

University of Minnesota
PHYSICS AND NANOTECHNOLOGY BUILDING
U OF M PROJECT#: 01-155-08-1718

VOLUME 4: CLEAN ROOM
CONFORMED SET - PROJECT DIRECTIVE NO. 3

MAY 11, 2012

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Date 02-24-2012 Reg. No. 14703

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100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Physics and Nanotechnology Building
U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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COVER SHEET

g0.04

VOLUME 1

Sheet Number	Sheet Name
g0.01	COVER SHEET
g1.01	INDEX OF DRAWINGS

LIFE SAFETY				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
ls1.01	LIFE SAFETY PLANS	FC	FC	FC
ls1.02	LIFE SAFETY PLANS		FC	FC
ls1.03	LIFE SAFETY PLANS - CONTROL AREAS			FC

CIVIL				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
c1.00	Civil Notes	FC		FC
c2.00	Erosion Control Plan	FC		FC
c2.01	Field Verification Plan	FC		FC
c3.00	Site Demolition Plan	FC		FC
c4.00	Dimensioned Site Plan		FC	FC
c5.00	Grading and Drainage Plan	FR	FC	FC
c6.00	Overall Site Utility Plan	FC		FC
c6.01	Utility Plan – Sanitary Sewer	FC		FC
c6.02	Utility Plan – Watermain	FC		FC
c6.03	Utility Plan – Storm Sewer	FC		FC
c6.04	Utility Plan – Steam Tunnel and Gas Lines	FC		FC
c6.05	Utility Plan – Electrical Ductbank and Telecom Ductbank	FC		FC
c6.06	Steam Tunnel and Electrical Ductbank Plan and Profile	FC		FC
c6.07	NTS Ductbank Plan and Profile	FC		FC
c7.00	Paving Plan		FC	FC
c8.00	Civil Details	FC		FC
c8.01	Civil Details	FC		FC

LANDSCAPE				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
l100	Landscape Plan		FC	FC

ARCHITECTURAL				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
a0.01	GENERAL INFORMATION		FC	FC
a0.10	SITE PLAN		FC	FC
a1.01	FLOOR PLAN - BASEMENT		FC	FC
a1.02	FLOOR PLAN - LEVEL 1		FC	FC
a1.03	FLOOR PLAN - LEVEL 2		FC	FC
a1.04	FLOOR PLAN - LEVEL 3		FC	FC
a1.05	FLOOR PLAN - LEVEL 4		FC	FC
a1.06	FLOOR PLAN - PENTHOUSE		FC	FC
a1.07	ROOF PLAN		FC	FC
a2.01	REFLECTED CEILING PLAN - BASEMENT		FC	FC
a2.02	REFLECTED CEILING PLAN - LEVEL 1		FC	FC
a2.03	REFLECTED CEILING PLAN - LEVEL 2		FC	FC
a2.04	REFLECTED CEILING PLAN - LEVEL 3		FC	FC
a2.05	REFLECTED CEILING PLAN - LEVEL 4		FC	FC
a2.06	REFLECTED CEILING PLAN - PENTHOUSE		FC	FC
a3.01	OVERALL SOUTH AND EAST EXTERIOR ELEVATIONS		FC	FC
a3.02	OVERALL NORTH AND WEST EXTERIOR ELEVATIONS		FC	FC
a3.03	BUILDING SECTION/ELEVATIONS		FC	FC
a3.04	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - LAB WEST		FC	FC
a3.05	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - WEST ENTRY		FC	FC
a3.06	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - OFFICE BAR SOUTH		FC	FC
a3.07	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - EAST ENTRY		FC	FC
a3.08	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - LAB EAST		FC	FC
a3.09	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - LAB EAST		FC	FC
a3.10	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - HIGH BAY & TANK YARD		FC	FC
a3.11	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - HIGH BAY, TANK YARD, STAIR 2 EXTERIOR		FC	FC
a3.12	ENLARGED EXTERIOR ELEVATION / SECTION / PLAN - LAB NORTH		FC	FC
a4.01	TYPICAL EXTERIOR BUILDING ASSEMBLIES		FC	FC
a4.11	EXTERIOR DETAIL - CURTAIN WALL		FC	FC
a4.12	EXTERIOR DETAILS - CURTAINWALL		FC	FC
a4.13	EXTERIOR DETAILS - CURTAINWALL		FC	FC
a4.14	EXTERIOR DETAILS		FC	FC
a4.21	EXTERIOR DETAILS		FC	FC
a4.22	EXTERIOR DETAILS AND EXTERIOR CLEANROOM DETAIL		FC	FC
a4.23	EXTERIOR DETAILS		FC	FC
a4.24	EXTERIOR DETAILS		FC	FC
a4.25	EXTERIOR DETAIL - SKYLIGHT		FC	FC
a4.26	EXTERIOR DETAILS - HANGAR DOOR		FC	FC
a4.27	EXTERIOR DETAILS - HIGH BAY & TANK YARD		FC	FC
a4.28	EXTERIOR DETAILS - TANK YARD		FC	FC
a4.29	EXTERIOR DETAILS - TANK YARD		FC	FC
a4.30	WATERPROOFING DETAILS		FC	FC
a4.31	EXTERIOR DETAILS - TYPICAL ROOF DETAILS		FC	FC
a4.32	ROOF DETAILS		FC	FC
a4.33	ROOF DETAILS		FC	FC
a5.01	ENLARGED INTERIOR PLAN / ELEVATION / SECTION - STAIR NO. 1		FC	FC
a5.02	ENLARGED INTERIOR PLAN / ELEVATION / SECTION - STAIR NO. 2		FC	FC
a5.03	ENLARGED INTERIOR PLAN / ELEVATION / SECTION - STAIR NO. 3		FC	FC
a5.04	ENLARGED INTERIOR PLAN / ELEVATION / SECTION - MISC STAIRS		FC	FC
a5.05	ENLARGED INTERIOR PLAN / ELEVATION / SECTION - FREIGHT ELEVATOR		FC	FC
a5.06	ENLARGED INTERIOR PLAN / ELEVATION / SECTION - PASSENGER ELEVATOR		FC	FC
a6.11	ENLARGED INTERIOR PLAN / ELEVATION - LOBBY		FC	FC
a6.12	ENLARGED INTERIOR PLAN / ELEVATION - LOBBY		FC	FC
a6.13	ENLARGED INTERIOR PLAN / ELEVATION - LOBBY		FC	FC
a6.14	ENLARGED INTERIOR PLAN / ELEVATION - KITCHENETTE		FC	FC
a6.15	ENLARGED INTERIOR PLAN - LOADING DOCK, HE LIQUIFIER ROOM, EXTERIOR GAS STROAGE AND LN2 FILLING ROOM		FC	FC
a6.21	ENLARGED INTERIOR PLAN/ELEVATION - RESTROOMS		FC	FC
a7.01	INTERIOR ELEVATIONS		FC	FC
a7.02	INTERIOR ELEVATIONS		FC	FC
a7.03	INTERIOR ELEVATIONS		FC	FC
a7.04	INTERIOR ELEVATIONS		FC	FC
a7.05	INTERIOR ELEVATIONS		FC	FC
a7.06	INTERIOR ELEVATIONS		FC	FC
a7.07	INTERIOR ELEVATIONS		FC	FC
a7.10	INTERIOR ELEVATIONS		FC	FC
a7.11	INTERIOR ELEVATIONS		FC	FC
a7.31	INTERIOR ELEVATIONS - HIGH BAY		FC	FC
a7.41	INTERIOR ELEVATIONS - LABS BASEMENT		FC	FC
a7.42	INTERIOR ELEVATIONS - LABS BASEMENT		FC	FC
a7.43	INTERIOR ELEVATIONS - LABS LEVEL 1		FC	FC
a7.44	INTERIOR ELEVATIONS - LABS LEVEL 2		FC	FC
a7.45	INTERIOR ELEVATIONS - LABS LEVEL 3		FC	FC
a7.46	INTERIOR ELEVATIONS - LABS LEVEL 3		FC	FC
a7.47	INTERIOR ELEVATIONS - LABS LEVEL 4		FC	FC
a7.48	INTERIOR ELEVATIONS - LABS LEVEL 4		FC	FC
a7.49	INTERIOR ELEVATIONS - LABS LEVEL 4		FC	FC
a8.01	PARTITION TYPES		FC	FC
a8.02	PARTITION DETAILS		FC	FC
a8.03	INTERIOR WALL SECTIONS		FC	FC

VOLUME 1 (CONT.)

ARCHITECTURAL				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
a8.04	CLEANROOM INTERIOR DETAILS		FC	FC
a8.10	DOOR SCHEDULE		FC	FC
a8.11	DOOR AND FRAME TYPES		FC	FC
a8.12	DOOR DETAILS		FC	FC
a8.21	INTERIOR DETAILS - ATRIUM		FC	FC
a8.22	INTERIOR DETAILS		FC	FC
a8.23	INTERIOR DETAILS		FC	FC
a8.24	INTERIOR DETAILS		FC	FC
a8.25	INTERIOR DETAILS - GUARDRAIL AND FEATURE STAIR		FC	FC
a8.26	INTERIOR DETAILS - FEATURE STAIR		FC	FC
a8.27	INTERIOR DETAILS			FC
a8.31	INTERIOR DETAILS		FC	FC
a8.32	INTERIOR DETAILS		FC	FC
a8.33	INTERIOR DETAILS		FC	FC
a8.34	INTERIOR DETAILS		FC	FC
a8.35	INTERIOR DETAILS		FC	FC
a8.41	INTERIOR DETAILS - CEILING		FC	FC
a8.42	INTERIOR DETAILS - CEILING		FC	FC
a8.50	STAIR AND RAILING DETAILS		FC	FC
a9.02	MATERIAL FINISH SCHEDULE LEVELS B-2		FC	FC
a9.03	MATERIAL FINISH SCHEDULE LEVELS 3-P		FC	FC
a10.01	FINISH PLAN-BASEMENT		FC	FC
a10.02	FINISH PLAN- LEVEL 1		FC	FC
a10.03	FINISH PLAN - LEVEL 2		FC	FC
a10.04	FINISH PLAN - LEVEL 3		FC	FC
a10.05	FINISH PLAN - LEVEL 4		FC	FC

LABORATORY FURNISHINGS				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
LF1.00	GENERAL NOTES & LEGEND		FC	FC
LF1.01	SCHEDULES		FC	FC
LF1.02	CASEWORK ELEVATIONS		FC	FC
LF2.00	OVERALL BASEMENT PLAN		FC	FC
LF2.00C	BASEMENT PARTIAL PLAN		FC	FC
LF2.00D	BASEMENT PARTIAL PLAN		FC	FC
LF2.00E	BASEMENT PARTIAL PLAN		FC	FC
LF2.01	LEVEL 1 OVERALL PLAN		FC	FC
LF2.01C	LEVEL 1 PARTIAL PLAN		FC	FC
LF2.01D	LEVEL 1 PARTIAL PLAN		FC	FC
LF2.02	LEVEL 2 OVERALL PLAN		FC	FC
LF2.02C	LEVEL 2 PARTIAL PLAN		FC	FC
LF2.02D	LEVEL 2 PARTIAL PLAN		FC	FC
LF2.03	LEVEL 3 OVERALL PLAN		FC	FC
LF2.03A	LEVEL 3 PARTIAL PLAN		FC	FC
LF2.03B	LEVEL 3 PARTIAL PLAN		FC	FC
LF2.03C	LEVEL 3 PARTIAL PLAN		FC	FC
LF2.03D	LEVEL 3 PARTIAL PLAN		FC	FC
LF2.04	LEVEL 4 OVERALL PLAN		FC	FC
LF2.04B	LEVEL 4 PARTIAL PLAN		FC	FC
LF2.04C	LEVEL 4 PARTIAL PLAN		FC	FC
LF2.04D	LEVEL 4 PARTIAL PLAN		FC	FC
LF3.00	ELEVATIONS		FC	FC
LF3.01	ELEVATIONS		FC	FC
LF4.00	DETAILS		FC	FC
LF4.01	DETAILS		FC	FC
LF4.02	DETAILS		FC	FC
LF4.03	DETAILS		FC	FC
LF4.04	DETAILS		FC	FC
LF4.05	DETAILS		FC	FC
LF4.06	DETAILS		FC	FC

VERTICAL TRANSPORTATION				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
VT01	GENERAL ELEVATOR INFORMATION	FC		FC
VT02	PLANS AND SECTION - ELEVATOR 1	FC		FC
VT03	PLANS AND SECTION - ELEVATOR 2	FC		FC

STRUCTURAL				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
s0.01	TITLE SHEET	FC	FC	FC
s0.02	GENERAL STRUCTURAL NOTES	FC	FC	FC
s2.00	FOUNDATION PLAN	FC	FC	FC
s2.01	LEVEL 1 - FOUNDATION / FRAMING PLAN	FC	FC	FC
s2.02	LEVEL 2 - FRAMING PLAN		FC	FC
s2.03	LEVEL 3 - FRAMING PLAN		FC	FC
s2.04	LEVEL 4 - FRAMING PLAN		FC	FC
s2.05	PENTHOUSE - FRAMING PLAN		FC	FC
s2.06	ROOF - FRAMING PLAN		FC	FC
s3.01	SHEAR WALL AND BRACE FRAME ELEVATIONS	FC	FC	FC
s3.02	SHEAR WALL AND BRACE FRAME DETAILS	FC	FC	FC
s4.01	SCHEDULES	FC	FC	FC
s4.02	ELEVATED COLUMN SCHEDULE	FC	FC	FC
s4.03	WALL SCHEDULE AND TYPICAL WALL AND COLUMN DETAILS	FC	FC	FC
s4.04a	CONCRETE BEAM SCHEDULE AND TYPICAL DETAILS	FR	FC	FC
s4.04b	CONCRETE BEAM SCHEDULE		FC	FC
s4.04c	CONCRETE BEAM SCHEDULE		FC	FC
s4.04d	CONCRETE BEAM SCHEDULE		FC	FC
s4.05	CONCRETE JOIST SCHEDULES AND TYPICAL DETAILS		FC	FC
s4.06	STEEL FRAMING SCHEDULES AND TYPICAL DETAILS		FC	FC
s4.07	MASONRY SCHEDULE AND DETAILS		FC	FC
s5.01	STRUCTURAL FOUNDATION DETAILS	FC	FC	FC
s5.02	STRUCTURAL FOUNDATION DETAILS	FC	FC	FC
s5.03	STRUCTURAL FOUNDATION DETAILS	FC	FC	FC
s7.01	STRUCTURAL FRAMING DETAILS		FC	FC
s7.02	STRUCTURAL FRAMING DETAILS		FC	FC
s7.03	STRUCTURAL FRAMING DETAILS		FC	FC
s7.04	STRUCTURAL FRAMING DETAILS		FC	FC
s7.05	STRUCTURAL FRAMING DETAILS		FC	FC

VOLUME 2

Sheet Number	Sheet Name
g0.02	COVER SHEET
g1.02	INDEX OF DRAWINGS

FIRE PROTECTION				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
f0.01	Fire Protection Symbols and Abbreviations		FC	FC
f2.00	Fire Protection - Basement		FC	FC
f2.01	Fire Protection - Level 1		FC	FC
f2.02	Fire Protection - Level 2		FC	FC
f2.03	Fire Protection - Level 3		FC	FC
f2.04	Fire Protection - Level 4		FC	FC
f2.05	Fire Protection - Penthouse		FC	FC
f2.06	Fire Protection - Roof		FC	FC
f8.01	Fire Protection Details		FC	FC
f9.01	Fire Protection Flow Diagram		FC	FC

PLUMBING				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
p0.01	Plumbing Symbols and Abbreviations		FC	FC
p2.u00C	Piping Underfloor - Zone C		FC	FC

VOLUME 2 (CONT.)

PLUMBING				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
p2.u00D	Piping Underfloor - Zone D		FC	FC
p2.u00E	Piping Underfloor - Zone E		FC	FC
p2.00C	Piping Basement - Zone C		FC	FC
p2.00D	Piping Basement - Zone D		FC	FC
p2.00E	Piping Basement - Zone E		FC	FC
p2.01B	Piping Level 1 - Zone B		FC	FC
p2.01C	Piping Level 1 - Zone C		FC	FC
p2.01D	Piping Level 1 - Zone D		FC	FC
p2.01E	Piping Level 1 - Zone E		FC	FC
p2.02A	Piping Level 2 - Zone A		FC	FC
p2.02B	Piping Level 2 - Zone B		FC	FC
p2.02C	Piping Level 2 - Zone C		FC	FC
p2.02D	Piping Level 2 - Zone D		FC	FC
p2.02E	Piping Level 2 - Zone E		FC	FC
p2.03A	Piping Level 3 - Zone A		FC	FC
p2.03B	Piping Level 3 - Zone B		FC	FC
p2.03C	Piping Level 3 - Zone C		FC	FC
p2.03D	Piping Level 3 - Zone D		FC	FC
p2.03E	Piping Level 3 - Zone E		FC	FC
p2.04A	Piping Level 4 - Zone A		FC	FC
p2.04B	Piping Level 4 - Zone B		FC	FC
p2.04C	Piping Level 4 - Zone C		FC	FC
p2.04D	Piping Level 4 - Zone D		FC	FC
p2.04E	Piping Level 4 - Zone E		FC	FC
p2.05A	Piping Penthouse - Zone A		FC	FC
p2.05B	Piping Penthouse - Zone B		FC	FC
p2.05C	Piping Penthouse - Zone C		FC	FC
p2.05D	Piping Penthouse - Zone D		FC	FC
p2.05E	Piping Penthouse - Zone E		FC	FC
p2.06A	Pipng Roof - Zone A		FC	FC
p2.06B	Roof Piping - Zone B		FC	FC
p2.06C	Roof Piping - Zone C		FC	FC
p2.06D	Roof Piping - Zone D		FC	FC
p5.01	Domestic Water Flow Diagram		FC	FC
p5.02	Compressed Air Flow Diagram		FC	FC
p5.03	Lab Vacuum Flow Diagram		FC	FC
p5.04	Nitrogen System P&ID		FC	FC
p5.10	Corrosion Resistant Waste Flow Diagram			FC
p5.11	Corrosion Resistant Waste Flow Diagram			FC
p5.12	Sanitary Drainage Flow Diagram			FC
p5.13	Storm Drainage Flow Diagram			FC
p8.01	Details		FC	FC
p8.02	Details		FC	FC
p8.03	Details		FC	FC
p9.01	Schedules		FC	FC

MECHANICAL				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
m0.01	Mechanical Symbols and Abbreviations		FC	FC
m2.00C	Mechanical Basement-Zone C		FC	FC
m2.00D	Mechanical Basement-Zone D		FC	FC
m2.00E	Mechanical Basement-Zone E		FC	FC
m2.01C	Mechanical Level 1 - Zone C		FC	FC
m2.01D	Mechanical Level 1 - Zone D		FC	FC
m2.01E	Mechanical Level 1 - Zone E		FC	FC
m2.02C	Mechanical Level 2 - Zone C		FC	FC
m2.02D	Mechanical Level 2 - Zone D		FC	FC
m2.02E	Mechanical Level 2 - Zone E		FC	FC
m2.03A	Mechanical Level 3 - Zone A		FC	FC
m2.03B	Mechanical Level 3 - Zone B		FC	FC
m2.03C	Mechanical Level 3 - Zone C		FC	FC
m2.03D	Mechanical Level 3 - Zone D		FC	FC
m2.03E	Mechanical Level 3 - Zone E		FC	FC
m2.04A	Mechanical Level 4 - Zone A		FC	FC
m2.04B	Mechanical Level 4 - Zone B		FC	FC
m2.04C	Mechanical Level 4 - Zone C		FC	FC
m2.04D	Mechanical Level 4 - Zone D		FC	FC
m2.04E	Mechanical Level 4 - Zone E		FC	FC
m2.05A	Mechanical Penthouse - Zone A		FC	FC
m2.05B	Mechanical Penthouse - Zone B		FC	FC
m2.05C	Mechanical Penthouse - Zone C		FC	FC
m2.05D	Mechanical Penthouse - Zone D		FC	FC
m2.06A	Mechanical Roof - Zone A		FC	FC
m2.06B	Mechanical Roof - Zone B		FC	FC
m2.06D	Mechanical Roof - Zone D		FC	FC
mc3.00	Steam Tunnel Piping Plans and Sections		FC	FC
mc3.01	Steam Tunnel Piping Plans and Sections		FC	FC
mc3.02	Steam Tunnel Piping Plans and Sections		FC	FC
mc3.03	Chilled Water Piping Building Connection Plan		FC	FC
m3.00C	Mechanical Basement - Zone C		FC	FC
m3.00D	Mechanical Basement - Zone D		FC	FC
m3.00E	Mechanical Basement - Zone E		FC	FC
m3.01C	Mechanical Level 1 - Zone C		FC	FC
m3.01D	Mechanical Level 1 - Zone D		FC	FC
m3.01E	Mechanical Level 1 - Zone E		FC	FC
m3.02C	Mechanical Level 2 - Zone C		FC	FC
m3.02D	Mechanical Level 2 - Zone D		FC	FC
m3.02E	Mechanical Level 2 - Zone E		FC	FC
m3.03A	Mechanical Level 3 - Zone A		FC	FC
m3.03B	Mechanical Level 3 - Zone B		FC	FC
m3.03C	Mechanical Level 3 - Zone C		FC	FC
m3.03D	Mechanical Level 3 - Zone D		FC	FC
m3.03E	Mechanical Level 3 - Zone E		FC	FC
m3.04A	Mechanical Level 4 - Zone A		FC	FC
m3.04B	Mechanical Level 4 - Zone B		FC	FC
m3.04C	Mechanical Level 4 - Zone C		FC	FC
m3.04D	Mechanical Level 4 - Zone D		FC	FC
m3.04E	Mechanical Level 4 - Zone E		FC	FC
m6.01	Mechanical Sections		FC	FC
m7.01	Steam and Condensate System Control/Flow Diagram		FC	FC
m7.02	Heating Hot Water System Control/Flow Diagram		FC	FC
m7.03	Clean Steam System		FC	FC
m7.05	Laboratory Process Chilled Water System Control/ Flow Diagram		FC	FC
m7.10	Chilled Water System Control/ Flow Diagram		FC	FC
m7.12	Laboratory Air Handling Units System Control/Flow Diagram		FC	FC
m7.13	Electrical Room Air Handling Unit Control/Flow Diagram		FC	FC
m7.14	Office Air Handling Unit Control/Flow Diagram		FC	FC
m7.16	Laboratory Fume Hood and Laboratory Exhaust Systems Control/Air Flow Diagram		FC	FC
m7.17	Chilled Beam Chilled Water System Control/Flow Diagram		FC	FC
m7.20	Room Typical - Control Diagrams		FC	FC
m7.21	Room Typical - Control Diagrams		FC	FC
m7.22	Room Typical - Control Diagrams		FC	FC
m7.23	Room Typical - Control Diagrams		FC	FC
m7.24	Room Typical - Control Diagrams		FC	FC
m7.25	Room Typical - Control Diagrams		FC	FC
m8.01	Details		FC	FC
m8.02	Details		FC	FC
m8.03	Details		FC	FC
m8.04	Details		FC	FC
m8.05	Details		FC	FC
m8.06	Details		FC	FC
m9.01	Schedules		FC	FC
m9.02	Schedules		FC	FC
m9.03	Schedules		FC	FC
m9.04	Schedules		FC	FC
m9.05	Schedules		FC	FC
m9.06	Schedules		FC	FC
m9.07	Schedules		FC	FC
m9.08	Schedules		FC	FC

VOLUME 3

Sheet Number	Sheet Name
g0.03	COVER SHEET
g1.03	INDEX OF DRAWINGS

ELECTRICAL				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
e0.01	Electrical Symbols and Abbreviations	FC	FC	FC
e0.02	Electrical Site Plan	FC		FC
e0.03	Electrical Site Lighting and Power Plan		FC	FC
e1.00C	Electrical Lighting Basement-Zone C		FC	FC
e1.00D	Electrical Lighting Basement-Zone D		FC	FC
e1.00E	Electrical Lighting Basement-Zone E		FC	FC
e1.01C	Electrical Lighting Level 1 - Zone C		FC	FC
e1.01D	Electrical Lighting Level 1 - Zone D		FC	FC
e1.01E	Electrical Lighting Level 1 - Zone E		FC	FC
e1.02C	Electrical Lighting Level 2 - Zone C		FC	FC
e1.02D	Electrical Lighting Level 2 - Zone D		FC	FC
e1.02E	Electrical Lighting Level 2 - Zone E		FC	FC
e1.03A	Electrical Lighting Level 3 - Zone A		FC	FC
e1.03B	Electrical Lighting Level 3 - Zone B		FC	FC
e1.03C	Electrical Lighting Level 3 - Zone C		FC	FC
e1.03D	Electrical Lighting Level 3 - Zone D		FC	FC
e1.03E	Electrical Lighting Level 3 - Zone E		FC	FC
e1.04A	Electrical Lighting Level 4 - Zone A		FC	FC
e1.04B	Electrical Lighting Level 4 - Zone B		FC	FC
e1.04C	Electrical Lighting Level 4 - Zone C		FC	FC
e1.04D	Electrical Lighting Level 4 - Zone D		FC	FC
e1.04E	Electrical Lighting Level 4 - Zone E		FC	FC
e1.05A	Electrical Lighting Penthouse - Zone A		FC	FC
e1.05B	Electrical Lighting Penthouse - Zone B		FC	FC
e1.05C	Electrical Lighting Penthouse - Zone C		FC	FC
e1.05D	Electrical Lighting Penthouse - Zone D		FC	FC
e1.05E	Electrical Lighting Penthouse - Zone E		FC	FC
e2.00	Electrical Basement Ductbank Entry Plan	FC		FC
e2.00C	Electrical Power Basement-Zone C		FC	FC
e2.00D	Electrical Power Basement-Zone D		FC	FC
e2.00E	Electrical Power Basement-Zone E		FC	FC
e2.01C	Electrical Power Level 1 - Zone C		FC	FC
e2.01D	Electrical Power Level 1 - Zone D		FC	FC
e2.01E	Electrical Power Level 1 - Zone E		FC	FC
e2.02C	Electrical Power Level 2 - Zone C		FC	FC
e2.02D	Electrical Power Level 2 - Zone D		FC	FC
e2.02E	Electrical Power Level 2 - Zone E		FC	FC
e2.03A	Electrical Power Level 3 - Zone A		FC	FC
e2.03B	Electrical Power Level 3 - Zone B		FC	FC
e2.03C	Electrical Power Level 3 - Zone C		FC	FC
e2.03D	Electrical Power Level 3 - Zone D		FC	FC
e2.03E	Electrical Power Level 3 - Zone E		FC	FC
e2.04A	Electrical Power Level 4 - Zone A		FC	FC
e2.04B	Electrical Power Level 4 - Zone B		FC	FC
e2.04C	Electrical Power Level 4 - Zone C		FC	FC
e2.04D	Electrical Power Level 4 - Zone D		FC	FC
e2.04E	Electrical Power Level 4 - Zone E		FC	FC
e2.05A	Electrical Power Penthouse - Zone A		FC	FC
e2.05B	Electrical Power Penthouse - Zone B		FC	FC
e2.05C	Electrical Power Penthouse - Zone C		FC	FC
e2.05D	Electrical Power Penthouse - Zone D		FC	FC
e2.06A	Electrical Power Roof - Zone A		FC	FC
e2.06B	Electrical Power Roof - Zone B		FC	FC
e2.06C	Electrical Power Roof - Zone C		FC	FC
e2.06D	Electrical Power Roof - Zone D		FC	FC
e3.00C	Electrical Systems Basement-Zone C		FC	FC
e3.00D	Electrical Systems Basement-Zone D		FC	FC
e3.00E	Electrical Systems Basement-Zone E		FC	FC
e3.01C	Electrical Systems Level 1 - Zone C		FC	FC
e3.01D	Electrical Systems Level 1 - Zone D		FC	FC
e3.01E	Electrical Systems Level 1 - Zone E		FC	FC
e3.02C	Electrical Systems Level 2 - Zone C		FC	FC
e3.02D	Electrical Systems Level 2 - Zone D		FC	FC
e3.02E	Electrical Systems Level 2 - Zone E		FC	FC
e3.03A	Electrical Systems Level 3 - Zone A		FC	FC
e3.03B	Electrical Systems Level 3 - Zone B		FC	FC
e3.03C	Electrical Systems Level 3 - Zone C		FC	FC
e3.03D	Electrical Systems Level 3 - Zone D		FC	FC
e3.03E	Electrical Systems Level 3 - Zone E		FC	FC
e3.04A	Electrical Systems Level 4 - Zone A		FC	FC
e3.04B	Electrical Systems Level 4 - Zone B		FC	FC
e3.04C	Electrical Systems Level 4 - Zone C		FC	FC
e3.04D	Electrical Systems Level 4 - Zone D		FC	FC
e3.04E	Electrical Systems Level 4 - Zone E		FC	FC
e3.05A	Electrical Systems Penthouse - Zone A		FC	FC
e3.05B	Electrical Systems Penthouse - Zone B		FC	FC
e3.05C	Electrical Systems Penthouse - Zone C		FC	FC
e3.05D	Electrical Systems Penthouse - Zone D		FC	FC
e4.00C	Electrical Telecom Basement-Zone C		FC	FC
e4.00D	Electrical Telecom Basement-Zone D		FC	FC
e4.00E	Electrical Telecom Basement-Zone E		FC	FC
e4.01C	Electrical Telecom Level 1 - Zone C		FC	FC
e4.01D	Electrical Telecom Level 1 - Zone D		FC	FC
e4.01E	Electrical Telecom Level 1 - Zone E		FC	FC
e4.02C	Electrical Telecom Level 2 - Zone C		FC	FC
e4.02D	Electrical Telecom Level 2 - Zone D		FC	FC
e4.02E	Electrical Telecom Level 2 - Zone E		FC	FC
e4.03A	Electrical Telecom Level 3 - Zone A		FC	FC
e4.03B	Electrical Telecom Level 3 - Zone B		FC	FC
e4.03C	Electrical Telecom Level 3 - Zone C		FC	FC
e4.03D	Electrical Telecom Level 3 - Zone D		FC	FC
e4.03E	Electrical Telecom Level 3 - Zone E		FC	FC
e4.04A	Electrical Telecom Level 4 - Zone A		FC	FC
e4.04B	Electrical Telecom Level 4 - Zone B		FC	FC
e4.04C	Electrical Telecom Level 4 - Zone C		FC	FC
e4.04D	Electrical Telecom Level 4 - Zone D		FC	FC
e4.04E	Electrical Telecom Level 4 - Zone E		FC	FC
e4.05C	Electrical Telecom Penthouse - Zone C		FC	FC
e4.05D	Electrical Telecom Penthouse - Zone D		FC	FC
e5.01	Electrical One-Line Diagram		FC	FC
e5.02	Electrical One-Line Diagram		FC	FC
e5.03	Electrical One-Line Diagram		FC	FC
e5.04	Electrical One-Line Diagram		FC	FC
e5.05	Electrical One-Line Diagram		FC	FC
e5.06	Electrical One-Line Diagram		FC	FC
e5.07	Electrical One-Line Diagram		FC	FC
e5.08	Electrical One-Line Diagram		FC	FC
e5.09	Grounding One-Line Diagram		FC	FC
e5.10	Fire Alarm One-Line Diagram		FC	FC
e5.11	Rescue Assistance Intercom One-Line Diagram		FC	FC
e7.04	Steam Tunnel Electrical Lighting Power and Systems Plan		FC	FC
e8.01	Electrical Site Work Details	FC		FC
e8.02	Electrical Site Work Details	FC		FC
e8.03	Electrical Details		FC	FC
e8.04	Electrical Details		FC	FC
e9.01	Luminaire Schedule		FC	FC
e9.02	Electrical Feeder Schedule		FC	FC
e9.03	Electrical Panel Schedules		FC	FC
e9.04	Electrical Panel Schedules		FC	FC
e9.05	Electrical Panel Schedules		FC	FC
e9.06	Electrical Panel Schedules		FC	FC
e9.07	Electrical Panel Schedules		FC	FC
e9.08	Electrical Panel Schedules		FC	FC
e9.09	Electrical Panel Schedules		FC	FC
e9.10	Electrical Panel Schedules		FC	FC
e9.11	Electrical Panel Schedules		FC	FC
e9.12	Electrical Panel Schedules		FC	FC
e9.13	Electrical Panel Schedules		FC	FC
e9.14	Electrical Panel Schedules		FC	FC
e9.15	Electrical Panel Schedules		FC	FC
e9.16	Electrical Panel Schedules		FC	FC
e9.17	Electrical Motor Schedule		FC	FC

VOLUME 3 (CONT.)

COMMUNICATIONS				
Sheet Number	Sheet Name	BP-1	BP-2	PD3
T100	Title/ Index		FC	FC
T200	Basement Level Floor

CLEAN ROOM ABBREVIATIONS

BENCHTOP MATERIAL SCHEDULE

[E] EPOXY BENCHTOP

[S] STAINLESS STEEL BENCHTOP

+30", +34", +36" INDICATES BENCHTOP HEIGHT ABOVE FINISH FLOOR

TYPICAL ABBREVIATIONS

ADA	AMERICAN DISABILITIES ACT
A.F.F.	ABOVE FINISHED FLOOR
ARCH	ARCHITECTURAL
CFM	CUBIC FEET/MINUTE
CRWS	CLEAN ROOM WALL SYSTEM
DIA	DIAMETER
DIV.	DIVISION
EQUIP	EQUIPMENT
EMO	EMERGENCY MANUAL OFF
EW	EYEWASH
FZR	FREEZER
GA.	GAUGE
H.D.	HEAVY DUTY
MAX.	MAXIMUM
MIN.	MINIMUM
MTD.	MOUNTED
N.T.S.	NOT TO SCALE
O.C.	ON CENTER
OFOI	OWNER FURNISHED, OWNER INSTALLED
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
O.H.	OVERHEAD
OHSC	OVERHEAD SERVICE CARRIER
REF	REFRIGERATOR
SS	SAFETY SHOWER
ST.STL.	STAINLESS STEEL
TEMP	TEMPERATURE
TGMS	TOXIC GAS MONITORING SYSTEM
TYP.	TYPICAL
UC	UNDER COUNTER
U.O.N.	UNLESS OTHERWISE NOTED
WP	WEATHERPROOF

CLEAN ROOM SERVICE ABBREVIATIONS

CDA	COMPRESSED DRY AIR (100 PSIG)
H-VAC	HOUSEKEEPING VACUUM
ICW-S	INDUSTRIAL COLD WATER - SOFTENED
LN2	LIQUID NITROGEN
N2	NITROGEN GAS
PCWS	PROCESS COOLING WATER SUPPLY
PCWR	PROCESS COOLING WATER RETURN
RO	REVERSE OSMOSIS WATER
SG	SPECIAL GAS
TW	TEPID WATER (POTABLE)
UHP-DIR	ULTRA-HIGH PURITY DEIONIZED WATER RETURN
UHP-DIS	ULTRA-HIGH PURITY DEIONIZED WATER SUPPLY
VAC	VACUUM

CLEAN ROOM SYMBOLS LEGEND

DETAIL NUMBER / SHEET NUMBER

ELEVATION NUMBER (A, B, C, D) / SHEET NUMBER / SHADED ARROW INDICATES ELEVATION VIEW IS SHOWN

SECTION NUMBER / SHEET NUMBER

ONLY LATEST OR CURRENT REVISION IS CLOUDED

INDICATES EXISTING CONDITION TO REMAIN

INDICATES EXISTING CONDITION TO BE DEMOLISHED OR REMOVED

INDICATES NEW WORK

GRATED FLOOR

DROP-IN LIGHT FIXTURES

FLUSH MOUNT RECESS LIGHT FIXTURES

LIGHT FIXTURES ON EMERGENCY POWER

FAN FILTER UNIT

HEPA FILTER

CEILING GRID

EXIT SIGNS. ARROW INDICATES SIGN DIRECTION ARROW

SPEAKER

SPRINKLER HEAD

INDICATES WALL TYPE. SEE SHEETS CRLF-4.00/4.01

SWINGING HINGED DOOR. NUMBER LOCATION ON PAIRED DOORS INDICATES ACTIVE LEAF

AUTOMATIC SLIDING DOOR. NUMBER LOCATION ON PAIRED DOORS INDICATES ACTIVE LEAF

KEYED NOTE

INDICATES WORK, DATUM OR CONTROL POINT

MATCH LINE, SHADED PORTION IS SIDE CONSIDERED

FOR PROJECT PLAN DRAWING PURPOSES, DESIGNATES DIRECTION OF 'NORTH'

TGMS ALARM BEACON/SIREN

TGMS EMERGENCY MANUAL OFF SWITCH

FIRE EXTINGUISHER CABINET - RECESS MOUNT

FIRE EXTINGUISHER CABINET - SURFACE MOUNT

CEILING EXHAUST/SNORKEL SIZE (DIAMETER) INDICATED

FLOOR SINK - REFER TO CLEANROOM PLUMBING

WET PROCESS HOOD. SIZE (WIDTH) INDICATED

FUME HOOD. SIZE (WIDTH) INDICATED

WET PROCESS HOOD WITH LAMINAR FLOW. SIZE (WIDTH) INDICATED

MOVABLE TABLE (STAINLESS STEEL TOP, STAINLESS STEEL FRAME) BY DIV 11

CYLINDER RACK BY DIV 11

18"d. SOLVENT STORAGE CABINET, BY DIV 11. REFER TO I11.02.

18"d. CORROSIVE STORAGE CABINET, BY DIV 11. REFER TO I11.02.

GOWNING RACK. QUANTITY OF HANGERS INDICATED

GOWNING BENCH SIZE (WIDTH) INDICATED

MULTI-TIERED WIRE SHELVING SIZE (DEPTH/WIDTH) INDICATED

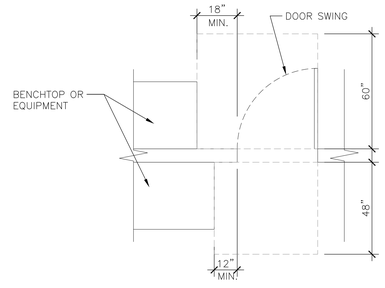
BOOTIE/SHOE SHELVING RACK

EMERGENCY SAFETY SHOWER/EYEWASH COMBINATION UNIT BY DIV 11

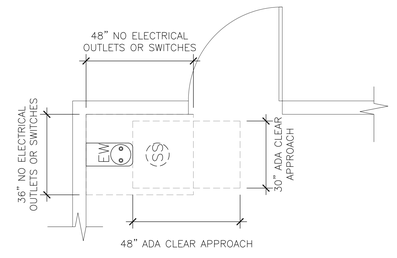
GAS CYLINDER SAFETY CABINET (GAS TYPE INDICATED)

HOOD SLOT ORGANIZER

INTERIOR DOOR CLEARANCES (ADA COMPLIANT)



APPROACH CLEARANCES AT SS/EW



CLEAN ROOM GENERAL NOTES

1. DOOR SCHEDULE: REFER TO SHEET CRLF-1.01.
2. DIMENSIONS: CRWS DIMENSIONS ARE TAKEN TO CENTERLINE OF WALL PANEL SYSTEM; ALL OTHER WALL DIMENSIONS ARE TAKEN TO THE FACE OF FINISH, FACE OF CONCRETE OR FACE OF MASONRY, UNLESS OTHERWISE NOTED.
3. WRITTEN DIMENSIONS: SHALL TAKE PRECEDENCE OVER SCALE. SCALED DIMENSIONS TAKEN BY THE CONTRACTOR WITHOUT CONSULTING THE ARCHITECT ARE USED AT THE CONTRACTORS OWN RISK.
4. CONDITIONS THAT ARE NOT DETAILED SHALL BE ASSUMED TO BE SIMILAR IN CHARACTER TO THOSE WHICH ARE. WHERE SPECIFIC DIMENSIONS, DETAILS OR DESIGN INTENT CANNOT BE DETERMINED,THE CONTRACTOR SHALL NOTIFY THE ARCHITECT PRIOR TO PROCEEDING WITH THE WORK.
5. FIRE RESISTIVE CONSTRUCTION: ALL PIPES, DUCTS, AND CONDUITS THAT PENETRATE FLOOR SLABS AND/OR RATED WALL ASSEMBLIES SHALL BE INSTALLED IN A MANNER THAT WILL PRESERVE THE FIRE RESISTIVE AND STRUCTURAL INTEGRITY OF THE BUILDING. FIRE STOPS OF SUCH PENETRATION SHALL BE BASED ON AN APPROVED U.L. OR FACTORY TESTED MUTUAL TESTED ASSEMBLY.
6. CEILING LAYOUT: EACH SUB CONTRACTOR SHALL COORDINATE PLACING OF THEIR CEILING ELEMENTS WITH OTHER SUB CONTRACTORS WHERE DISCREPANCIES EXIST BETWEEN DRAWINGS AND INSTALLATION. THE SUB-CONTRACTOR IS TO CONSULT THE ARCHITECT PRIOR TO PROCEEDING WITH THE WORK.
7. CEILING ACCESS PANELS: THE DRAWINGS DO NOT SHOW ALL REQUIRED ACCESS PANELS. THE SUB-CONTRACTOR IS TO CONSULT WITH ALL OTHER SUB-CONTRACTORS WITH CEILING ELEMENTS AND SUBMIT DRAWINGS TO THE GENERAL CONTRACTOR SHOWING ALL REQUIRED ACCESS PANELS AND INDICATE SIZE AND TYPE. THE GENERAL CONTRACTOR IS TO SUBMIT THESE DRAWINGS TO THE ARCHITECT FOR REVIEW.
8. EQUIPMENT LOCATIONS SHOWN ARE TO BE FIELD VERIFIED DURING INSTALLATION.
9. COORDINATE ALL WORK WITH OTHER TRADES INCLUDING, BUT NOT LIMITED TO: MECHANICAL, ELECTRICAL, PROCESS, AND STRUCTURAL. NOTIFY ARCHITECT OF ANY DISCREPANCIES OR INTERFERENCES.
10. ALL CASEWORK, HOODS AND ANY OTHER FURNISHINGS WITH EXPOSED-TO-VIEW BACKS AND SIDES SHALL BE FINISHED.
11. INSTALL CLOSURE PANELS BETWEEN HOODS AND WALLS AT EXPOSED ENDS AND/OR HOODS THAT ARE SET BACK TO BACK.
12. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION.
13. OWNER'S REPRESENTATIVE WILL SELECT COLORS FOR ALL COMPONENTS OF PROJECT INDICATED ON THESE DRAWINGS. COLOR SELECTION WILL BE FROM THE MANUFACTURER'S STANDARD COLOR LINE.
14. FREE STANDING SHELVING AND CASEWORK LESS THAN 18" DEEP SHALL BE SECURED TO PREVENT TIPPING. SUBMIT SHOP DRAWINGS OF ATTACHMENT PRIOR TO INSTALLATION.
15. SAFETY SHOWER/EYEWASH UNITS SHALL COMPLY WITH ANSI STANDARDS FOR USABILITY BY THE PHYSICALLY DISABLED. SAFETY SHOWER/EYEWASH UNITS SHALL BE FURNISHED UNDER DIVISION 11 FOR INSTALLATION UNDER DIVISION 22.
16. STRUCTURALLY ANCHORED AND SUSPENDED DEVICES WHICH REQUIRE COORDINATION WITH OTHER TRADES SHALL BE THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR (UNLESS OTHERWISE NOTED). ADDITIONAL FRAMING MAY BE REQUIRED TO ACCOMMODATE ANCHORAGE AROUND DUCTWORK OR OTHER OBSTRUCTIONS.

CLEANROOM DESIGN PARAMETERS

1. ENVIRONMENTAL DESIGN CONDITIONS:

   CLEAN BAYS
   TEMPERATURE: 68°F DB +/- 0.18°F
   HUMIDITY: 45%rh +/- 2%rh

   GOWNING
   TEMPERATURE: 68°F DB +/- 2.0°F
   HUMIDITY: NOT ACTIVELY CONTROLLED (RESULTANT FROM CLEANROOM HUMIDITY CONTROL)

2. SUPPLY AIR DESIGN (NOMINAL):

   ISO CLASS 6 (CLASS 1,000)
   AVERAGE ROOM AIR VELOCITY: 25 FPM
   AIR CHANGE RATE (10-FT CEILING): 150 ACH

   ISO CLASS 5 (CLASS 100)
   AVERAGE ROOM AIR VELOCITY: 50 FPM
   AIR CHANGE RATE (10-FT CEILING): 300 ACH

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed Professional Engineer under the laws of the State of Minnesota.

For Research Facilities Design

By Paul Lemestre

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Date 02-24-2012 Reg. No. 46527

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
Driven to Discover℠

CLEANROOM
GENERAL NOTES & LEGEND

crlf-1.00

EXHAUST EQUIPMENT SCHEDULES

SPECIAL USE FUME HOODS

DRAWING REFERENCE	HOOD SIZE AND TYPE	TYPE OF SASH	TYPE OF SILL	NUMBER OF VERTICAL SASHES	DESIGN OPERATING CONDITIONS			MINIMUM VAV AIR FLOW	MIN STATIC PRESSURE AT HOOD OUTLET	HOOD COLLAR SIZE	EXHAUST CONNECTION BY MECHANICAL	REMARKS
					SASH OPENING	FACE VELOCITY	AIRFLOW					
					INCH	FPM	CFM	CFM	INCH OF WATER	INCH	INCH DIAMETER	
8' FH	8' FUME HOOD	VERTICAL	FLUSH	1	18	100	1100	N/A	0.5	4X30	12	PROVIDE DUCT COLLAR TRANSITION TO 12 INCH STANDARD ANSI FLANGE CONNECTION. NOTE 1.
8' WPH	8' WET PROCESS HOOD	HINGED FACE SHILED	N/A	N/A	18	100	1,200	N/A	0.5	4X30	12	PROVIDE DUCT COLLAR TRANSITION TO 12 INCH STANDARD ANSI FLANGE CONNECTION. NOTE 1.
8' WPH-LF	8' WET PROCESS HOOD LAMINAR FLOW	HINGED FACE SHILED	N/A	N/A	18	100	1,900	N/A	0.5	4X30	14	PROVIDE DUCT COLLAR TRANSITION TO 14 INCH STANDARD ANSI FLANGE CONNECTION. NOTE 1.

NOTES:
1. EXHAUST IS CONSTANT AIR VOLUME (CAV).

OTHER EXHAUST EQUIPMENT

DRAWING REFERENCE	EQUIPMENT	EXHAUST AIR FLOW	STATIC PRESSURE	EXHAUST DUCT CONNECTION SIZE	REMARKS
		CFM	INCH OF WATER	INCH	
◐	SNORKEL EXHAUST	60	0.5	3	PROVIDE MOVEX MODEL TERFU T-1500-75 SNORKEL WITH WALL MOUNT BASE. SEE DIV 11 SPECIFICATIONS.
TCS43	VENTED CORROSIVE STORAGE CABINET	UNREGULATED	-	2	PROVIDE SCHEDULE 80 CPVC PIPE FOR EXHAUST DUCT PIPE.
TSS43	VENTED SOLVENT STORAGE CABINET	UNREGULATED	-	2	PROVIDE 2"ø MAKEUP AIR PIPE CONNECTION FROM SUPPLY AIR SYSTEM. PROVIDE GALVANIZED OR EPOXY PAINTED BLACK IRON PIPE FOR SUPPLY & EXHAUST DUCT PIPE.
	VENTED GAS CYLINDER STORAGE CABINET (2-CYLINDER)	250	0.5	6	

CLEANROOM DOOR SCHEDULE

DOOR NO.	WIDTH	HEIGHT	THICK	TYPE	MATERIAL	LABEL	UPPER PANEL	LOWER PANEL	HARDWARE	REMARKS
1-180	7'-0"	9'-0"	2"	SLIDER	ALUMINUM	ISO 5	GLASS	GLASS	GROUP 3	1
1-180A	3'-0"	8'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 4	
1-180B	7'-0"	9'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 1	
1-180C	7'-0"	9'-0"	2"	SLIDER	ALUMINUM	ISO 5	GLASS	GLASS	GROUP 3	1
1-180D	3'-0"	8'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 1	
1-180E	3'-0"	8'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 1	
1-180F	3'-0"	8'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 1	
1-180G	3'-0"	8'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 1	
1-180H	3'-0"	8'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 1	
1-180I	6'-0"	9'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 2	
1-180J	6'-0"	9'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 2	
1-180K	6'-0"	9'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 2	
1-180L	6'-0"	9'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 2	
1-180M	6'-0"	9'-0"	1-3/4"	HINGED SWING	ALUMINUM	ISO 5	GLASS	SOLID	GROUP 2	
1-180N	3'-0"	8'-0"	N/A	HINGED SWING	CHAIN LINK	N/A	N/A	N/A	SEE ARCH	2
1-180P	3'-0"	8'-0"	N/A	HINGED SWING	CHAIN LINK	N/A	N/A	N/A	SEE ARCH	2
1-180Q	6'-0"	8'-0"	N/A	HINGED SWING	CHAIN LINK	N/A	N/A	N/A	SEE ARCH	2

NOTES:
1. DOUBLE BREAKAWAY DOOR SEGMENTS.
2. REFER TO ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR CHAIN LINK SWING DOORS.

CLEANROOM DOOR HARDWARE SCHEDULE

ITEM	QUANTITY	DESCRIPTION	ITEM	QUANTITY	DESCRIPTION
GROUP 1	CLEANROOM SWING DOOR		GROUP 3	CLEANROOM AUTO SLIDING DOOR	
HINGE/PIVOT	3 EA	BY DOOR SUPPLIER	HINGE/PIVOT	-	NONE
EXIT DEVICE	-	NONE	EXIT DEVICE	-	BREAKAWAY DOOR SEGMENTS
LATCH	-	NONE	LATCH	-	NONE
CLOSER	1	CONCEALED	CLOSER	1	MOTOR ASSEMBLY
THRESHOLD	-	NONE	THRESHOLD	-	NONE
DOOR SWEEP	1	BY DOOR SUPPLIER	DOOR SWEEP	1	BY DOOR SUPPLIER
GASKETING	1	BY WALL SUPPLIER	GASKETING	1	BY DOOR SUPPLIER
PUSH BAR & PULL HANDLE	1 SET	BY DOOR SUPPLIER	PUSH BAR & PULL HANDLE	-	NONE
DOOR STOP	1	BY DOOR SUPPLIER	DOOR STOP	-	NONE
GROUP 2	CLEANROOM SWING DOOR		GROUP 4	CLEANROOM SWING DOOR	
HINGE/PIVOT	3 EA	BY DOOR SUPPLIER	HINGE/PIVOT	3 EA	BY DOOR SUPPLIER
EXIT DEVICE	-	NONE	EXIT DEVICE	1	PASSAGE LEVER
LATCH	-	NONE	LATCH	1	ELECTRONIC RETRACT W/ KEY OVERRIDE
CLOSER	2	CONCEALED	CLOSER	2	CONCEALED
THRESHOLD	-	NONE	THRESHOLD	-	NONE
DOOR SWEEP	2	BY DOOR SUPPLIER	DOOR SWEEP	2	BY DOOR SUPPLIER
GASKETING	1	BY WALL SUPPLIER	GASKETING	1	BY WALL SUPPLIER
PUSH BAR & PULL HANDLE	2 SETS	BY DOOR SUPPLIER	PUSH BAR & PULL HANDLE	1	BY DOOR SUPPLIER
DOOR STOP	2	BY DOOR SUPPLIER	DOOR STOP	1	BY DOOR SUPPLIER

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(651) 705-1242

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Date 02-24-2012

Project

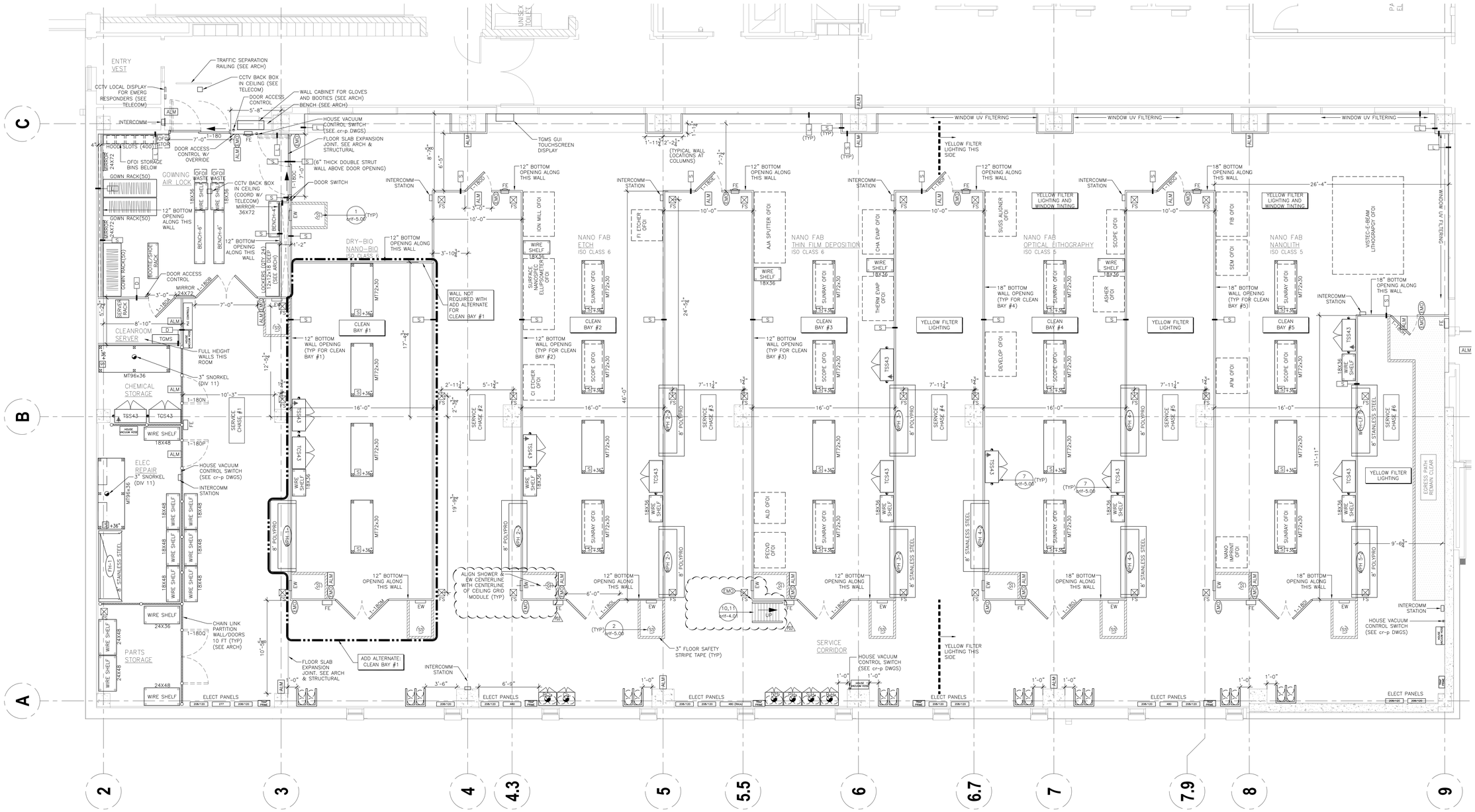
Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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CLEANROOM SCHEDULES

crlf-1.01



CLEANROOM FLOOR PLAN

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

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Date 03-24-2012

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

PROJECT NORTH

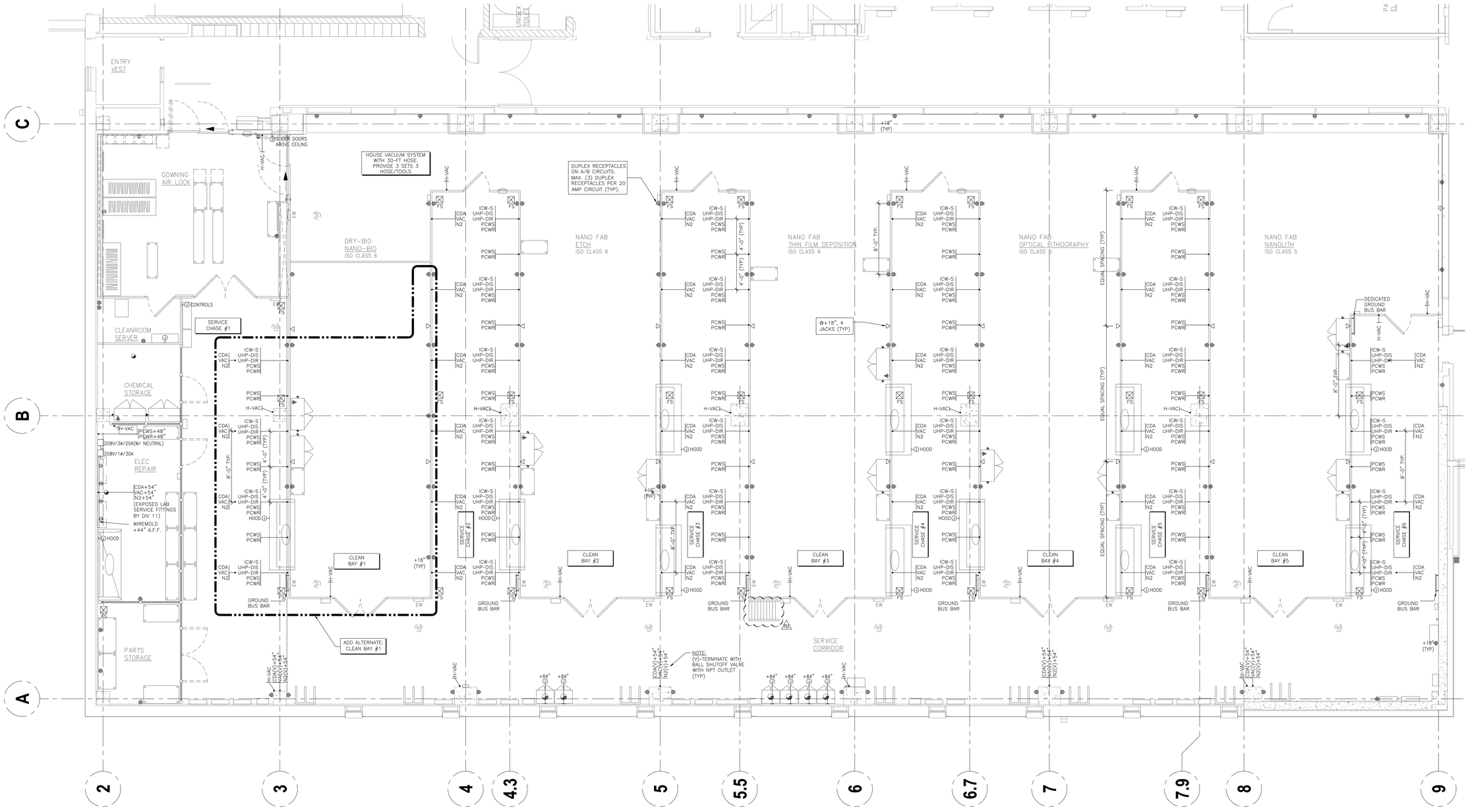
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CLEANROOM FLOOR PLAN

crlf-2.10

CLEANROOM DESIGN AIRFLOWS

CLEAN SPACE	AREA (SF)	DESIGN CLASS (ISO)		AVERAGE ROOM AIR VELOCITY (FPM)		DESIGN SUPPLY AIR VOLUME (CFM)	
		INITIAL	FUTURE	INITIAL	FUTURE	INITIAL	FUTURE
CLEAN BAY #1	730	6	5	25	50	18,250	36,500
CLEAN BAY #2	730	6	5	25	50	18,250	36,500
CLEAN BAY #3	730	6	5	25	50	18,250	36,500
CLEAN BAY #4	730	5	5	50	50	36,500	36,500
CLEAN BAY #5	1,090	5	5	50	50	54,500	54,500
CLEAN CORRIDOR (NORTH)	600	6	5	25	50	15,000	30,000
CLEAN CORRIDOR (SOUTH)	260	5	6	50	50	13,000	13,000
GOWNING	375	6	6	25	25	9,375	9,375



CLEANROOM FLOOR PLAN UTILITIES

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

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

Issued for	Date
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Date 03-24-2012

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

PROJECT NORTH

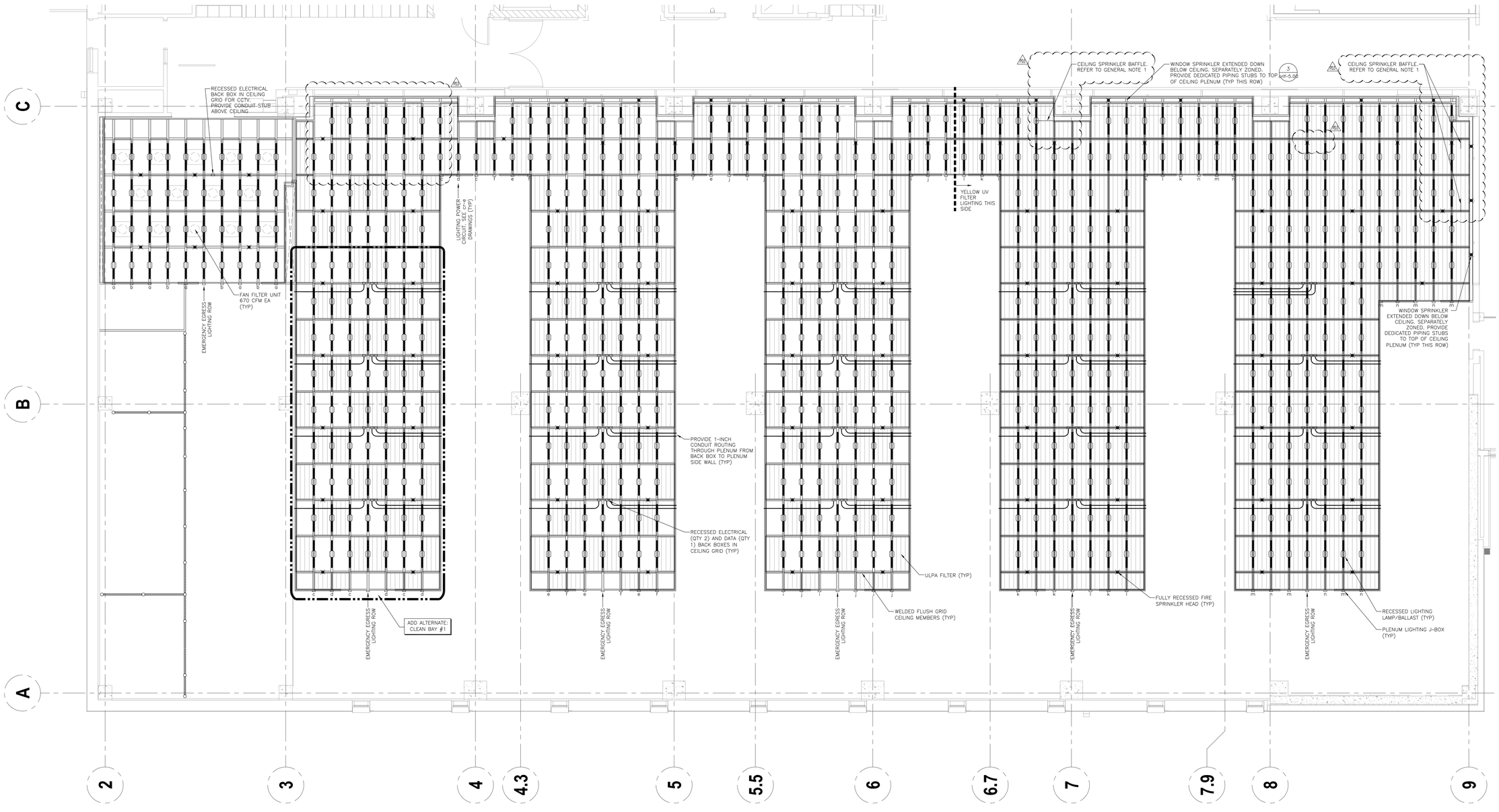
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CLEANROOM FLOOR PLAN UTILITIES

crlf-2.11

GENERAL NOTES:

1. CEILING SPRINKLER BAFFLE ATTACHED TO CEILING GRID MEMBER. BAFFLE SHALL BE REMOVABLE TO ALLOW FOR LIGHTING AND FILTER MAINTENANCE. PROVIDE FINISH TO MATCH CEILING. BAFFLES SHALL BE DESIGNED AND INSTALLED TO MEET NFPA 13 CRITERIA AS FOLLOWS:
   1.1. BAFFLES SHALL BE INSTALLED AND LOCATED MIDWAY BETWEEN SPRINKLERS AND ARRANGED TO PROTECT THE ACTUATING ELEMENTS.
   1.2. BAFFLES SHALL BE OF NONCOMBUSTIBLE OR LIMITED-COMBUSTIBLE MATERIAL THAT WILL STAY IN PLACE BEFORE AND DURING SPRINKLER OPERATION.
   1.3. BAFFLES SHALL NOT BE LESS THAN 8-INCH WIDE AND 6-INCH HIGH.
   1.4. THE BOTTOM OF BAFFLES SHALL EXTEND DOWNWARD TO A LEVEL AT LEAST EVEN WITH THE DEFLECTORS OF PENDENT SPRINKLERS.



CLEAN ROOM REFLECTED CEILING PLAN

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

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

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Project

Physics and Nanotechnology Building

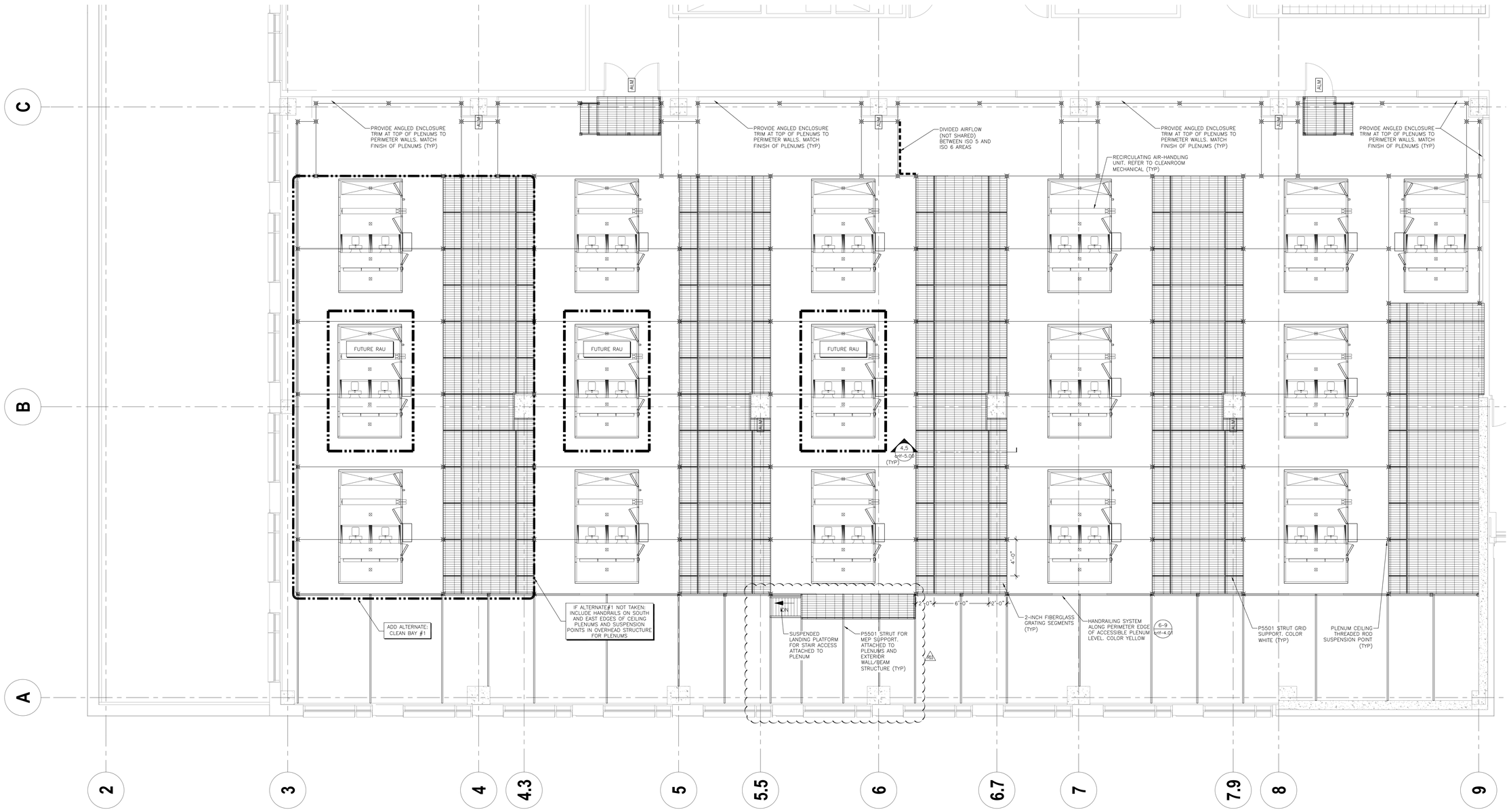
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CLEANROOM
REFLECTED CEILING PLAN

crlf-2.12



CLEANROOM PLENUM PLAN

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

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 03-24-2012 Reg. No. 46527

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Project

Physics and Nanotechnology Building

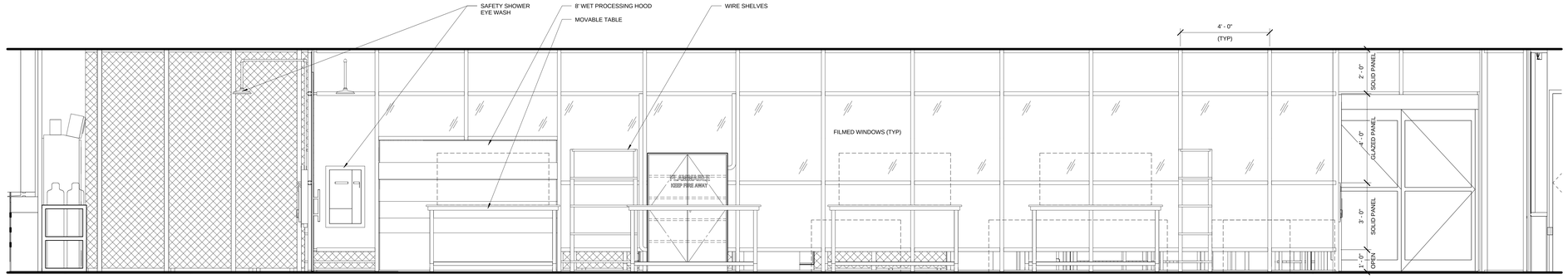
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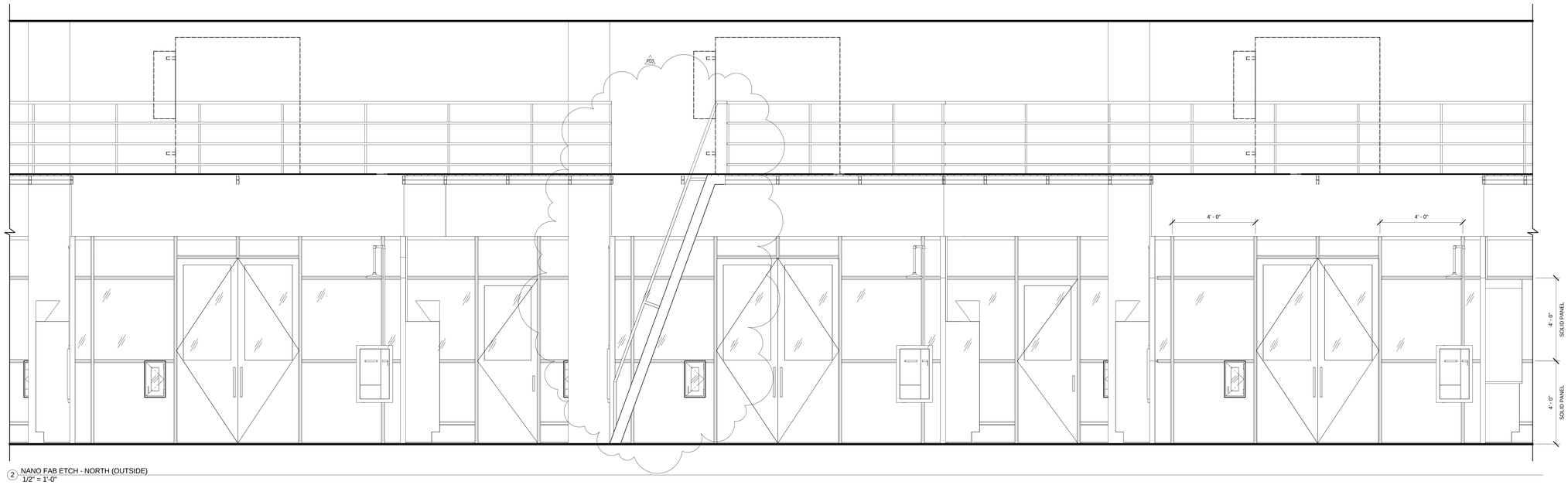
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CLEANROOM PLENUM PLAN

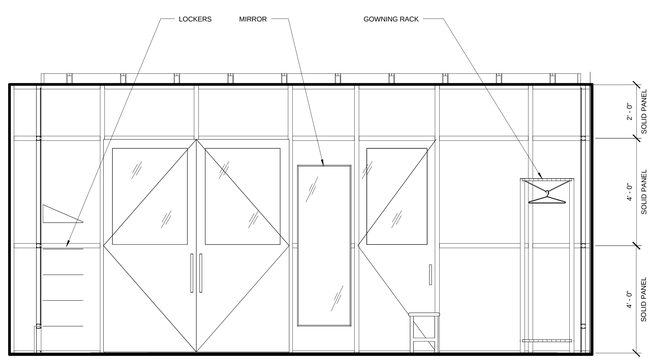
crlf-2.20



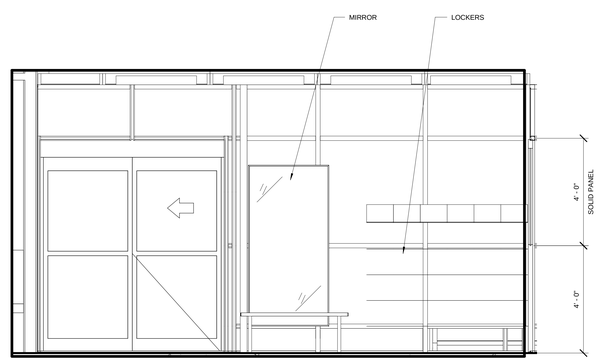
1 NANO FAB ETCH - WEST
1/2" = 1'-0"



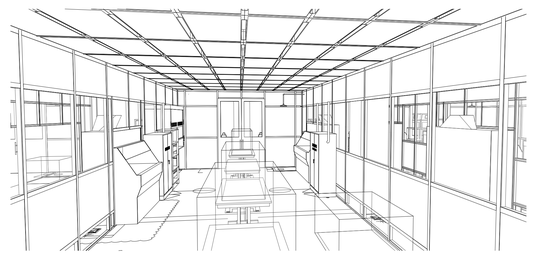
2 NANO FAB ETCH - NORTH (OUTSIDE)
1/2" = 1'-0"



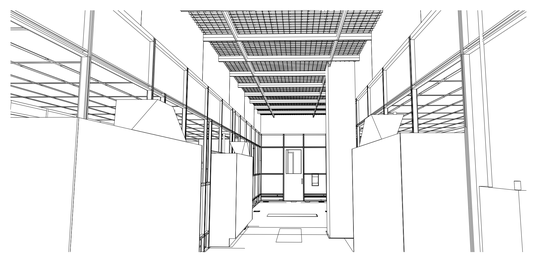
3 GOWNING AIR LOCK - SOUTH
1/2" = 1'-0"



4 GOWNING AIR LOCK - EAST
1/2" = 1'-0"



5 NANO FAB LITOGRAPHY - SOUTH



6 SERVICE CHASE #4 - NORTH

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For Research Facilities Design

By

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Drawn Author

Checked Checker

Date 11/23/11

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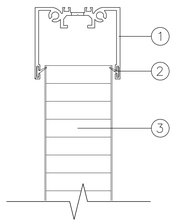
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CLEAN ROOM ELEVATIONS

crlf-3.00

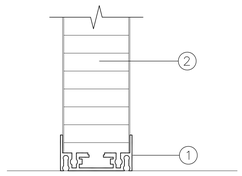
No.	Qty	Item No.	Description
1	1	831113	HEADTRACK, 2.38" STRAIGHT
2	2	830686_	GASKET, HEADTRACK
3	1	_____	PANEL, 1.88"



WALL TYPE "D" - HEADTRACK DETAIL

NTS 1

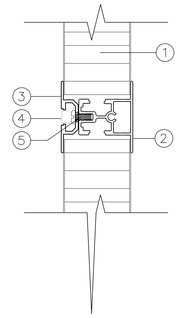
No.	Qty	Item No.	Description
1	1	831114	FLOORTRACK
2	1	_____	PANEL, 1.88"



WALL TYPE "D" - FLOORTRACK DETAIL

NTS 2

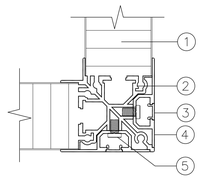
No.	Qty	Item No.	Description
1	1	_____	PANEL, 1.88"
2	1	831934	POST, F2550
3	1	830647	T-BATTEN, 2"
4	1	830606	ENCLOSURE CAP
5	-	868008	SCREW, BATTEN PPH 10-24 x 7/16"



WALL TYPE "D" - WALL CONNECTION DETAIL

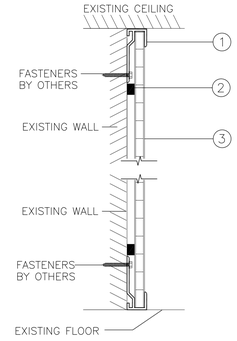
NTS 3

No.	Qty	Item No.	Description
1	2	_____	PANEL, 1.88"
2	1	831111	POST, 2.00" CORNER
3	2	830606	ENCLOSURE CAP
4	2	830593	BATTEN, 2.50" TEE
5	4	840808	SCREW, BATTEN LHSHCS 1/4-20 x 3/8"



WALL TYPE "D" - CORNER DETAIL

NTS 4

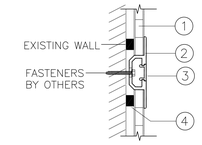


No.	Qty	Item No.	Description
1	2	830206	J-TRIM, 1/4" OFFSET
2	2	840083	GASKET, POLYETHYLENE 3/8" x 1/4"
3	1	_____	PANEL, .25"

WALL TYPE "L" - J TRIM DETAIL

NTS 5

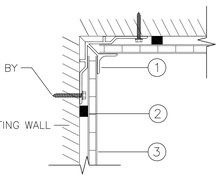
No.	Qty	Item No.	Description
2	1	831111	POST, 2.00" CORNER
3	1	830606	ENCLOSURE CAP
4	2	840083	GASKET, POLYETHYLENE 3/8" x 1/4"



WALL TYPE "L" - WALL CONNECTION DETAIL

NTS 6

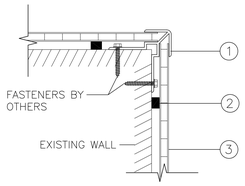
No.	Qty	Item No.	Description
1	1	830647	T-BATTEN, 2"
2	1	_____	PANEL, .25"



WALL TYPE "L" - INSIDE CORNER DETAIL

NTS 7

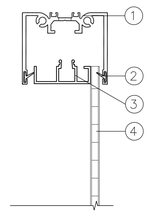
No.	Qty	Item No.	Description
3	2	830604	CORNER, 1/4" INSIDE
4	2	840083	GASKET, POLYETHYLENE 3/8" x 1/4"
5	2	_____	PANEL, .25"



WALL TYPE "L" - OUTSIDE CORNER DETAIL

NTS 8

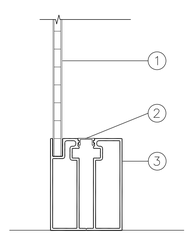
No.	Qty	Item No.	Description
1	1	831113	HEADTRACK, 2.38" STRAIGHT
2	2	830686_	GASKET, HEADTRACK
3	1	830603	GLAZING CLIP SINGLE
4	1	_____	PANEL, .25"



WALL TYPE "S" - HEADTRACK DETAIL

NTS 9

No.	Qty	Item No.	Description
1	1	_____	PANEL, .25"
2	1	831937	FLOOR TRACK, LCS
3	1	830606	HDW ENCLOSURE CAP

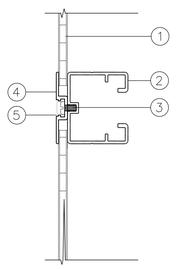


NOTE:
FLOOR TRACK OMITTED
AT WALL ASSEMBLIES
WITH BOTTOM OPENINGS
FOR RETURN AIR

WALL TYPE "S" - FLOORTRACK DETAIL

NTS 10

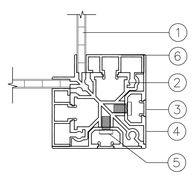
No.	Qty	Item No.	Description
1	2	_____	PANEL, 0.25"
2	1	831935	POST, S5050
3	-	868006	SCREW, BATTEN PPH 10-24 x 5/16
4	1	831085	T-BATTEN, 2" SHALLOW
5	1	830606	ENCLOSURE CAP



WALL TYPE "S" - WALL CONNECTION DETAIL

NTS 11

No.	Qty	Item No.	Description
1	2	_____	PANEL, .25"
2	1	831111	POST, 2.00" CORNER
3	2	830606	ENCLOSURE CAP
4	2	830593	BATTEN, 2.50" TEE
5	4	840808	SCREW, BATTEN LHSHCS 1/4-20 x 3/8"
6	2	830603	GLAZING CLIP, SINGLE



WALL TYPE "S" - INSIDE CORNER DETAIL

NTS 12

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Physics and Nanotechnology Building

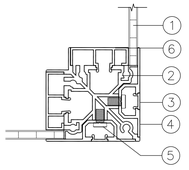
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CLEANROOM DETAILS

crlf-4.00

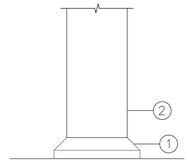
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1	2	_____	PANEL, .25"
2	1	831111	POST, 2.00" CORNER
3	2	830606	ENCLOSURE CAP
4	2	830593	BATTEN, 2.50" TEE
5	4	840808	SCREW, BATTEN LHSHCS 1/4-20 x 3/8"
6	2	830603	GLAZING CLIP, SINGLE



WALL TYPE "S" - OUTSIDE CORNER DETAIL

NTS 1

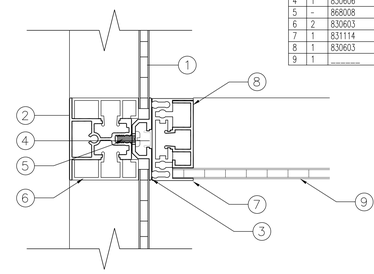
No.	Qty	Item No.	Description
1	1	841019	STUD BASE, POLYPROPYLENE
2	1	831935	POST, S5050



WALL TYPE "S" - STRUT POST BASE

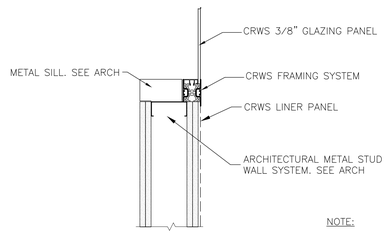
NTS 2

No.	Qty	Item No.	Description
1	1	831934	POST, F2550 FRAMED
3	1	830647	T-BATTEN, 2.0"
4	1	830606	ENCLOSURE CAP
5	-	868008	SCREW, BATTEN PPH 10-24 x 7/16"
6	2	830603	GLAZING CLIP, SINGLE
7	1	831114	FLOORTRACK
8	1	830603	GLAZING CLIP, SINGLE
9	1	_____	PANEL, .25"



PANEL/ PANEL DETAIL WITH WALL START

NTS 3



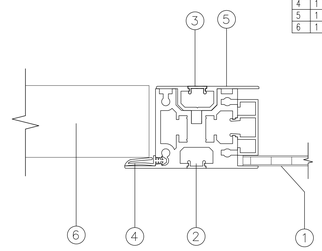
NOTE:

COORDINATE WITH ARCHITECTURAL CLEANROOM INTERIOR DETAILS FOR WINDOWS AT PERIMETER OF CLEANROOM ENVELOPE

WALL TYPE "L" - PERIMETER WALL WINDOW DETAIL

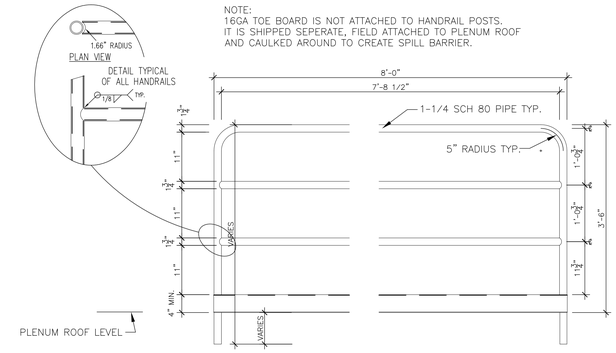
NTS 4

No.	Qty	Item No.	Description
1	1	_____	PANEL, .25"
2	1	830608	DOOR JAMB, 2.0"
3	2	830606	ENCLOSURE CAP
4	1	830659	GASKET, DOOR FRAME
5	1	830593	BATTEN, 2.50" TEE
6	1	_____	GLAZING CLIP, SINGLE



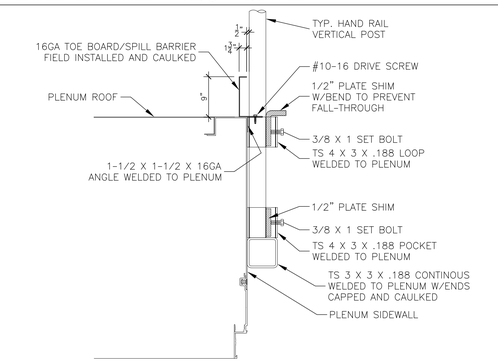
DOOR JAMB DETAIL

NTS 5



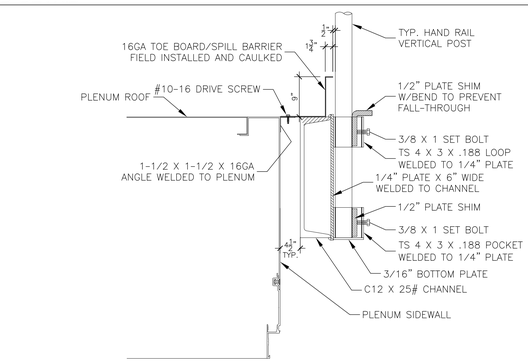
TYPICAL 8FT NOMINAL HANDRAIL SECTION

NTS 6



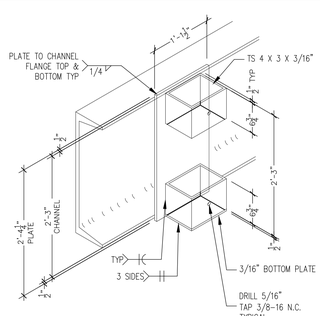
HANDRAIL ATTACHMENT AT PLENUM SIDEWALL

NTS 7



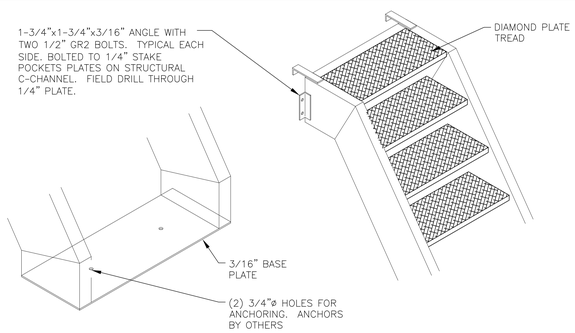
HANDRAIL ATTACHMENT WITH STEEL FRAMING

NTS 8



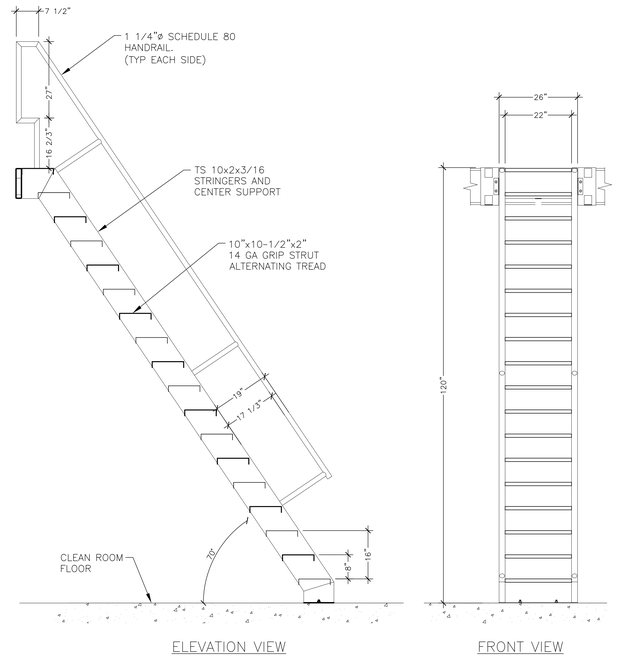
HANDRAIL STAKE POCKET - ISOMETRIC

NTS 9



SHIP LADDER ATTACHMENT DETAIL

NTS 10



SHIP LADDER DETAIL

NTS 11

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By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

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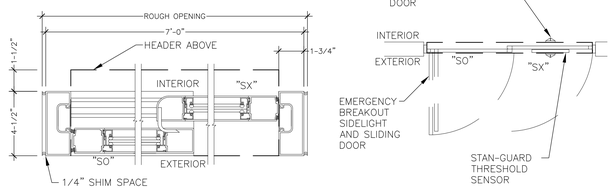
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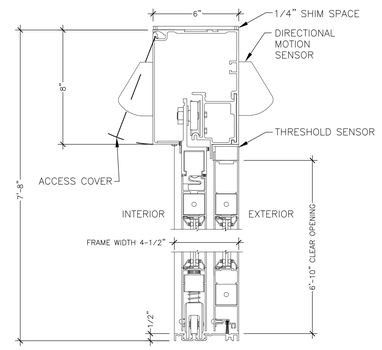
CLEANROOM DETAILS

crlf-4.01



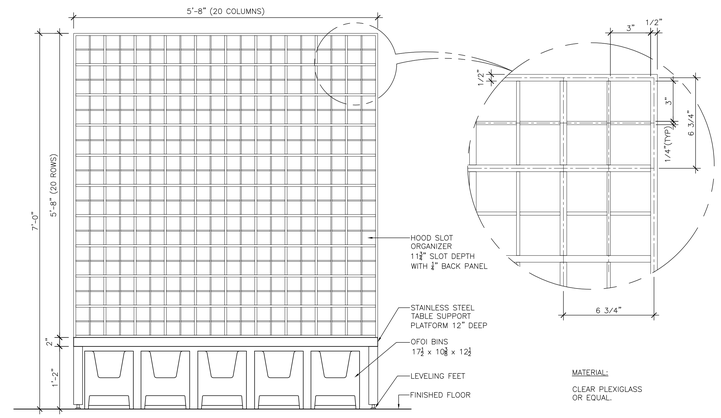
SLIDING DOOR DETAIL - PLAN VIEW

NTS 1



SLIDING DOOR DETAIL - VERTICAL SECTION

NTS 2



HOOD SLOT ORGANIZER DETAIL (QUANTITY 400)

1"=1'-0" 3

4 5 6

7 8 9

NTS 10 11 12

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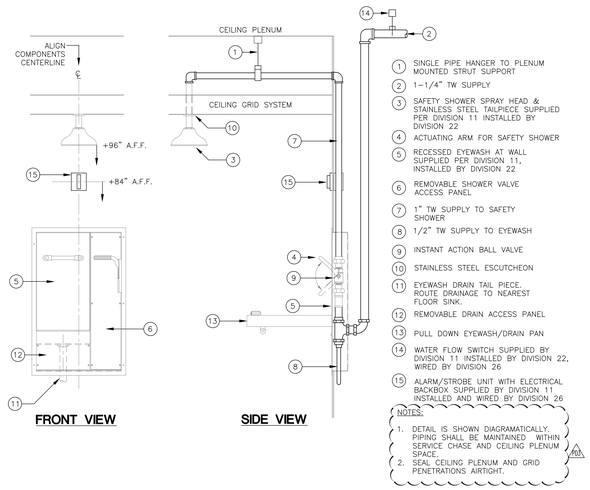
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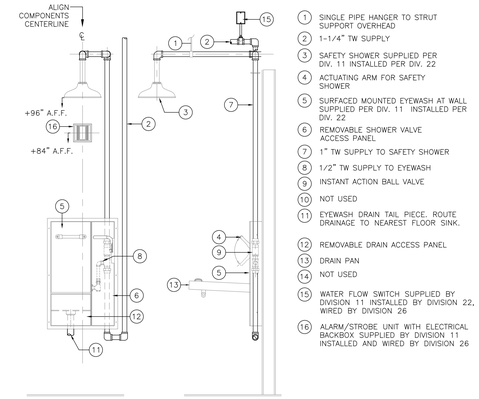
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CLEANROOM DETAILS

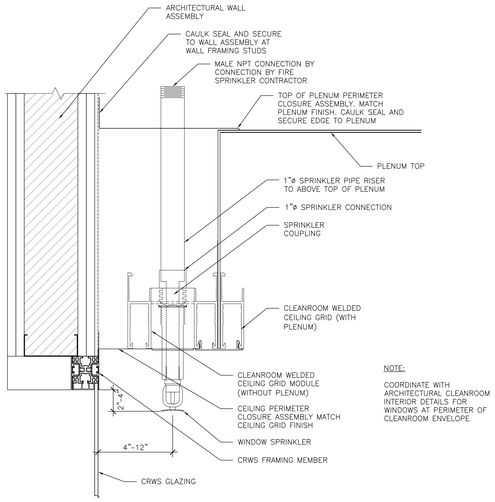
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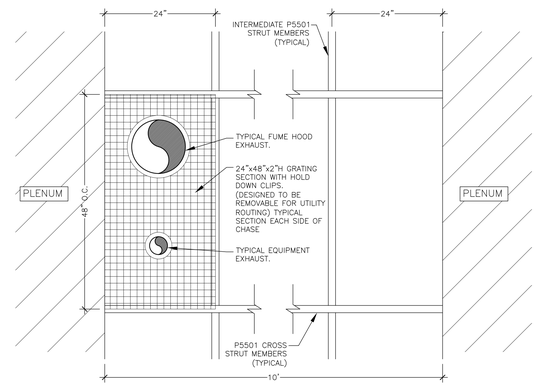
PIPING AT RECESSED SAFETY SHOWER / RECESSED EYEWASH UNIT NTS (1)



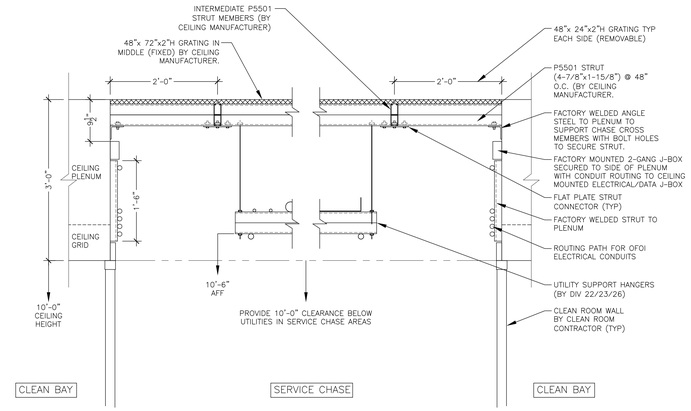
PIPING AT SURFACE MOUNTED SAFETY SHOWER / EYEWASH UNIT NTS (2)



PENDANT SPRINKLER AT PERIMETER WINDOW DETAIL NTS (3)

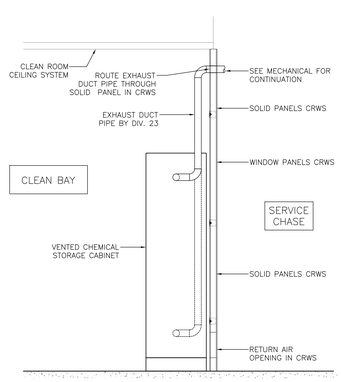


SERVICE CHASE CEILING SUPPORT SYSTEM NTS (4)

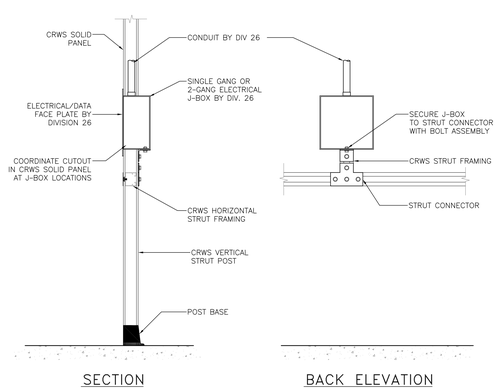


SERVICE CHASE CEILING & UTILITY SUPPORT DETAIL NTS (5)

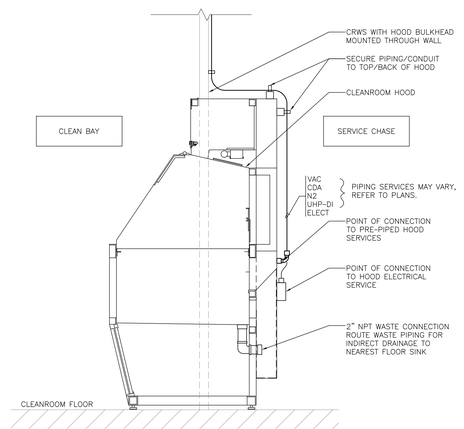
HOOD EXHAUST CONNECTION DETAIL NTS (6)



VENTED CHEMICAL STORAGE CABINET DETAIL NTS (7)



CRWS ELECTRICAL BACK BOX MOUNTING DETAIL NTS (8)



HOOD UTILITY CONNECTION DETAIL NTS (9)

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Date 03-24-2012

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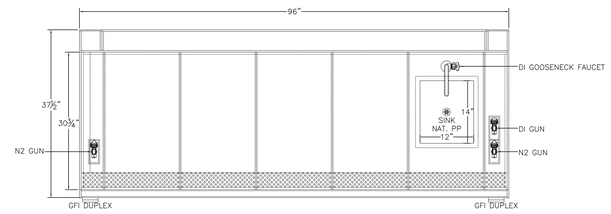
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CLEANROOM SERVICE DETAILS

crlf-5.00

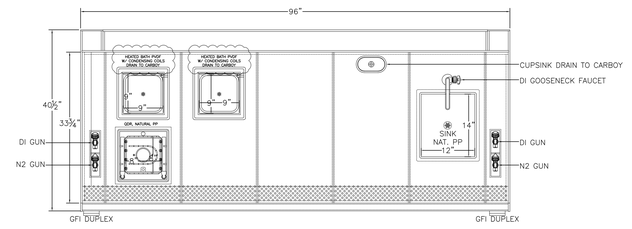
WPH 1-1 (ADD ALTERNATE) 1"=1'-0" 1



PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY.

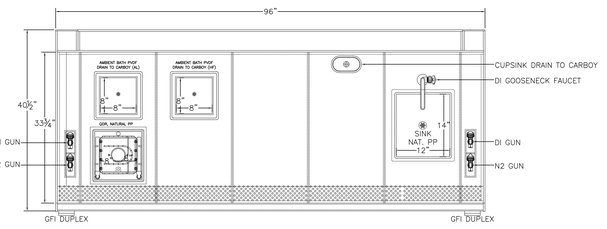
WPH 2-1 (KOH ETCHING) 1"=1'-0" 2



PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY. KOH USE ONLY.
3. (2) PFA (TEFLON) ETCH STATIC BATH STATIONS (KOH ETCHING); 105C TEMP AND 45% CONCENTRATION. CONDENSING COILS.
4. HEATED BATHS DRAIN TO SINGLE SHARED CARBOY.
5. (1) NATURAL PP QUICK DUMP RINSER.
6. 4" AND 6" WAFERS. 25 QTY.
7. (1) PP CUPSINK DRAIN TO SHARED CARBOY.
8. ADD ALTERNATE: PROVIDE THE HEATED BATHS WITH PUMPED RECIRCULATED FILTERING SYSTEM.

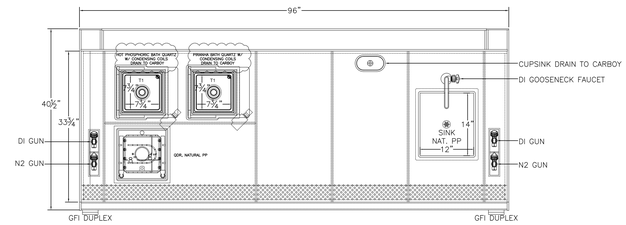
WPH 2-2 (ACID ETCHING) 1"=1'-0" 3



PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY. GENERAL USE.
3. (2) PVDF AMBIENT ETCH TANKS; (1) ALUMINUM; (1) HF ETCHING; DEDICATED WASTE CARBOY EACH TANK.
4. (1) NATURAL PP QUICK DUMP RINSER.
5. 4" AND 6" WAFER CARRIERS. 25 QTY
6. (1) PP CUPSINK DRAIN TO DEDICATED CARBOY (ACID WASTE).

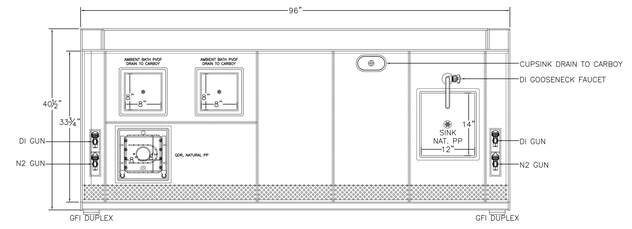
WPH 2-3 (HEATED ETCHING) 1"=1'-0" 4



PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O WITH NATURAL POLYPROPYLENE WORK DECK.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY. GENERAL USE.
3. HF PROCESSES:
4. (1) QUARTZ PHOSPHORIC (HOT - 160C); IMMERSION HEATER; DRAIN TO DEDICATED CARBOY. CONDENSING COILS.
5. (1) QUARTZ PIRANA BATH; DRAIN TO DEDICATED CARBOY. CONDENSING COILS.
6. (1) NATURAL PP QUICK DUMP RINSER.
7. (1) PP CUPSINK DRAIN TO DEDICATED CARBOY (ACID WASTE).

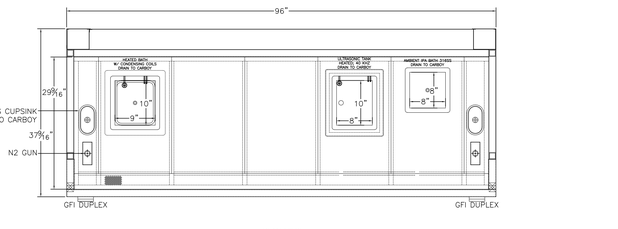
WPH 3-1 (HF ETCHING) 1"=1'-0" 5



PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY.
3. CLEANING/ETCHING SURFACE PRIOR TO DEPOSITION, ACID AND BASE WORK.
4. (2) PVDF RECESSED TANKS (HF RELATED) - AMBIENT TEMP. DRAIN TO HARED CARBOY.
5. (1) NATURAL PP QUICK DUMP RINSER.
6. (1) PP CUPSINK DRAIN TO DEDICATED CARBOY (ACID WASTE).

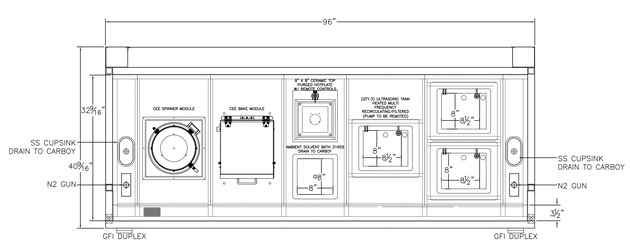
WPH 3-2 (SOLVENT CLEANING) 1"=1'-0" 6



PLAN VIEW

NOTES:
1. MATERIAL: STAINLESS STEEL.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY.
3. LIFTOFF PROCESSES. SOLVENT CLEANING.
4. (1) ULTRASONIC BATHS; HEATED; 40KHZ FIXED FREQUENCY. DRAIN TO DEDICATED CARBOY
5. (1) RECESSED AMBIENT TANK FOR IPA. DRAIN TO CARBOY
6. (1) SS RESIST STRIP TANKS - HEATED. DRAINS TO DEDICATED CARBOY. CONDENSING COILS.
7. (2) SS CUPSINKS DRAIN TO SHARED CARBOY.
8. ADD ALTERNATE: PROVIDE THE HEATED BATHS WITH PUMPED RECIRCULATED FILTERING SYSTEM.

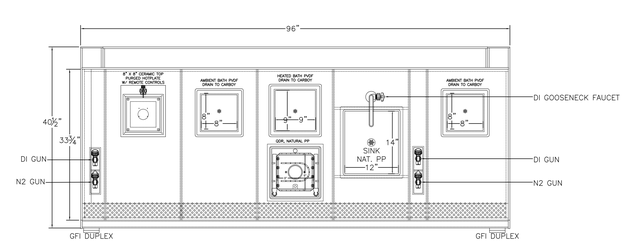
WPH 4-1 (RESIST DEVELOP) 1"=1'-0" 7



PLAN VIEW

NOTES:
1. MATERIAL: STAINLESS STEEL.
2. OPEN WET BENCH WITH HINGED SHIELD. LAMINAR HEPA SUPPLY AIR FLOW AND EXHAUST.
3. GENERAL SOLVENT WORK.
4. (1) BREWER SCIENCE SPIN COATER.
5. (1) BREWER SCIENCE BAKE PLATE.
6. (3) MULTI-FREQUENCY HEATED ULTRASONIC TANKS. PROVIDE PUMPED RECIRCULATED FILTERING SYSTEM FOR EACH TANK.
7. (1) SS SOLVENT TANKS - DRAIN TO SEPARATE CARBOY. ROOM TEMPERATURE WORK.
8. (1) 8" X 8" HOT PLATE, PURGED, STIRRING, REMOTE CONTROLS.
9. HOOD HAS LITHO GOLD UV FILTERS OVER LIGHTS.

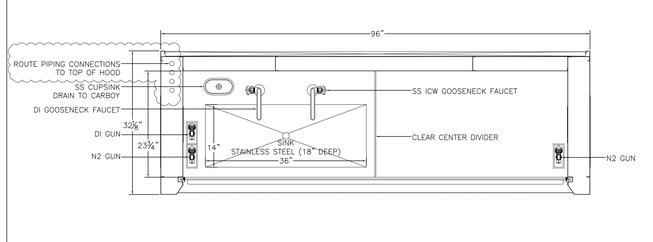
WPH 4-2 (SOLVENT) 1"=1'-0" 8



PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY. GENERAL USE.
3. (2) PVDF AMBIENT TANKS; DRAIN TO CARBOY.
4. (1) PVDF HEATED TANK; 10 - 50C; SULFURIC ACID.
5. (1) PP QUICK DUMP RINSER.
6. 4" AND 6" WAFER CARRIERS.
7. (1) 8" X 8" HOT PLATE, PURGED, STIRRING, REMOTE CONTROLS.
8. HOOD HAS LITHO GOLD UV FILTERS OVER LIGHTS.

WPH 4 -3 (RESIST COAT) 1"=1'-0" 9



PLAN VIEW

NOTES:
1. MATERIAL: STAINLESS STEEL.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY.
3. GENERAL SOLVENT WORK. RESIST STRIP. ROOM TEMPERATURE WORK.
4. (2) BREWER SCIENCE SPIN COATER.
5. (3) BREWER SCIENCE BAKE PLATE.
6. (2) SS SOLVENT CUPSINKS - DRAIN TO SHARED CARBOY.
7. HOOD HAS LITHO GOLD UV FILTERS OVER LIGHTS.

WPH-LF 5-1 (RESIST COAT) 1"=1'-0" 10

PLAN VIEW

NOTES:
1. MATERIAL OF CONSTRUCTION: POLYPROPYLENE UL94 V/O.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY. GENERAL USE.
3. DEVELOPER WORK WITH CAUSTICS.
4. (1) HEATED PVDF BATH. DRAIN TO CARBOY.
5. (3) TEFLON TANKS FOR DEVELOPER SOLUTIONS. ASPIRATION FOR DRAINING TANKS TO CARBOY.
6. (1) RECESSED BEAKER AREA WITH FLUSH COVER.
7. (1) PP CUPSINK DRAIN TO DEDICATED CARBOY.
8. HOOD HAS LITHO GOLD UV FILTERS OVER LIGHTS.

WPH 5-2 (RESIST DEVELOP) 1"=1'-0" 11

PLAN VIEW

NOTES:
1. MATERIAL: STAINLESS STEEL.
2. OPEN WET BENCH WITH HINGED SHIELD. EXHAUST ONLY.
3. (3) RECESSED AMBIENT TANKS. DRAIN TO SHARED CARBOY.
4. (1) QUICK DUMP RINSER.
5. HOOD HAS LITHO GOLD UV FILTERS OVER LIGHTS.

FH-1 (REPAIR SHOP) 1"=1'-0" 12

PLAN VIEW

NOTES:
1. MATERIAL: STAINLESS STEEL.
2. FUME HOOD WITH VERTICAL RISING SASH DESIGN; 18-INCH OPERATING SASH HEIGHT. EXHAUST ONLY.
3. STANDARD FUME HOOD DESIGN WITHOUT DRAIN TUB BELOW WORK DECK.
4. SOLID WORK SURFACES.
5. (1) SS CUPSINK. SOLVENT WASTE. DRAIN TO CARBOY.

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

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Checked

Date 03-24-2012

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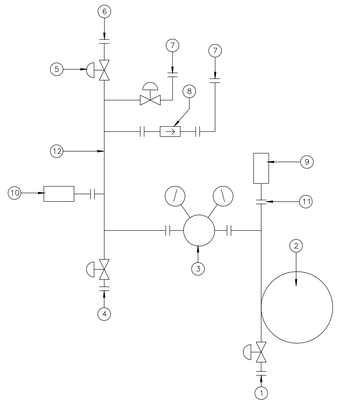
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CLEANROOM
HOOD DECK PLANS

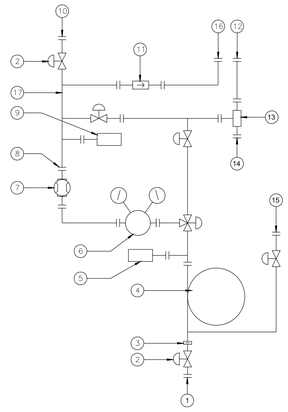
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1. PURGE GAS CYLINDER INLET FROM SOURCE
2. CYLINDER CONNECTION TUBING PIGTAIL
3. REGULATOR ASSEMBLY
4. PURGE OUTLET
5. AUTOMATIC PNEUMATIC VALVE
6. PURGE GAS OUTLET
7. VENT OUTLET, ROUTE TO GAS CABINET EXHAUST DUCT
8. RELIEF VALVE
9. HIGH PRESSURE TRANSDUCER
10. LOW PRESSURE TRANSDUCER
11. THREADED CONNECTION (TYP.)
12. ULTRA-HIGH PURITY STAINLESS STEEL TUBING WITH WELD JOINTS AND FITTINGS (TYP.)

PURGE PANEL - AUTOMATIC

NTS (1)

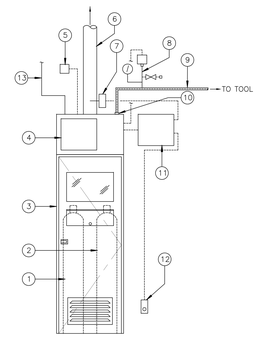


1. PROCESS GAS CYLINDER INLET
2. AUTOMATIC PNEUMATIC VALVE (TYP)
3. FLOW ORIFICE
4. CYLINDER CONNECTION PIGTAIL
5. HIGH PRESSURE TRANSDUCER
6. REGULATOR ASSEMBLY
7. EXCESS FLOW SWITCH SHUT-OFF VALVE
8. THREADED CONNECTION (TYP.)
9. LOW PRESSURE TRANSDUCER
10. PROCESS GAS OUTLET
11. RELIEF VALVE
12. VENT OUTLET, ROUTE TO GAS CABINET EXHAUST DUCT. TERMINATE ABOVE DUCT GAS SENSOR.
13. VACUUM VENTURI
14. AIR/NITROGEN GAS CONNECTION
15. PURGE GAS INLET FROM PURGE PANEL
16. VENT OUTLET, ROUTE TO GAS CABINET EXHAUST DUCT
17. ULTRA-HIGH PURITY STAINLESS STEEL TUBING WITH WELD JOINTS AND FITTINGS (TYP.)

FLOW ORIFICE SIZES:
-H2S: 500 sccm (MAX)

PROCESS PANEL - AUTOMATIC

NTES (2)



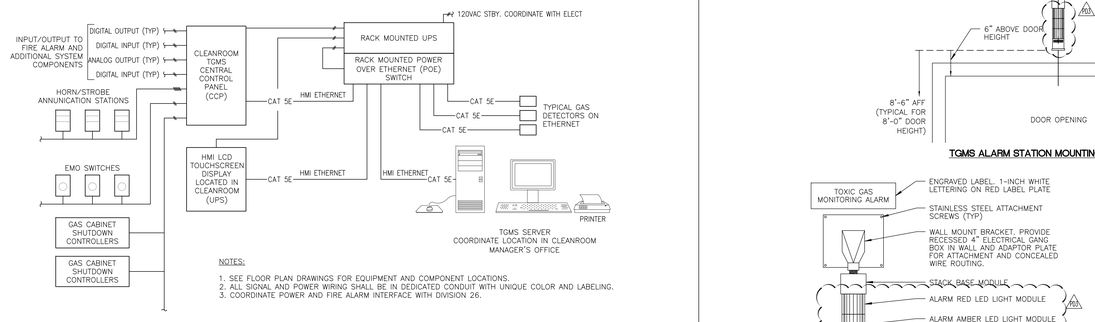
1. PROCESS GAS CYLINDER, (OFOI)
2. PURGE GAS CYLINDER, (OFOI)
3. GAS CABINET WITH AUTOMATIC PROCESS & PURGE PANEL. REFER TO DETAILS 1 & 2/crlf-7.00
4. AUTOMATIC CONTROLLER
5. POWER, 120 VAC
6. EXHAUST DUCT (BY DIV 23)
7. DUCT GAS SENSOR
8. COAXIAL TUBING INTERSTITIAL FILL ASSEMBLY WITH FILL VALVE AND FITTING, PRESSURE GAUGE, AND PRESSURE MONITORING SWITCH. (OFOI)
9. COAXIAL GAS PIPING (TYP), OFOI
10. BULKHEAD TUBE FITTING (TYP)
11. SCANNING ALARM RECEIVER WITH SHUTDOWN OUTPUT TO CONTROLLER
12. GAS SENSOR/ TRANSMITTER (TYP)
13. PROVIDE SUPPLY TUBING TO GAS CABINET FROM NITROGEN SOURCE

NOTES:

1. SEE crlf DRAWINGS FOR EQUIPMENT LOCATIONS AND PIPE ROUTING.
2. ALL SIGNAL AND POWER WIRING SHALL BE IN CONDUIT.
3. COORDINATE GAS SENSOR LOCATIONS WITH OWNER'S INSTALLED EQUIPMENT.
4. FINAL TERMINATION OF COAXIAL TUBING AT EQUIPMENT SHALL BE COORDINATED WITH OWNER UPON TOOL MOVE-IN.

SPECIALTY GAS DIAGRAM

NTS (3)

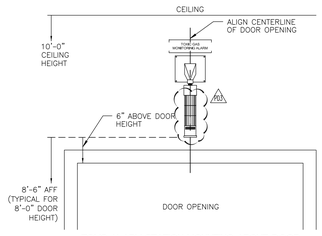


NOTES:

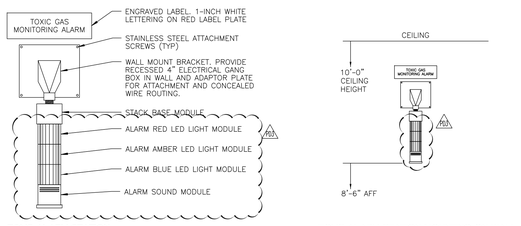
1. SEE FLOOR PLAN DRAWINGS FOR EQUIPMENT AND COMPONENT LOCATIONS.
2. ALL SIGNAL AND POWER WIRING SHALL BE IN DEDICATED CONDUIT WITH UNIQUE COLOR AND LABELING.
3. COORDINATE POWER AND FIRE ALARM INTERFACE WITH DIVISION 26.

TGMS ALARM SYSTEM

NTS (4)



TGMS ALARM STATION MOUNTING ABOVE DOOR

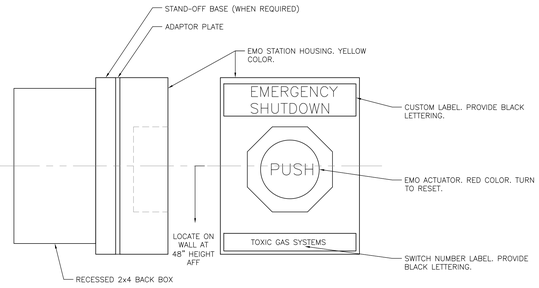


TGMS ALARM STATION

TGMS ALARM STATION MOUNTING ON WALL

TGMS ALARM BEACON/ HORN DETAIL

NTS (5)



NOTES:

1. SEE FLOOR PLAN DRAWINGS FOR ESS LOCATIONS.
2. ALL SIGNAL AND POWER WIRING SHALL BE IN CONDUIT.
3. WIRE ALL EMO SWITCH UNITS IN SERIES TO PROGRAM SHUTDOWN OF ALL HAZARDOUS PRODUCTION MATERIAL (HPM) GAS AUTOMATIC SHUTDOWN CONTROLLERS WITH ACTIVATION OF ANY EMO SWITCH.

TGMS EMERGENCY MANUAL OFF (EMO) SWITCH

NTS (6)

(7) (8) (9)

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For Research Facilities Design

By Paul Lemestre

Name Paul Lemestre

Date 02-24-2012 Reg. No. 46527

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Bid Package No. 2	02-24-2012

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CLEANROOM
GAS DELIVERY AND TGMS DETAILS

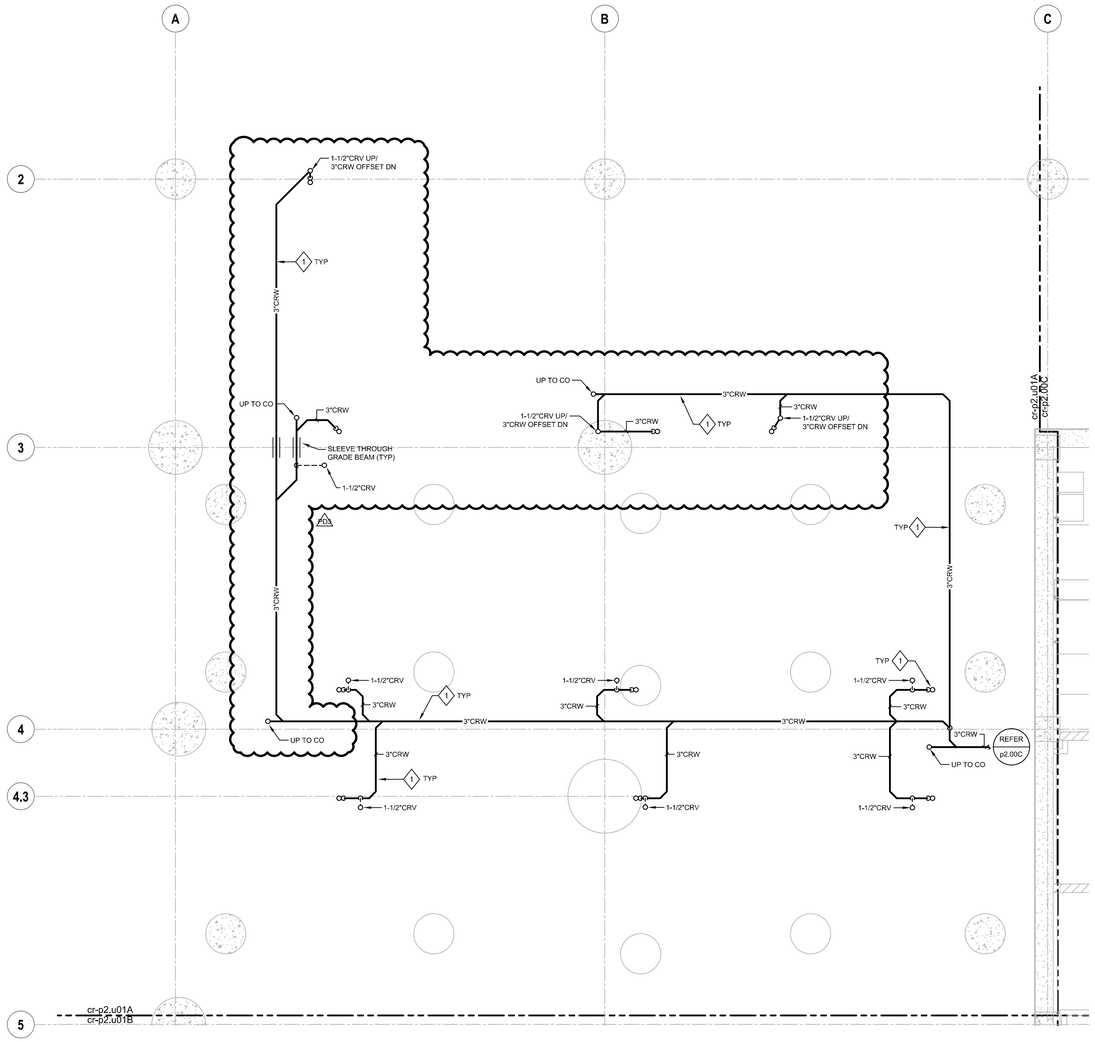
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GENERAL NOTES

1. ALL INVERT ELEVATIONS ARE BASED ON FFE = 844'-0". REFER TO SHEET s2.01 FOR SLAB THICKNESS.

SHEET KEYNOTES

1 HANG PIPING PER DETAIL 3 ON SHEET cr-p8.01.



1 **UNDERFLOOR - ZONE A**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

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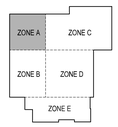
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CLEANROOM PIPING
UNDERFLOOR - ZONE A

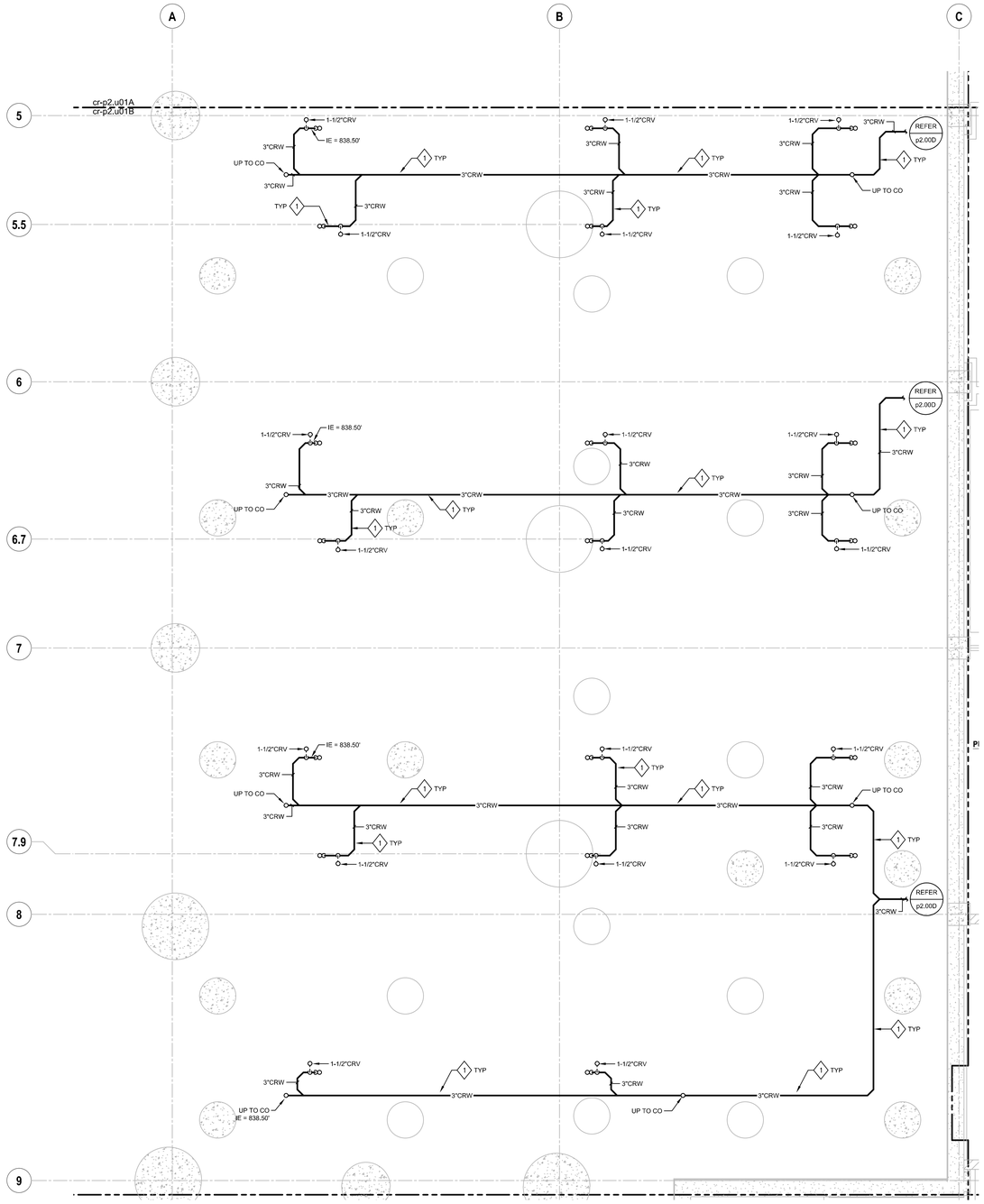
cr-p2.u01A

GENERAL NOTES

1. ALL INVERT ELEVATIONS ARE BASED ON F/E = 844'-0". REFER TO SHEET s2.01 FOR SLAB THICKNESS.

SHEET KEYNOTES

1 HANG PIPING PER DETAIL 3 ON SHEET cr-p8.01.



1 **UNDERFLOOR - ZONE B**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

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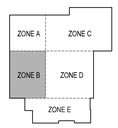
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Project

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CLEANROOM PIPING
UNDERFLOOR - ZONE B

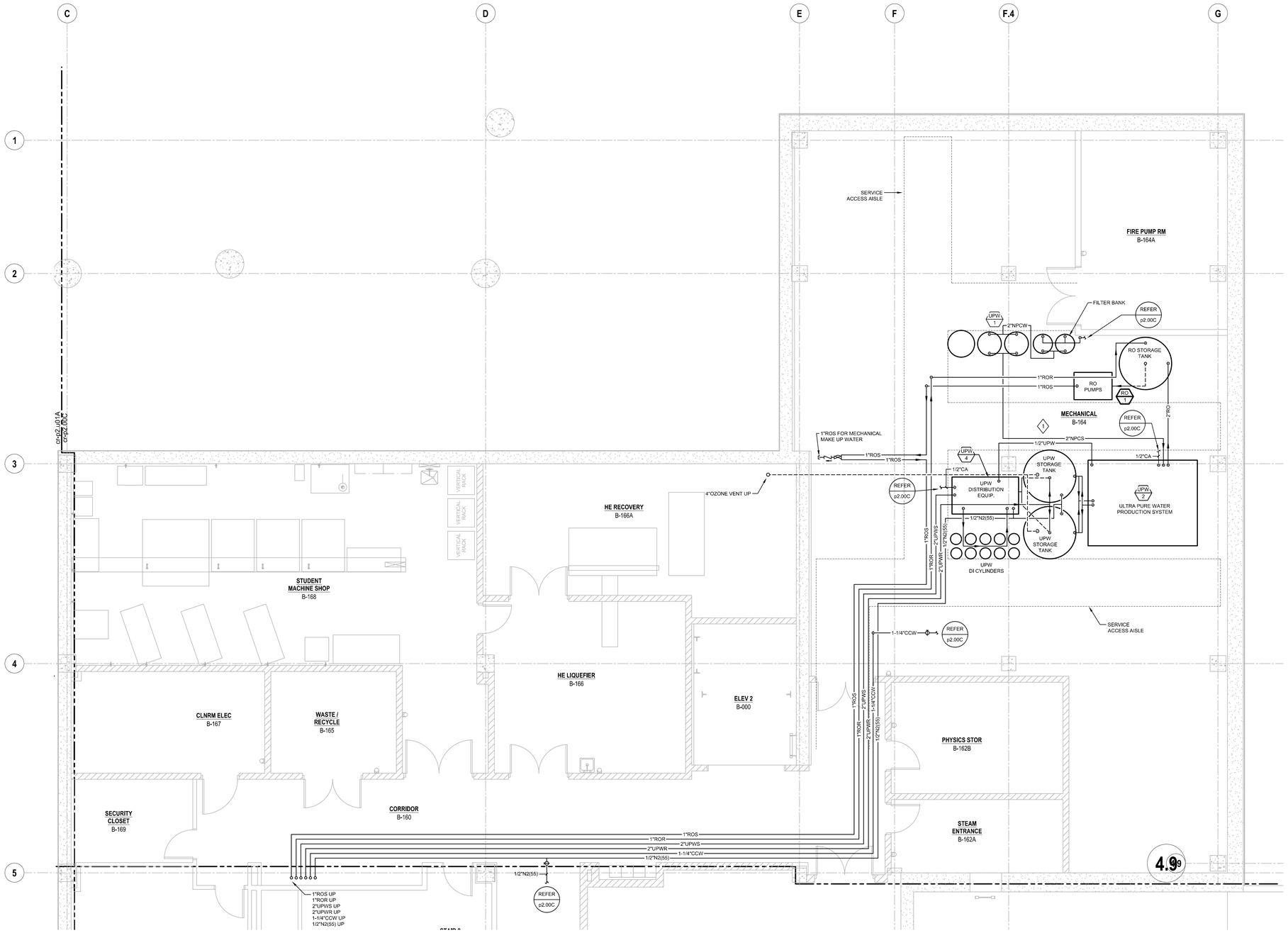
cr-p2.u01B

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, BALANCING VALVES ARE SET AT 0.5 GPM

SHEET KEYNOTES

1 HOUSEKEEPING PADS FOR RO & UPW EQUIPMENT SHALL BE DETERMINED AFTER APPROVAL OF SHOP DRAWINGS & INSTALLED BY MECHANICAL CONTRACTOR.



1 **BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

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Date 02-24-2012 Reg. No. 25384

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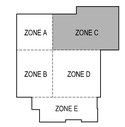
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CLEANROOM PIPING
BASEMENT - ZONE C

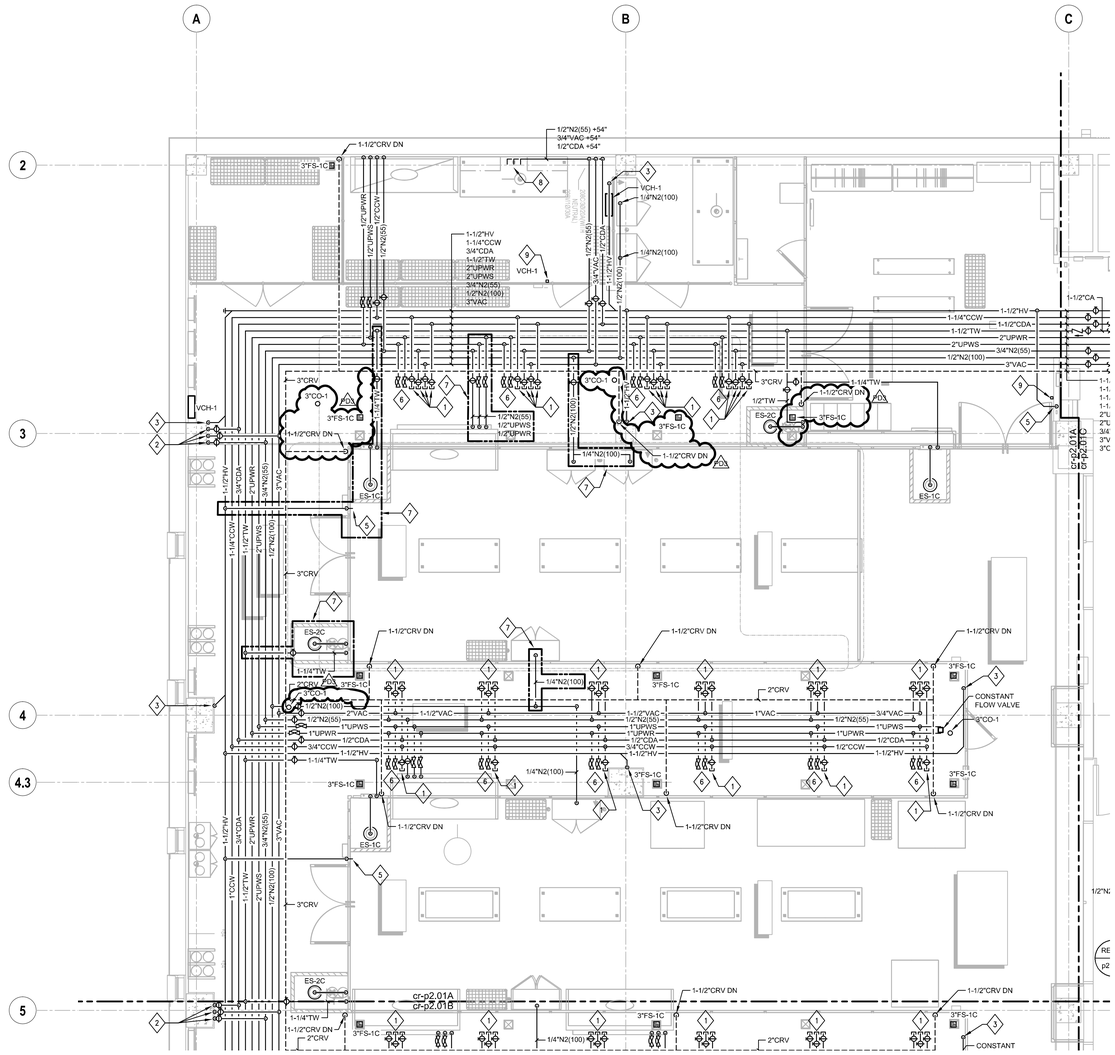
cr-p2.00C

GENERAL NOTES

1. INSTALL UPWS PIPING AS PER SECTION 226714.15CR AND FLOW DIAGRAMS.

SHEET KEYNOTES

1. CAP UTILITIES FOR FUTURE CLEAN-ROOM TOOL CONNECTIONS AT EDGE OF PIPE RACK.
2. TERMINATE N2, VAC, AND CDA PIPING WITH BALL VALVES AT 54"AFF. BALL VALVES TO HAVE MALE NPT OUTLET WITH SCREW CAP CHAINED TO VALVE.
3. TERMINATE 1-1/2"HV WITH VCV-1 AT 18" AFF.
4. NOT USED
5. TERMINATE 1-1/2"HV WITH VCV-2 AT 18" AFF.
6. DIAPHRAGM VALVES TO BE DIRECTLY INSTALLED IN UPWS PIPING LOOP AS SHOWN ON DRAWING cr-p5.08. BRANCH TAKE-OFF PIPING SHALL BE DOWNSTEAM OF DIAPHRAGM VALVE AND SUPPLIED BY OWNER.
7. PIPING WITHIN BOUNDARY IS PART OF ALTERNATE CLEAN BAY #1.
8. TERMINATE CDA, VAC, AND N2 PIPING AT 54"AFF. BELOW WALL SHELVING AND ABOVE ELECTRICAL RACEWAY.
9. HOUSEKEEPING VACUUM CONTROL SWITCH.



1 **LEVEL 1 - ZONE A**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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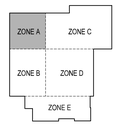
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CLEANROOM PIPING
LEVEL 1 - ZONE A

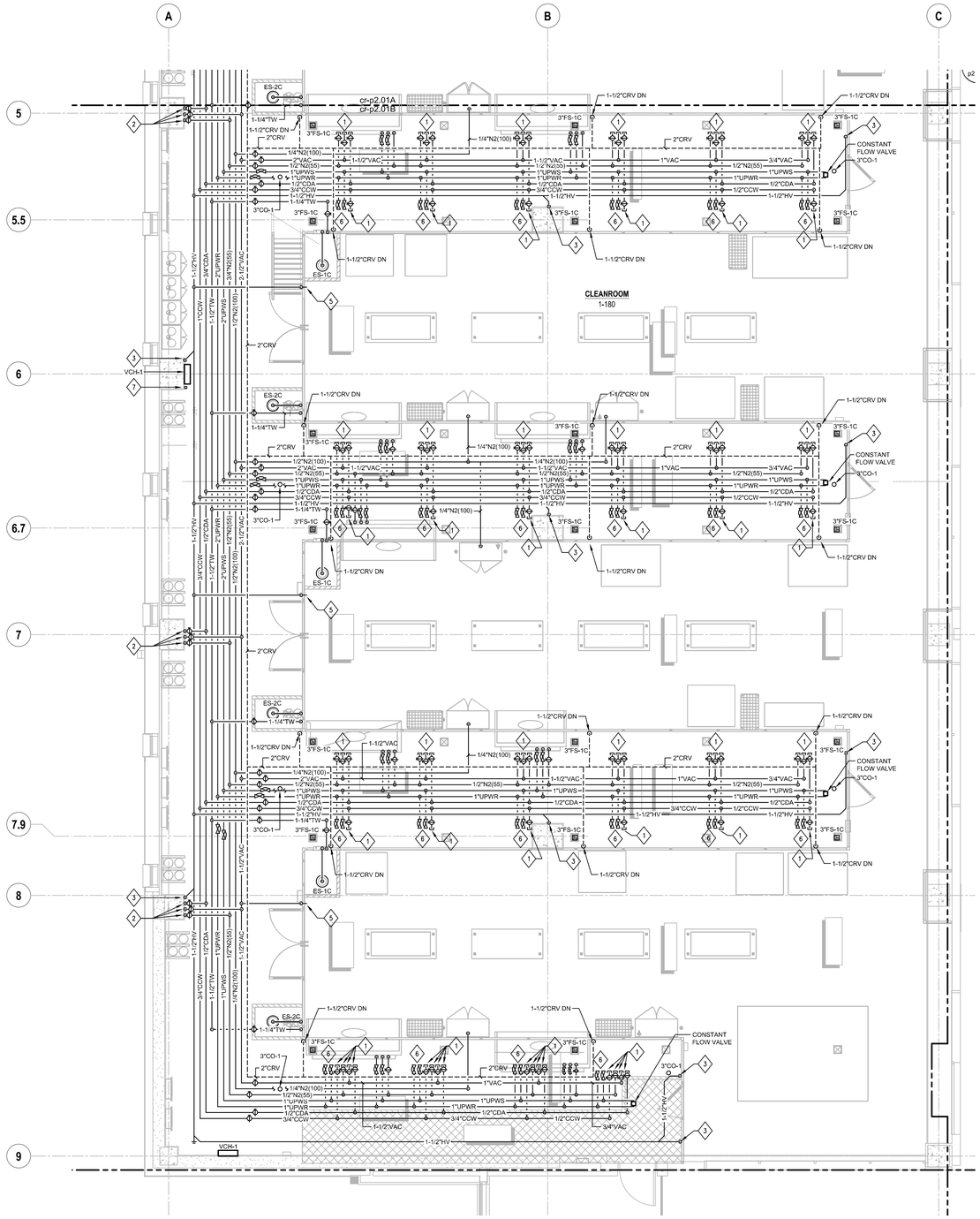
cr-p2.01A

GENERAL NOTES

1. INSTALL UPWS PIPING AS PER SECTION 226714.15CR AND FLOW DIAGRAMS.

SHEET KEYNOTES

1. CAP UTILITIES FOR FUTURE CLEAN-ROOM TOOL CONNECTIONS AT EDGE OF PIPE RACK.
2. TERMINATE N2, VAC, AND CDA PIPING WITH BALL VALVES AT 54"AFF. BALL VALVES TO HAVE MALE NPT OUTLET WITH SCREW CAP CHAINED TO VALVE.
3. TERMINATE 1-1/2"HV WITH VCV-1 AT 18" AFF.
4. NOT USED.
5. TERMINATE 1-1/2"HV WITH VCV-2 AT 18" AFF.
6. DIAPHRAGM VALVES TO BE DIRECTLY INSTALLED IN UPWS PIPING LOOP PER DRAWING cr-p5.08. BRANCH TAKE-OFF PIPING SHALL BE DOWNSTEAM OF DIAPHRAGM VALVE AND SUPPLIED BY OWNER.
7. HOUSEKEEPING VACUUM CONTROL SWITCH.



1 **LEVEL 1 - ZONE B**
SCALE: 1/4" = 1'-0"

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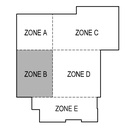
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CLEANROOM PIPING
LEVEL 1 - ZONE B

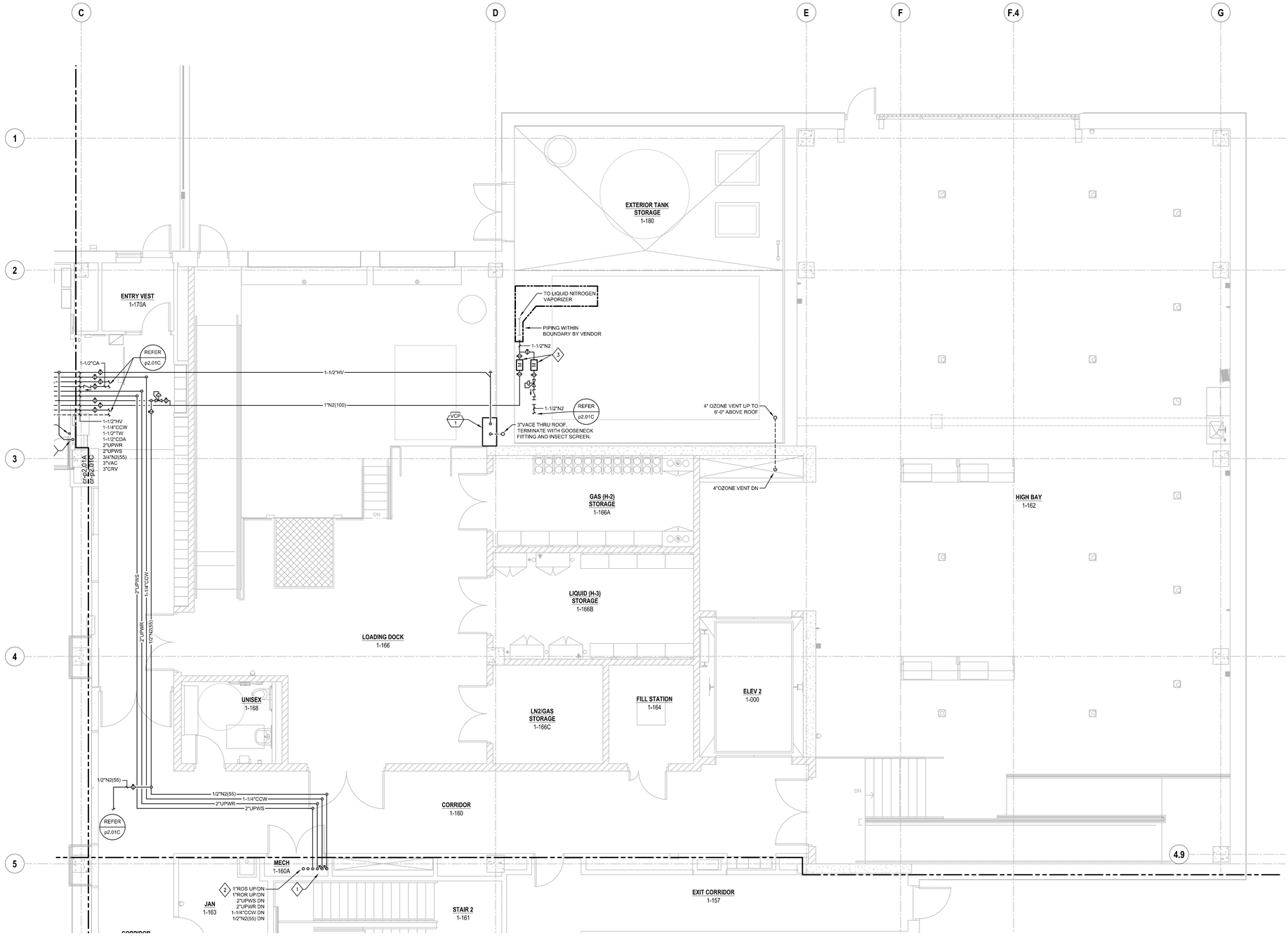
cr-p2.01B

GENERAL NOTES

1. UNLESS OTHERWISE NOTED, BALANCING VALVES ARE SET AT 0.5 GPM

SHEET KEYNOTES

1. VALVES SHALL BE PROVIDED OFF THE RISER AT 42" AFF.
2. ROUTE ROS AND ROR PIPING IN CHASE UP TO PENTHOUSE. REFER TO cr-p2.05C FOR CONTINUATION OF PIPING INTO PENTHOUSE.
3. CONNECT N2 METERS TO CLEANROOM CONTROL SYSTEM FOR MEASUREMENT & TOTALIZATION OF USAGE .



1 **LEVEL 1 - ZONE C**
SCALE: 1/4" = 1'-0"

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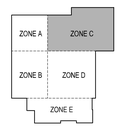
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Project

Physics and Nanotechnology Building

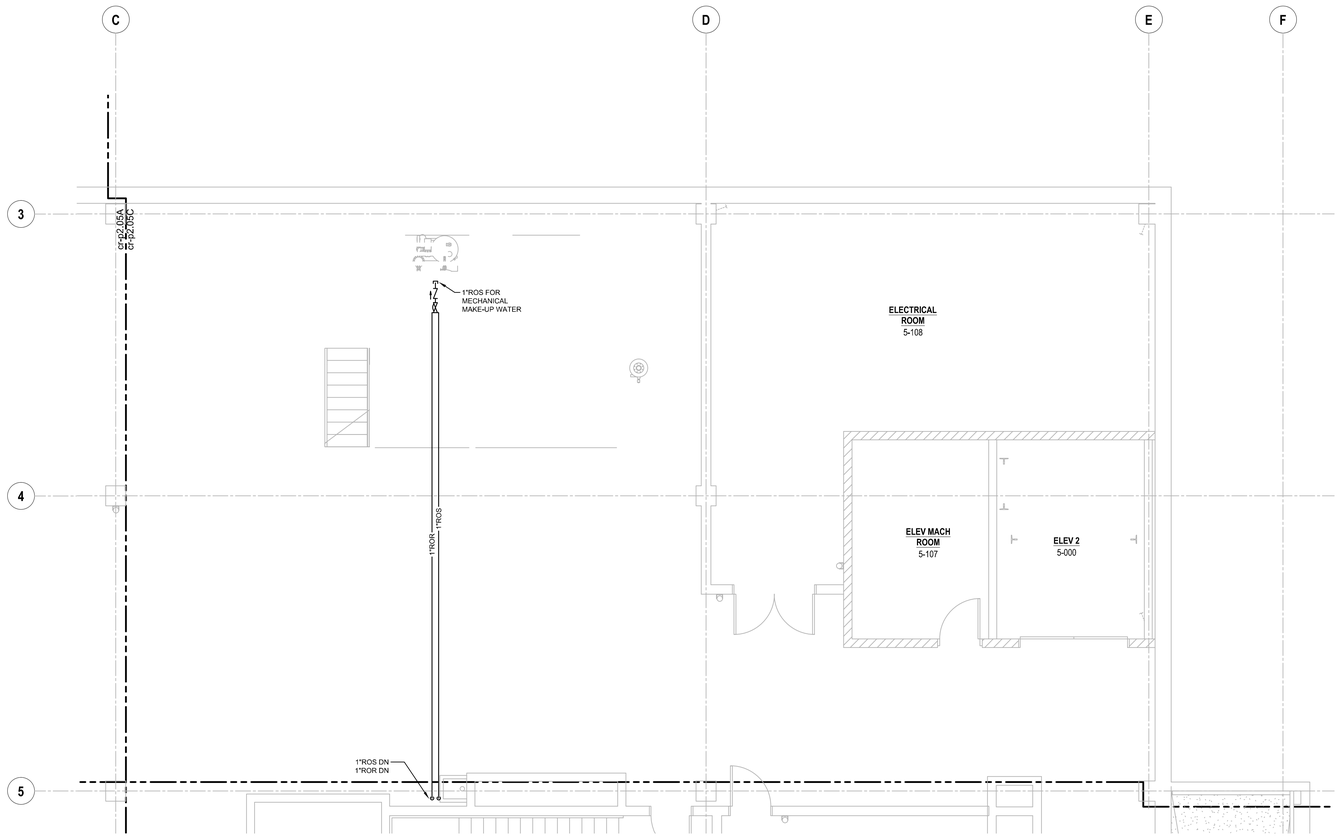
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CLEANROOM PIPING
LEVEL 1 - ZONE C

cr-p2.01C



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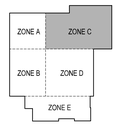
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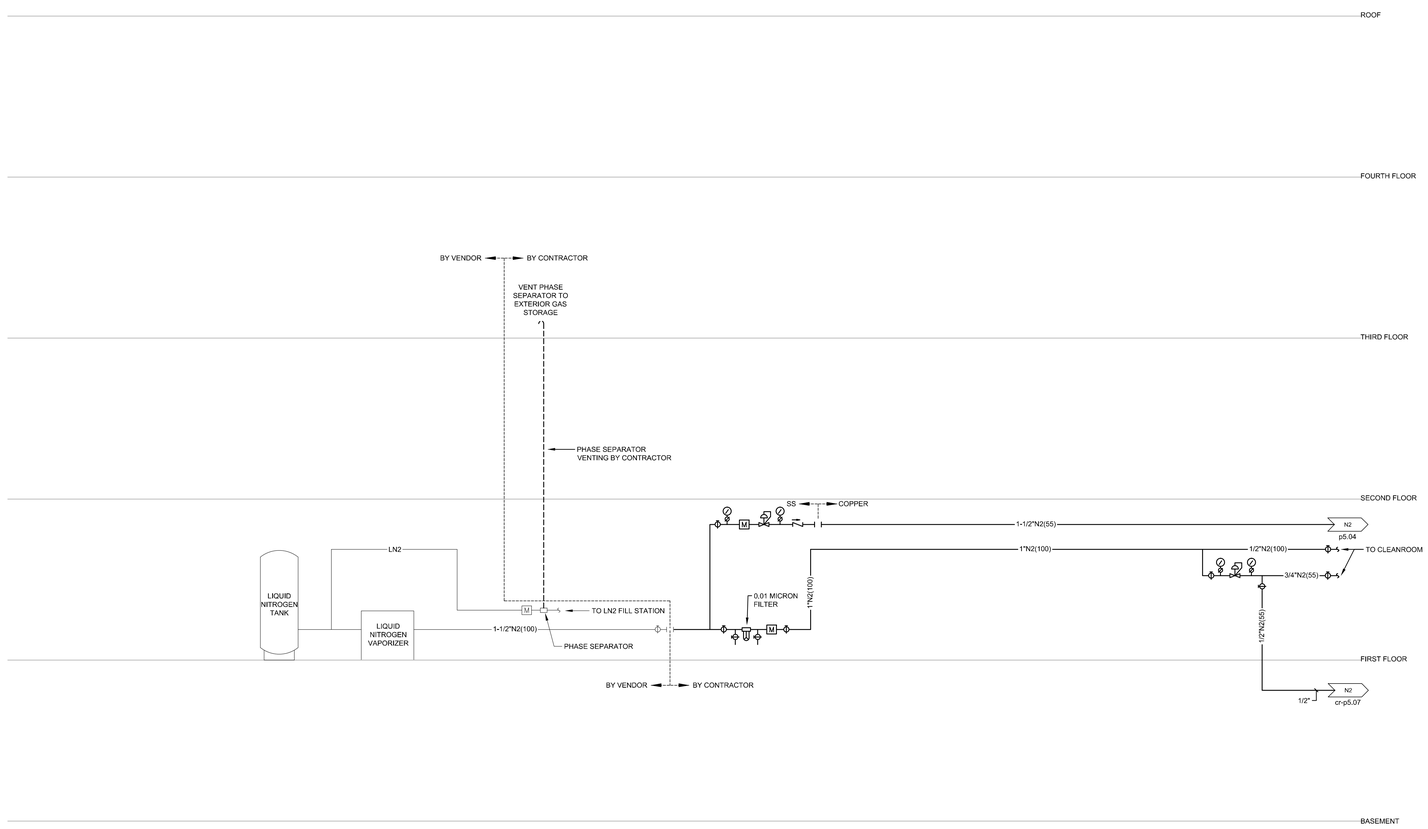
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CLEANROOM PIPING
PENTHOUSE - ZONE C

cr-p2.05C

GENERAL NOTES

1. DRAWING IS INTENDED TO BE DIAGRAMATIC. REFER TO FLOOR PLANS FOR ACTUAL PIPING AND EQUIPMENT LOCATIONS.



1 CLEANROOM NITROGEN SYSTEM FLOW DIAGRAM
SCALE: NONE

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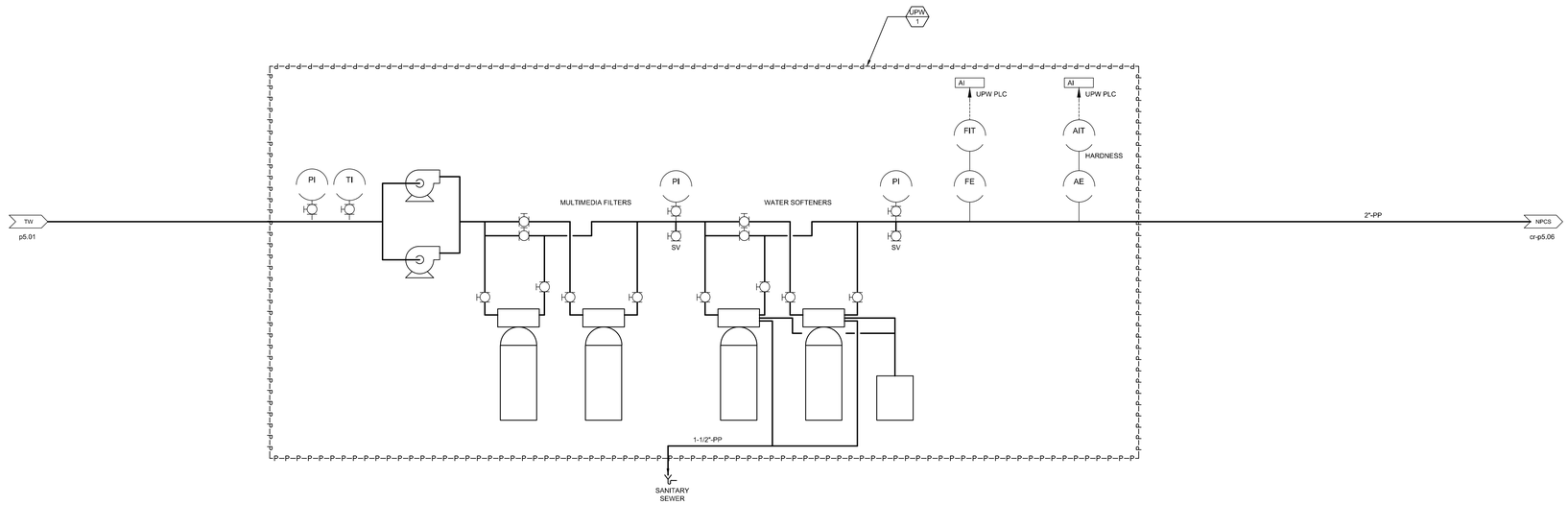
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CLEANROOM NITROGEN SYSTEM FLOW DIAGRAM

cr-p5.04



1 **CLEANROOM ULTRA PURE WATER PRETREATMENT FLOW DIAGRAM**
SCALE: NONE

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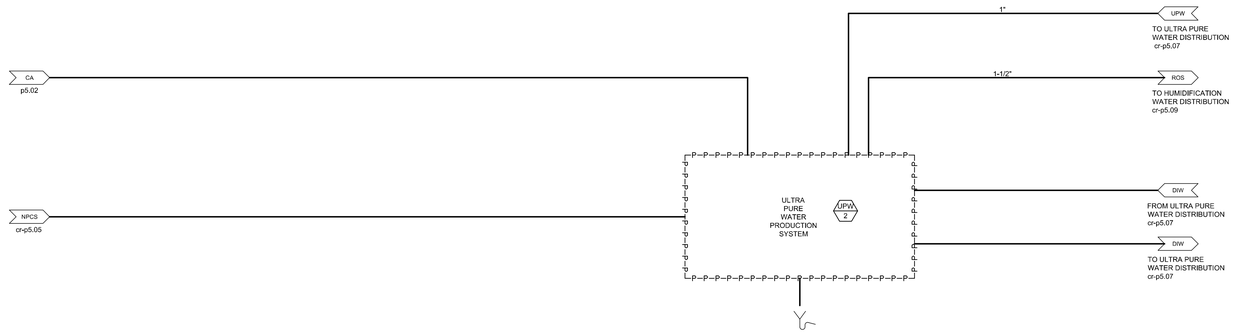
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CLEANROOM
ULTRA PURE WATER
PRETREATMENT FLOW DIAGRAM

cr-p5.05



1 **CLEANROOM ULTRA PURE WATER PRODUCTION SYSTEM FLOW DIAGRAM**
SCALE: NONE

GENERAL NOTES

1. REFER TO SECTION 226720.15CR.

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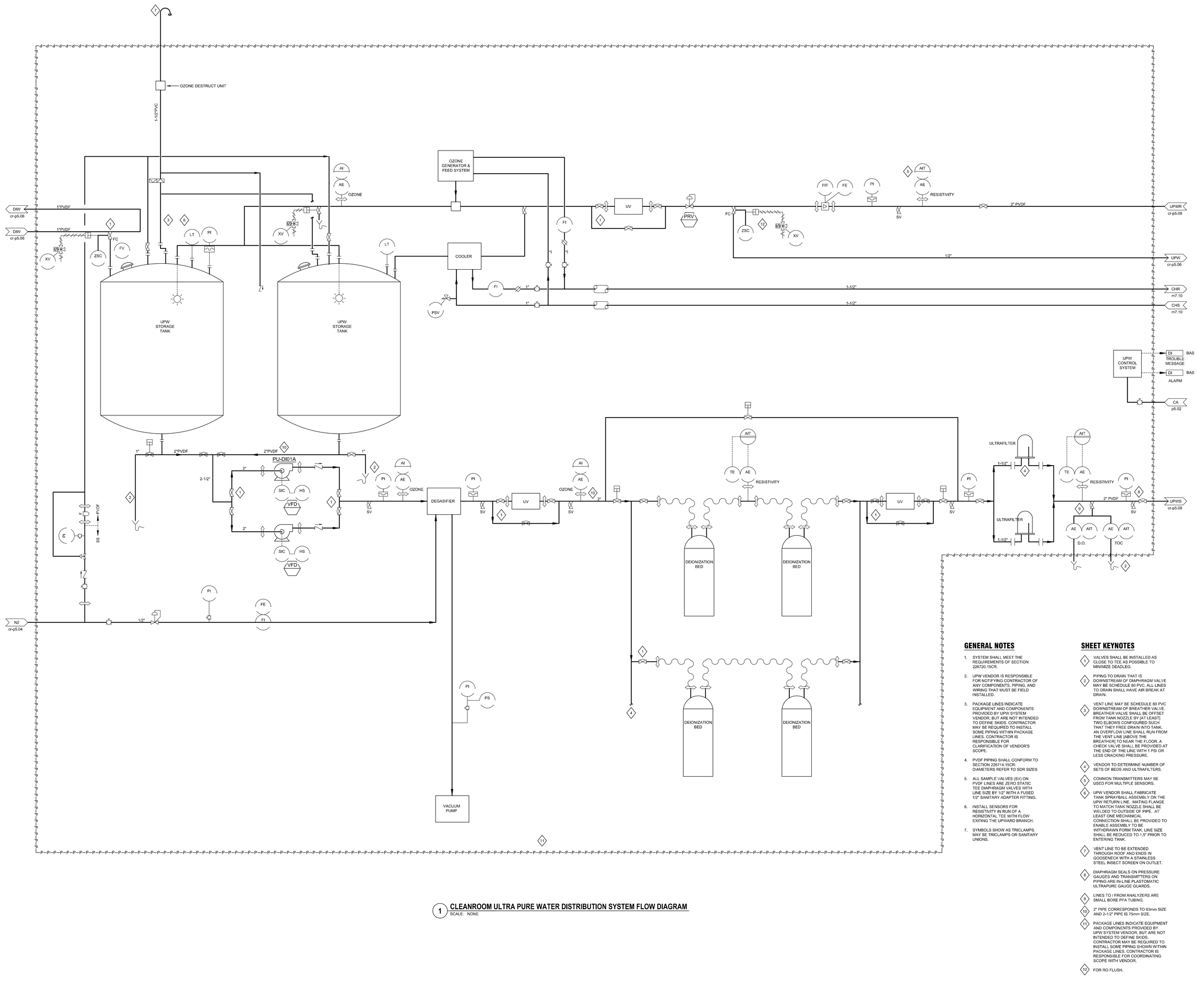
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CLEANROOM
ULTRA PURE WATER PRODUCTION
FLOW DIAGRAM

cr-p5.06



1 **CLEANROOM ULTRA PURE WATER DISTRIBUTION SYSTEM FLOW DIAGRAM**
SCALE: NONE

GENERAL NOTES

1. SYSTEM SHALL MEET THE REQUIREMENTS OF SECTION 226720.15CR.
2. UPW VENDOR IS RESPONSIBLE FOR NOTIFYING CONTRACTOR OF ANY COMPONENTS, PIPING, AND WIRING THAT MUST BE FIELD INSTALLED.
3. PACKAGE LINES INDICATE EQUIPMENT AND COMPONENTS PROVIDED BY UPW SYSTEM VENDOR, BUT ARE NOT INTENDED TO DEFINE SKIDS. CONTRACTOR MAY BE REQUIRED TO INSTALL SOME PIPING WITHIN PACKAGE LINES. CONTRACTOR IS RESPONSIBLE FOR CLARIFICATION OF VENDOR'S SCOPE.
4. PVDF PIPING SHALL CONFORM TO SECTION 226714.15CR: DIAMETERS REFER TO SDR SIZES
5. ALL SAMPLE VALVES (SV) ON PVDF LINES ARE ZERO STATIC TEE DIAPHRAGM VALVES WITH LINE SIZE BY 1/2" WITH A FUSED 1/2" SANITARY ADAPTER FITTING.
6. INSTALL SENSORS FOR RESISTIVITY IN RUN OF A HORIZONTAL TEE WITH FLOW EXITING THE UPWARD BRANCH.
7. SYMBOLS SHOW AS TRICLAMPS. MAY BE TRICLAMPS OR SANITARY UNIONS.

SHEET KEYNOTES

1. VALVES SHALL BE INSTALLED AS CLOSE TO TEE AS POSSIBLE TO MINIMIZE DEADLEG.
2. PIPING TO DRAIN THAT IS DOWNSTREAM OF DIAPHRAGM VALVE MAY BE SCHEDULE 80 PVC. ALL LINES TO DRAIN SHALL HAVE AIR BREAK AT DRAIN.
3. VENT LINE MAY BE SCHEDULE 80 PVC DOWNSTREAM OF BREATHER VALVE. BREATHER VALVE SHALL BE OFFSET FROM TANK NOZZLE BY [AT LEAST] TWO ELBOWS CONFIGURED SUCH THAT THEY FREE DRAIN INTO TANK. AN OVERFLOW LINE SHALL RUN FROM THE VENT LINE [ABOVE THE BREATHER] TO NEAR THE FLOOR. A CHECK VALVE SHALL BE PROVIDED AT THE END OF THE LINE WITH 1 PSI OR LESS CRACKING PRESSURE.
4. VENDOR TO DETERMINE NUMBER OF SETS OF BEDS AND ULTRAFILTERS.
5. COMMON TRANSMITTERS MAY BE USED FOR MULTIPLE SENSORS.
6. UPW VENDOR SHALL FABRICATE TANK SPRAYBALL ASSEMBLY ON THE UPW RETURN LINE. MATING FLANGE TO MATCH TANK NOZZLE SHALL BE WELDED TO OUTSIDE OF PIPE. AT LEAST ONE MECHANICAL CONNECTION SHALL BE PROVIDED TO ENABLE ASSEMBLY TO BE WITHDRAWN FORM TANK, LINE SIZE SHALL BE REDUCED TO 1.5" PRIOR TO ENTERING TANK.
7. VENT LINE TO BE EXTENDED THROUGH ROOF AND ENDS IN GOOSENECK WITH A STAINLESS STEEL INSECT SCREEN ON OUTLET.
8. DIAPHRAGM SEALS ON PRESSURE GAUGES AND TRANSMITTERS ON PIPING ARE IN-LINE PLASTOMATIC ULTRAPURE GAUGE GUARDS.
9. LINES TO / FROM ANALYZERS ARE SMALL BORE PFA TUBING.
10. 2" PIPE CORRESPONDS TO 63mm SIZE AND 2-1/2" PIPE IS 75mm SIZE.
11. PACKAGE LINES INDICATE EQUIPMENT AND COMPONENTS PROVIDED BY UPW SYSTEM VENDOR, BUT ARE NOT INTENDED TO DEFINE SKIDS. CONTRACTOR MAY BE REQUIRED TO INSTALL SOME PIPING SHOWN WITHIN PACKAGE LINES. CONTRACTOR IS RESPONSIBLE FOR COORDINATING SCOPE WITH VENDOR.
12. FOR RO FLUSH.

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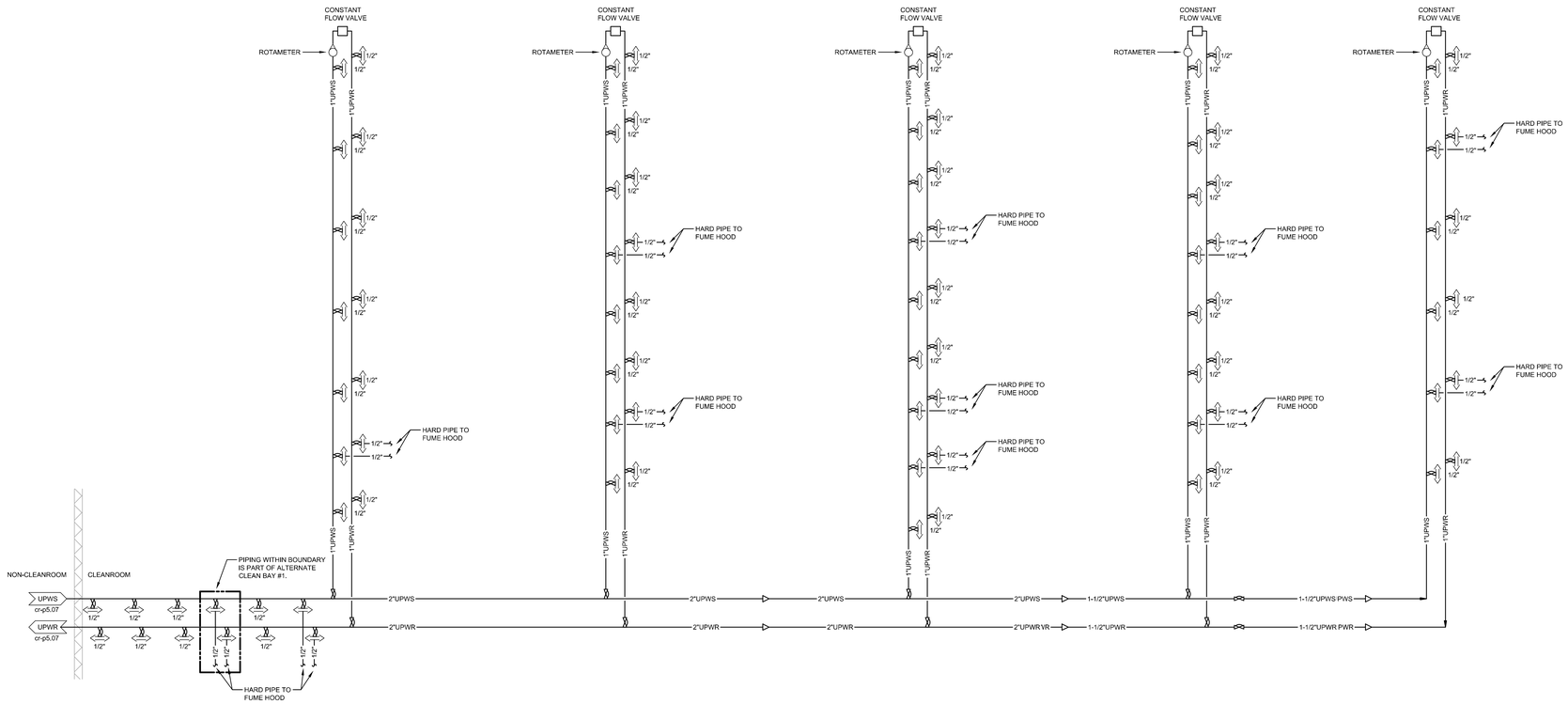
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CLEANROOM
ULTRA PURE WATER DISTRIBUTION
SYSTEM FLOW DIAGRAM

cr-p5.07

GENERAL NOTES

1. ALL ITEMS ON THIS DRAWING SHALL BE PROVIDED BY CONTRACTOR. PIPING IS PVDF PER SECTION 226714.15CR: DIAMETERS REFER TO SDR SIZES.
2. PIPING SHALL BE CONTINUOUSLY SUPPORTED BY STAINLESS STEEL "V" CHANNEL.
3. PIPE ROUTING IS SHOWN ON CLEANROOM PIPING DRAWINGS.



1 **CLEANROOM ULTRA PURE WATER DISTRIBUTION PIPING FLOW DIAGRAM**
SCALE: NONE

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROE

Date 02-24-2012 Reg. No. 25384

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Bid Package No. 2	02-24-2012

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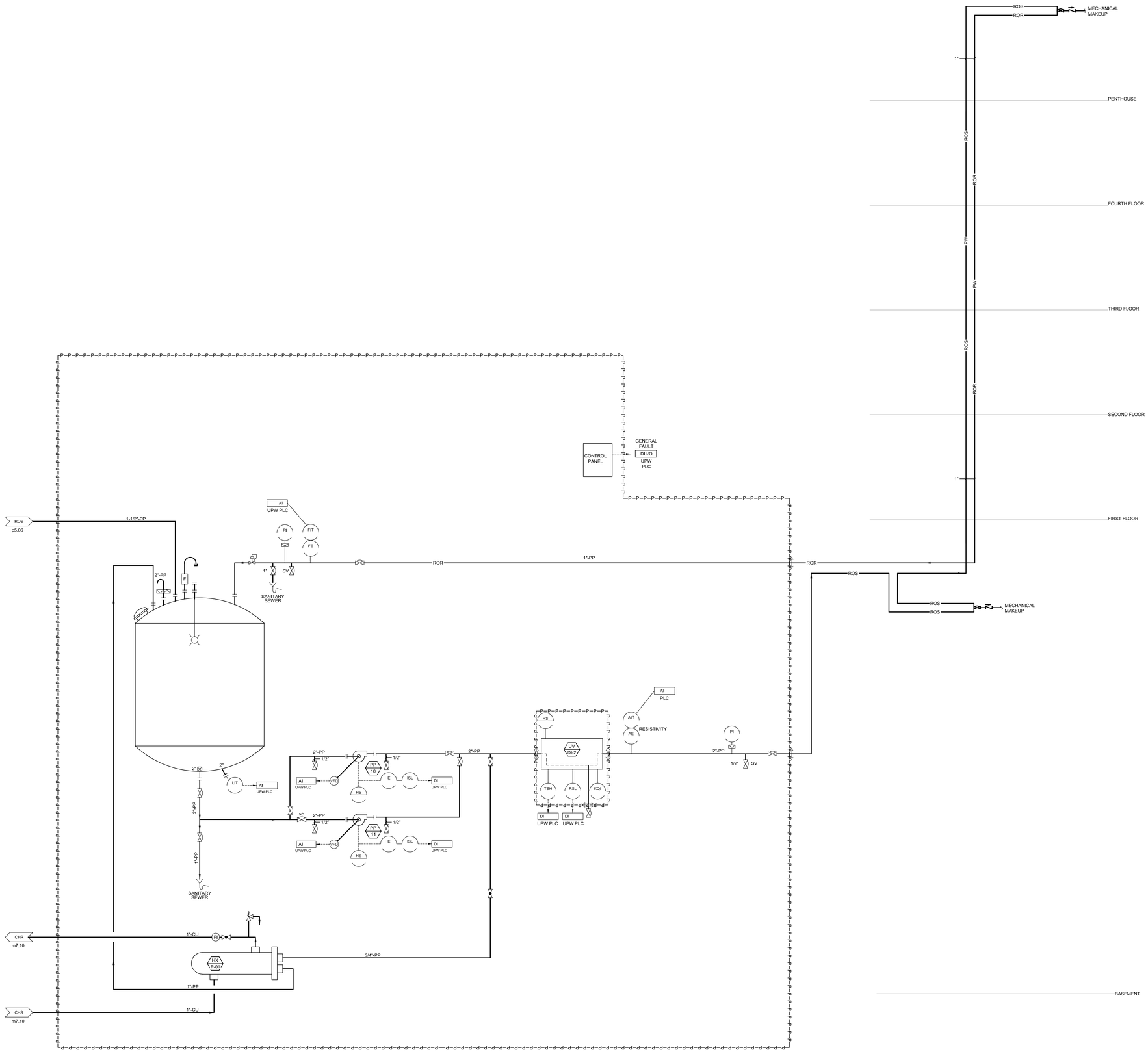
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CLEANROOM
ULTRA PURE WATER DISTRIBUTION
PIPING FLOW DIAGRAM

cr-p5.08



1 **CLEANROOM RO HUMIDIFICATION WATER DISTRIBUTION FLOW DIAGRAM**
SCALE: NONE

GENERAL NOTES

1. SYSTEM SHALL MEET THE REQUIREMENTS OF SECTION 226720.13CR.
2. UPW VENDOR IS RESPONSIBLE FOR NOTIFYING CONTRACTOR OF ANY COMPONENTS, PIPING, AND WIRING THAT MUST BE FIELD INSTALLED.
3. PACKAGE LINES INDICATE EQUIPMENT AND COMPONENTS PROVIDED BY UPW SYSTEM VENDOR, BUT ARE NOT INTENDED TO DEFINE SKIDS. CONTRACTOR MAY BE REQUIRED TO INSTALL SOME PIPING WITHIN PACKAGE LINES. CONTRACTOR IS RESPONSIBLE FOR CLARIFICATION OF VENDOR'S SCOPE.
4. ALL SAMPLE VALVES (SV) ARE ZERO STATIC TEE DIAPHRAGM VALVES WITH LINE SIZE BY 1/2" WITH A FUSED 1/2" SANITARY ADAPTER FITTING.
5. SYMBOLS SHOW AS TRICLAMPS. MAY BE TRICLAMPS OR SANITARY UNIONS.

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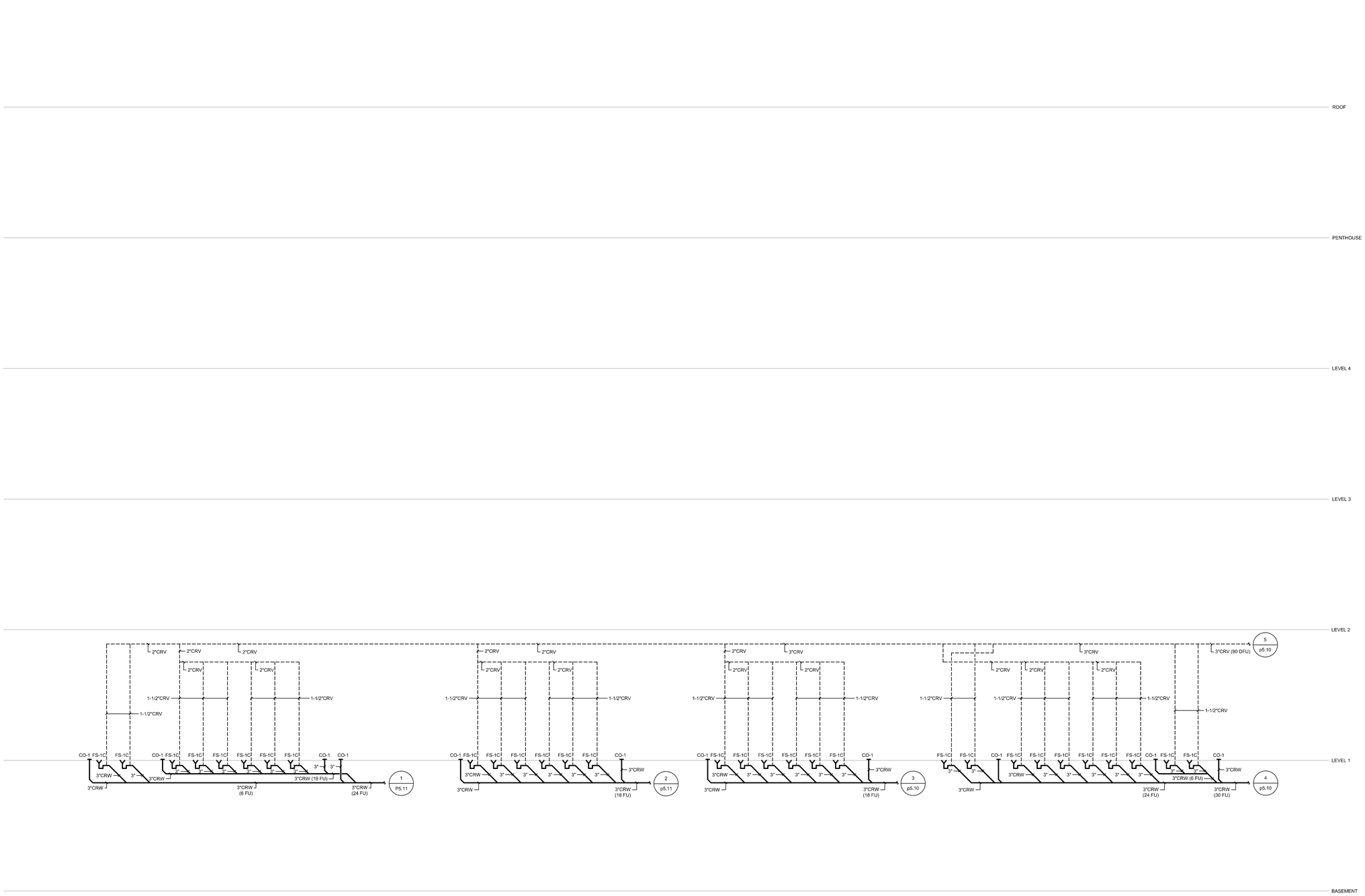
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CLEANROOM
RO HUMIDIFICATION WATER
DISTRIBUTION FLOW DIAGRAM

cr-p5.09



1 CLEANROOM CORROSION RESISTANT WASTE FLOW DIAGRAM
SCALE: NONE

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By

Name MICHAEL J. BROGE

Date 05-11-2012 Reg. No. 25364

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Project Directive No. 3	05-11-2012

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Date 04/05/12

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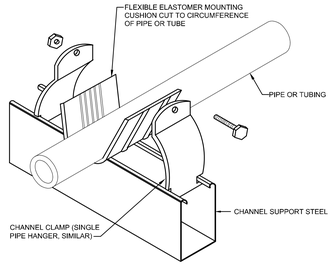
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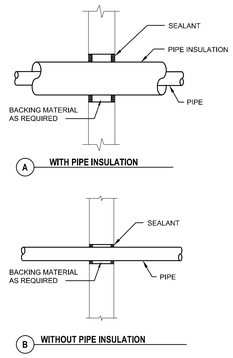
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CLEANROOM CORROSION RESISTANT WASTE FLOW DIAGRAM

cr-p5.10

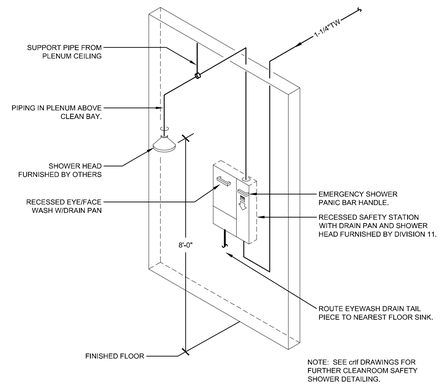


4 PIPE OR TUBING ISOLATION SUPPORT
SCALE: NOT TO SCALE

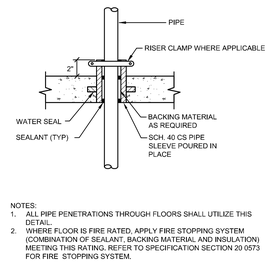


NOTE:
1. WHERE WALL IS FIRE RATED, APPLY FIRE STOPPING SYSTEM (COMBINATION OF SEALANT, BACKING MATERIAL AND INSULATION) MEETING THIS RATING. REFER TO SPECIFICATION SECTION 20 0573 FOR FIRE STOPPING SYSTEM.

1 PIPE THROUGH INTERIOR WALL
SCALE: NOT TO SCALE

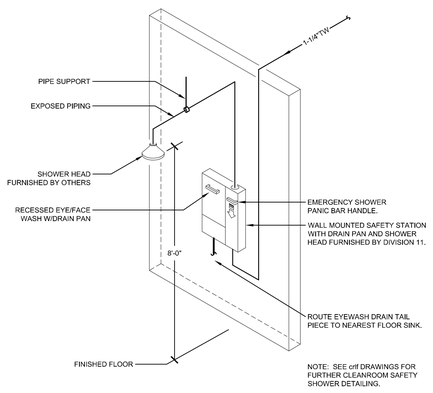


5 RECESSED EMERGENCY SHOWER/EYEWASH (ES-1C)
SCALE: NOT TO SCALE

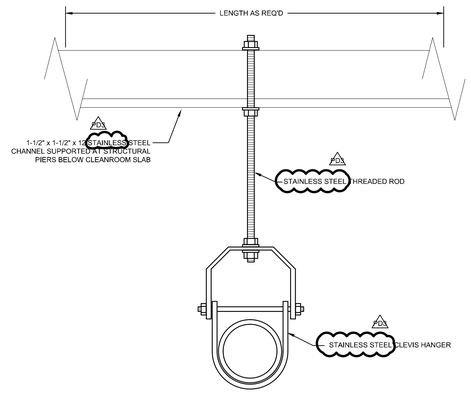


NOTES:
1. ALL PIPE PENETRATIONS THROUGH FLOORS SHALL UTILIZE THIS DETAIL.
2. WHERE FLOOR IS FIRE RATED, APPLY FIRE STOPPING SYSTEM (COMBINATION OF SEALANT, BACKING MATERIAL AND INSULATION) MEETING THIS RATING. REFER TO SPECIFICATION SECTION 20 0573 FOR FIRE STOPPING SYSTEM.

2 PIPE THROUGH FLOOR SLEEVE
SCALE: NOT TO SCALE (CAST IN PLACE WITHOUT PIPE INSULATION)



6 SURFACE MOUNTED EMERGENCY SHOWER/EYEWASH (ES-2C)
SCALE: NOT TO SCALE



3 PIPE HANGER - BELOW CLEANROOM SLAB
SCALE: NOT TO SCALE

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

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Checked LJH

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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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CLEANROOM DETAILS

cr-p8.01

DRAINS AND CLEANOUTS

NUMBER	BASIS OF DESIGN MANUFACTURER AND MODEL	DESCRIPTION
FS-1C	J.R. SMITH 3004-F-C-41	12"x12"x10" STAINLESS STEEL WITH SOLID GRATES. PROVIDE 1/2 GRATE FOR EACH DRAIN FOR FUTURE OWNER USE.
CO-1C	J.R. SMITH 4020 SERIES	POLYPROPYLENE, MEDIUM LOAD FLOOR CLEANOUT, STAINLESS STEEL COVER, WITHOUT FLASHING CLAMP.

ULTRA PURE WATER EQUIPMENT

TAG	EQUIPMENT NAME	REMARKS
UPW-1	ULTRA PURE WATER PRETREATMENT	SEE SPECIFICATION SECTION 22 6720.15CR
UPW-2	ULTRA PURE WATER PUMP SKID	SEE SPECIFICATION SECTION 22 6720.15CR
UPW-3	ULTRA PURE WATER SKID A	SEE SPECIFICATION SECTION 22 6720.15CR
UPW-4	ULTRA PURE WATER SKID B	SEE SPECIFICATION SECTION 22 6720.15CR
RO-1	RO HUMIDIFICATION WATER PUMP SKID	SEE SPECIFICATION SECTION 22 6720.13CR

HOUSEKEEPING VACUUM PUMP

NUMBER	SERVICE	LOCATION	TYPE	CAPACITY (SCFM)	SUCTION PRESSURE (" Hg)	TEMP INLET (°F)	BASIS OF DESIGN TUBE INLET (IN.)	TUBE OUTLET (IN.)	MOTOR HP	MOTOR RPM	MOTOR VOLT	MOTOR PH	REMARKS
VCP-1	HV	LOADING DOCK 1-166	DRY CLAW	220	7.8	70	4	4	10	3500	460	3	14.7 PSIA DISCHARGE PRESSURE

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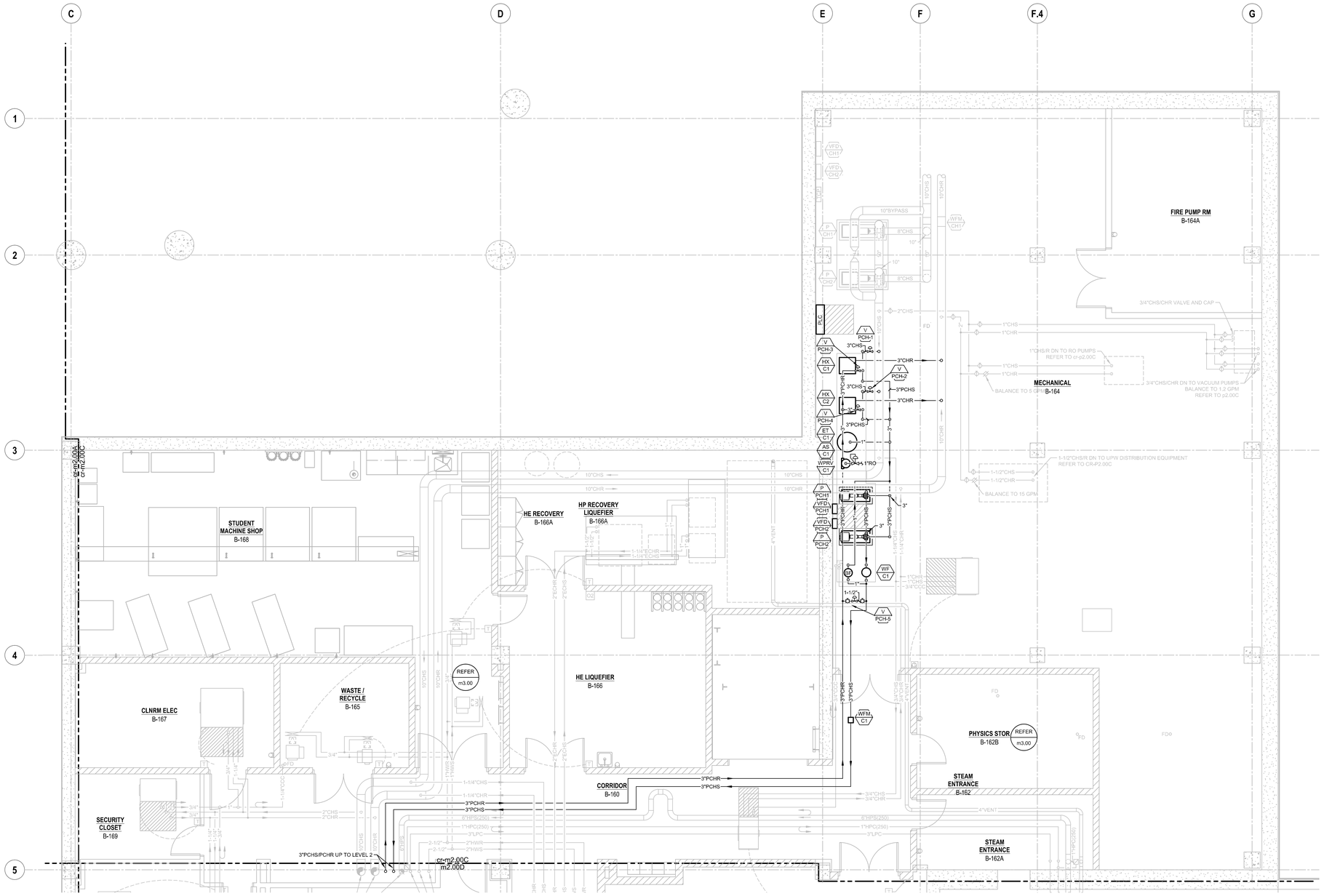
Physics and Nanotechnology Building

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CLEANROOM SCHEDULES

cr-p9.01



1 **BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

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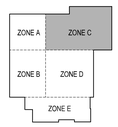
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Date	12/16/11

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Physics and Nanotechnology Building

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CLEANROOM MECHANICAL
BASEMENT - ZONE C

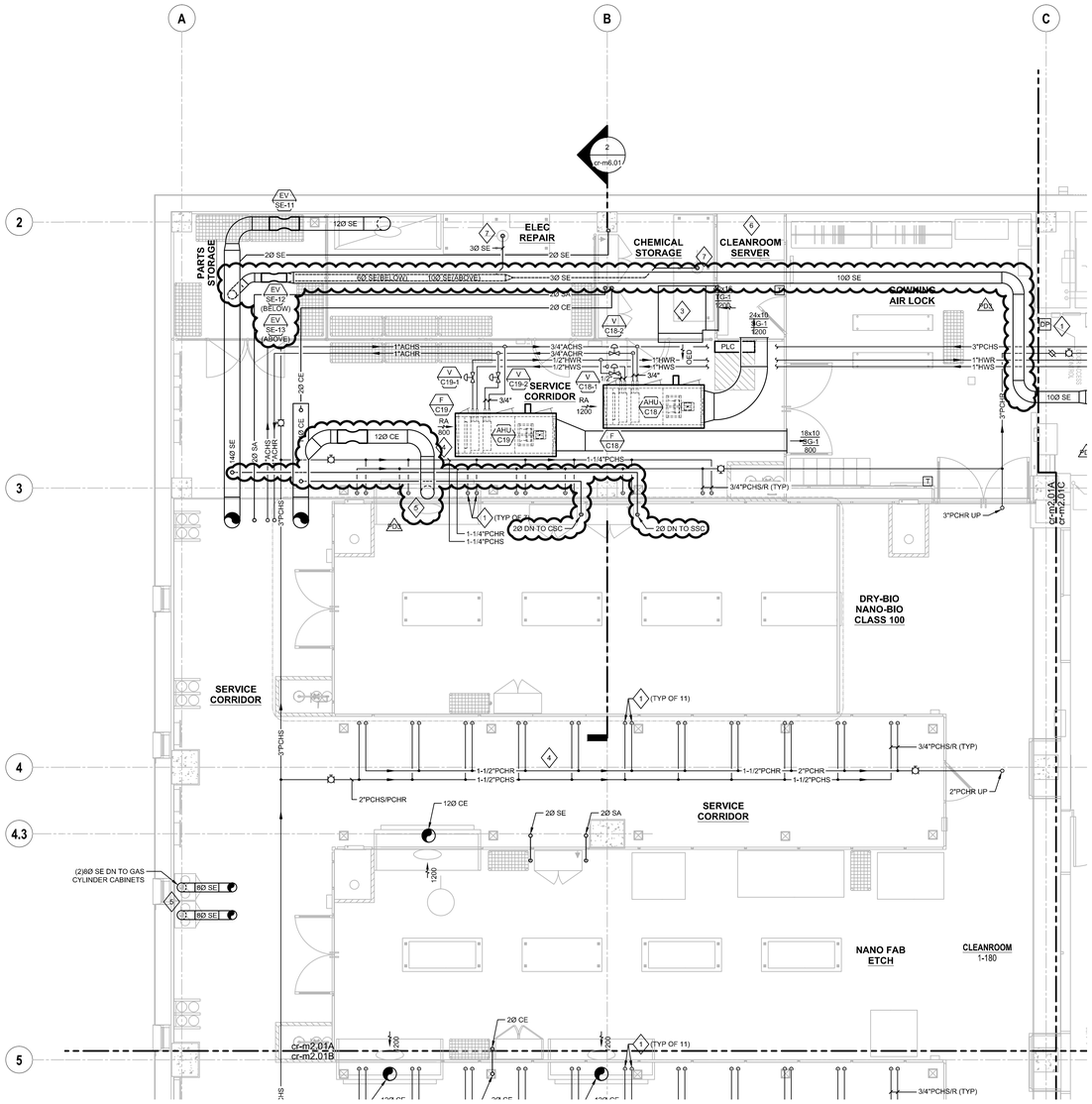
cr-m2.00C

GENERAL NOTES

1. PROVIDE MANUAL BALANCING DAMPER AT EACH DIFFUSER, GRILLE, AND BRANCH TAKEOFF IN ALL SPLY, RETURN, AND EXHAUST DUCTWORK. LOCATE BALANCING DAMPER AS CLOSE TO BRANCH TAKEOFF AS POSSIBLE.
2. DUCT SIZE TO DIFFUSERS, REGISTERS, AND GRILLES SHALL BE SAME AS NECK SIZE UNLESS NOTED OR DETAILED OTHERWISE.
3. INLET DUCT SIZE TO AIR TERMINAL DEVICES SHALL BE SAME AS INLET UNLESS OTHERWISE NOTED.

SHEET KEYNOTES

1. 3/4"PCHS & PCHR DOWN. LOCATE VALVE AND CAP IN HORIZONTAL AT 8'-0" AFF. REFER TO DETAIL 2/crf-5.00.
2. NOT USED.
3. TRANSFER DUCT IS NOT TO BE LINED.
4. PCHS & PCHR ARE TO BE LOCATED ON PIPE RACK. COORDINATE WITH PIPING. REFER TO DETAILS 5/crf-5.00 & 6/crf-5.00.
5. TRANSITION TO 6Ø AT GAS CABINET. (TYP OF 2)
6. LOCATE CLEANROOM CONTROL SERVER RACK IN CLEANROOM SERVER ROOM.
7. 3Ø DN TO SNORKEL, BALANCE TO 60 CFM.
8. CLEANROOM ALTERNATE BID NO. 1.



1 **LEVEL 1 - ZONE A**
SCALE: 1/4" = 1'-0"

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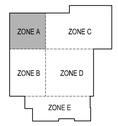
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Date	12/16/11

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Physics and Nanotechnology Building

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CLEANROOM MECHANICAL
LEVEL 1 - ZONE A

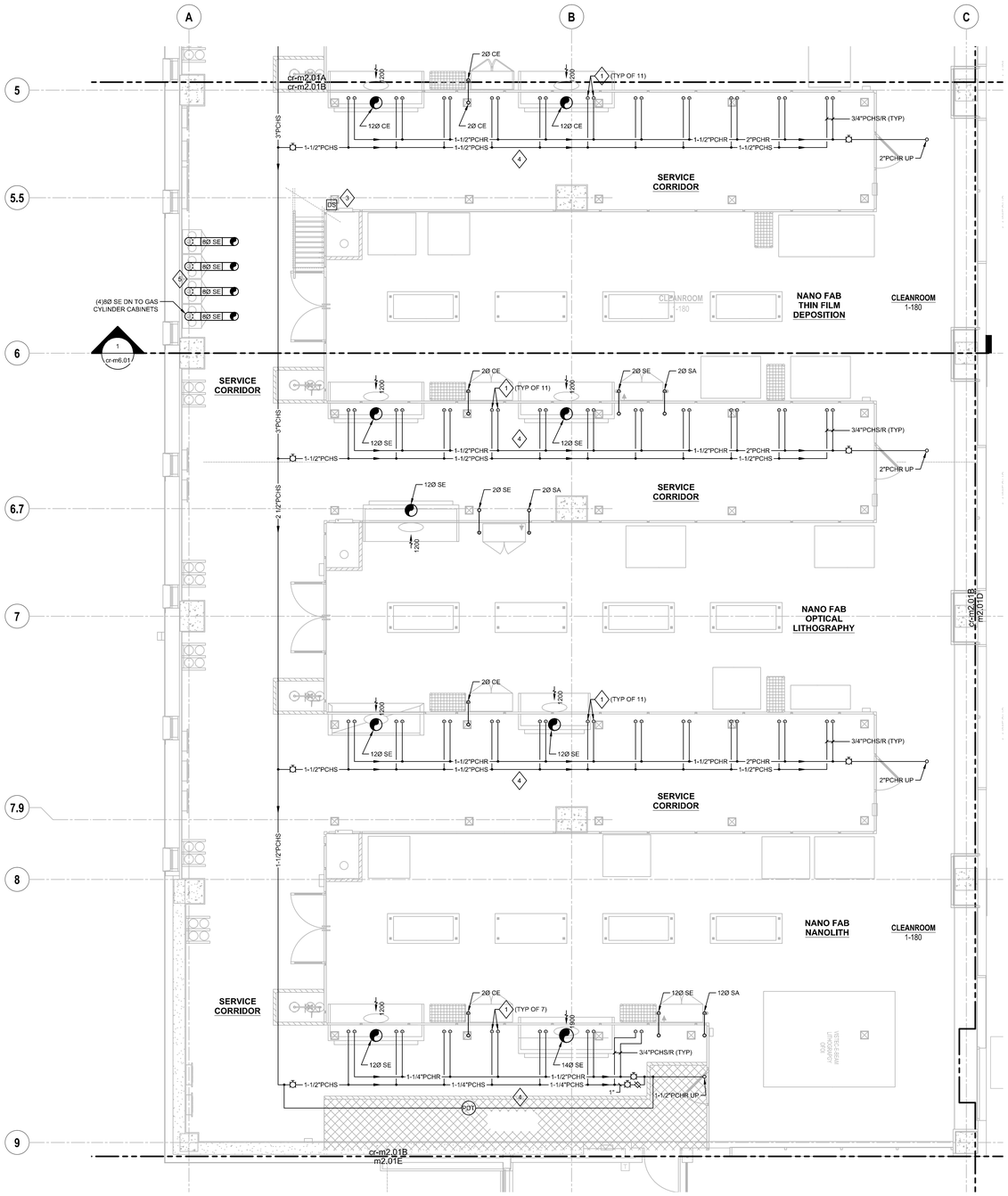
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GENERAL NOTES

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2. DUCT SIZE TO DIFFUSERS, REGISTERS, AND GRILLES SHALL BE SAME AS NECK SIZE UNLESS NOTED OR DETAILED OTHERWISE.
3. INLET DUCT SIZE TO AIR TERMINAL DEVICES SHALL BE SAME AS INLET UNLESS OTHERWISE NOTED.
4. PIPING TO TERMINAL HEATING DEVICES SHALL BE 1/2" UNLESS OTHERWISE NOTED.

SHEET KEYNOTES

1. 3/4"PCHS & PCHR DOWN. LOCATE VALVE IN VERTICAL AND CAP AT 8'-0" AFF.
2. NOT USED.
3. MOUNT DEW POINT SENSOR 96" AFF.
4. PCHS & PCHR ARE TO BE LOCATED ON PIPE RACK. COORDINATE WITH PIPING. REFER TO DETAILS 5/crf-5.00 & 6/crf-5.00.
5. TRANSITION TO 6Ø AT GAS CABINET. (TYP OF 4)



1 **LEVEL 1 - ZONE B**
SCALE: 1/4" = 1'-0"

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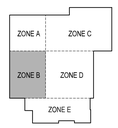
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Project

Physics and Nanotechnology Building

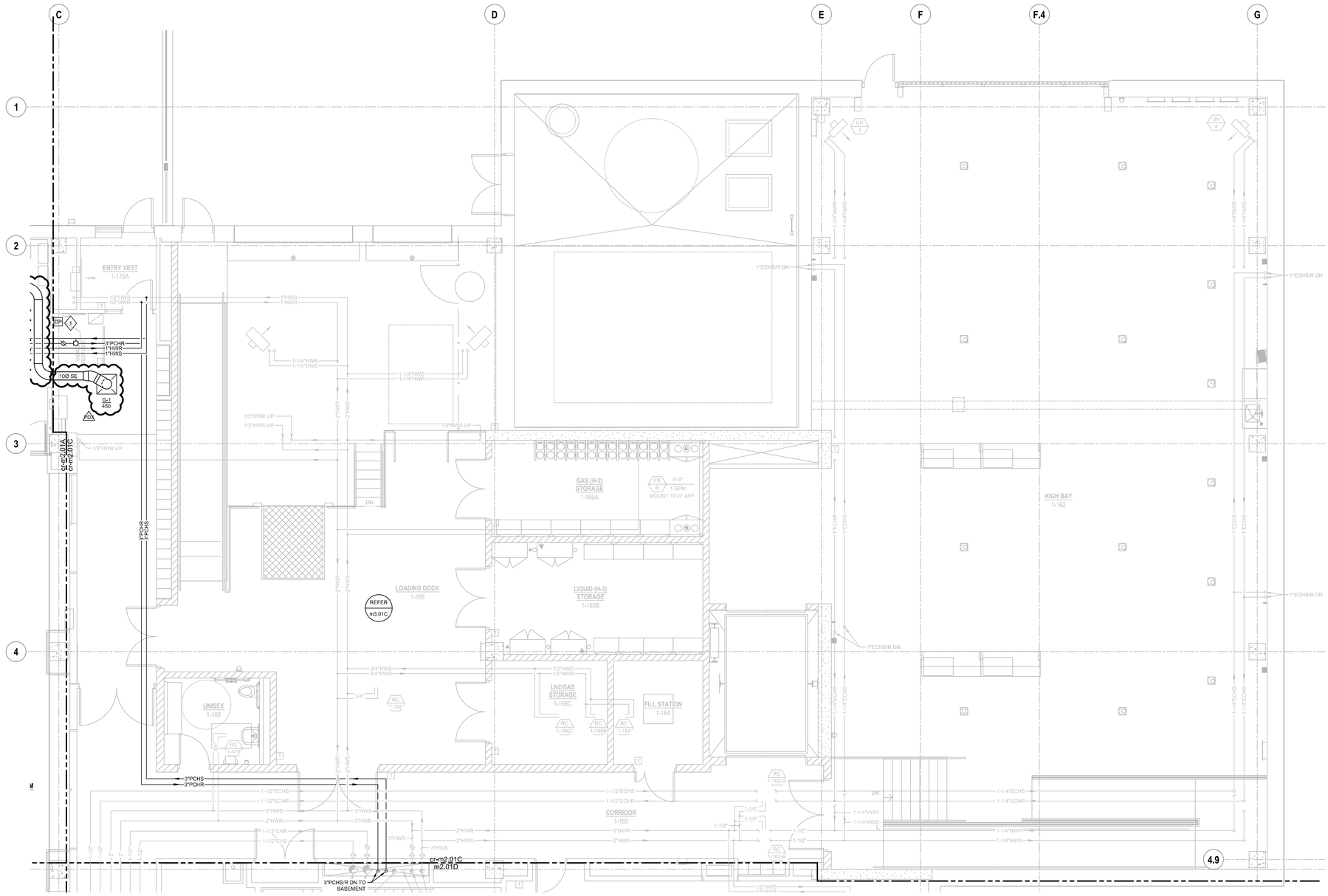
U of M Project # 01-155-08-1718



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CLEANROOM MECHANICAL
LEVEL 1 - ZONE B

cr-m2.01B



1 **LEVEL 1 - ZONE C**
SCALE: 1/4" = 1'-0"

SHEET KEYNOTES

1 MOUNT DIFFERENTIAL PRESSURE SENSOR 96" AFF.

ARCHITECTURAL ALLIANCE
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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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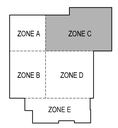
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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CLEANROOM MECHANICAL
LEVEL 1 - ZONE C

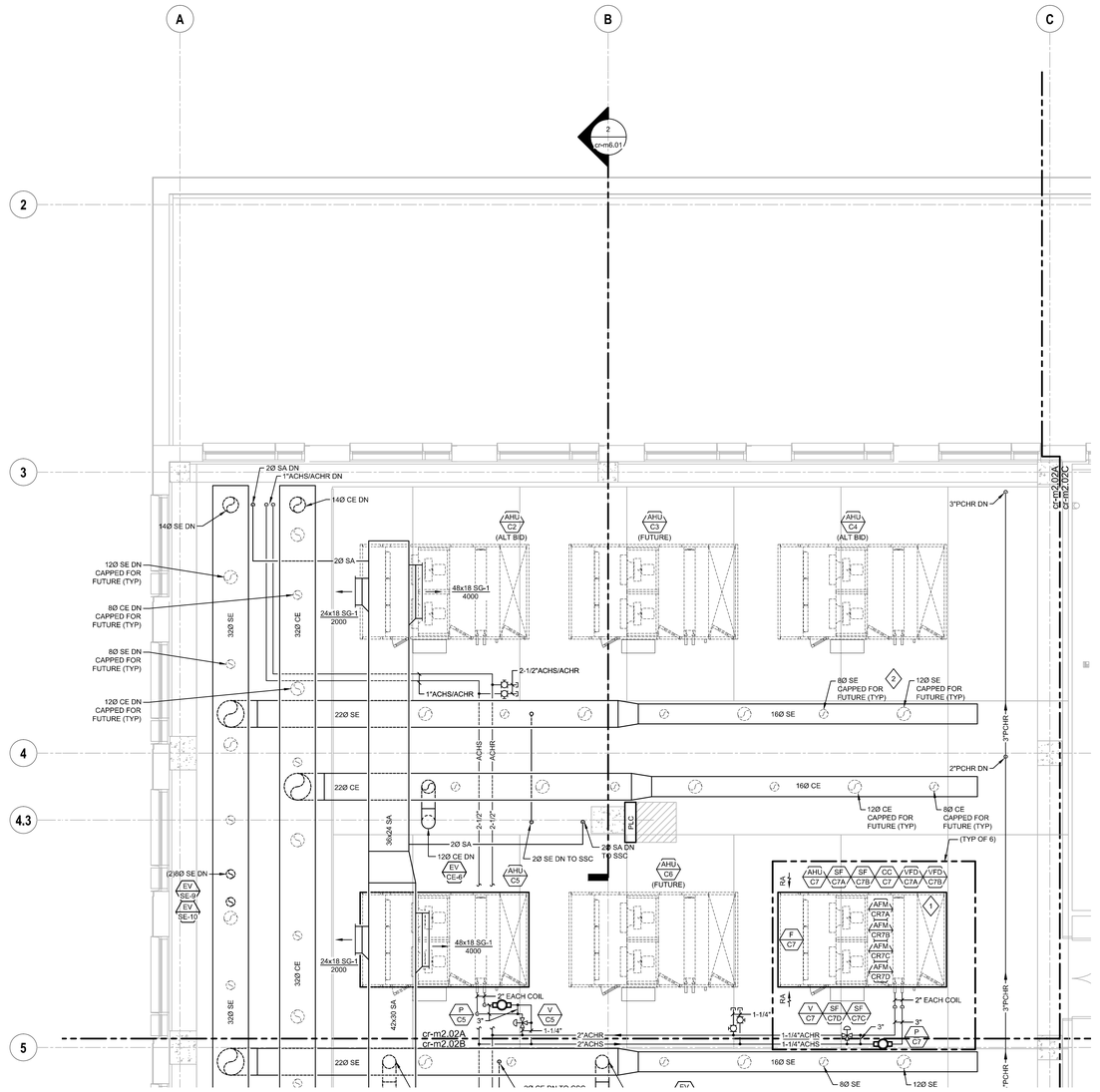
cr-m2.01C

GENERAL NOTES

1. PROVIDE MANUAL BALANCING DAMPER AT EACH DIFFUSER, GRILLE, AND BRANCH TAKEOFF IN ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK. LOCATE BALANCING DAMPER AS CLOSE TO BRANCH TAKEOFF AS POSSIBLE.
2. DUCT SIZE TO DIFFUSERS, REGISTERS, AND GRILLES SHALL BE SAME AS NECK SIZE UNLESS NOTED OR DETAILED OTHERWISE.
3. INLET DUCT SIZE TO AIR TERMINAL DEVICES SHALL BE SAME AS INLET UNLESS OTHERWISE NOTED.
4. EXHAUST AIR TERMINALS ARE MOUNTED VERTICALLY UNLESS OTHERWISE SHOWN.

SHEET KEYNOTES

1. CONNECT SA OPENINGS IN PLENUM.
2. REFER TO DETAIL 7/m8.06.



1 **LEVEL 2 - ZONE A**
SCALE: 1/4" = 1'-0"

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Drawn MJC

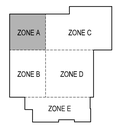
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Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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CLEANROOM MECHANICAL
LEVEL 2 - ZONE A

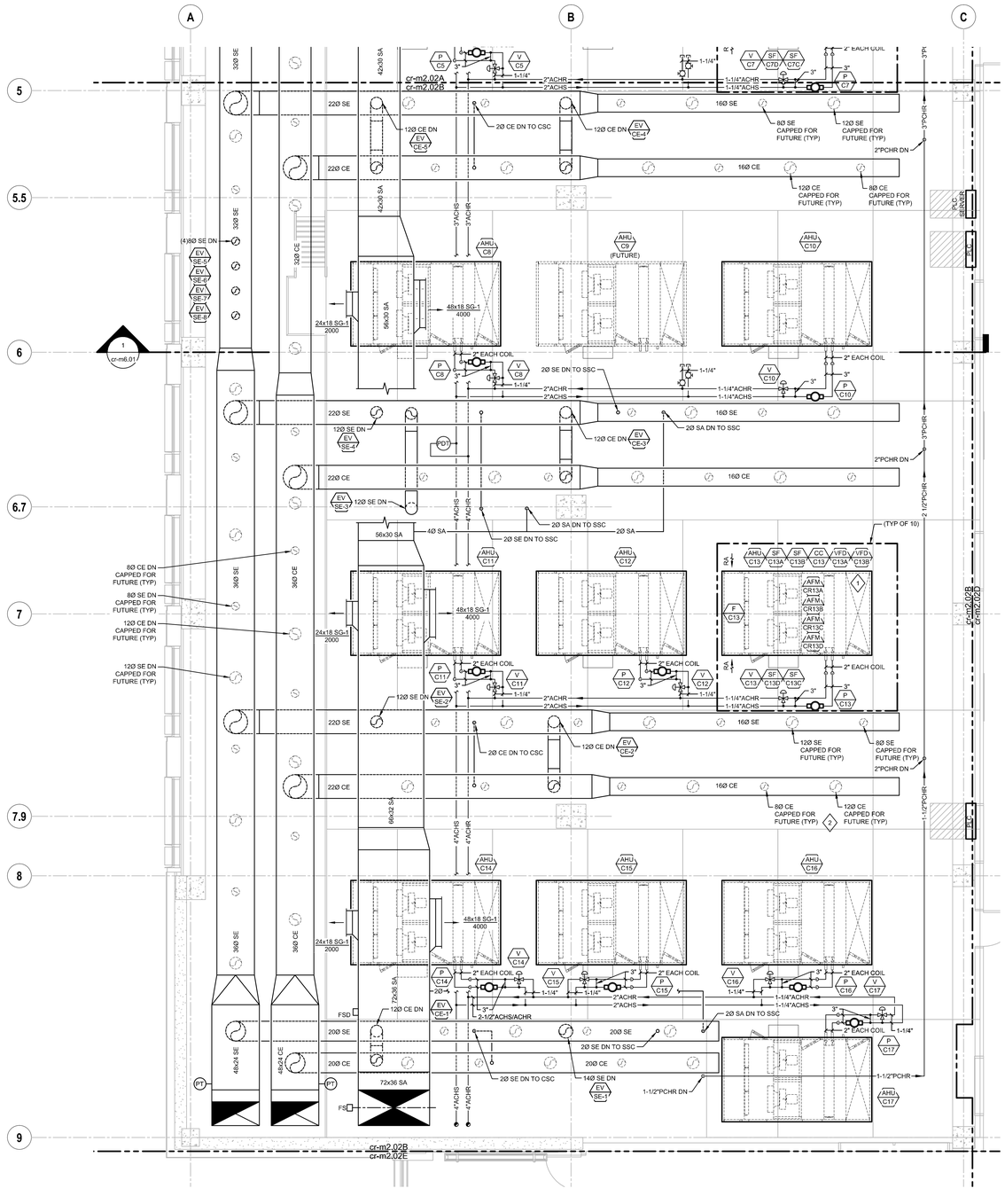
cr-m2.02A

GENERAL NOTES

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SHEET KEYNOTES

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2. REFER TO DETAIL 7/m8.06.



1 **LEVEL 2 - ZONE B**
SCALE: 1/4" = 1'-0"

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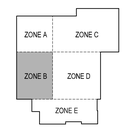
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



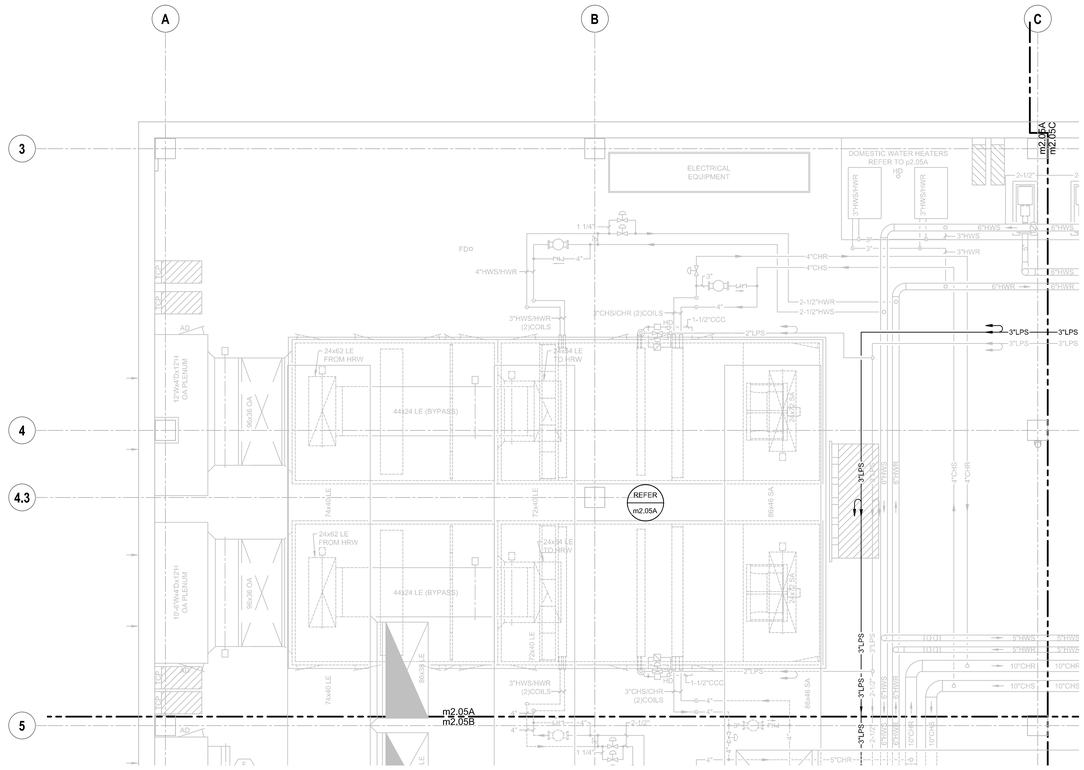
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CLEANROOM MECHANICAL
LEVEL 2 - ZONE B

cr-m2.02B

GENERAL NOTES

1. ALL LPC PIPING TO BE 1" UNLESS OTHERWISE NOTED.



1 **PENTHOUSE - ZONE A**
SCALE: 1/4" = 1'-0"

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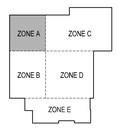
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Project

Physics and Nanotechnology Building

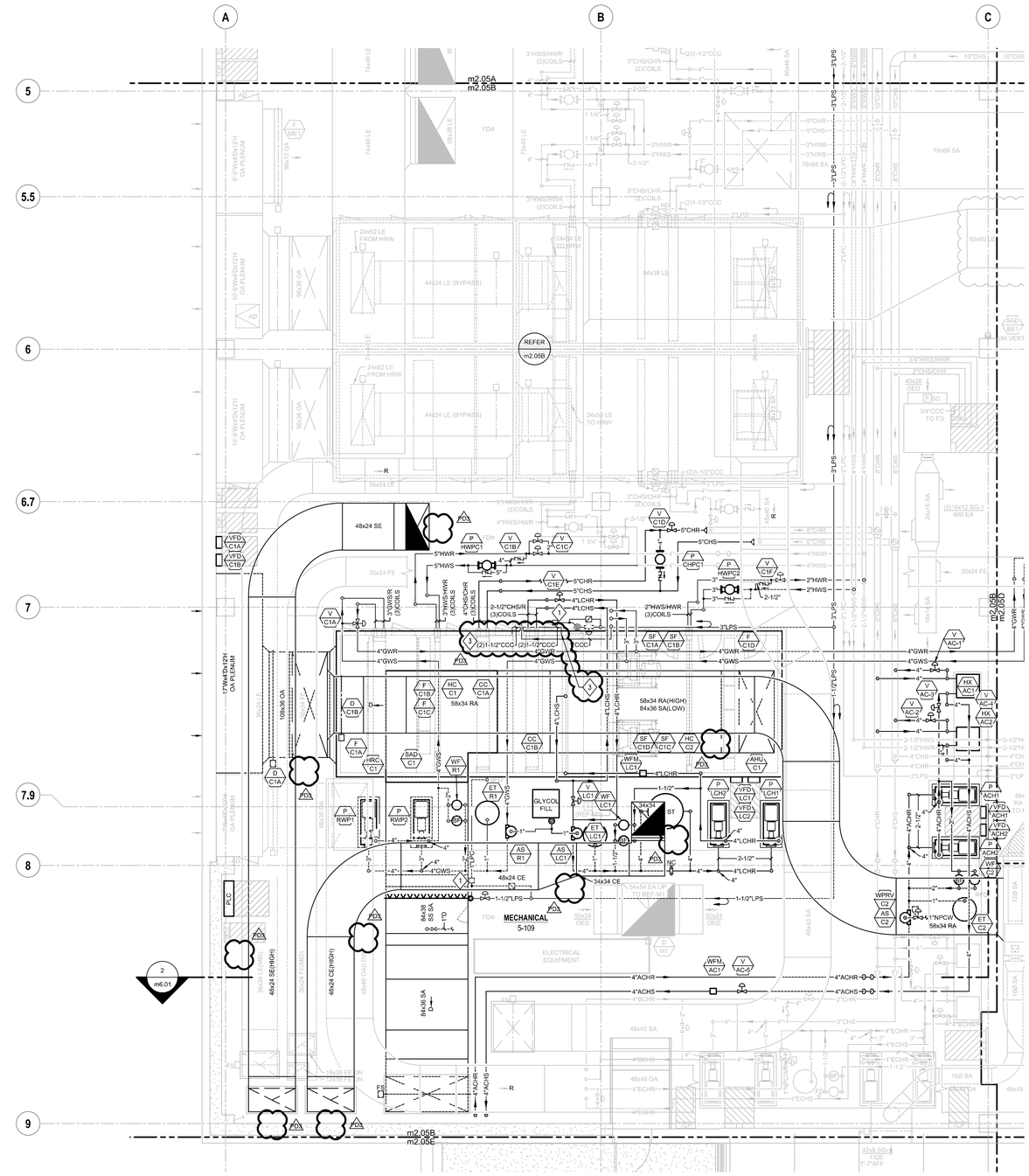
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MECHANICAL
PENTHOUSE - ZONE A

cr-m2.05A



1 **PENTHOUSE - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL LPC PIPING TO BE 1" UNLESS OTHERWISE NOTED.

SHEET KEYNOTES

1. RUN 1"LPC FROM HUMIDIFIER DISTRIBUTION GRID AND STEAM GENERATOR TO AFTER COOLER. PC TO PROVIDE 1/2"NPCW TO AFTER COOLER. RUN 2"DRAIN TO NEAREST FD. PROVIDE TRAP PRIMER.
2. NOT USED.
3. PROVIDE (2) 1-1/2"CCC, FROM PRIMARY DRAIN PAN AND SECONDARY DRAIN PAN OR SECOND DRAIN CONNECTION TO PRIMARY DRAIN PAN.

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25384

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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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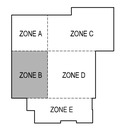
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



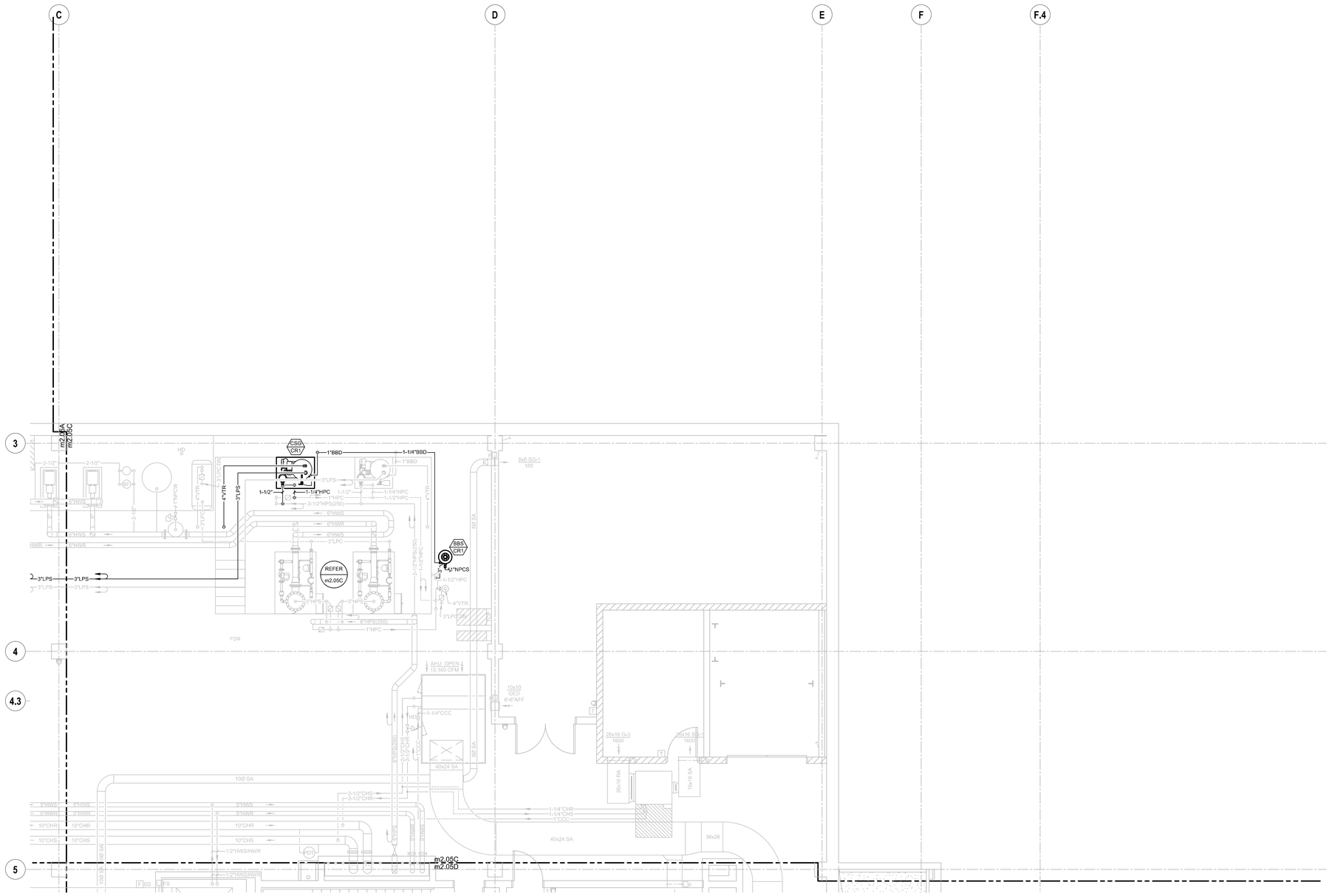
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CLEANROOM MECHANICAL PENTHOUSE - ZONE B

cr-m2.05B

GENERAL NOTES

1. ALL LPC PIPING TO BE 1" UNLESS OTHERWISE NOTED.



1 **PENTHOUSE - ZONE C**
SCALE: 1/4" = 1'-0"

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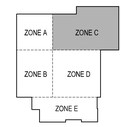
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Project

Physics and Nanotechnology Building

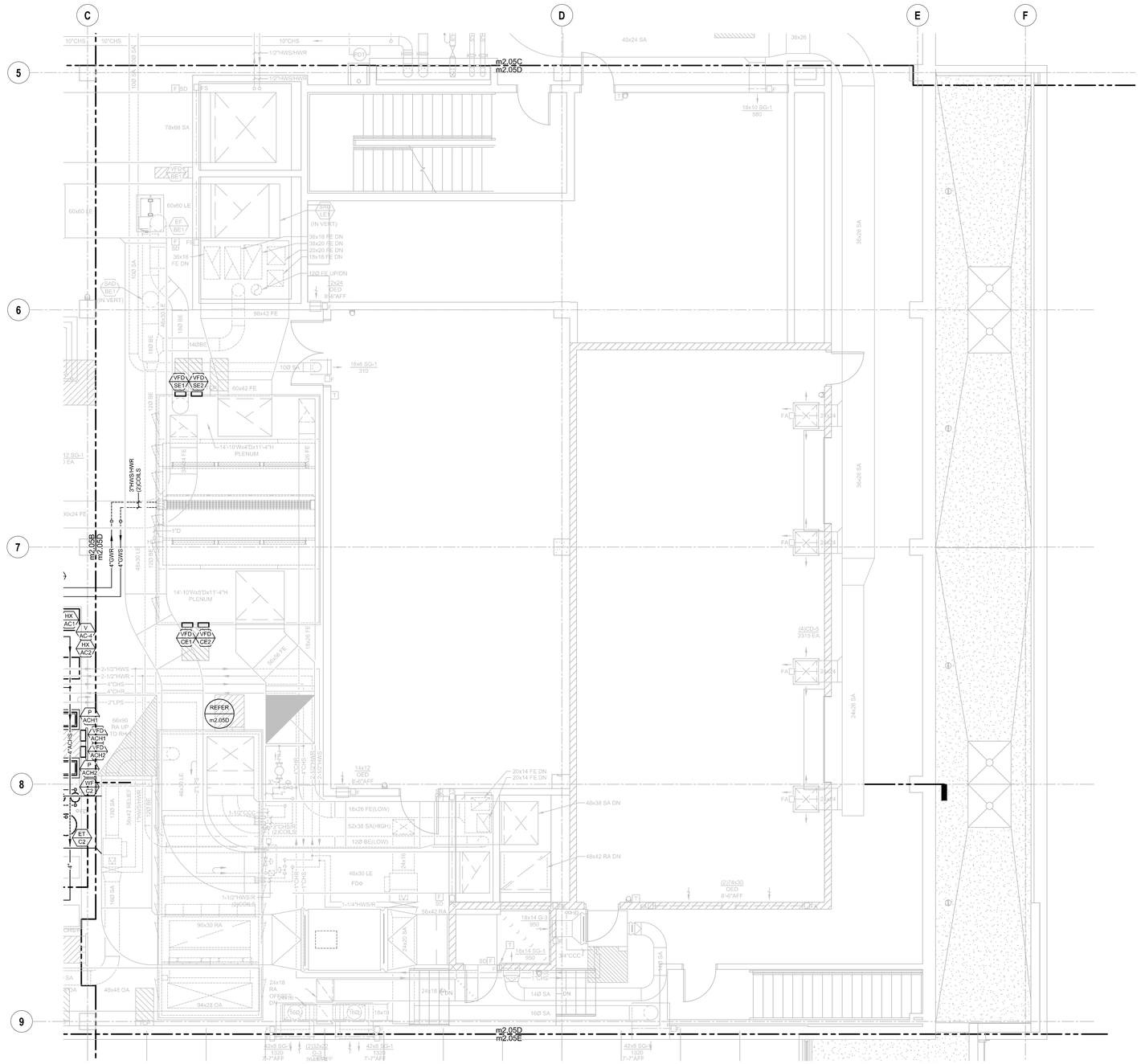
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MECHANICAL
PENTHOUSE - ZONE C

cr-m2.05C



1 **PENTHOUSE - ZONE D**
SCALE: 1/4" = 1'-0"

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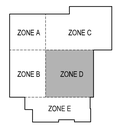
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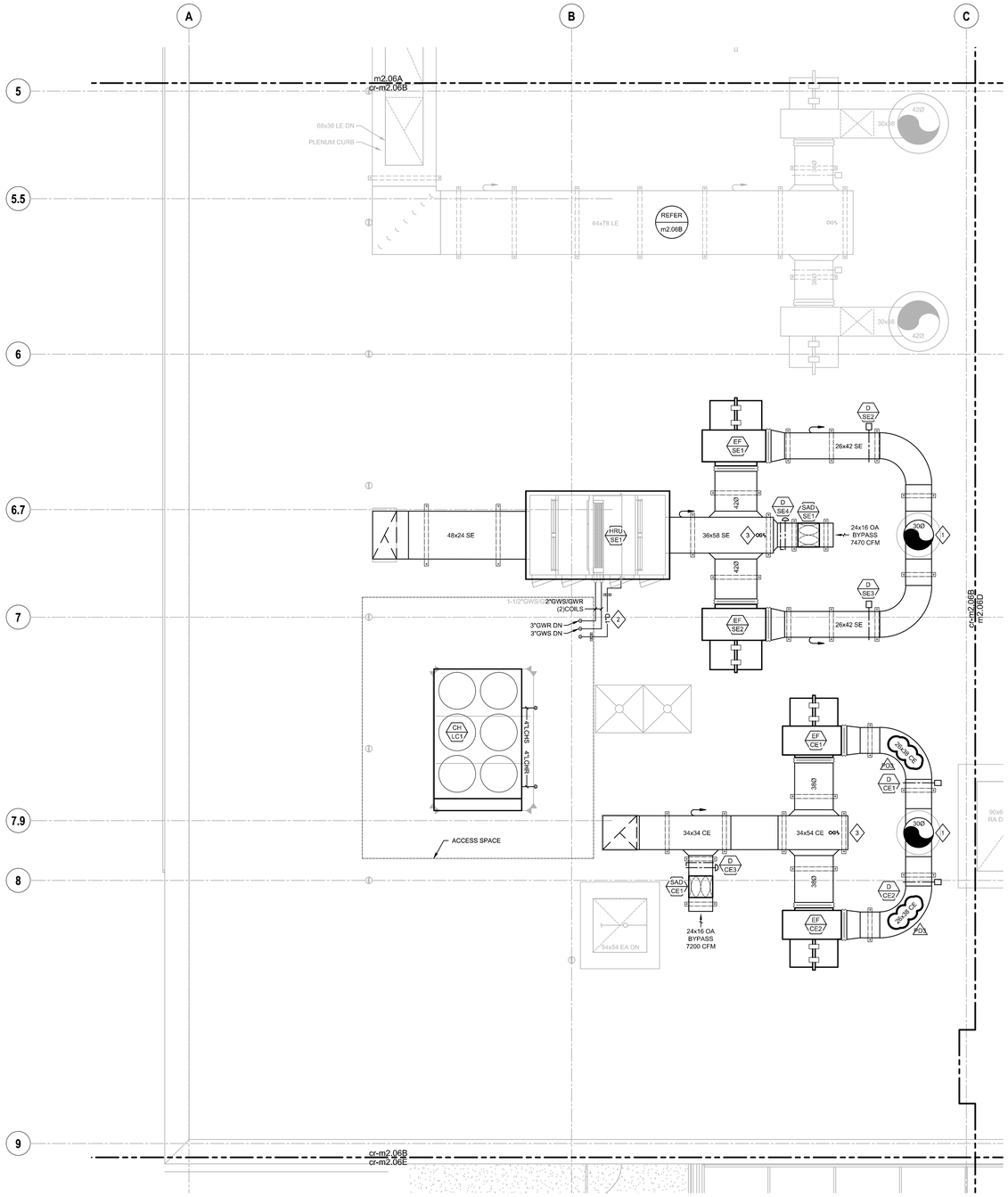
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CLEANROOM MECHANICAL
PENTHOUSE - ZONE D

cr-m2.05D



1 **ROOF - ZONE B**
SCALE: 1/4" = 1'-0"

SHEET KEYNOTES

1. TERMINATE EXHAUST STACK 20'-0" ABOVE ROOF.
2. INSULATE AND HEAT TRACE 1"DRAIN LINE.
3. PROVIDE 1"DRAIN WITH INSULATED AND HEAT TRACED P-TRAP. REFER TO DETAIL 12/m8.02.

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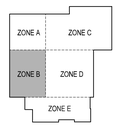
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Physics and Nanotechnology Building

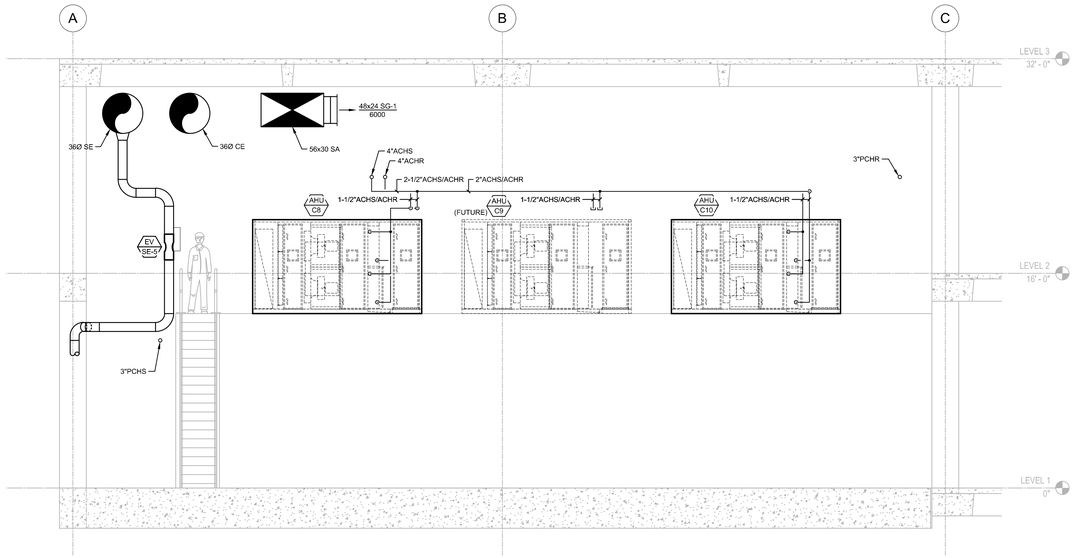
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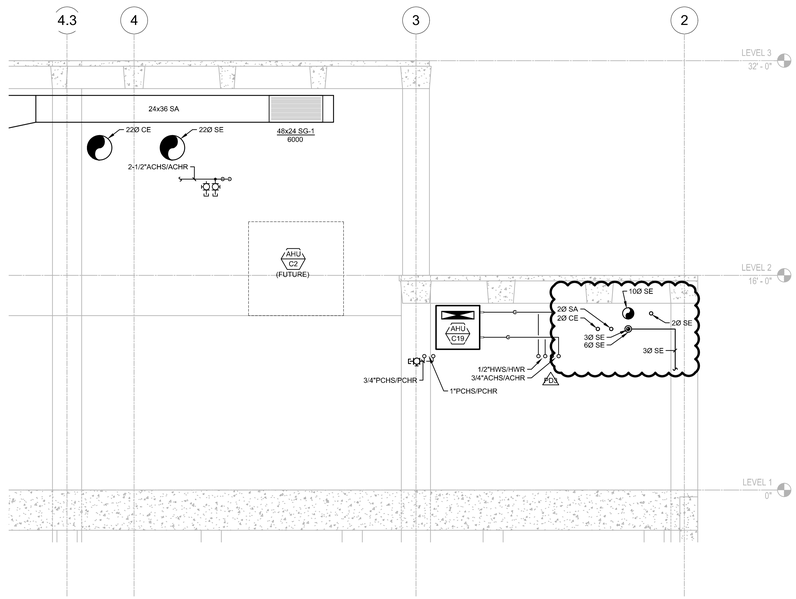
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CLEANROOM MECHANICAL
ROOF - ZONE B

cr-m2.06B



1 **CLEANROOM SECTION LOOKING NORTH**
SCALE: 1/4" = 1'-0"



2 **CLEANROOM SECTION LOOKING WEST**
SCALE: 1/4" = 1'-0"

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-15-2012

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Checked RLH

Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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SECTIONS

cr-m6.01

GENERAL NOTES

1. NETWORK ARCHITECTURE PATHWAYS ARE ILLUSTRATIVE ONLY. CONTRACTOR TO DETERMINE FINAL LAYOUT. FINAL LAYOUT SHALL BE APPROVED BY OWNER AND ENGINEER.
2. NETWORK HARDWARE IS ILLUSTRATIVE ONLY. CONTRACTOR TO DETERMINE HARDWARE REQUIREMENTS. FINAL HARDWARE REQUIREMENTS SHALL BE APPROVED BY OWNER AND ENGINEER.
3. CONTROL PANELS TO BE SIZED BASED ON EQUIPMENT I/O COUNT AND APPLICATION. FINAL CONTROL PANEL TYPES TO BE DETERMINED BY CONTRACTOR AND APPROVED BY OWNER AND ENGINEER.

SHEET KEYNOTES

1. REFER TO cr-p2.01C FOR METER LOCATION.
2. CONTROL CONTRACTOR TO PROVIDE ALL MODBUS COMMUNICATION CABLING AND CONNECTORS FOR INTERFACING WITH UNIT CONTROLLERS. COORDINATE MODBUS DEVICE ADDRESSING WITH FAN FILTER UNIT PROVIDER.

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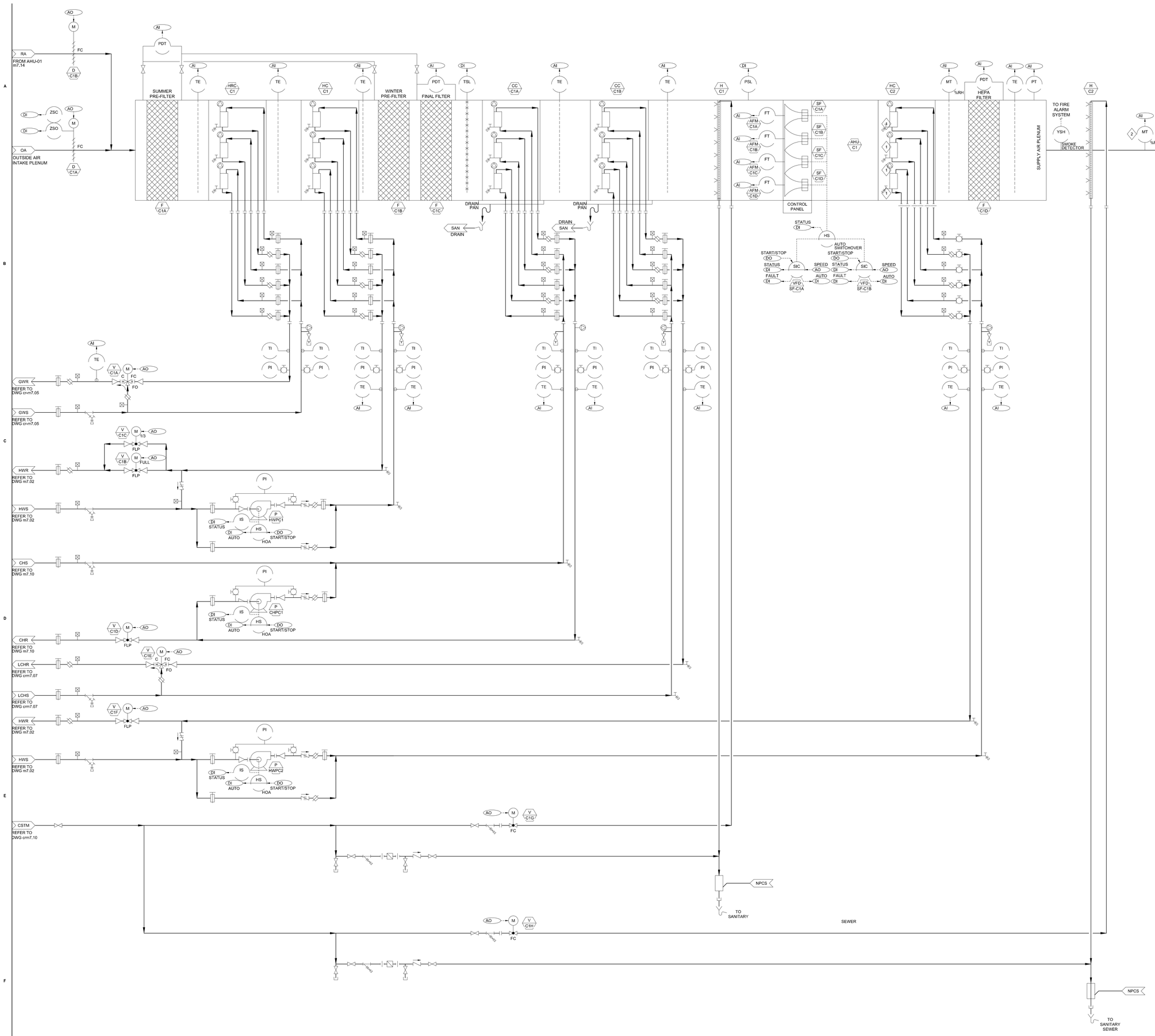
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CLEANROOM
CONTROL SYSTEM NETWORK
ARCHITECTURE DIAGRAM

cr-m7.01



GENERAL NOTES

1. THE CONTROL/FLOW DIAGRAM IS ONLY INTENDED TO PROVIDE CONTROL AND INSTRUMENTATION RELATED INFORMATION. REFER TO MECHANICAL DETAILS FOR VALVING, DAMPERING AND ASSOCIATED SPECIALTIES INSTALLATION REQUIREMENTS.
2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.

SHEET KEYNOTES

1. AIR FLOW MEASURING ELEMENTS AND TRANSMITTERS PROVIDED WITH FAN WALL.
2. LOCATE TEMPERATURE AND HUMIDITY SENSORS A MINIMUM OF 10 FT DOWNSTREAM OF BOOSTER HUMIDIFIER.

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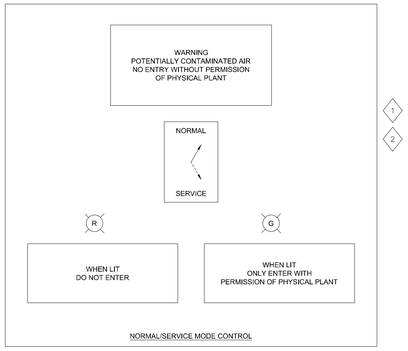
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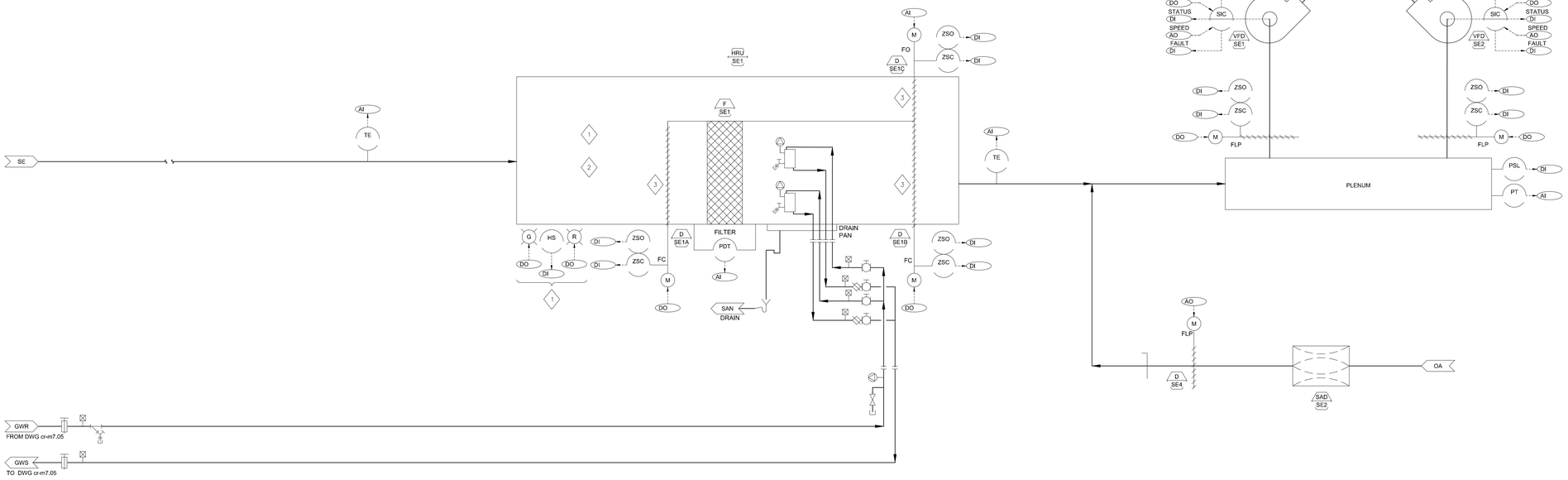
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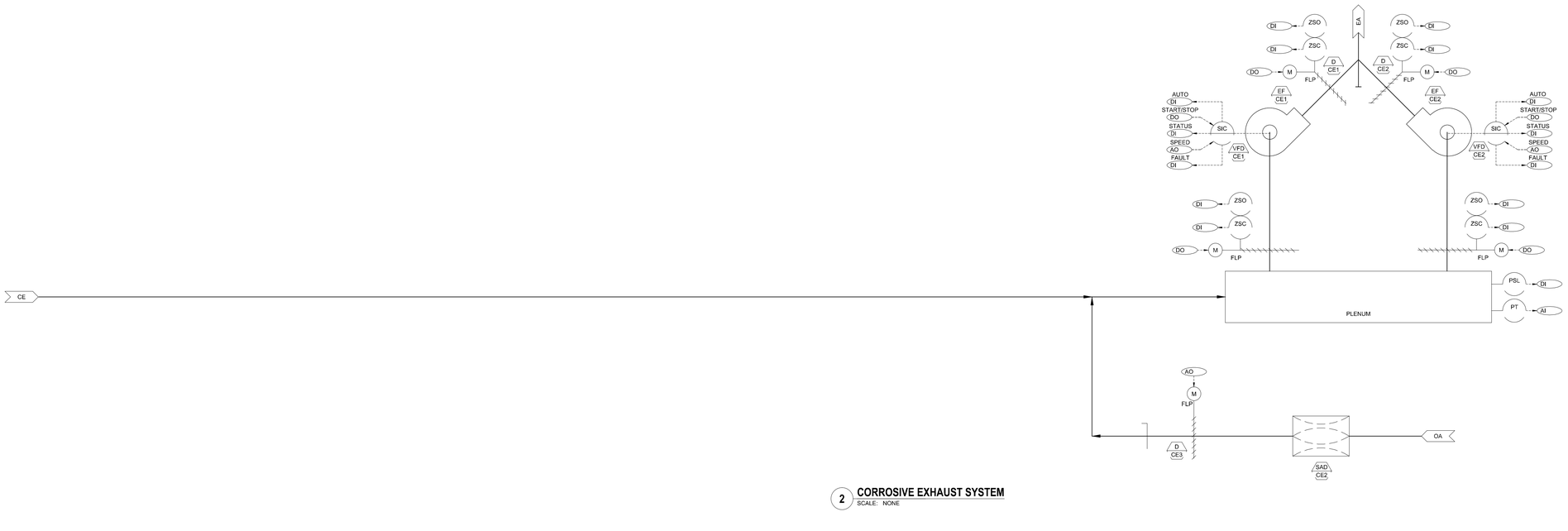
CLEANROOM AIR HANDLING UNIT SYSTEM CONTROL/FLOW DIAGRAM

cr-m7.02





1 SOLVENT EXHAUST SYSTEM
SCALE: NONE



2 CORROSIVE EXHAUST SYSTEM
SCALE: NONE

GENERAL NOTES

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2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.

SHEET KEYNOTES

1. LOCATE ADJACENT TO PLENUM ACCESS DOOR.
2. PROVIDE SIGNAGE AS INDICATED IN DETAIL ON THIS SHEET AND REFER TO CONTROL SEQUENCES.
3. DAMPER TO BE PROVIDED BY HEAT RECOVERY UNIT MANUFACTURER.

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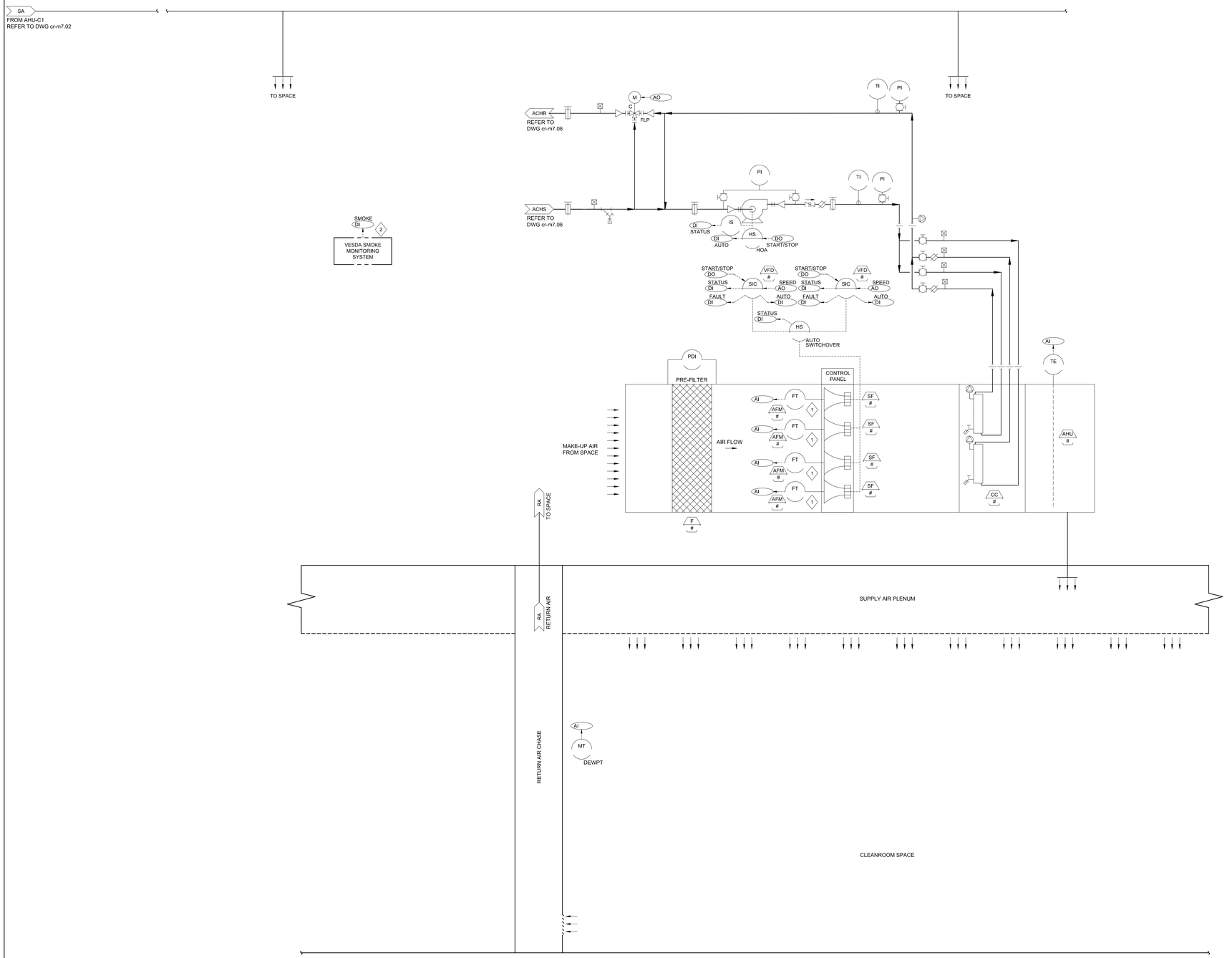
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CLEANROOM SOLVENT AND CORROSIVE EXHAUST SYSTEMS CONTROL/AIR FLOW DIAGRAM

cr-m7.03



GENERAL NOTES

1. THE CONTROL/FLOW DIAGRAM IS ONLY INTENDED TO PROVIDE CONTROL AND INSTRUMENTATION RELATED INFORMATION. REFER TO MECHANICAL DETAILS FOR VALVING, DAMPERING AND ASSOCIATED SPECIALTIES INSTALLATION REQUIREMENTS.
2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.

SHEET KEYNOTES

1. AIR FLOW MEASURING ELEMENT AND TRANSMITTER PROVIDED WITH FAN WALL.
2. ONE SMOKE ALARM CONTACT TO BE PROVIDED AT VESDA PANEL FOR SHUTDOWN OF ALL RECIRCULATING UNITS.

CLEANROOM AIR HANDLING UNITS

GENERAL	EQUIPMENT								
AHU (#)	SF (#)	VFD (#)	CC (#)	F (#)	V (#)	AFM (#)	P (#)	COMMENT
C2	C2A	C2A	C2	C2	C2	C2A	C2	ALTERNATE BID
	C2B	C2B				C2B		
	C2C					C2C		
	C2D					C2D		
C3	C3A	C3A	C3	C3	C3	C3A	C3	FUTURE
	C3B	C3B				C3B		
	C3C					C3C		
	C3D					C3D		
C4	C4A	C4A	C4	C4	C4	C4A	C4	ALTERNATE BID
	C4B	C4B				C4B		
	C4C					C4C		
	C4D					C4D		

CLEANROOM AIR HANDLING UNITS

GENERAL	EQUIPMENT								
AHU (#)	SF (#)	VFD (#)	CC (#)	F (#)	V (#)	AFM (#)	P (#)	COMMENT
C5	C5A	C5A	C5	C5	C5	C5A	C5	
	C5B	C5B				C5B		
	C5C					C5C		
	C5D					C5D		
C6	C6A	C6A	C6	C6	C6	C6A	C6	FUTURE
	C6B	C6B				C6B		
	C6C					C6C		
	C6D					C6D		
C7	C7A	C7A	C7	C7	C7	C7A	C7	
	C7B	C7B				C7B		
	C7C					C7C		
	C7D					C7D		

CLEANROOM AIR HANDLING UNITS

GENERAL	EQUIPMENT								
AHU (#)	SF (#)	VFD (#)	CC (#)	F (#)	V (#)	AFM (#)	P (#)	COMMENT
C8	C8A	C8A	C8	C8	C8	C8A	C8	
	C8B	C8B				C8B		
	C8C					C8C		
	C8D					C8D		
C9	C9A	C9A	C9	C9	C9	C9A	C9	FUTURE
	C9B	C9B				C9B		
	C9C					C9C		
	C9D					C9D		
C10	C10A	C10A	C10	C10	C10	C10A	C10	
	C10B	C10B				C10B		
	C10C					C10C		
	C10D					C10D		

CLEANROOM AIR HANDLING UNITS

GENERAL	EQUIPMENT								
AHU (#)	SF (#)	VFD (#)	CC (#)	F (#)	V (#)	AFM (#)	P (#)	COMMENT
C11	C11A	C11A	C11	C11	C11	C11A	C11	
	C11B	C11B				C11B		
	C11C					C11C		
	C11D					C11D		
C12	C12A	C12A	C12	C12	C12	C12A	C12	
	C12B	C12B				C12B		
	C12C					C12C		
	C12D					C12D		
C13	C13A	C13A	C13	C13	C13	C13A	C13	
	C13B	C13B				C13B		
	C13C					C13C		
	C13D					C13D		

CLEANROOM AIR HANDLING UNITS

GENERAL	EQUIPMENT								
AHU (#)	SF (#)	VFD (#)	CC (#)	F (#)	V (#)	AFM (#)	P (#)	COMMENT
C14	C14A	C14A	C14	C14	C14	C14A	C14	
	C14B	C14B				C14B		
	C14C					C14C		
	C14D					C14D		
C15	C15A	C15A	C15	C15	C15	C15A	C15	
	C15B	C15B				C15B		
	C15C					C15C		
	C15D					C15D		
C16	C16A	C16A	C16	C16	C16	C16A	C16	
	C16B	C16B				C16B		
	C16C					C16C		
	C16D					C16D		
C17	C17A	C17A	C17	C17	C17	C17A		
	C17B	C17B				C17B		
	C17C					C17C		
	C17D					C17D		

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For AFFILIATED ENGINEERS, INC.

By

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Date 02-24-2012 Reg. No. 25394

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CLEANROOM
RECIRCULATING AHU
CONTROL/FLOW DIAGRAM

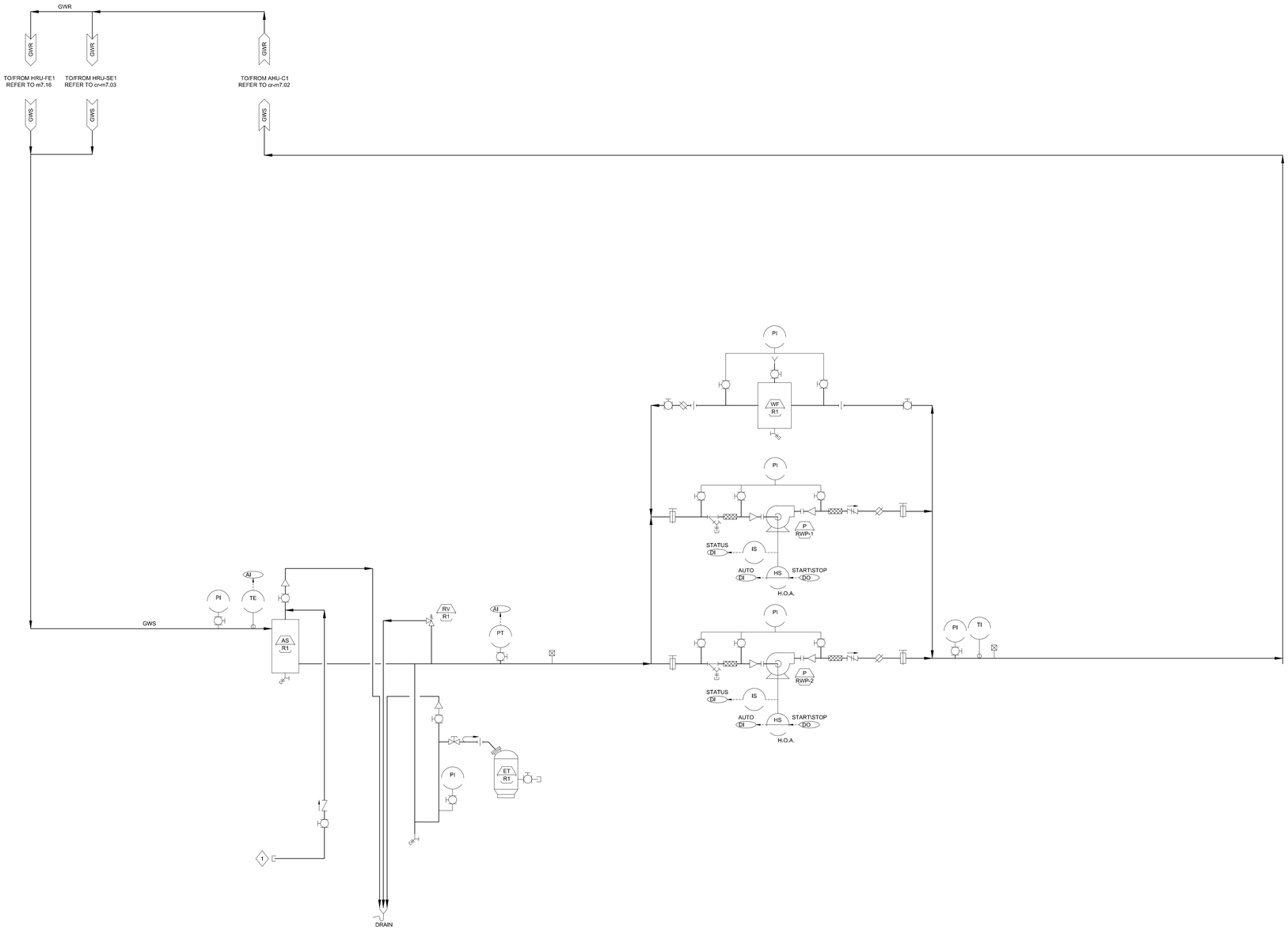
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GENERAL NOTES

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2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.

SHEET KEYNOTES

1 1" CONNECTION FOR SYSTEM GLYCOL FILL. CONTRACTOR TO PROVIDE PUMP FOR FILLING SYSTEM. PUMP IS TO REMAIN PROPERTY OF CONTRACTOR.



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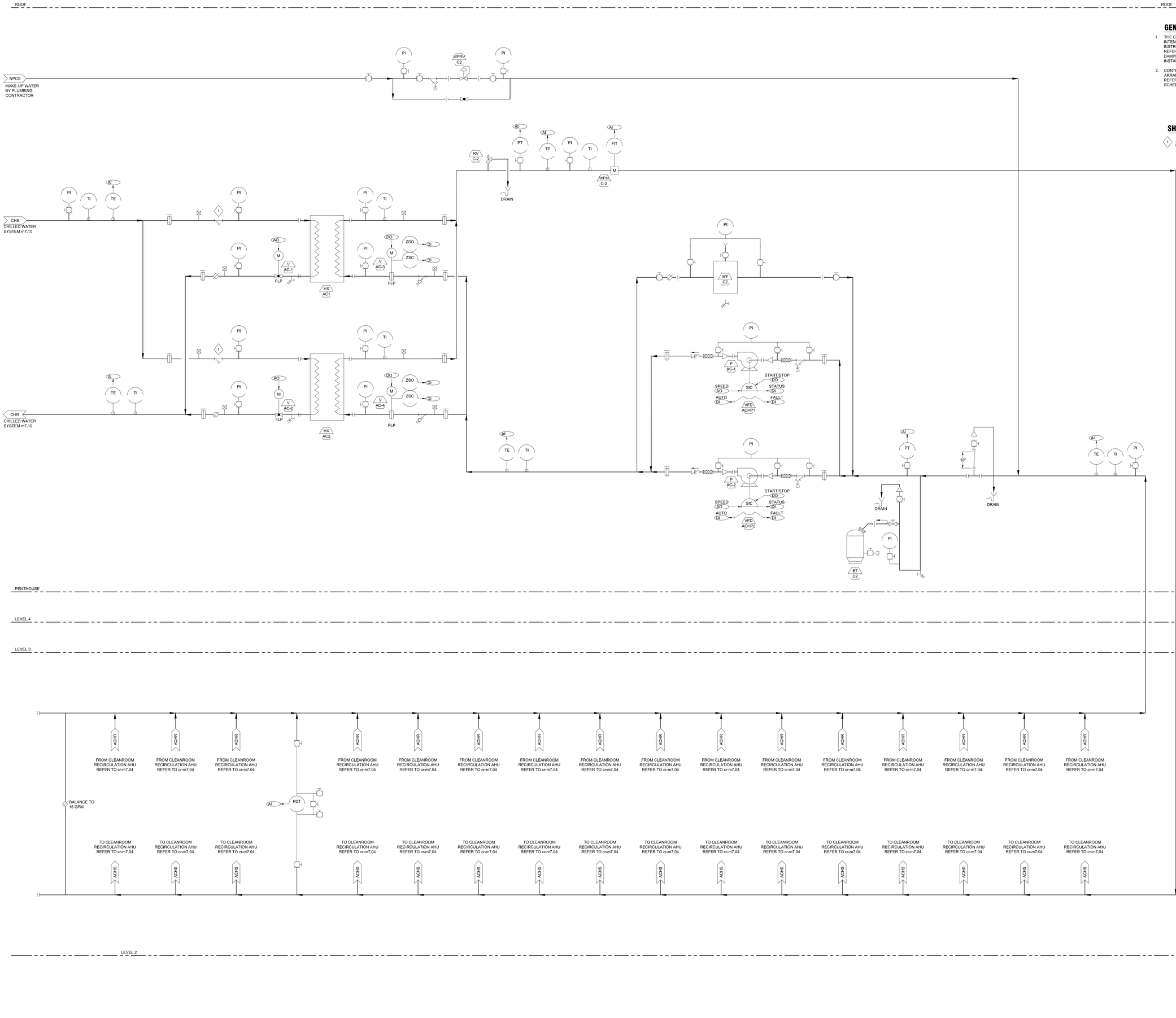
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GLYCOL HEAT RECOVERY SYSTEM CONTROL/ FLOW DIAGRAM

cr-m7.05



GENERAL NOTES

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SHEET KEYNOTES

1 AUTO FLUSH STRAINER WITH FINE MESH SCREEN

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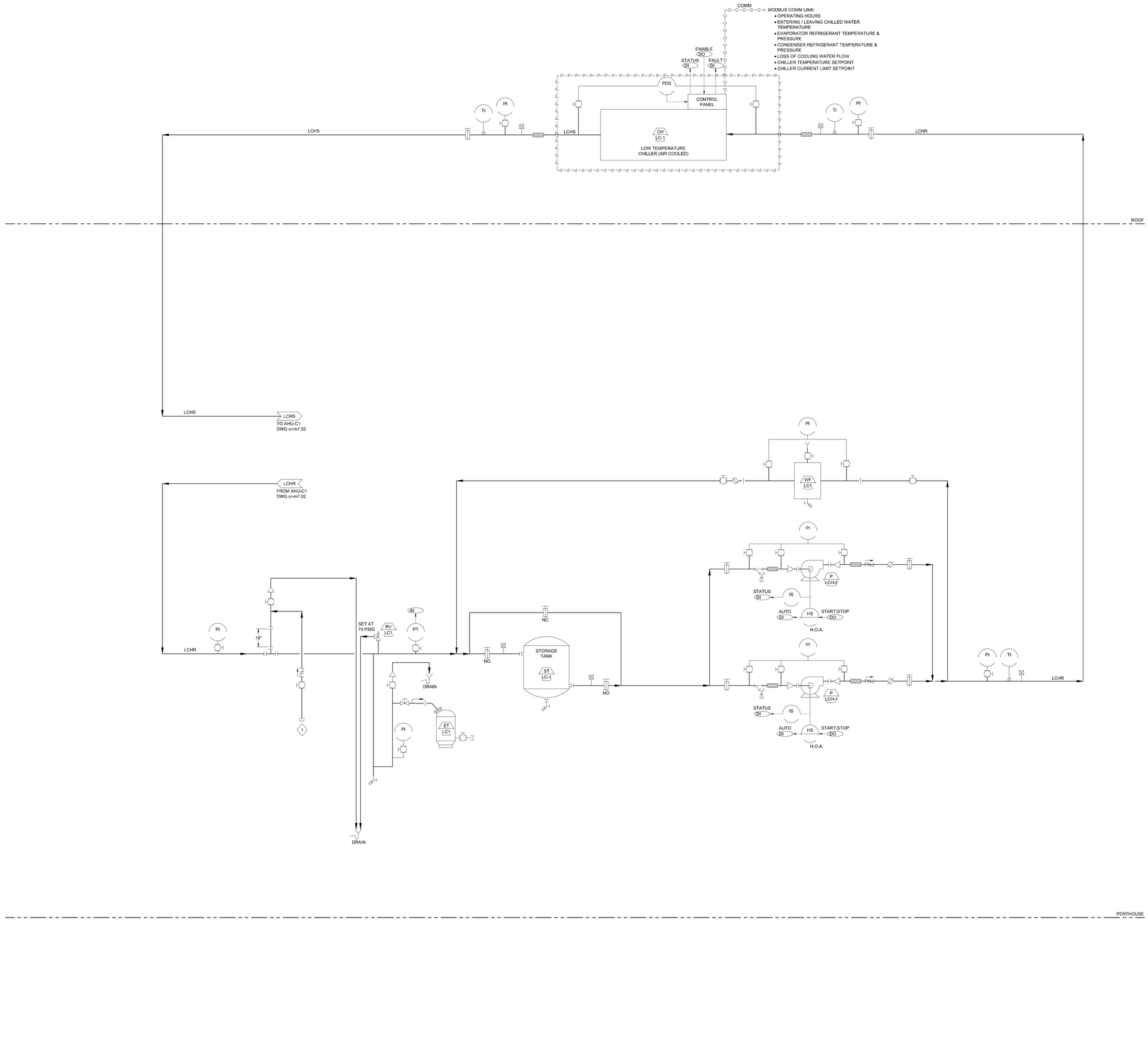
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CLEANROOM AHU
CHILLED WATER SYSTEM
CONTROL/FLOW DIAGRAM

cr-m7.06



GENERAL NOTES

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LOW TEMPERATURE CHILLED WATER SYSTEM CONTROL/FLOW DIAGRAM

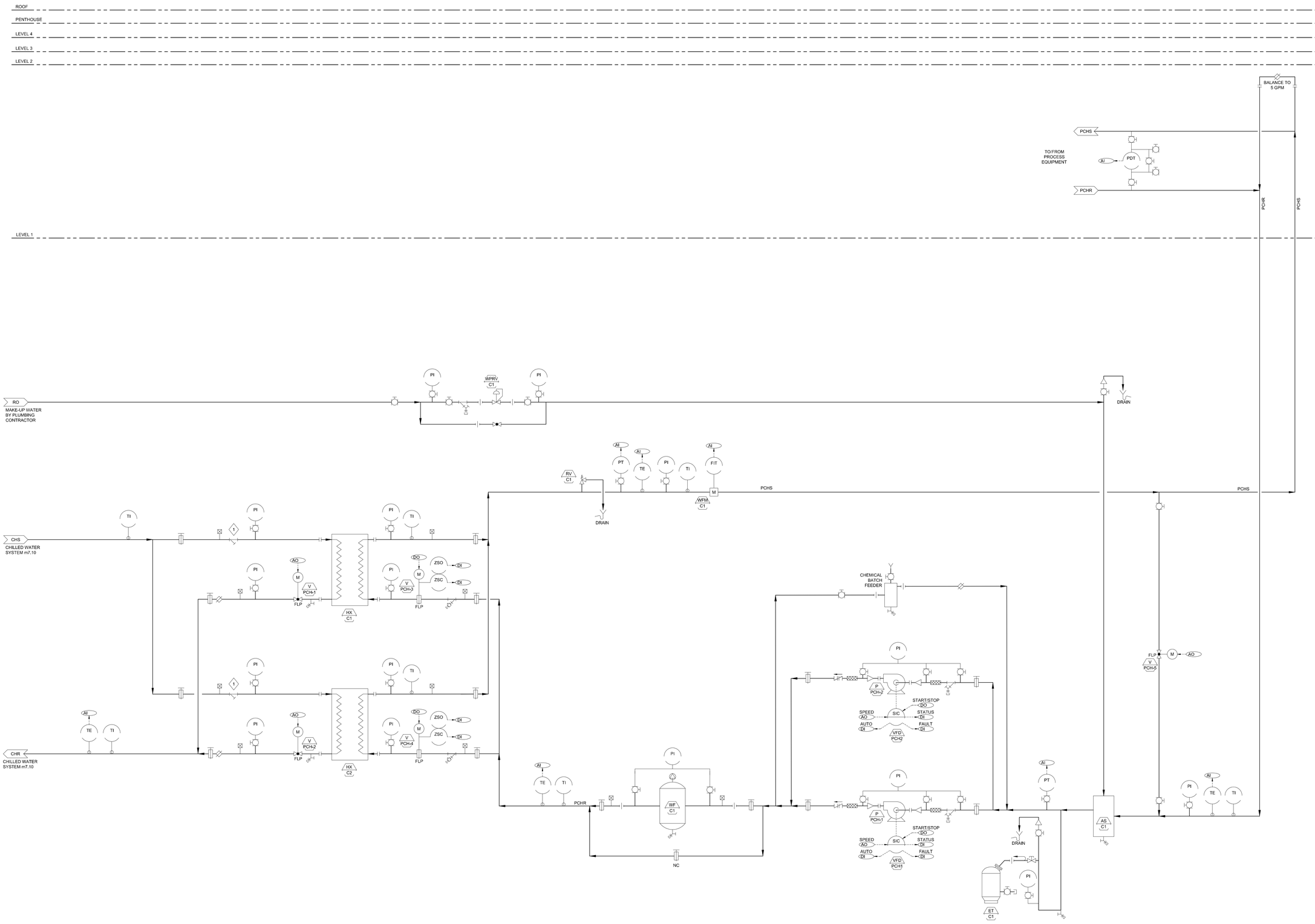
cr-m7.07

GENERAL NOTES

1. THE CONTROL/FLOW DIAGRAM IS ONLY INTENDED TO PROVIDE CONTROL AND INSTRUMENTATION RELATED INFORMATION. REFER TO MECHANICAL DETAILS FOR VALVING, DAMPERING AND ASSOCIATED SPECIALTIES INSTALLATION REQUIREMENTS.
2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.

SHEET KEYNOTES

1 AUTO FLUSH STRAINER WITH FINE MESH SCREEN



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By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

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Bid Package No. 2	02-24-2012

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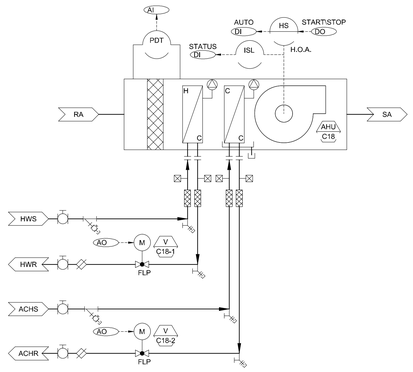
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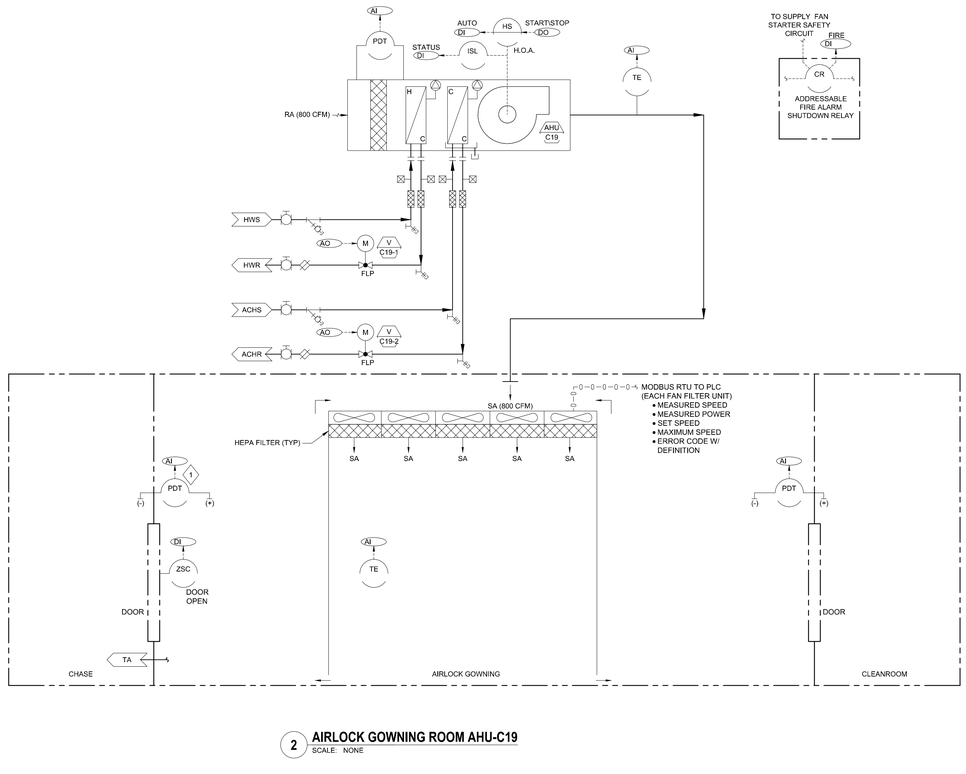
CLEANROOM PROCESS CHILLED WATER SYSTEM CONTROL/FLOW DIAGRAM

cr-m7.08



1 **AIR HANDLING UNIT AHU-C18**
SCALE: NONE





2 **AIRLOCK GOWNING ROOM AHU-C19**
SCALE: NONE

GENERAL NOTES

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2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.

SHEET KEYNOTES

1 SPACE DIFFERENTIAL PRESSURE INPUT TO BE USED TO CONTROL AHU-C1 SUPPLY FAN SPEED. WIRE SENSOR DIRECTLY TO AHU CONTROLLER RACK I/O.

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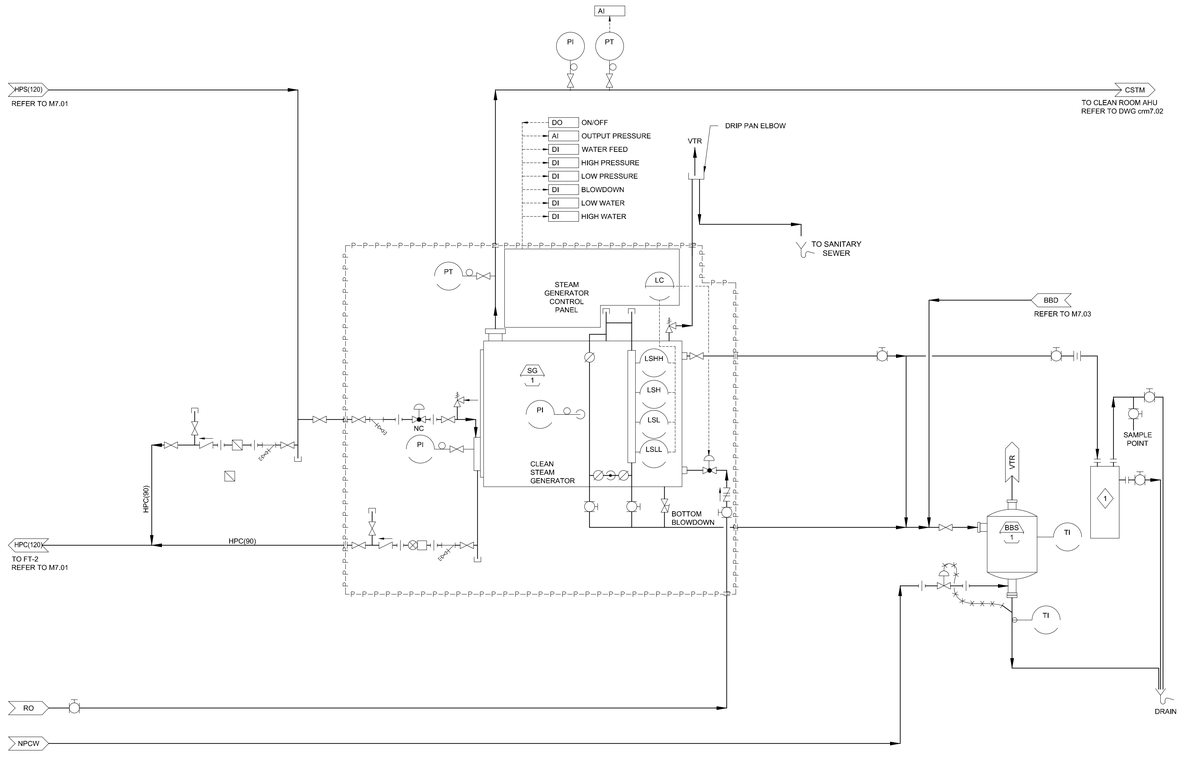
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CLEANROOM
MISCELLANEOUS
FLOW DIAGRAMS

cr-m7.09



GENERAL NOTES

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2. CONTROL/FLOW DIAGRAM INCLUDES GENERAL ARRANGEMENT OF SYSTEM COMPONENTS. REFER TO FLOOR PLANS AND EQUIPMENT SCHEDULES FOR COMPONENT QUANTITIES.
3. ALL DEVICES WITH MANUAL RESET TO BE LOCATED WITHIN 6 FEET OF FLOOR OR OTHERWISE ACCESSIBLE WITHOUT THE USE OF A LADDER.

SHEET KEYNOTES

1 2-PASS SURFACE BLOWDOWN SAMPLE COOLER. SUPPORT SAMPLE COOLER FROM WALL OR PIPE STAND.

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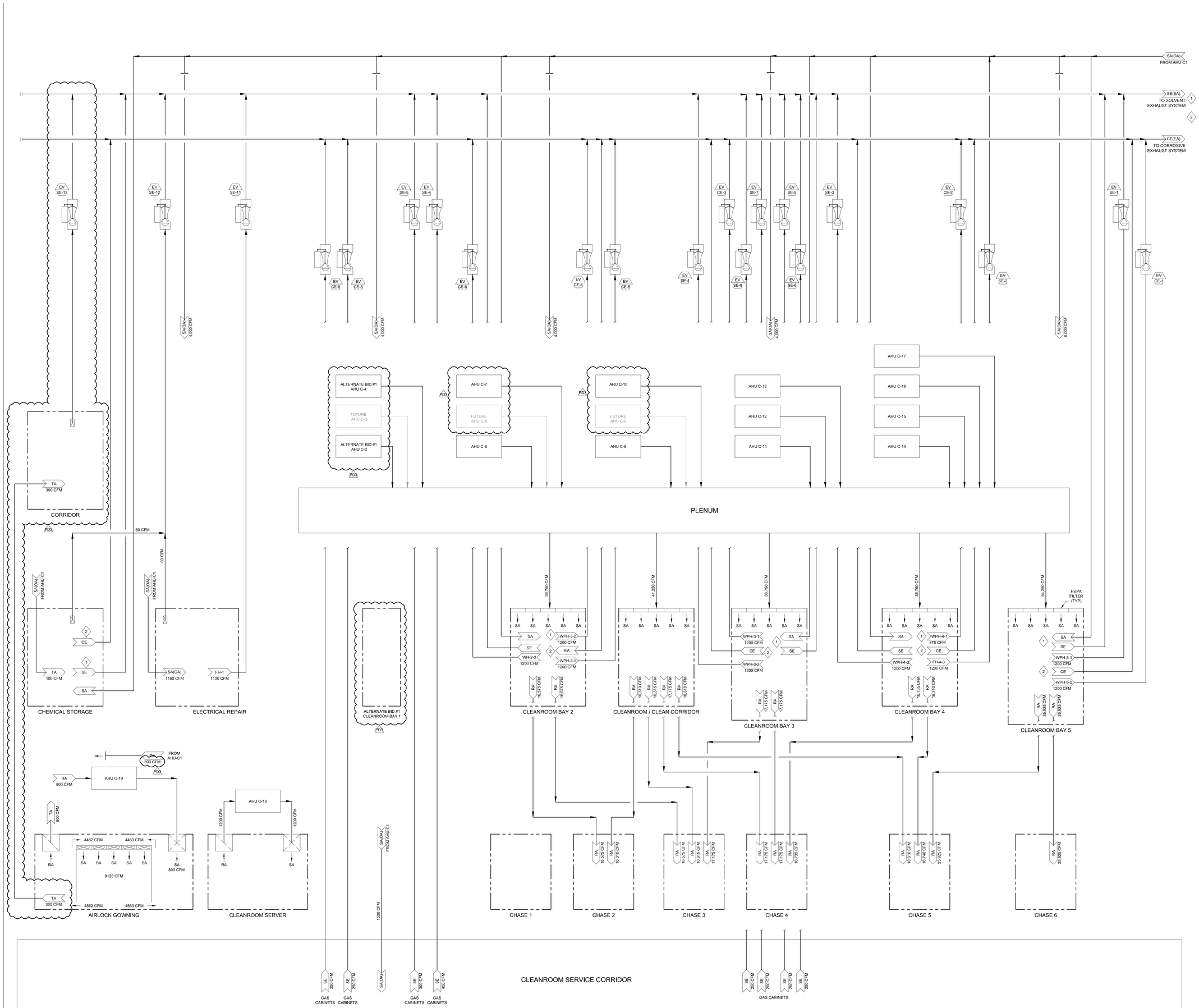
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CLEANROOM
CLEAN STEAM SYSTEM

cr-m7.10



SHEET KEYNOTES

1. 2'Ø SA TO & 2'Ø EA FROM TSS431 FLAMMABLE STORAGE CABINETS. CFM IS UNREGULATED.
2. 2'Ø EA FROM TC543 FLAMMABLE STORAGE CABINETS. CFM IS UNREGULATED.

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Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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CLEANROOM AIR FLOW DIAGRAM

cr-m7.20

WATER SYSTEM FILTERS

MARK (WF)	SERVICE	CAPACITY (GPM)	MAXIMUM PRESSURE DROP (FT)	PIPE SIZE (IN)	NUMBER OF CARTRIDGES	REMARKS
C1	CLEANROOM PROCESS CHILLED WATER	130	15	3	8	5 MICRON FILTER (1)
C2	CLEANROOM AHU CHILLED WATER	20	10	2	1	(2)
LC1	LOW TEMPERATURE CHILLED WATER	15	10	2	1	(2)
R1	RECLAIM WATER	20	10	2	1	(2)

(1) WATER FILTER HOSING TO BE CONSTRUCTED OF 304 STAINLESS STEEL.
(2)COMBINATION WATER FILER AND CHEMICAL BATCH FEEDER - 5 MICRON FILTER

AIR SEPARATORS

MARK (AS)	SYSTEM	SIZE (IN)	GPM	STRAINER	REMARKS
R1	RECLAIM WATER	4	250	NO	-

BOILER BLOWDOWN SEPARATORS

MARK (BBS)	LOCATION	CODE	MAX. OPERATING PRESSURE (PSIG)	WORKING OPERATING PRESSURE (PSIG)	BLOWDOWN PIPE SIZE (IN)	VENT SIZE (IN)	DRAIN SIZE (IN)	AFTER COOLING COOLER WATER LINE AND VALVE			REMARKS
								TEMP (°F)	WATER PRESS. (PSIG)	VALVE SIZE (IN)	
CR1	PENTHOUSE	ASME	150	15	1.25	4	4	80	50	1	-

CLEAN ROOM CLEAN STEAM GENERATORS

MARK (CSG)	LOCATION	PLANT STEAM		CLEAN STEAM		MAKE-UP WATER		REMARKS
		PRESSURE (PSIG)	FLOW REQUIRED (LB/HR)	CAPACITY (LB/HR)	PRESSURE (PSIG)	TYPE	TEMP (F)	BASED ON
CR1	PENTHOUSE	115	1500	1200	10	RO	40	-

WATER PRESSURE REGULATING VALVES

MARK (WPRV)	SYSTEM	SERVICE	SIZE (IN)	INLET PRESS. (PSIG)	OUTLET PRESS. (PSIG)	BYPASS SIZE (IN)	REMARKS
C1	PROCESS CHILLED WATER	CHILLED WATER	0.5	70	65	1	-
C2	AHU CHILLED WATER	CHILLED WATER	0.5	30	25	1	-

PUMPS

MARK (P)	LOCATION	SERVICE	TYPE	CAP. (GPM)	HEAD (FT)	MAX NPSH REQ'D (FT)	MIN. EFF. (%)	SIZE (IN)		MOTOR					REMARKS
								SUCT.	DISCH.	HP	RPM	VOLT	PH	VFD	
HWPC1	PENTHOUSE	HW AHU-C1 HC-C1	IN LINE	200	30	7	71	3	3	3	1750	460	3	NO	
HWPC2	PENTHOUSE	HW AHU-C1 HC-C2	IN LINE	95	25	4	61	2.5	2.5	1	1750	460	3	NO	
CHPC1	PENTHOUSE	CH AHU-C1 CC-C1	IN LINE	210	20	6	67	4	4	2	1150	460	3	NO	
PCH1	BASEMENT MECHANICAL ROOM	CLEANROOM PROCESS CH	END SUCTION(1)	130	230	8	57	2.5	1.5	15	3500	460	3	YES	
PCH2	BASEMENT MECHANICAL ROOM	CLEANROOM PROCESS CH	END SUCTION(1)	130	230	8	57	2.5	1.5	15	3500	460	3	YES	
ACH1	PENTHOUSE	CLEANROOM AHU CH	END SUCTION	180	90	8	67	2.5	2	7.5	1750	460	3	YES	
ACH2	PENTHOUSE	CLEANROOM AHU CH	END SUCTION	180	90	12	71	2.5	2	7.5	1750	460	3	YES	
LCH1	PENTHOUSE	LOW TEMPERATURE CH	END SUCTION	180	75	7	70	2.5	2	7.5	1750	460	3	YES	30% ETHYLENE GLYCOL
LCH2	PENTHOUSE	LOW TEMPERATURE CH	END SUCTION	180	75	7	70	2.5	2	7.5	1750	460	3	YES	30% ETHYLENE GLYCOL
RWP1	PENTHOUSE	HEAT RECLAIM WATER	END SUCTION	270	100	8	71	4	3	15	1750	460	3	NO	30% ETHYLENE GLYCOL
RWP2	PENTHOUSE	HEAT RECLAIM WATER	END SUCTION	270	100	8	71	4	3	15	1750	460	3	NO	30% ETHYLENE GLYCOL
C2	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	CLEANROOM ALTERNATE BID (2)
C3	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	FUTURE
C4	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	CLEANROOM ALTERNATE BID
C5	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C6	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	FUTURE
C7	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C8	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C9	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	FUTURE
C10	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C11	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C12	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C13	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C14	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C15	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C16	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	
C17	CLEANROOM	AIR HANDLING UNIT CHILLED WATER	IN LINE	65	15	12.4	55	1.5	1.5	0.75	1750	460	3	NO	

(1) CLOSED CLOUPED END SUCTION STAINLESS STEEL PUMP.
(2) PROVIDE 3 SPACE PUMPS.

HEAT EXCHANGERS

MARK (HX)	LOCATION	SYSTEM	TYPE	TOTAL MBH	HEAT TRANS. AREA (FT²)	CHILLED WATER					PROCESS CHILLED WATER					REMARKS
						GPM	EWT (°F)	LWT (°F)	PD (FT)	SCALE FACTOR	GPM	EWT (°F)	LWT (°F)	PD (FT)	SCALE FACTOR	
AC1	PENTHOUSE	CLEANROOM AIR HANDLING UNIT CHILLED WATER	PLATE & FRAME	960	139	160	48	60	20	0.0001	160	72	60	25	0.0001	
AC2	PENTHOUSE	CLEANROOM AIR HANDLING UNIT CHILLED WATER	PLATE & FRAME	960	139	160	48	60	20	0.0001	160	72	60	25	0.0001	
C1	BSMT MECHANICAL RM	CLEANROOM PROCESS CHILLED WATER	PLATE & FRAME	780	134	130	48	60	20	0.0001	130	72	60	25	0.0001	
C2	BSMT MECHANICAL RM	CLEANROOM PROCESS CHILLED WATER	PLATE & FRAME	780	134	130	48	60	20	0.0001	130	72	60	25	0.0001	

EXPANSION TANKS

MARK (ET)	SYSTEM	TANK VOLUME (GAL)	MIN. ACCEP. VOLUME (GAL)	DIMENSIONS			AIR CHARGE PRESSURE (PSIG)	REMARKS (1)
				DIA. (IN)	HEIGTH (IN)	SYSTEM CONN. (IN)		
CI	CLEANROOM. PROCESS CHILLED WATER	53	53	24	39	1	40	
C2	CLEANROOM AHU CHILLED WATER	53	53	24	39	1	25	
LC1	LOW TEMPERATURE CHILLED WATER	53	53	24	39	1	25	30% ETHYLENE GLYCOL
R1	RECLAIM WATER	53	53	24	39	1	25	30% ETHYLENE GLYCOL

(1) BLADDER TYPE

WATER PRESSURE RELIEF VALVES

MARK (RV)	SYSTEM	SIZE (IN)	SET PRESSURE (PSIG)	ASME	CAPACITY (MBH)	REMARKS
C1	PROCESS CHILLED WATER	0.75	75	YES	780	
C2	AHU CHILLED WATER	0.75	100	YES	1240	
LC1	LOW TEMPERATURE CHILLED WATER	0.75	75	YES	1040	
R1	RECLAIM WATER	1	75	YES	2300	

WATER FLOW METERS

MARK (WFM)	LOCATION	SYSTEM	SERVICE	TYPE	CAPACITY (GPM)	SIZE (IN)	PIPE MATERIAL	MAX. PD (FT)	REMARKS
C2	PENTHOUSE	AHU CHILLED WATER	AHU CHILLED WATER	TRANSIT TIME ULTRASONIC	230	4	CVPC	-	
C1	B-164	CLEANROOM PROCESS CHILLED WATER	CLEANROOM PROCESS CHILLED WATER	TRANSIT TIME ULTRASONIC	130	3	CVPC	-	

CHILLERS

MARK (CH)	LOCATION	TYPE	CAPACITY MBH	MAXIMUM COMPRESSOR KW	REFRIGERANT	EVAPORATOR						ELECTRICAL				REMARKS
						GPM	LWT (°F)	EWT (°F)	PASS	MAX. PD (FT)	FLUID	FOULING FACTOR	MAX. POWER INPUT (KW)	VOLT	PH	STARTER TYPE	
LC1	ROOF	AIR COOLED SCROLL COMPRESSOR	1040	138.1	410A	165	34	47.7	-	10	30% ETHYLENE GLYCOL WATER SOLUTION	0.0001	148.2	460	3	ACROSS THE LINE	105°F AMBIENT AIR TEMPERAURE (1)

(1) CHILLER IS TO HAVE A MINIMUM OF TWO INDEPENDENT REFRIGERANT CIRCUITS WITH A MINIMUM OF TWO COMPRESSORS PER CIRCUIT.

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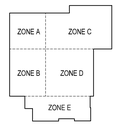
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SCHEDULES

cr-m9.01

PACKAGED AIR HANDLING UNITS

MARK (AHU)	LOCATION	SERVICE	FAN CHARACTERISTICS(4)						MOTOR				HEATING COIL						COOLING COIL (2)												FACE AND BYPASS DAMPERS	REMARKS
			CFM	MIN. O.A. CFM	WHEEL TYPE(4)	WHEEL DIA. (IN)	TSP ("WG)	ESP ("WG) (1)	HP	PH	VOLT	VFD	EAT (°F)	LAT (°F)	EWT (°F)	MAX. AIR PD ("WG)	CAPACITY (MBH)	GPM	MAX. WATER PD (FT)	EAT (°F) DB	EAT (°F) WB	LAT (°F) DB	LAT (°F) WB	MAX. FACE VEL. (FPM)	MAX. AIR PD ("WG)	MAX. WATER PD (FT)	CAPACITY (MBH) SENSIBLE	TOTAL (MBH)	GPM	EWT (°F)	LWT (°F)		
C18	SERVICE CHASE NO. 1	CLEANROOM SEVER	1,200	0	AF	12	2	.35	1	3	460	NO	68	72.6	180	0.1	6	0.6	5	77	59.5	68	56	450	0.75	10	12	12	2.6	60	71.2	NO	
C19	SERVICE CHASE NO. 1	AIR LOCK/GOWNING	800	0	AF	12	2	.35	1	3	460	NO	68	78.4	180	0.1	9	0.9	5	77.5	59.6	68	59.6	450	0.75	10	8.6	8.6	1.7	60	72.1	NO	

(1) ESP TO EXCLUDE PD OF UNIT COMPONENTS FURNISHED BY UNIT MANUFACTURER SUCH AS COILS, FACE AND BYPASS DAMPERS, HOT AND COLD DECK DAMPERS, INLET VANES AND PERFORATED DIFFUSER PLATES WHERE REQUIRED.
(2) MAX. 6 ROWS 8 FINS INCH.
(3) REFER TO FILTER.
(4) DRECT DRIVE PLENUM FAN.

VARIABLE FREQUENCY DRIVES

MARK (VFD)	SYSTEM	MAX. HORSEPOWER	INPUT ELECTRICAL CHARACTERISTICS			INTERLOCK	REMARKS
			VOLT	FREQUENCY	PHASE		
C1A	AHU-C1	100	460	60	3	-	
C1B	AHU-C1	100	460	60	3	-	REDUNDANT VFD
C2A	AHU-C2	15	460	60	3	-	(1)
C2B	AHU-C2	15	460	60	3	-	REDUNDANT VFD (1)
C3A	AHU-C3	15	460	60	3	-	(2)
C3B	AHU-C3	15	460	60	3	-	REDUNDANT VFD (2)
C4A	AHU-C4	15	460	60	3	-	(1)
C4B	AHU-C4	15	460	60	3	-	REDUNDANT VFD (1)
C5A	AHU-C5	15	460	60	3	-	
C5B	AHU-C5	15	460	60	3	-	REDUNDANT VFD
C6A	AHU-C6	15	460	60	3	-	REDUNDANT VFD (2)
C6B	AHU-C6	15	460	60	3	-	(2)
C7A	AHU-C7	15	460	60	3	-	
C7B	AHU-C7	15	460	60	3	-	REDUNDANT VFD
C8A	AHU-C8	15	460	60	3	-	
C8B	AHU-C8	15	460	60	3	-	REDUNDANT VFD
C9A	AHU-C9	15	460	60	3	-	REDUNDANT VFD (2)
C9B	AHU-C9	15	460	60	3	-	(2)
C10A	AHU-C10	15	460	60	3	-	
C10B	AHU-C10	15	460	60	3	-	REDUNDANT VFD
C11A	AHU-C11	15	460	60	3	-	
C11B	AHU-C11	15	460	60	3	-	REDUNDANT VFD
C12A	AHU-C12	15	460	60	3	-	
C12B	AHU-C12	15	460	60	3	-	REDUNDANT VFD
C13A	AHU-C13	15	460	60	3	-	
C13B	AHU-C13	15	460	60	3	-	REDUNDANT VFD
C14A	AHU-C14	15	460	60	3	-	
C14B	AHU-C14	15	460	60	3	-	REDUNDANT VFD
C15A	AHU-C15	15	460	60	3	-	
C15B	AHU-C15	15	460	60	3	-	REDUNDANT VFD
C16A	AHU-C16	15	460	60	3	-	
C16B	AHU-C16	15	460	60	3	-	REDUNDANT VFD
C17A	AHU-C17	15	460	60	3	-	
C17B	AHU-C17	15	460	60	3	-	REDUNDANT VFD
SE1	EF-SE1	30	460	60	3	-	
SE2	EF-SE2	30	460	60	3	-	
CE1	EF-CE1	25	460	60	3	-	
CE2	EF-CE2	25	460	60	3	-	
PCH1	P-PCH1	25	460	60	3	-	
PCH2	P-PCH2	25	460	60	3	-	
ACH1	P-ACH1	7.5	460	60	3	-	
ACH2	P-ACH2	7.5	460	60	3	-	

(1) CLEANROOM ALTERNATE BID
(2) FUTURE

HEATING COILS IN AIR HANDLING UNITS

MARK (HC)	SYSTEM	NO.	TOTAL CAP.		NOMINAL SIZE			AIR SIDE				WATER SIDE				REMARKS
			MBH	CFM	FACE AREA (F²)	DIM (IN) H	DIM (IN) L	MAX. FACE VEL.	MAX. PD ("WG)	EAT (°F)	LAT (°F)	GPM	MAX. PD (FT)	MIN WATER VELOCITY FPS	EWT (°F)	
C1	AHU-C1	3	2,848	35,000	70	30	112	500	0.3	-20	55	190	15	1.7	130	PREHEAT COIL(1)
C2	AHU-C1	3	987	35,000	70	30	112	500	0.1	42	68	110	10	4	130	REHEAT COIL(2)

(1) MAX. 4 ROW AND 6 FINS/IN.
(2) MAX. 2 ROW AND 8 FINS/IN.

HEAT RECOVERY UNITS

MARK (HRU)	SYSTEM	GLYCOL HEAT RECOVERY COIL(1) & (2)											HR COIL NOMINAL SIZE		BY-PASS DAMPER		FACE DAMPERS		FILTERS	REMARKS
		CAPACITY		AIR SIDE				WATER SIDE					TOTAL FACE AREA (SQFT)	QUANITY	DIM (IN) H	DIM (IN) L	DIM (IN) H	DIM (IN) L	DIM (IN) H	DIM (IN) L	REFER TO FILTER SCHEDULE	
		SENSIBLE MBH	CFM	MAX. FACE VEL.	MAX. PD ("WG)	EAT (DEGF) DB	EAT (DEGF) WB	LAT (DEGF) DB	GPM	EWT (DEGF) DB	LWT (DEGF) DB	MAX. PD (FT)									
SE1	SOLVENT EXHAUST	586.4	15,000	462	0.6	75	42.6	42.1	80	33.4	48.9	15	32.5	2	36	65	18	72	72	72	F-SE-1	(1), (2) & (3)

(1) HERESITE COATED
(2) HEAT RECLAIM SYSTEM USE 30% ETHYLENE GLYCOL SOLUTION. MAXIMUM 8 ROWS 10 FINS PER INCH.
(3) ROOF TOP UNITS.

HUMIDIFIERS

MARK (H)	LOCATION	SYSTEM	TYPE	CFM	CAPACITY (LBS/HR)	STEAM PRESSURE AT STEAM DISPERATION UNIT (PSIG)	MANIFOLD LENGTH (IN)	ENTERING AIR TEMPERATURE DB(°F) / WB(°F) / GR PER LB	LEAVING AIR TEMPERATURE DB(°F) / WB(°F) / GR PER LB	MAX. ABSORPTION DISTANCE (INCHES)	REMARKS
C1	PENTHOUSE	AHU-C1	STEAM DISPERATION	35,000	900	2(3)	REFER TO DRAWINGS	60 / 38.2 / 0	60 / 50.5 / 39.4	18	STEAM DISPERATION TYPE HUMIDIFIER(1) & (2)
C2	PENTHOUSE	AHU-C2	STEAM DISPERATION	35,000	150	2(3)	REFER TO DRAWINGS	60 / 50.5 / 39.4	68 / 55.8 / 47	18	STEAM DISPERATION TYPE HUMIDIFIER(1) & (2)

(1) RO WATER IS USED FOR MAKEUP.
(2) PROVIDE INSULATED TUBES IN MANIFOLD, CONTROL VALVE AND HUMIDIFICATION CONTROLS PROVIDED BY CLEANROOM CONTROL CONTRACTOR.
(3) 9 PSIG AT INLET OF CONTOL VALVE AND 2 PSIG AT STEAM DISPERATION HUMIDIFIER.

FACTORY FABRICATED CUSTOM AIR HANDLING UNITS

MARK (AHU)	LOCATION	SERVICE	CFM	MIN. OA (%)	SUPPLY FAN	HEAT RECOVERY COILS	COOLING COILS	HEATING COILS	HUMIDIFIERS	FILTERS	REMARKS
C1	PENTHOUSE	CLEANROOM OA	35,000	100	SF-C1A, 1B, 1C & 1D	HRC-C1	CC-C1A & CC-1B	HC-C1 & HC-C2	H-C1	F-C1A, F-C1B & F-C1C	(1)
C2	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C2A, 2B, 2C & 2D	-	CC-C2	-	-	F-C2	(1) CLEANROOM ALTERNATE BID
C3	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C3A, 3B, 3C & 3D	-	CC-C3	-	-	F-C3	(1) FUTURE
C4	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C4A, 4B, 4C & 4D	-	CC-C4	-	-	F-C4	(1) CLEANROOM ALTERNATE BID
C5	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C5A, 5B, 5C & 5D	-	CC-C5	-	-	F-C5	(1)
C6	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C6A, 6B, 6C & 6D	-	CC-C6	-	-	F-C6	(1) FUTURE
C7	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C7A, 7B, 7C & 7D	-	CC-C7	-	-	F-C7	(1)
C8	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C8A, 8B, 8C & 8D	-	CC-C8	-	-	F-C8	(1)
C9	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C9A, 9B, 9C & 9D	-	CC-C9	-	-	F-C9	(1) FUTURE
C10	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C10A, 10B, 10C & 10D	-	CC-C10	-	-	F-C10	(1)
C11	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C11A, 11B, 11C & 11D	-	CC-C11	-	-	F-C11	(1)
C12	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C12A, 12B, 12C & 12D	-	CC-C12	-	-	F-C12	(1)
C13	CLEANROOM	CLEANROOM RECIRULATING	15,500	0	SF-C13A, 13B, 13C & 13D	-	CC-C13	-	-	F-C13	(1)
C14	CLEANROOM	CLEANROOM RECIRULATING	14,375	0	SF-C14A, 14B, 14C & 14D	-	CC-C14	-	-	F-C14	(1)
C15	CLEANROOM	CLEANROOM RECIRULATING	14,375	0	SF-C15A, 15B, 15C & 15D	-	CC-C15	-	-	F-C15	(1)
C16	CLEANROOM	CLEANROOM RECIRULATING	14,375	0	SF-C16A, 16B, 16C & 16D	-	CC-C16	-	-	F-C16	(1)
C17	CLEANROOM	CLEANROOM RECIRULATING	14,375	0	SF-C17A, 17B, 17C & 17D	-	CC-C17	-	-	F-C17	(1)

(1) REFER TO INDIVIDUAL EQUIPMENT SCHEDULE.

HEAT RECOVERY COILS IN FACTORY FABRICATED CUSTOM AIR HANDLING UNITS

MARK (HRC)	SYSTEM	TOTAL CAP.		NOMINAL SIZE			AIR SIDE				WATER SIDE(1)				REMARKS
		MBH	CFM	FACE AREA (SQFT)	NO. OF COILS	DIM (IN) H	DIM (IN) L	MAX. FACE VEL.	MAX. PD ("WG)	EAT (°F)	LAT (°F)	GPM	MAX. PD (FT)	EWT (°F)	
C1	AHU-C1	2,214.0	35,000	74.3	3	33	108	475.0	0.5	-20	38.3	245	20	53.1	-

(1) HEAT RECLAIM SYSTEM USE 30% ETHYLENE GLYCOL SOLUTION.
(2) MAXIMUM 8 ROWS 10 FINS PER INCH.

COOLING COILS IN FACTORY FABRICATED CUSTOM AIR HANDLING UNITS

MARK (CC)	SYSTEM	NO. OF COILS	TOTAL CAP.		NOMINAL SIZE	DIM (IN) FINNED		AIR SIDE		EAT (°F)		LAT (°F)		WATER SIDE				REMARKS
			MBH	CFM	FACE AREA (SQFT)	H	L	MAX. FACE VEL.	MAX. PD ("WG)	DB	WB	DB	WB	TOTAL GPM	MAX. PD (FT)	MIN. WATER VEL.(FPS)	EWT (°F)	
C1A	AHU-C1	3	3,948	35,000	88.0	33	128	400	0.7	96.5	83.5	53.8	53.7	435	20	4.8	42	MAX. 10 ROWS 8 FINS PER INCH
C1B	AHU-C1	3	1,040	35,000	88.0	33	128	400	0.5	54.4	54.2	43	43	165	25	3.8	34	MAX. 8 ROWS 8 FINS PER INCH(1)
C2	AHU-C2	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH(3)
C3	AHU-C3	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH (2)
C4	AHU-C4	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH(3)
C5	AHU-C5	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C6	AHU-C6	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH (2)
C7	AHU-C7	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C8	AHU-C8	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C9	AHU-C9	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH (2)
C10	AHU-C10	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C11	AHU-C11	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C12	AHU-C12	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C13	AHU-C13	2	57.2	15500	33.0	36	66	470	0.25	71.4	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C14	AHU-C14	2	54.6	14375	33.0	36	66	436	0.25	71.5	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C15	AHU-C15	2	54.6	14375	33.0	36	66	436	0.25	71.5	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C16	AHU-C16	2	54.6	14375	33.0	36	66	436	0.25	71.5	56.8	68	55.1	65	5	3	60	MAX. 2 ROWS 8 FINS PER INCH
C17	AHU-C17	2	54.6	14375	33.0	36	66	436	0.25	71.5	56.8	68	55.1	65	5	3	58	MAX. 2 ROWS 8 FINS PER INCH

(1) 30% ETHYLENE GLYCOL WATER SOLUTION.
(2) FUTURE
(3) CLEAN ROOM ALTERNATE BID.

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

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Date 02-24-2012 Reg. No. 25364

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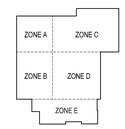
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



UNIVERSITY OF MINNESOTA
Driven to Discover℠

SCHEDULES

cr-m9.02

SUPPLY, RETURN, AND EXHAUST FANS

MARK SF/EF	LOCATION	SERVICE	CFM	SP ("WG)	FAN TYPE	DRIVE	WHEEL TYPE	MIN. DIA.	MAXIMUM RPM	FAN CLASS	FAN ARRANGEMENT	FAN MOTOR LOCATION(3)	FAN DISCHARGE AND ROTATION(3)	DAMPER	INTERLOCK	MAX. DISCHARGE/INLET SOUND POWER LEVELS(1) 63 HZ	125 HZ	250 HZ	500 HZ	1000 HZ	2000 HZ	4000 HZ	8000 HZ	MOTOR HP	PH	VOLT	VFD	REMARKS
SF-C1A, C1B, C1C & C1D	PENTHOUSE	CLEANROOM	8,750	9	PLENUM	DIRECT	AF	20	3,839	III	4	-	-	BACKDRAFT	-	97	100	99	100	101	99	95	90	25 HP EA, 100 TOTAL (5)	3	460	YES	
SF-C2A, C2B, C2C & C2D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	CLEANROOM ALTERNATE BID
SF-C3A, C3B, C3C & C3D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	FUTURE
SF-C4A, C4B, C4C & C4D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	CLEANROOM ALTERNATE BID
SF-C5A, C5B, C5C & C5D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C6A, C6B, C6C & C6D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	FUTURE
SF-C7A, C7B, C7C & C7D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C8A, C8B, C8C & C8D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C9A, C9B, C9C & C9D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	FUTURE
SF-C10A, C10B, C10C & C10D	CLEANROOM	CLEANROOM	3875(7)	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C11A, C11B, C11C & C11D	CLEANROOM	CLEANROOM	3,875	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C12A, C12B, C12C & C12D	CLEANROOM	CLEANROOM	3,875	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C13A, C13B, C13C & C13D	CLEANROOM	CLEANROOM	3,875	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	85/85	91/90	84/81	785/79	82/78	74/75	68/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C14A, C14B, C14C & C14D	CLEANROOM	CLEANROOM	3,595	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	87/85	90/90	84/84	86/79	82/78	74/74	67/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C15A, C15B, C15C & C15D	CLEANROOM	CLEANROOM	3,595	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	87/85	90/90	84/84	86/79	82/78	74/74	67/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C16A, C16B, C16C & C16D	CLEANROOM	CLEANROOM	3,595	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	87/85	90/90	84/84	86/79	82/78	74/74	67/67	3 EA, 12 TOTAL(6)	3	460	YES	
SF-C17A, C17B, C17C & C17D	CLEANROOM	CLEANROOM	3,595	2.5	PLENUM	DIRECT	AF	18	1,770	I	4	-	-	BACKDRAFT	-	83/82	87/85	90/90	84/84	86/79	82/78	74/74	67/67	3 EA, 12 TOTAL(6)	3	460	YES	
EF-SE1	ROOF	CLEANROOM-SOLVENT EXHAUST	15,000	7	SWSI	DIRECT	BI	40	1,221	II	8	-	-	-	-	98	106	100	92	91	89	85	82	30	3	460	YES	(1) &(2)
EF-SE2	ROOF	CLEANROOM-SOLVENT EXHAUST	15,000	7	SWSI	DIRECT	BI	40	1,221	II	8	-	-	-	-	98	106	100	92	91	89	85	82	30	3	460	YES	(1) &(2)
EF-CE1	ROOF	CLEANROOM-CORROSIVE EXHAUST	15,000	5.5	SWSI	DIRECT	BI	36	1,371	II	4	-	-	-	-	93	103	97	89	88	86	82	79	25	3	460	YES	(2) & (4)
EF-CE2	ROOF	CLEANROOM-CORROSIVE EXHAUST	15,000	5.5	SWSI	DIRECT	BI	36	1,371	II	4	-	-	-	-	93	103	97	89	88	86	82	79	25	3	460	YES	(2) & (4)

(1) FANS TO BE HERESITE COATED
(2) PROVIDE TEFC MOTOR AND WEATHER PROOF ENCLOSURE
(3) REFER TO DRAWINGS.
(4) FANS TO BE 316 SS WITH TEFLON COATING .
(5) FOUR 25 HP SUPPLY FANS SERVED BY ONE 100 HP VFD, WITH REDUNDANT VFD.
(6) FOUR 3 HP SUPPLY FANS SERVED BY ONE 15 HP VFD, WITH REDUNDANT VFD.
(7) FUTURE CFM LISTED, BALANCE TO 2910 CFM FOR PRESENT.

SOUND ATTENUATING DEVICES

MARK SAD	LOCATION	SERVICE	TOTAL CAPACITY (CFM)	MAX. VEL. (FPM)	MAX. PD ("WG)	OVERALL DIMENSION (IN) H / DIA.	W	L	DYNAMIC INSERTION LOSS 63	125	250	500	1000	2000	4000	8000	REMARKS
C1	PENTHOUSE	AHU-C1 SA	35,000	1,667	0.25	36	84	114	11	17	28	38	30	25	20	12	ELBOW PACKLESS GALVANIZED STEEL
SE1	ROOF	EF-SE-1 OA BYPASS	7,470	2,801	0.75	24	16	36	8	6	13	16	10	9	7	7	PACKLESS 316 STAINLESS STEEL
CE1	ROOF	EF-CE-1 OA BYPASS	7,200	2,700	0.75	24	16	36	8	6	13	16	10	9	7	7	TEFLON COATEDPACKLESS 316 STAINLESS STEEL

CONSTANT VOLUME EXHAUST AIR VALVES

MARK EV	LOCATION	SERVICE	SYSTEM	CFM	MAXIMUM UNIT PD ("WG)	MINIMUM INLET SIZE (IN)	REMARKS
CE1	(1)	WPH-5-2	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING
CE2	(1)	WH-4-1	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING
CE3	(1)	WH-3-1	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING
CE4	(1)	WPH-2-2	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING
CE5	(1)	WPH-2-1	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING
CE6	(1)	WPH-1-2	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING
CE-7	(1)	WPH-1-1	CORROSIVE EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH PVDF COATING (2)
SE1	(1)	WPH-5-1	SOLVENT EXHAUST SYSTEM	1900	0.6	14	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE2	(1)	WPH-4-2	SOLVENT EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE3	(1)	WPH-4-1	SOLVENT EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE4	(1)	WPH-3-2	SOLVENT EXHAUST SYSTEM	1200	0.6	12	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE5	(1)	GAS CABINET	SOLVENT EXHAUST SYSTEM	450	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE6	(1)	GAS CABINET	SOLVENT EXHAUST SYSTEM	250	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE7	(1)	GAS CABINET	SOLVENT EXHAUST SYSTEM	250	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE8	(1)	GAS CABINET	SOLVENT EXHAUST SYSTEM	250	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE9	(1)	GAS CABINET	SOLVENT EXHAUST SYSTEM	250	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE10	(1)	GAS CABINET	SOLVENT EXHAUST SYSTEM	250	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE11	(1)	FH-1	SOLVENT EXHAUST SYSTEM	1100	0.6	12	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE12	(1)	SNORKEL'S	SOLVENT EXHAUST SYSTEM	100	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING
SE-13	(1)	GENERAL EXHAUST	SOLVENT EXHAUST SYSTEM	300	0.6	8	MATERIAL TO BE ALUMINUM WITH BAKED HERESITE COATING

(1) REFER TO DRAWINGS.
(2) CLEANROOM ALTERNAT BID NO. 1.
* SEE SPECIFICATION FOR MAXIMUM SOUND POWER LEVEL PER OCTAVE BAND.

FILTERS AND FILTER HOUSINGS

MARK F	SYSTEM	LOCATION	TYPE	CFM	MIN. FACE AREA (SQFT)	PRESS. DROP ("WG) INITIAL	FINAL	PD FOR FAN TSP AND AIR BALANCE	MIN. EFF. (%)	MERV RATING	MEDIA LENGTH (IN)	REMARKS
C1A	AHU-C1	PENTHOUSE	PLEATED	35,000	90	0.3	0.8	0.8	-	8	2	
C1B & 1C	AHU-C1	PENTHOUSE	CARTRIDGE	35,000	90	0.6	1.5	1.2	-	14	12	PROVIDE 2" PREFILTER RACK
C1D	AHU-C1	PENTHOUSE	HEPA	35,000	90	1	2	1.5	99.97	-	12	
C2	AHU-C2	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	CLEANROOM ALTERNATE BID
C3	AHU-C3	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	FUTURE
C4	AHU-C4	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	CLEANROOM ALTERNATE BID
C5	AHU-C5	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C6	AHU-C6	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	FUTURE
C7	AHU-C7	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C8	AHU-C8	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C9	AHU-C9	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	FUTURE
C10	AHU-C10	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C11	AHU-C11	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C12	AHU-C12	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C13	AHU-C13	CLEANROOM	PLEATED	15500	40	0.3	0.8	0.8	-	8	4	
C14	AHU-C14	CLEANROOM	PLEATED	14375	40	0.3	0.8	0.8	-	8	4	
C15	AHU-C15	CLEANROOM	PLEATED	14375	40	0.3	0.8	0.8	-	8	4	
C16	AHU-C16	CLEANROOM	PLEATED	14375	40	0.3	0.8	0.8	-	8	4	
C17	AHU-C17	CLEANROOM	PLEATED	14375	40	0.3	0.8	0.8	-	8	4	
C18	AHU-C18	CLEANROOM	PLEATED	1,200	4	0.3	0.8	0.8	-	8	2	
C19	AHU-C19	CLEANROOM	PLEATED	800	4	0.3	0.8	0.8	-	8	2	
SE-1	HRU-SE-1	ROOF	PLEATED	15,000	30	0.3	0.8	0.8	-	8	2	

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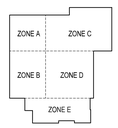
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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



UNIVERSITY OF MINNESOTA
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SCHEDULES

cr-m9.03

VALVES

MARK (V)	SERVICE	TYPE	LINE SIZE (IN)	GPM (LBS/HR)	CV@90% STROKE MAX. (3 PSID)	CV@90% STROKE MIN. (5 PSID)	SHUTOFF PRESSURE DIFFERENTIAL (PSI)	ACTUATOR TYPE	ACTUATOR FAIL POSITION	REMARKS
C1A	GW	3-WAY	--	245	145,6	112.8	150	ELEC / MOD	BYPASS	SIEMENS MAGNETIC VALVE
C1B	HW	2-WAY GLOBE	--	75	43.3	33.5	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C1C	HW	2-WAY GLOBE	--	35	20.2	15,7	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C1D	CH	(4)	--	435	251,1	194,5	150	ELEC / MOD	FLP	PRESSURE INDEPENDENT
C1E	LCH	3-WAY GLOBE	--	165	98,1	76,0	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C1F	HW	2-WAY GLOBE	--	110	63,5	49,2	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C1G	HPS(250)	2-WAY GLOBE	--	(1500)	46,5	46,5	250	ELEC / MOD	FC	SIEMENS MAGNETIC VALVE (1)
C1H	LPS	2-WAY GLOBE	--	(900)	28,1	28,1	80	ELEC / MOD	FC	SIEMENS MAGNETIC VALVE (1)
C1J	LPS	2-WAY GLOBE	--	(150)	4,6	4,6	80	ELEC / MOD	FC	SIEMENS MAGNETIC VALVE (1)
C2	ACH	2-WAY GLOBE	--	9,6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE (2)
C3	ACH	2-WAY GLOBE	--	9.6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE (3)
C4	ACH	2-WAY GLOBE	--	9.6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE (2)
C5	ACH	2-WAY GLOBE	--	9,6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C6	ACH	2-WAY GLOBE	--	9,6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE (3)
C7	ACH	2-WAY GLOBE	--	9.6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C8	ACH	2-WAY GLOBE	--	9.6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C9	ACH	2-WAY GLOBE	--	9,6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE (3)
C10	ACH	2-WAY GLOBE	--	9.6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C11	ACH	2-WAY GLOBE	--	9.6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C12	ACH	2-WAY GLOBE	--	9,6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C13	ACH	2-WAY GLOBE	--	9,6	5.7	4,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C14	ACH	2-WAY GLOBE	--	9,1	5,4	4,2	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C15	ACH	2-WAY GLOBE	--	9,1	5,4	4,2	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C16	ACH	2-WAY GLOBE	--	9,1	5,4	4,2	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C17	ACH	2-WAY GLOBE	--	9,1	5,4	4,2	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C18-1	HWR	2-WAY GLOBE	--	0,6	0,4	0,3	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C18-2	ACH	2-WAY GLOBE	--	2,6	1.5	1,2	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C19-1	HWR	2-WAY GLOBE	--	0,9	0,5	0,4	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
C19-2	ACH	2-WAY GLOBE	--	1,7	1.0	0,8	150	ELEC / MOD	FLP	SIEMENS MAGNETIC VALVE
PCH-1	CH	(4)	--	130	75,1	58,1	150	ELEC / MOD	FLP	PRESSURE INDEPENDENT
PCH-2	CH	(4)	--	130	75,1	58,1	150	ELEC / MOD	FLP	PRESSURE INDEPENDENT
PCH-3	PCH	2-WAY B-FLY	3	130	--	--	150	ELEC / 2-POS	FLP	LINE SIZE
PCH-4	PCH	2-WAY B-FLY	3	130	--	--	150	ELEC / 2-POS	FLP	LINE SIZE
AC-1	CHS	(4)	--	160	92,4	71,6	150	ELEC / MOD	FLP	PRESSURE INDEPENDENT
AC-2	CHS	(4)	--	160	92,4	71,6	150	ELEC / MOD	FLP	PRESSURE INDEPENDENT
AC-3	ACHR	2-WAY B-FLY	4	160	--	--	150	ELEC / 2-POS	FLP	LINE SIZE
AC-4	ACHR	2-WAY B-FLY	4	160	--	--	150	ELEC / 2-POS	FLP	LINE SIZE

(1) STEAM CONTROL VALVE SIZED WITH 120 PSIG INLET. STEAM CONTROL VALVE TO BE RATED FOR 300 PSIG.
(2) CLEAN ROOM ALTERNATE BID .
(3) FUTURE
(4) SELF BALANCING PRESSURE INDEPENDENT CONTROL VALVE.

CONTROL DAMPERS

TAG (D)	SERVICE	BLADE TYPE OPPOSED	BLADE TYPE PARALLEL	FAIL POSITION FC	FAIL POSITION FO	FAIL POSITION FLP	SIZE (IN) W	SIZE (IN) H	LOW LEAK SEALS	INSULATED	REMARKS
C1A	OA	X		X			108	36	YES	YES	AHU-C1 OA
C1B	RA	X		X			58	34	YES	NO	AHU-C1 RA FROM RF-O1
SE2	EA		X			X	26	42	YES	NO	EF-SE-1 ISOLATION DAMPER
SE3	EA		X			X	26	42	YES	NO	EF-SE-2 ISOLATION DAMPER
SE4	EA	X				X	24	16	YES	NO	EF-SE-1 & 2 OA BYPASS DAMPER
CE1	EA		X			X	26	38	YES	NO	EF-CE-1 ISOLATION DAMPER
CE2	EA		X			X	26	38	YES	NO	EF-CE-2 ISOLATION DAMPER
CE3	EA	X				X	24	16	YES	NO	EF-CE-1 & 2 OA BYPASS DAMPER

AIR FLOW METERS

MARK (AFM)	LOCATION	SYSTEM	CFM	TYPE	DUCT SIZE (IN)	MAXIMUM PRESSURE DROP("WG)	REMARKS
CR1A	CLEANROOM SUPPLY FAN	AHU-C1	8750	(1)	-	0,1	AFM TO BE AT FAN INLET
CR1B	CLEANROOM SUPPLY FAN	AHU-C1	8750	(1)	-	0,1	AFM TO BE AT FAN INLET
CR1C	CLEANROOM SUPPLY FAN	AHU-C1	8750	(1)	-	0,1	AFM TO BE AT FAN INLET
CR1D	CLEANROOM SUPPLY FAN	AHU-C1	8750	(1)	-	0,1	AFM TO BE AT FAN INLET
CR2A	CLEANROOM SUPPLY FAN	AHU-C2	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR2B	CLEANROOM SUPPLY FAN	AHU-C2	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR2C	CLEANROOM SUPPLY FAN	AHU-C2	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR2D	CLEANROOM SUPPLY FAN	AHU-C2	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR3A	CLEANROOM SUPPLY FAN	AHU-C3	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR3B	CLEANROOM SUPPLY FAN	AHU-C3	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR3C	CLEANROOM SUPPLY FAN	AHU-C3	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR3D	CLEANROOM SUPPLY FAN	AHU-C3	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR4A	CLEANROOM SUPPLY FAN	AHU-C4	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR4B	CLEANROOM SUPPLY FAN	AHU-C4	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR4C	CLEANROOM SUPPLY FAN	AHU-C4	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR4D	CLEANROOM SUPPLY FAN	AHU-C4	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, CLEANROOM ALTERNATE BID
CR5A	CLEANROOM SUPPLY FAN	AHU-C5	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR5B	CLEANROOM SUPPLY FAN	AHU-C5	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR5C	CLEANROOM SUPPLY FAN	AHU-C5	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR5D	CLEANROOM SUPPLY FAN	AHU-C5	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR6A	CLEANROOM SUPPLY FAN	AHU-C6	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR6B	CLEANROOM SUPPLY FAN	AHU-C6	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR6C	CLEANROOM SUPPLY FAN	AHU-C6	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR6D	CLEANROOM SUPPLY FAN	AHU-C6	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR7A	CLEANROOM SUPPLY FAN	AHU-C7	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR7B	CLEANROOM SUPPLY FAN	AHU-C7	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR7C	CLEANROOM SUPPLY FAN	AHU-C7	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR7D	CLEANROOM SUPPLY FAN	AHU-C7	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR8A	CLEANROOM SUPPLY FAN	AHU-C8	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR8B	CLEANROOM SUPPLY FAN	AHU-C8	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR8C	CLEANROOM SUPPLY FAN	AHU-C8	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR8D	CLEANROOM SUPPLY FAN	AHU-C8	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR9A	CLEANROOM SUPPLY FAN	AHU-C9	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR9B	CLEANROOM SUPPLY FAN	AHU-C9	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR9C	CLEANROOM SUPPLY FAN	AHU-C9	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR9D	CLEANROOM SUPPLY FAN	AHU-C9	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET, FUTURE
CR10A	CLEANROOM SUPPLY FAN	AHU-C10	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR10B	CLEANROOM SUPPLY FAN	AHU-C10	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR10C	CLEANROOM SUPPLY FAN	AHU-C10	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR10D	CLEANROOM SUPPLY FAN	AHU-C10	3875(2)	(1)	-	0,1	AFM TO BE AT FAN INLET
CR11A	CLEANROOM SUPPLY FAN	AHU-C11	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR11B	CLEANROOM SUPPLY FAN	AHU-C11	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR11C	CLEANROOM SUPPLY FAN	AHU-C11	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR11D	CLEANROOM SUPPLY FAN	AHU-C11	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR12A	CLEANROOM SUPPLY FAN	AHU-C12	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR12B	CLEANROOM SUPPLY FAN	AHU-C12	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR12C	CLEANROOM SUPPLY FAN	AHU-C12	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR12D	CLEANROOM SUPPLY FAN	AHU-C12	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR13A	CLEANROOM SUPPLY FAN	AHU-C13	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR13B	CLEANROOM SUPPLY FAN	AHU-C13	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR13C	CLEANROOM SUPPLY FAN	AHU-C13	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR13D	CLEANROOM SUPPLY FAN	AHU-C13	3,585	(1)	-	0,1	AFM TO BE AT FAN INLET
CR14A	CLEANROOM SUPPLY FAN	AHU-C14	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR14B	CLEANROOM SUPPLY FAN	AHU-C14	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR14C	CLEANROOM SUPPLY FAN	AHU-C14	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR14D	CLEANROOM SUPPLY FAN	AHU-C14	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR15A	CLEANROOM SUPPLY FAN	AHU-C15	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR15B	CLEANROOM SUPPLY FAN	AHU-C15	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR15C	CLEANROOM SUPPLY FAN	AHU-C15	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR15D	CLEANROOM SUPPLY FAN	AHU-C15	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR16A	CLEANROOM SUPPLY FAN	AHU-C16	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR16B	CLEANROOM SUPPLY FAN	AHU-C16	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR16C	CLEANROOM SUPPLY FAN	AHU-C16	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR16D	CLEANROOM SUPPLY FAN	AHU-C16	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR17A	CLEANROOM SUPPLY FAN	AHU-C17	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR17B	CLEANROOM SUPPLY FAN	AHU-C17	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR17C	CLEANROOM SUPPLY FAN	AHU-C17	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CR17D	CLEANROOM SUPPLY FAN	AHU-C17	3,815	(1)	-	0,1	AFM TO BE AT FAN INLET
CRR1	CLEANROOM OFFICE MAKEUP AIR DUCT	AHU-C1	30000	THERMAL DISPERSION	84X24	0.25	-

(1) REFER TO FAN SPECIFICATION.
(2) FUTURE CFM LISTED, BALANCE TO 2910 CFM FOR PRESENT.

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For AFFILIATED ENGINEERS, INC.

By

Name MICHAEL J. BROGE

Date 02-24-2012 Reg. No. 25364

Issued for	Date
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Bid Package No. 2	02-24-2012

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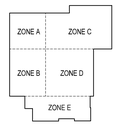
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Date 12/16/11

Project

Physics and Nanotechnology Building

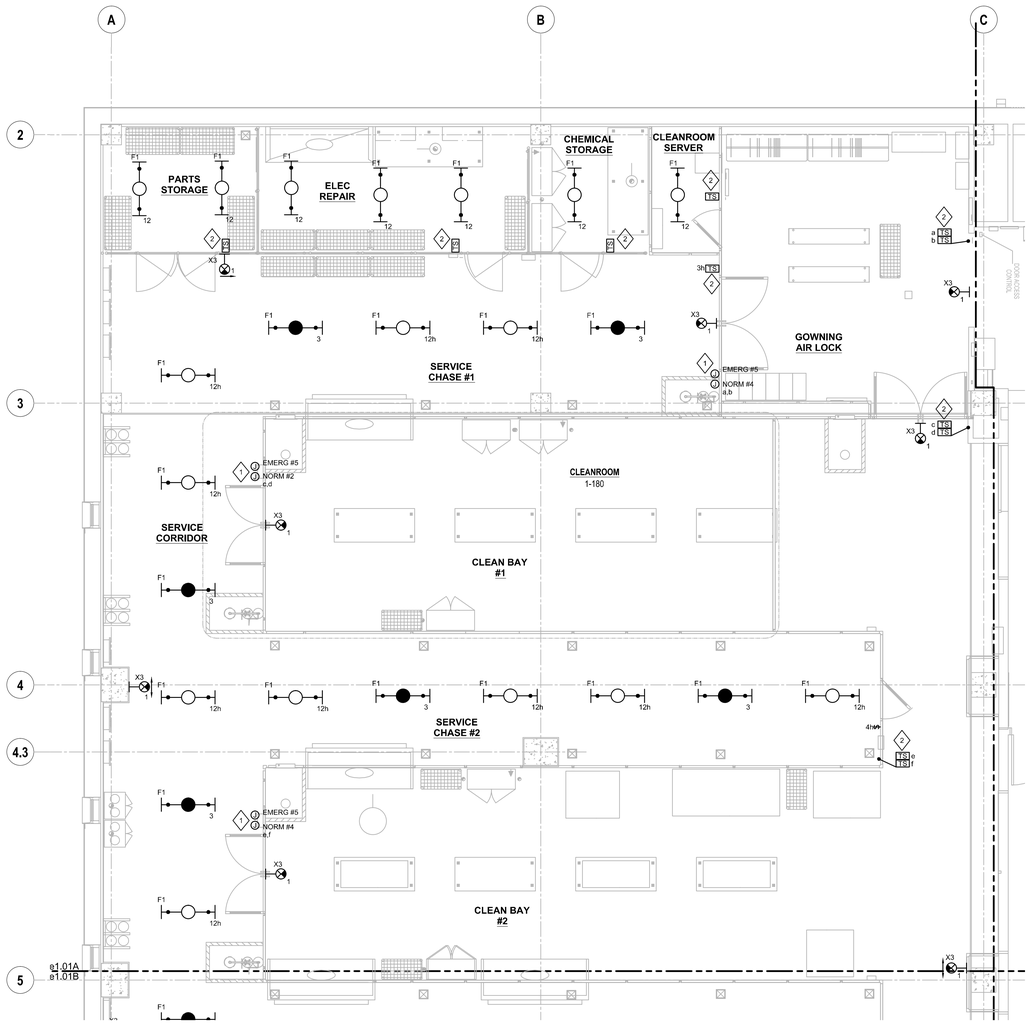
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SCHEDULES

cr-m9.04



1 **CLEANROOM ELECTRICAL LIGHTING LEVEL 1 - ZONE A**
SCALE: 1/4" = 1'-0"

LUMINAIRE SCHEDULE

Type	Description	Manufacturer	Catalog Number	Lamps				Volts	Ballast			Mounting Type	Mounting Height	Remarks
				Qty	Type	Color Temp	Watts		Type	Qty	Model No.			
F1	1'X4' fluorescent vapor tight wrap with acrylic lens and fiberglass housing. Wet location listed. Refer to luminaire schedule notes.	Cooper (Metalux)	VT3-232DR-UNV-ER81-WL	2	T8	SPX41	25(46)	277	Electronic Prog Rapid Start	1		Surface	Ceiling	
X3	Exit Sign/Light combination, single face, universal mounting with direction arrows and mounting as indicated on plans. White thermoplastic housing. Red letters. Provide with battery backup, self diagnostics.	Cooper (Sure-Lites)	LPXT 0 R WH DH SD		LED							Universal		

Luminaire Schedule Notes:
1. Luminaires shall be provided complete with necessary accessories for proper installation.
2. Industrial type luminaires in unfinished areas, which are near obstructions such as ducts and pipes, shall be:
   a). Suspended so that bottom of luminaire is no higher than bottom of obstruction.
   b). Located at height of lowest luminaire.
   c). Minimum height: 8'-0" to B.O.L.
   d). Shall not be located until locations of obstructions are determined.
3. Specifications and drawings convey the features, and functions of luminaires only and do not show every item or detail necessary for the work.
4. All steel fabricated luminaires shall be PAF (painted after fabrication) or post painted.
5. Refer to division one documents for alternate submittal procedure.

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES, AND HUMAN INTERFACE BUTTON CONTROL WALL STATIONS.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION, OR CONTROLLED BY VACANCY SENSOR, SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF. ASSUME ONE (1) TIMED OVERRIDE WALL STATION FOR EVERY 1500 SQ. FT.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F1 ON THIS SHEET AT 10"-0" AFF TO BOL.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL CRLP1A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH1A.
9. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEAN ROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
10. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDING AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE POWER FOR LIGHTING SUPPLIED WITH CLEANROOM. TYPICAL OF 6 CONNECTIONS FOR NORMAL POWER AT EACH KEYNOTE.
2. PROVIDE 12 HOUR ELECTRONIC TIMER FOR LIGHTING. INTERMATIC MODEL EI400 SERIES.

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012

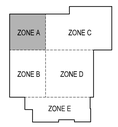
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Date 12/16/11

Project

Physics and Nanotechnology Building

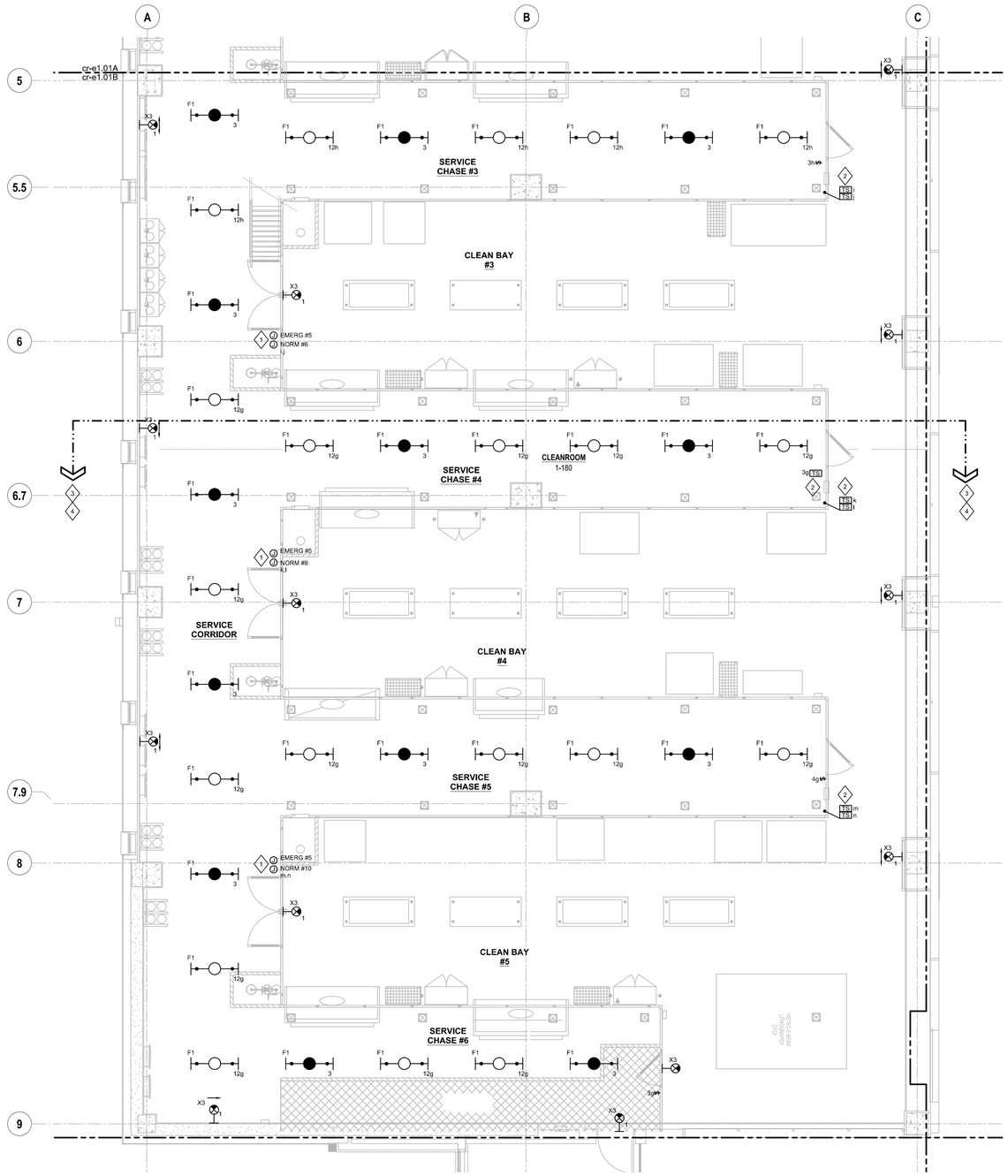
U of M Project # 01-155-08-1718



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CLEANROOM ELECTRICAL LIGHTING
LEVEL 1 - ZONE A

cr-e1.01A



1 **CLEANROOM ELECTRICAL LIGHTING LEVEL 1 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES, AND HUMAN INTERFACE BUTTON CONTROL WALL STATIONS.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION, OR CONTROLLED BY VACANCY SENSOR, SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF. ASSUME ONE (1) TIMED OVERRIDE WALL STATION FOR EVERY 1500 SQ. FT.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F1 ON THIS SHEET AT 10'-0" AFF TO BOL.
7. ALL NORMAL POWER THIS SHEET FED FROM PANEL CRLP1A.
8. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH1A.
9. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEAN ROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
10. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
11. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
12. ALL CONDUITS IN CLEAN ROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO LUMINAIRES AND WIRING DEVICES.
13. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOORPLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
14. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDING AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE POWER FOR LIGHTING SUPPLIED WITH CLEANROOM, TYPICAL OF 6 CONNECTIONS FOR NORMAL POWER AT EACH KEYNOTE.
2. PROVIDE 12 HOUR ELECTRONIC TIMER FOR LIGHTING. INTERMATIC MODEL EI400 SERIES.
3. ALL LAMPS SHALL HAVE A YELLOW UV FILTER SLEEVE. OWNER TO PROVIDE INFORMATION ON TYPE OF YELLOW UV FILTER SLEEVE.
4. DUE TO EMF INTERFERENCE CONCERNS, ALL BRANCH CIRCUIT WIRING FROM PANELBOARDS TO RECEPTACLES, MOTORS, DISCONNECTS, LIGHTS, AND FIXED EQUIPMENT IN THIS ZONE SHALL BE MADE IN GALVANIZED RIGID STEEL HEAVY WALL CONDUIT. EMT OR IMC CONDUIT SHALL NOT BE USED.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012

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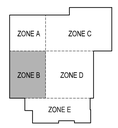
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Project

Physics and Nanotechnology Building

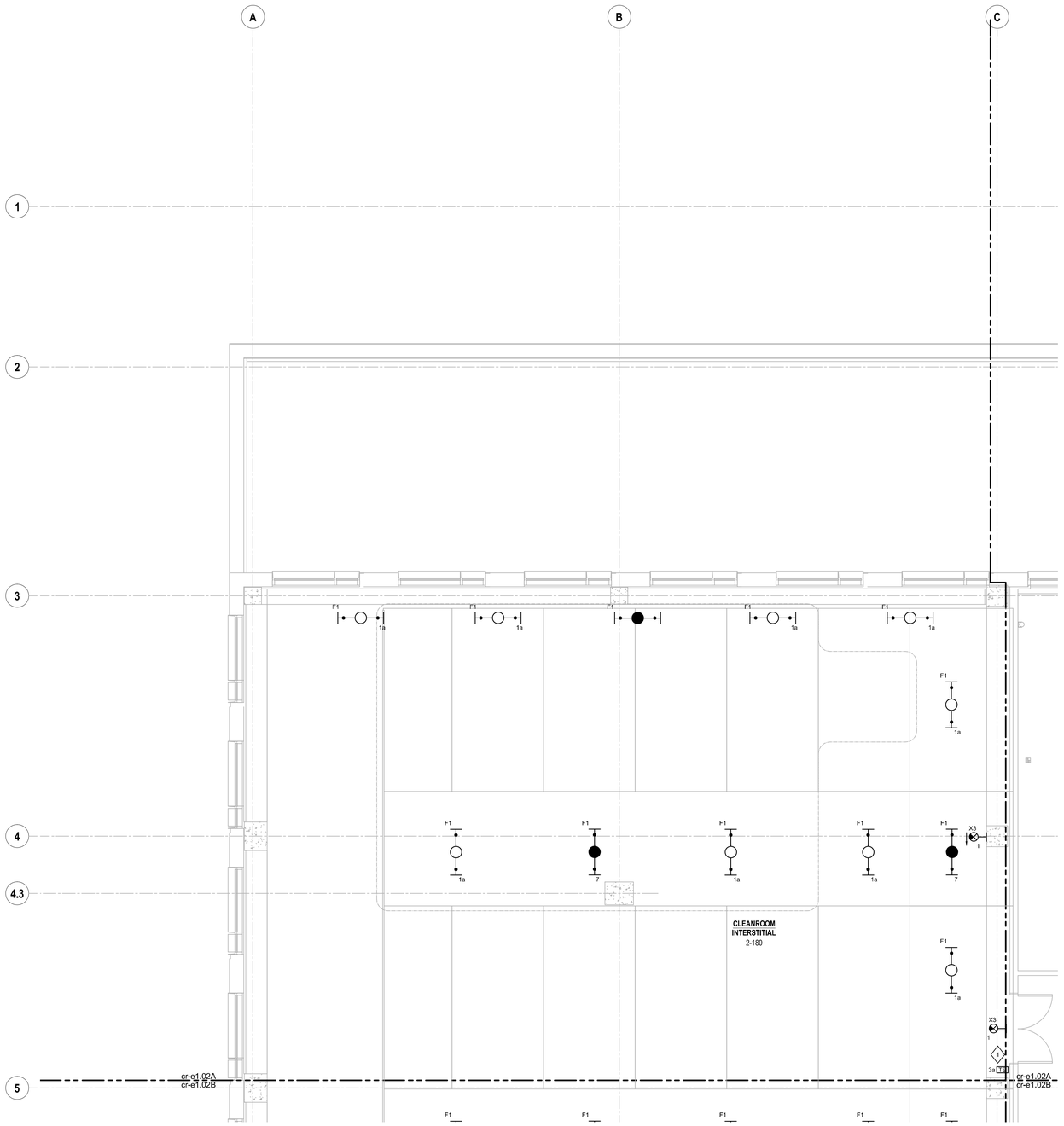
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CLEANROOM ELECTRICAL LIGHTING
LEVEL 1 - ZONE B

cr-e1.01B



1 **CLEANROOM ELECTRICAL LIGHTING LEVEL 2 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES, AND HUMAN INTERFACE BUTTON CONTROL WALL STATIONS.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION, OR CONTROLLED BY VACANCY SENSOR, SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF. ASSUME ONE (1) TIMED OVERRIDE WALL STATION FOR EVERY 1500 SQ. FT.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F15 ON THIS SHEET AT 10'-0" AFF TO BOL.
6. ALL NORMAL POWER THIS SHEET FED FROM PANEL CRLP1A.
7. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH2A.
8. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEAN ROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
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SHEET KEYNOTES

1 PROVIDE 12 HOUR ELECTRONIC TIMER FOR LIGHTING. INTERMATIC MODEL EI400 SERIES.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

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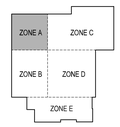
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Date 12/16/11

Project

Physics and Nanotechnology Building

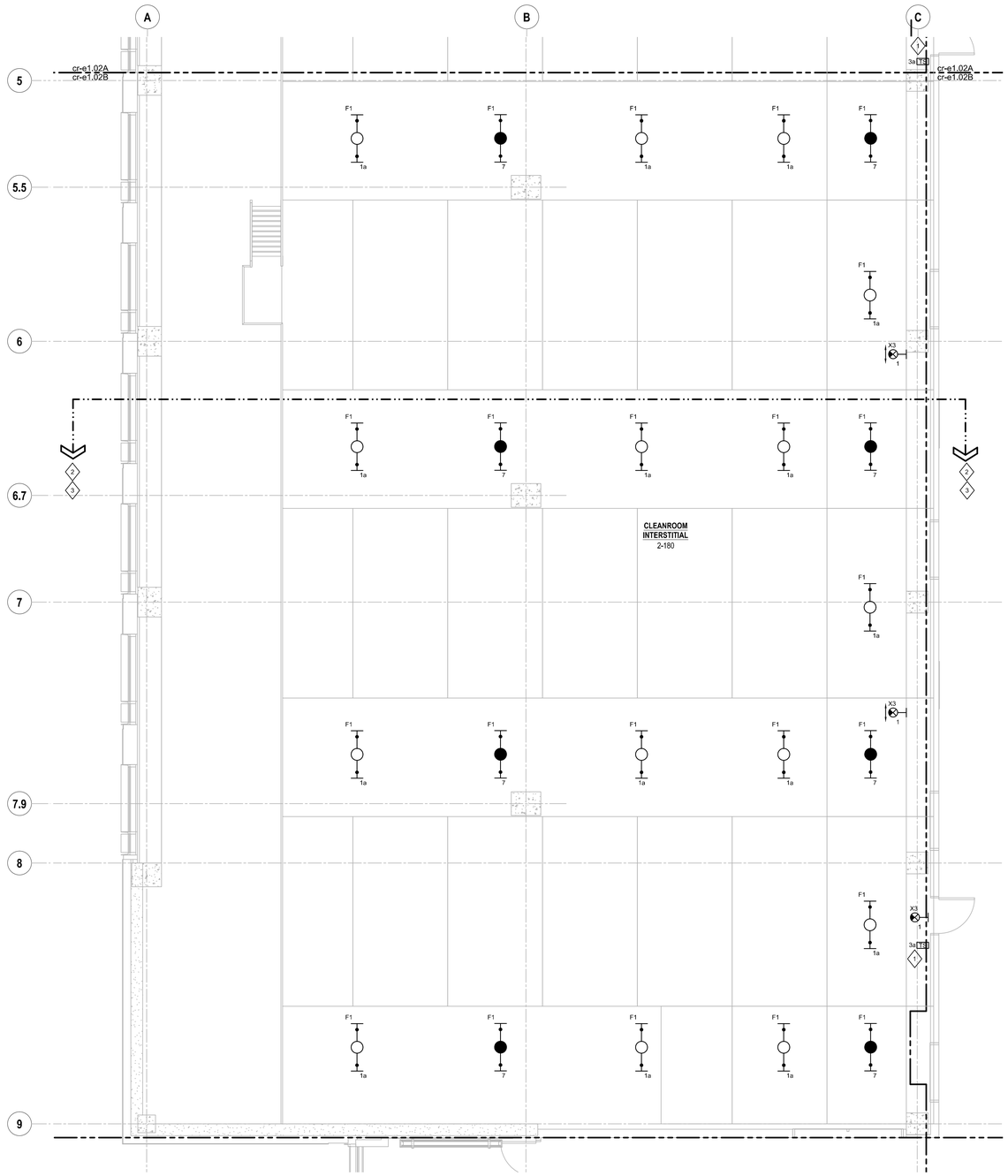
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CLEANROOM ELECTRICAL LIGHTING
LEVEL 2 - ZONE A

cr-e1.02A



1 **CLEANROOM ELECTRICAL LIGHTING LEVEL 2 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL PUBLIC AREA LIGHTING SHALL BE CONTROLLED BY LIGHTING CONTROL SYSTEM, UNLESS OTHERWISE NOTED. RELAY CABINETS, OCCUPANCY/VACANCY SENSORS, AUTOMATED SYSTEM CONTROL INTERFACES, AND HUMAN INTERFACE BUTTON CONTROL WALL STATIONS.
2. LIGHTING LOADS NOT DESIGNATED FOR 24 HOUR OPERATION, OR CONTROLLED BY VACANCY SENSOR, SHALL BE SUBJECT TO AUTOMATED AFTER HOURS SWEEP TO OFF. ASSUME ONE (1) TIMED OVERRIDE WALL STATION FOR EVERY 1500 SQ. FT.
3. OCCUPANCY SENSORS SHALL CONTROL ALL LUMINAIRES IN ROOM WHICH THEY ARE INSTALLED. PROVIDE ADDITIONAL RELAY TO CONTROL 120V LUMINAIRES.
4. ALL WALL MOUNTED EXIT LIGHTS SHOWN ABOVE DOORS SHALL BE 1'-0" ABOVE DOOR FRAME TO BOTTOM OF EXIT LIGHT.
5. MOUNT LUMINAIRE TYPE F15 ON THIS SHEET AT 10"-0" AFF TO BOL.
6. ALL NORMAL POWER THIS SHEET FED FROM PANEL CRLP1A.
7. ALL EMERGENCY LIFE SAFETY POWER THIS SHEET FED FROM PANEL EH2A.
8. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEAN ROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
9. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
10. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
11. ALL CONDUITS IN CLEAN ROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO LUMINAIRES AND WIRING DEVICES.
12. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOORPLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
13. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE 12 HOUR ELECTRONIC TIMER FOR LIGHTING. INTERMATIC MODEL EI400 SERIES.
2. ALL LAMPS SHALL HAVE A YELLOW UV FILTER SLEEVE. OWNER TO PROVIDE INFORMATION ON TYPE OF YELLOW UV FILTER SLEEVE.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL BRANCH CIRCUIT WIRING FROM PANELBOARDS TO RECEPTACLES, MOTORS, DISCONNECTS, LIGHTS, AND FIXED EQUIPMENT IN THIS ZONE SHALL BE MADE IN GALVANIZED RIGID STEEL HEAVY WALL CONDUIT, EMT OR IMC CONDUIT SHALL NOT BE USED.

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For AFFILIATED ENGINEERS, INC.

By

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Date 02-24-2012 Reg. No. 25163

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Bid Package No. 2	02-24-2012

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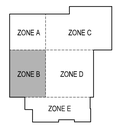
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Physics and Nanotechnology Building

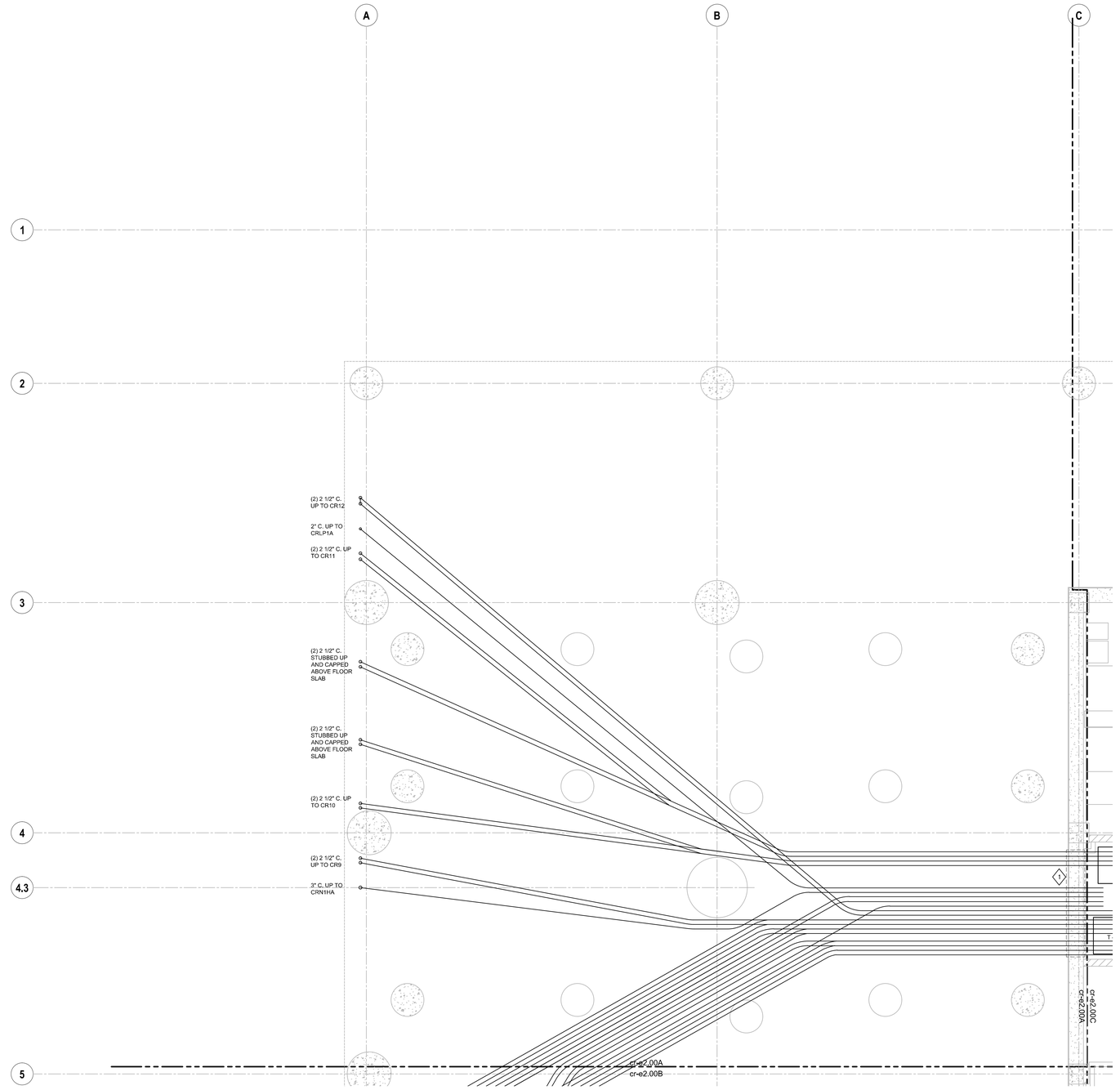
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CLEANROOM ELECTRICAL LIGHTING
LEVEL 2 - ZONE B

cr-e1.02B



1 **CLEANROOM ELECTRICAL POWER BASEMENT - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO If SERIES OF DRAWINGS FOR ELECTRICAL DISCONNECTS, RECEPTACLE TYPES, GROUNDING LOCATIONS, TELE/DATA PORTS, DEVICE QUANTITIES AND LOCATIONS INSIDE LABORATORY SPACES.
2. ROUTING FOR MISCELLANEOUS COMPONENTS SUCH AS GROUND BUS CONDUITS UNDER SLAB SHALL FOLLOW ROUTES SIMILAR TO CONDUIT ROUTES INDICATED.
3. REFER TO FEEDER SCHEDULE AND RISER DIAGRAMS TO CONFIRM CONDUIT SIZES AND QUANTITIES PER RUN.
4. CONDUITS SHALL BE RUN COMPLETELY BELOW CLEANROOM FLOOR SLAB. COORDINATE EXACT ROUTING WITH UNDERFLOOR UTILITIES OF OTHER TRADES AND TELECOMMUNICATIONS DUCTBANK INSTALLED UNDER BP-1.
5. ALL CONDUITS BELOW SLAB SHALL BE GALVANIZED RIGID STEEL FOR THE ENTIRE LENGTH OF RUN FROM SOURCE TO TERMINATION.
6. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS SHALL BE RUN AT NOMINAL DEPTH OF 5'-6" BELOW TOP OF CLEANROOM SLAB UNTIL IMMEDIATELY BELOW THE PANEL OR EQUIPMENT SERVED WHERE THEY SHALL RISE VERTICALLY TO BOTTOM FEED OF PANEL OR EQUIPMENT.

SHEET KEYNOTES

1 CONDUITS MAY EXIT BOTTOM OF GEAR IN ELECTRICAL ROOM B-167 OR MAY EXIT ABOVE GRADE OF ROOM B-167 TO BE ROUTED APPROXIMATELY 5'-6" BELOW THE TOP OF THE CLEAN ROOM SLAB. FOR ANY CONDUITS WITHIN THIS AREA WHICH ENTER ROOM B-167 ABOVE GRADE, PROVIDE WATERPROOF SEAL EQUAL TO LINK-SEAL. REFER TO DETAIL 5/e8.03.

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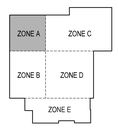
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Physics and Nanotechnology Building

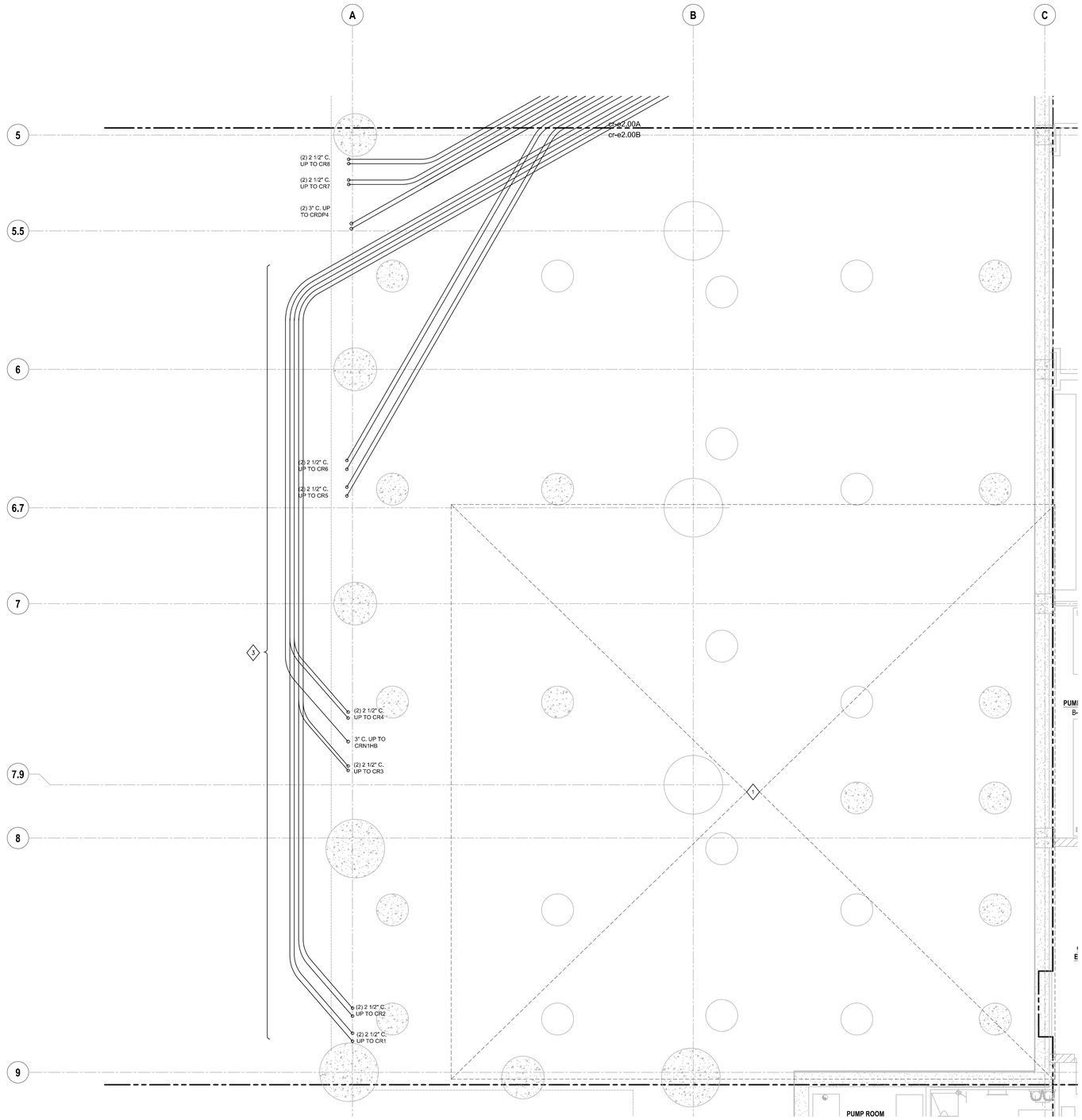
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CLEANROOM ELECTRICAL POWER BASEMENT - ZONE A

cr-e2.00A



1 **CLEANROOM ELECTRICAL POWER BASEMENT - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. REFER TO If SERIES OF DRAWINGS FOR ELECTRICAL DISCONNECTS, RECEPTACLE TYPES, GROUNDING LOCATIONS, TELE/DATA PORTS, DEVICE QUANTITIES AND LOCATIONS INSIDE LABORATORY SPACES.
2. ROUTING FOR MISCELLANEOUS COMPONENTS SUCH AS GROUND BUS CONDUITS UNDER SLAB SHALL FOLLOW ROUTES SIMILAR TO CONDUIT ROUTES INDICATED.
3. REFER TO FEEDER SCHEDULE AND RISER DIAGRAMS TO CONFIRM CONDUIT SIZES AND QUANTITIES PER RUN.
4. CONDUITS SHALL BE RUN COMPLETELY BELOW CLEANROOM FLOOR SLAB AS DEEP AS POSSIBLE. COORDINATE EXACT ROUTING WITH UNDERFLOOR UTILITIES OF OTHER TRADES AND TELECOMMUNICATIONS DUCTBANK INSTALLED UNDER BP-1.
5. ALL CONDUITS BELOW SLAB SHALL BE GALVANIZED RIGID STEEL FOR THE ENTIRE LENGTH OF RUN FROM SOURCE TO TERMINATION.
6. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS SHALL BE RUN AT NOMINAL DEPTH OF 5'-6" BELOW TOP OF CLEANROOM SLAB UNTIL IMMEDIATELY BELOW THE PANEL OR EQUIPMENT SERVED WHERE THEY SHALL RISE VERTICALLY TO BOTTOM FEED OF PANEL OR EQUIPMENT.

SHEET KEYNOTES

1. NO CONDUITS SHALL BE ROUTED UNDERSLAB WITHIN THIS AREA DUE TO MOST SENSITIVE ELECTRONIC EQUIPMENT IN CLEANROOM.
2. CONDUITS SERVING PANELS DESIGNATED WITH THIS NOTE SHALL BE ROUTED
3. CONDUIT ROUTING INDICATED FOR THESE PANELS IS BASED ON CONTRACTOR INFORMATION AND COORDINATION WITH EXCAVATION PLANS. ROUTING INDICATED IS APPROXIMATE AND SHALL BE FIELD COORDINATED. CONDUITS SERVING PANELS CR1, CR2, CR3, CR4, AND CRN1HB SHALL BE ROUTED TO MAINTAIN A SEPARATION OF 16' HORIZONTALLY FROM THE ZONE INDICATED IN KEYNOTE 1 UNTIL THE POINT WHERE THE MAKE THE FINAL TURN AND BEND TO STUB UP ABOVE CLEAN ROOM FLOOR SLAB TO SERVE PANEL.

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By

Name RONALD M. PARSLEY

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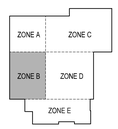
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Physics and Nanotechnology Building

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CLEANROOM ELECTRICAL POWER BASEMENT - ZONE B

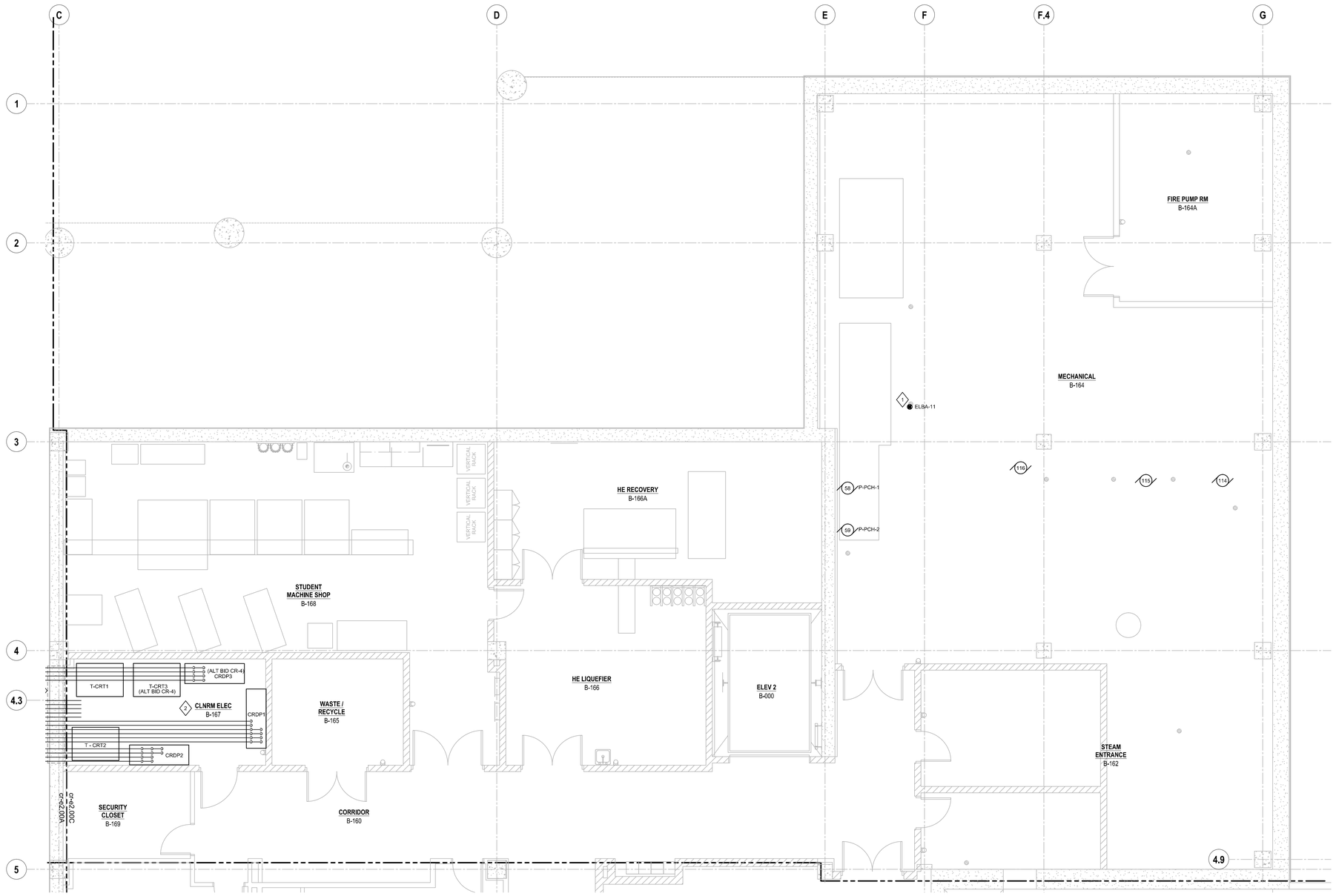
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GENERAL NOTES

1. REFER TO tf SERIES OF DRAWINGS FOR DETAILS AND ELEVATIONS OF SPACES INSIDE LABORATORY AREAS.
2. ALL CONDUITS SERVING CLEANROOM SHALL BE GALVANIZED RIGID STEEL FOR THE ENTIRE LENGTH OF RUN FROM SOURCE TO TERMINATION.
3. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS SHALL BE RUN AT NOMINAL DEPTH OF 5'-6' BELOW TOP OF CLEANROOM SLAB UNTIL IMMEDIATELY BELOW THE PANEL OR EQUIPMENT SERVED WHERE THEY SHALL RISE VERTICALLY TO BOTTOM FEED OF PANEL OR EQUIPMENT.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO PLC REMOTE I/O PANEL FOR CLEAN ROOM FROM PANEL ELBA. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.
2. CONDUITS MAY EXIT BOTTOM OF GEAR IN ELECTRICAL ROOM B-167 OR MAY EXIT ABOVE GRADE OF THIS FLOOR TO BE ROUTED APPROXIMATELY 5'-6' BELOW THE TOP OF THE CLEAN ROOM SLAB. FOR ANY CONDUITS WITHIN THIS AREA WHICH ENTER ROOM B-167 ABOVE GRADE, PROVIDE WATERPROOF SEAL EQUAL TO LINK-SEAL. REFER TO DETAIL 5/e8.03.



1 **CLEANROOM ELECTRICAL POWER BASEMENT - ZONE C**
SCALE: 1/4" = 1'-0"

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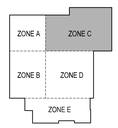
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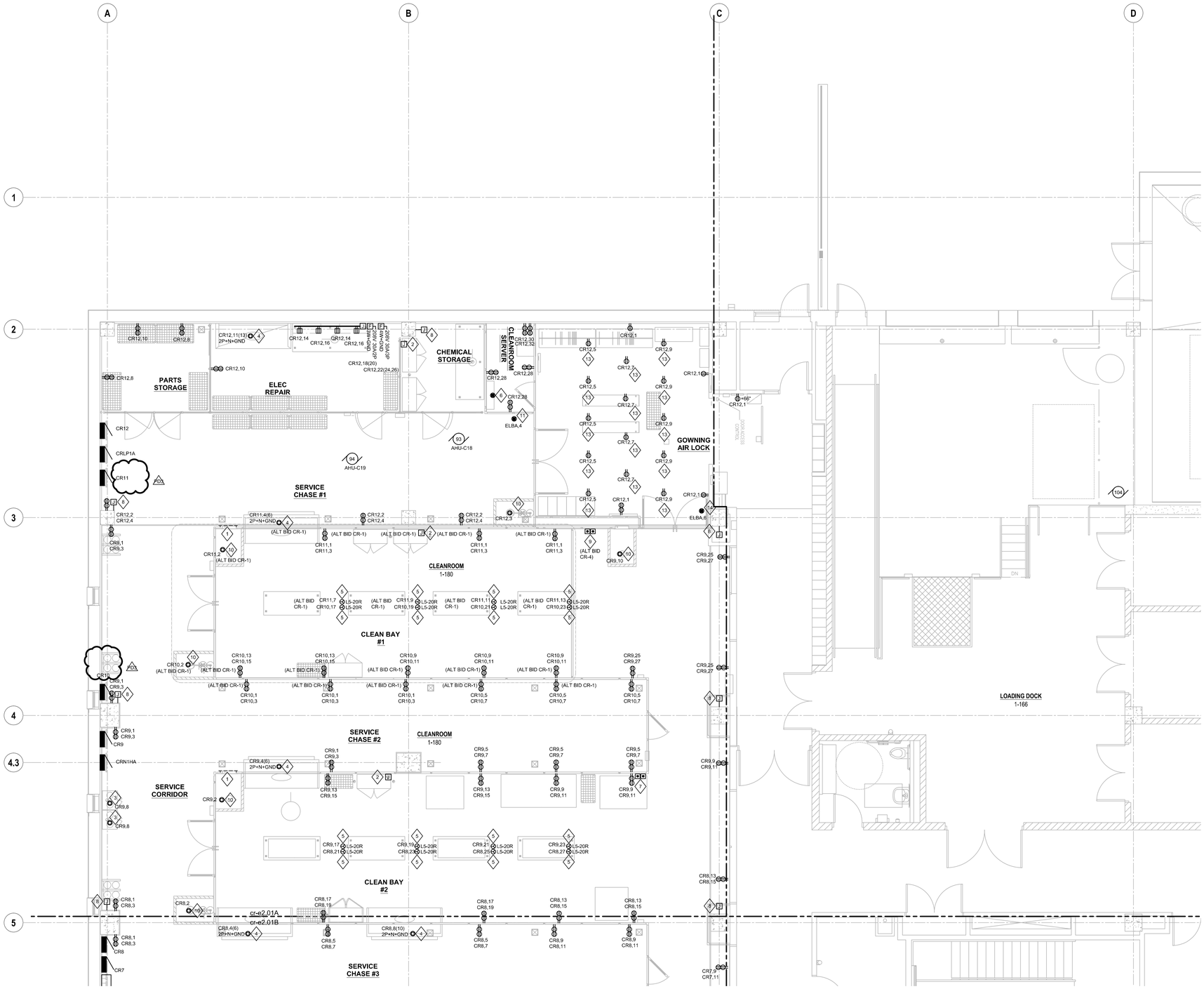
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CLEANROOM ELECTRICAL POWER BASEMENT - ZONE C

cr-e2.00C



1 **CLEANROOM ELECTRICAL POWER LEVEL 1 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL 120V 20A RECEPTACLES IN CLEAN ROOM SHALL BE HOSPITAL GRADE.
2. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEAN ROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
3. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
4. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
5. ALL CONDUITS IN CLEAN ROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY BACK DOWN TO PANELBOARDS.
6. ALL PANELBOARDS, FEEDERS, AND GROUND BUS GROUND WIRE CONDUITS INDICATED ON THIS SHEET SHALL BE FED HORIZONTALLY COMPLETELY BELOW THE CLEANROOM FLOOR SLAB VIA THE CLEANROOM ELECTRICAL ROOM INDICATED ON SHEET cr-e2.00A. ALL CONDUIT SHALL BE GALVANIZED RIGID STEEL. COORDINATE ROUTING OF CONDUIT WITH INCOMING TELECOM DUCTBANK AND STRUCTURAL FLOOR SLAB SUPPORTS INTO EARTH.
7. ALL TWISTLOCK CEILING MOUNTED RECEPTACLES AND FIXED POWER CONNECTIONS AND HOODS SHALL BE PROVIDED FROM DEDICATED CIRCUITS.
8. REFER TO cnf SERIES DRAWINGS FOR FURTHER INFORMATION ON REQUIREMENTS OF ELECTRICAL UTILITIES WITHIN CLEANROOM.
9. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOORPLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
10. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDING AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE 24" X 4" X ¼" GROUND BUS ON INSULATED STANDOFFS AT 24" AFF. PROVIDE #3/0 AWG GROUNDING CONDUCTOR "I" GRS FROM GROUND BUS TO MAIN BUILDING GROUNDING BUS IN ROOM B-158. ROUTE CONDUIT BELOW SLAB.
2. PROVIDE #8 AWG GROUNDING CONDUCTOR IN 3/4" CONDUIT FROM SOLVENT STORAGE CABINET TO 208/120V BRANCH PANELBOARD GROUND BUS SERVING THIS AREA.
3. PROVIDE 120V FIXED POWER CONNECTION TO VENTILATED CABINET.
4. PROVIDE 120V FIXED POWER CONNECTION TO HOOD. FINAL CONNECTION TO JUNCTION BOX ON HOOD SHALL BE MADE WITH LIQUID TIGHT FLEXIBLE CONDUIT.
5. TYPICAL: CONDUIT THROUGH CLEANROOM BOUNDARY AND BACKBOX IS BY OTHERS. PROVIDE DEVICE, FACEPLATE, WIRING, AND CONDUIT FROM CLEANROOM BOUNDARY TO PANEL.
6. PROVIDE EMERGENCY POWER TO CLEAN ROOM GAS MONITORING ALARM SYSTEM FROM PANEL EL2A. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.
7. PROVIDE SHUNT TRIP PUSHBUTTONS WITH RED MUSHROOM HEAD AND FLIP-UP PLASTIC COVER TO OPEN SHUNT TRIP BREAKER ON PANEL CR8 AND CR9.
8. PROVIDE JUNCTION BOX WITH #6 AWG GROUND WIRE CONNECTED TO ANTI-STATIC FLOORING. MOUNT BOX 6" ABOVE FLOOR. COORDINATE EXACT CONNECTION POINT WITH FLOORING PROVIDER. CONNECT #6 AWG TO NEAREST AVAILABLE GROUND BUS IN 3/4" CONDUIT.
9. PROVIDE SHUNT TRIP BUSHBUTTONS WITH RED MUSHROOM HEAD AND FLIP-UP PLASTIC COVER TO OPEN SHUNT TRIP BREAKER ON PANEL CR10 AND CR11.
10. PROVIDE FIXED 120V CONNECTION TO EMERGENCY SHOWER ELECTRIC ALARM. COORDINATE EXACT LOCATION WITH SHOWER PROVIDER.
11. PROVIDE 120V FIXED POWER CONNECTION TO PLC REMOTE I/O PANEL FOR CLEANROOM FROM PANEL EL2A. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.
12. NOT USED.
13. PROVIDE 120V DUPLEX RECEPTACLE ABOVE CEILING SPACE TO PROVIDE POWER TO CLEAN ROOM FAN FILTER UNITS.
14. PROVIDE FIXED CONNECTION ABOVE CEILING TO POWER SUPPLY FOR SLIDING DOORS.

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Project Directive No. 3	05-11-2012

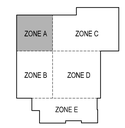
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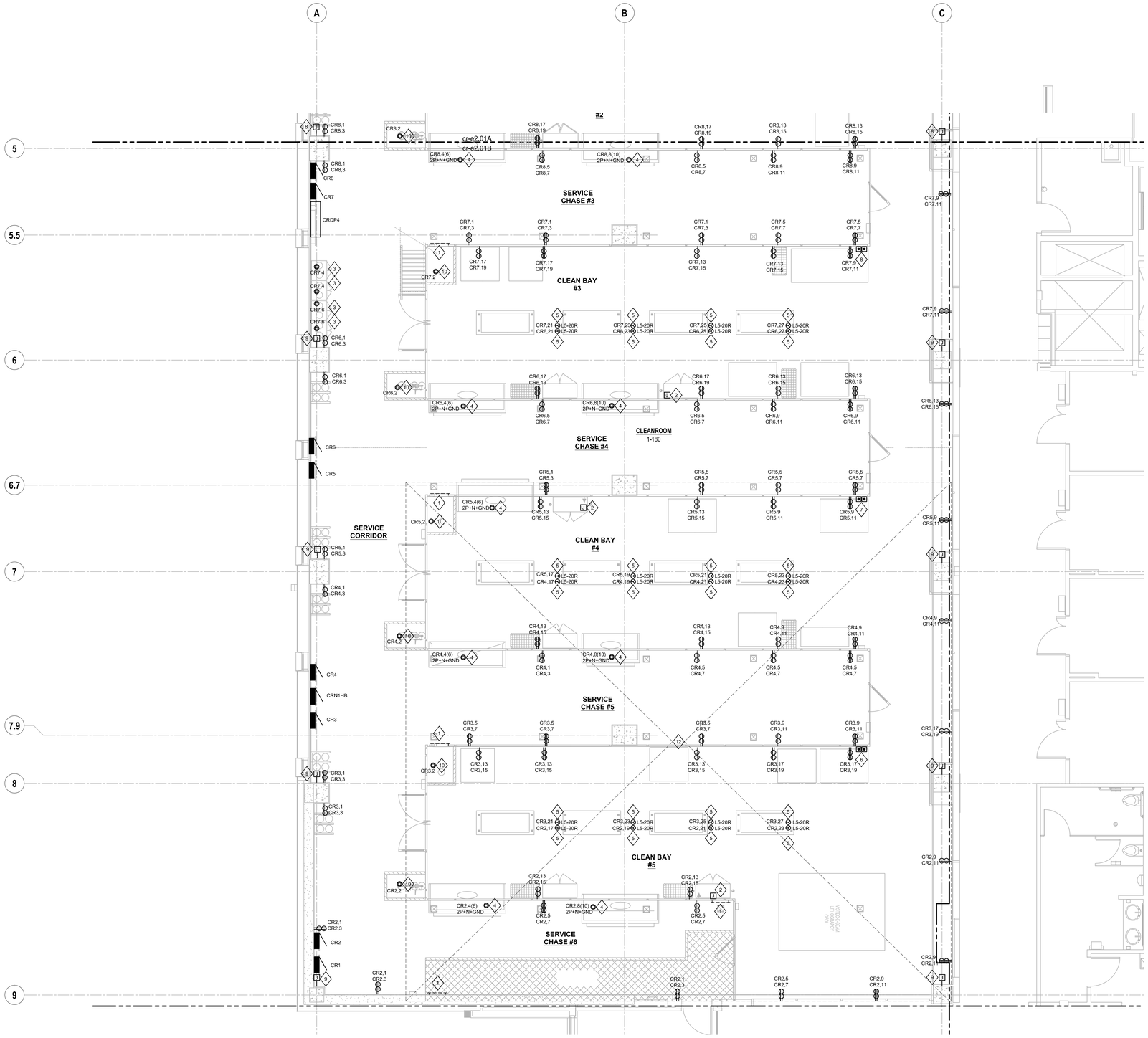
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CLEANROOM ELECTRICAL POWER LEVEL 1 - ZONE A

cr-e2.01A



1 **CLEANROOM ELECTRICAL POWER LEVEL 1 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL 120V 20A RECEPTACLES IN CLEAN ROOM SHALL BE HOSPITAL GRADE.
2. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEAN ROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
3. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
4. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
5. ALL CONDUITS IN CLEAN ROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO BACK DOWN TO PANELBOARDS.
6. ALL PANELBOARDS, FEEDERS, AND GROUND BUS GROUND WIRE CONDUITS INDICATED ON THIS SHEET SHALL BE FED HORIZONTALLY COMPLETELY BELOW THE CLEANROOM FLOOR SLAB VIA THE CLEANROOM ELECTRICAL ROOM INDICATED ON SHEET cr-e2.00B. ALL CONDUIT SHALL BE GALVANIZED RIGID STEEL. COORDINATE ROUTING OF CONDUIT WITH INCOMING TELECOM DUCTBANK AND STRUCTURAL FLOOR SLAB SUPPORTS INTO EARTH.
7. ALL DOUBLE DUPLEX RECEPTACLES AND FIXED CONNECTIONS INDICATED SHALL BE FED FROM NEAREST BRANCH PANELBOARDS IN CLEANROOM SUPPORT CORRIDOR. EACH ONE OF THE DOUBLE DUPLEX RECEPTACLES SHALL BE WIRED WITH ONE RECEPTACLE ON TYPICAL CIRCUIT "1" AND ONE ON TYPICAL CIRCUIT "3" WITH A MAXIMUM OF 3 TOTAL DUPLEXES PER CIRCUIT.
8. ALL TWISTLOCK CEILING MOUNTED RECEPTACLES AND FIXED POWER CONNECTIONS AND HOODS SHALL BE PROVIDED FROM DEDICATED CIRCUITS.
9. REFER TO cr# SERIES DRAWINGS FOR FURTHER INFORMATION ON REQUIREMENTS OF ELECTRICAL UTILITIES WITHIN CLEANROOM.
10. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOORPLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
11. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE 24" x 4" x ¼" GROUND BUS ON INSULATED STANDOFFS AT 24" AFF. PROVIDE #3/0 AWG GROUNDING CONDUCTOR IN 1" GRS FROM GROUND BUS TO MAIN BUILDING GROUNDING BUS IN ROOM B-158. ROUTE CONDUIT BELOW SLAB.
2. PROVIDE #6 AWG GROUNDING CONDUCTOR IN 3/4" CONDUIT FROM SOLVENT STORAGE CABINET TO 208/120V BRANCH PANELBOARD GROUND BUS SERVING THIS AREA.
3. PROVIDE 120V FIXED POWER CONNECTION TO VENTILATED CABINET.
4. PROVIDE 208V FIXED POWER CONNECTION TO HOOD #10AWG. FINAL CONNECTION TO JUNCTION BOX ON HOOD SHALL BE MADE WITH LIQUID TIGHT FLEXIBLE CONDUIT.
5. TYPICAL: CONDUIT THROUGH CLEANROOM BOUNDARY AND BACKBOX IS BY OTHERS. PROVIDE DEVICE, FACEPLATE, WIRING, AND CONDUIT FROM CLEANROOM BOUNDARY TO PANEL.
6. PROVIDE SHUNT TRIP PUSHBUTTONS WITH RED MUSHROOM HEAD AND FLIP-UP PLASTIC COVER TO OPEN SHUNT TRIP BREAKER ON PANEL CR2 AND CR3.
7. PROVIDE SHUNT TRIP PUSHBUTTONS WITH RED MUSHROOM HEAD AND FLIP-UP PLASTIC COVER TO OPEN SHUNT TRIP BREAKER ON PANEL CR4 AND CR5.
8. PROVIDE SHUNT TRIP PUSHBUTTONS WITH RED MUSHROOM HEAD AND FLIP-UP PLASTIC COVER TO OPEN SHUNT TRIP BREAKER ON PANEL CR6 AND CR7.
9. PROVIDE JUNCTION BOX WITH #6 AWG GROUND WIRE CONNECTED TO ANTI-STATIC FLOORING. MOUNT BOX 6" ABOVE FLOOR. COORDINATE EXACT CONNECTION POINT WITH FLOORING PROVIDER. CONNECT #6 AWG TO NEAREST AVAILABLE GROUND BUS IN 3/4" CONDUIT.
10. PROVIDE FIXED 120V CONNECTION TO EMERGENCY SHOWER ELECTRIC ALARM. COORDINATE EXACT LOCATION WITH SHOWER PROVIDER.
11. NOT USED.
12. DUE TO EMF INTERFERENCE CONCERNS, ALL BRANCH CIRCUIT WIRING FROM PANELBOARDS TO RECEPTACLES, DISCONNECTS, LIGHTS, AND FIXED EQUIPMENT IN THIS ZONE SHALL BE MADE IN GALVANIZED RIGID STEEL. HEAVY WALL CONDUIT. EMT OR IMC CONDUIT SHALL NOT BE USED.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012

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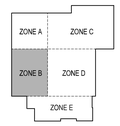
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Project

Physics and Nanotechnology Building

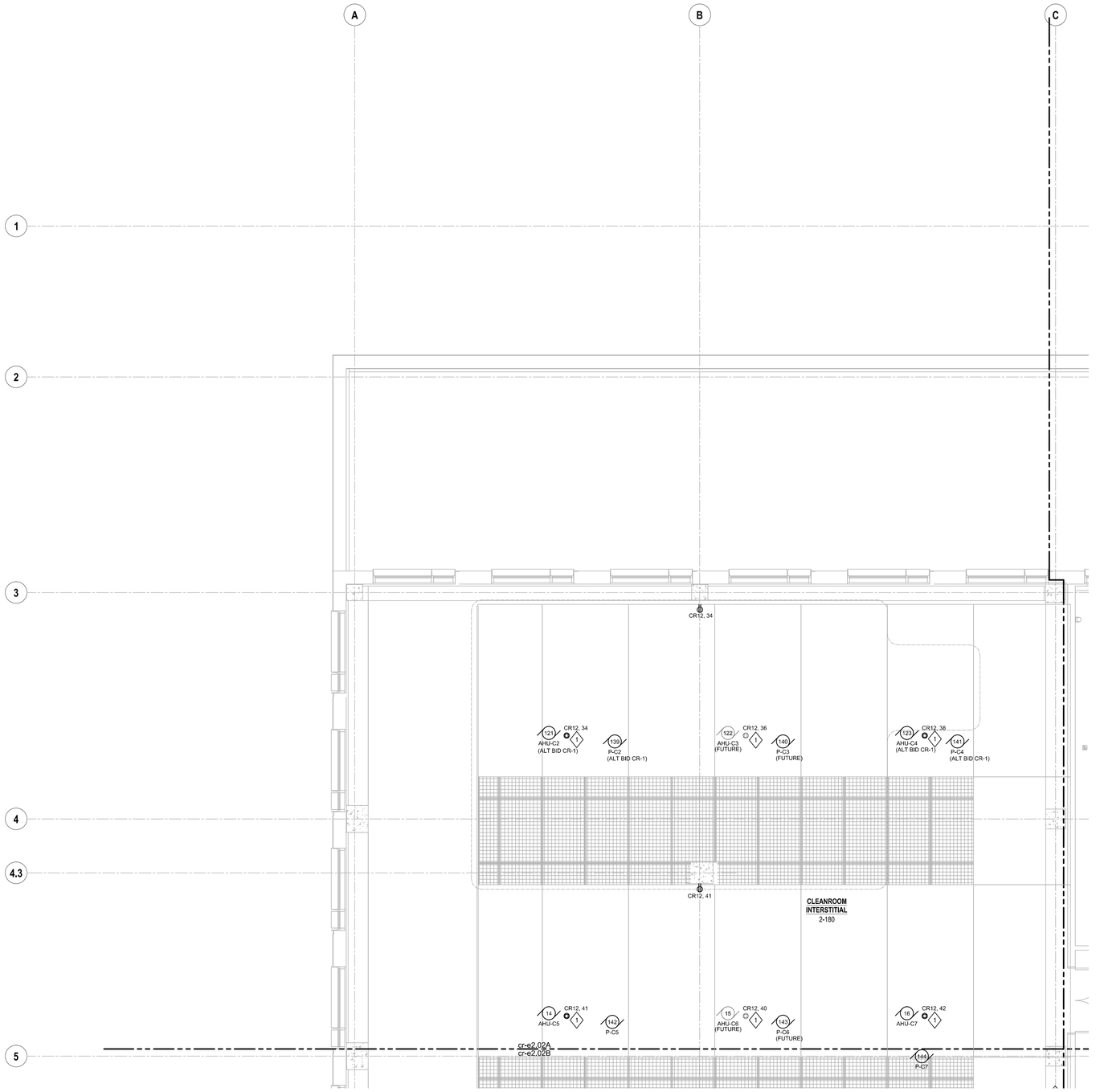
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CLEANROOM ELECTRICAL POWER LEVEL 1 - ZONE B

cr-e2.01B



1 **CLEANROOM ELECTRICAL POWER LEVEL 2 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
2. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDING AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM, BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1 PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.

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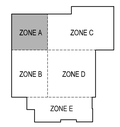
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Project

Physics and Nanotechnology Building

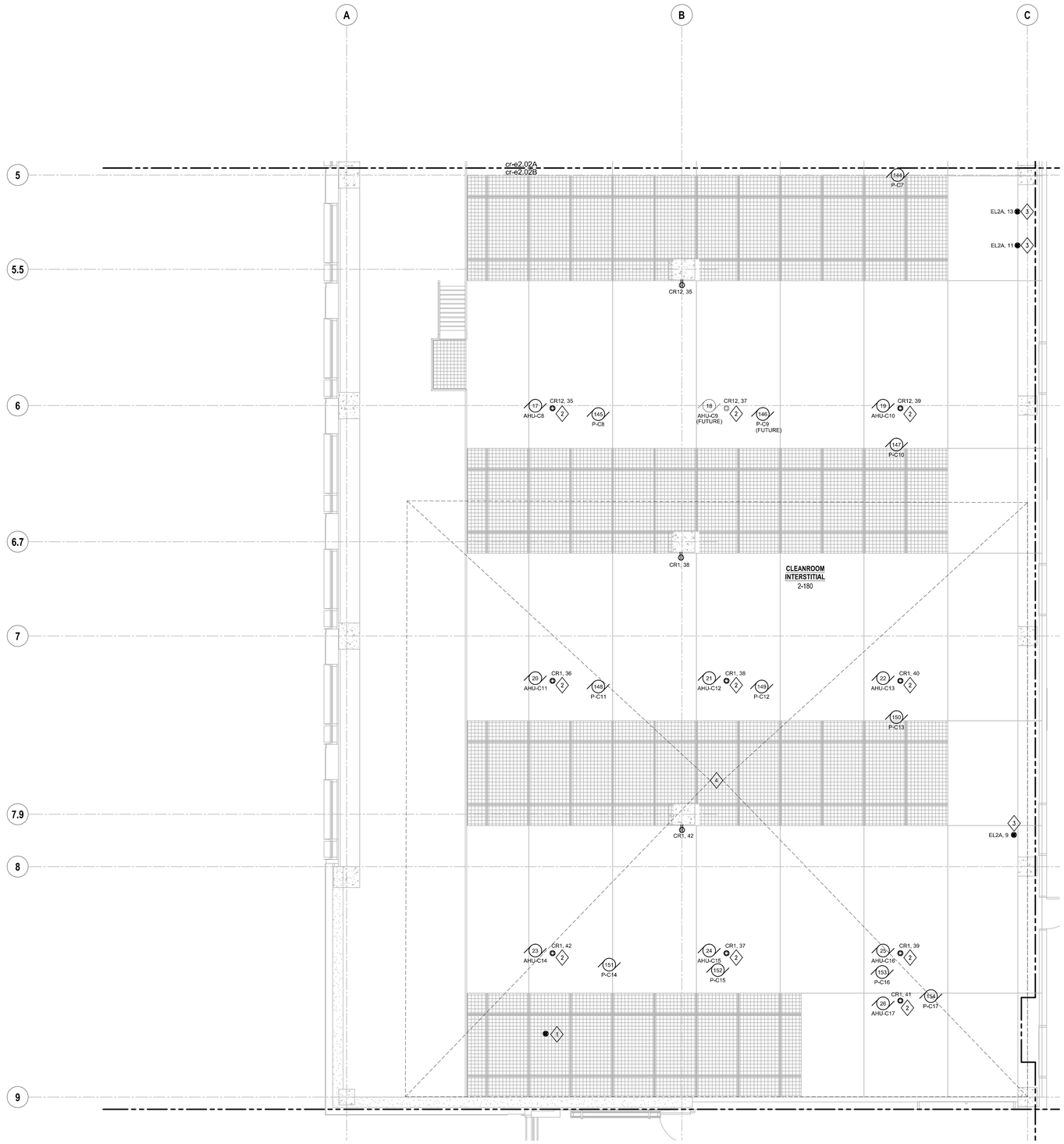
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CLEANROOM ELECTRICAL POWER LEVEL 2 - ZONE A

cr-e2.02A



1 **CLEANROOM ELECTRICAL POWER LEVEL 2 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
2. ALL CONDUITS IN CLEANROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY BACK DOWN TO PANELBOARDS.
3. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER FROM PANEL EL2A. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.
2. PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.
3. PROVIDE 120V FIXED POWER CONNECTION TO PLC REMOTE I/O PANEL FOR CLEANROOM FROM PANEL EL2A. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.
4. DUE TO EMF INTERFERENCE CONCERNS, ALL BRANCH CIRCUIT WIRING FROM PANELBOARDS TO RECEPTACLES, MOTORS, DISCONNECTS, LIGHTS, AND FIXED EQUIPMENT IN THIS ZONE SHALL BE MADE IN GALVANIZED RIGID STEEL HEAVY WALL CONDUIT. EMT OR IMC CONDUIT SHALL NOT BE USED.

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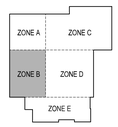
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Physics and Nanotechnology Building

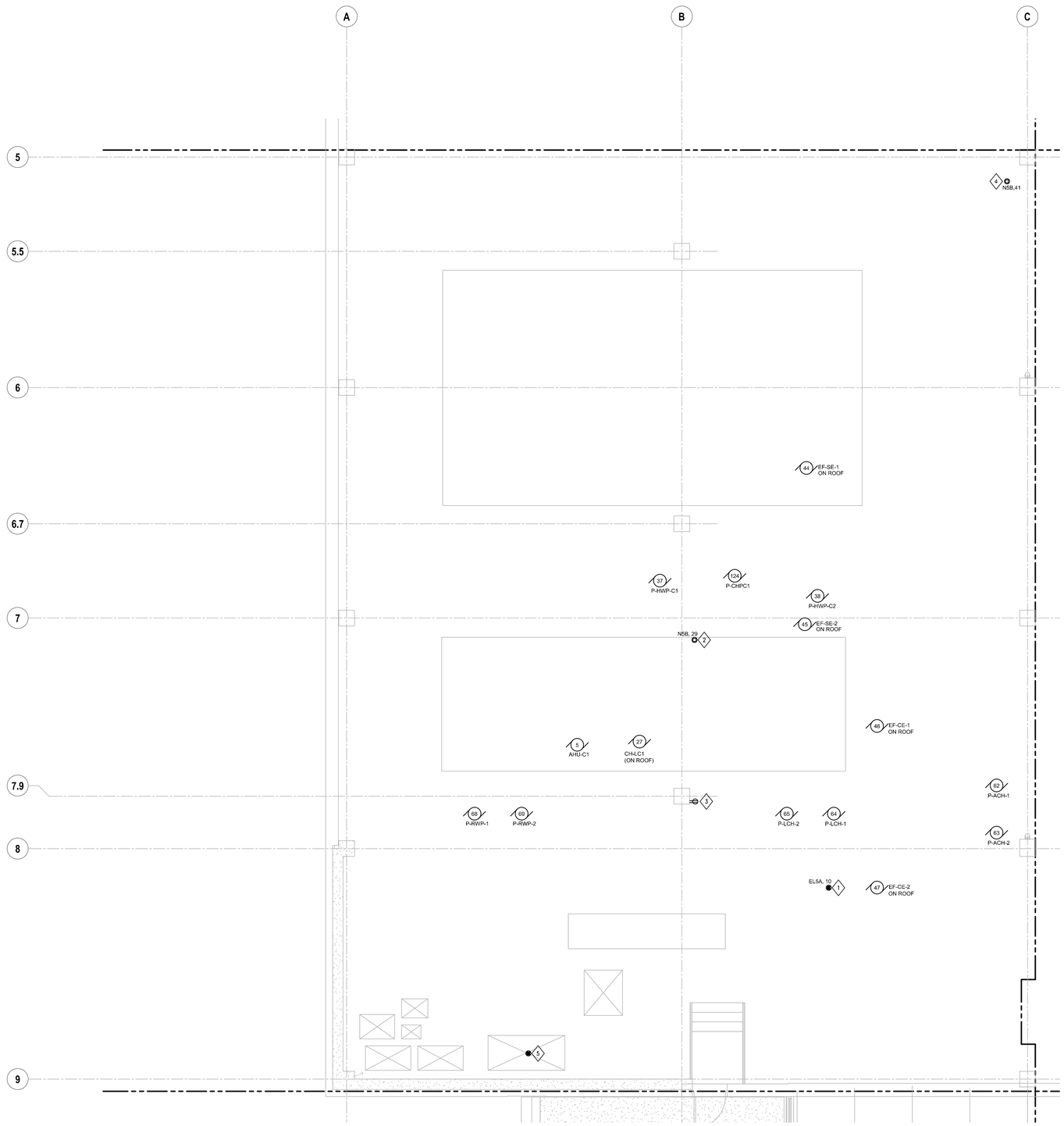
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CLEANROOM ELECTRICAL POWER LEVEL 2 - ZONE B

cr-e2.02B



1 **CLEANROOM ELECTRICAL POWER PENTHOUSE - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL RECEPTACLES AND EQUIPMENT CONNECTIONS ON THIS SHEET WHICH ARE SHOWN OUTSIDE OF PANEL DIVISION LINES ARE CIRCUITED FROM PANEL N5B UNLESS OTHERWISE SHOWN.

SHEET KEYNOTES

1. PROVIDE 120V FIXED POWER CONNECTION TO PLC REMOTE I/O PANEL FOR CLEANROOM FROM PANEL EL5A. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.
2. PROVIDE DEDICATED 120V FIXED CONNECTION TO AIR HANDLER UNIT (AHU) FOR INTERNAL LIGHTING AND RECEPTACLES. VERIFY EXACT LOCATION WITH AHU SUPPLIER.
3. PROVIDE DUPLEX RECEPTACLE FOR GLYCOL FILL PUMP.
4. PROVIDE 120V FIXED POWER CONNECTION FOR CLEAN ROOM STEAM GENERATOR CONTROLS (CSG-CR1) NEAR GRID LINES 3 AND D. VERIFY EXACT EQUIPMENT CONNECTION POINT WITH SUPPLIER.
5. PROVIDE 120V FIXED POWER CONNECTION TO DAMPER FROM PANEL EL5A. PROVIDE DEDICATED CIRCUIT TO SYSTEM AT THIS LOCATION.

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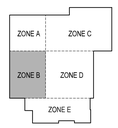
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Physics and Nanotechnology Building

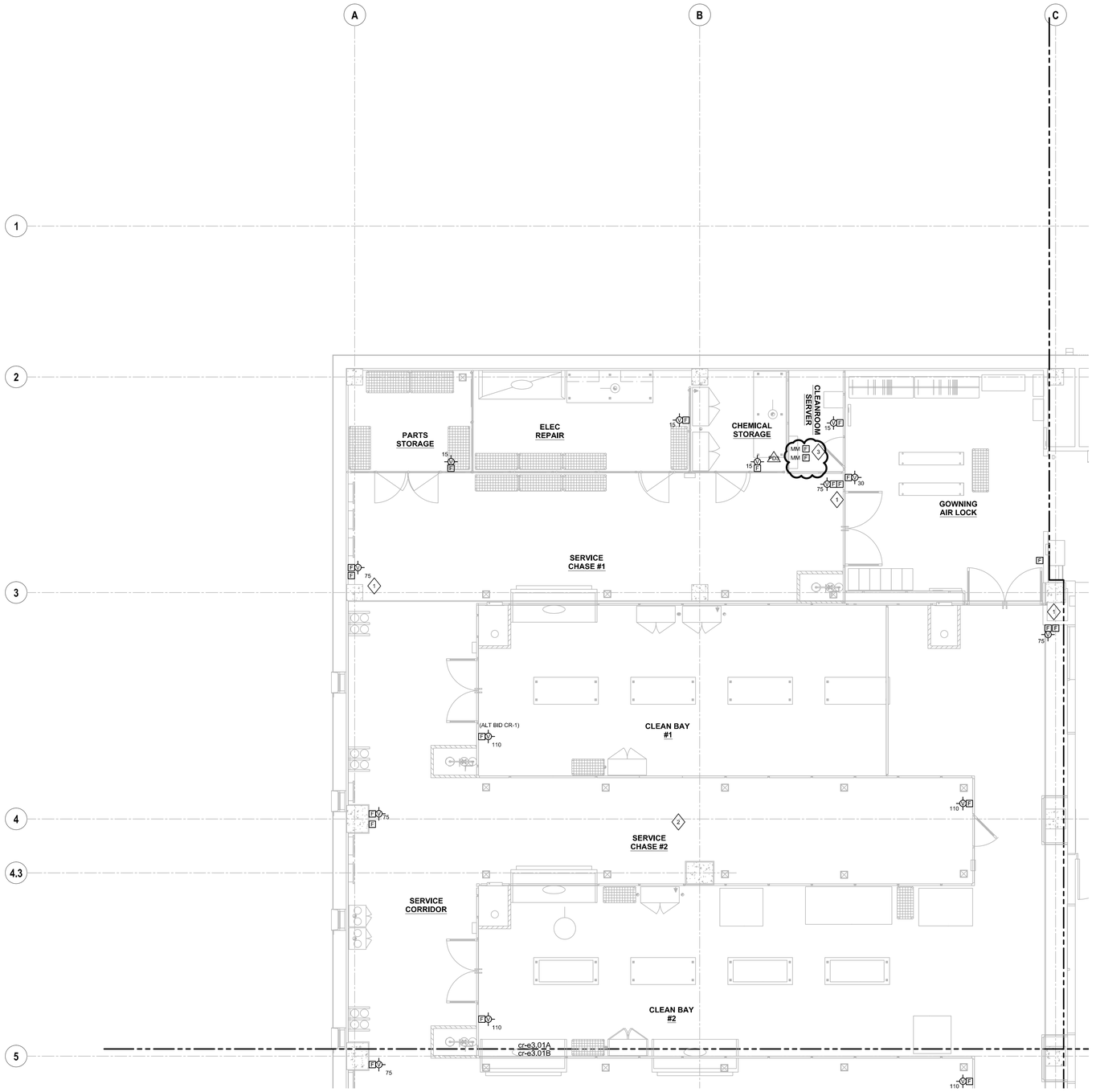
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CLEANROOM
ELECTRICAL POWER
PENTHOUSE - ZONE B

cr-e2.05B



1 **CLEANROOM ELECTRICAL SYSTEMS LEVEL 1 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEANROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
2. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
3. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
4. ALL CONDUITS IN CLEANROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO OTHER DEVICES.
5. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
6. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1 PER INTERNATIONAL BUILDING CODE SECTION 414, PROVIDE A DISTINCT MANUAL PULL STATION FOR USE IN CASE OF SPILL OR OTHER EMERGENCY RELATED TO THE STORAGE OF HAZARDOUS MATERIALS IN H OCCUPANCY. PULL STATION SHALL BE DISTINCT GREEN COLOR AND LABELED "HAZARD ALARM". ACTIVATION OF PULL STATION SHALL INDICATE A SEPARATE AND DISTINCT AUDIO MESSAGE ON THE FIRE ALARM SPEAKERS AND BE TRANSMITTED AS A SEPARATE AND DISTINCT ALARM CONDITION TO BSAC AND THE VIA THE FIRE ALARM DACT. AUDIO MESSAGE ON FIRE ALARM SPEAKERS WITHIN THIS ROOM AND THROUGHOUT THE CLEANROOM FIRE ALARM SPEAKERS INDICATED ON "e-cr" SERIES DRAWINGS, ROOM 1-170A, ROOM 1-165, AND THE CORRIDOR BETWEEN 1-166 AND THE CLEAN ROOM SHALL BE A HUMAN VOICE RECORDING INDICATING THE PRESENCE OF AN EMERGENCY RELATED TO HAZARDOUS MATERIAL STORAGE.

2 TYPICAL ENTIRE CLEANROOM: PROVIDE VESDA SMOKE DETECTION SYSTEM FOR CLEAN ROOM PER SPECIFICATION 283116CR. PROVIDE SAMPLING POINTS AT CLEANROOM RETURN AIR OPENINGS PER MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

3 PROVIDE FIRE ALARM MONITOR MODULES FOR CLEAN ROOM TOXIC GAS MONITORING SYSTEM (TGMS) AND OXYGEN DEPLETION SYSTEM. EACH SYSTEM SHALL BE INDEPENDENTLY MONITORED AND SEND A DISTINCT SIGNAL TO BSAC VIA THE FIRE ALARM SYSTEM.

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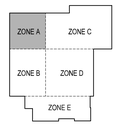
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Project

Physics and Nanotechnology Building

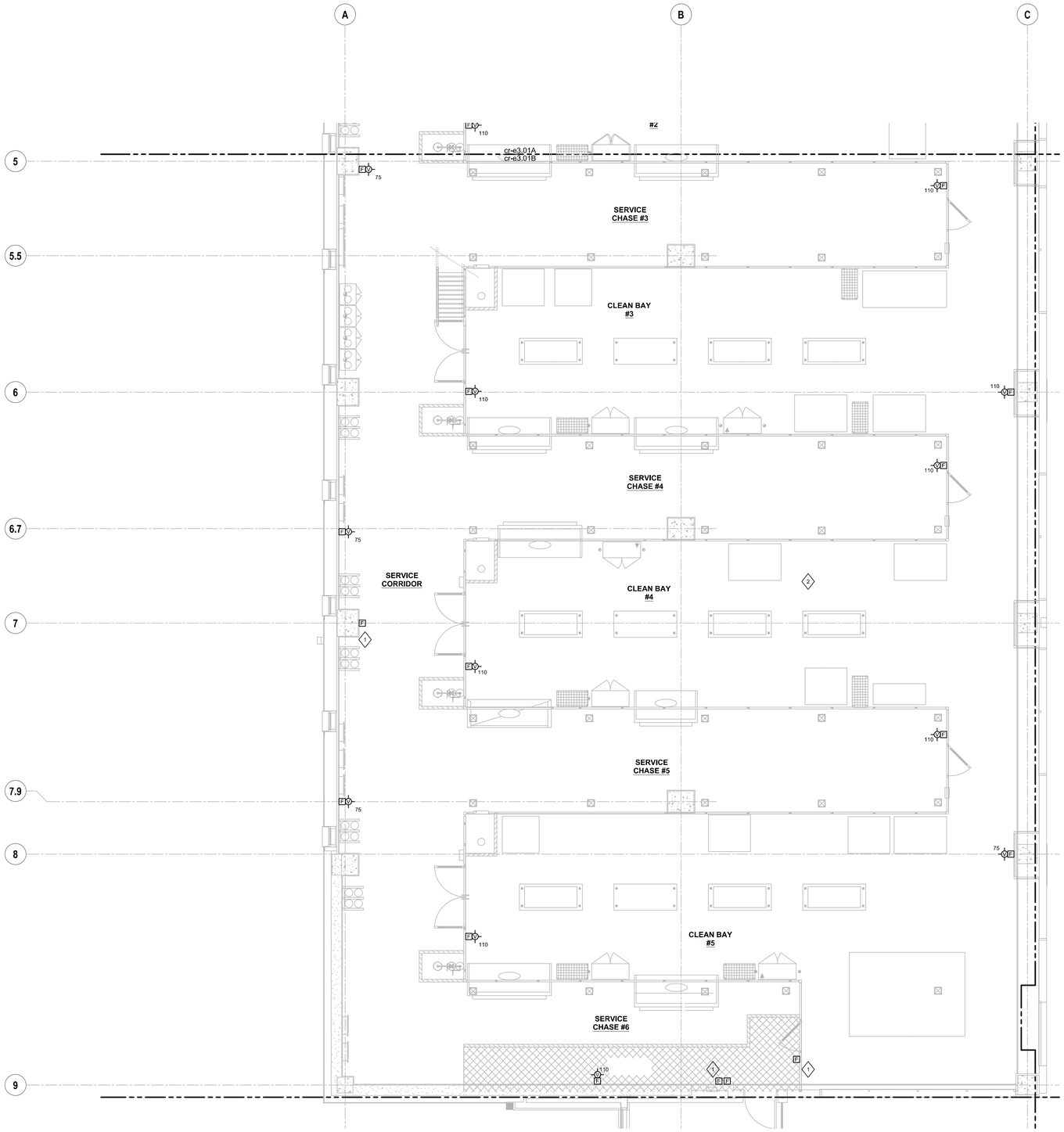
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CLEANROOM ELECTRICAL SYSTEMS LEVEL 1 - ZONE A

cr-e3.01A



1 **CLEANROOM ELECTRICAL SYSTEM LEVEL 1 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEANROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
2. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
3. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
4. ALL CONDUITS IN CLEANROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO OTHER DEVICES.
5. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
6. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PER INTERNATIONAL BUILDING CODE SECTION 414, PROVIDE A DISTINCT MANUAL PULL STATION FOR USE IN CASE OF SPILL OR OTHER EMERGENCY RELATED TO THE STORAGE OF HAZARDOUS MATERIALS IN H OCCUPANCY. PULL STATION SHALL BE DISTINCT GREEN COLOR AND LABELED "HAZARD ALARM". ACTIVATION OF PULL STATION SHALL INDICATE A SEPARATE AND DISTINCT AUDIO MESSAGE ON THE FIRE ALARM SPEAKERS AND BE TRANSMITTED AS A SEPARATE AND DISTINCT ALARM CONDITION TO BSAC AND THE VIA THE FIRE ALARM DACT. AUDIO MESSAGE ON FIRE ALARM SPEAKERS WITHIN THIS ROOM AND THROUGHOUT THE CLEANROOM FIRE ALARM SPEAKERS INDICATED ON "e-cr" SERIES DRAWINGS. ROOM 1-170A, ROOM 1-166, AND THE CORRIDOR BETWEEN 1-166 AND THE CLEAN ROOM SHALL BE A HUMAN VOICE RECORDING INDICATING THE PRESENCE OF AN EMERGENCY RELATED TO HAZARDOUS MATERIAL STORAGE.
2. TYPICAL ENTIRE CLEANROOM: PROVIDE VESDA SMOKE DETECTION SYSTEM FOR CLEAN ROOM PER SPECIFICATION 283116CR. PROVIDE SAMPLING POINTS AT CLEANROOM RETURN AIR OPENINGS PER MANUFACTURER'S INSTRUCTIONS AND SPECIFICATIONS.

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For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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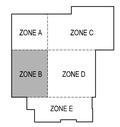
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Project

Physics and Nanotechnology Building

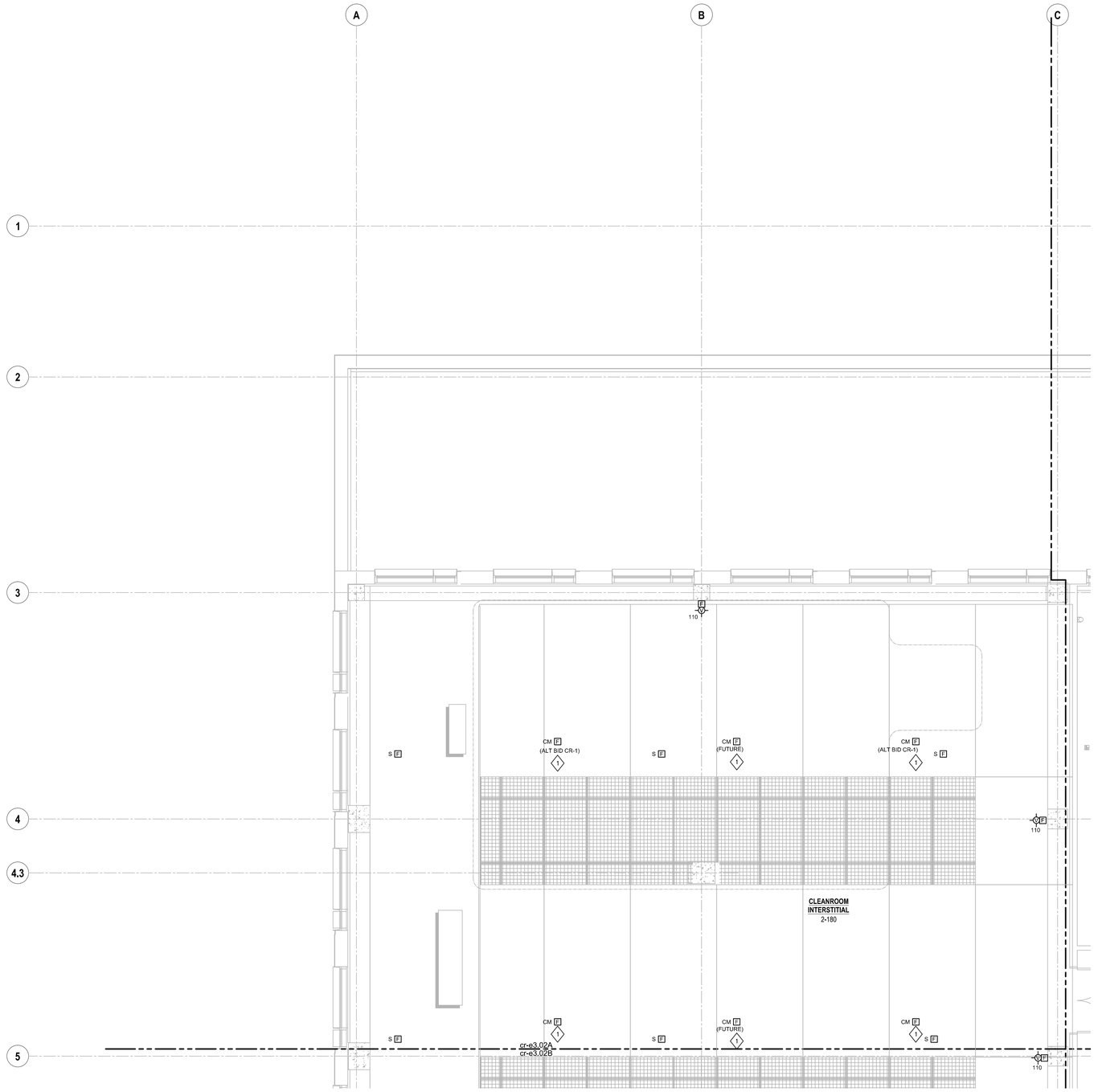
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CLEANROOM ELECTRICAL SYSTEMS LEVEL 1 - ZONE B

cr-e3.01B



1 **CLEANROOM ELECTRICAL SYSTEMS LEVEL 2 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL FIRE ALARM SPEAKERS INSTALLED IN MECHANICAL SPACES SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
2. AUDIBLE DEVICES ON THIS FLOOR SHALL ACTIVATE ON FIRE ALARM OR ON HAZARD SPILL ALARM SYSTEM AS INDICATED ON DEVICES ON LEVEL 1.
3. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
4. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1 PROVIDE FIRE ALARM CONTROL MODULE WITHIN 3' OF AIR HANDLER UNIT CONTROL PANEL. CONTROL MODULE SHALL ACTIVATE UPON DETECTION OF SMOKE BY ANY SPOT SMOKE DETECTOR ON THIS SHEET Or cr-e3.02B. CONTROL MODULE SHALL ALSO ACTIVATE UPON DETECTION OF SMOKE BY VESDA SYSTEM INDICATED ON SHEETS cr-e3.01A OR cr-e3.01B.

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By

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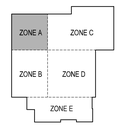
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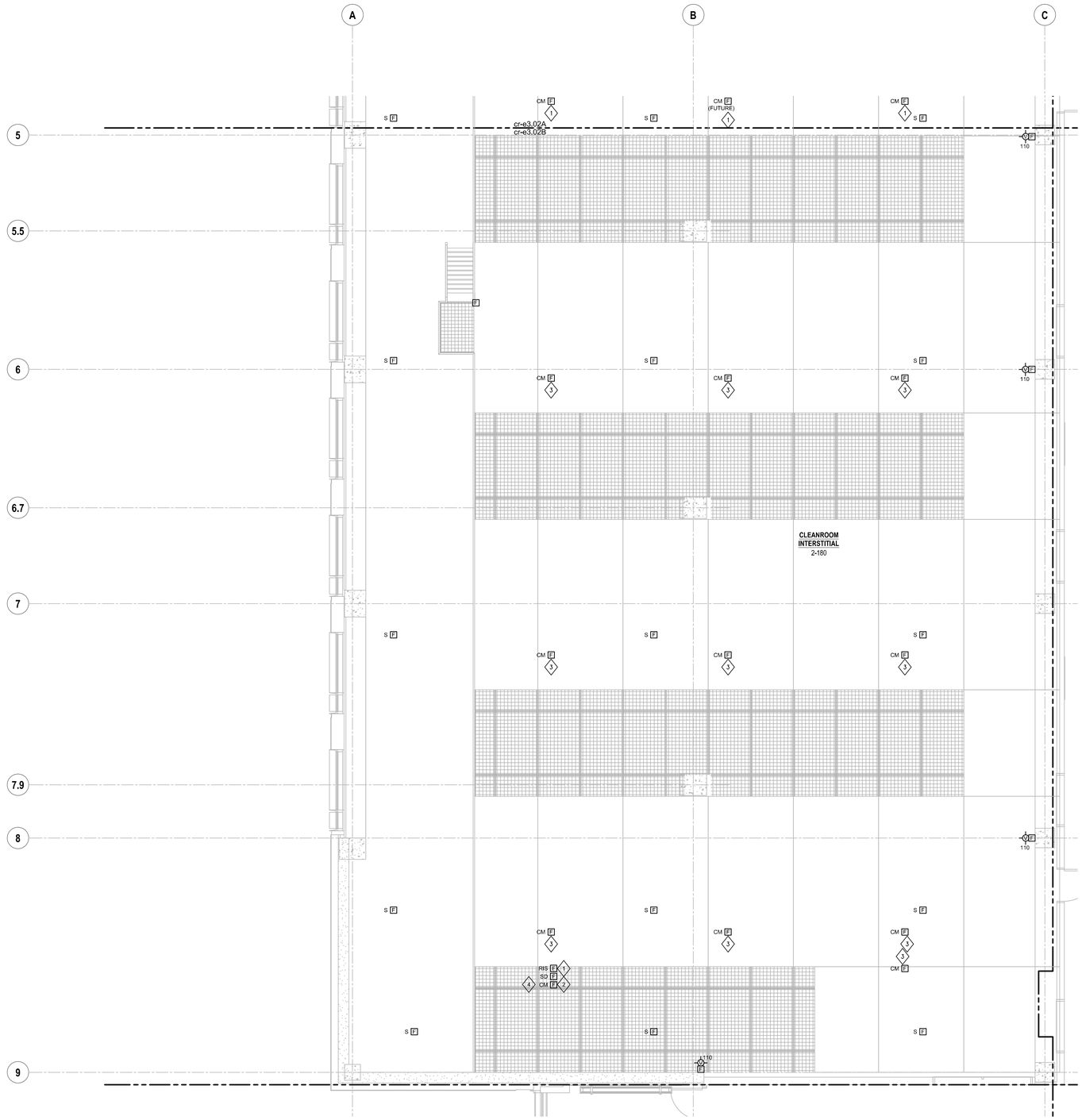
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CLEANROOM ELECTRICAL SYSTEMS LEVEL 2 - ZONE A

cr-e3.02A



1 **CLEANROOM ELECTRICAL SYSTEMS LEVEL 2 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. ALL FIRE ALARM SPEAKERS INSTALLED IN MECHANICAL SPACES SHALL BE SET TO PROVIDE 95DB AT 10 FEET REVERBERANT.
2. AUDIBLE DEVICES ON THIS FLOOR SHALL ACTIVATE ON FIRE ALARM OR ON HAZARD SPILL ALARM SYSTEM AS INDICATED ON DEVICES ON LEVEL 1.
3. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
4. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDILNG AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. INSTALL REMOTE INDICATOR AND TEST SWITCH IN NEAREST SERVICE CHASE ON FLOOR BELOW. WALL MOUNT INDICATOR.
2. TYPICAL: PROVIDE DUCT SMOKE DETECTOR WITH ADDRESSABLE RELAY MODULE WITHIN 3' OF DAMPER MOTOR OPERATOR. FIRE ALARM SYSTEM SHALL DISABLE 120V TO DAMPER DURING SMOKE DETECTION.
3. PROVIDE FIRE ALARM CONTROL MODULE WITHIN 3' OF AIR HANDLER UNIT CONTROL PANEL. CONTROL MODULE SHALL ACTIVATE UPON DETECTION OF SMOKE BY ANY SPOT SMOKE DETECTOR ON THIS SHEET OR cr-e3.02A. CONTROL MODULE SHALL ALSO ACTIVATE UPON DETECTION OF SMOKE BY VESDA SYSTEM INDICATED ON SHEETS cr-e3.01A OR cr-e3.01B.
4. DAMPER IS ASSOCIATED WITH MOTORS IN AHU-C-1. DAMPER SHALL BE CLOSED BY FIRE ALARM SYSTEM UPON SIGNAL FROM BUILDING AUTOMATION SYSTEM UPON LOSS OF AIR FLOW. REFER TO SHEET e3.05B.

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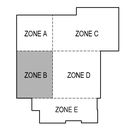
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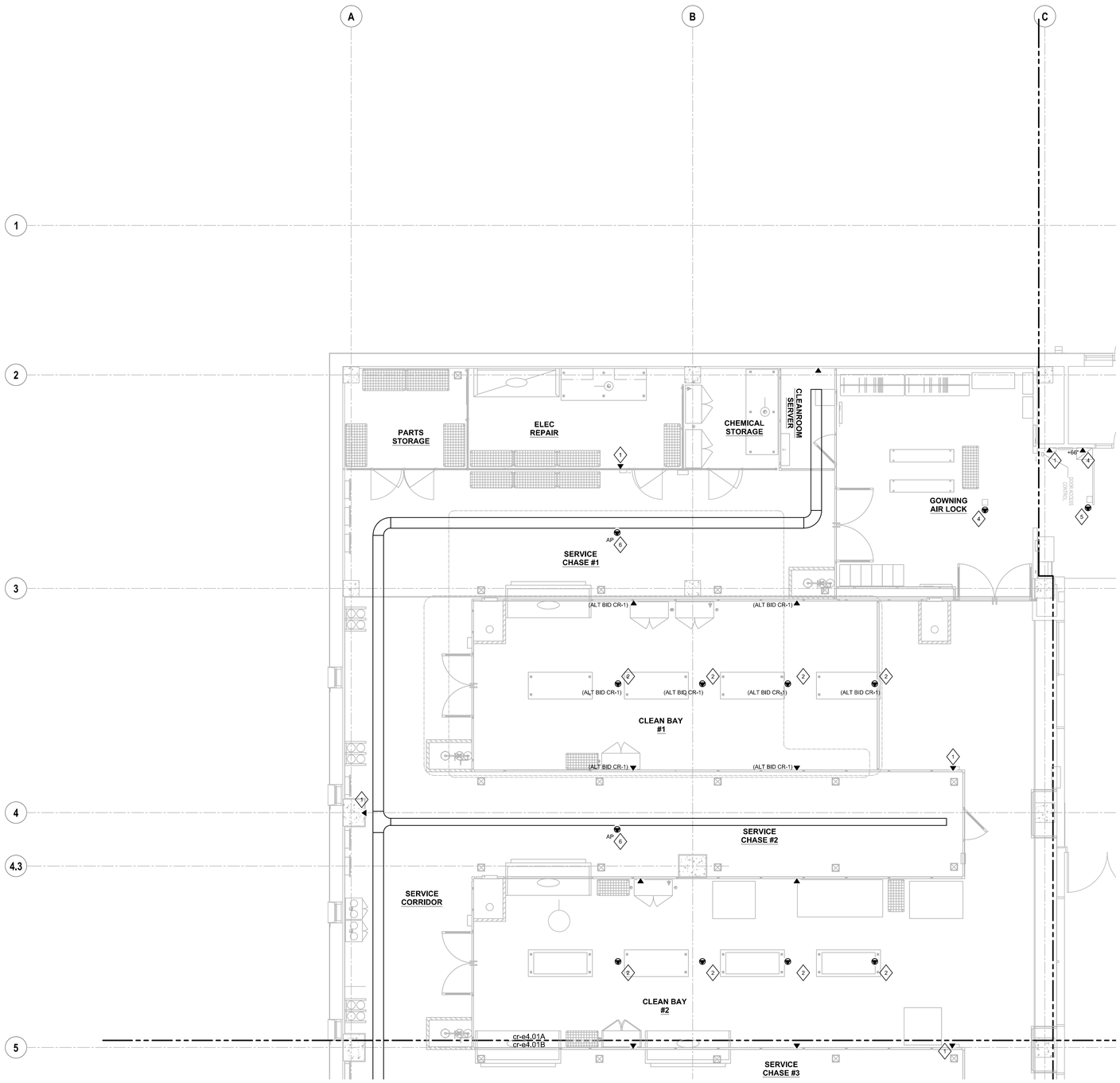
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CLEANROOM ELECTRICAL SYSTEMS LEVEL 2 - ZONE B

cr-e3.02B



1 **CLEANROOM ELECTRICAL TELECOM LEVEL 1 - ZONE A**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. SUPPORT CABLE TRAY FROM UTILITY UNISTRUT IN SERVICE CHASES.
2. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEANROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
3. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
4. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
5. ALL CONDUITS IN CLEANROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO CABLE TRAY.
6. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
7. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDING AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE BACKBOX AND 3/4" CONDUIT STUB-UP TO NEAREST ACCESSIBLE CABLE TRAY FOR INTERCOM SYSTEM. COORDINATE EXACT LOCATION AND HEIGHT WITH OWNER.
2. A TELECOM BACKBOX IS BEING PROVIDED IN THE CLEANROOM CEILING SYSTEM ADJACENT TO POWER RECEPTACLES AT THIS LOCATION. CONDUIT IS PROVIDED AS PART OF CEILING SYSTEM AND EXTENDS TO SERVICE CHASE. REFER TO SHEET cr#-2.12 FOR EXACT LOCATIONS.
3. CCTV CAMERA BACKBOX IS BEING PROVIDED IN THE CLEANROOM CEILING WITH A CONDUIT STUB UP. CONTRACTOR SHALL EXTEND CONDUIT FROM THIS POINT TO NEAREST SERVICE CORRIDOR CABLE TRAY.
4. PROVIDE BACKBOX AND 1" CONDUIT FOR CCTV MONITOR. EXTEND CONDUIT INTO NEAREST CLEANROOM SERVICE CORRIDOR CABLE TRAY.
5. PROVIDE CEILING MOUNTED BACKBOX AND 1" CONDUIT FOR CCTV CAMERA. EXTEND CONDUIT INTO NEAREST CLEANROOM SERVICE CORRIDOR CABLE TRAY.
6. PROVIDE WIRELESS ACCESS POINT CONSISTING OF JUNCTION BOX MOUNTED JUST BELOW CABLE TRAY AND SUPPORTED FROM CABLE TRAY WITH 3/4" CONDUIT STUB-UP BONDED TO TRAY.

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By

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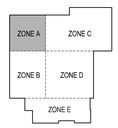
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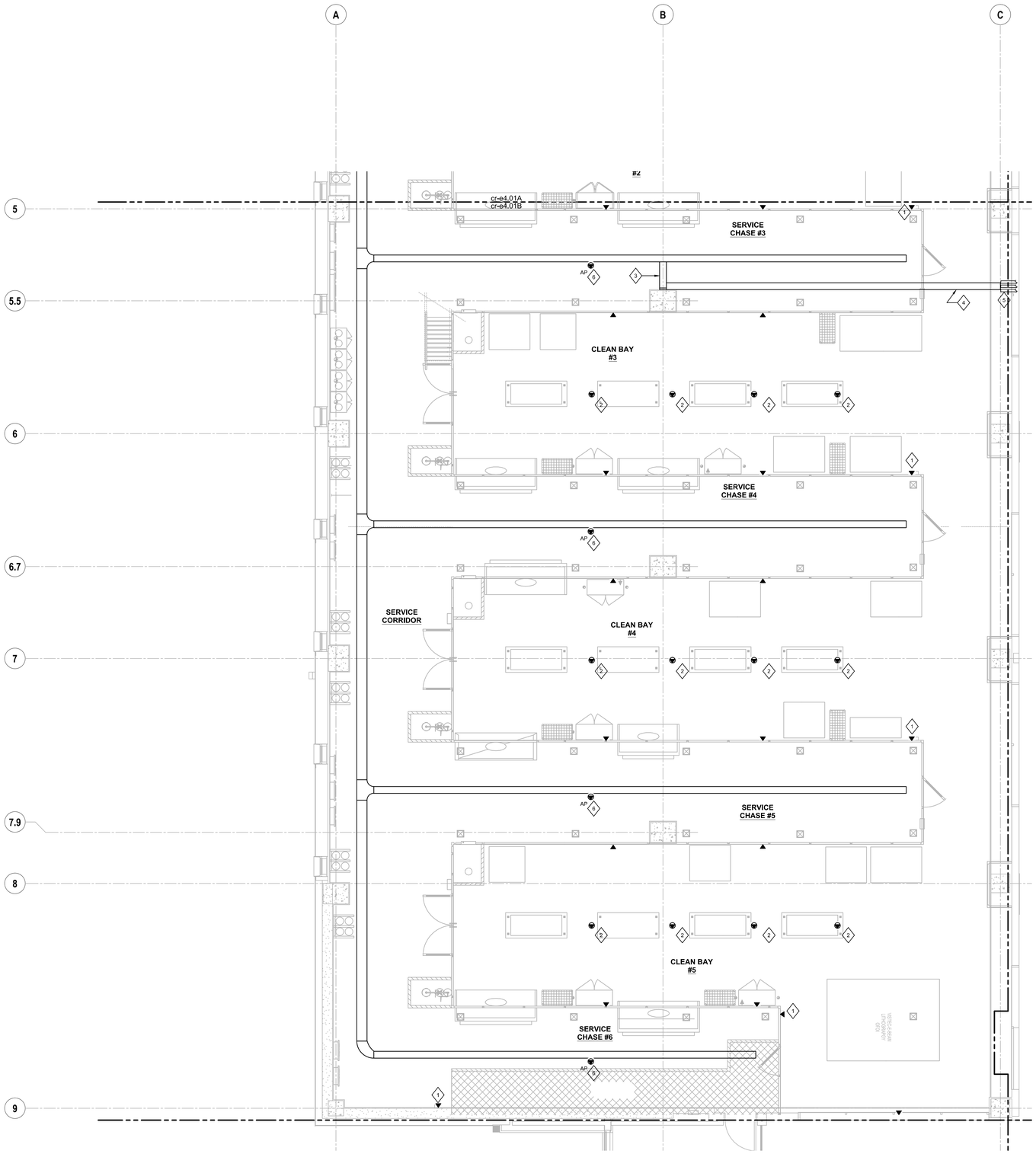
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CLEANROOM ELECTRICAL TELECOM LEVEL 1 - ZONE A

cr-e4.01A



1 **CLEANROOM ELECTRICAL TELECOM LEVEL 1 - ZONE B**
SCALE: 1/4" = 1'-0"

GENERAL NOTES

1. SUPPORT CABLE TRAY FROM UTILITY UNISTRUT IN SERVICE CHASES.
2. ALL DEVICES INSTALLED ALONG WALL NEAR COLUMN LINE C IN CLEANROOM SHALL BE CAST ALUMINUM BOXES WITH 1" OF CAULK SEALANT INSIDE CONDUIT HUB AFTER WIRES ARE PULLED. PROVIDE CAULK SEALANT AROUND PERIMETER OPENING OF BOX OPENING AND ADJACENT DRYWALL.
3. ALL DEVICES INSTALLED ALONG COLUMN LINES 2 AND 9 SHALL BE SURFACE MOUNTED WITH SURFACE MOUNTED BOXES.
4. ALL DEVICES INSTALLED IN INTERIOR PARTITIONS BETWEEN SERVICE CHASE AND CLEAN BAYS SHALL BE STANDARD ELECTRICAL BOXES WITH SURFACE MOUNTED EMT CONDUIT.
5. ALL CONDUITS IN CLEANROOM AREA SHALL BE AS HIGH AS VERTICALLY POSSIBLE TO UNDERSIDE OF SUPPORT SPACE ABOVE AND HORIZONTALLY TO CABLE TRAY.
6. ALL MATERIALS USED THROUGHOUT CLEANROOM AREA AND THE FLOOR PLAN INDICATED ON THIS DRAWING SHALL BE PLENUM RATED.
7. ALL CONDUIT PENETRATIONS THROUGH ANY CLEANROOM PERIMETER BETWEN THE CLEAN ROOM AND THE REST OF THE BUILDING AT LEVEL 1 OR 2 (SUCH AS LOW VOLTAGE WIRING, SECURITY, FIRE ALARM , BRANCH CIRCUIT FROM OTHER AREAS OF BUILDING) OR FEEDERS AND GROUND WIRES COMING UP THROUGH FLOOR TO SERVE PANELBOARDS OR GROUND BUSSES SHALL BE SEALED COMPLETELY INSIDE THE CONDUIT SO AS TO PROVIDE AN AIR TIGHT BARRIER AND NOT ALLOW THE TRANSMISSION OF AIR OUT OF THE CLEAN ROOM AREA. CONDUITS SHALL BE SEALED COMPLETELY WITH SILICONE CAULK AFTER PULLING WIRES THROUGH WALL/FLOOR PENETRATIONS. REFER TO SPECIFICATION 260000CR FOR ADDITIONAL INFORMATION ON SEALING IN AND AROUND CONDUITS.

SHEET KEYNOTES

1. PROVIDE BACKBOX AND 3/4" CONDUIT STUB-UP TO NEAREST ACCESSIBLE CABLE TRAY FOR INTERCOM SYSTEM. COORDINATE EXACT LOCATION AND HEIGHT WITH OWNER.
2. A TELECOM BACKBOX IS BEING PROVIDED IN THE CLEAN ROOM CEILING SYSTEM ADJACENT TO POWER RECEPTACLES AT THIS LOCATION. CONDUIT IS PROVIDED AS PART OF CEILING SYSTEM AND EXTENDS TO SERVICE CHASE. REFER TO SHEET crlf-2.12 FOR EXACT LOCATIONS.
3. PROVIDE 9" x 2" DEEP BASKET CABLE TRAY HORIZONTALLY OFF OF MAIN CABLE TRAY INDICATED IN SERVICE CORRIDOR. CABLE TRAY SHALL THEN EXTEND VERTICALLY ALONG COLUMN B.5.5 TO A HEIGHT 8' ABOVE GRATED SURFACE ABOVE.
4. CABLE TRAY INDICATED IS LOCATED IN LEVEL 2 SPACE, 8' ABOVE GRATING. PROVIDE 9" x 2" DEEP CABLE TRAY HORIZONTALLY TO CLEANROOM WALL PERIMETER.
5. AT PERIMETER PROVIDE (3)3" EMT CONDUITS THROUGH CLEANROOM WALL AND EXTEND TO IDF ROOM 2-157. CONDUITS SHALL BE DEDICATED SOLELY TO CLEANROOM. ROUTE CONDUIT TO ROOM 2-157 VIA CORRIDORS 2-170, 2-160 AND 2-140 ALONG A PATH SIMILAR TO CABLE TRAY INDICATED ON SHEETS e4.02C AND e4.02D. PROVIDE PULL BOXES AS REQUIRED FOR NUMBER OF BENDS. PULL BOXES SHALL BE PROVIDED WITH LOCKABLE COVERS. BEND CONDUITS TO CABLE TRAY. IN IDF ROOM, EXTEND CONDUITS TO OWNER FURNISHED RACK CONTAINING CLEANROOM EQUIPMENT. PROVIDE SEALED ENDCAPS ON ANY SPARE CONDUITS AND PROVIDE CAULK FILL INSIDE CONDUITS IN WHICH TELECOM WIRES WHICH ARE INSTALLED FOR INITIAL OCCUPANCY.
6. PROVIDE WIRELESS ACCESS POINT CONSISTING OF JUNCTION BOX MOUNTED JUST BELOW CABLE TRAY AND SUPPORTED FROM CABLE TRAY WITH 3/4" CONDUIT STUB-UP BONDED TO TRAY.

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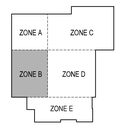
Checked SDM

Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718



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CLEANROOM ELECTRICAL TELECOM LEVEL 1 - ZONE B

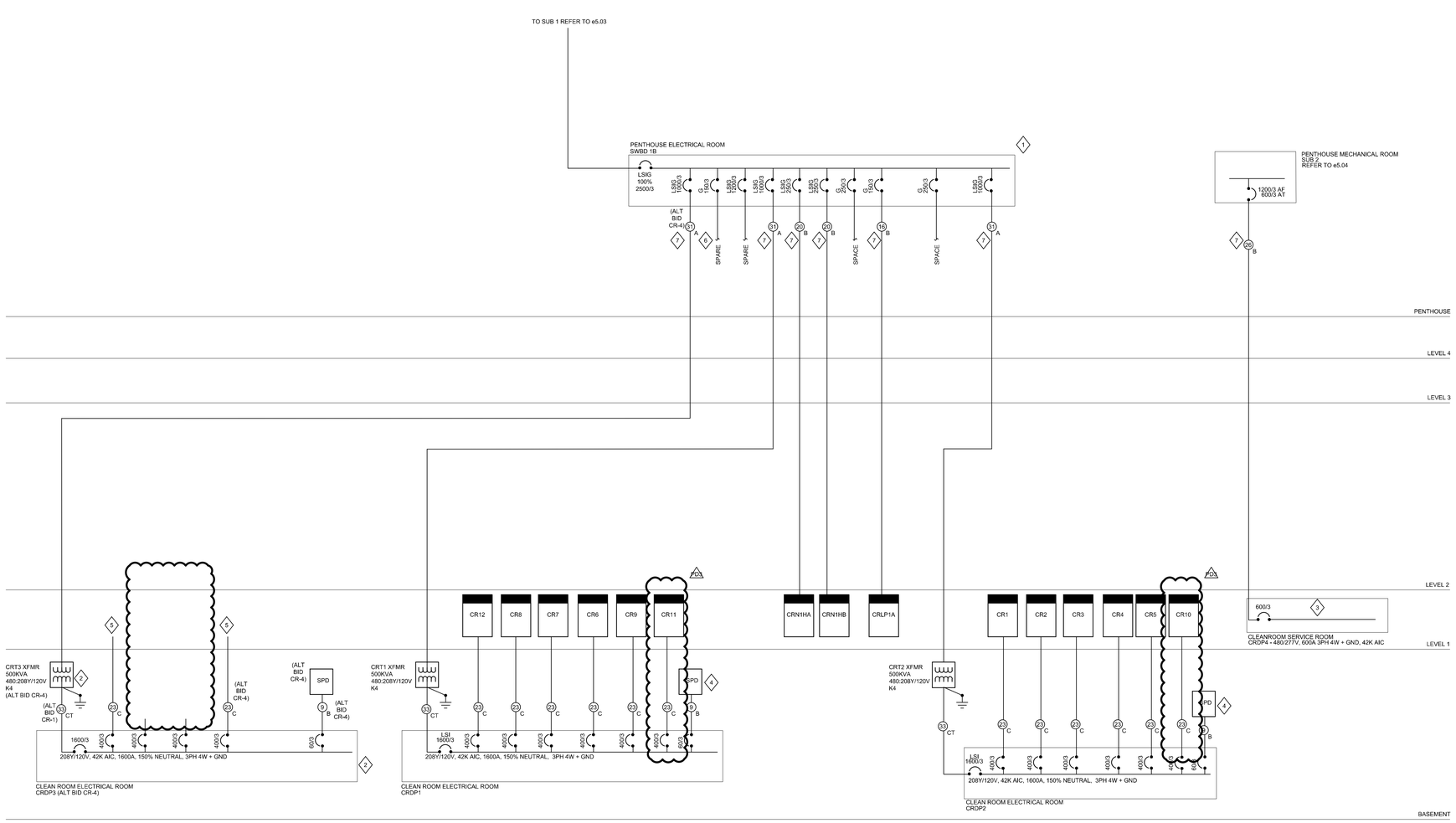
cr-e4.01B

GENERAL NOTES

1. RISER INDICATES EQUIPMENT DEDICATED FOR CLEANROOM AS IT IS SERVED FROM GEAR INSTALLED AND INDICATED ON SHEET e5.08.
2. REFER TO SHEET e9.02 FOR FEEDER SCHEDULES.
3. LSI(G) = FULLY ADJUSTABLE LONG TIME PICKUP/DELAY, SHORT TIME PICKUP/DELAY, INSTANTANEOUS ADJUSTMENT, AND GROUND FAULT ADJUSTMENTS.

SHEET KEYNOTES

1. REFER TO SHEET e5.08 FOR FURTHER INFORMATION ON THIS EQUIPMENT.
2. FOR BASE BID, CONTRACTOR SHALL PROVIDE CONDUIT BELOW CLEANROOM FLOOR SLAB SIMILAR TO ALL EQUIPMENT BEING INSTALLED EXCEPT CONDUITS SHALL REMAIN EMPTY. FOR ALTERNATE BID CR-4, PROVIDE PANELS, TRANSFORMERS, AND CONDUCTORS INDICATED.
3. REFER TO MOTOR SCHEDULES AND CLEANROOM MOTOR SCHEDULE FOR MOTORS SERVED FROM THIS EQUIPMENT. PROVIDE BRANCH BREAKERS AS INDICATED IN THE MOTOR SCHEDULE. PROVIDE ADDITIONAL 25% SPARE AND 25% SPACES OF ALL CIRCUIT BREAKERS INDICATED IN EQUIPMENT ON SCHEDULES.
4. LOCATE SPD IMMEDIATELY ADJACENT TO PANEL.
5. FOR BASE BID, CONTRACTOR SHALL PROVIDE CONDUIT BELOW CLEANROOM FLOOR SLAB SIMILAR TO ALL EQUIPMENT BEING INSTALLED EXCEPT CONDUITS SHALL REMAIN EMPTY. STUB CONDUITS UP ABOVE FLOOR SLAB. LOCATE ONE ADJACENT TO LOCATION OF PANEL CR10 AND ONE ADJACENT TO LOCATION OF PANEL CR11. FOR ALTERNATE BID CR-4, PROVIDE CONDUCTORS INDICATED.
6. FOR BASE BID, CONTRACTOR SHALL INSTALL CONDUIT FROM PENTHOUSE TO BASEMENT CLEANROOM ELECTRICAL ROOM. FOR ALTERNATE BID CR-4 PROVIDE CONDUCTORS INDICATED.
7. DUE TO EMF INTERFERENCE CONCERNS, ALL CONDUITS INSTALLED BETWEEN BASEMENT AND UP TO ABOVE THE FLOOR OF THIRD LEVEL AND ROUTED VIA ELECTRICAL ROOMS SHALL BE INSTALLED IN GALVANIZED RIGID STEEL CONDUIT. FROM THE FLOOR OF THIRD LEVEL TO LEVELS ABOVE AND INCLUDING THE PENTHOUSE CONDUCTORS MAY BE INSTALLED IN EMT CONDUIT.



1 **CLEANROOM ELECTRICAL ONE-LINE DIAGRAM**
SCALE: NONE

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Elert & Associates
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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
100% CD set	12-16-2011
Bid Package No. 2	02-24-2012
Project Directive No. 3	05-11-2012

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Checked SDM

Date 12/16/11

Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

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CLEANROOM ELECTRICAL ONE-LINE DIAGRAM

cr-e5.01

3 Phase Panelboard Schedule

Panel Designation: CR1 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Spare	20/1	1							2	20/1	Space
Spare	20/1	3							4	20/1	Space
Spare	20/1	5							6	20/1	Space
Spare	20/1	7							8	20/1	Space
Spare	20/1	9							10	20/1	Space
Spare	20/1	11							12	20/1	Space
Spare	20/1	13							14	20/1	Space
Spare	20/1	15							16	20/1	Space
Spare	20/1	17							18	20/1	Space
Spare	20/1	19							20	20/1	Space
Spare	20/1	21							22	20/1	Space
Spare	20/1	23							24	20/1	Space
Spare	20/1	25							26	20/1	Space
Spare	20/1	27							28	20/1	Space
Spare	20/1	29							30	20/1	Space
Spare	20/1	31							32	20/1	Space
Spare	20/1	33							34	20/1	Space
Space	20/1	35			0.2			0.6	36	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	37	0.6			0.6			38	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	39		0.6			0.6		40	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	41			0.6			0.6	42	20/1	AHU LTG & Rcpts

Recep(R): 0.2 kVA
Left Side Subtotal 0.6 0.6 0.8 Continuous(C): 4.2 kVA
Right Side Subtotal 0.6 0.6 1.2 Non-continuous(N): 0.0 kVA
Total Load per Phase 1.2 1.2 2.0 Total Connected Load: 4.4 kVA
Total Demand Load (D): 4.4 kVA

3 Phase Panelboard Schedule

Panel Designation: CR2 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 6 Rcpts	20/1	1	0.54			0.2			2	20/1	Srvc 6 Shower
Srvc 6 Rcpts	20/1	3		0.54			0.5		4	30/2	Bay 5 Hood
Srvc 6 Rcpts	20/1	5			0.54			0.5	6	|	|
Srvc 6 Rcpts	20/1	7	0.54			0.5			8	30/2	Bay 5 Hood
Bay 5 Rcpts	20/1	9		0.54			0.5		10	|	|
Bay 5 Rcpts	20/1	11			0.54				12	20/1	Space
Bay 5 Rcpts	20/1	13	0.36						14	20/1	Space
Bay 5 Rcpts	20/1	15		0.36					16	20/1	Space
Bay 5 Rcpts	20/1	17			0.18				18	20/1	Space
Bay 5 Rcpts	20/1	19	0.18						20	20/1	Space
Bay 5 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 5 Rcpts	20/1	23			0.18				24	20/1	Space
Spare	20/1	25							26	20/1	Space
Spare	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 2.8 kVA
Left Side Subtotal 1.6 1.6 1.4 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.0 0.5 Non-continuous(N): 4.1 kVA
Total Load per Phase 2.3 2.6 1.9 Total Connected Load: 6.9 kVA
Total Demand Load (D): 6.9 kVA

3 Phase Panelboard Schedule

Panel Designation: CR3 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 5 Rcpts	20/1	1	0.36			0.2			2	20/1	Srvc 5 Shower
Srvc 5 Rcpts	20/1	3		0.36					4	20/1	Space
Srvc 5 Rcpts	20/1	5			0.54				6	20/1	Space
Srvc 5 Rcpts	20/1	7	0.54						8	20/1	Space
Srvc 5 Rcpts	20/1	9		0.36					10	20/1	Space
Srvc 5 Rcpts	20/1	11			0.36				12	20/1	Space
Bay 5 Rcpts	20/1	13	0.54						14	20/1	Space
Bay 5 Rcpts	20/1	15		0.54					16	20/1	Space
Bay 5 Rcpts	20/1	17			0.54				18	20/1	Space
Bay 5 Rcpts	20/1	19	0.54						20	20/1	Space
Bay 5 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 5 Rcpts	20/1	23			0.18				24	20/1	Space
Bay 5 Rcpts	20/1	25	0.18						26	20/1	Space
Bay 5 Rcpts	20/1	27		0.18					28	20/1	Space
Spare	20/1	29							30	20/1	Space
Spare	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 1.5 kVA
Left Side Subtotal 2.2 1.6 1.6 Continuous(C): 0.0 kVA
Right Side Subtotal 0.2 0.0 0.0 Non-continuous(N): 4.1 kVA
Total Load per Phase 2.4 1.6 1.6 Total Connected Load: 5.6 kVA
Total Demand Load (D): 5.6 kVA

3 Phase Panelboard Schedule

Panel Designation: CR4 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 5 Rcpts	20/1	1	0.18			0.2			2	20/1	Srvc 5 Shower
Srvc 5 Rcpts	20/1	3		0.18			0.5		4	30/2	Bay 4 Hood
Srvc 5 Rcpts	20/1	5			0.54			0.5	6	|	|
Srvc 5 Rcpts	20/1	7	0.54			0.5			8	30/2	Bay 4 Hood
Bay 4 Rcpts	20/1	9		0.54			0.5		10	|	|
Bay 4 Rcpts	20/1	11			0.54				12	20/1	Space
Bay 4 Rcpts	20/1	13	0.36						14	20/1	Space
Bay 4 Rcpts	20/1	15		0.36					16	20/1	Space
Bay 4 Rcpts	20/1	17			0.18				18	20/1	Space
Bay 4 Rcpts	20/1	19	0.18						20	20/1	Space
Bay 4 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 4 Rcpts	20/1	23			0.18				24	20/1	Space
Spare	20/1	25							26	20/1	Space
Spare	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 2.1 kVA
Left Side Subtotal 1.3 1.3 1.4 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.0 0.5 Non-continuous(N): 4.1 kVA
Total Load per Phase 2.0 2.3 1.9 Total Connected Load: 6.2 kVA
Total Demand Load (D): 6.2 kVA

3 Phase Panelboard Schedule

Panel Designation: CR5 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 4 Rcpts	20/1	1	0.36			0.2			2	20/1	Srvc 4 Shower
Srvc 4 Rcpts	20/1	3		0.36			0.5		4	30/2	Bay 4 Hood
Srvc 4 Rcpts	20/1	5			0.54			0.5	6	|	|
Srvc 4 Rcpts	20/1	7	0.54						8	20/1	Space
Bay 4 Rcpts	20/1	9		0.54					10	20/1	Space
Bay 4 Rcpts	20/1	11			0.54				12	20/1	Space
Bay 4 Rcpts	20/1	13	0.36						14	20/1	Space
Bay 4 Rcpts	20/1	15		0.36					16	20/1	Space
Bay 4 Rcpts	20/1	17			0.18				18	20/1	Space
Bay 4 Rcpts	20/1	19	0.18						20	20/1	Space
Bay 4 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 4 Rcpts	20/1	23			0.18				24	20/1	Space
Spare	20/1	25							26	20/1	Space
Spare	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 2.0 kVA
Left Side Subtotal 1.4 1.4 1.4 Continuous(C): 0.0 kVA
Right Side Subtotal 0.2 0.5 0.5 Non-continuous(N): 3.6 kVA
Total Load per Phase 1.6 1.9 1.9 Total Connected Load: 5.5 kVA
Total Demand Load (D): 5.5 kVA

3 Phase Panelboard Schedule

Panel Designation: CR6 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 4 Rcpts	20/1	1	0.36			0.2			2	20/1	Srvc 4 Shower
Srvc 4 Rcpts	20/1	3		0.36			0.5		4	30/2	Bay 3 Hood
Srvc 4 Rcpts	20/1	5			0.36			0.5	6	|	|
Srvc 4 Rcpts	20/1	7	0.36			0.5			8	30/2	Bay 3 Hood
Srvc 4 Rcpts	20/1	9		0.36			0.5		10	|	|
Srvc 4 Rcpts	20/1	11			0.36				12	20/1	Space
Bay 3 Rcpts	20/1	13	0.54						14	20/1	Space
Bay 3 Rcpts	20/1	15		0.54					16	20/1	Space
Bay 3 Rcpts	20/1	17			0.36				18	20/1	Space
Bay 3 Rcpts	20/1	19	0.36						20	20/1	Space
Bay 3 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 3 Rcpts	20/1	23			0.18				24	20/1	Space
Bay 3 Rcpts	20/1	25	0.18						26	20/1	Space
Bay 3 Rcpts	20/1	27		0.18					28	20/1	Space
Spare	20/1	29							30	20/1	Space
Spare	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 1.8 kVA
Left Side Subtotal 1.8 1.6 1.3 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.0 0.5 Non-continuous(N): 4.6 kVA
Total Load per Phase 2.5 2.6 1.8 Total Connected Load: 6.9 kVA
Total Demand Load (D): 6.9 kVA

3 Phase Panelboard Schedule

Panel Designation: CR7 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 3 Rcpts	20/1	1	0.54			0.2			2	20/1	Srvc 3 Shower
Srvc 3 Rcpts	20/1	3		0.54			0.2		4	20/1	Srvc 3 Vent Cab
Srvc 3 Rcpts	20/1	5			0.36			0.2	6	20/1	Srvc 3 Vent Cab
Srvc 3 Rcpts	20/1	7	0.36						8	20/1	Space
Bay 3 Rcpts	20/1	9		0.54					10	20/1	Space
Bay 3 Rcpts	20/1	11			0.54				12	20/1	Space
Bay 3 Rcpts	20/1	13	0.36						14	20/1	Space
Bay 3 Rcpts	20/1	15		0.36					16	20/1	Space
Bay 3 Rcpts	20/1	17			0.36				18	20/1	Space
Bay 3 Rcpts	20/1	19	0.36						20	20/1	Space
Bay 3 Rcpts	20/1	21							22	20/1	Space
Bay 3 Rcpts	20/1	23							24	20/1	Space
Bay 3 Rcpts	20/1	25							26	20/1	Space
Bay 3 Rcpts	20/1	27							28	20/1	Space
Spare	20/1	29							30	20/1	Space
Spare	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 2.3 kVA
Left Side Subtotal 1.6 1.4 1.3 Continuous(C): 0.0 kVA
Right Side Subtotal 0.2 0.2 0.2 Non-continuous(N): 3.1 kVA
Total Load per Phase 1.8 1.6 1.5 Total Connected Load: 4.9 kVA
Total Demand Load (D): 4.9 kVA

3 Phase Panelboard Schedule

Panel Designation: CR8 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 3 Rcpts	20/1	1	0.36			0.18			2	20/1	Srvc 3 Shower
Srvc 3 Rcpts	20/1	3		0.36			0.5		4	30/2	Bay 2 Hood
Srvc 3 Rcpts	20/1	5			0.36			0.5	6	|	|
Srvc 3 Rcpts	20/1	7	0.36			0.5			8	30/2	Bay 2 Hood
Srvc 3 Rcpts	20/1	9		0.36			0.5		10	|	|
Srvc 3 Rcpts	20/1	11			0.36				12	20/1	Space
Bay 2 Rcpts	20/1	13	0.54						14	20/1	Space
Bay 2 Rcpts	20/1	15		0.54					16	20/1	Space
Bay 2 Rcpts	20/1	17			0.36				18	20/1	Space
Bay 2 Rcpts	20/1	19	0.36						20	20/1	Space
Bay 2 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 2 Rcpts	20/1	23			0.18				24	20/1	Space
Bay 2 Rcpts	20/1	25	0.18						26	20/1	Space
Bay 2 Rcpts	20/1	27		0.18					28	20/1	Space
Spare	20/1	29							30	20/1	Space
Spare	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 2.3 kVA
Left Side Subtotal 1.8 1.6 1.3 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.0 0.5 Non-continuous(N): 4.6 kVA
Total Load per Phase 2.5 2.6 1.8 Total Connected Load: 6.9 kVA
Total Demand Load (D): 6.9 kVA

3 Phase Panelboard Schedule

Panel Designation: CR9 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 2 Rcpts	20/1	1	0.36			0.2			2	20/1	Srvc 2 Shower
Srvc 2 Rcpts	20/1	3		0.36			0.5		4	30/2	Bay 2 Hood
Srvc 2 Rcpts	20/1	5			0.54			0.5	6	|	|
Srvc 2 Rcpts	20/1	7	0.54			0.2			8	20/1	Srvc 2 Vent Cab
Bay 2 Rcpts	20/1	9		0.54			0.2		10	20/1	Bay 2 Shower
Bay 2 Rcpts	20/1	11			0.54				12	20/1	Space
Bay 2 Rcpts	20/1	13	0.36						14	20/1	Space
Bay 2 Rcpts	20/1	15		0.36					16	20/1	Space
Bay 2 Rcpts	20/1	17			0.18				18	20/1	Space
Bay 2 Rcpts	20/1	19	0.18						20	20/1	Space
Bay 2 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 2 Rcpts	20/1	23			0.18				24	20/1	Space
Bay 2 Rcpts	20/1	25	0.36						26	20/1	Space
Bay 2 Rcpts	20/1	27		0.36					28	20/1	Space
Spare	20/1	29							30	20/1	Space
Spare	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 1.8 kVA
Left Side Subtotal 1.8 1.8 1.4 Continuous(C): 0.0 kVA
Right Side Subtotal 0.4 0.7 0.5 Non-continuous(N): 4.7 kVA
Total Load per Phase 2.2 2.5 1.9 Total Connected Load: 6.6 kVA
Total Demand Load (D): 6.6 kVA

3 Phase Panelboard Schedule

Panel Designation: CR10 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Srvc 2 Rcpts	20/1	1	0.54			0.2			2	20/1	Srvc 2 Shower
Srvc 2 Rcpts	20/1	3		0.54					4	20/1	Space
Srvc 2 Rcpts	20/1	5			0.54				6	20/1	Space
Srvc 2 Rcpts	20/1	7	0.54						8	20/1	Space
Bay 1 Rcpts	20/1	9		0.54					10	20/1	Space
Bay 1 Rcpts	20/1	11			0.54				12	20/1	Space
Bay 1 Rcpts	20/1	13	0.36						14	20/1	Space
Bay 1 Rcpts	20/1	15		0.36					16	20/1	Space
Bay 1 Rcpts	20/1	17			0.18				18	20/1	Space
Bay 1 Rcpts	20/1	19	0.18						20	20/1	Space
Bay 1 Rcpts	20/1	21		0.18					22	20/1	Space
Bay 1 Rcpts	20/1	23			0.18				24	20/1	Space
Spare	20/1	25							26	20/1	Space
Spare	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 1.8 kVA
Left Side Subtotal 1.6 1.6 1.4 Continuous(C): 0.0 kVA
Right Side Subtotal 0.2 0.0 0.0 Non-continuous(N): 3.1 kVA
Total Load per Phase 1.8 1.6 1.4 Total Connected Load: 4.9 kVA
Total Demand Load (D): 4.9 kVA

3 Phase Panelboard Schedule

Panel Designation: CR11 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Bay 1 Rcpts	20/1	1	0.54			0.2			2	20/1	Srvc 1 Shower
Bay 1 Rcpts	20/1	3		0.54			0.5		4	30/2	Bay 1 Hood
Bay 1 Rcpts	20/1	5			0.54			0.5	6	|	|
Spare	20/1	7				0.5			8	30/2	Bay 1 Hood
Spare	20/1	9					0.5		10	|	|
Spare	20/1	11							12	20/1	Space
Spare	20/1	13							14	20/1	Space
Spare	20/1	15							16	20/1	Space
Spare	20/1	17							18	20/1	Space
Space	20/1	19							20	20/1	Space
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space

Recep(R): 2.8 kVA
Left Side Subtotal 0.5 0.5 0.5 Continuous(C): 0.0 kVA
Right Side Subtotal 0.7 1.0 0.5 Non-continuous(N): 1.0 kVA
Total Load per Phase 1.2 1.5 1.0 Total Connected Load: 3.8 kVA
Total Demand Load (D): 3.8 kVA

3 Phase Panelboard Schedule

Panel Designation: CR12 Floor: FIRST CLEANROOM Project No. 08643-00
208/120 Volt 3 Phase 4 Wire + Ground
Bus Rating: 400 A Main Breaker: 400 A 22 kAIC Fault Current Rating
Remarks: Provide 150% Neutral Bus
Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Gowning Rcpts	20/1	1	0.72			0.18			2	20/1	Srvc 1 Rcpts
Svrc 1 Shower	20/1	3		0.2			0.18		4	20/1	Srvc 1 Rcpts
Air Lock FFU	20/1	5			1.2			1	6	20/1	Spare
Air Lock FFU	20/1	7	1.2			0.72			8	20/1	Parts Stg Rcpts
Air Lock FFU	20/1	9		1.2			0.36		10	20/1	Elec Rpr Rcpts
Elec Repair Hood	30/2	11			0.5			1	12	20/1	Elec Rpr Hood
|	|	13	0.5		0.36			14	20/1	Elec Rpr Wrnld
Spare	20/1	15					0.36		16	20/1	Elec Rpr Wrnld
Spare	20/1	17						1	18	30/2	Elec Rpr Rcpts
Space	20/1	19				1			20	|	|
Space	20/1	21					1		22	30/3	Elec Rpr Rcpts
Space	20/1	23						1	24	|	|
Space	20/1	25				1			26	|	|
Space	20/1	27					0.54		28	20/1	Srvr Room
Space	20/1	29						0.54	30	20/1	Srvr Room
Space	20/1	31				0.54			32	20/1	Srvr Room
Space	20/1	33					0.6		34	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	35			0.6			0.6	36	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	37	0.6			0.6			38	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	39		6			0.6		40	20/1	AHU LTG & Rcpts
AHU LTG & Rcpts	20/1	41			0.6			0.6	42	20/1	AHU LTG & Rcpts

Recep(R): 16.3 kVA
Left Side Subtotal 3.0 7.4 2.9 Continuous(C): 10.8 kVA
Right Side Subtotal 4.4 3.6 5.7 Non-continuous(N): 0.0 kVA
Total Load per Phase 7.4 11.0 8.6 Total Connected Load: 27.1 kVA
Total Demand Load (D): 24.0 kVA

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3 Phase Panelboard Schedule

Panel Designation: CRN1HA Floor: FIRST CLEANROOM Project No. 08643-00
480/277 Volt: 3 Phase 4 Wire + Ground
Bus Rating: 250 A Main Breaker: 250 A 14 kAIC Fault Current Rating
Remarks: Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Space	20/1	1							2	20/1	Space
Space	20/1	3							4	20/1	Space
Space	20/1	5							6	20/1	Space
Space	20/1	7							8	20/1	Space
Space	20/1	9							10	20/1	Space
Space	20/1	11							12	20/1	Space
Space	20/1	13							14	20/1	Space
Space	20/1	15							16	20/1	Space
Space	20/1	17							18	20/1	Space
Space	20/1	19							20	20/1	Space
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space
											Recep(R): 0.0 kVA
Left Side Subtotal			0.0	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.0	0.0	0.0						Total Connected Load: 0.0 kVA
											Total Demand Load (D): 0.0 kVA

3 Phase Panelboard Schedule

Panel Designation: CRN1HB Floor: FIRST CLEANROOM Project No. 08643-00
480/277 Volt: 3 Phase 4 Wire + Ground
Bus Rating: 250 A Main Breaker: 250 A 14 kAIC Fault Current Rating
Remarks: Provide 120V shunt trip main breaker

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Space	20/1	1							2	20/1	Space
Space	20/1	3							4	20/1	Space
Space	20/1	5							6	20/1	Space
Space	20/1	7							8	20/1	Space
Space	20/1	9							10	20/1	Space
Space	20/1	11							12	20/1	Space
Space	20/1	13							14	20/1	Space
Space	20/1	15							16	20/1	Space
Space	20/1	17							18	20/1	Space
Space	20/1	19							20	20/1	Space
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space
											Recep(R): 0.0 kVA
Left Side Subtotal			0.0	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			0.0	0.0	0.0						Non-continuous(N): 0.0 kVA
Total Load per Phase			0.0	0.0	0.0						Total Connected Load: 0.0 kVA
											Total Demand Load (D): 0.0 kVA

3 Phase Panelboard Schedule

Panel Designation: CRLP1A Floor: FIRST CLEANROOM Project No. 08643-00
480/277 Volt: 3 Phase 4 Wire + Ground
Bus Rating: 150 A Main Breaker: 150 A 14 kAIC Fault Current Rating
Remarks:

Description	AMP/ Pole	CCT No.	Left Side, kVA A	B	C	Right Side, kVA A	B	C	CCT No.	AMP/ Pole	Description
Ltg Cleanroom Int	20/1	1	1.3			2			2	20/1	Ltg Cleanrm Clg
Spare	20/1	3					2		4	20/1	Ltg Cleanrm Clg
Spare	20/1	5						2	6	20/1	Ltg Cleanrm Clg
Spare	20/1	7				2			8	20/1	Ltg Cleanrm Clg
Spare	20/1	9					2		10	20/1	Ltg Cleanrm Clg
Spare	20/1	11						2	12	20/1	Ltg Cleanrm Clg
Spare	20/1	13				1			14	20/1	Ltg Cleanrm Clg
Spare	20/1	15							16	20/1	Space
Space	20/1	17							18	20/1	Space
Space	20/1	19							20	20/1	Space
Space	20/1	21							22	20/1	Space
Space	20/1	23							24	20/1	Space
Space	20/1	25							26	20/1	Space
Space	20/1	27							28	20/1	Space
Space	20/1	29							30	20/1	Space
Space	20/1	31							32	20/1	Space
Space	20/1	33							34	20/1	Space
Space	20/1	35							36	20/1	Space
Space	20/1	37							38	20/1	Space
Space	20/1	39							40	20/1	Space
Space	20/1	41							42	20/1	Space
											Recep(R): 5.3 kVA
Left Side Subtotal			1.3	0.0	0.0						Continuous(C): 0.0 kVA
Right Side Subtotal			5.0	4.0	4.0						Non-continuous(N): 9.0 kVA
Total Load per Phase			6.3	4.0	4.0						Total Connected Load: 14.3 kVA
											Total Demand Load (D): 14.3 kVA

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

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Project

Physics and Nanotechnology Building

U of M Project # 01-155-08-1718

UNIVERSITY OF MINNESOTA
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CLEANROOM ELECTRICAL PANEL SCHEDULES

cr-e9.02

Motor Schedule

Motor Number Tag	Motor Name	Location	EM Power	Panel	Overcurrent Protection Device	Volts	Phase	HP or Amps	Wire and Conduit Minimum Size	NEMA STARTER/ VFD	LOCAL FUSED DISC, AT MOTOR. AMP/FUSE/POLES	REMARKS
5	AHU-C1	5-109	X	EHDP	175/3	480	3	100 HP	2" - 3#2/0, 1#6 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR.
6	NOT USED											
7	NOT USED											
8	NOT USED											
14	AHU-C5	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
15	AHU-C6	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
16	AHU-C7	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
17	AHU-C8	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
18	AHU-C9	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
19	AHU-C10	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
20	AHU-C11	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
21	AHU-C12	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
22	AHU-C13	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
23	AHU-C14	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
24	AHU-C15	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
25	AHU-C16	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
26	AHU-C17	2-180		CRDP4	50/3	480	3	4 x 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
27	CH-LC1	ROOF		SWBD MTR3	300/3	480	3	242 A	(2 SETS) 2" - 3#3/0, 1 #3 GND	FVNR BY MC	400/300/3 NEMA 3R	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, FUSED DISCONNECT, AND CONTROL PANEL. WIRING BETWEEN VFD AND MOTORS BY EQUIPMENT SUPPLIER.
37	P-HWP-C1	5-109		SWBD MTR3	15/3	480	3	3 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
38	P-HWP-C2	5-109		SWBD MTR3	15/3	480	3	3 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
44	EF-SE-1	ROOF	X	EHDP	90/3	480	3	30 HP	1" 3#6, 1#6 GND	VFD BY MC	60/50/3 NEMA 3R	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR.
45	EF-SE-2	ROOF	X	EHDP	90/3	480	3	30 HP	1" 3#6, 1#6 GND	VFD BY MC	60/50/3 NEMA 3R	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR.
46	EF-CE-1	ROOF	X	EHDP	80/3	480	3	25 HP	3/4" 3#8, 1#8 GND	VFD BY MC	60/45/3 NEMA 3R	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR.
47	EF-CE-2	ROOF	X	EHDP	80/3	480	3	25 HP	3/4" 3#8, 1#8 GND	VFD BY MC	60/45/3 NEMA 3R	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD IN PENTHOUSE, MOTOR DISCONNECT AND MOTOR.
58	P-PCH-1	B-164		NBHA	70/3	480	3	15 HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
59	P-PCH-2	B-164		NBHA	70/3	480	3	15 HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
62	P-ACH-1	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/15/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR. ONLY 1 OF 2 RUN AT A TIME.
63	P-ACH-2	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/15/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR. ONLY 1 OF 2 RUN AT A TIME.
64	P-LCH-1	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
65	P-LCH-2	5-109		SWBD MTR3	30/3	480	3	7.5 HP	3/4" - 3#12, 1#12 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
68	P-RWP-1	5-109		SWBD MTR3	50/3	480	3	15 HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
69	P-RWP-2	5-109		SWBD MTR3	50/3	480	3	15 HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, VFD, AND MOTOR. ONLY 1 OF 2 RUN AT A TIME.
93	AHU-C18	1-180		CRDP4	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2.8/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR.
94	AHU-C19	1-180		CRDP4	15/3	480	3	1 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2.8/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR.
95	NOT USED											
104	VCP-1	1-163		HDP1	40/3	480	3	10 HP	3/4" - 3#12, #12 GND	W UNIT		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND LOAD.
114	UPW EQUIPMENT	B-164		NBHA	30/3	480	3	30A	3/4" - 3#10, 1#10 GND	W UNIT		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND SKID CONTROL PANEL.
115	UPW EQUIPMENT	B-164		NBHA	30/3	480	3	30A	3/4" - 3#10, 1#10 GND	W UNIT		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND SKID CONTROL PANEL.
116	UPW EQUIPMENT	B-164		NBHA	30/3	480	3	30A	3/4" - 3#10, 1#10 GND	W UNIT		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND SKID CONTROL PANEL.
121	AHU-C2 (ALT BID CR-1)	2-180		CRDP4	50/3	480	3	4 X 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
122	AHU-C3	2-180		CRDP4	50/3	480	3	4 X 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
123	AHU-C4 (ALT BID CR-1)	2-180		CRDP4	50/3	480	3	4 X 3HP	3/4" - 3#10, 1#10 GND	VFD BY MC		PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER AND VFD. WIRING BETWEEN VFD AND MOTOR BY AHU SUPPLIER.
124	P-CHPC1	5-109		SWBD MTR3	15/3	480	3	2 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/6/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
139	P-C2 (ALT BID CR-1)	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
140	P-C3	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
141	P-C4 (ALT BID CR-1)	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
142	P-C5	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
143	P-C6	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
144	P-C7	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
145	P-C8	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
146	P-C9	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
147	P-C10	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
148	P-C11	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
149	P-C12	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
150	P-C13	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
151	P-C14	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
152	P-C15	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
153	P-C16	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.
154	P-C17	2-180		CRDP4	15/3	480	3	0.75 HP	3/4" - 3#12, 1#12 GND	COMBINATION NEMA 0 FVNR AND FUSED DISCONNECT BY EC	30/2/3	PROVIDE WIRING AND CONDUIT BETWEEN BRANCH CIRCUIT BREAKER, STARTER, AND MOTOR. LOCATE STARTER/DISC WITHIN 3' OF MOTOR.

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I hereby certify that this plan or drawing was prepared by me or under my direct supervision and that I am a duly licensed ELECTRICAL ENGINEER under the laws of the State of Minnesota.

For AFFILIATED ENGINEERS, INC.

By

Name RONALD M. PARSLEY

Date 02-24-2012 Reg. No. 25163

Issued for	Date
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Bid Package No. 2	02-24-2012
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Date 12/16/11

Project

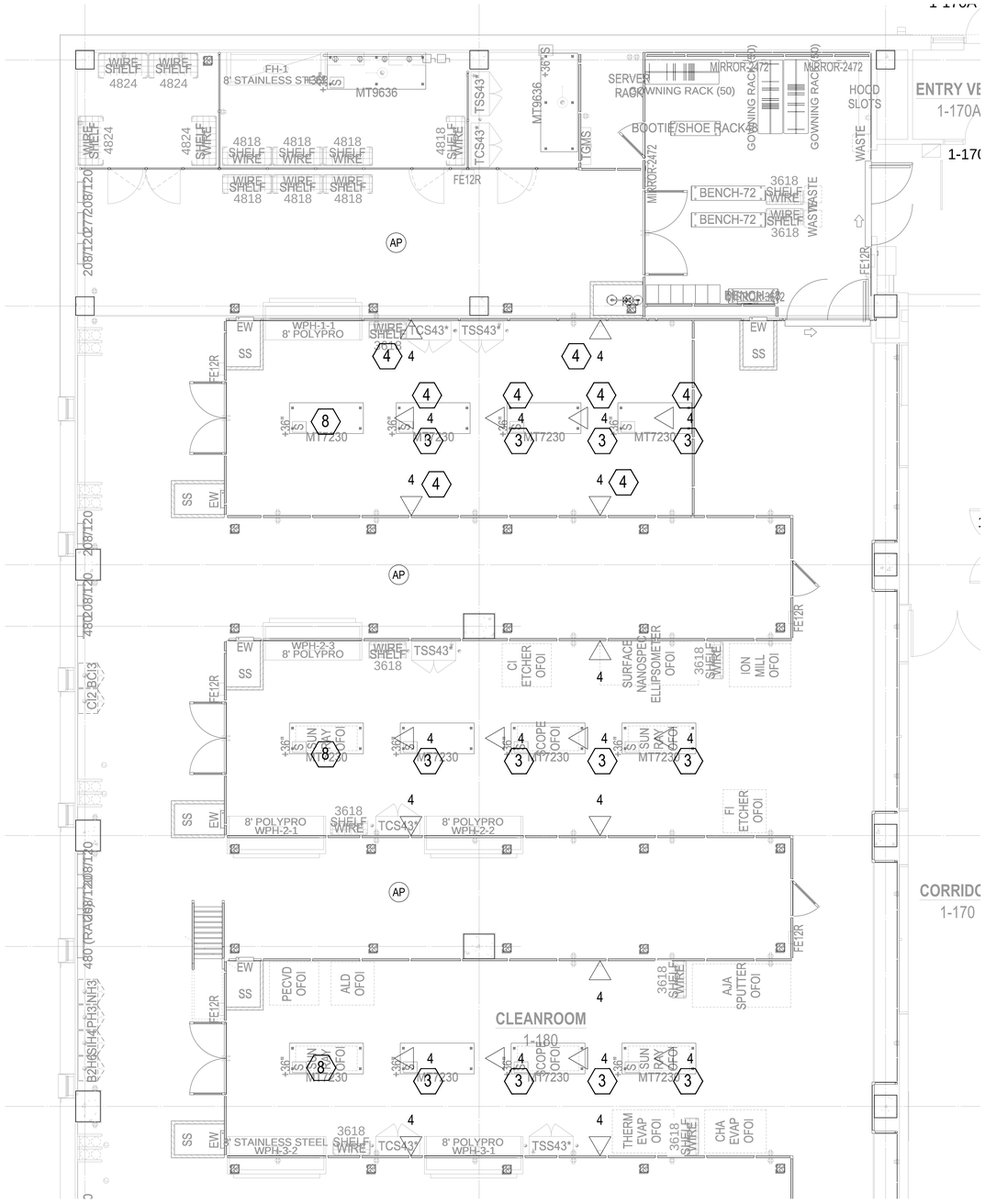
Physics and Nanotechnology Building

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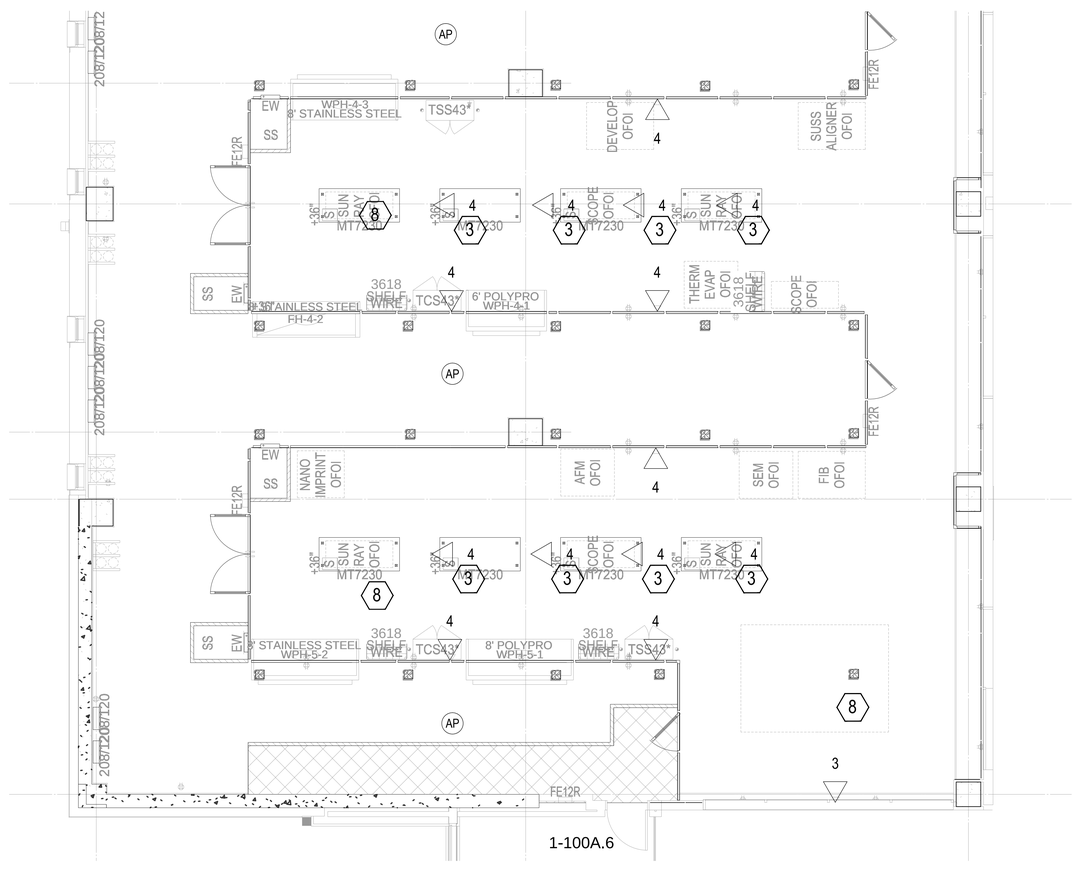
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CLEANROOM ELECTRICAL MOTOR SCHEDULE

cr-e9.03



1 CLEAN ROOM - LEVEL 1 - NORTH
1/4" = 1'-0"



1 CLEAN ROOM - LEVEL 1 - SOUTH
1/4" = 1'-0"

KEYNOTES:

1. CARD READER, DOOR CONTACT, AND CONNECTION TO ELECTRIFIED DOOR HARDWARE/REX PROVIDED AS PART OF ALTERNATE #T-1.
2. CARD READER, DOOR CONTACT, AND CONNECTION TO ELECTRIFIED DOOR HARDWARE/REX PROVIDED AS PART OF ALTERNATE #T-2.
3. OUTLET MOUNTED IN OVERHEAD SERVICE CHASE. PATHWAYS AND SPACES PROVIDED BY OTHERS.
4. DEVICES PROVIDED AS PART OF ALTERNATIVE (CR-1)
5. ROUGH IN ONLY THIS DOOR. CARD ACCESS PROVIDED BY OTHERS FOR THIS DOOR.
6. ALL HORIZONTAL CABLES THIS SHEET TERMINATE IN THIS ROOM. HORIZONTAL PATCH PANELS PROVIDED BY THIS CONTRACTOR. RACKS AND CLOSET BUILD OUT BY OTHERS. COORDINATE PATCH PANEL MOUNTING WITH OWNER/RACK PROVIDER.
7. ALL HORIZONTAL CABLES THIS SHEET TERMINATE IN 4TH FLOOR IDF. COORDINATE PATCH PANEL MOUNTING WITH OWNER/RACK PROVIDER.
8. ALL HORIZONTAL CABLES IN THE CLEAN ROOM TERMINATE IN 2ND FLOOR IDF. COORDINATE PATCH PANEL MOUNTING WITH OWNER/RACK PROVIDER.
9. CEILING MOUNTED DATA OUTLET FOR DISPLAY MONITOR. DISPLAY PROVIDED BY OTHERS.
10. CORNER MOUNTED CAMERA PROVIDE SEAL TIGHT CONNECTION W/DRIP LOOP FROM SURFACE MOUNT BOX ON SIDE WALL TO CAMERA/MOUNT.
11. STAIRWELL DOORS SHALL UNLOCK AND REMAIN POSITIVELY LATCHED DURING A FIRE ALARM. FIRE ALARM CONTRACTOR SHALL PROVIDE A FIRE ALARM RELAY IN SECURITY CLOSET B-169 FOR THESE DOORS.
12. 120V POWER, LOCAL POWER SUPPLY, AND FIRE ALARM RELAY REQUIRED AT THIS DOOR. POWER SUPPLY FURNISHED BY DIVISION 8 AND INSTALLED BY THIS CONTRACTOR.

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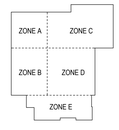
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Physics and Nanotechnology Building
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Clean Room Floor Plan

Not For Construction

CR T201