THE ENGINEER.

- 20 **DEMOLITION AND REMOVAL WORK:**
- PROVIDE DEMOLITION AND REMOVAL WORK AS INDICATED. ITEMS FOR REUSE OR TO BE TURNED OVER TO OWNER SHALL BE CAREFULLY IDENTIFIED, DISMANTLED AND STORED TO PREVENT DAMAGE TO SAME. WHERE EQUIPMENT IS TO BE REMOVED, ASSOCIATED CIRCUIT INCLUDING BOXES, CONDUIT AND WIRING SHALL ALSO BE REMOVED BACK TO THE SOURCE. ITEMS NOT NOTED TO BE REUSED OR TURNED OVER TO THE OWNER SHALL BECOME PROPERTY OF CONTRACTOR AND SHALL BE REMOVED FROM SITE AND LEGALLY DISPOSED.

- WHEN RELOCATING OR REMOVING LUMINAIRE(S), RECEPTACLE(S) OR OTHER ELECTRICAL DEVICE(S), BUT NOT OTHER DEVICES ON THE SAME CIRCUIT, CIRCUIT SHALL BE RECONNECTED FOR CONTINUED SERVICE TO REMAINING ITEMS ON CIRCUIT. THIS SAME STIPULATION APPLIES TO LOW VOLTAGE SYSTEMS, INCLUDING BUT NOT LIMITED TO FIRE ALARM, NURSE CALL, SECURITY, PAGING, AND TELEVISION.

- ELECTRICAL WORK INTERFERING WITH AND REQUIRING RELOCATION OR MODIFICATION FOR NEW WORK SHALL BE DISCONNECTED, REMOVED AND RE-ROUTED TO SUIT FINAL INSTALLATION.

- 21 **EXISTING BUILDING WORK:**
- THIS CONTRACTOR SHALL ALSO RELOCATE ANY ELECTRICAL WORK, WHETHER SHOWN OR NOT, THAT INTERFERES WITH NEW WORK OF ANY TRADE.
- PERFORM ALL NECESSARY CUTTING AND PATCHING OF FLOORS, WALLS AND CEILINGS. RESTORE ALL CUT WORK TO ITS ORIGINAL CONDITION.

- ALL DIRT AND RUBBISH RESULTING FROM THIS WORK SHALL BE REMOVED FROM THE PREMISES
- ALL DOWN TIMES SHALL BE MINIMAL AND SHALL BE COORDINATED WITH THE BUILDING OWNER AND SHALL BE SUBJECT TO THEIR APPROVAL.

- 22 **TEMPORARY SECURITY:**
- THIS CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY ELECTRICAL SERVICES FOR TEMPORARY LIGHTING, TEMPORARY NON-ELECTRIC HEAT, TEMPORARY ELEVATOR, POWER TOOLS, INCLUDING TEMPORARY PANELS, FEEDERS, BRANCH CIRCUITS, GFCI PROTECTED RECEPTACLE, ETC. AS IS APPROPRIATE FOR THE CONSTRUCTION OF ALL TRADES, AND REMOVAL SUCH TEMPORARY SERVICES AT THE PROJECT COMPLETION.

- 23 **GROUNDING:**
- MATERIALS:
- BARE GROUNDING CONDUCTORS: STRANDED ANNEALED COPPER.
- INSULATED GROUNDING CONDUCTORS: PER "WIRES AND CABLES".
- EQUIPMENT GROUNDING CONDUIT TERMINATIONS: USE BOLTED PRESSURE CLAMPS.

- INSTALLATION:
- ALL ELECTRICAL EQUIPMENT SHALL BE GROUNDED.
- PROVIDE AN INSULATED, 600 VOLT, COLOR-CODED GREEN STRANDED GROUNDING CONDUIT IN EACH FEEDER AND BRANCH CIRCUIT. REFER TO "WIRES AND CABLES".
- SECONDARY NEUTRAL AND TRANSFORMER ENCLOSURE: INTERCONNECT AND CONNECT TO GROUNDING CONDUCTOR.

- 24 **CONDUIT:**
- MATERIALS:
- ELECTRICAL METALLIC TUBING: ZINC-COATED STEEL PER ANSI C80.3 "SPECIFICATION FOR ELECTRICAL TUBING, ZINC-COATED". MANUFACTURERS: ALLIED, REPUBLIC OR WHEATLAND.
- FLEXIBLE STEEL CONDUIT: FULL WALL, ZINC-COATED STEEL PER UL-1, "FLEXIBLE STEEL CONDUIT". MANUFACTURERS: AFC CABLE SYSTEM, ELECTRI-FLEX, OR INTERNATIONAL METAL HOSE.

- LIQUID-TIGHT FLEXIBLE STEEL CONDUIT: PER UL-360, "LIQUID TIGHT FLEXIBLE STEEL CONDUIT, ELECTRICAL". MANUFACTURERS: AFC CABLE SYSTEM, ALFLEX, "SEALTITE", ELECTRI-FLEX OR INTERNATIONAL METAL HOSE.
- RIGID NON-METALLIC CONDUIT, ELBOWS AND COUPLINGS: SMOOTH-WALL POLYVINYLCHLORIDE (PVC), 90 DEGREE C UL LISTED AND IN COMPLIANCE WITH THE TESTING REQUIREMENTS DEFINED IN NEMA WTC-2, NEMA TC-3, UL-651, AND UL-514 (FITTINGS). MANUFACTURERS: SCHEDULE 40 - PRIME CONDUIT OR CANTEX, SCHEDULE 80 - PRIME CONDUIT OR CANTEX.

- METHOD:
- MRI SHIELD ROOM 105-3 NON-FERROUS CONDUIT.
- INDOOR, CONCEALED IN WALLS OR ABOVE CEILINGS: ELECTRICAL METALLIC TUBING.
- INDOOR, CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND MOTOR DRIVEN EQUIPMENT): FLEXIBLE STEEL CONDUIT, EXCEPT IN WET OR DAMP LOCATIONS USE LIQUID-TIGHT FLEXIBLE STEEL CONDUIT.

- INSTALLATION:
- ALL CONDUITS TO BE INSTALLED PARALLEL TO OR AT RIGHT ANGLE TO WALLS AND IN AN ORDERLY MANNER.
- INSTALL CONDUIT SIZES AS INDICATED. WHERE CONDUIT SIZES ARE NOT INDICATED, INSTALL SIZES PER NEC REQUIREMENTS, EXCEPT DO NOT USE CONDUITS SMALLER THAN 3/4-INCH UNLESS OTHERWISE NOTED. USE 1/2-INCH FUTURE STEMS OPTIONALLY, UNLESS OTHERWISE NOTED.

- USE EMT IN CONCEALED DRY LOCATIONS UP TO 4-INCHES IN DIAMETER WHERE CONDUITS ARE NOT SUBJECT TO MECHANICAL DAMAGE.
- CONCEAL ALL CONDUIT IN FINISHED AREAS EITHER ABOVE CEILINGS OR IN WALLS. CONDUIT SHALL NOT BE INSTALLED IN FLOORS OR IN SLABS ON GRADE, UNLESS INDICATED ON THE DRAWINGS.

- DO NOT INSTALL CONDUIT ACROSS OR PERPENDICULAR TO DUCT SHAFTS, PIPE SHAFTS OR VENT DUCT OPENINGS.
- SECURE CONDUIT IN PLACE BY TWO LOCKNUTS AND TERMINATE WITH A BUSHING WHEN CONDUIT ENTERING STEEL METAL ENCLOSURE AND OUTLET BOXES AND NOT TERMINATED IN A THREADED HUB.

- COMPLETE INSTALLATION OF ELECTRICAL RACEWAYS BEFORE STARTING INSTALLATION OF CONDUCTORS WITHIN THE RACEWAYS.
- ALL CONDUITS SHALL BE INSTALLED IN THE CEILING SPACE OF THE FLOOR IT SERVES, UNLESS OTHERWISE INDICATED. CONDUIT BENEATH THE SLAB ON GRADE IS UNACCEPTABLE, UNLESS EXPRESSLY INDICATED ON THE DRAWINGS.

- FLEXIBLE STEEL CONDUIT SHALL BE USED FOR ALL FINAL CONNECTIONS TO CEILING MOUNTED EQUIPMENT SUCH AS LUMINAIRES AND SMOKE DETECTORS.
- LIQUID TIGHT FLEXIBLE STEEL CONDUIT SHALL BE USED FOR ALL FINAL CONNECTIONS TO TRANSFORMERS, VIBRATING EQUIPMENT SUCH AS MOTORS, UNDER RAISED ACCESS FLOORING, AND FINAL CONNECTIONS TO EQUIPMENT CHAMBERS.

- INSTALL CONDUIT A MINIMUM OF 1/2-INCHES FROM HOT WATER OR STEAM PIPES AND 3-INCHES FROM OTHER MECHANICAL PIPING.
- 25 **CONDUIT FITTINGS:**
- COUPLINGS AND CONNECTORS FOR EMT: ZINC-PLATED STEEL COMPRESSION TYPE OR STEEL (NOT CAST) SET-SCREW TYPE.

- FITTINGS FOR FLEXIBLE STEEL CONDUIT: MALLEABLE IRON OR STEEL, ZINC OR CADMIUM PLATED, SECURED BY THE CONDUIT BY CLAMPING ACTION AROUND THE PERIPHERY OF THE CONDUIT. DO NOT FURNISH FITTINGS THAT ANCHOR THE CONDUIT BY MEANS OF SET SCREWS.
- SEAL-OFF FITTINGS FOR HAZARDOUS AREAS: UL LISTED FOR USE IN CLASS 1, GROUP A, B, C, OR D AREAS AS APPLICABLE.

- MANUFACTURERS: APPLETON, O-2 / GEDNEY, THOMAS & BETTS, STEEL CITY, RACO OR CROUSE-HINDS.
- 26 **CONDUIT SUPPORTS:**
- DO NOT SUPPORT CONDUIT FROM PIPES, HANGERS, OR EXTENSION OF INSTALLATION OF OTHER TRADES, UNLESS NECESSARY DUE TO CEILING SPACE CONSTRAINTS, BUT OBTAIN WRITTEN APPROVAL BY THE STRUCTURAL ENGINEER BEFORE PROCEEDING WITH INSTALLATION.

- INSTALL SUPPORTS TO SECURELY AND PERMANENTLY FASTEN CONDUIT SYSTEM.
- DO NOT SUPPORT 1-1/2 INCH AND LARGER CONDUIT RUNS ABOVE SUSPENDED CEILING FROM CEILING MEMBERS. SUPPORT SUCH CONDUIT FROM STRUCTURAL SUPPORT SYSTEM.

- INSTALL INDIVIDUAL AND MULTIPLE HANGERS AND RISER CLAMPS TO SUPPORT CONDUITS. PROVIDE U-BOLTS, CLAMPS, ATTACHMENTS, AND OTHER HARDWARE NECESSARY FOR HANGER ASSEMBLIES AND FOR SECURING HANGER RODS AND CONDUITS. INSTALL CLEVIS TYPE HANGERS FOR INDIVIDUAL CONDUIT NOT SUPPORTED ON PIPE STRAPS.
- SUPPORT RISER CONDUIT AT EACH FLOOR LEVEL BY APPROVED CLAMP HANGERS.

- SUPPORT PARALLEL RUNS OF HORIZONTAL CONDUITS TOGETHER ON TRAPEZE- OR BRACKET-TYPE HANGERS.
- SUPPORT INDIVIDUAL HORIZONTAL CONDUITS WITH SEPARATE, MALLEABLE-IRON PIPE HANGERS OR CLAMPS. LIMIT ANCHOR TO SUPPORT OF 1-1/2 INCH CONDUIT OR SMALLER. USE OF PERFORATED STRAP OR WIRE IS NOT ACCEPTABLE.

- SUPPORT EXPOSED CONDUIT AND OUTLET BOXES BY APPROVED HANGERS, CLAMPS OR CLIPS FASTENED BY MACHINE SCREWS TO EXPANSION ANCHORS. LEAD ANCHORS ARE NOT APPROVED FOR USE. SUPPORT CONDUIT ON BOTH SIDES OF BENDS.
- BEAM CLAMPS FOR SUPPORT OF CONDUIT SHALL BE MALLEABLE IRON WITH HOOK RODS TO GRIP BEAM FLANGE. C-CLAMPS ARE NOT ACCEPTABLE.

- SUPPORT CONDUIT EVERY 8-FEET ON CENTER (MIN) IF SMALLER THAN 2-INCHES AND EVERY 10-FEET ON CENTER (MIN) IF 2-INCHES OR LARGER.
- DO NOT EXCEED LOADING LIMITS OF STRUCTURAL SYSTEMS WHERE GROUPS OF CONDUITS ARE SUPPORTED ON COMMON HANGERS.

- MANUFACTURERS: SAME AS LISTED FOR CONDUITS, PLUS B-LINE, KINDORF, MIDLAND-ROSS, RACO, OZ / GEDNEY, STEEL CITY, THOMAS & BETTS, OR UNISTRUT.
- 27 **BUSHINGS:**
- FOR 1-INCH CONDUIT AND SMALLER: INSULATING PLASTIC TYPE OF NON-BURNABLE THERMOSETTING PHENOLIC, CONFORMING TO UL REQUIREMENTS. DO NOT FURNISH NON-RIGID PLASTIC BUSHINGS.

- FOR 1-1/4 INCH AND LARGER: MALLEABLE IRON OR STEEL, ZINC OR CADMIUM PLATED, WITH INSULATING INSERT OF THERMOSETTING PLASTIC AS SPECIFIED FOR SMALLER CONDUIT BUSHINGS. MOLDED AND LOCKED INTO THE BUSHING RING.

- INSTALL INSULATING BUSHINGS ON CONDUIT ENDS BEFORE THE INSTALLATION OF ANY CONDUCTORS.

- 28 **OUTLET BOXES:**
- MATERIALS:
- SHEET STEEL BOXES: GALVANIZED STOCK NOT LESS THAN 14 GAUGE, WITH KNOCKOUT OPENINGS, SINGLE OR MULTIPLE GANG, WITH EXTENSIONS, ADAPTERS, PLASTER RINGS, TILE COVERS, FUTURE STUDS AND COVER PLATES. MANUFACTURERS: APPLETON, O-2/GEDNEY, RACO OR STEEL CITY.

- CAST OR MALLEABLE IRON BOXES: GALVANIZED OR CADMIUM PLATED, SINGLE OR MULTIPLE GANG, WITH TAPER THREADED HUBS, ADAPTERS AND COVER PLATES. MANUFACTURERS: APPLETON, CROUSE-HINDS OR THOMAS & BETTS.

- HAZARDOUS LOCATIONS: ALL BOXES INSTALLED IN HAZARDOUS LOCATION AREAS SHALL BE GALVANIZED, CAST OR MALLEABLE IRON, WITH THREADED HUBS AND THREADED COVERS. APPROVED FOR USE IN CLASS 1, GROUP A, B, C OR D AREAS AS APPLICABLE. MANUFACTURERS: APPLETON, CROUSE-HINDS, O-2/GEDNEY OR THOMAS & BETTS.

- INSTALLATION:
- IN GENERAL, USE OUTLET BOXES NOT LESS THAN 4-INCHES SQUARE, AT LEAST 2-1/2 INCHES DEEP AND OF SUFFICIENT SIZE TO ACCOMMODATE THE WIRING DEVICES TO BE INSTALLED. FLUSH MOUNTED BOXES FOR MULTIPLE OUTLETS SHALL BE GANG TYPE. BOXES SHALL NOT BE LESS THAN 3-INCH DEEP FOR CEILING BOXES.

- WHERE SHOWN ON THE DRAWINGS AND NOTED IN THESE SPECIFICATIONS, USE THREADED-HUB CAST METAL OUTLET BOXES FOR EXPOSED CONDUIT SYSTEMS OR FOR WEATHERPROOF DEVICES SUITABLE FOR THE WIRING DEVICES TO BE INSTALLED.

- USE OUTLET BOXES WITH PLASTER RING COVERS FOR WIRING DEVICES IN FINISHED WALLS WHERE PRACTICABLE, TO BRING BOX OPENINGS FLUSH WITH FINISHED WALL OR NOT MORE THAN 1/4-INCH BACK OF SAME.

- WHERE MOUNTING HEIGHT OR LOCATION OF OUTLET IS NOT SHOWN OR SPECIFIED, LOCATE THE OUTLET AS BEST SUITED FOR THE EQUIPMENT CONNECTED OR AS DIRECTED.
- USE 4-INCH OCTAGON BOXES WITH 3/8-INCH STUD FOR LUMINAIRES.

- SECURELY FASTEN OUTLET BOXES. ATTACH EXPOSED OUTLET BOXES TO PERMANENT INSERTS OR EXPANSION ANCHOR WITH MACHINE SCREWS OR THREADED RODS.

- CLOSE UNUSED OPENINGS IN OUTLET BOXES WITH KNOCKOUT COVERS MANUFACTURED FOR THE PURPOSE.
- PROVIDE ISOLATING PARTITION BETWEEN 277 VAC SWITCHES.

- FOR CONCEALED VOICE/DATA OUTLETS INSTALL 4-11/16 INCH SQUARE TYPE OUTLET BOXES WITH PLASTER COVER AND BUSHED 3/8-INCH OPENING COVER PLATE.

- 29 **PULL AND JUNCTION BOXES:**
- MATERIALS:
- FOR BOXES NOT OVER 100 CUBIC INCHES: USE 4-11/16 INCH SQUARE BY 1-1/2 INCH (MIN) DEEP OUTLET BOXES.

- FOR BOXES OVER 100 CUBIC INCHES: SHEET METAL BOXES, CODE GAUGE, GALVANIZED STEEL, FULL SEAM WELDED WITH BENT-IN FLANGES SEAM WELDED AT CORNER JOINTS, SCREW FASTENED GALVANIZED COVER OF SAME GAUGE AS BOX. FASTEN COVER WITH BRASS MACHINE SCREWS. PROVIDE SIZES CONFORMING TO NEC REQUIREMENTS FOR WIRING SPACE, EXCEPT WHERE BOXES OF LARGER SIZE ARE INDICATED. FURNISH GASKETS WHEN LOCATED IN AREAS REQUIRING GASKETS. MANUFACTURER: COOPER B-LINE, HOFFMAN, OR WIEGMANN.

- INSTALLATION:
- INSTALL PULL AND JUNCTIONS BOXES AT LEAST EVERY 100-FEET IN LONG CONDUIT RUNS. INSTALL PULL OR JUNCTION BOX SO THAT CONDUIT RUNS DO NOT EXCEED (3) 90 DEGREE BENDS BETWEEN BOXES.

- 30 **WIREWAYS:**
- PAINTED STEEL ENCLOSURE NEMA 1 WITH SCREWED FASTENED COVER, BENDS, ELBOWS, TEES, CROSSES, ADAPTERS AND ACCESSORIES AS REQUIRED FOR A COMPLETE SYSTEM. PROVIDE SIZES PER NEC REQUIREMENTS FOR WIRING SPACES, EXCEPT WHERE LARGER SIZES ARE INDICATED. FURNISH GASKETS WHEN LOCATED IN AREAS REQUIRING GASKETS. MANUFACTURERS: COOPER B-LINE, HOFFMAN, WIEGMANN, SQUARE D, OR WIREMOLD.

- INSTALL WIREWAYS COMPLETE WITH ALL REQUIRED COUPLINGS, END CLOSURES, ETC., AS REQUIRED. TAPS AND SPLICES ARE PERMITTED WITH THE WIREWAY, BUT SHALL BE LIMITED TO THE REQUIREMENTS OF NEC.

- 31 **PULL ROPE:**
- INSTALL 1/8-INCH DIAMETER NYLON PULLING ROPE WITH WOODEN BLOCKS AND IDENTIFICATION FASTENED TO BOTH ENDS OF ALL EMPTY ELECTRICAL AND VOICE/DATA CONDUITS.

- 32 **SLEEVES:**
- INSTALL SLEEVES AS NOTED. WHERE CONDUITS ARE TO PASS THROUGH FLOOR SLABS, AND PIPE SLOTS ARE NOT PROVIDED, INSTALL RIGID STEEL CONDUIT SLEEVES FOR CONDUIT SIZES AS INDICATED. INSTALL SLEEVES WITH BOTTOM OF SLEEVES FLUSH WITH SLAB AND TOP OF SLEEVE 3-INCHES ABOVE FINISHED FLOOR.

- CLOSE AND MAKE WATERTIGHT ALL OPEN SPACES AROUND INSTALLED CONDUIT WITH OAKUM AND APPROVED MASTIC. SUPPORT CONDUIT AT EACH FLOOR. PROVIDE APPROVED MASTIC FOR FIRE STOP AT ALL FIRE RATED WALL OR FLOOR PENETRATIONS.

- 33 **CONDUIT EXPANSION FITTINGS:**
- INSTALL A CONDUIT EXPANSION FITTING IN EACH CONDUIT RUN WHEREVER IT CROSSES AN EXPANSION JOINT IN THE STRUCTURE. INSTALL A CONDUIT EXPANSION FITTING IN EACH CONDUIT RUN WHICH IS MECHANICALLY ATTACHED TO SEPARATE STRUCTURES. INSTALL A BONDING JUMPER OR GROUND CLAMP TO CONNECT THE CONDUITS.

- 34 **WIRES AND CABLES:**
- MATERIALS:
- WIRE AND CABLE SHALL BE PER STANDARD SPECIFICATIONS ESTABLISHED FOR SUCH MATERIAL AND CONSTRUCTION BY ASTM, ANSI, IPCEA AND NEMA, WHERE APPLICABLE. ALL CONDUCTORS FURNISHED SHALL BE COPPER OF 98% CONDUCTIVITY. ALL CONDUCTORS FURNISHED SHALL BE NOT LESS THAN #12 AWG, EXCEPT CONTROL WHICH MAY BE #14 AWG. PROVIDE CONDUCTOR SIZES AS INDICATED OR PER THE N.E.C. WHERE NOT INDICATED. PROVIDE STRANDED CONDUCTORS FOR #12 AWG AND LARGER. PROVIDE SOLID CONDUCTORS FOR #14 AWG AND SMALLER.

- WIRE FOR GENERAL INTERIOR OR ABOVE-GRADE EXTERIOR WORK: SINGLE CONDUCTOR, ANNEALED COPPER, RATED 600 VOLTS AS FOLLOWS:
- NEC TYPE "THHN" RATED 90 DEG C, DRY AND DAMP LOCATIONS.
 - NEC TYPE "XHHW", RATED 90 DEG C, DRY AND DAMP LOCATION AND 75 DEG C, WET LOCATION.
 - NEC TYPE "XHHW-2", RATED 90 DEG C, DRY AND WET LOCATION.

- WIRE FOR BRANCH CIRCUITS FED FROM AN ISOLATION PANEL: SINGLE CONDUCTOR, ANNEALED COPPER, RATED 600 VOLTS AS FOLLOWS:
- NEC TYPE "XHHW-2", RATED 90 DEG C.

- MANUFACTURERS: AMERICAN INSULATED WIRE, GENERAL CABLE, OKONITE, SOUTHWIRE OR ESSEX.
- INSTALLATION:
- INSTALL WIRING IN ACCORDANCE WITH NEC OR PER ANY OTHER CODES THAT TAKE PRECEDENCE.

- INSTALL CONDUCTORS CONTINUOUS, WITHOUT SPLICES, BETWEEN EQUIPMENT, WHERE POSSIBLE. WHERE SPLICES ARE REQUIRED, MAKE UP SPLICES IN BOXES; DO NOT USE FITTINGS FOR SAME.
- INSTALL PHASE AND NEUTRAL CONDUCTORS OF EACH BRANCH OR FEEDER CIRCUIT IN A SINGLE CONDUIT EXCEPT WHERE PARALLELING CIRCUITS ARE INDICATED. INSTALL PARALLELING CIRCUITS OF IDENTICAL MAKE-UP AND LENGTH AS THE PARALLELED CIRCUIT, AND TERMINATE CONDUCTORS AT THE SAME LOCATION, MECHANICALLY AND ELECTRICALLY, AT BOTH ENDS, TO ENSURE EQUAL DIVISION OF THE TOTAL CURRENT BETWEEN CONDUCTORS.

- RUN A SEPARATE NEUTRAL WIRE FOR EACH SINGLE PHASE LOAD. THE NEUTRAL WIRE SHALL NOT BE SHARED BETWEEN PHASES IN 3 PHASE, 4 WIRE SYSTEM, AND IN THE CASE OF 120/240 VOLT AC SYSTEM, THE NEUTRAL SHALL NOT BE SHARED BETWEEN THE LINES.
- CONTINUOUSLY LUBRICATE CABLES AT THE PULL-IN POINT OF CONDUIT SYSTEMS WITH AN APPROVED COMPOUND COMPATIBLE WITH CONDUIT INSULATION OR JACKET. BRANCH CIRCUIT WIRING FOR ISOLATION PANELS SHALL NOT USE LUBRICATION.

- INSTALL CONDUCTORS IN SUCH A MANNER THAT THE BENDING RADIUS OF ANY WIRE OR CABLE IS NOT LESS THAN THE MINIMUM RECOMMENDED BY IPCEA AND/OR THE MANUFACTURER. DO NOT EXCEED MANUFACTURER'S RECOMMENDED VALUES FOR MAXIMUM PULLING TENSION APPLIED TO ANY WIRE OR CABLE.
- CONNECT ALL POWER WIRING TO EQUIPMENT, SUCH THAT PHASING SHALL BE A-B-C-N LEFT TO RIGHT, TOP TO BOTTOM AND FRONT TO BACK, WHERE POSSIBLE, AND PERMANENTLY IDENTIFY PHASING ON THE STRUCTURE OR HOUSING ADJACENT TO BUS. PHASE IDENTIFICATION A-B-C IS EQUIVALENT TO TRANSFORMER PHASE IDENTIFICATION X1-X2-X3 AND H1-H2-H3.

- CONNECT PHASE WIRING TO ALL 3 PHASE RECEPTACLES TO INSURE THE SAME PHASE ROTATION IN ALL RECEPTACLES WITH INTERCHANGEABLE PLUGS.

- PROVIDE AN APPROPRIATELY SIZED GREEN GROUND WIRE FOR EVERY FEEDER AND BRANCH CIRCUIT.

- ALL DROP CORD SERVICES SHALL BE TYPE "SO" CABLE WITH AN IDENTIFIED EQUIPMENT GROUND WIRE. ALL DROP CORD INSTALLATIONS SHALL BE PROVIDED WITH STRAIN RELIEF GRIPS.

- 51 **CIRCUIT BREAKERS FOR EXISTING PANELBOARDS:**
- PROVIDE ANY ADDITIONAL CIRCUIT BREAKERS IN EXISTING PANELBOARDS AS REQUIRED. CIRCUIT BREAKER SHALL MATCH EXISTING BREAKER MANUFACTURER, TYPE, AND AMP RATINGS.

- 35 **CONNECTORS FOR SPLICING COPPER CONDUCTORS:**
- CONNECTORS FOR STRAIGHT SPLICING CONDUCTORS UP TO AND INCLUDING #10 AWG: SOLDERLESS COMPRESSION TYPE. MANUFACTURER: THOMAS & BETTS "STA-KON" OR BURNDY "HYDENT".

- TWIST-ON CONNECTORS FOR PGITAIL SPLICING UP TO AND INCLUDING #10 AWG: METAL WIRE SPRING PRESSURE TYPE CONNECTOR WITH THERMOPLASTIC INSULATED COVER WITH POSITIVE GRIP DESIGN AND VOLTAGE RATING OF 600 VAC. MANUFACTURER: 3M "SCOTCHLOK" OR IDEAL "WIRE-NU".

- CRIMP CONNECTORS FOR PGITAIL SPLICING CONDUCTORS UP TO AND INCLUDING #10 AWG: SOLDERLESS TYPE WITH A METALLIC INSERT CRIMP CONNECTOR WITH A PLASTIC INSULATING COVER RATED 600 VAC. MANUFACTURER: BUCHANAN #2011S (CRIMP) AND #2014 (INSULATOR) OR IDEAL #411 (CRIMP) AND #417 (INSULATOR).

- CONNECTOR FOR STRAIT SPLICING CONDUCTORS #8 AWG AND LARGER: SOLDERLESS COMPRESSION 2-WAY CONNECTOR. MANUFACTURER: THOMAS & BETTS "54500 SERIES"; BURNDY TYPE "YS-L", OR ILSCO "CT" OR "CTL".

- CONNECTORS FOR 3-WAY SPLICING CONDUCTORS #8 AWG AND LARGER: SOLDERLESS COMPRESSION TYPE. MANUFACTURER: THOMAS & BETTS "54700 SERIES" OR BURNDY "YS-T".
- TWIST-ON PIGTAIL CONNECTORS SHALL BE USED FOR #10 AWG AND SMALLER NOT SUBJECT TO MOVEMENT AND VIBRATIONS. THEY SHALL NOT BE USED FOR CONNECTION TO ROTATING EQUIPMENT. CRIMP PIGTAIL CONNECTORS SHALL BE USED FOR #10 AWG AND SMALLER FOR CONNECTIONS TO ROTATING EQUIPMENT, OR WHERE SUBJECT TO MOVEMENT AND VIBRATION.

- 36 **LUGS FOR TERMINATING COPPER CONDUCTORS:**
- LUGS FOR TERMINATING POWER CONDUCTORS UP TO AND INCLUDING #6 AWG: TIN PLATED, SOLDERLESS TYPE, MANUFACTURER'S STANDARD, UNLESS OTHERWISE SPECIFIED.

- LUGS FOR TERMINATING POWER CONDUCTORS #6 AWG AND LARGER: HIGH CONDUCTIVE WROUGHT COPPER, TIN PLATED, SOLDERLESS COMPRESSION TYPE, ONE HOLE, SINGLE INDENT FOR #6 AWG THROUGH #40 AWG INCLUSIVE, AND TWO HOLE, LONG BARREL, DOUBLE INDENT FOR LARGER SIZES. LUGS FOR #40 AWG AND LARGER SHALL BE SIZED FOR THE SPECIFIC CABLE SIZE, MULTIRANGE LUGS ARE NOT ACCEPTABLE. MANUFACTURER: BURNDY TYPE "YAL-L", THOMAS & BETTS "SERIES 54000", ILSCO "CN", OR 3M COMPANY.

- 37 **CONDUCTOR COLOR CODING:**
- PROVIDE PHASE SPECIFIC COLOR CODING ON THREE PHASE FEEDERS AND THREE PHASE BRANCH CIRCUITS AS INDICATED BELOW.

- FOR 480/277 VOLT SYSTEM:
- PHASE A - BROWN, PHASE B - ORANGE, PHASE C - YELLOW, NEUTRAL - GRAY, GROUND - GREEN. ISOLATED GROUND - GREEN WITH YELLOW STRIP OR TAPE.

- FOR 208/120 VOLT AND 240/120 VOLT SYSTEM:
- PHASE A - BLACK, PHASE B - RED, PHASE C - BLUE, NEUTRAL - WHITE, GROUND - GREEN. ISOLATED GROUND - GREEN WITH YELLOW STRIP OR TAPE.

- FOR ISOLATED POWER CIRCUITS:
- ISOLATED CONDUCTOR NO. 1 - ORANGE WITH AT LEAST ONE DISTINCTIVE COLORED STRIPE OTHER THAN WHITE, GREEN, OR GRAY ALONG THE ENTIRE LENGTH OF THE CONDUCTOR.

- ISOLATED CONDUCTOR NO. 2 - BROWN WITH AT LEAST ONE DISTINCTIVE COLORED STRIPE OTHER THAN WHITE, GREEN, OR GRAY ALONG THE ENTIRE LENGTH OF THE CONDUCTOR.

- ISOLATED CONDUCTOR NO. 3 (THREE PHASE SYSTEMS) - YELLOW WITH AT LEAST ONE DISTINCTIVE COLORED STRIPE OTHER THAN WHITE, GREEN, OR GRAY ALONG THE ENTIRE LENGTH OF THE CONDUCTOR.

- 38 **CONDUCTOR IDENTIFICATION:**
- WIRE LABELS FOR IDENTIFICATION OF CONDUCTORS SHALL BE FLAME RESISTING, ADHESIVE TYPE. MANUFACTURER: BRADY, GARDNER BENDER, IDEAL, OR 3M COMPANY.

- PROVIDE UNIQUE LABELING OF ALL BRANCH CIRCUIT CONDUCTORS AND ASSOCIATED NEUTRAL CONDUCTORS. IN ALL TERMINAL CABINETS, PANELBOARDS, DISTRIBUTION, CONTROL AND LOAD CENTERS, PULL BOXES AND WHEREVER CONDUIT RUN IS BROKEN, MARK THE WHITE MARKING STRIP ON THE CONTRL TERMINAL BLOCKS WITH THE SAME IDENTIFICATION AS THE CONNECTING WIRE IN PERMANENT BLACK INK.

- ALL CONDUCTORS SHALL BE TAGGED AT THEIR POINT OF ORIGIN, IN ALL JUNCTION AND PULL BOXES AND AT THEIR POINT OF TERMINATION.

- 39 **INSULATING TAPE:**
- FOR GENERAL USE: SCOTCH 33 PLUS OR OKONITE TYPE CLF SERIES 602-20.

- 40 **FUSES:**
- FUSES FOR POWER FEEDERS AND/OR BRANCH CIRCUITS RATED 600 AMPERE OR LOWER: UL CLASS RK1, DUAL ELEMENT, TIME DELAY, CURRENT LIMITING TYPE WITH REPLACEMENT FUSE INDICATOR (WHERE AVAILABLE) AND 200,000 AMPERE INTERRUPTING RATING. BUSSMANN LPN-RK SP (250V), LPS-RK SP (600V) OR FERRAZ SHAWMUT A2D-R (250V), A6D-R (600V).

- FUSES FOR POWER FEEDERS RATED 601 AMPERE OR GREATER: UL CLASS I, CURRENT LIMITING TYPE, TIME DELAY WITH 200,000 AMPERE INTERRUPTING RATING. BUSSMANN HI-CAP KRP-C SP OR FERRAZ SHAWMUT A4BQ.

- FUSES FOR LIGHTING FEEDERS AND/OR LIGHTING PANELBOARDS: UL CLASS RK-1, CURRENT LIMITING, TIME DELAY TYPE WITH REPLACEMENT FUSE INDICATOR (WHERE AVAILABLE) AND 200,000 AMPERE INTERRUPTING RATING. BUSSMANN LPN-RK SP (250V), LPS-RK SP (600V) OR FERRAZ SHAWMUT A2KR (250V), A6KR-R (600V).

- SPARE FUSES: PROVIDE ONE SPARE SET OF THREE FOR EACH SIZE AND TYPE OF FUSES INSTALLED.

- INSTALL FUSES IN FUSIBLE DEVICES. ARRANGE FUSES SO REPLACEMENT FUSE INDICATOR AND RATING INFORMATION IS READABLE WITHOUT REMOVING FUSE.

- ALL FUSES SHALL BE OF THE SAME MANUFACTURER, INCLUDING SPARES.
- 41 **DISCONNECT SWITCH:**

- HEAVY DUTY, NEMA 1, 600 VAC RATED, QUICK-MAKE, QUICK-BREAK, NON-ROTARY, VISIBLE BLADE, WITH FULL COVER INTERLOCK. FUSIBLE OR NON-FUSIBLE AS INDICATED ON DRAWINGS. PROVISION FOR PADLOCKING IN THE OPEN POSITION. EQUIP SWITCHES WITH CLASS R REJECTION TYPE CLIPS AND CLASS R FUSES TO OBTAIN A SHORT CIRCUIT RATING OF 50,000 A.I.C. MINIMUM. PROVIDE A NEMA 3R ENCLOSURE WHEN INSTALLED OUTDOORS OR IN DAMP AREAS.

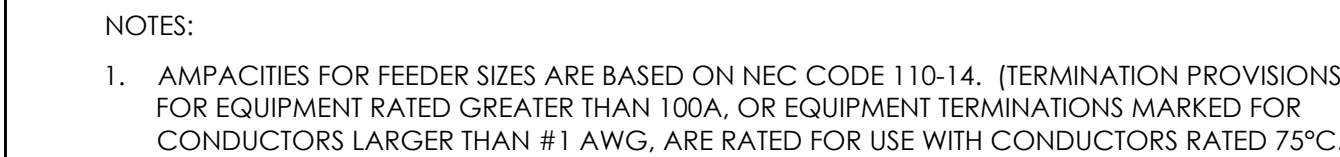
- MANUFACTURER: ALLEN BRADLEY, SQUARE D, EATON, GENERAL ELECTRIC, OR SIEMENS.

- 42 **FUSIBLE DISCONNECT SWITCH:**
- FUSIBLE DISCONNECT SWITCH SHALL HAVE AN EXTERNAL OPERATING HANDLE ARRANGED FOR BOTH MANUAL AND HOOK-STOP OPERATING AND INTERLOCKED WITH THE COVER DOOR SUCH

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I-HED

26913 Northwestern Hwy
Suite 200
Southfield, Michigan
48033 USA
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WWW.HED.DESIGN

E-021

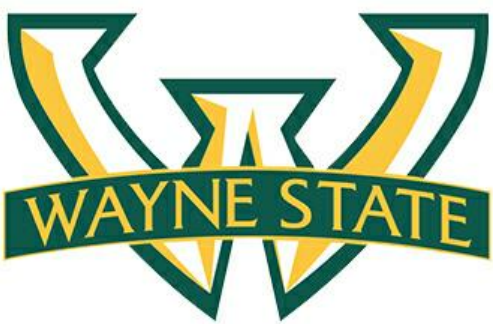
LIGHT FIXTURE SCHEDULE				
TYPE	DESCRIPTION	LAMP AND DRIVER	MAX WATTS	
"L1"	8-FT LINEAR LED LOW BAY FIXTURE WITH: 20-GAUGE STEEL HOUSING HAVING HIGH-GLOSS BAKED WHITE ENAMEL FINISH; DIFFUSE ACRYLIC LENS; AIRCRAFT CABLE MOUNTING; 277VOLT LED DRIVER DELIVERING 16000 LUMENS; 0-10V DIMMING	4000K LED PROVIDED WITH FIXTURE	149	
	LITHONIA TMSL SERIES			
"L2"	2-FT x 4-FT LED MRI/IMAGING SUITE TROFFER WITH: NON-FERROUS ALUMINUM CONSTRUCTION HAVING MATTE WHITE POWDER COAT FINISH; EXTRUDED FROSTED ACRYLIC LENS; 0-10V DIMMING (W/ DIMMING FILTER); REMOTE POWER SUPPLY WITH EMI FILTER; 24 VDC INPUT TO FIXTURE DELIVERING 2500 LUMENS.	4000K LED PROVIDED WITH FIXTURE	26	
	KENALL MEDMASTER TROFFER			
"L3"	2-FT x 4-FT LED TROFFER WITH: MATTE WHITE POWDER COAT FINISH ON REFLECTOR; EXTRUDED CURVED SMOOTH ACRYLIC DIFFUSER; MULTI-VOLT DRIVER DELIVERING 3000 LUMENS	4000K LED PROVIDED WITH FIXTURE	23	
	LITHONIA BLT SERIES			
"X1"	LED EXIT SIGN WITH: UNIVERSAL MOUNTING CAPABILITIES; AC ONLY OPERATION; CUSTOM WORDING/ SPECIAL SIGNAGE CAPABLE; WHITE HOUSING; RED LETTERING.	LED PROVIDED WITH FIXTURE	1	
	LITHONIA LQM SERIES			

LIGHTING CONTROL COMPLIANCE MATRIX												
SPACE TYPE	MANDATORY REQUIREMENTS (SEE ASHRAE 90.1-2013, TABLE 9.6.1)								OPTIONAL ADDITIONAL....		COMMENTS	
	LOCAL MANUAL CONTROL	RESTRICTED TO MANUAL ON	RESTRICTED TO PARTIAL AUTOMATIC ON	BILEVEL LIGHTING CONTROL	AUTOMATIC DAYLIGHT RESPONSIVE CONTROLS FOR SIDELIGHTING	AUTOMATIC DAYLIGHT RESPONSIVE CONTROLS FOR TOP LIGHTING	AUTOMATIC PARTIAL OFF	AUTOMATIC FULL OFF	SCHEDULED SHUTOFF	MANUAL, CONTINUOUS DIMMING CONTROL OR PROGRAMMABLE MULTILEVEL DIMMING CONTROL		PROGRAMMABLE MULTILEVEL DIMMING CONTROL USING PROGRAMMABLE TIME SCHEDULING
MRI RM 105.3 - IMAGING ROOM	X		X							X		
CHEMISTRY RM 105-1 - LABORATORY FOR MEDICAL/INDUSTRIAL/RESEARCH	X	X		X	SEE NOTE 2	SEE NOTE 3			X			
CONTROL RM 105.2 - OFFICE; ENCLOSED	X	X		X	SEE NOTE 2	SEE NOTE 3			X			
EQUIPMENT RM 105-4 OFFICE; ENCLOSED	X	X		X	SEE NOTE 2	SEE NOTE 3			X			
<p>NOTE 1: SPACE TYPE HAS INSTANCES WHERE SOME ROOMS HAVE WINDOWS AND/OR TOPLIGHTS AND OTHER INSTANCES WHERE NO WINDOWS AND OR TOPLIGHTS ARE PRESENT. FOR SPACES WITH WINDOWS OR TOPLIGHTS WHERE DAYLIGHT RESPONSE CONTROLS ARE REQUIRED, DAYLIGHT RESPONSE CONTROL WILL BE PROVIDED.</p> <p>NOTE 2: SELECT SPACES HAVE EITHER NO WINDOWS OR NO WINDOWS WITH VIEWS TO THE EXTERIOR WITHIN PRIMARY DAYLIGHTING ZONE. THEREFORE, DAYLIGHT RESPONSE CONTROL FOR SIDELIGHTING IS NOT REQUIRED.</p> <p>NOTE 3: SELECT SPACES HAVE NO TOPLIGHTING. THEREFORE, DAYLIGHT RESPONSE CONTROL FOR TOPLIGHTING IS NOT REQUIRED.</p> <p>NOTE 4: SCHEDULED SHUTOFF IN SELECT AREAS ARE EXEMPT DUE TO SECURITY AND SAFETY REQUIREMENTS OF THE OWNER (SEE ASHRAE 90.1-2013, SECTION 9.4.1.1.i).</p> <p>NOTE 5: AUTOMATIC PARTIAL SHUTOFF IS COMPLIED WITH BY PROVIDING AUTOMATIC FULL SHUTOFF. PER ASHRAE 90.1-2013, SECTION 9.4.1.1.g.</p> <p>NOTE 6: OCCUPANCY SENSORS IN THE SPACE SHALL BE CONFIGURED BY LIGHTING CONTROL SYSTEM TO UTILIZE AUTOMATIC PARTIAL OFF DURING NORMALLY OCCUPIED HOURS OF OPERATION, AND AUTOMATIC FULL OFF DURING NORMALLY UNOCCUPIED HOURS OF OPERATION.</p> <p>NOTE 7: SPACES USING LESS THAN 150W OF LIGHTING ARE EXEMPT FROM SIDELIGHTING AND TOPLIGHTING DAYLIGHT RESPONSE CONTROLS, PER ASHRAE 90.1-2013 SECTION 9.4.1.1.e & 9.4.1.1.f.</p> <p>NOTE 8: SELECT SPACES EXEMPT FROM REQUIRING "RESTRICTED TO MANUAL ON" CONTROL WHERE DOING SO WOULD ENDANGER THE SAFETY OR SECURITY OF THE ROOM OR BUILDING OCCUPANTS, PER ASHRAE 90.1-2013 SECTION 9.4.1.1.b.</p>												

EXISTING DP-LAB #5											
VOLTAGE:		LOCATION:		MAINS:		ISSUED FOR:		A.I.C. RATING:			
480 / 277		LAB #5		50 A. / MCB				144A			
Ø / WIRE		MAXIMUM POLE CAPACITY:		NEUTRAL RATING:		FED FROM:		MOUNTING:			
3 / 4		24		100%		LAB BUS DUCT		SURFACE			
		BRANCH		VA				BRANCH			
NO.	POLE	BREAKER	LOAD TYPE []	DESCRIPTION	ØA	ØB	ØC	LOAD TYPE []	BREAKER	POLE	NO.
1	3	45	E	RP-LAB #5 TRANSFORMER	4586 0			DIGITAL METER (VOLTAGE SENSOR)	E	30	3
3	3	45	E	RP-LAB #5 TRANSFORMER		4126 0		DIGITAL METER (VOLTAGE SENSOR)	E	30	4
5	3	45	E	RP-LAB #5 TRANSFORMER			3570 0	DIGITAL METER (VOLTAGE SENSOR)	E	30	6
7	3	30	S	SPARE		3000		WATER HEATER	E	30	3
9	3	30	S	SPARE			3000	WATER HEATER	E	30	3
11	3	30	S	SPARE				WATER HEATER	E	30	3
13	3	30	S	SPARE					S	30	3
15	3	30	S	SPARE				SPARE	S	30	3
17	3	30	S	SPARE				SPARE	S	30	3
19	3	30	S	SPARE				SPARE	S	30	3
21	3	30	S	SPARE				SPARE	S	30	3
23	3	30	S	SPARE				SPARE	S	30	3
TOTALS:					7586	7126	6570				
					0.00 KVA	CONNECTED LOAD LIGHTING (L)					
					0.00 KVA	CONNECTED LOAD RECEPTACLE (R)					
					21.28 KVA	EQUIPMENT LOAD (E)					
					0.00 KVA	CONNECTED LOAD KITCHEN EQUIP. (K)					
					21.28 KVA	TOTAL CONNECTED LOAD: (LESS SPARE)					
					17.03 KVA	TOTAL DEMAND LOAD					
					0.00 KVA	25% OF LIGHTING LOAD					
					21.28 KVA	KVA FOR MINIMUM FEEDER DESIGN					
PANEL BOARD TOTAL LOAD:											
25.6 = AMPS CONNECTED											
20.5 = AMPS DEMAND											
25.6 = AMPS MIN. FEEDER DESIGN											

DP-LAB #5											
VOLTAGE:		LOCATION:		MAINS:		ISSUED FOR:		A.I.C. RATING:			
480 / 277		LAB #5 [105.1]		250 A. / MCB				22kA			
Ø / WIRE		MAXIMUM POLE CAPACITY:		NEUTRAL RATING:		FED FROM:		MOUNTING:			
3 / 4		24		100%		LAB BUS DUCT		SURFACE			
		BRANCH		VA				BRANCH			
NO.	POLE	BREAKER	LOAD TYPE []	DESCRIPTION	ØA	ØB	ØC	LOAD TYPE []	BREAKER	POLE	NO.
1	3	45	E	RP-LAB #5 [VIA TRANSFORMER]	4880			DIGITAL METER (VOLT SENSOR)	E	30	3
					0						
3	3	45	E	RP-LAB #5 [VIA TRANSFORMER]		7564		DIGITAL METER (VOLT SENSOR)	E	30	4
						0					
5	3	45	E	RP-LAB #5 [VIA TRANSFORMER]			7814	DIGITAL METER (VOLT SENSOR)	E	30	6
							0				
7	3	70	E	MRI ISOLATED POWER CABINET	14000				WH-2	E	110
					24082						8
9	3	70	E	MRI ISOLATED POWER CABINET		14000			WH-2	E	110
						24082					10
11	3	70	E	MRI ISOLATED POWER CABINET			14000		WH-2	E	110
							24082				12
13	1	20	L	GENERAL LIGHTING	741				SPARE	S	110
											14
15	1	20	S	SPARE					SPARE	S	110
											16
17	1	20	S	SPARE					SPARE	S	110
											18
19	3	45	S	SPARE					SPARE	S	30
											20
21	3	45	S	SPARE					SPARE	S	30
											22
23	3	45	S	SPARE					SPARE	S	30
											24
25	3	70	S	SPARE					SPD	E	30
											26
27	3	70	S	SPARE					SPD	E	30
											28
29	3	70	S	SPARE					SPD	E	30
											30
TOTALS:					43703	45646	45896				
					0.74 KVA	CONNECTED LOAD LIGHTING (L)					
					0.00 KVA	CONNECTED LOAD RECEPTACLE (R)					
					134.50 KVA	EQUIPMENT LOAD (E)					
					0.00 KVA	CONNECTED LOAD KITCHEN EQUIP. (K)					
<u>PANEL BOARD TOTAL LOAD:</u>					135.25 KVA	TOTAL CONNECTED LOAD: (LESS SPARE)					
162.7 = AMPS CONNECTED					108.34 KVA	TOTAL DEMAND LOAD					
130.3 = AMPS DEMAND					0.19 KVA	25% OF LIGHTING LOAD					
162.9 = AMPS MIN. FEEDER DESIGN					135.43 KVA	KVA FOR MINIMUM FEEDER DESIGN					
NOTES:											
1. PROVIDE GE "A" SERIES PANEL OR APPROVED EQUAL WITH 250A MCB, HAVING INTEGRATED SPD											
2. PROVIDE PANEL WITH GROUND BUS											
3. PROVIDE TYPE TEY BRANCH CIRCUIT BREAKERS OR APPROVED EQUAL TIME-CURRENT CHARACTERISTICS											
4. PROVIDE ALL SPARE CIRCUIT BREAKERS AS SHOWN											

EXISTING RP-LAB #5											
VOLTAGE:		LOCATION #5		MAINS:		ISSUED FOR:		A.I.C. RATING:			
208 / 120		LAB #5		100 A. / MCB				10kA			
Ø / WIRE		MAXIMUM POLE CAPACITY:		NEUTRAL RATING:		FED FROM:		MOUNTING:			
3 / 4		30		100%		EXISTING DP-LAB#5 VIA...		SURFACE			
		BRANCH		VA				BRANCH			
NO.	POLE	BREAKER	LOAD TYPE []	DESCRIPTION	ØA	ØB	ØC	LOAD TYPE []	BREAKER	POLE	NO.
1	1	20	R	N WALL RECEPTACLES	180						
					1000	180					
3	1	20	R	N WALL RECEPTACLES							
							900				
5	1	20	R	N WALL RECEPTACLES							
7	1	20	R	W WALL RECEPTACLES	540						
					416						
9	1	20	R	S WALL RECEPTACLES		360					
						416					
11	1	20	R	S WALL RECEPTACLES			360				
							540				
13	1	20	S	SPARE							
15	1	20	R	S WALL RECEPTACLES		180					
						540					
17	1	20	R	S WALL RECEPTACLES			180				
							180				
19	1	20	R	S WALL RECEPTACLES	540						
					180						
21	1	20	R	S WALL RECEPTACLES		540					
						180					
23	1	20	R	S WALL RECEPTACLES			180				
							540				
25	1	20	S	SPARE							
					1730						
27	1	20	S	SPARE							
						1730					
29	1	20	S	SPARE							
				TOTALS:	4586	4126	3570				
					0.00 KVA	CONNECTED LOAD LIGHTING (L)					
					9.76 KVA	CONNECTED LOAD RECEPTACLE (R)					
					2.52 KVA	EQUIPMENT LOAD (E)					
					0.00 KVA	CONNECTED LOAD KITCHEN EQUIP. (K)					
PANEL BOARD TOTAL LOAD:					12.28 KVA	TOTAL CONNECTED LOAD: (LESS SPARE)					
34.1 = AMPS CONNECTED					11.78 KVA	TOTAL DEMAND LOAD					
32.7 = AMPS DEMAND					0.00 KVA	25% OF LIGHTING LOAD					
34.1 = AMPS MIN. FEEDER DESIGN					12.28 KVA	KVA FOR MINIMUM FEEDER DESIGN					



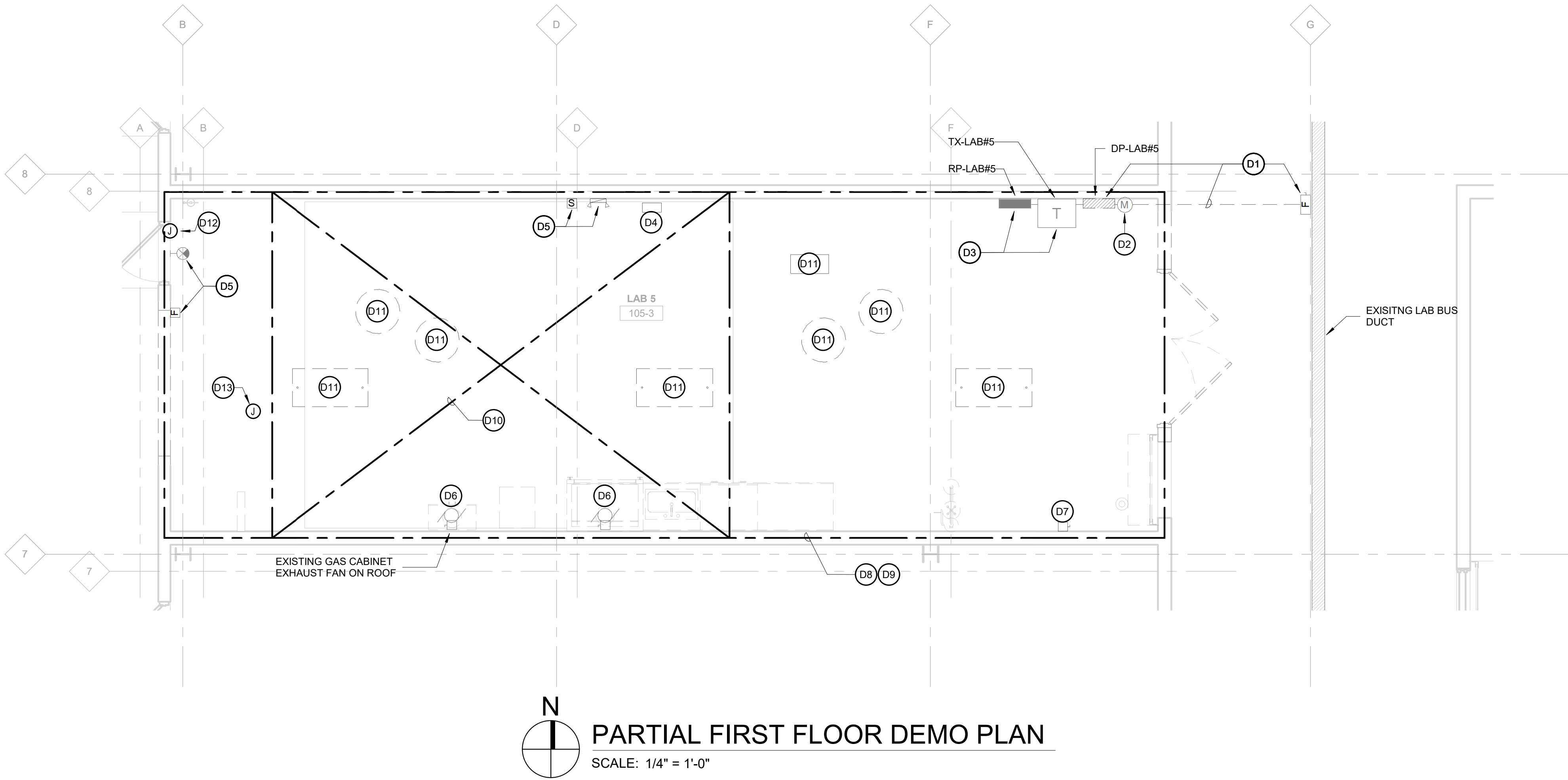
Wayne State
University

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Detroit, MI 48202

I2C MRI
Installation -
Lab 5 Fit-Out

461 Burroughs St.
Detroit, MI 48202

Date Issued For
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DEMOLITION PLAN NOTES:

- DISCONNECT ALL EXISTING ELECTRICAL WORK, WHETHER SHOWN OR NOT IN THE AREA OF NEW CONSTRUCTION AS REQUIRED FOR REMOVAL BY THE GENERAL CONTRACTOR. THIS CONTRACTOR SHALL ALSO RELOCATE ANY ELECTRICAL WORK, WHETHER SHOWN OR NOT, THAT INTERFERES WITH NEW WORK OF ANY TRADE.
- JUNCTION BOXES, CONDUITS AND WIRING FEEDING DEVICES AND EQUIPMENT TO BE REMOVED SHALL ALSO BE REMOVED UP TO THE NEXT ACTIVE PULL BOX, JUNCTION BOX OR PANEL. ALL OPEN HOLES IN DUCTS, BOXES, PANELS AND KNOCK OUTS SHALL BE CLOSED WITH SUITABLE PLUGS OR FILLER PLATES.
- EXISTING ELECTRICAL EQUIPMENT TO REMAIN SHALL BE KEPT IN SERVICE AND BE PROTECTED. PROVIDE TEMPORARY SERVICE AS REQUIRED. ALL DOWN TIMES SHALL BE MINIMUM AND SHALL BE COORDINATED WITH THE BUILDING OWNER AND SHALL BE SUBJECT TO THEIR APPROVAL.
- REMOVAL OF EQUIPMENT SERVING LOCATIONS BEYOND THE RENOVATED AREAS SHALL BE CONFIRMED WITH THE ARCHITECT/ENGINEER PRIOR TO START OF WORK.
- THE BUILDING OWNER SHALL BE GRANTED THE RIGHT OF FIRST REFUSAL ON ALL EQUIPMENT TO BE REMOVED. ANY EQUIPMENT WAIVED BY THE BUILDING OWNER SHALL BE LEGALLY DISPOSED OF OFF THE SITE BY THE CONTRACTOR.
- WHERE EXISTING ELECTRICAL EQUIPMENT TO REMAIN IS SUPPORTED ON WALLS OR CEILINGS TO BE REMOVED, THE EQUIPMENT SHALL BE RE-SUPPORTED AS REQUIRED.
- ALL DEMOLITION WORK SHALL BE DONE IN A NEAT, WORKMANLIKE MANNER USING CARE NOT TO DAMAGE ANY OF THE EXISTING STRUCTURE.
- WHERE WORK IS REQUIRED IN OCCUPIED SPACES, THE WORK SHALL BE SCHEDULED "OFF HOURS" AND BE SUBJECT TO THE BUILDING OWNER'S APPROVAL.

DEMOLITION KEYNOTES	
Key Value	Keynote Text
D1	REMOVE EXISTING DP-LAB#5 BUSWAY PLUG, CONDUIT AND FEEDERS, AND DP-LAB#5. CONTRACTOR TO DETERMINE PROPER PHASING TO PROVIDE TEMPORARY POWER DURING CONSTRUCTION.
D2	EXISTING MULTIFUNCTION DIGITAL METER TO BE REUSED. RETAIN EXISTING NETWORK CONNECTIONS AND MODIFY 120V SERVICE FROM RP-LAB#5 AS NEEDED.
D3	EXISTING TX-LAB#5 AND RP-LAB#5 TO BE REUSED. REFER TO ONE-LINE DIAGRAM E-021.
D4	EXISTING MAU CONTROLS TO BE RELOCATED. REWORK CONDUIT AND WIRING FOR POWER AS NEEDED. COORDINATE WITH MECHANICAL CONTRACTOR. REFER TO PLAN E-102 FOR FINAL LOCATION.
D5	REMOVE AND RETAIN FOR REUSE. MODIFY OR EXTEND EXISTING SERVICES TO NEW LOCATIONS ACCORDINGLY. REFER TO MISC. SYSTEMS, LIGHTING, AND POWER PLANS.
D6	EXISTING ROOF MOUNTED EXHAUST FAN FOR FUME HOOD TO REMAIN IN PLACE. GAS CABINET EXHAUST FAN TO BE REMOVED AND REPLACED IN THE SAME LOCATION. MODIFY ELECTRICAL SERVICE AND CONTROL WIRING TO NEW LOCATIONS. REFER TO PLAN E-102 FOR FINAL LOCATIONS AND CONTROL METHODS.
D7	REMOVE EXISTING WATER HEATER DISCONNECT, CONDUIT, AND WIRING.
D8	REMOVE ALL EXISTING 120/208V BRANCH CIRCUITS FED FROM RP-LAB#5, UNLESS NOTED OTHERWISE ON THIS PLAN.
D9	COMPLETELY REMOVE ALL EXISTING IT/DATA/VOICE CABELING PRESENT IN LAB #5 BACK TO THEIR SOURCE. UNLESS OTHERWISE NOTED.
D10	RELOCATE ALL EXISTING ELECTRICAL JUNCTION BOXES TO OUTSIDE OF FUTURE MRI SHIELD ROOM, AS SPACE WILL BECOME INACCESSIBLE. REFER TO ARCHITECTURAL PLAN A-101 FOR EXACT DIMENSIONS OF SHIELD ROOM.
D11	REMOVE ALL EXISTING DC LIGHTING, HIGHBAY LIGHTING & FANS, AND LOCAL CONTROLS WITHIN LAB #5. REMOVE CONDUIT AND WIRING TO NEAREST ACTIVE JUNCTION BOX OR PANEL.
D12	EXISTING LOCAL DOOR ALARM SYSTEM TO REMAIN.
D13	DISCONNECT ELECTRICAL FOR THE REMOVAL OF EXISITNG FAN MIX BOX. LEAVE CIRCUIT FOR RECONNECTION TO NEW MECHANICAL UNIT(S).

LIGHTING POWER DENSITY CALCULATION

CALCULATION METHOD	Building Area Method
INTERIOR:	
TOTAL SQ. FT.	909 ft2
TOTAL INSTALLED	0.741 kW
TOTAL ALLOWED	
BASED ON ANSI/ASHRAE/IESNA 90.1-2013	0.791 kW
NET DIFFERENCE	0.050 kW
PERCENT REDUCTION	6.30%
AVERAGE LIGHTING POWER DENSITY	0.815 W/ft2
TOTAL ALLOWED LIGHTING POWER...	0.870 W/ft2

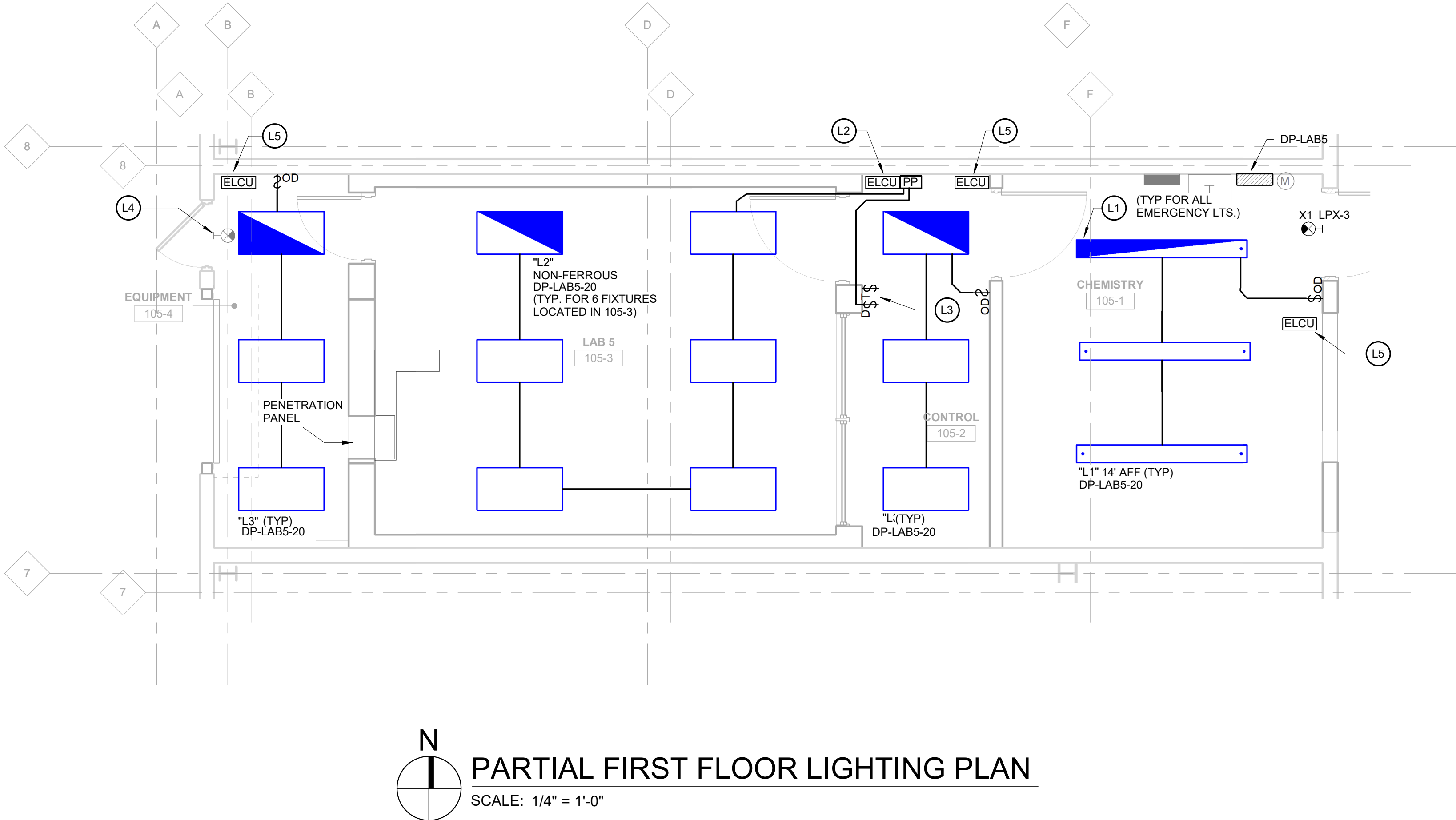
LIGHTING KEYNOTES	
Key Value	Keynote Text
L1	LUMINAIRES INDICATED AS BEING FOR EMERGENCY ILLUMINATION SHALL BE CONNECTED TO AN UL 924 EMERGENCY TRANSFER DEVICE / AUTOMATIC LOAD CONTROL RELAY. THE LUMINAIRE SHALL BE CONNECTED TO THE EXISTING EMERGENCY LIGHTING CIRCUIT (LPX-3). AND THE EMERGENCY TRANSFER DEVICE UNIT SHALL MONITOR THE NORMAL LIGHTING CIRCUIT FOR A LOSS OF POWER. IN THE EVENT OF A LOSS OF NORMAL POWER, THE EMERGENCY LIGHTS SHALL BYPASS THE NORMAL LIGHTING CONTROL AND BE FORCED TO THE ON POSITION AT FULL BRIGHTNESS. CONSULT MANUFACTURES WIRING DIAGRAMS FOR EMERGENCY CONTROL DEVICE PRIOR TO INSTALLATION. UNDER NORMAL CONDITIONS, THESE EMERGENCY LUMINAIRES WILL BE CONTROLLED BY THE SAME LIGHTING CONTROLS AS THE ADJACENT NORMAL POWERED LUMINAIRES. PROVIDE A REMOTE TEST SWITCH IN AREAS THE EMERGENCY TRANSFER DEVICE IS NOT EXPOSED TO THE SPACE.
L2	SUGGESTED LOCATION FOR LED DRIVERS (PP) AND ELCU, TO BE LOCATED OUTSIDE OF THE MRI SHIELD ROOM (105-3) FOR ALL LIGHT FIXTURES WITHIN THE SHIELD ROOM. ADHERE TO MANUFACTURER INSTALLATION REQUIREMENTS.
L3	MRI ROOM LIGHTING CONTROLS LOCATED IN CONTROL ROOM. PROVIDE 12 HOUR AUTOMATIC SHUT-OFF TIMER HAVING ON/OFF CONTROL AND 2 MIN FLICKER TIME OUT WARNING (SENSOR SWITCH PTS720 OR SIMILAR) WIRED AHEAD OF DIMMER SWITCH, IN ACCORDANCE WITH LIGHTING CONTROL COMPLIANCE MATRIX, SEE DRAWING E-041.
L4	EXTEND EXISTING EMERGENCY LIGHTING CIRCUIT, LPX-3 TO ALL NEW TYPE "X1" FIXTURES AND EMERGENCY TRANSFER DEVICE(S) (CALLED FOR IN KEYNOTE L-1). VERIFY CIRCUIT BREAKER LOADING PRIOR TO EXTENSION OF SERVICE. LOAD NOT TO EXCEED 4400 WATTS. EMERGENCY LIGHTING PANEL LOCATED IN SECURE TENANT ENTRY ROOM 114. SEE E-011.
L5	LOCATE EMERGENCY LIGHTING CONTROL UNITS (ELCU) FOR THIS SPACE (CALLED FOR IN KEYNOTE L1) IN THIS GENERAL LOCATION. COORDINATE EXACT QUANTITY OF UNITS REQUIRED WITH MANUFACTURER'S REPRESENTATIVE. PROVIDE ASSOCIATED KEY SWITCH FOR REMOTE TESTING AND VERIFY QUANTITY OF KEY SWITCHES REQUIRED WITH MANUFACTURER'S REPRESENTATIVE. INSTALL ABOVE CEILING WHERE CEILING IS PRESENT, OTHERWISE MOUNT AT MANUFACTURER RECOMMENDED HEIGHT.

LIGHTING PLAN NOTES:

- SEE DRAWING E-001 FOR ELECTRICAL SYMBOL LEGEND.
- SEE DRAWING E-011 FOR GENERAL NOTES AND TYPICAL MOUNTING HEIGHT INFORMATION.
- SEE DRAWING E-012 FOR ELECTRICAL SPECIFICATIONS.
- SEE DRAWING E-041 FOR PANEL SCHEDULES, LIGHT FIXTURE SCHEDULE.
- SURVEY FIELD CONDITIONS AND VERIFY WORK IS BUILDABLE AS SHOWN. IF ELECTRICAL DEVICES AS INDICATED CANNOT BE INSTALLED DUE TO CONFLICT WITH THE BUILDING ELEMENTS, OBTAIN WRITTEN CLARIFICATION FROM ARCHITECT PRIOR TO PROCEEDING WITH WORK.
- ALL POWER, LIGHTING, AND MISC. SYSTEM WIRING, DEVICES, RACEWAYS, AND ENCLOSURES THAT ARE LOCATED WITHIN THE SHIELD ROOM (LAB 5 ROOM 105-3) SHALL BE NON-FERROUS AND PROPERLY TERMINATED AT RF SHIELD PENETRATION PANEL.
- LIGHT FIXTURES SHALL BE INDEPENDENTLY SUPPORTED.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF LUMINAIRES.
- ALL LUMINAIRES MOUNTED IN LAY-IN CEILING SHALL BE FURNISHED WITH SAFETY T-BAR CLIPS AND MOUNTING HARDWARE AS NECESSARY TO ACCOMMODATE THE LAY-IN GRID TYPE BEING USED AT EACH FIXTURE LOCATION.
- ALL FIXTURES AND ASSOCIATED COMPONENTS SHALL BE UL LISTED FOR THEIR USE.
- SWITCHES SHALL BE MOUNTED TO AVOID THE AREA OF THE DOOR SWING. SWITCHES SHALL CLEAR DOOR SWING BY 6" MINIMUM. COORDINATE WITH ARCHITECTURAL TRADES.
- ALL SUSPENDED CONTINUOUS LINEAR RUNS OF LUMINAIRES, AND ALL SUSPENDED LUMINAIRES SHOWN ON PLANS AS BEING ORIENTED IN ROWS, SHALL BE ALIGNED TO BE STRAIGHT, PLUMB, AND LEVEL.

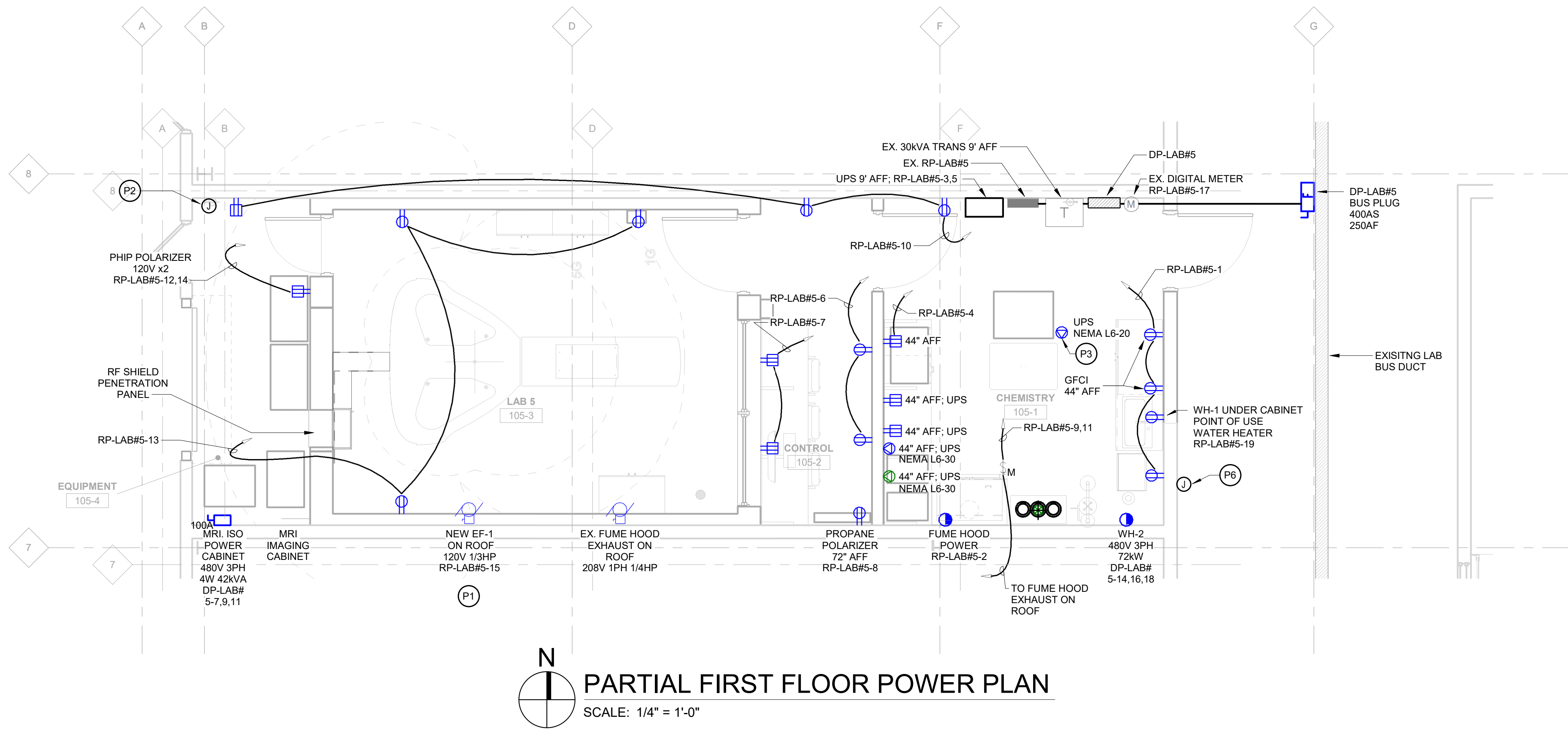
LIGHTING CONTROL NOTES:

- PROVIDE QUANTITY AND TYPE OF SWITCHES NOTED ON PLAN.
- SEE DRAWING E-041 FOR LIGHTING CONTROL COMPLIANCE MATRIX.
- UNLESS OTHERWISE SHOWN ON DRAWING, CIRCUIT ALL LUMINAIRES OF THE SAME TYPE IN A ROOM TO THE SAME SWITCH.
- MOTION SENSORS AND PHOTOCELLS SHOWN ON PLANS ARE FOR SCHEMATIC PURPOSES ONLY. FINAL LAYOUT OF MOTION SENSORS AND PHOTOCELLS FOR THE DAYLIGHTING SYSTEM SHALL BE PROVIDED BY THE VENDORS OF SAID PRODUCT.
- WALL SWITCH TYPE MOTION SENSORS SHALL BE SET TO "MANUAL-ON/AUTO-OFF" OPERATION.
- CEILING MOUNTED OCCUPANCY SENSORS MAY NOT HAVE BEEN SHOWN "CONNECTED" FOR DRAWING LEGIBILITY.
- WHERE MULTIPLE CEILING MOUNTED OCCUPANCY SENSORS ARE INDICATED WITHIN A ROOM, THEY SHALL BE INTERCONNECTED TO COMMON CONTROL.
- CONNECT WALL SWITCH(S) DOWN STREAM OF AREA OCCUPANCY SENSOR OR POWER PACK CONTROL WITHIN A DESIGNATED AREA OR ROOM.
- ALL CONTROLS AND ASSOCIATED COMPONENTS SHALL BE UL LISTED FOR THEIR USE.
- OCCUPANCY SENSOR TIME DELAY SHALL BE COORDINATED WITH OWNER AND LIGHTING CONTROL VENDOR. TIME DELAY SHALL NOT BE LESS THAN 10 MINUTES AND SHALL NOT BE GREATER THAN 30 MINUTES.
- VERIFY DIMMING SWITCH COMPATIBILITY WITH SPECIFIED LUMINAIRES PRIOR TO ORDERING DIMMING SWITCHES AND LUMINAIRES.
- SUBMIT A NARRATIVE DESCRIBING THE OPERATION OF THE SYSTEM AS PART OF THE SHOP DRAWING PROCESS. THIS NARRATIVE SHALL DESCRIBE TYPICAL ROOM FUNCTIONALITY FOR SIMILAR ROOMS, AND SHALL INDICATE MANUAL, CONTROLS, AUTOMATIC CONTROLS, AND SCHEDULE/TIME DELAY INTERVALS. NARRATIVE SHOULD ACCOUNT FOR ALL ASPECTS OF THE LIGHTING CONTROL SYSTEM AS DESCRIBED IN THESE DRAWINGS.
- LIGHTING CONTROL DEVICES SHOWN ON PLANS ARE TO ILLUSTRATE INTENT OF CONTROL AND AREA OF CONTROL. COMBINING MULTIPLE CONTROL DEVICES IN A SPACE SHOWN ON THE PLANS INTO A SINGLE DEVICE IS ACCEPTABLE PROVIDED THE FOLLOWING CONDITIONS ARE MET:
 - ALL OF THE FUNCTIONALITY OF THE ORIGINAL SPECIFIED PRODUCT MUST BE PROVIDED.
 - THE PROPOSED DEVICES ARE OF AN APPROVED LIGHTING CONTROL MANUFACTURE LISTED IN THE SPECIFICATIONS.
 - THE CONTRACTOR MUST SUBMIT ALTERNATE DEVICE AND LAYOUT TO THE ENGINEER FOR APPROVAL AS PART OF THE SUBMITTAL/SHOP-DRAWING PROCESS.
 - THE CONTRACTOR ADHERES TO ALL REQUIREMENTS LISTED IN THE SPECIFICATION RELATED TO SUBMITTING SUBSTITUTIONS.



Electrical Demo &
Lighting Plans

E-101



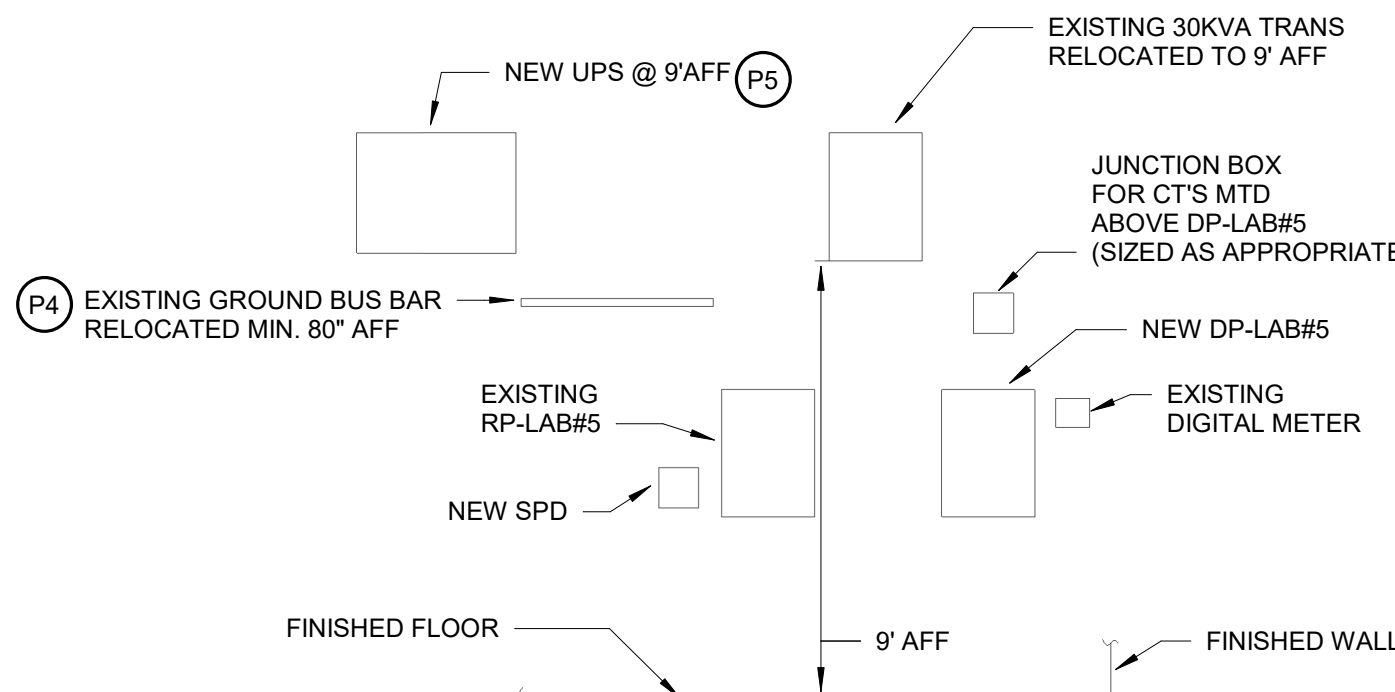
PARTIAL FIRST FLOOR POWER PLAN

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

POWER PLAN NOTES:

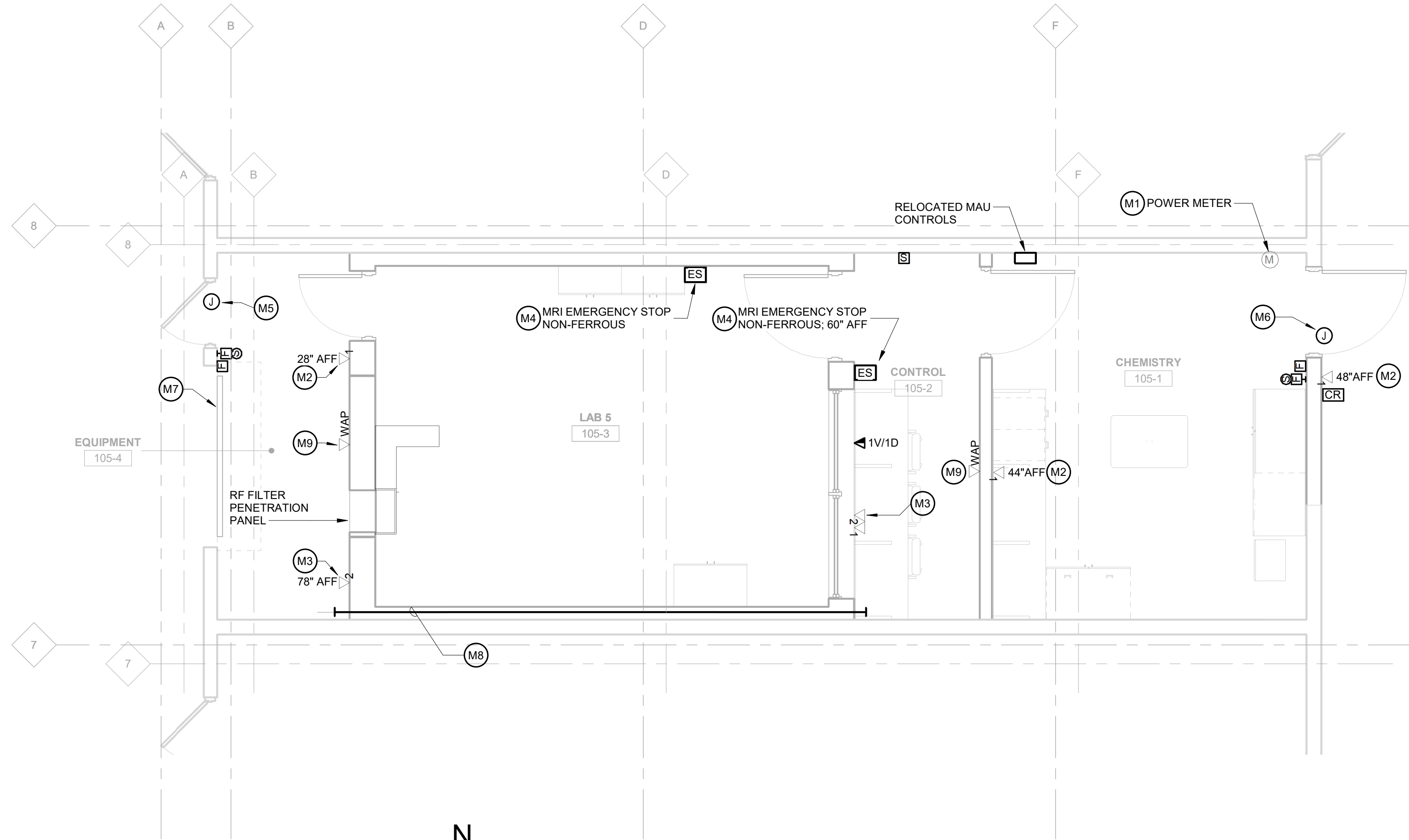
- SEE DRAWING E-001 FOR ELECTRICAL SYMBOL LEGEND.
- SEE DRAWING E-011 FOR GENERAL NOTES AND TYPICAL MOUNTING HEIGHT INFORMATION.
- SEE DRAWING E-012 FOR ELECTRICAL SPECIFICATIONS.
- SEE DRAWING E-041 FOR PANEL SCHEDULES.
- SEE ARCHITECTURAL DRAWING A-161 FOR EQUIPMENT SCHEDULE.
- SEE DRAWING E-021 FOR ELECTRICAL ONE-LINE DIAGRAM.
- SURVEY FIELD CONDITIONS AND VERIFY WORK IS BUILDABLE AS SHOWN. IF ELECTRICAL DEVICES AS INDICATED CANNOT BE INSTALLED DUE TO CONFLICT WITH THE BUILDING ELEMENTS, OBTAIN WRITTEN CLARIFICATION FROM ARCHITECT PRIOR TO PROCEEDING WITH WORK.
- CONTRACTOR SHALL REVIEW ANY SITE SPECIFIC DRAWINGS PROVIDED AND COORDINATE WITH MRI AND SHIELD VENDERS FOR A COMPLETE INSTALLATION.
- ALL POWER, LIGHTING, AND MISC. SYSTEM WIRING, DEVICES, RACEWAYS, AND ENCLOSURES THAT ARE LOCATED WITHIN THE SHIELD ROOM (LAB 5 ROOM 105-3) SHALL BE NON-FERROUS AND PROPERLY TERMINATED AT RF SHIELD PENETRATION PANEL.
- CONTRACTOR SHALL FURNISH AND INSTALL NEW FUSED BUS PLUG (MATCH EXISTING MANUFACTURER), SIZE SHOWN ON PLAN.
- CONTRACTOR SHALL FURNISH AND INSTALL UPS UNIT (TRIPP-LITE MODEL # SUI2000RT4UHW, OR EQUIVALENT) WITH THE FOLLOWING CHARACTERISTICS:
 - 12KVA 208/120V +/-3% 60HZ OUTPUT
 - NETWORK INTERFACE FOR MONITORING
 - 208/120V HARDWARE INPUT
 - 208/120V HARDWARE OUTPUT
 - EXPANDABLE RUNTIME WITH EXTERNAL BATTERY PACK
- COORDINATE SECURITY SYSTEM REQUIREMENTS WITH LAFORCE ELECTRONIC SECURITY SYSTEMS. PHONE NO. 586-756-8400.
- THE ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MRI EQUIPMENT PROVIDER, TIME MEDICAL SYSTEMS, FOR A COMPLETE INSTALLATION.
- PROVIDE MANUFACTURER APPROVED WALL MOUNT BRACKET FOR LAB #5 30KVA TRANSFORMER.

POWER KEYNOTES	
Key Value	Keynote Text
P1	NEW GAS CABINET EXHAUST FAN (EF-1) TO OPERATE CONTINUOUSLY.
P2	PROVIDE SNAP SWITCH AND SINGLE POINT CONNECTION TO 120V-24V TRANSFORMER FURNISHED BY MECHANICAL TRADE FOR REHEAT COILS. COORDINATE EXACT LOCATION WITH MECHANICAL CONTRACTOR BEFORE INSTALLATION.
P3	PROVIDE CORD DROP FROM CEILING MOUNTED JUNCTION BOX HAVING STRAIN RELIEF CONNECTOR(S), SKY-TIE CABLE CLAMP W/SPRING, APPROPRIATELY SIZED TYPE "SO" CABLE AND FEMALE CORD CAP CONFIGURATION AS INDICATED ON PLAN. TO BE CONNECTED TO CUSTOMER SUPPLIED EQUIPMENT.
P4	RELOCATE EXISTING GROUND BUS BAR FROM FLOOR TO WALL, AT A MIN. HEIGHT OF 80" AFF. ANCHOR AS REQUIRED. MODIFY EXISTING GROUNDING CONDUCTOR AS NEEDED.
P5	REFER TO STRUCTURAL DRAWINGS FOR UPS SHELF SUPPORT DETAIL. COORDINATE FINAL SIZE, LOCATION, AND ELEVATION BEFORE INSTALLATION.
P6	FOR GAS MONITOR AND ADDITIONAL MONITORING, PROVIDE 120V CONNECTION. COORDINATE FINAL LOCATION AND CONNECTION REQUIREMENTS WITH MECHANICAL CONTRACTOR PRIOR TO INSTALLATION.



LAB #5 ELECTRICAL ELEVATION

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



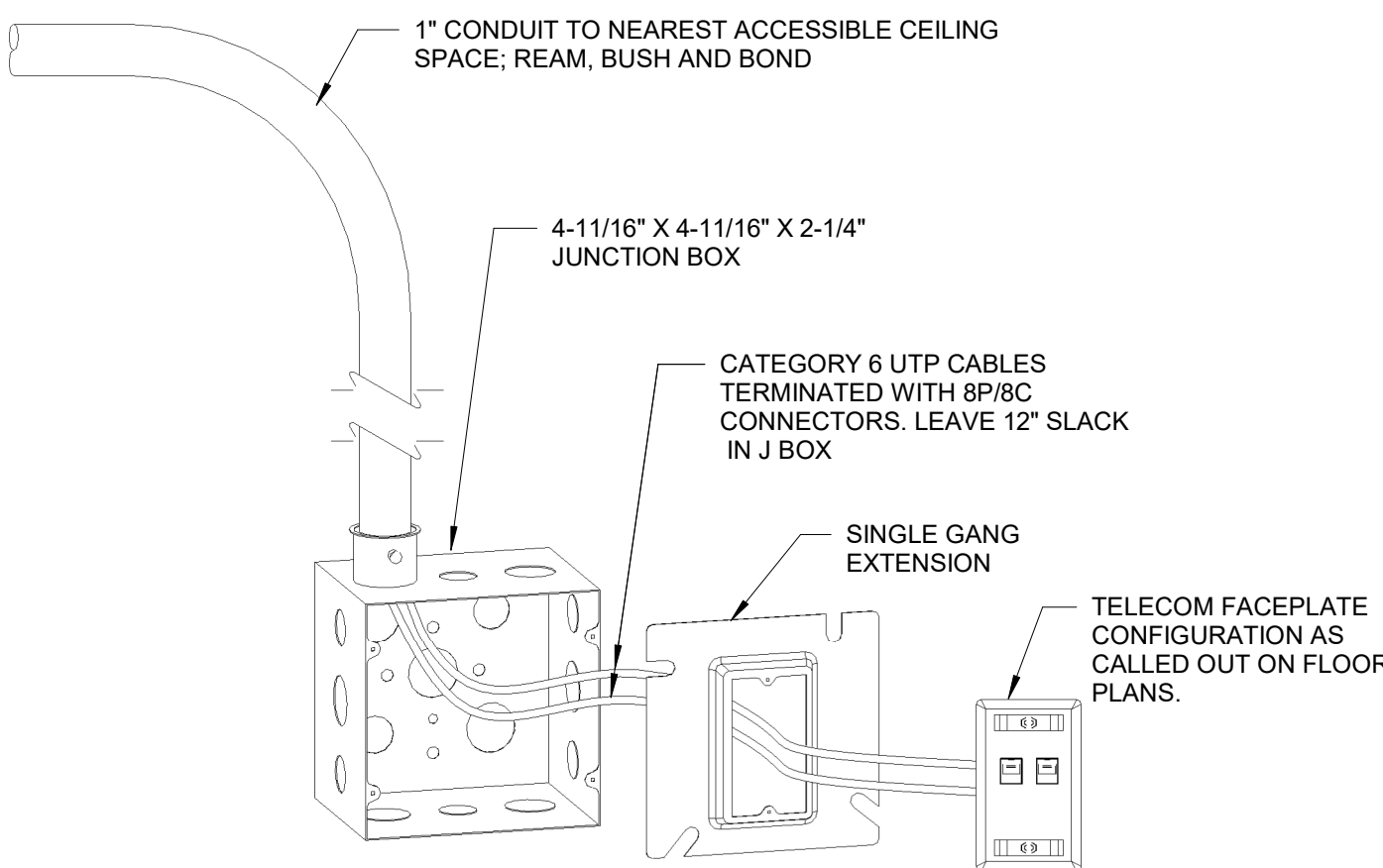
PARTIAL FIRST FLOOR MISC SYSTEMS PLAN

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

MISC. SYSTEMS PLAN NOTES:

- SEE DRAWING E-001 FOR ELECTRICAL SYMBOL LEGEND.
- SEE DRAWING E-011 FOR GENERAL NOTES AND TYPICAL MOUNTING HEIGHT INFORMATION.
- ALL POWER, LIGHTING, AND MISC. SYSTEM WIRING, DEVICES, RACEWAYS, AND ENCLOSURES THAT ARE LOCATED WITHIN THE SHIELD ROOM (LAB 5 RM 105-3) SHALL BE NON-FERROUS AND MEET RF SHIELDING REQUIREMENTS. COORDINATION WITH RF SHIELD VENDOR.
- CONTRACTOR SHALL REVIEW ANY SITE SPECIFIC DRAWINGS PROVIDED AND COORDINATE WITH MRI AND SHIELD VENDERS FOR A COMPLETE INSTALLATION.
- FURNISH AND INSTALL FIRE ALARM DEVICES BY SIEMENS TECHNOLOGY TO MATCH EXISTING. TIE INTO EXISTING FIRE ALARM CONTROL PANEL LOCATED IN SECURE TENANT ENTRY ROOM 137. COORDINATE EXACT REQUIREMENTS WITH SIEMENS FIRE SAFETY, SIEMENS BUILDING TECHNOLOGIES INC. REPRESENTATIVE. PHONE NO. 734-456-3800.
- THE FIRE ALARM DESIGN ASSUMES OCCUPANTS WITHIN MRI SHIELD RM 105-3 ARE UNDER THE SUPERVISION OF MRI TECH/STAFF AND WOULD BE NOTIFIED/EVACUATED UPON FIRE ALARM GENERAL ALARM EVENT.
- SUBMIT ALL FIRE ALARM SHOP DRAWINGS FOR REVIEW AND APPROVAL TO WAYNE STATE UNIVERSITY FIRE SAFETY OFFICER, WILLIAM KEMP. EMAIL WILLIAM.KEMP@WAYNE.EDU.
- FURNISH AND INSTALL DATA DEVICES AS SHOW PROVIDE CABLING TO EXISTING SWITCH, LOCATED IN SECURE TENANT ENTRY ROOM IDF 142. COORDINATE WITH WAYNE STATE UNIVERSITY C&IT. PHONE NO. 313-577-4357.
- COORDINATE SECURITY SYSTEM REQUIREMENT WITH LAFORCE ELECTRONIC SECURITY SYSTEMS. PHONE NO. 586-756-8400.I
- FOR CARD READER LOCATED AT ENTRANCE DOOR TO RM 105-1, PROVIDE WSU STANDARD APTIQ MULTI-TECH CARD READER WITH INTEGRATED KEYPAD, MODEL # MTMSK15

MISC. SYSTEMS KEYNOTES	
Key Value	Keynote Text
M1	UTILIZE EXISTING NETWORK CONNECTION TO BUILDING MONITORING SYSTEM.
M2	FOR CARD READER/KEY PAD, PROVIDE RECESSED CONDUIT STUB TO ACCESSIBLE CEILING SPACE AND SINGLE GANG BACK BOX TO SUPPORT CARD READER/KEYPAD.
M3	INTRANET (LAN) CONNECTION. PROVIDE (2) CABLES (MINIMUM CAT5E) FROM CONTROL ROOM (105-2) TO EQUIPMENT ROOM (105-4). COORDINATE TERMINATION REQUIREMENTS WITH TIME MEDICAL SYSTEMS.
M4	SURFACE MOUNT MRI EMERGENCY STOP BUTTON AND WIRING PROVIDED BY TIME MEDICAL SYSTEMS. PROVIDE ROUGH-IN INSTALLATION. COORDINATE EXACT REQUIREMENTS WITH TIME MEDICAL SYSTEMS.
M5	EXISTING LOCAL DOOR ALARM TO REMAIN. PREP FOR FUTURE DOOR MONITORING PROJECT BY PROVIDING CONDUIT STUB(S) WITHIN DOOR FRAME TO SUPPORT DOOR POSITION SWITCH.
M6	PROVIDE CONDUIT STUB(S) WITHIN DOOR FRAMES TO SUPPORT DOOR POSITION SWITCHES AND ELECTRIC POWER TRANSFERS.
M7	FOR OVERHEAD DOOR PROVIDE CONDUIT STUB AND SINGLE GANG BOX WITH BLANK COVER PLATE LOCATED 12" AFF. WITHIN 24" ADJACENT TO DOOR TRACK FOR SUPPORT OF MAGNETIC SWITCH.
M8	PROVIDE 2" EMT CONDUIT SLEEVE, CONTINUOUS, OUTSIDE OF SHIELDING @ MINIMUM 13" AFF FOR LOW VOLTAGE WIRING.
M9	WIRELESS ACCESS POINT. PROVIDE CABLING, COORDINATE EXACT HEIGHT AND LOCATION WITH WSU C&IT.



TYPICAL TELECOM OUTLET DETAIL

SCALE: N.T.S.



Wayne State University

461 Burroughs St.
Detroit, MI 48202

I2C MRI
Installation -
Lab 5 Fit-Out

461 Burroughs St.
Detroit, MI 48202

Date Issued For
06/07/2019 Design Development
07/12/2019 Owner Review
08/12/2019 Bids / Permits

HED

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WWW.HED.DESIGN

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CLIENT'S PROJECT NUMBER: 212-313128

Electrical Power
and Misc.
Systems Plans

E-102