Wayne State University

ENGINEERING RESEARCH LABS - PHASE TWO ENGINEERING BUILDING

PROJECT NO. 090-250890-1

ISSUE: BID 02-06-2015

WAYNE STATE UNIVERSITY **OWNER:**

Design and Construction Services

5454 Cass Avenue

Detroit, Michigan 48202

Engineering Building PROJECT

Limited Second & Third Floor Areas LOCATION:

5050 Anthony Wayne Drive

Detroit, Michigan 48202

ARCHITECT: iDesign Solutions

400 Water Street, Suite LL1 Rochester, Michigan 48307

Tel: 248.440.7310

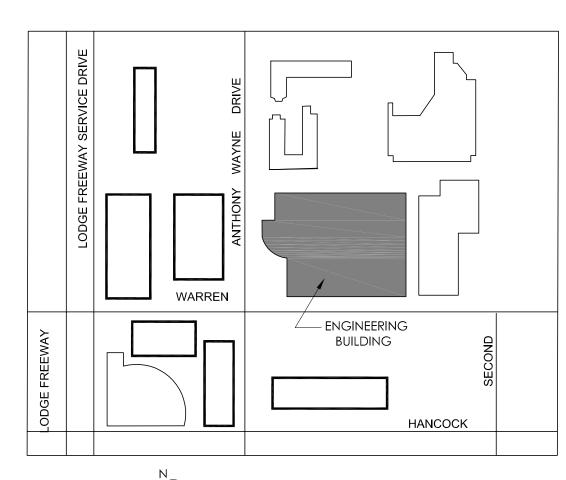
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MECH / ELECT **ENGINEER:**

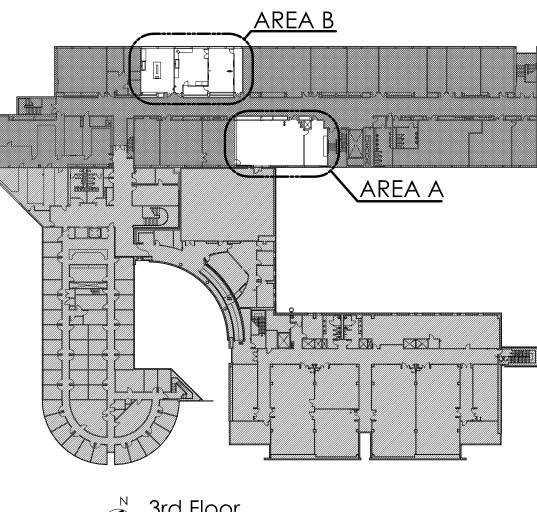
Peter Basso Associates 5145 Livernois, Suite 100

Troy, MI 48098 Tel: 248.879.5666

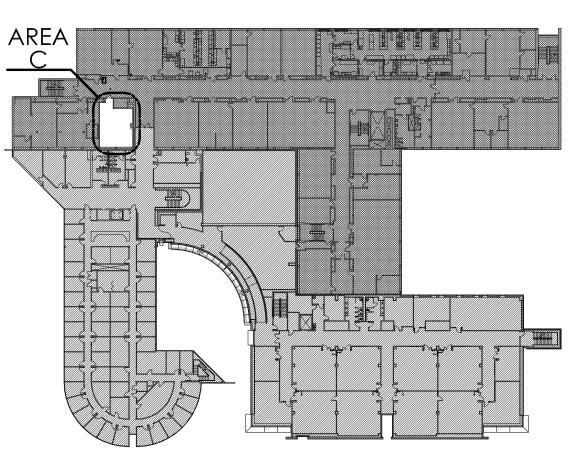
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Vicinity Map - Not to Scale







2nd Floor Location Map - Not to Scale

UNIVERSITY 656 West Kirby Street, Detroit, MI 48202 **Project Location:**

WAYNE STATE

WAYNE STATE UNIVERSITY ENGINEERING BUILDING 5050 ANTHONY WAYNE DRIV DETROIT MICHIGAN 48202

CONTACT: Mark Gibbons

iDesign Solutions, LLC



Scientific Facilities & Laboratory Design 400 Water Street, Suite LL1 Rochester, MI 48307 248-440-7310 info@iDesign-Solutions.info www.iDesign-Solutions.info



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issue:	date
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designed by:	LAC
drawn by:	CTW
coordination checked:	CTW
checked:	LAC
approved:	LAC

project

Engineering

Research Labs -Phase Two

sheet title:

Cover Sheet

project number: sheet number: G-00 090-250890-1 (1156-2: iDesign project number)

DRAWING INDEX

Sheet # Sheet Title

LIFE SAFETY PLAN AND CODE REVIEW - SECOND FLOOR

LIFE SAFETY PLAN AND CODE REVIEW - THIRD FLOOR

PARTIAL 2nd & 3rd FLOOR ARCHITECTURAL PLANS

LEGENDS, ARCHITECTURAL SCHEDULES and DETAILS

MECHANICAL STANDARDS AND DRAWING INDEX

PARTIAL FIRST FLOOR FLOOR PLUMBING PLANS

ELECTRICAL STANDARDS AND DRAWING INDEX

THIRD FLOOR POWER AND AUXILIARY SYSTEMS PLAN

THIRD FLOOR ELECTRICAL DEMOLITION PLAN

SECOND FLOOR ELECTRICAL PLANS

THIRD FLOOR LIGHTING PLAN

ELECTRICAL DETAILS

PROFESSIONAL SEALS

ELECTRICAL STANDARD SCHEDULES AND PANEL SCHEDULES

PARTIAL SECOND AND THIRD FLOOR PLUMBING PLANS

PARTIAL SECOND AND THIRD FLOOR HVAC PIPING PLANS PARTIAL SECOND AND THIRD FLOOR SHEET METAL PLANS

PARTIAL 2nd & 3rd FLOOR LABORATORY EQUIPMENT PLANS PARTIAL 2nd & 3rd FLOOR REFLECTED CEILING PLANS

PARTIAL SECOND AND THIRD FLOOR PLUMBING DEMOLITION PLANS

PARTIAL SECOND AND THIRD FLOOR HVAC DEMOLITION PLANS PARTIAL SECOND AND THIRD FLOOR SHEET METAL DEMOLITION PLANS

PARTIAL 2nd FLOOR DEMO PLAN

PARTIAL 3rd FLOOR DEMO PLAN

INTERIOR ELEVATIONS (AREA 'A' & 'B') INTERIOR ELEVATIONS (AREA 'C')

LABORATORY SCHEDULES and DETAILS

PLUMBING INSULATION AND MATERIALS

MECHANICAL DETAILS AND DIAGRAMS

MECHANICAL DETAILS AND DIAGRAMS

HVAC INSULATION AND MATERIALS

ROOF MECHANICAL PLAN

MECHANICAL SCHEDULES

TEMPERATURE CONTROLS

TEMPERATURE CONTROLS

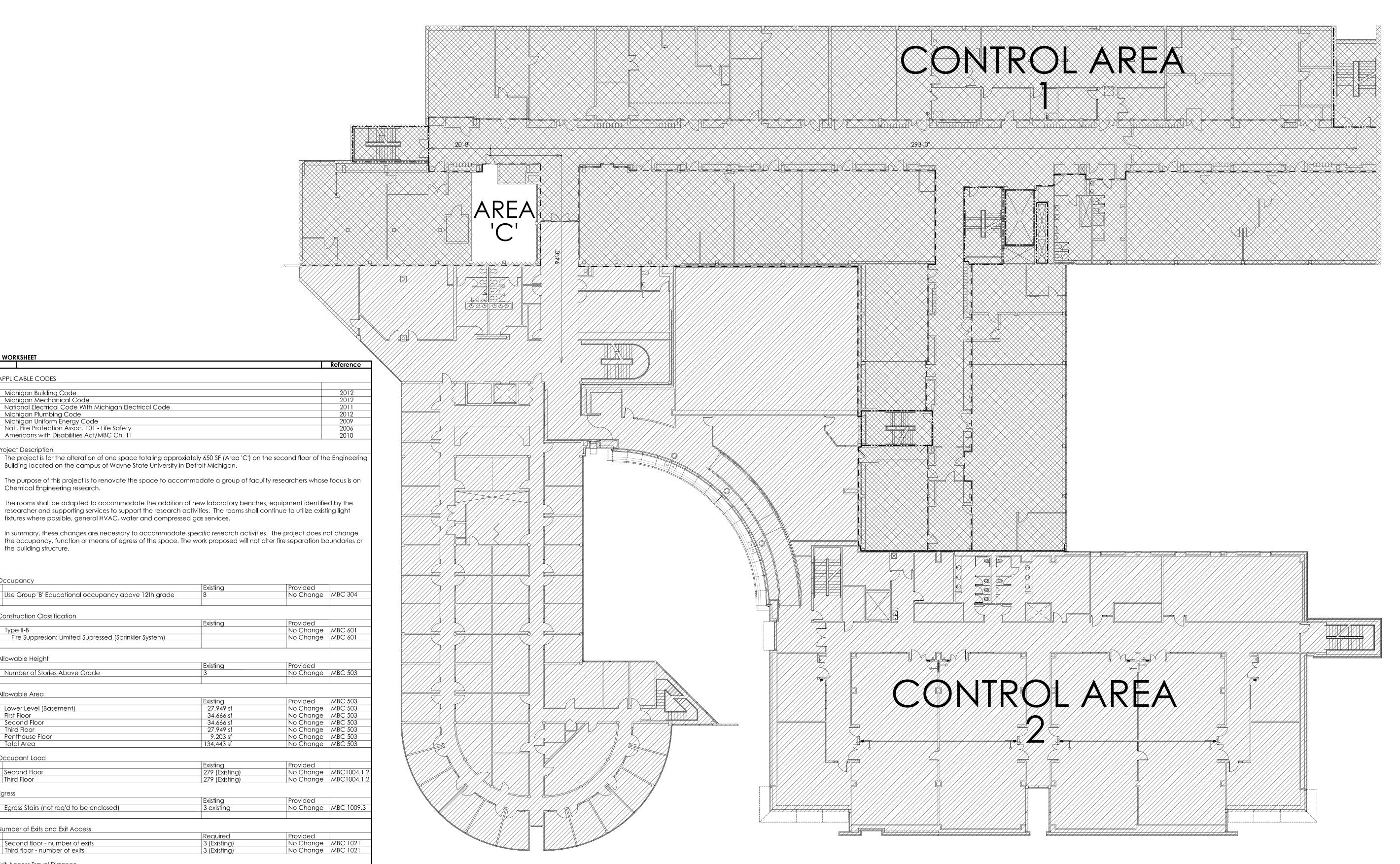
M-801

E-202

E-302

E-701

ELECTRICAL DRAWINGS



CODE WORKSHEET

APPLICABLE CODES

Michigan Building Code Michigan Mechanical Code

Chemical Engineering research.

the building structure.

Construction Classification

Number of Stories Above Grade

Egress Stairs (not req'd to be enclosed)

Travel Distance to Exit - 300'-0" Max (Sprinklered)
Common Path of Travel - 100'-0" Max

Comply with Americans w/ Disabilities Act Accessibility Guidelines Compliant

Number of Exits and Exit Access

10. Exit Access Travel Distance

. Fire Protection Systems

2. Accessibility - New Work

13. Control Area - Allowable

Second Floor Third Floor

Second floor - number of exits Third floor - number of exits

Dead End Limit - 50'-0" Max

Automatic Sprinkler System
Portable extinguishers
Fire Alarm System

Comply with Chapter 11

Lower Level (Basement) First Floor

Allowable Height

Allowable Area

Second Floor Third Floor

Penthouse Floor Total Area

Occupant Load

Second Floor Third Floor

Occupancy

National Electrical Code With Michigan Electrical Code

Use Group 'B' Educational occupancy above 12th grade

Fire Suppression: Limited Supressed (Sprinkler System)

Building located on the campus of Wayne State University in Detroit Michigan.

fixtures where possible, general HVAC, water and compressed gas services.

Existing 27,949 s 34,666 s

34,666 sf 27,949 sf 9,203 sf 134,443 sf

Existing
279 (Existing)
279 (Existing)

Existing 3 existing

Required
3 (Existing)
3 (Existing)

No Change No Change No Change

Existing Bldg
Compliant

Provided
No Change MBC 1018.4
No Change MBC 1016.2
No Change MBC 1014.1

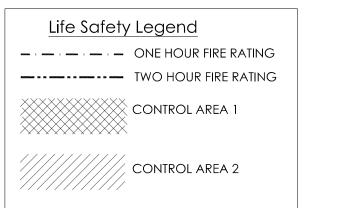
Provided MBC 903
suit to fit new room layout
new @ renovated labs
No Change

Provided
Compliant MBC Ch 11

Compliant ADAAG201

Provided
2 (no change) MBC 414.2.2
2 (no change) MBC 414.2.2

Michigan Plumbing Code Michigan Uniform Energy Code Natl. Fire Protection Assoc. 101 - Life Safety Americans with Disabilities Act/MBC Ch. 11





TOTAL AREA SECOND FLOOR TO BE RENOVATED = 627 SQUARE FEET TOTAL AREA THIRD FLOOR TO BE RENOVATED = 3,751 SQUARE FEET

(AREA A = 1,768 SQUEAR FEET)

(AREA B = 1,983 SQUARE FEET) TOTAL PROJECT AREA TO BE RENOVATED = 4,378 SQUARE FEET

WAYNE STATE UNIVERSITY

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02.04.20
02.06.20

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coordination checked:	CTW
checked:	LAC
approved:	LAC

project:

Engineering Research Labs -

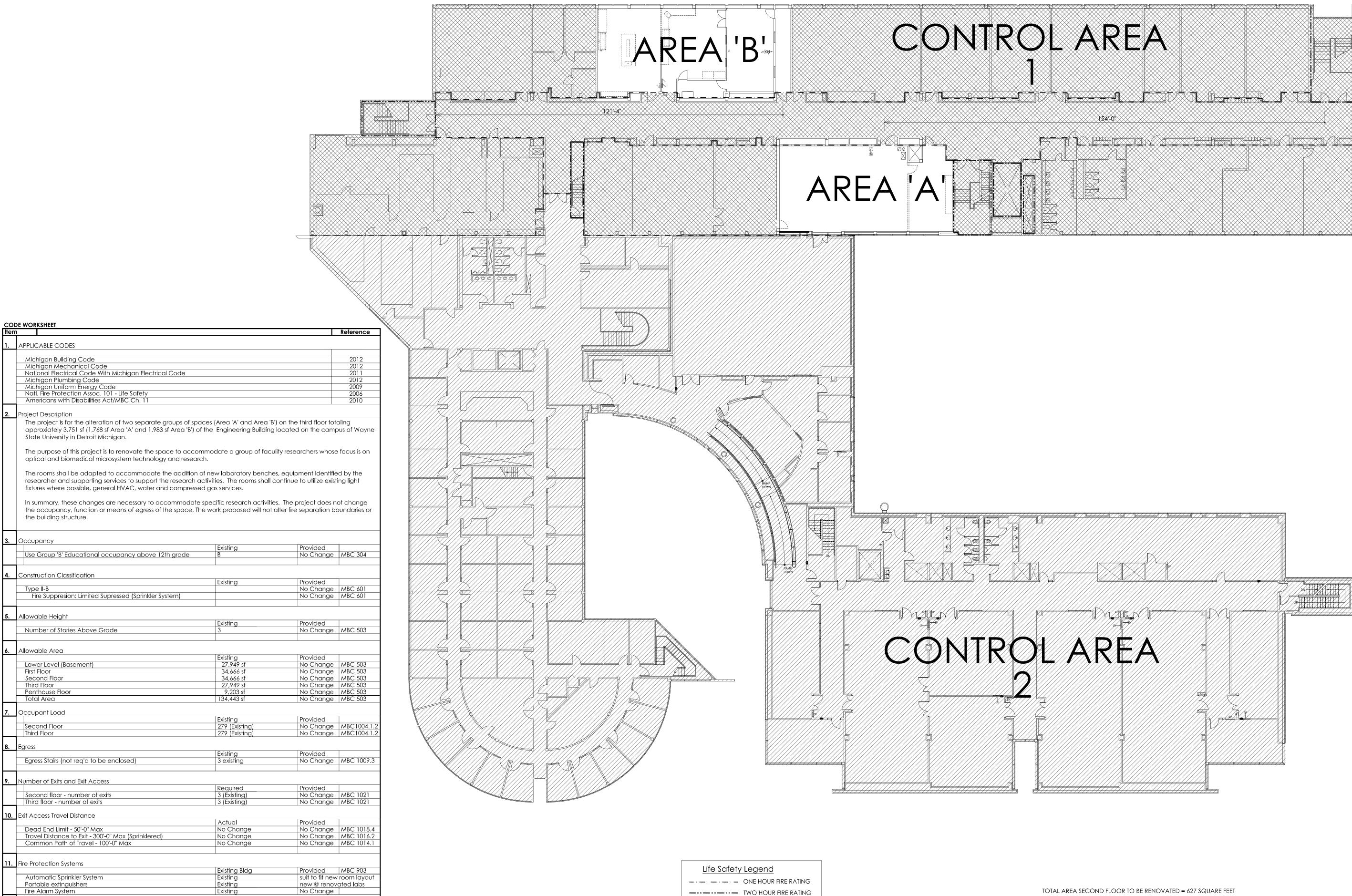
Phase Two

sheet title:

Life Safety Plan and Code Review - Secod Floor

project number sheet number:

090-250890-1 G-01 (1156-2: iDesign project number)



12. Accessibility - New Work

13. Control Area - Allowable

Second Floor Third Floor

Comply with Chapter 11

Comply with Americans w/ Disabilities Act Accessibility Guidelines Compliant

Provided | Compliant | MBC Ch 11

Compliant ADAAG20

Provided
2 (no change) MBC 414.2.2
2 (no change) MBC 414.2.2

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designed by: CTW drawn by: CTW coordination checked: LAC checked: LAC approved:

project

Engineering Research Labs -

Phase Two

sheet title:

Life Safety Plan and Code Review - Third Floor

project number sheet number:

090-250890-1 G-02 (1156-2: iDesign project number)

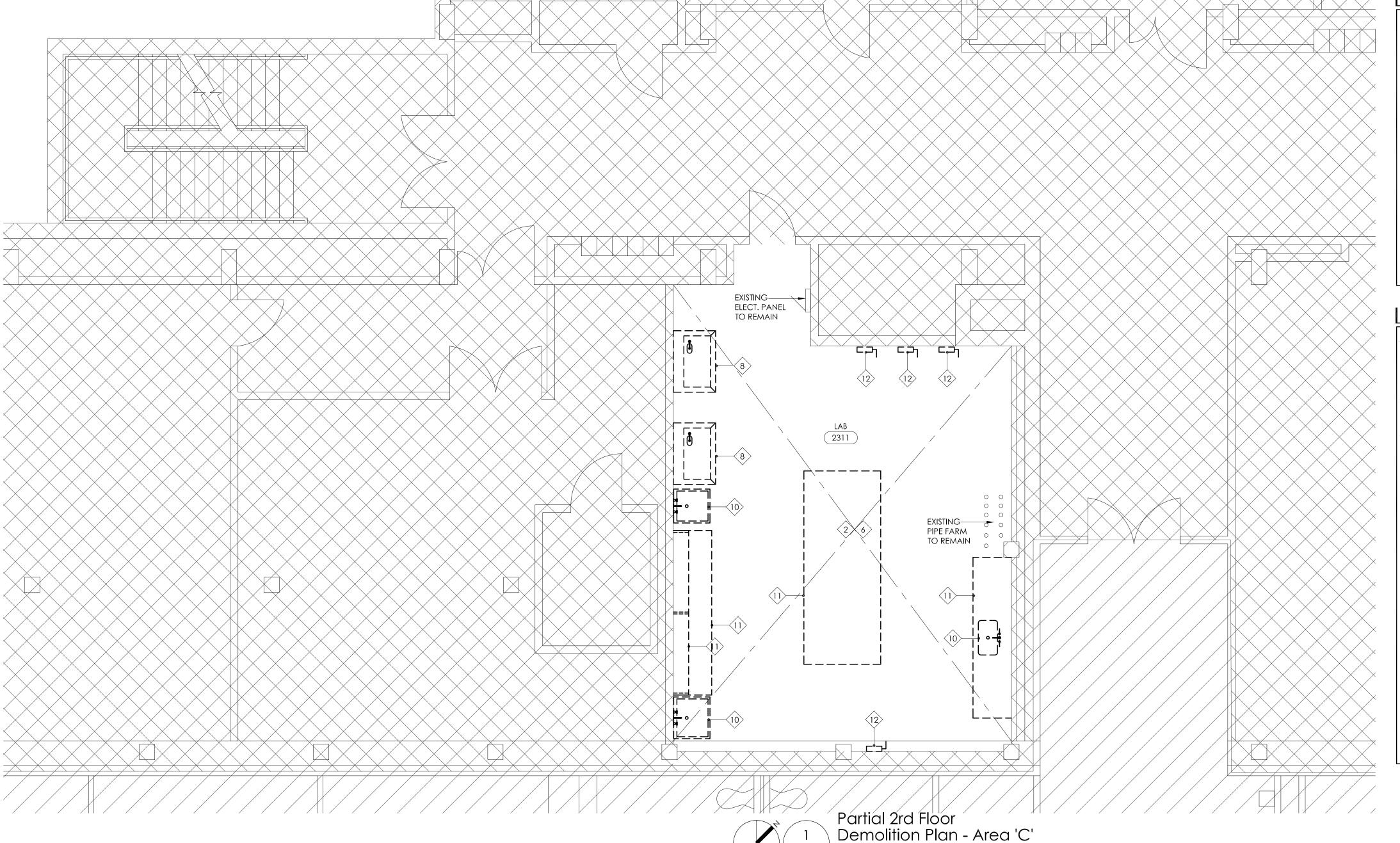




TOTAL AREA SECOND FLOOR TO BE RENOVATED = 627 SQUARE FEET

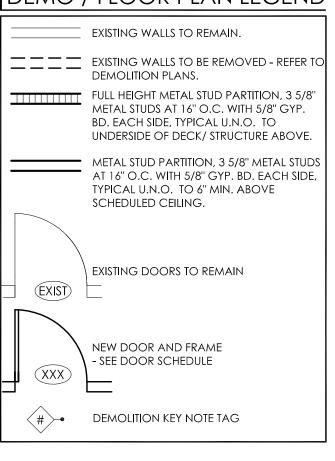
TOTAL AREA THIRD FLOOR TO BE RENOVATED = 3,751 SQUARE FEET (AREA A = 1.768 SQUEAR FEET) (AREA B = 1.983 SQUARE FEET)

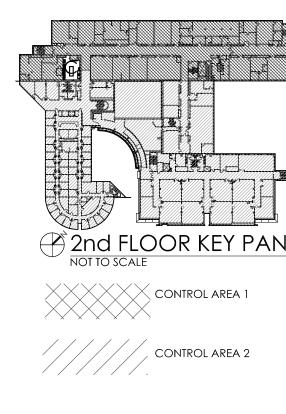
TOTAL PROJECT AREA TO BE RENOVATED = 4,378 SQUARE FEET



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

DEMO / FLOOR PLAN LEGEND





GENERAL CONSTRUCTION NOTES

- FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION, TYPICAL.
- ALL INTERIOR PARTITIONS TO BE MINIMUM OF 6" ABOVE CEILING HEIGHT U.N.O.
- ALL ACT CEILINGS TO BE 9'-0" A.F.F, TYPICAL, U.N.O.
- REFER TO TYPICAL PARTITION CONSTRUCTION DETAILS, SHEET A401 FOR WALL/ PARTITION CONSTRUCTION INFORMATION.
- REFER TO SHEETS A401 & A402 FOR LABORATORY EQUIPMENT LEGENDS, SCHEDULES AND DETAILS.

DEMOLITION GENERAL NOTES

- REMOVE AND REPLACE EXISTING CONSTRUCTION AS REQUIRED FOR THE EXECUTION OF NEW
- PROTECT EXISTING CONSTRUCTION TO REMAIN AS REQUIRED DURING DEMOLITION.
- REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS AND FOR COORDINATION OF WORK.
- DISCONNECT ALL MISCELLANEOUS FEATURES (I.E. ELECTRICAL, MECHANICAL, PLUMBING, ETC.) ASSOCIATED WITH ITEMS TO BE DEMOLISHED (I.E. PARTITIONS, WALLS, CEILINGS, CABINETS ETC.).
- REMOVAL OF ANY MECHANICAL, ELECTRICAL AND MISCELLANEOUS ITEMS WILL REQUIRE PATCH
- AND REPAIR OF ADJACENT MATERIALS TO REMAIN.
- REMOVAL OF ANY WALLS, PARTITIONS, DOORS OR OTHER PERMANENT BUILDING ELEMENTS WILL REQUIRE PATCH AND REPAIR OF ADJACENT WALL, FLOOR, CEILING MATERIALS TO REMAIN.
- REMOVE EXISTING UNUSED NAILS, SCREWS AND OTHER WALL PROTRUSIONS FROM EXISTING SURFACES TO REMAIN. PATCH AND REPAIR TO MATCH EXISTING ADJACENT SURFACES AS REQUIRED TO RECEIVE NEW FINISHES.
- 8. CONTRACTOR SHALL PLACE ANY ITEMS OR MATERIALS TO BE SALVAGED AND/OR RETAINED AS DIRECTED BY OWNER.
- REMOVAL OF EXISTING BUILDING MATERIALS CONTAINING ASBESTOS SHALL BE BY THE OWNER'S ABATEMENT CONTRACTOR. CONTRACTOR SHALL COORDINATE THE REMOVAL OF EXISTING MATERIALS REQUIRED FOR REMOVAL OF MATERIALS CONTAINING ASBESTOS.

| DEMOLITION KEY NOTES

- > REMOVE CMU INTERIOR PARTITION, DOOR, FRAME AND ALL ASSOCIATED COMPONENTS INTEGRATED TO WALL. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR NEW CONSTRUCTION. PATCH AND REPAIR ADJACENT SURFACES TO REMAIN. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- REMOVE FLOORING & BASE. PATCH, REPAIR & PREP FLOOR FOR NEW FINISHES & CONSTRUCTION. PATCH AND REPAIR ANY ADJACENT FLOOR FINISHES TO REMAIN OUTSIDE OF AREA OF WORK.
- 3 remove door and frame. Patch and repair adjacent surfaces to remain.
- REMOVE SCHEDULED DOOR HARDWARE (DOOR TO REMAIN). REFER TO DOOR SCHEDULE FOR
- > PATCH / REPAIR ALL VACANT OPENINGS IN THE CLEAN ROOM WALL PANELS. REFER TO ARCHITECTURAL DRAWINGS FOR SCOPE AND MECHANICAL AND ELECTRICAL DRAWINGS FOR COORDINATION.
- > REMOVE & SALVAGE LIGHT FIXTURES FOR REUSE AT NEW WORK. REMOVE ASSOCIATED WIRING TO ELECTRICAL PANEL. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE & SALVAGE ELECTRICAL PANEL FOR REUSE AT NEW WORK. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION.
- 3 > REMOVE FUME HOOD, CANOPY & AND ASSOCIATED BASE CABINETS & TURN OVER TO OWNER. CAP EXHAUST & SERVICES AT NEAREST BRANCH LINE. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE EMERGENCY SHOWER. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE LAB SINKS, SINK FIXTURES AND SERVICE CHASE REMAINING IN SPACE. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE & SALVAGE ALL REMAINING SHELVING, BASE CASEWORK AND BENCHTOPS. REFER TO ARCHITECTURAL & LABORATORY DRAWINGS FOR ADDITIONAL COORDINATION. COORD. WITH OWNER ALL ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- 2 REMOVE ELECTRICAL PANEL / DISCONNECT PANEL- REFER TO ELECTRICAL

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designed by: CTW drawn by: CTW coordination checked: LAC checked: LAC approved:

project:

Engineering

Research Labs -Phase Two

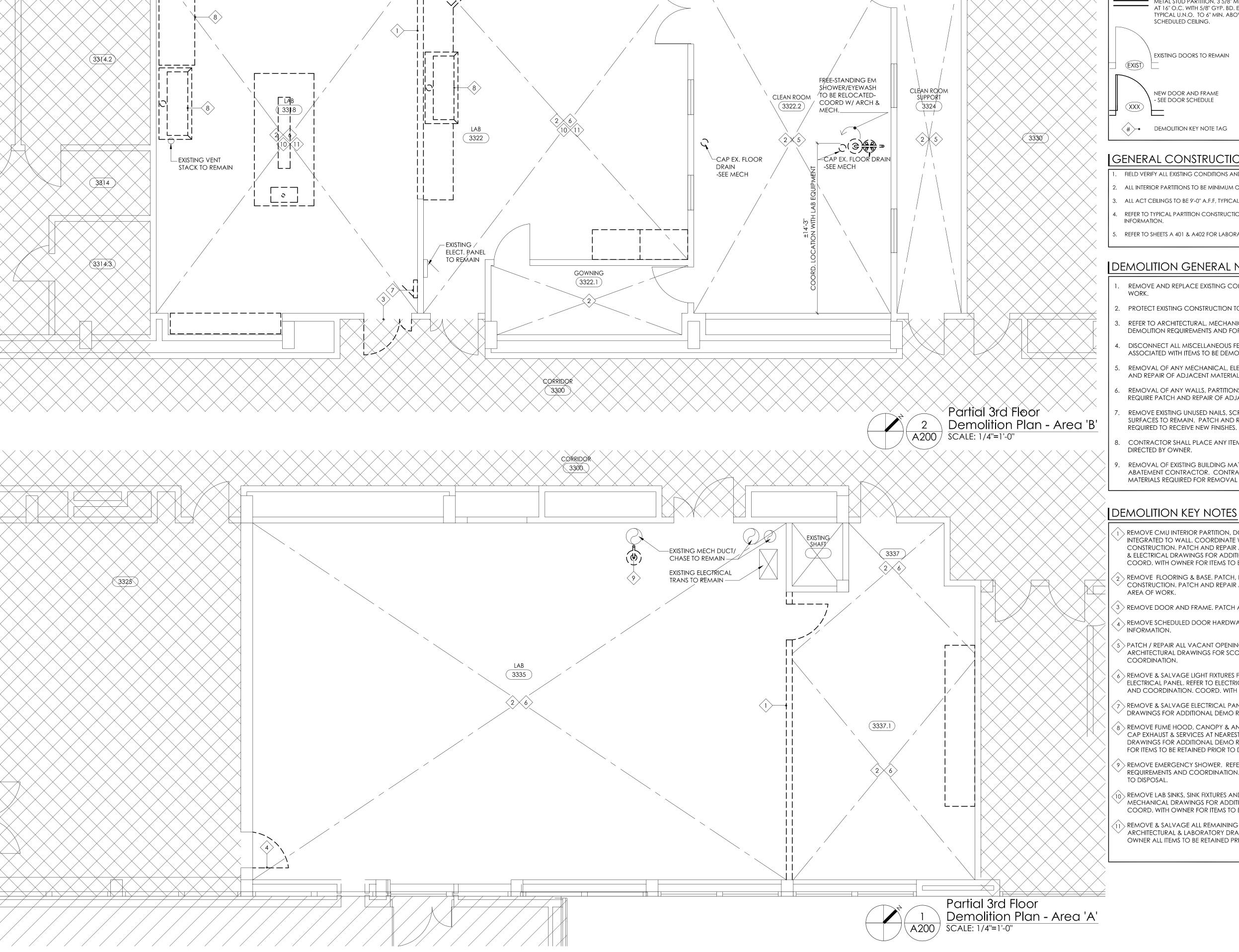
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Partial 2rd Floor Demo Plan

project number:

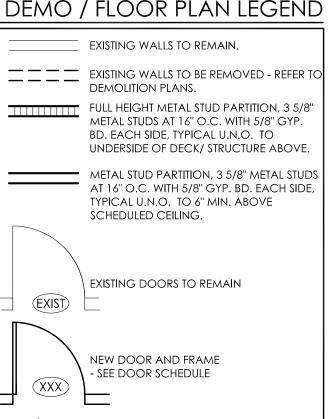
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| DEMO / FLOOR PLAN LEGEND



|GENERAL CONSTRUCTION NOTES

FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS PRIOR TO CONSTRUCTION, TYPICAL.

- ALL INTERIOR PARTITIONS TO BE MINIMUM OF 6" ABOVE CEILING HEIGHT U.N.O.
- ALL ACT CEILINGS TO BE 9'-0" A.F.F, TYPICAL, U.N.O.
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REFER TO SHEETS A 401 & A402 FOR LABORATORY EQUIPMENT LEGENDS, SCHEDULES AND DETAILS.

| DEMOLITION GENERAL NOTES

REMOVE AND REPLACE EXISTING CONSTRUCTION AS REQUIRED FOR THE EXECUTION OF NEW

PROTECT EXISTING CONSTRUCTION TO REMAIN AS REQUIRED DURING DEMOLITION.

REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION REQUIREMENTS AND FOR COORDINATION OF WORK.

DISCONNECT ALL MISCELLANEOUS FEATURES (I.E. ELECTRICAL, MECHANICAL, PLUMBING, ETC.) associated with items to be demolished (i.e. partitions, walls, ceilings, cabinets etc.).

REMOVAL OF ANY MECHANICAL, ELECTRICAL AND MISCELLANEOUS ITEMS WILL REQUIRE PATCH AND REPAIR OF ADJACENT MATERIALS TO REMAIN.

REMOVAL OF ANY WALLS, PARTITIONS, DOORS OR OTHER PERMANENT BUILDING ELEMENTS WILL REQUIRE PATCH AND REPAIR OF ADJACENT WALL, FLOOR, CEILING MATERIALS TO REMAIN.

REMOVE EXISTING UNUSED NAILS, SCREWS AND OTHER WALL PROTRUSIONS FROM EXISTING SURFACES TO REMAIN. PATCH AND REPAIR TO MATCH EXISTING ADJACENT SURFACES AS

CONTRACTOR SHALL PLACE ANY ITEMS OR MATERIALS TO BE SALVAGED AND/OR RETAINED AS

REMOVAL OF EXISTING BUILDING MATERIALS CONTAINING ASBESTOS SHALL BE BY THE OWNER'S

ABATEMENT CONTRACTOR. CONTRACTOR SHALL COORDINATE THE REMOVAL OF EXISTING MATERIALS REQUIRED FOR REMOVAL OF MATERIALS CONTAINING ASBESTOS.

DEMOLITION KEY NOTES

- > REMOVE CMU INTERIOR PARTITION, DOOR, FRAME AND ALL ASSOCIATED COMPONENTS INTEGRATED TO WALL. COORDINATE WITH ARCHITECTURAL DRAWINGS FOR NEW CONSTRUCTION. PATCH AND REPAIR ADJACENT SURFACES TO REMAIN. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE FLOORING & BASE. PATCH, REPAIR & PREP FLOOR FOR NEW FINISHES & CONSTRUCTION. PATCH AND REPAIR ANY ADJACENT FLOOR FINISHES TO REMAIN OUTSIDE OF AREA OF WORK.
- 3 Remove door and frame. Patch and Repair adjacent surfaces to Remain.
- > REMOVE SCHEDULED DOOR HARDWARE (DOOR TO REMAIN). REFER TO DOOR SCHEDULE FOR INFORMATION.
- > PATCH / REPAIR ALL VACANT OPENINGS IN THE CLEAN ROOM WALL PANELS. REFER TO ARCHITECTURAL DRAWINGS FOR SCOPE AND MECHANICAL AND ELECTRICAL DRAWINGS FOR COORDINATION.
- > REMOVE & SALVAGE LIGHT FIXTURES FOR REUSE AT NEW WORK. REMOVE ASSOCIATED WIRING TO ELECTRICAL PANEL. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE & SALVAGE ELECTRICAL PANEL FOR REUSE AT NEW WORK. REFER TO ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION.
- ackslash remove fume hood, canopy & and associated base cabinets & turn over to owner. CAP EXHAUST & SERVICES AT NEAREST BRANCH LINE. REFER TO MECHANICAL & ELECTRICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE EMERGENCY SHOWER. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR
- > REMOVE LAB SINKS, SINK FIXTURES AND SERVICE CHASE REMAINING IN SPACE. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL DEMO REQUIREMENTS AND COORDINATION. COORD. WITH OWNER FOR ITEMS TO BE RETAINED PRIOR TO DISPOSAL.
- > REMOVE & SALVAGE ALL REMAINING SHELVING, BASE CASEWORK AND BENCHTOPS. REFER TO ARCHITECTURAL & LABORATORY DRAWINGS FOR ADDITIONAL COORDINATION. COORD. WITH OWNER ALL ITEMS TO BE RETAINED PRIOR TO DISPOSAL.

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Engineering

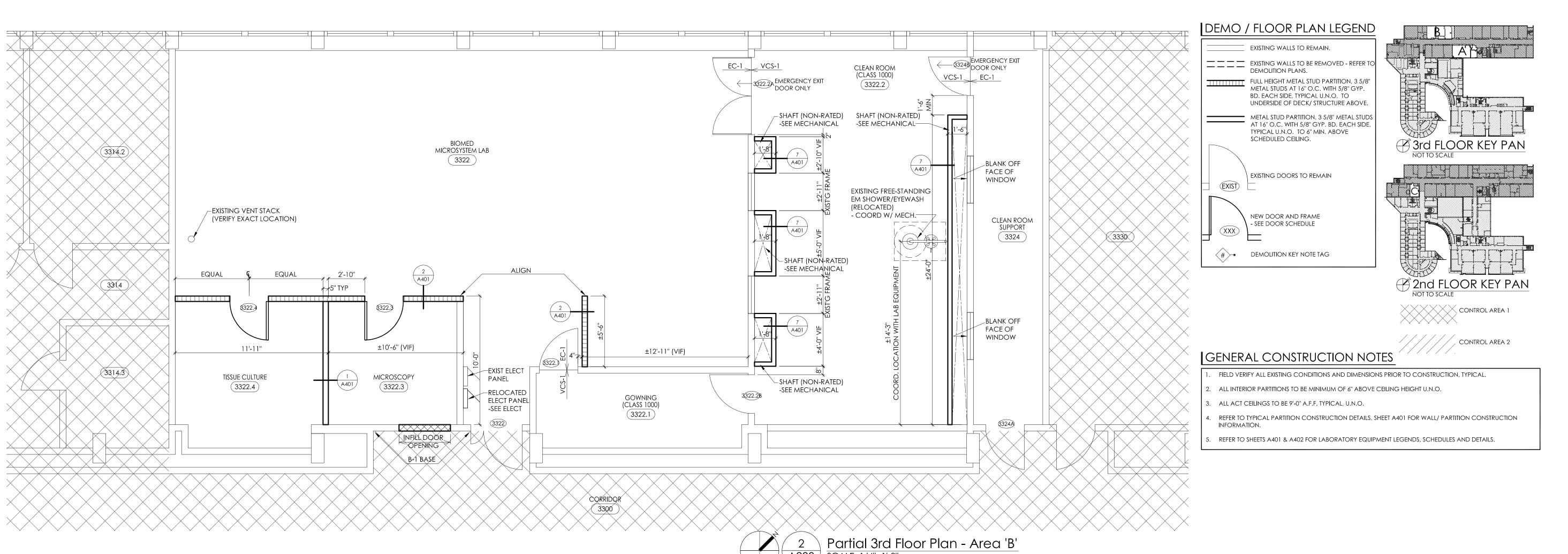
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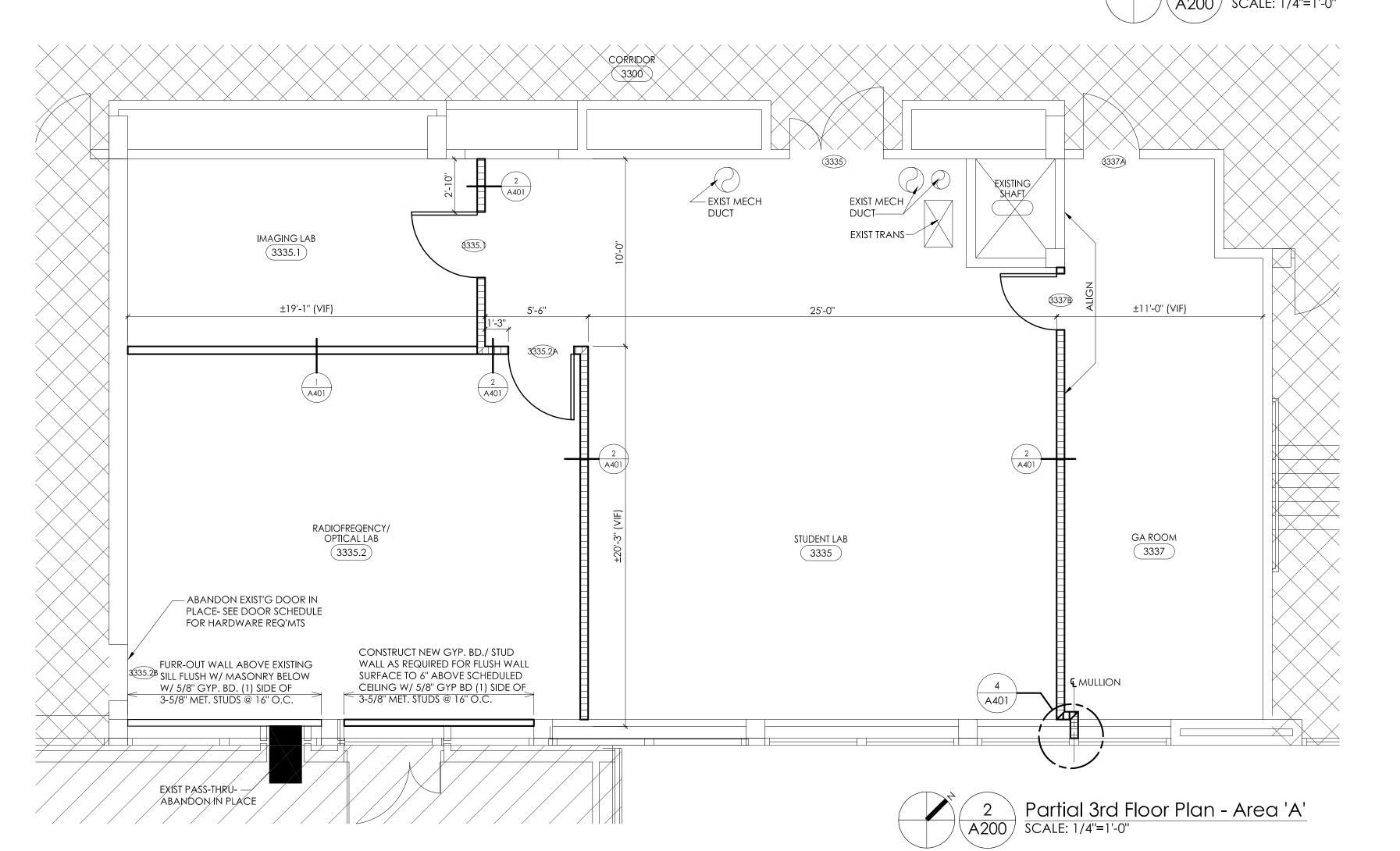
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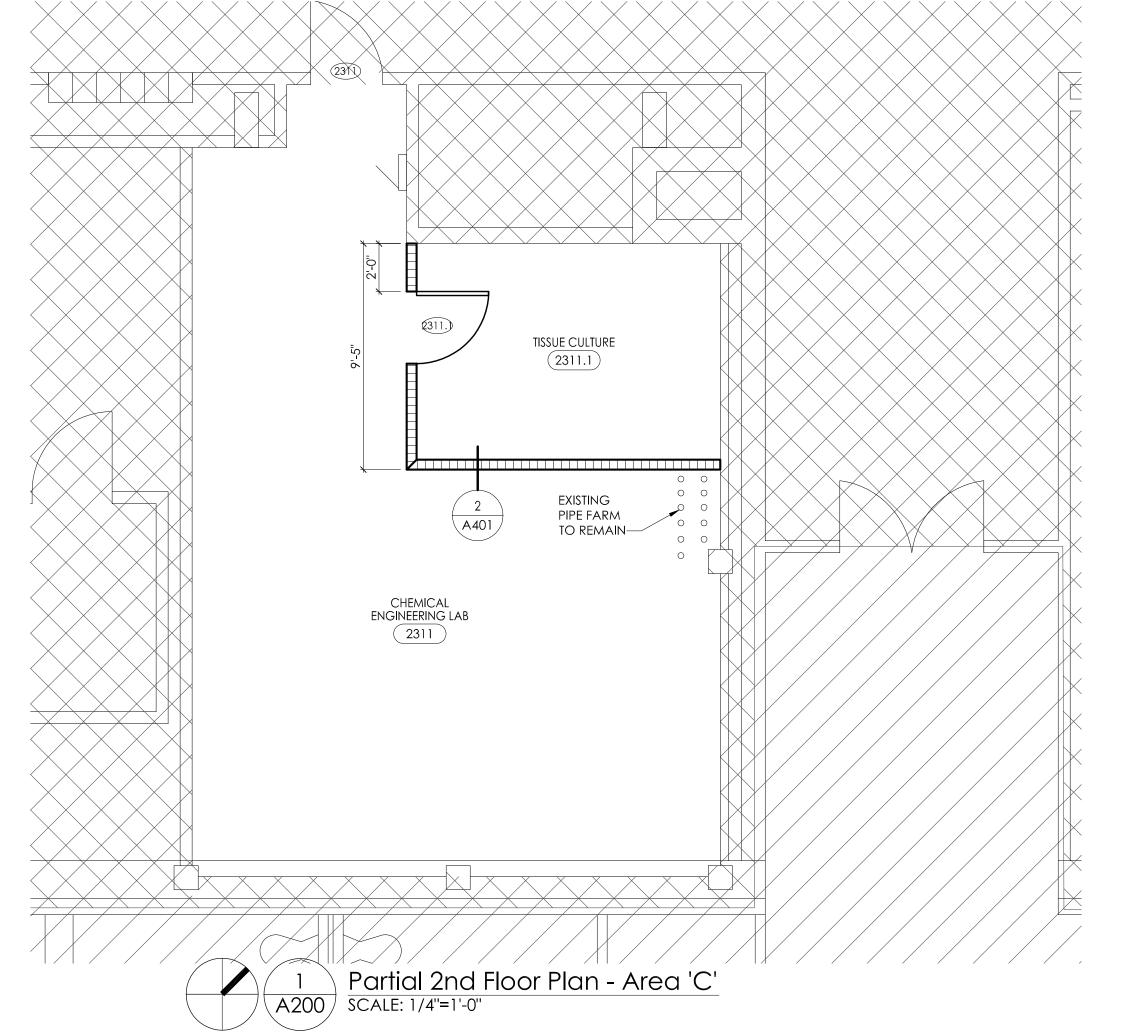
Partial 3rd Floor Demo Plan

project number sheet number:

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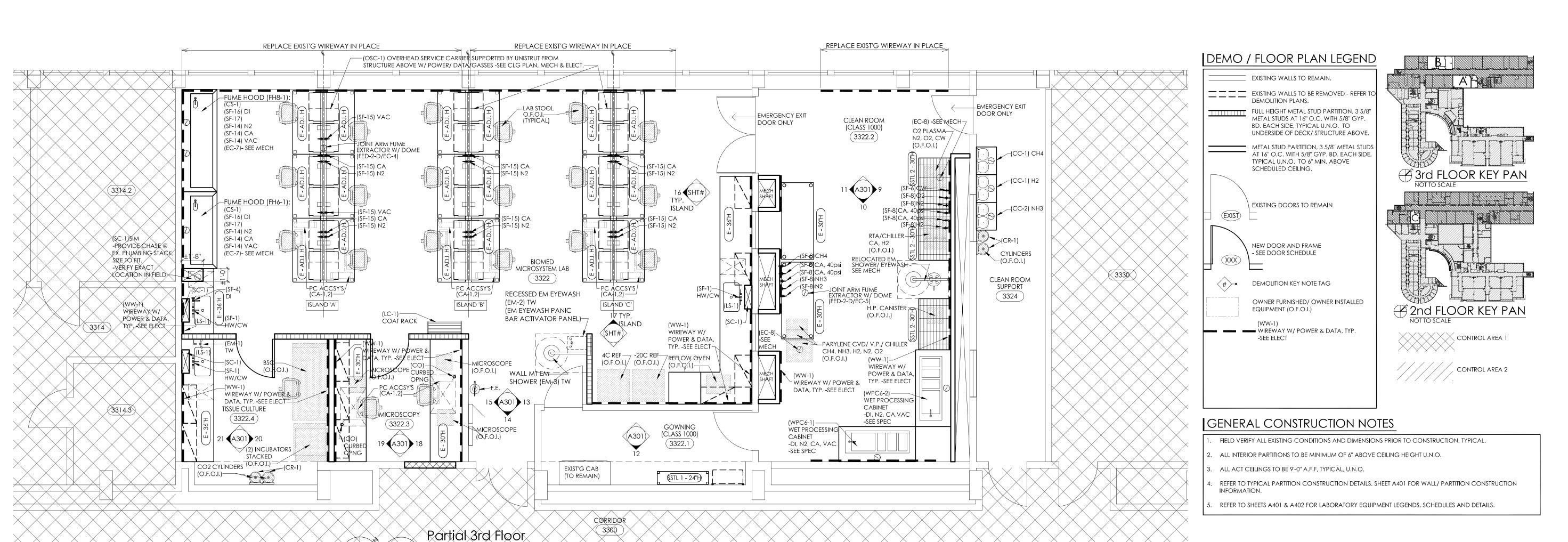
Engineering Research Labs -

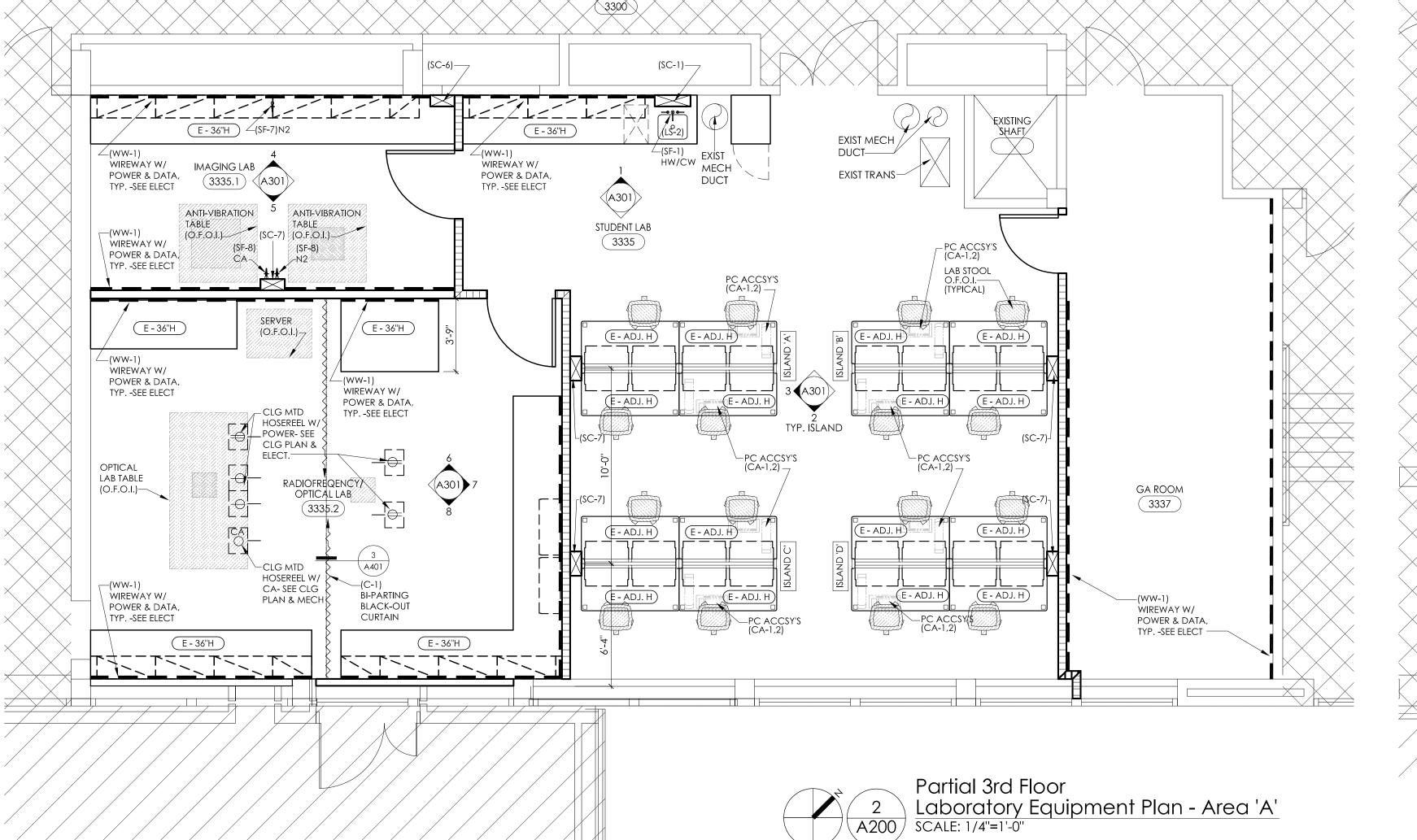
Phase Two

sheet title:

Partial 2nd & 3rd Floor Architectural Plans

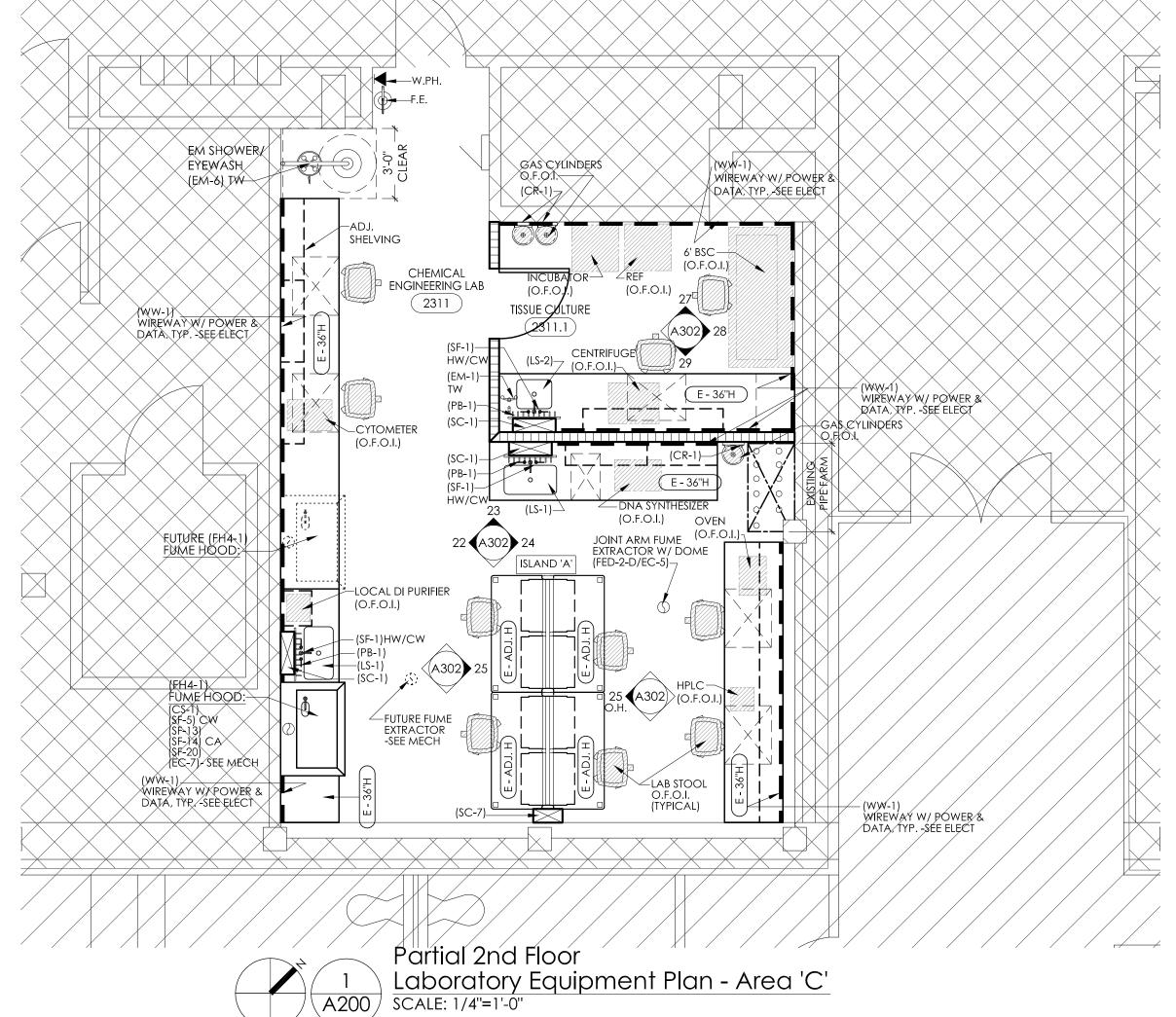
sheet number: project number: 090-250890-1 A201





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

Laboratory Equipment Plan - Area 'B'



WAYNE STATE UNIVERSITY

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ENGINEERING BUILDING
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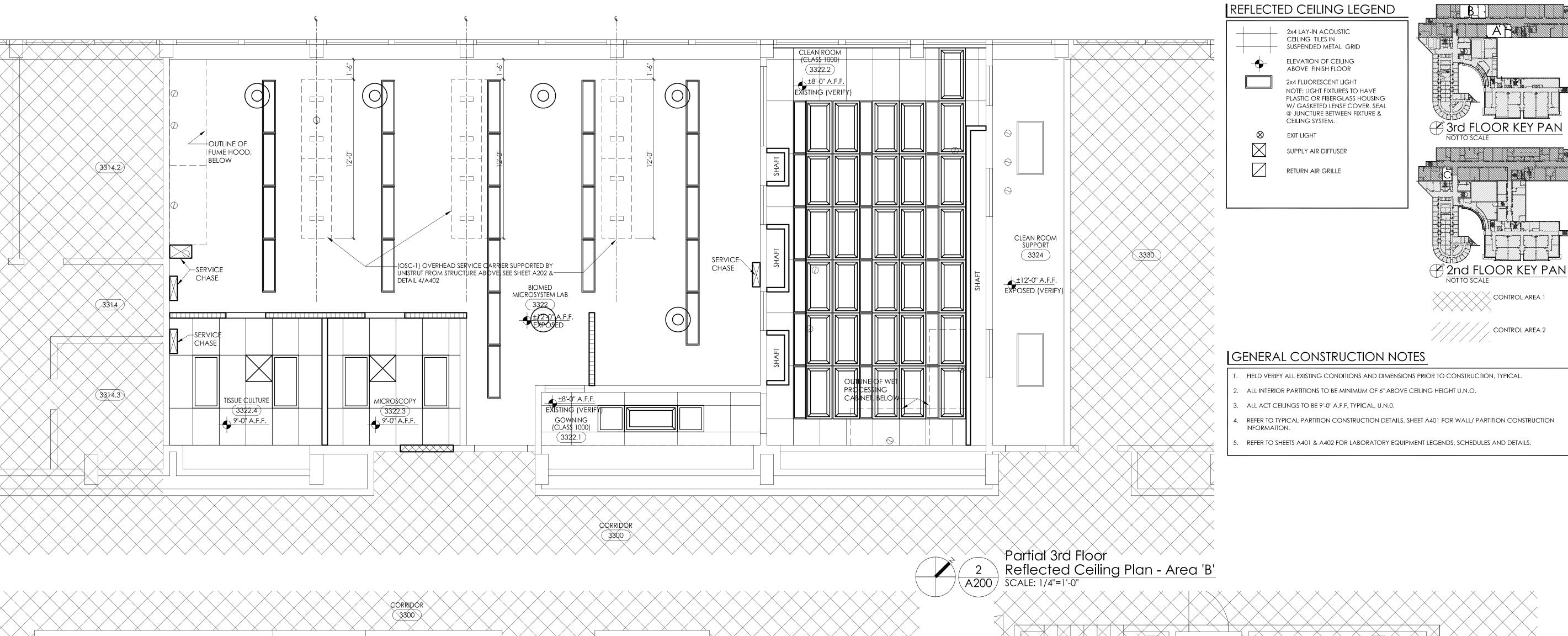
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Research Labs -

Phase Two

sheet title:

Partial 2nd & 3rd Floor Laboratory Equipment Plans

project number: sheet number: 090-250890-1 A202 (1156-2: iDesign project number)



GA ROOM

9'-0" A.F.F.

SERVICE CHASE

—SERVICE CHASE STUDENT LAB
3335

SERVICE

CHASE

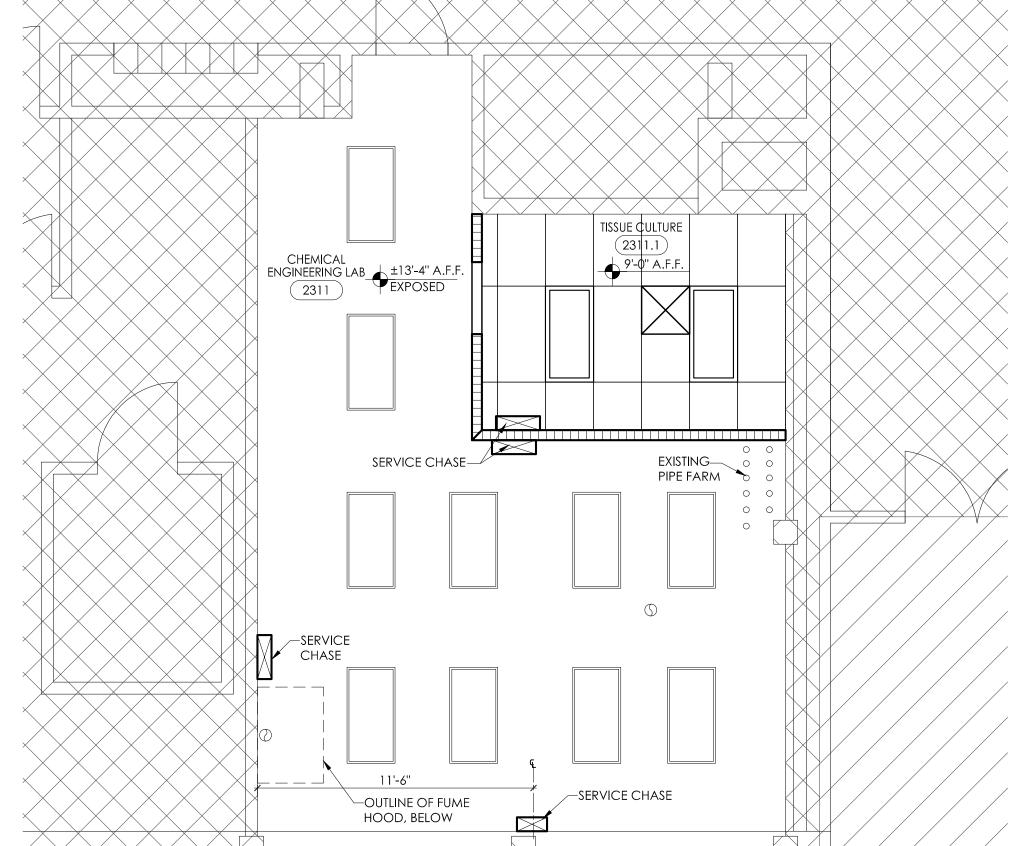
RADIOFREQENCY/
OPTICAL LAB
3335.2
9'-0" A.F.F.

BI-PÁRTING BLACK-OUT CURTAIN

CLG MTD HOSEREEL W/ POWER- SEE ELECT. & MECH EXISTING SHAFT

SERVICE – CHASE

Partial 3rd Floor
Reflected Ceiling Plan - Area 'A'
SCALE: 1/4"=1'-0"



Wayne State University

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WAYNE STATE UNIVERSITY
ENGINEERING BUILDING
5050 ANTHONY WAYNE DRIVE
DETROIT MICHIGAN 48202

CONTACT: Mark Gibbons

iDesign Solutions, LLC

www.iDesign-Solutions.info



issue

Scientific Facilities & Laboratory Design 400 Water Street, Suite LL1 Rochester, MI 48307 248-440-7310 info@iDesign-Solutions.info



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50% Review	02.04.201
BID	02.06.201

designed by:	LAC
drawn by:	CTW
coordination checked:	CTW
checked:	LAC
approved:	LAC

project:

Engineering

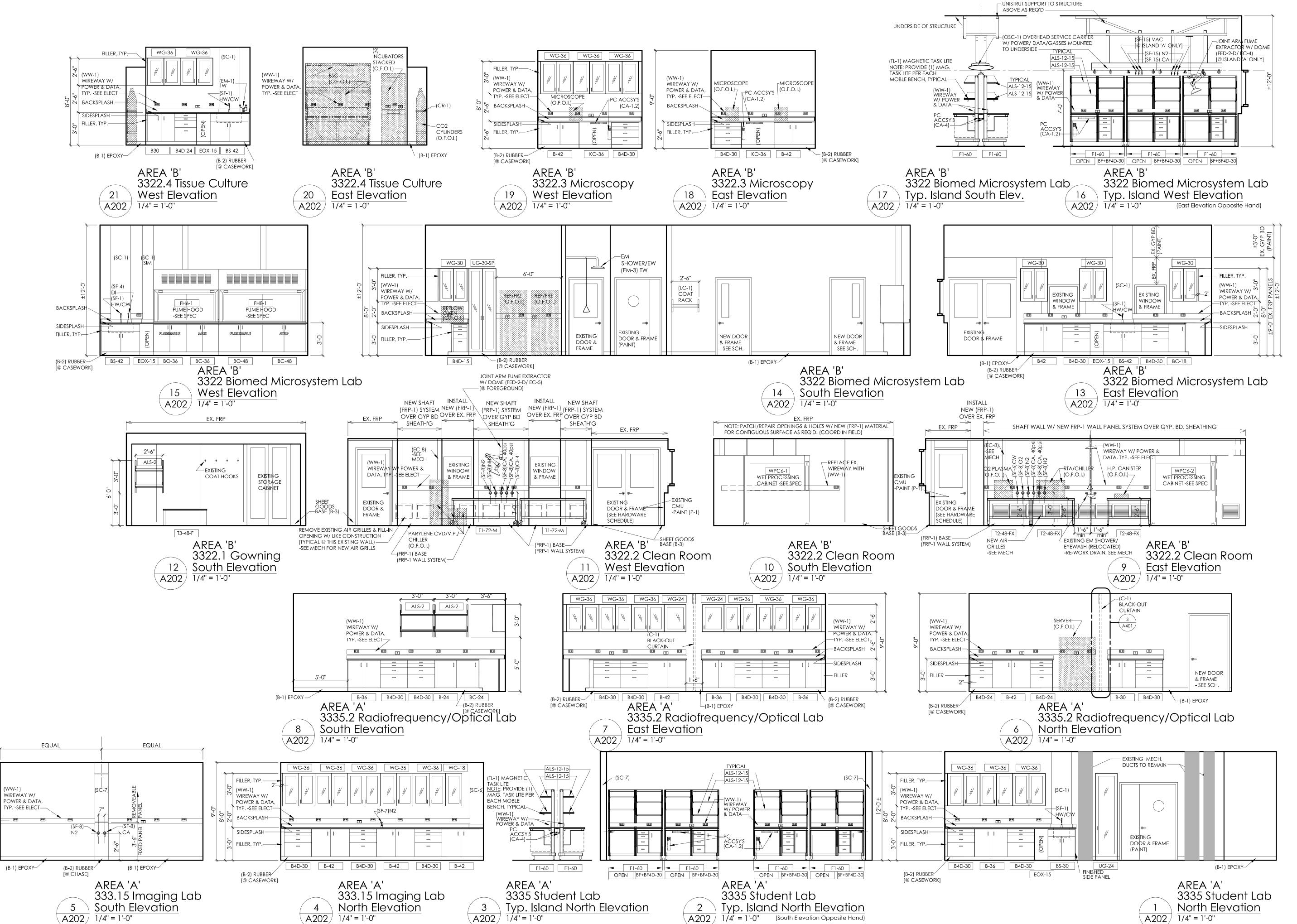
Research Labs -Phase Two

sheet title:

Partial 2nd Floor
Reflected Ceiling Plan - Area 'C'
SCALE: 1/4"=1'-0"

Partial 2nd & 3rd Floor Reflected Ceiling Plans

project number: sheet number: 090-250890-1 A203 (1156-2: iDesign project number)



WAYNE STATE UNIVERSITY

656 West Kirby Street, Detroit, MI 48202

Project Location:

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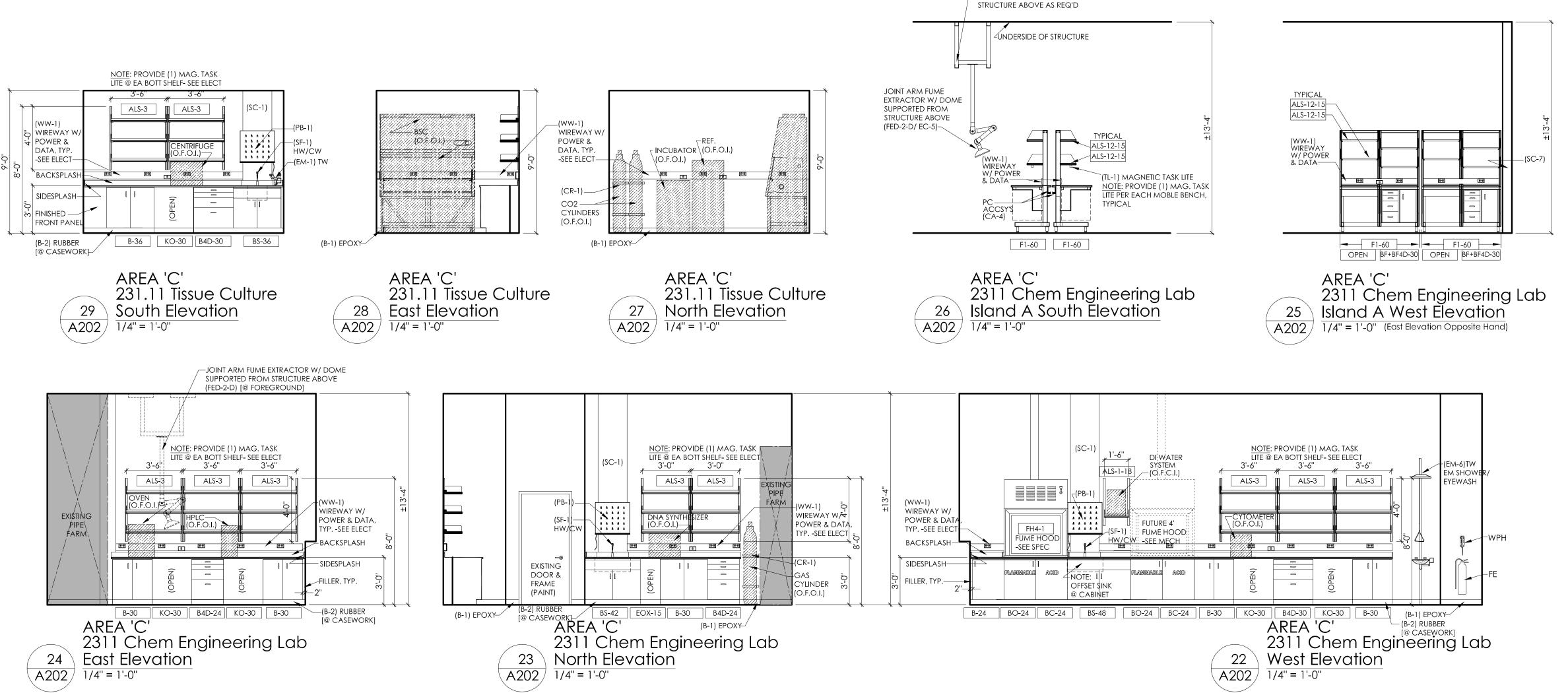
Engineering Research Labs -

Phase Two

sheet title: Interior Elevations (AREA 'A' & 'B')

project number sheet number:

090-250890-1 A301 (1156-2: iDesign project number)



—UNISTRUT SUPPORT TO

WAYNE STATE UNIVERSITY

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checked:

Engineering

Research Labs -Phase Two

coordination checked:

sheet title: Interior Elevations (AREA 'C')

project number: sheet number:

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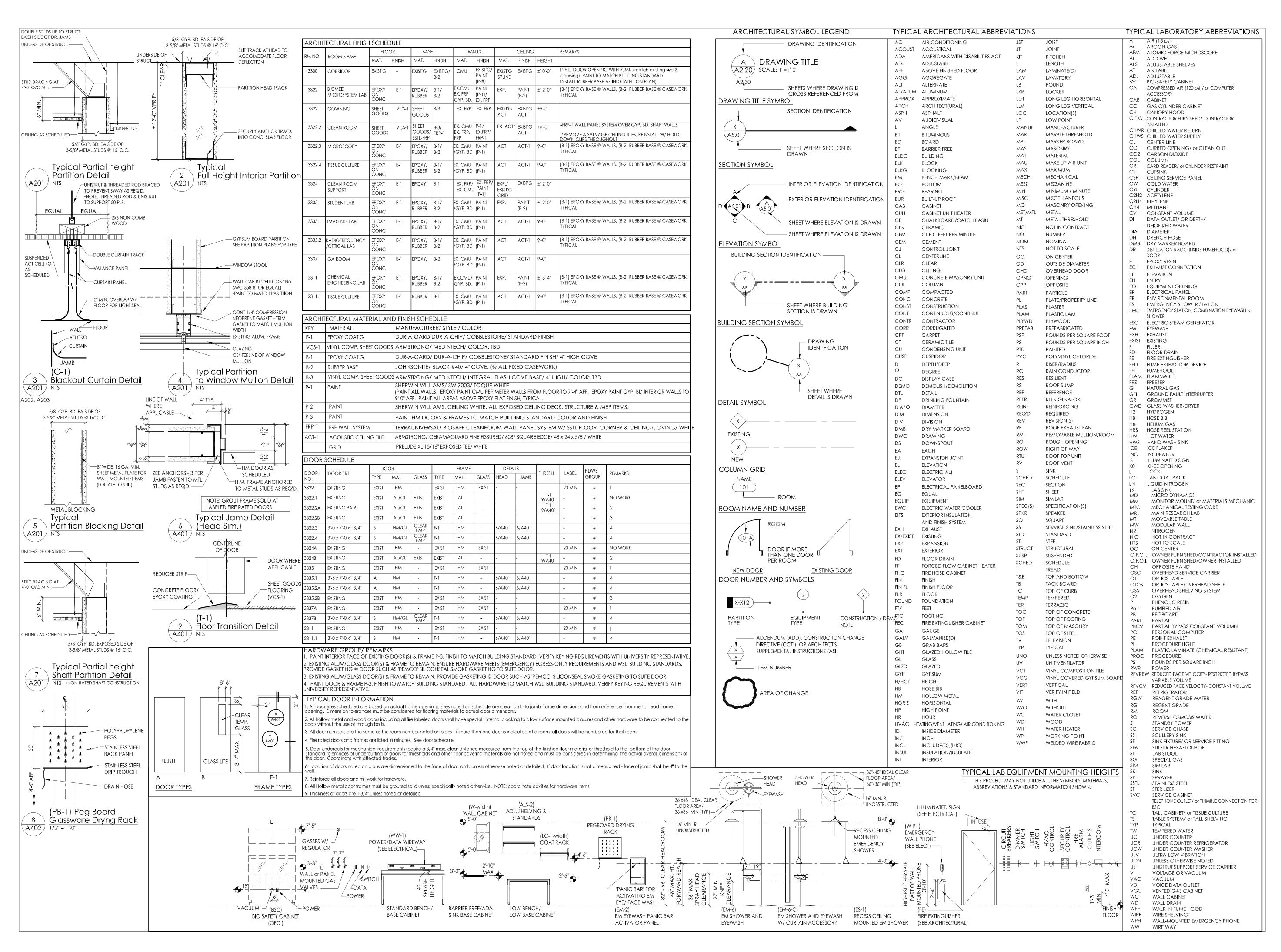
CTW

CTW

LAC

LAC

090-250890-1 A302 (1156-2: iDesign project number)



WAYNE STATE UNIVERSITY

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Project Location:

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project Engineering

Research Labs -Phase Two

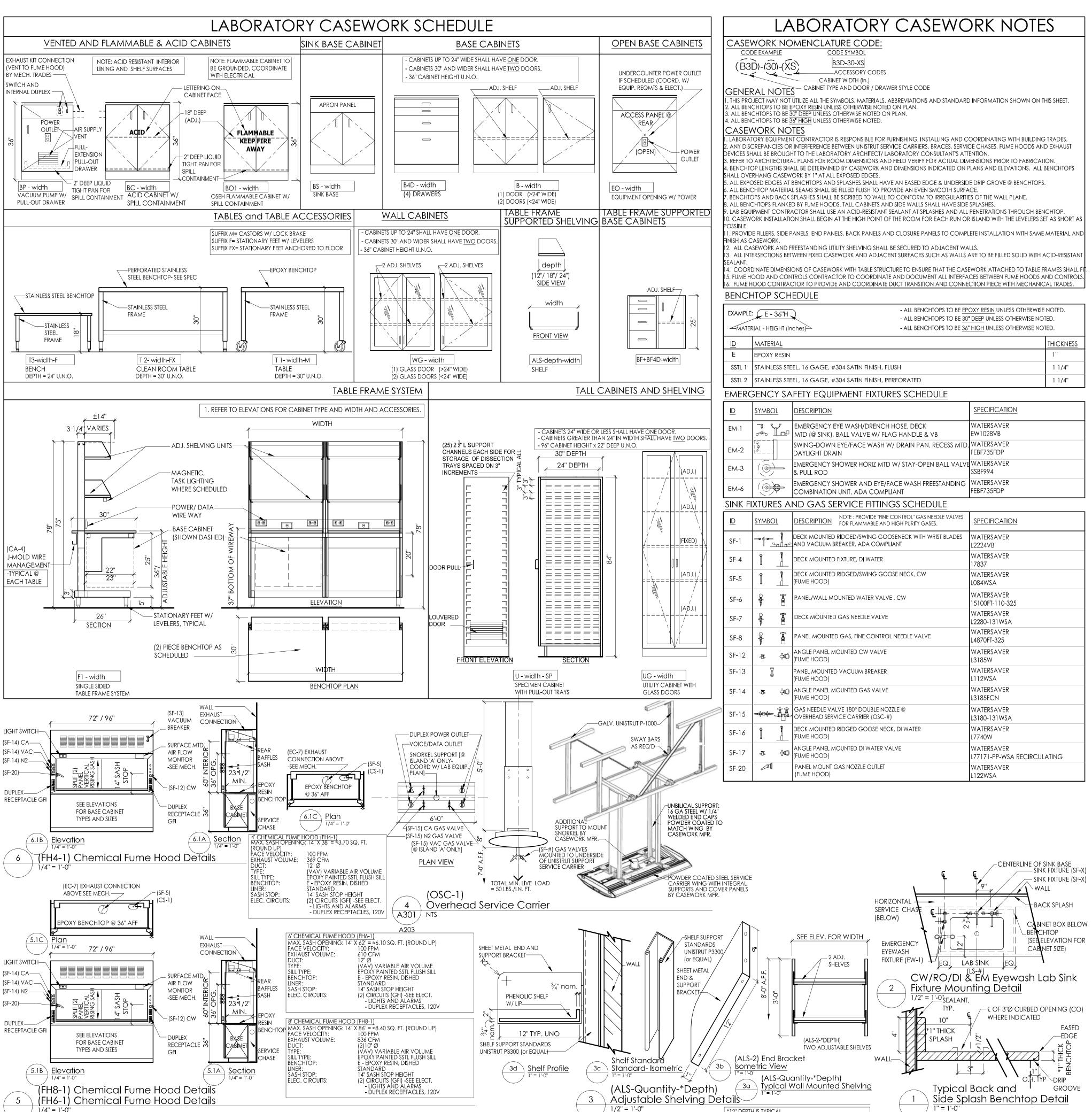
sheet title: Legends, **Architectural Schedules**

sheet number: project number:

and Details

A401

090-250890-(1156-2: iDesign project number)



DEPTH IS NOTED ONLY WHEN DIFFERENT FROM TYPICAL.

.D.	ITEM	MATERIAL & FINISH	COLOR	NOTES	DETAIL
ACCI	ESSORIES	L			
(ALS-#)	ADJUSTABLE LAB SHELVES	PHENOLIC RESIN	MFR. STD. BLACK	TRESPA TOP LAB (DESIGN STD)	3/A402
	SHELF BRACKETS & SUPPORT STANDARD:	PAINTED METAL	MATCH CASEWORK	SLOTTED STANDARD SUPPORT/ STEEL BRACKETS, ADJ. 1" INCREMENTS. SEE SPEC	
(OSC-1)	PREFABRICATED OVERHEAD SERVICE CARRIER WITH UNISTRUT SUPPORTS	PAINTED STEEL	MATCH CASEWORK	WING STYLE WITH SUPPORT AND UTILITY COVERS	4/A402
(WW-1)	DUAL SERVICE WIREWAY	MFR. STD.	DESIGNER GRAY	LEGRAND ALDS 4000 (SEE ELECT)	
	ELECTRICAL RECEPTACLES & SWITCHES	MFR. STD.	STANDARD BLACK	EMERGENCY POWER = RED (SEE ELECT)	
(C-1)	BLACK-OUT CURTAIN	MFR. STD.	BLACK	PL SYSTEMS (DESIGN STD)	3/A401
(PB-1)	PEGBOARD DRYINGRACK	STAINLESS STEEL	MFR. STD.	POLYPROPYLENE PEGS INTERDYNESYSTEMS (DESIGN STD)	8/A401
(CA-1)	KEYBOARD TRAY	MFR. STD.	BLACK	HUMANSCALE, 900-STD KEYBD W/MOUSE CLIP (DESIGN STD)	
(CA-2)	CPU HOLDER	MFR. STD.	BLACK	HUMANSCALE, CPU555 (DESIGN STD)	
(CA-4)	WIRE MANAGEMENT	MFR. STD.	BLACK	J-SHAPE WIRE MANAGER,#WM2A MOCKET (DESIGN STD)	
(TL-1)	MAGNETIC TASK LIGHT	MFR. STD.	MFR. STD.	REED (DESIGN STD), 24" LENGTH, TYP	
DENIC	HITODE CININE & CHD CININE				
	HTOPS, SINKS & CUP SINKS	EPOXY RESIN. MATTE	AAED STD DLA CK	DUDGON (DECION CED)	
(E)	EPOXY RESIN	STAINLESS STEEL, 16 GAGE, #304 S	MFR. STD. BLACK	DURCON (DESIGN STD) TERRAUNIVERSAL (DESIGN STD)	-
(GOWNING ROOM BENCH		·	MODEL #1560-31 TERRAUNIVERSAL (DESIGN STD)	
	CLEAN ROOM FIXED TABLES	STAINLESS STEEL, 16 GAGE, #304 S	ATIIN FIINISH, PERFORATED	MODEL #9604-83	
CASE	WORK	<u></u>	<u> </u>		
	BASE CABINETS	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	<u>-</u>
	WALL & TALL CABINETS	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	
	VENTED CABINETS	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	_
	FLAMMABLE CABINETS	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	-
	ACID CABINETS	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	-
	INSTRUMENT TABLE FRAMES	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	-
	CASEWORK HARDWARE, DOOR & DRAWER PULLS	STAINLESS STEEL, SATIN FINISH	NATURAL	-	
	CASEWORK LETTERING	PAINTED	RED		
FUME	HOODS				
(FH-#)	FUME HOOD	PAINTED METAL, SEMI-GLOSS	DOVE GRAY OR SIM	MOTT PAINTED STEEL (DESIGN STD)	_
. ,	ELEC. COVER PLATES	STAINLESS STEEL, SATIN	NATURAL	, ,	
	RECEPTACLES AND SWITCHES	STAINLESS STEEL, SATIN	MFR. STD. BLACK		
WET F	PROCESSING CABINET		<u>'</u>	•	
WPC-1)	WET PROCESSING BENCH - ACID	POLYPROPYLENE	MFR. STD. WHITE	TERRAUNIVERSAL (DESIGN STD) PROVIDE ACID STORAGE CABINETS BELOW	/ BENCH
WPC-2)	WET PROCESSING BENCH - SOLVENTS	BRUSHED STAINLESS STEEL	NATURAL	TERRAUNIVERSAL (DESIGN STD) PROVIDE SOLVENT STORAGE CABINETS BE	OW BENCH
EMER	GENCY FIXTURES, SINK FIXTUR	ES AND SERVICE FITTINGS	•	•	=
(SF-#)	SINK FIXTURES	CHROME, SATIN FINISH	NATURAL	WITH CLEAR EPOXY COATING- SEE SCHEDULE & SPEC	
(SF-#)	SERVICE FITTINGS	CHROME, SATIN FINISH	NATURAL	WITH CLEAR EPOXY COATING-	_
(ES-#)	EMERGENCY FIXTURES	STAINLESS STEEL, SATIN FINISH	NATURAL	SEE SCHEDULE & SPEC SEE SPEC	
(EW-#)	DRATORY SYMBOL LEGEN	·		SEE 01 E0	

LABOR	AIORY 5	MBOL LEGEND	
<u>ID</u>	<u>symbol</u>	<u>DESCRIPTION</u>	<u>NOTES</u>
CC-#	ුරු ලි	GAS CYLINDER CABINET	REFER TO LAB DOCUMENTS N FOR LOCATIONS AND DETAILS
CH-#		CANOPY HOOD	REFER TO LAB DOCUMENTS FOR LOCATIONS AND DETAILS- COORDINATE WITH MECHANICAL
CR-#	0	Cylinder restraint	REFER TO LAB DOCUMENTS FOR LOCATIONS AND DETAILS
EC-#	0	EXHAUST CONNECTION	SEE SCHEDULE THIS SHEET, COORDINATE WITH MECHANICAL
FH#-#	0	FUME HOOD	REFER TO LAB DOCUMENTS FOR LOCATIONS AND DETAILS
FE-#		FIRE EXTINGUISHER	REFER TO LAB DOCUMENTS FOR LOCATIONS AND ARCHITECTURAL SPECIFICATIONS
LC-#		LAB COAT RACK	REFER TO LAB DOCUMENTS FOR LOCATIONS, LAB ELEVATIONS FOR WIDTH AND THIS SHEET FOR TYPICAL MOUNTING HEIGHT
PB-#	11111111	PEG BOARD DRYING RACK	REFER TO LAB PLAN FOR LOCATIONS AND A400 SERIES FOR DETAILS
W PH		EM WALL-MOUNTED PHONE	COORDINATE WITH ELECTRICAL DOCUMENTS
СО	0	CURBED OPENING (BENCHTOP)	REFER TO LAB DOCUMENTS FOR LOCATIONS AND BENCHTOP DETAIL.

SINK SCHEDULE (REFER TO LAB PLAN FOR LOCATIONS)

- PROVIDE SINKS W/ STRAINERS, TAIL PIECES, TRAPS, FITTINGS, SUPPLIES, STOPS & ESCUTCHEONS

011 111 01	- PROVIDE SINKS W/ STRAINERS, TAIL PIECES, TRAPS, HITINGS, SUPPLIES, STOPS & ESCUTCHEONS.			HITINGS, SUPPLIES, STOPS & ESCUTCHEONS.
<u>ID</u>	<u>SYMBOL</u>	MATERIAL	<u>NOMINAL SIZE</u>	DESCRIPTION
LS-1	•	epoxy resin	28" x 15" x 12" DEEP	TYPICAL LAB SINK
LS-2	•	epoxy resin	18" x 15" x 11" DEEP	TYPICAL HANDWASH SINK
CS-1	•	epoxy resin	6" x 3" x 4" DEEP	CUP SINK (@ FUME HOOD)

EXHAUST CONNECTIONS LEGEND

<u>ID</u>	DESCRIPTION NOTE: SEE MECHANICAL DOCUMENTS FOR ALL DUCTWORK AND CONNECTIONS (COORDINATE WITH MECHANICAL)
EC-1	EXHAUST CONNECTION AND DUCTWORK BY MECHANICAL TRADES ROUTED VERTICALLY THROUGH BENCHTOP AND HORIZONTALLY BEHIND CASEWORK TO VENTED BASE CABINETS (BC-#, BV-# & BP-#).
EC-2	EXHAUST CONNECTION AND DUCTWORK BY MECHANICAL TRADES ROUTED VERTICALLY TO VENTED CABINETS (UC-#, UV-# & CC-#).
EC-4	DIRECT VERTICAL EXHAUST CONNECTION THRU OVERHEAD SERVICE CARRIER "WING" TO WING MOUNTED (FED-2) FUME EXTRACTOR DEVICE. COORD W/MECH DOCUMENTS
EC-5	EXHAUST CONNECTION TO CEILING BRACKET SUPPORTED JOINT ARM (FED-2) FUME EXTRACTOR DEVICE TO DUCTWORK BY MECH TRADES. COORD W/MECH DOCUMENTS
EC-7	DIRECT EXHAUST CONNECTION & DUCTWORK BY MECH TRADES TO FUME HOODS . SEE FUME HOODS DETAILS. COORDINATE WITH MECH DOCUMENTS
EC-8	DIRECT EXHAUST CONNECTION TO OWNER FURNISHED EQUIPMENT. COORDINATE WITH MECH DOCUMENTS

EXHAUST CONNECTION SCHEDULE & ACCESSORY CODE (FED-#-Accessory Code)

CONNECTION ID	DESCRIPTION		CODE	SYMBOL	DESCRIPTION
FED-2	(3) JOINT ARM FUME EXTRACTOR		О		DOME

GENERAL NOTES:

- THIS PROJECT MAY NOT UTILIZE ALL THE SYMBOLS, MATERIALS, ABBREVIATIONS & STANDARD INFORMATION SHOWN ON THIS SHEET
- FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION. DO NOT SCALE DRAWINGS
- REFER TO SHEET A-302 FOR LABORATORY CASEWORK SCHEDULE AND NOTES.
- REFER TO SHEET A-302 FOR LABORATORY CASEWORK, FIXTURE AND ACCESSORY DETAILS.
- REFER TO SHEET A-302 FOR LABORATORY EXHAUST AND BENCH SERVICE CHASE EQUIPMENT DETAILS.
- REFER TO SHEET A-302 FOR LABORATORY EQUIPMENT SUPPORT DETAILS
- REFER TO FLOOR PLAN FOR ROOM DIMENSIONS
- ALL DIMENSIONS ARE NOMINAL. COORDINATE VARIATIONS BASED ON MANUFACTURER OR CLOSEST MANUFACTURER STANDARD, SUBJECT TO LAB ARCHITECT'S AND/ OR LABORATORY CONSULTANT'S APPROVAL.
- PROVIDE BLOCKING OR BACKING PLATE FOR WALL REINFORCEMENT AND SUPPORT FOR WALL MOUNTED EQUIPMENT, SHELVING AND CABINETS.

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Engineering Research Labs -Phase Two

sheet title:

Laboratory Schedules and Details

project number sheet number: A402 090-250890-

MECHANICAL ABBREVIATION LIST **ABBREVIATION DESCRIPTION ABBREVIATION** DESCRIPTION DESCRIPTION COMPRESSED AIR FLOOR DRAIN OXYGEN COMPRESSED AIR (SPECIFIC PSIG) FUNNEL FLOOR DRAIN OUTSIDE AIR OAT OUTSIDE AIR TEMPERATURE AUTOMATIC AIR VENT FIRE HYDRANT ACC AIR COOLED CONDENSER FIRE HOSE CABINET OBD OPPOSED BLADE DAMPER ON CENTER/CENTER TO CENTER ACCU AIR COOLED CONDENSING UNIT FIRE HOSE RACK ACCESS DOOR FIRE HOSE VALVE OUTSIDE DIÁMETER OWNER FURNISHED, CONTRACTOR INSTALLED AREA DRAIN FULL LOAD AMPS OWNER FURNISHED, OWNER INSTALLED AIR EXTRACTOR FLOOR FLOW MEASURING DEVICE ABOVE FINISHED FLOOR OVERLOAD FLOW MEASURING STATION ORC ORD OVERFLOW RAIN CONDUCTOR AIR HANDLING UNIT OVERFLOW ROOF DRAIN ALTERNATE FEET PER MINUTE AMPERE FIRE PUMP OS&Y OUTSIDE SCREW AND YOKE AIR PRESSURE DROP FAN POWERED (AIR) TERMINAL UNIT OUTLET VELOCITY ARGON FLOOR SINK AMERICAN SOCIETY OF HEATING, REFRIGERATION PACU PACKAGED AIR CONDITIONING UNIT ASHRAE FOOD SERVICE EQUIPMENT CONTRACTOR PARALLEL BLADE DAMPER AND AIR-CONDITIONING ENGINEERS ASR AUTOMATIC SPRINKLER RISER FINNED TUBE RADIATION PUMPED CONDENSATE PROCESS COOLING WATER AUXILIARY FACE VELOCITY AUX PROCESS COOLING WATER RETURN ACID VENT AVTR ACID VENT THROUGH ROOF NATURAL GAS PROCESS COOLING WATER SUPPLY ACID WASTE GAUGE PRESSURE DROP (FEET OF WATER) PERIMETER HEAT GALLON BUILDING AUTOMATION SYSTEM GRAVITY RELIEF HOOD PERIMETER HEAT RETURN PHR PHS PERIMETER HEAT SUPPLY BLOWER COIL UNIT GALLONS PER HOUR PNL PPM BDD BACKDRAFT DAMPER GALLONS PER MINUTE PARTS PER MILLION BELOW FINISHED FLOOR **BACKFLOW PREVENTER** HYDROGEN PRESS PRESSURE PRESSURE REDUCING VALVE BRAKE HORSEPOWER HOSE BIBB PRV BOD BOTTOM OF DUCT HEATING COIL PUMPED SANITARY BOTTOM OF PIPE HOT DECK HIGH EFFICIENCY PARTICULATE ARRESTANCE BTU BRITISH THERMAL UNIT HEPA POUNDS PER SQUARE INCH BRITISH THERMAL UNIT PER HOUR HIGH LIMIT POUNDS PER SQUARE INCH - ABSOLUTE BTUH HAND/OFF/AUTO BACKWATER VALVE POUNDS PER SQUARE INCH - GAUGE HEAT PUMP PURIFIED WATER PURIFIED WATER RETURN COMMON HORSEPOWER HPCW HIGH PRESSURE DOMESTIC COLD WATER CAPACITY PURIFIED WATER SUPPLY CAV CONSTANT AIR VOLUME HIGH PRESSURE DOMESTIC HOT WATER HIGH PRESSURE DOMESTIC HOT WATER RETURN CATCH BASIN RELOCATED COOLING COIL HEAT PUMP LOOP RETURN GRILLE OR REGISTER HEAT PUMP LOOP RETURN RETURN AIR COLD DECK RETURN AIR TEMPERATURE CONDENSATE DRAIN HEAT PUMP LOOP SUPPLY CONTRACTOR FURNISHED, CONTRACTOR INSTALLED CFCI HOUR RAIN CONDUCTOR RADIANT CEILING PANEL CUBIC FEET PER HOUR HEATING CFH HEATING VENTILATING CUBIC FEET PER MINUTE ROOF DRAIN CHILLER HEATING, VENTILATING, AIR CONDITIONING REQUIRED HVAC CHW CHWR CHWS CHILLED WATER ROOF EXHAUST FAN HOT WATER HEATING HOT WATER HEATING RETURN CHILLED WATER RETURN RETURN FAN CHILLED WATER SUPPLY HOT WATER HEATING SUPPLY RELATIVE HUMIDITY CLG CNDS DOMESTIC HOT WATER REFRIGERANT LIQUID COOLING DOMESTIC HOT WATER (SPECIFIC TEMP 'F) RLFA CONDENSATE RFI IFF AIR CONDENSATE (SPECIFIC PSIG) CNDS (__#) REVOLUTIONS PER MINUTE DOMESTIC HOT WATER RETURN REFRIGERANT SUCTION CLEAN OUT HEAT EXCHANGER CO2 CONT CARBON DIOXIDE RTU ROOFTOP UNIT CONTINUATION OR CONTINUED CONTR CONTRACTOR INDOOR AIR QUALITY SUPPLY AIR DIFFUSER OR GRILLE CONV CONVECTOR INSIDE DIAMETER SOUND ATTENUATOR COEFFICIENT OF PERFORMACE SUPPLY AIR COP INVERT ELEVATION CENTRAL OPERATOR STATION INTAKE HOOD SANITARY WASTE CIRCULATING PUMP SUPPLY AIR TEMPERATURE INCHES CONDENSATE RETURN UNIT INFRARED HEATER CRU SECTION SUPPLY FAN CLINICAL SERVICE SINK INDIRECT WASTE COOLING TOWER SHOWER CABINET UNIT HEATER JANITOR'S CLOSET CUH SNOW MELT RETURN CW DOMESTIC COLD WATER JOCKEY PUMP CONDENSER WATER RETURN SNOW MELT SUPPLY CONDENSER WATER SUPPLY KILOWATT STATIC PRESSURE KILOWATT-HOUR SPECIFICATION DRIP AND TRAP Sprinkler DISCHARGE AIR LEAVING AIR TEMPERATURE SQUARE FOOT/SQUARE FEET DISCHARGE AIR TEMPERATURE LABORATORY START/STOP DRY BULB LAVATORY SERVICE SINK DIRECT DIGITAL CONTROL POUNDS STORM DEGREE LEAVING DRY BULB STANDARD DRAINAGE FIXTURE UNITS STACK LOW LIMIT LOW PRESSURE CONDENSATE DIAMETER Damper LOW PRESSURE STEAM STEAM (SPECIFIC PSIG) DAY/NIGHT LOCKED ROTOR AMPS SUMMER/WINTER LAB (AIR) TERMINAL UNIT DOWNSPOUT NOZZLE LEAVING WET BULB LEAVING WATER TEMPERATURE DUCT SILENCER TRANSFER GRILLE TEMPERATURE CONTROL DRAIN THE DRAIN TILE CONNECTION MIXED AIR TEMPERING COIL MIXED AIR TEMPERATURE TEMPERATURE CONTROL PANEL DOMESTIC WATER HEATER MAKE-UP AIR UNIT TRENCH DRAIN DRAWING MAXIMUM TEMPERATURE THOUSAND BRITISH THERMAL UNITS PER HOUR TEMPORARY EXHAUST GRILLE OR REGISTER MEDICAL COMPRESSED AIR TERMINAL HEATING MINIMUM CIRCUIT AMPACITY TOTAL HEAT ABSORBED FACH TERMINAL HEATING RETURN EXHAUST AIR MOTOR CONTROL CENTER ENTERING AIR TEMPERATURE MECHANICAL TOTAL HEAT REJECTED EXPANSION COMPENSATOR MEZZANINE TERMINAL HEATING SUPPLY ECUH ELECTRIC CABINET UNIT HEATER MANUFACTURER TOTAL STATIC PRESSURE ENTERING DRY BULB MANHOLE (AIR) TERMINAL UNIT ENERGY EFFICIENCY RATIO MINIMUM TURNING VANES EMERGENCY EYE WASH MISCELLANEOUS TYPICAL MILLION BRITISH THERMAL UNITS PER HOUR EXHAUST FAN UNIT HEATER MOTOR STARTER ELECTRIC HEATING COIL MOUNTED UNDERWRITER'S LABORATORY EXPANSION JOINT MOTOR UNLESS OTHERWISE NOTED MANUAL AIR VENT ELEVATION ELEC ELECTRICAL MEDICAL VACUUM UNIT VENTILATOR ENERGY MANAGEMENT SYSTEM EMS NITROGEN ENERGY RECOVERY LOOP ERLR ENERGY RECOVERY LOOP RETURN NITROUS OXIDE ERLS ENERGY RECOVERY LOOP SUPPLY NOISE CRITERIA VACUUM **ENERGY RECOVERY UNIT** NORMALLY CLOSED VARIABLE AIR VOLUME ERU NORMALLY CLOSED TIMED CLOSED EMERGENCY SHOWER VACUUM BREAKER VOLUME DAMPER (MANUALLY ADJUSTABLE) EXTERNAL STATIC PRESSURE NORMALLY CLOSED TIMED OPEN NATIONAL FIRE PROTECTION ASSOCIATION ELECTRIC UNIT HEATER NFPA VOLUME VARIABLE FREQUENCY CONTROLLER ENTERING WET BULB NORMALLY OPEN TIMED CLOSED ELECTRIC WATER COOLER NORMALLY OPEN TIMED OPEN VENT THROUGH ROOF VERTICAL UNIT VENTILATOR ENTERING WATER TEMPERATURE NOT IN CONTRACT NORMALLY OPEN EXHAUST FIRE PROTECTION NON POTABLE COLD WATER WASTE AND VENT DEGREES FAHRENHEIT WET BULB FACE AND BYPASS WATER CLOSET FLOAT AND THERMOSTATIC WATER COLUMN FACE AREA WATER GAUGE FAN COIL UNIT WALL HYDRANT WATER PRESSURE DROP XFMR TRANSFORMER

TEMPERATURE CONTROL - PARTIAL SYMBOLS LIST

<u> </u>	LITATORIE CONTINCE	I AITHAL OI	INDOES LIST
SYMBOL	<u>DESCRIPTION</u>	<u>SYMBOL</u>	DESCRIPTION
C02	CARBON DIOXIDE SENSOR	os	OCCUPANCY SENSOR
со	CARBON MONOXIDE SENSOR	PT	PRESSURE TRANSMITTER
DPT	DIFFERENTIAL PRESSURE TRANSMITTER	SP	STATIC PRESSURE SENSOR OR PROBE
FM	FLOW METER	叒	VALVE - 2 WAY CONTROL VALVE
	GUARD FOR STAT OR SENSOR	**	VALVE - 3 WAY CONTROL VALVE
H	HUMIDISTAT OR HUMIDITY SENSOR (AS DEFINED ON TC DRAWINGS)	T	THERMOSTAT OR TEMPERATURE SENSOR (AS DEFINED ON TC DRAWINGS)

NOTE: LIST OF ADDITIONAL SYMBOLS & ABBREVIATIONS ASSOCIATED WITH TEMPERATURE CONTROLS ARE IDENTIFIED ON TC DRAWINGS.

	<u>DESCRIPTION</u> AIR VENT — AUTOMATIC AIR VENT — MANUAL	<u>SYMBOL</u>	<u>DESCRIPTION</u>
		<i>,</i> — <i>,</i>	410 TERMINA AND
BFP		<u>10-101</u>	AIR TERMINAL UNIT
	BACKFLOW PREVENTER	TU-101	AIR TERMINAL UNIT WITH HEATING COIL
_o <u></u>	CATCH BASIN	<u> </u>	LABORATORY AIR TERMINAL UNIT
•	CIRCULATING PUMP CLEAN OUT — IN FLOOR	├ ├ ├ ├ ├ ├ ├ ├ ├ ├	LABORATORY AIR TERMINAL UNIT WITH HEATING COIL
- 11	CLEAN OUT - IN FLOOR CLEAN OUT - FLANGE		DAMPER — HORIZONTAL FIRE (EXISTING, NEW)
-	DIRECTION OF FLOW	_&	DAMPER - HORIZONTAL FIRE / SMOKE (EXISTING, NEW)
	DIRECTION OF PITCH - DOWN		, , ,
₹	FINNED TUBE RADIATION FIRE PROTECTION — SIAMESE CONNECTION — FREE STANDING	<i>→ →</i>	DAMPER — SMOKE (EXISTING, NEW)
$\stackrel{\searrow}{\longrightarrow}$	FIRE PROTECTION — SIAMESE CONNECTION — WALL MOUNTED		DAMPER — VERTICAL FIRE (EXISTING, NEW)
•	FIRE PROTECTION - SPRINKLER HEAD, CONCEALED	& BQD	DAMPER - VERTICAL FIRE / SMOKE (EXISTING, NEW)
-	FIRE PROTECTION — SPRINKLER HEAD, PENDANT		DAMPER - BACK DRAFT
- ⊙	FIRE PROTECTION — SPRINKLER HEAD, UPRIGHT FIRE PROTECTION — SPRINKLER HEAD, SIDEWALL	M	DAMPER - MOTORIZED
- ¹	FLOOR DRAIN		DAMPER - VOLUME (MANUALLY ADJUSTABLE)
Y	FLOOR DRAIN — ELEVATION	ìo	DIFFUSER — BLANK OFF
₹	FLOOR DRAIN — FUNNEL FLOOR DRAIN — FUNNEL, ELEVATION	<u> </u>	
× · · ·	FLOW MEASURING DEVICE		DIFFUSER — LINEAR SLOT
<u>' </u>	FLOW SWITCH		DIFFUSER - SQUARE OR RECTANGULAR
H—————————————————————————————————————	HOSE BIBB		DUCT CROSS SECTION — SUPPLY
 	MANHOLE OPEN SITE DRAIN		DUCT CROSS SECTION - RETURN OR EXHAUST
-X	PIPE — ANCHOR		DUCT CROSS SECTION — EXHAUST
-3	PIPE - CAP OR PLUG		DUCT — FLEXIBLE CONNECTION
⊸	PIPE - ELBOW DOWN	B	
→	PIPE — ELBOW UP PIPE — EXPANSION JOINT OR COMPENSATOR	- }}}}	DUCT — FLEXIBLE DUCT
⊣ı	PIPE - FLANGE	, , , , , , , , , , , , , , , , , , , 	DUCT TAKE-OFF - ROUND CONICAL
	PIPE - FLEXIBLE CONNECTION	\ \ \	DUCT TAKE-OFF - RECTANGULAR WITH SHOE TAP
<u></u>	PIPE — GUIDE PIPE — TEE DOWN	<u>} </u>	ELBOW - RECTANGULAR WITH TURNING VANES
_Ū	PIPE — TEE UP	5	ELBOW - RECTANGULAR/ ROUND SMOOTH RADIUS
	PIPE - UNION	<u>}</u>	ELBOW DOWN - RECTANGULAR
_ 〒P/T	PRESSURE AND TEMPERATURE TEST PLUG	_	
<u> </u>	PRESSURE GAUGE AND COCK	\longleftrightarrow	ELBOW DOWN — ROUND
├	REDUCER - CONCENTRIC REDUCER - ECCENTRIC	> ⊠	ELBOW UP - RECTANGULAR
✓	ROOF/OVERFLOW DRAIN	$\leftarrow \bigcirc$	ELBOW UP - ROUND
===	STEAM TRAP - FLOAT AND THERMOSTATIC		FAN – AXIAL
	STEAM TRAP — BUCKET	(o <u>-</u>	FAN - CENTRIFUGAL (ELEVATION)
	STRAINER STRAINER WITH BLOW-OFF		HEATING COIL
MAZ,		, D ,	
	THERMOMETER TRAP) ==+)	INCLINED DROP IN DIRECTION OF AIRFLOW
₽	VALVE - ANGLE	\ 	INCLINED RISE IN DIRECTION OF AIRFLOW
- б	VALVE - ANGLE VALVE - BALL		INTAKE OR RELIEF HOOD
- <u>/</u>	VALVE - BUTTERFLY	<u> </u>	REGISTER - RETURN OR EXHAUST
-⊠ _{0.5}	VALVE - BALANCE (i.e. BALANCE VALVE TO 0.5 GPM)		REGISTER - RETURN WITH BOOT
0.5	VALVE — COMBINATION BALANCE & FLOW MEASURING (i.e. BALANCE VALVE TO 0.5 GPM)		REGISTER – TRANSFER GRILLE
•••	VALVE - CHECK	_ _	
- ©	VALVE - SPRING CHECK VALVE - GAS (MANUAL)		ROOF EXHAUST FAN
–¤	VALVE — GLOBE	├─	TRANSITION - CONCENTRIC
-₩	VALVE - ISOLATION	\leftarrow	TRANSITION - ECCENTRIC
-₩ *	VALVE — NEEDLE	П→	UNIT HEATER - HORIZONTAL THROW
- Ø	VALVE - OS&Y		UNIT HEATER - VERTICAL THROW
	VALVE - PLUG	DOUBLE LINE	DUCTWORK SYMBOLS
-×	VALVE - PRESSURE REGULATING VALVE - PRESSURE REDUCING	SYMBOL	<u>DESCRIPTION</u>
2			DUCT TAKE-OFF - RECTANGULAR WITH SHOE TAP
<u></u>	VALVE - PRESSURE RELIEF		
	VALVE - PRESSURE & TEMPERATURE RELIEF		DUCT TAKE-OFF - ROUND CONICAL
—————————————————————————————————————	VENT THROUGH ROOF WALL HYDRANT	LJ L	FIDOW - DECTANCINAD WITH THOMBS MANES
·	PING SYMBOLS		ELBOW - RECTANGULAR WITH TURNING VANES
<u>) </u>	DESCRIPTION		ELBOW - RECTANGULAR SHORT RADIUS WITH SPLITTER

<u>SYMBOL</u>		<u>DESCRIPTION</u>	†E;;)	ELBOW - RECTANGULAR SHORT RADIUS WIT
		FLANGE	口	
		FLEX CONNECTION		ELBOW — ROUND
		STRAINER - BASKET	₽Ţ,	ELBOW - RECTANGULAR SMOOTH RADIUS
		STRAINER - Y TYPE	, "	
		VALVE - 2 WAY CONTROL	X	ELBOW DOWN - RECTANGULAR
		VALVE - 3 WAY CONTROL		ELBOW DOWN - ROUND
u	•		$\pm\Box$	ELBOW UP - RECTANGULAR
		VALVE — BUTTERFLY		
		VALVE - CHECK		ELBOW UP - ROUND
		VALVE - DETECTOR CHECK		HEATING COIL
*	•		<u> </u>	INCLINED DROP IN DIRECTION OF AIRFLOW

INCLINED RISE IN DIRECTION OF AIRFLOW

TRANSITION - CONCENTRIC

TRANSITION - ECCENTRIC

VALVE - OS&Y HORIZONTAL STEM

VALVE - OS&Y VERTICAL STEM

MECHANICAL DRAWING INDEX

MECHANICAL STANDARDS AND DRAWING INDEX

PARTIAL SECOND AND THIRD FLOOR PLUMBING PLANS

PARTIAL SECOND AND THIRD FLOOR SHEET METAL PLANS

PARTIAL SECOND AND THIRD FLOOR PLUMBING DEMOLITION PLANS

PARTIAL SECOND AND THIRD FLOOR SHEET METAL DEMOLITION PLANS

PLUMBING INSULATION AND MATERIALS

PARTIAL FIRST FLOOR PLUMBING PLANS

MECHANICAL DETAILS AND DIAGRAMS

HVAC INSULATION AND MATERIALS

ROOF MECHANICAL PLAN

MECHANICAL SCHEDULES

TEMPERATURE CONTROLS

SHEET TITLE

SHEET NO.

M001

M002

M003

MD201

MD401

M200

M201

M401

M402

M601

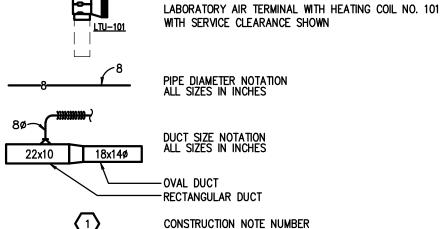
M701

M801

SUPPLY DIFFUSER WITH SCHEDULE TAG "1", 10" DIAMETER NECK SIZE 350-4 350 CFM TYPICAL FOR 4 RETURN REGISTER WITH SCHEDULE TAG "1", R-1 22"x 22" NECK SIZE 22x22 640-2 640 CFM TYPICAL FOR 2 EXHAUST REGISTER E DESIGNATION SIMILAR.

STANDARD METHODS OF NOTATION

TU-101 AIR TERMINAL UNIT WITH HEATING COIL NO. 101 WITH SERVICE CLEARANCE SHOWN



EF 1 EQUIPMENT DESIGNATION, (i.e. EXHAUST FAN NUMBER 1) HW-1 PIPING RISER DESIGNATION

(i.e. HOT WATER RISER NUMBER 1) - NEW SYSTEM COMPONENT EXISTING SYSTEM COMPONENT TO REMAIN

- POINT OF NEW CONNECTION SYMBOL —SECTION OR PLAN NUMBER -AREA OF ENLARGEMENT — PLAN NUMBER

SECTION OR PLAN NUMBER **SECTION OR ENLARGED PLAN** M5.1 SCALE: 1/8" - 1' - 0"

SHEET WHERE ENLARGED PLAN IS DRAWN

- SHEET WHERE SECTION IS CUT OR ENLARGED PLAN IS REFERENCED

HEAVY LINE WEIGHT INDICATES NEW WORK LIGHT LINE WEIGHT INDICATES EXISTING EQUIPMENT OR REFERENCED INFORMATION GRAY LINE INDICATES BACKGROUND INFORMATION DASHED LINES INDICATE PIPING _____ ROUTED BELOW SLAB OR GRADE

NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.

TO BE DISCONNECTED AND REMOVED.

HATCH MARKS INDICATE EQUIPMENT OR MATERIALS

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sheet title: **MECHANICAL** STANDARDS AND DRAWING INDEX

sheet number: project number: 090-250890

									PLI	JMI	BIN	IG	PIP	INC	3 8	ίV	AL	VE	Α	PPI	_IC	ΑT	101	v s	CH	IED	UL	E										
							N	MATERIA	AL											PRES	SURE (CONNEC	CTIONS	;						VITY [ISOLA	TION V	/ALVES		
PIPE SIZE (INCHES) ABOVEGROUND DOME	SOFT COPPER TYPE K	HARD COPPER TYPE L	HARD COPPER TYPE M	CARBON STEEL (SCHED. 40)	CARBON STEEL (STD.)	GALV. STEEL (SCHED. 40)	ь БЕХ	Jdd Jd TABL	PE SHEATHED CARBON STEEL PIPE	CSSI	NO-HUB CISP	PVC TYPE DWV	PP DRAINAGE PIPE	COPPER TYPE DWV	DUCTILE IRON PIPE	SOLDERED	OM BRAZED	WELDED	THREADED	FLANGED	GROOVED	INSERT & CRIMP	FUSION FUSION	PRESSURE—SEAL	MECHANICALLY-FORMED TEE	MECHANICAL JOINT	PUSH-ON-JOINT	SOLVENT WELDED	SOLDERED	FUSION	cispi hubless	HEAVY-DUTY HUBLESS	BALL	AGA BALL	GENERAL SERVICE BUTTERFLY	LUBRICATED PLUG	GATE	KEYED NOTES
UP TO 4	Π	x				Π										х	х			X	х			T x	×								x		х			A
ABOVEGROUND SANITARY WASTE & VENT - MIN. WORKING PRESS, 10-FOOT HEAD OF WATER																																						
1-1/2 TO 15											х																				х							
ABOVEGROUND INDIRECT SANITARY WASTE - MIN. WORKING PRESS. 10-FOOT HEAD OF WATER																																						
UP TO 8			Х											Х															Х									
UNDERGROUND SANITARY WASTE & VENT - MIN. WORKING PRESS, 10-FOOT HEAD OF WATER																																						
3 TO 12											Х																					Х						
3 TO 12												х																Х										
ABOVEGROUND COLD	CON	DENS/	ATE C	DRAIN	- MIN	r Mo	RKING	3 PRE	SSUF	RE: 10	FT. H	IEAD (OF W	ATER		•		•						•	•								•	!		•		
ALL SIZES			Х											Х		Х	х																					
ABOVEGROUND STOR	M DR	AINAG	Æ - N	AIN. W	ORKI	NG PI	RESS.	. 10-F	оот	HEAD	OF V	NATE	₹																									
2											Х																				Х							
ABOVEGROUND CHEM	ICAL-	WAS1	TE AN	ID VE	NT -	MIN. Y	WORK	ING F	PRESS	3.• 10-F	тоот	HEAD	OF	WATE	:R																							
1-1/2 TO 6													Х													Х				Х								
UNDERGROUND CHEMI	CAL-\	WAST	EAN	D VE	NT - I	MIN. V	VORK	ING P	RESS	. 10-F	ООТ	HEAD	OF 1	NATE	R																							
1-1/2 TO 6													Χ																	Χ								
GENERAL NOTES																																						

GENERAL NUTES

- 1. 'X' INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A PIPING SYSTEM, CONTRACTOR MAY
- SELECT FROM THOSE INDICATED SELECTIONS. 2. DISSIMILAR-METAL PIPING JOINTS: CONSTRUCT JOINTS USING DIELECTRIC FITTINGS COMPATIBLE WITH BOTH PIPING MATERIALS.
 - a. NPS 2 AND SMALLER: USE DIELECTRIC NIPPLE/WATERWAY.
- b. NPS 2-1/2 AND LARGER: USE DIELECTRIC FLANGE KITS.
- 3. USE UNIONS OR FLANGES AT VALVE AND EQUIPMENT CONNECTIONS. 4. PLUMBING EQUIPMENT DRAINS, VENTS, SAFETY VALVE PIPING, BLOWDOWN PIPING AND THE LIKE SHALL BE SAME PIPING MATERIAL AS ASSOCIATED
- PIPING SYSTEM. 5. GROOVED END VALVES MAY BE USED WITH GROOVED PIPING.

- A. GROOVED AND PRESSURE SEALED FITTINGS, JOINTS, AND COUPLINGS, IF INDICATED AS AN ACCEPTABLE SELECTION, MAY BE USED IN ACCESSIBLE LOCATIONS ONLY FOR THIS PIPING SYSTEM.
- B. JOINTS ARE NOT PERMITTED ON UNDERGROUND WATER PIPING.
- C. USE CAST IRON DRAINAGE PATTERN (DURHAM) FITTINGS. D. INSTALL IN CONTAINMENT JACKET, REFER TO SPECIFICATIONS.
- E. USE STEEL WELDING FITTINGS AND WELDED JOINTS IN PLENUM CEILINGS. VALVES, FLANGES, OR UNIONS ARE PROHIBITED.
- F. NO JOINTS ALLOWED UNDERGROUND.

ABOVEGROUND PLUMBING PIPE & ACCESSORY INSULATION APPLICATION SCHEDULE														
	IN	SULAT		TERIAL INCHES		IICKNES	SS	FIEL	D-APP	LIED J	IACKET	MATE	RIAL	
													KEYED NOTES	
NDOOR PIPE SYSTEM AND SIZE (INCHES)														
DOMESTIC COLD WATER	1	1						Χ		Х				Α
DOMESTIC HOT WATER SUPPLY & RETURN	1	1						Х		Х				Α
CONDENSATE AND EQUIPMENT DRAIN PIPING BELOW 60 DEG F	0.75	1												
FLOOR DRAINS, TRAPS AND SANITARY DRAIN PIPING WITHIN 10 FEET OF DRAIN RECEIVING CONDENSATE AND EQUIPMENT DRAIN WATER BELOW 60 DEG F	0.75							Х		Х				А
JNLESS OTHERWISE INDICATED OR SCHEDULED, DO NOT INSULATE	LESS OTHERWISE INDICATED OR SCHEDULED, DO NOT INSULATE THE FOLLOWING:													

FIRE SUPPRESSION PIPING UNDERGROUND PIPING LABORATORY GAS AND VACUUM PIPING MEDICAL GAS AND VACUUM PIPING FUEL GAS PIPING

FUEL OIL PIPING

GENERAL NOTES

- 1. 'X' OR THICKNESS IN INCHES INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
- 2. INSULATE PIPING WITHIN AIR HANDLING EQUIPMENT THE SAME AS INDOOR PIPING. PROVIDE ALUMINUM OR STAINLESS STEEL JACKET.

<u>KEYED NOTES</u>

A. PROVIDE FIELD APPLIED JACKET FOR PIPING EXPOSED IN EQUIPMENT ROOMS, STORAGE ROOMS, JANITORS CLOSETS, RECEIVING ROOMS, TEST AREAS, CIRCULATION AREAS AND SUCH AREAS SUBJECT TO DAMAGE, WITHIN 10 FEET (3 METERS) OF FINISHED FLOOR.

B. PROVIDE MANUFACTURER'S RECOMMENDED PROTECTIVE COATING FOR FLEXIBLE ELASTOMERIC THERMAL INSULATION.

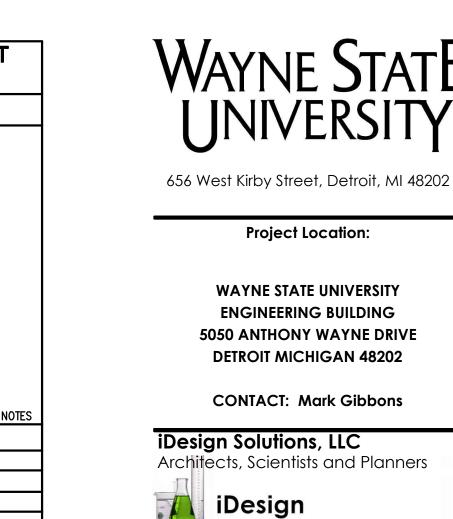
							_		_					
	HORIZONTAL PIPING AND SUPPORT APPLICATION SCHEDULE													
APPLICATI	<u> </u>					<u>.</u>				1				
			ANG POF			•		HIEL Typi	ב ב					
	NSC TYDE 1 OF DAY HANGED	MSS TYPE 10 SWIVEL RING BAND HANGER	MSS TYPE 41 DOUBLE ROD PIPE ROLLER	MSS TYPE 43 SINGLE ROD ROLLER HANGER	MSS TYPE 44 PIPE ROLLER & STAND	MSS TYPE 46 ADJUSTABLE PIPE ROLL STAND	MSS TYPE 39 PROTECTION SADDLE	MSS TYPE 40 INSULATION PROTECTION SHIELD	THERMAL—HANGER SHIELD		Notes			
PIPE TYPE & SIZE UNINSULATED SINGLE PIPE	╅	1	_	2	2	2	2	2	片	KETE	D NOTES			
UP TO 2 IN	CH >	X	┢			┢	\vdash	┢	\vdash					
2-1/2 INCH TO 4 IN	_	_	T											
		T												
INSULATED SINGLE COLD PIPES														
UP TO 2 IN	CH >	X						Х	Х	Α				
2-1/2 INCH TO 4 IN	CH >								Х					
INSULATED SINGLE HOT PIPES														
UP TO 2 IN	CH >	X					Х	Х	Х	A, C				
2-1/2 INCH TO 4 IN	СН		Х	Х	Х	Х	Х		Х	B, C				
OFNEDAL MOTEC														

GENERAL NOTES

- 1. "X" INDICATES APPROVED HANGER OR SUPPORT ELEMENTS. IF MORE THAN ONE HANGER OR SUPPORT ELEMENT IS INDICATED, SELECTION FROM APPROVED ELEMENTS IS CONTRACTOR'S OPTION.
- REFER TO HANGER AND SUPPORT SECTION FOR APPROVED MANUFACTURERS. 3. HANGERS AND SUPPORTS USED FOR FIRE PROTECTION SERVICES SHALL BE UL LISTED OR FMG APPROVED.
- 4. HANGER ELEMENTS IN CONTACT WITH BARE COPPER PIPE SHALL BE COPPER PLATED, PLASTIC COATED, FELT LINED, OR USE MANUFACTURED COPPER TUBE ISOLATORS.
- 5. REFER TO INDIVIDUAL PIPING SPECIFICATION SECTIONS FOR HANGER SPACING. 6. MULTIPLE PARALLEL COLD PIPES MAY BE TRAPEZE SUPPORTED FROM BELOW USING
- U-BOLTS OR STRUT CLAMPS AND THERMAL HANGER SHIELDS. refer to keyed note A.
- 7. MULTIPLE PARALLEL COLD PIPES MAY BE TRAPEZE SUPPORTED FROM ABOVE USING STANDARD HANGER ELEMENTS INDICATED FOR SINGLE COLD PIPES. 8. MULTIPLE PARALLEL HOT PIPES MAY BE TRAPEZE SUPPORTED FROM BELOW USING ROLLER
- ELEMENTS AND THERMAL HANGER SHIELD OR INSULATION PROTECTION SADDLE. REFER TO KEYED NOTES B AND C. 9. MULTIPLE PARALLEL HOT PIPES MAY BE TRAPEZE SUPPORTED FROM ABOVE USING
- STANDARD ROLLER HANGERS INDICATED AND THERMAL HANGER SHIELD OR INSULATION PROTECTION SADDLE. REFER TO KEYED NOTES B AND C.
- 10. REFER TO INDIVIDUAL PIPING SPECIFICATION SECTIONS FOR ADDITIONAL SYSTEM SPECIFIC HANGER APPLICATIONS

KEYED NOTES

- A. USE THERMAL HANGER SHIELD ON TRAPEZE SUPPORTED INSULATED PIPE TO PREVENT
- CRUSHING OF INSULATION. B. USE THERMAL HANGER SHIELD DESIGNED FOR USE ON ROLLER SUPPORTS FOR INSULATED
- C. USE TYPE 39 PROTECTION SADDLES IF INSULATION WITHOUT VAPOR BARRIER IS INDICATED. FILL INTERIOR VOIDS WITH INSULATION MATCHING ADJOINING INSULATION.





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Engineering Research Labs -Phase Two

sheet title:

PLUMBING INSULATION AND MATERIALS

project number: sheet number: M002 090-250890

ABOVEGROUND HVAC PIPING & VALVE APPLICATION SCHEDULE																				
			N	IATERIA	NL						CONN	ECTION				ISC	DLATIO	N VAL	/ES	
PIPE SIZE (INCHES)	SOFT COPPER TYPE K	HARD COPPER TYPE L	HARD COPPER TYPE M	CARBON STEEL (SCHED. 40)	CARBON STEEL (SCHED. 80)	CARBON STEEL (STD.)	COPPER TYPE DWV	SOLDERED	BRAZED	WELDED	THREADED	FLANGED	GROOVED	Pressure seal	MECHANICALLY FORMED TEE	BALL	GENERAL SERVICE BUTTERFLY	HI-PERF BUTTERFLY	GATE	KEYED NOTES
CHILLED WATER SUPPLY & RETURN - MIN. WORKING PRESS. & TEMP. 125 PSIG AT 200 DEG F																				
UP TO 2				x							x					x				
UP TO 2		х						х	х					х	х	х				
2-1/2 TO 4				х						Х		х	х				х			A
2-1/2 TO 4		Х						Х	х				х	Х	х		Х			A
CONDENSER WA	TER S	SUPPL	Y & I	RETU	RN - I	MIN. V	VORK	NG P	RE88	. & TI	EMP.	125 P	sig /	T 20	O DEC	3 F				
UP TO 2				Х							Х					Х				
UP TO 2		Х						Х	Х					Χ	Х	Х				
HEATING HOT W	ATER	SUPF	PLY &	RET	JRN -	MIN.	WOR	KING	PRES	S. & '	TEMP.	. 125	PSIG	AT 2	00 DE	EG F				
UP TO 2		Х						Х	Х					Х	Х	х				
2-1/2 TO 4 GENERAL NOTES				Х						Χ		Х	Х				Х			D

<u>GENERAL NOTES</u>

- 1. 'X' INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A PIPING SYSTEM, CONTRACTOR MAY
- SELECT FROM THOSE INDICATED SELECTIONS. 2. DISSIMILAR-METAL PIPING JOINTS: CONSTRUCT JOINTS USING DIELECTRIC FITTINGS COMPATIBLE WITH BOTH PIPING MATERIALS. IF A BRONZE VALVE CONNECTS THE DISSIMILAR METALS NO FURTHER DIELECTRIC ISOLATION IS REQUIRED.
 - a. NPS 2 AND SMALLER: USE BRASS COUPLING, NIPPLE, OR UNION.
- b. NPS 2-1/2 AND LARGER: USE DIELECTRIC FLANGE KITS.
- 3. USE UNIONS OR FLANGES AT VALVE AND EQUIPMENT CONNECTIONS. 4. HVAC EQUIPMENT DRAINS, VENTS, SAFETY VALVE PIPING, BLOWDOWN PIPING AND THE LIKE SHALL BE SAME PIPING MATERIAL AS ASSOCIATED
- PIPING SYSTEM. 5. GROOVED END VALVES MAY BE USED WITH GROOVED PIPING.

KEYED NOTES

- A. GROOVED FITTINGS, JOINTS, AND COUPLINGS, IF INDICATED AS AN ACCEPTABLE SELECTION, MAY BE USED IN ACCESSIBLE LOCATIONS
- FOR THIS PIPING SYSTEM ONLY. B. BALL VALVE WITH 250 PSIG STEAM TRIM.
- C. BALL VALVE WITH 150 PSIG STEAM TRIM. D. GROOVED FITTINGS, JOINTS AND COUPLINGS MAY BE USED IN MECHANICAL ROOMS ONLY.

DUCT SYSTEM APPLICATION SCHEDULE DUCT MATERIAL																		
						DI	JCT M	ATERIA	L									
AIR SYSTEMS	G90 GALV. SHEET METAL	DOUBLE-WALL LINED G90 GALV. SHEET METAL (SOLID INNER WALL)	DOUBLE—WALL LINED G90 GALV. SHEET METAL (PERF. INNER WALL)	G90 GALV. SHEET METAL WITH 1-INCH LINING	GALVANNEALED SHEET METAL	ALUMINUM	TYPE 304 STAINLESS STEEL	TYPE 316 STAINLESS STEEL	PVC COATED GALV. SHEET METAL (4X1)	PVC COATED GALV. SHEET METAL (1X4)	PVC COATED GALV. SHEET METAL (4X4)	16 GA. CARBON STEEL	ZERO-CLEARANCE PREFABRICATED RANGE HOOD EXHAUST DUCT	FABRIC	DESIGN PRESSURE CLASS (INCHES WG)	SEAL CLASS	MAX. ALLOWABLE LEAKAGE RATE (PERCENT)	keyed notes
SUPPLY AIR WITHOUT TERMINAL UNITS	Х														+2	Α	5	
RETURN AIR WITHOUT TERMINAL UNITS	Х														-2	Α	5	
EXHAUST AIR WITHOUT TERMINAL UNITS	Х														-2	Α	5	
SUPPLY AIR UPSTREAM OF TERMINAL UNITS	Х														+6	Α	5	
SUPPLY AIR DOWNSTREAM OF TERMINAL UNITS	Х														+2	Α	5	
EXHAUST AIR UPSTREAM OF TERMINAL UNITS	Х														-2	Α	5	
EXHAUST AIR DOWNSTREAM OF TERMINAL UNITS	Х														-6	Α	5	
air transfer duct				Х											+2	Α	5	
RELIEF AIR DOWNSTREAM OF FANS	Х														+6	Α	5	
GENERAL LAB EXHAUST UPSTREAM OF TERMINAL UNITS	х						х			х					-2	A	5	
GENERAL LAB EXHAUST AND COMBINED (GENERAL AND FUME HOOD) EXHAUST DOWNSTREAM OF TERMINAL UNITS	х						Х			х					-6	A	5	
FUME HOOD EXHAUST UPSTREAM OF TERMINAL UNITS							Х			Х					-2	A	5	
FUME HOOD EXHAUST DOWNSTREAM OF TERMINAL UNITS							Х			Х					-6	Α	5	
SOLVENT BENCH EXHAUST								Х										
ACID BENCH EXHAUST											Х							

GENERAL NOTES

- 1. 'X' INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A DUCT SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
- 2. 4 X 1 PVC-COATED GALVANIZED STEEL: FACTORY-APPLIED PVC COATINGS SHALL BE 4 MILS (0.10 MM) THICK ON EXTERIOR SHEET METAL SURFACES OF DUCTS AND FITTINGS EXPOSED TO CORROSIVE CONDITIONS AND MINIMUM 1 MIL (0.025 MM) THICK ON INTERIOR SURFACES.
- 3. 1 X 4 (4 X 1 REVERSE COATED) PVC-COATED GALVANIZED STEEL: FACTORY-APPLIED PVC COATINGS SHALL BE 4 MILS (0.10 MM) THICK ON INTERIOR
- SHEET METAL SURFACES OF DUCTS AND FITTINGS EXPOSED TO CORROSIVE CONDITIONS AND MINIMUM 1 MIL (0.025 MM) THICK ON EXTERIOR SURFACES. 4. 4 X 4 PVC-COATED GALVANIZED STEEL: FACTORY-APPLIED PVC COATINGS SHALL BE 4 MILS (0.10 MM) THICK ON SHEET METAL SURFACES OF DUCTS

AND FITTINGS EXPOSED TO CORROSIVE CONDITIONS AND 4 MILS (0.10 MM) THICK ON OPPOSITE SURFACES.

<u>KEYED NOTES</u>

A. SCREWS, DAMPERS, OR PROJECTIONS OF ANY TYPE ON INTERIOR OF DUCT SURFACE ARE PROHIBITED. B. DUCT SHALL BE LINED WITHIN 25 FEET UPSTREAM OF FANS. C. ALL WELDED CONSTRUCTION.

ABOVEGROUND HVAC PIPE & ACCESSORY INSULATION APPLICATION SCHEDULE														
	III.	NSULAT		ATERIAI INCHES		HCKNE	SS	FIEL	D-APF	PLIED .	IACKET	MATE	RIAL	
	FLEXIBLE ELASTOMERIC	FIBERGLASS	MINERAL WOOL	POLYISOCYANURATE	PHENOLIC	CELLULAR GLASS	CALCIUM SILICATE	ALUMINUM	STAINLESS STEEL	PVC	SELF-ADHESIVE (FOR OUTDOOR APPLICATIONS)	PVDC (INDOOR)	PVDC (OUTDOOR)	KEYED NOTES
INDOOR PIPE SYSTEM AND SIZE (INCHES)														
CHILLED WATER & BRINE 40 DEG F & BELOW	<u> </u>													
6 AND SMALLER		1		1	1	1.5		Х		Х				A
HEATING HOT WATER SUPPLY & RETURN 200 DEG F AND LOWER														
3 AND SMALLER		1						Х		Х				Α
REFRIGERANT SUCTION & HOT GAS (RIGID COPPER)	1	1		1	1	1.5		Х		Х				
REFRIGERANT SUCTION & HOT GAS (SOFT COPPER)	1							Х		Х				

GENERAL NOTES

- 1. 'X' OR THICKNESS IN INCHES INDICATES ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED, CONTRACTOR MAY SELECT FROM
- 2. INSULATE PIPING WITHIN AIR HANDLING EQUIPMENT THE SAME AS INDOOR PIPING. PROVIDE ALUMINUM OR STAINLESS STEEL JACKET.

<u>KEYED NOTES</u>

- A. PROVIDE FIELD APPLIED JACKET FOR PIPING EXPOSED IN EQUIPMENT ROOMS, STORAGE ROOMS, JANITORS CLOSETS, RECEIVING ROOMS, TEST AREAS, CIRCULATION
- AREAS AND SUCH AREAS SUBJECT TO DAMAGE WITHIN 10 FEET (3 METERS) OF FINISHED FLOOR. B. PROVIDE MANUFACTURER'S RECOMMENDED PROTECTIVE COATING FOR FLEXIBLE ELASTOMERIC THERMAL INSULATION.

	IN:	SULAT		ATERIAL INCHES		IICKNE:	ss	API	ELD PLIED KET	
	FIBERGLASS BLANKET 0.75 LB/CU FT	FIBERGLASS BLANKET 1.0 LB/CU FT	FIBERGLASS BOARD 2.25 LB/CU FT	FIBERGLASS BOARD 6.0 LB/CU FT	Flexible elastomeric	ASTM E2336 2-HOUR FIRE RATED BLANKET	2—HOUR FIRE RATED BLANKET		SELF-ADHESIVE (FOR OUTDOOR 집한 점) APPLICATIONS)	keyed notes
UCT SYSTEMS LOCATED INDOORS										
UPPLY AIR, EXCEPT AS NOTED BELOW		1.5								Α

- PLENUMS, DUCTS, AND DUCT ACCESSORIES NOT REQUIRING INSULATION: FIBROUS-GLASS DUCTS
- DOUBLE-WALL METAL DUCTS WITH INSULATION OF SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1 2007 METAL DUCTS WITH DUCT LINER OF SUFFICIENT THICKNESS TO COMPLY WITH ENERGY CODE AND ASHRAE/IESNA 90.1 - 2007
- EXPOSED SUPPLY DUCT IN CONDITIONED SPACE SERVED BY THAT SYSTEM
- FABRIC SUPPLY DUCTS
- FACTORY-INSULATED FLEXIBLE DUCTS FACTORY-INSULATED PLENUMS AND CASINGS
- FLEXIBLE CONNECTORS VIBRATION-CONTROL DEVICES
- FACTORY-INSULATED ACCESS PANELS AND DOORS

GENERAL NOTES

- 1. 'X' OR THICKNESS IN INCHES INDICATE ACCEPTABLE SELECTION. IF MORE THAN ONE SELECTION IS INDICATED FOR A DUCT SYSTEM, CONTRACTOR MAY SELECT FROM THOSE INDICATED SELECTIONS.
- 2. REFER TO METAL DUCT SECTION OF SPECIFICATIONS FOR DUCT LINING AND DOUBLE-WALL INSULATED DUCT. 3. REFER TO HVAC CASINGS SECTION OF SPECIFICATIONS FOR DOUBLE-WALL INSULATED PLENUMS.

<u>KEYED NOTES</u>

- A. INCLUDE INSULATION AROUND DUCT MOUNTED COILS AND AIR TERMINAL UNIT COILS. B. NUMBER OF LAYERS AND TOTAL INSULATION THICKNESS AS RECOMMENDED BY SELECTED MANUFACTURER.
- C. DOES NOT APPLY TO PREFABRICATED, ZERO-CLEARANCE GREASE DUCT.
- D. PROVIDE MANUFACTURER'S RECOMMENDED PROTECTIVE COATING FOR FLEXIBLE ELASTOMERIC THERMAL DUCT INSULATION. E. INSULATE DUCTWORK IN CRAWLSPACES, VENTILATED ATTICS, AND PARKING GARAGES HAVING NATURAL OR MECHANICAL VENTILATION THE SAME AS OUTDOOR DUCTWORK.

656 West Kirby Street, Detroit, MI 48202

Project Location:

WAYNE STATE UNIVERSITY ENGINEERING BUILDING **5050 ANTHONY WAYNE DRIVE DETROIT MICHIGAN 48202**

CONTACT: Mark Gibbons

iDesign Solutions, LLC Architects, Scientists and Planners



Scientific Facilities & Laboratory Design 400 Water Street, Suite LL1 Rochester, MI 48307 248-440-7310

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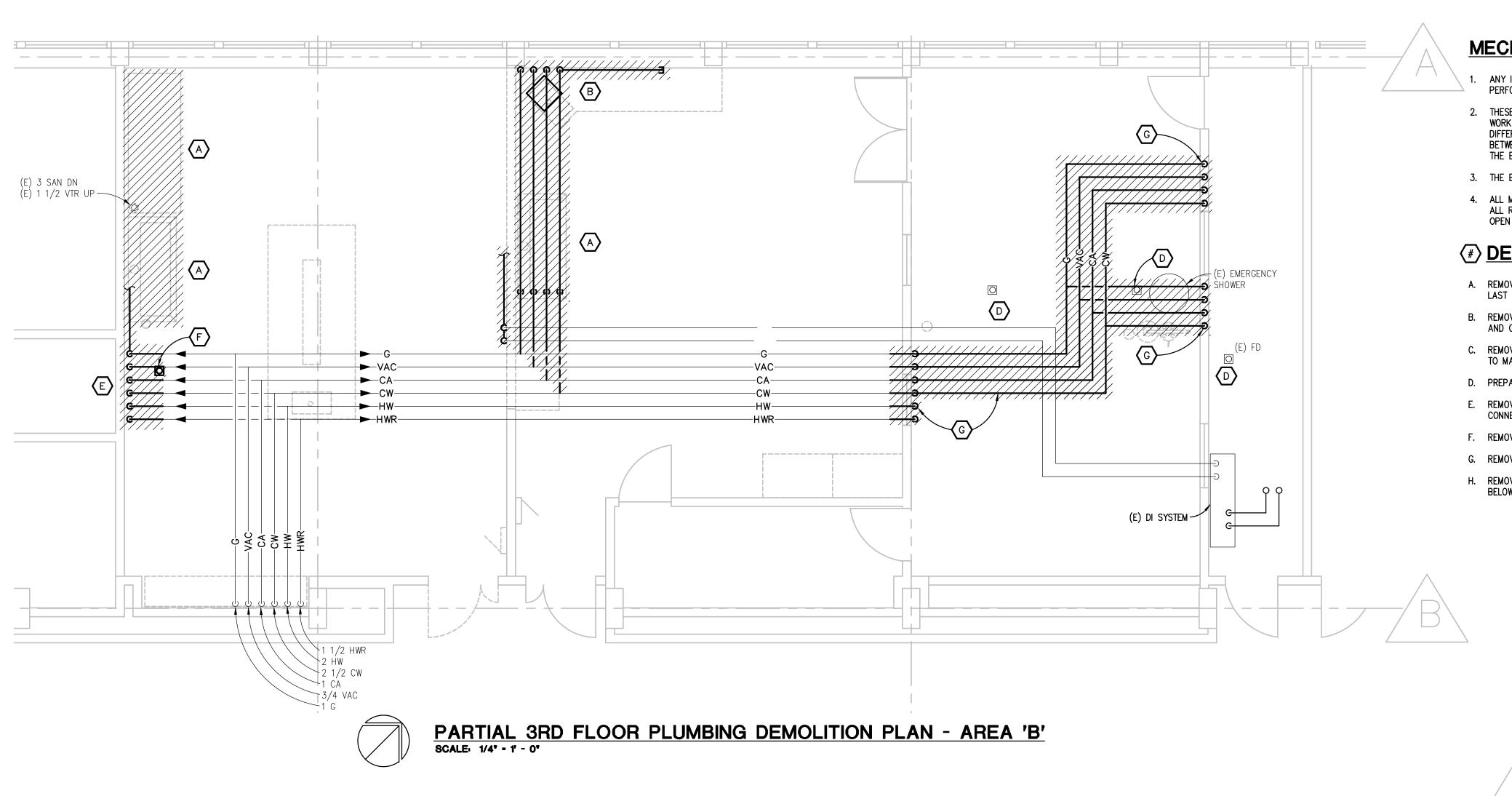
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BID	02.06.15

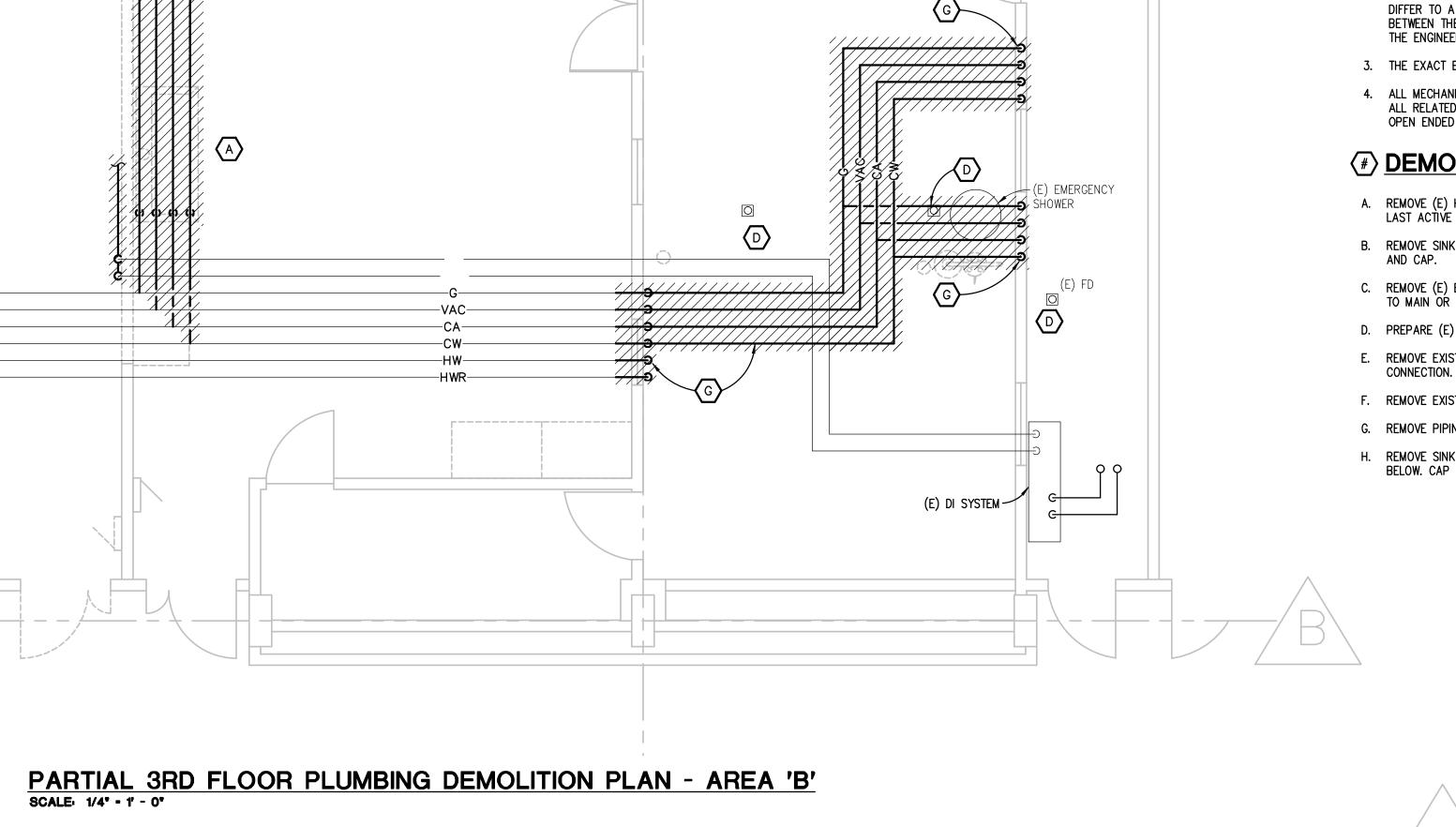
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drawn by:	BTB
coordination checked:	TRS
checked:	TRS
approved:	<u>GPI</u>

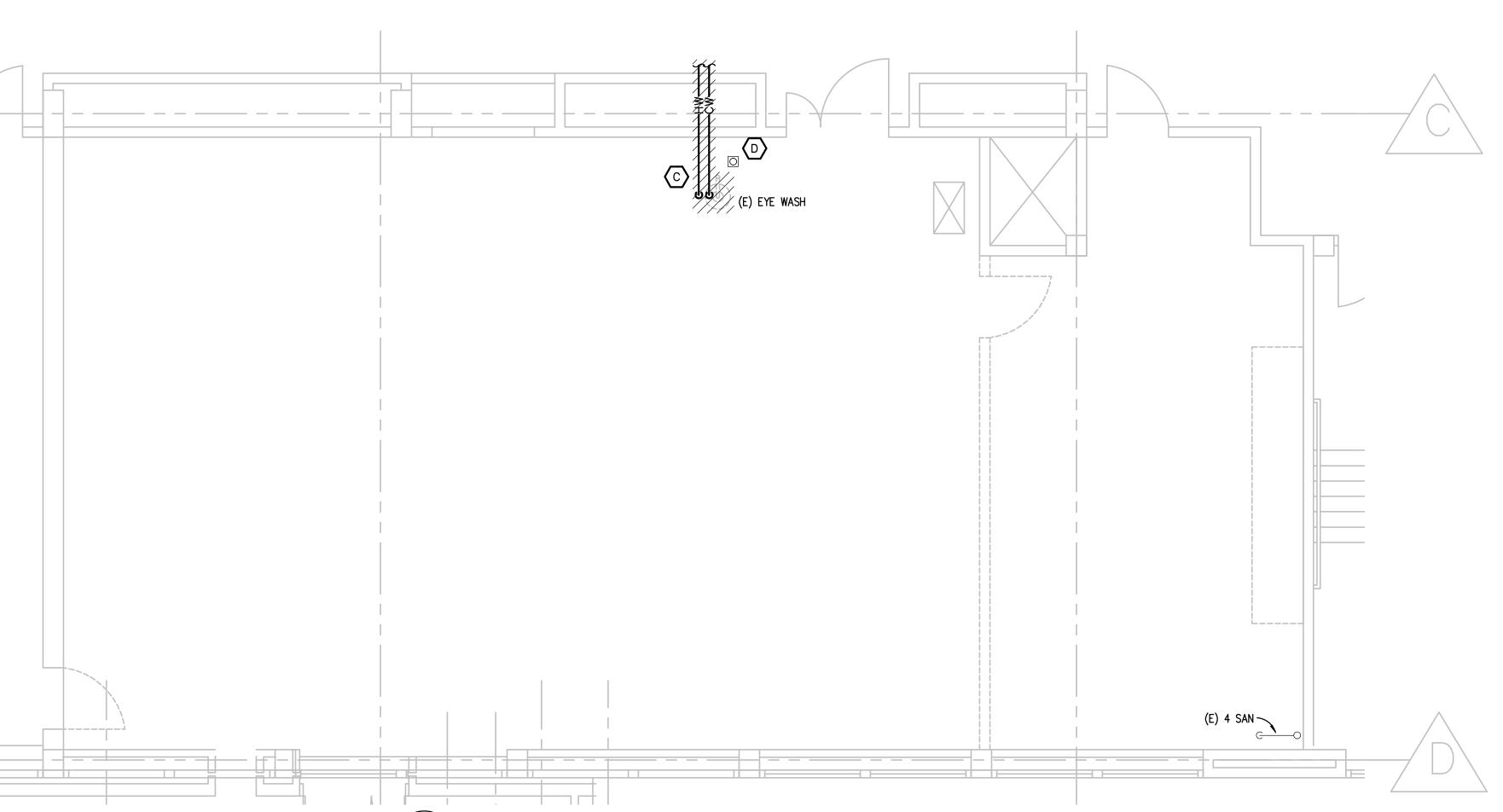
project: Engineering Research Labs Phase Two

sheet title: HVAC INSULATION AND MATERIALS

sheet number: project number: 090-250890







THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE.

PARTIAL 3RD FLOOR PLUMBING DEMOLITION PLAN - AREA 'A' SCALE: 1/4' - 1' - 0'

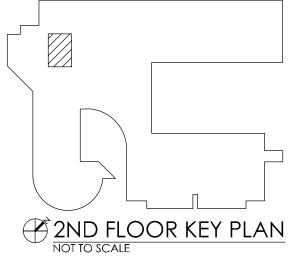
MECHANICAL GENERAL DEMOLITION NOTES:

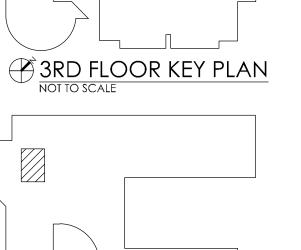
- 1. ANY INTERRUPTION OF EXISTING SERVICES AND/OR EQUIPMENT SHALL BE PERFORMED AT A TIME APPROVED IN ADVANCE BY THE OWNER'S REPRESENTATIVE.
- 2. THESE DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL EXTENT OF THE WORK. ACTUAL ROUTING AND SIZES OF EXISTING PIPING AND DUCTWORK MIGHT DIFFER TO A LIMITED EXTENT FROM WHAT IS SHOWN. MAJOR DISCREPANCIES BETWEEN THE DRAWINGS AND ACTUAL EXISTING CONDITIONS SHALL BE REPORTED TO THE ENGINEER.
- 3. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
- 4. ALL MECHANICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE, INCLUDING ALL RELATED ITEMS SUCH AS HANGERS, SUPPORTS, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTWORK.

DEMOLITION KEY NOTES:

- A. REMOVE (E) HOOD AND ALL ASSOCIATED GASES/CW/DI. CAP PIPING AT MAIN OR LAST ACTIVE BRANCH.
- B. REMOVE SINK AND ALL ASSOCIATED PIPING BACK TO MAIN OR LAST ACTIVE BRANCH
- C. REMOVE (E) EYE WASH AND ASSOCIATED MIXING BOX. REMOVE HW AND CW BACK TO MAIN OR LAST ACTIVE BRANCH AND CAP.
- D. PREPARE (E) FD FOR INSTALLATION OF SURE SEAL GASKET.
- E. REMOVE EXISTING SERVICES TO (2) FUME HOODS. CAP IN CEILING FOR FUTURE CONNECTION.
- F. REMOVE EXISTING FLOOR DRAIN. REMOVE SAN PIPING BACK TO MAIN AND CAP.
- G. REMOVE PIPING AS SHOWN. CAP IN CEILING FOR FUTURE CONNECTION.
- H. REMOVE SINK AND ASSOCIATED PIPING. CAP WASTE IN CEILING SPACE OF FLOOR BELOW. CAP WATER/VENT AT MAINS.









iDesign

WAYNE STATE UNIVERSITY

656 West Kirby Street, Detroit, MI 48202

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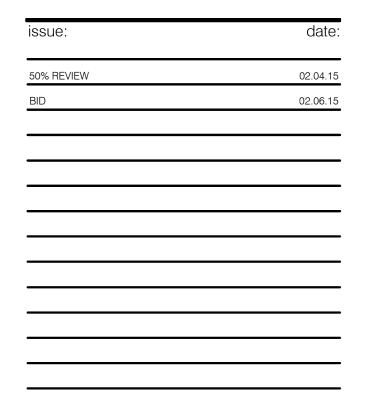
WAYNE STATE UNIVERSITY

ENGINEERING BUILDING **5050 ANTHONY WAYNE DRIVE**

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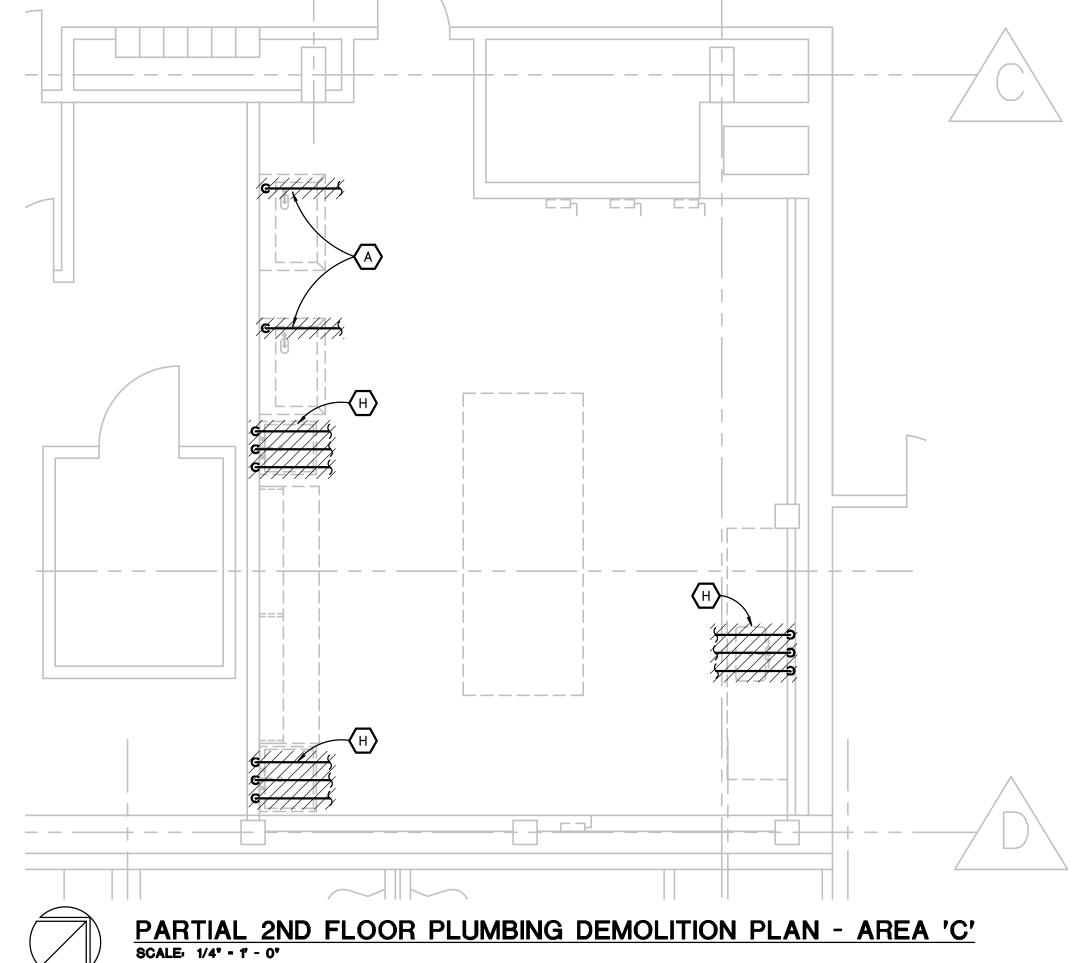


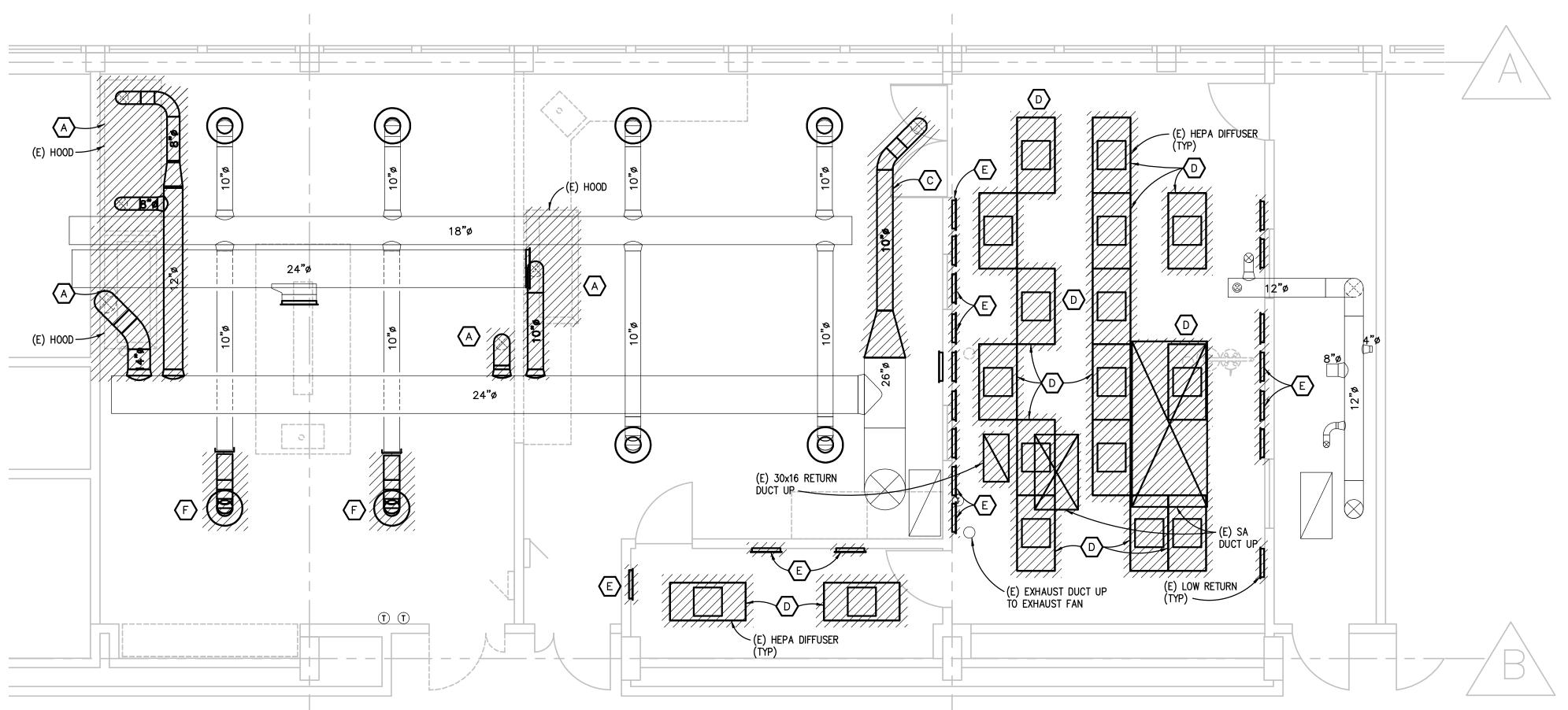
designed by:	BTB
drawn by:	BTB
coordination checked:	TRS
checked:	TRS
approved:	<u>GPI</u>
project:	

Engineering Research Labs -Phase Two

sheet title: PARTIAL SECOND AND THIRD FLOOR PLUMBING DEMOLITION PLANS

sheet number: project number: MD201 090-250890



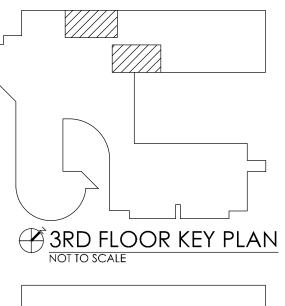


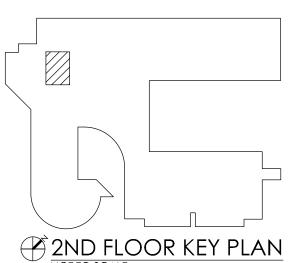
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- 3. THE EXACT EXTENT OF DEMOLITION SHALL BE AS REQUIRED BY THE NEW WORK.
- 4. ALL MECHANICAL ITEMS TO BE REMOVED SHALL BE REMOVED COMPLETE, INCLUDING ALL RELATED ITEMS SUCH AS HANGERS, SUPPORTS, CONTROLS, ETC. CAP ALL OPEN ENDED PIPES AND DUCTWORK.

(#) DEMOLITION KEY NOTES:

- A. REMOVE LAB HOOD COMPLETE. REMOVE ASSOCIATED DUCTWORK BACK TO MAIN AND
- B. REMOVE DUCT, VAV BOX, DIFFUSERS AS INDICATED.
- C. REMOVE ABANDONED DUCTWORK AS INDICATED.
- D. REMOVE CEILING HEPA DIFFUSER AND ASSOCIATED DUCTWORK.
- E. REMOVE WALL GRILLES. ARCHITECTURAL TRADES TO PATCH WALL.
- F. REMOVE DIFFUSER AND ASSOCIATED FLEX DUCTWORK. CAP FOR FUTURE





Peter Basso Associates Inc

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Project Location:

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CONTACT: Mark Gibbons

Architects, Scientists and Planners

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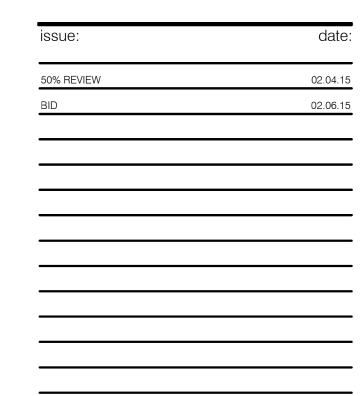
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approved:	<u>GPI</u>
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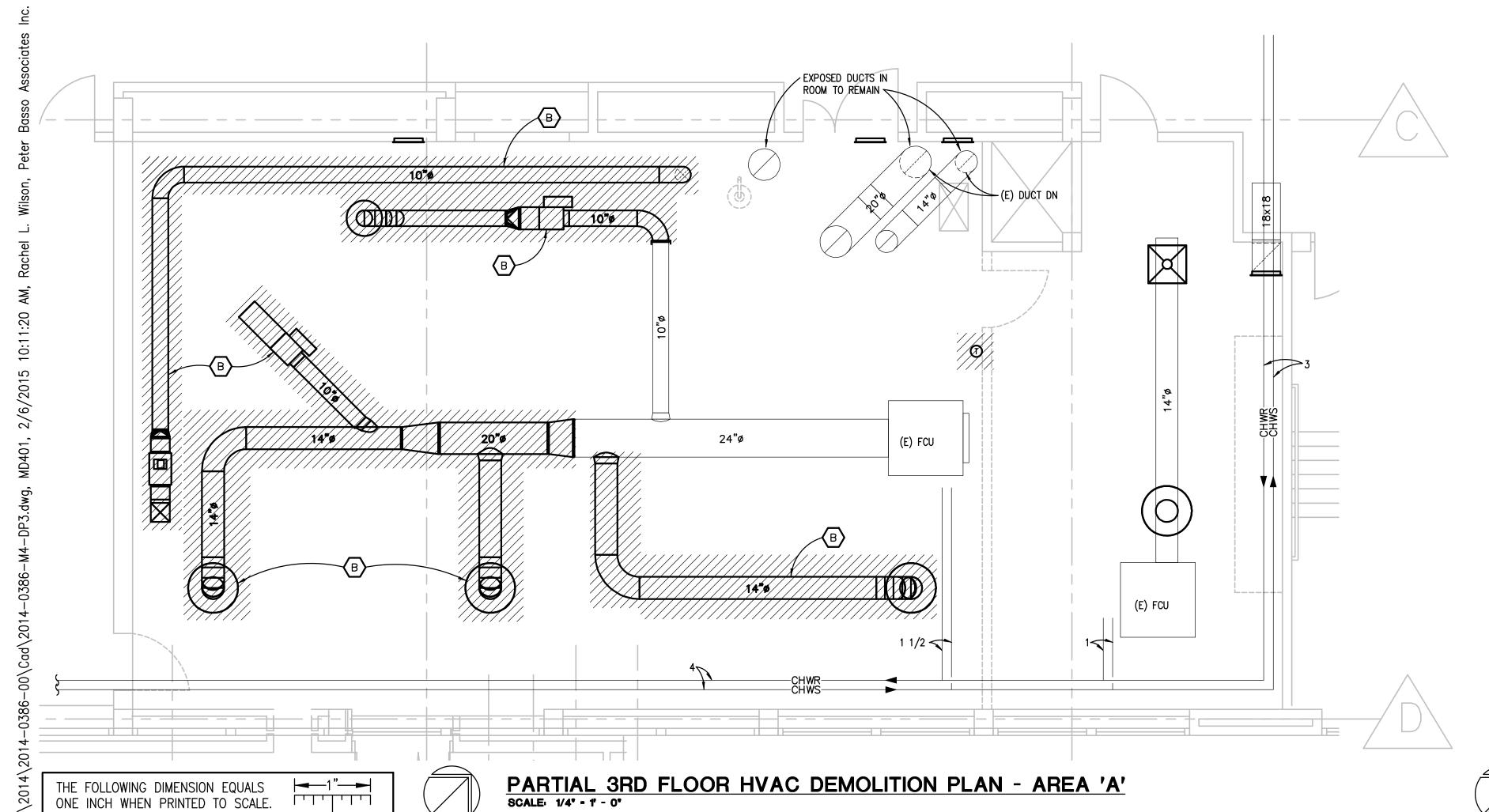
Engineering Research Labs -Phase Two

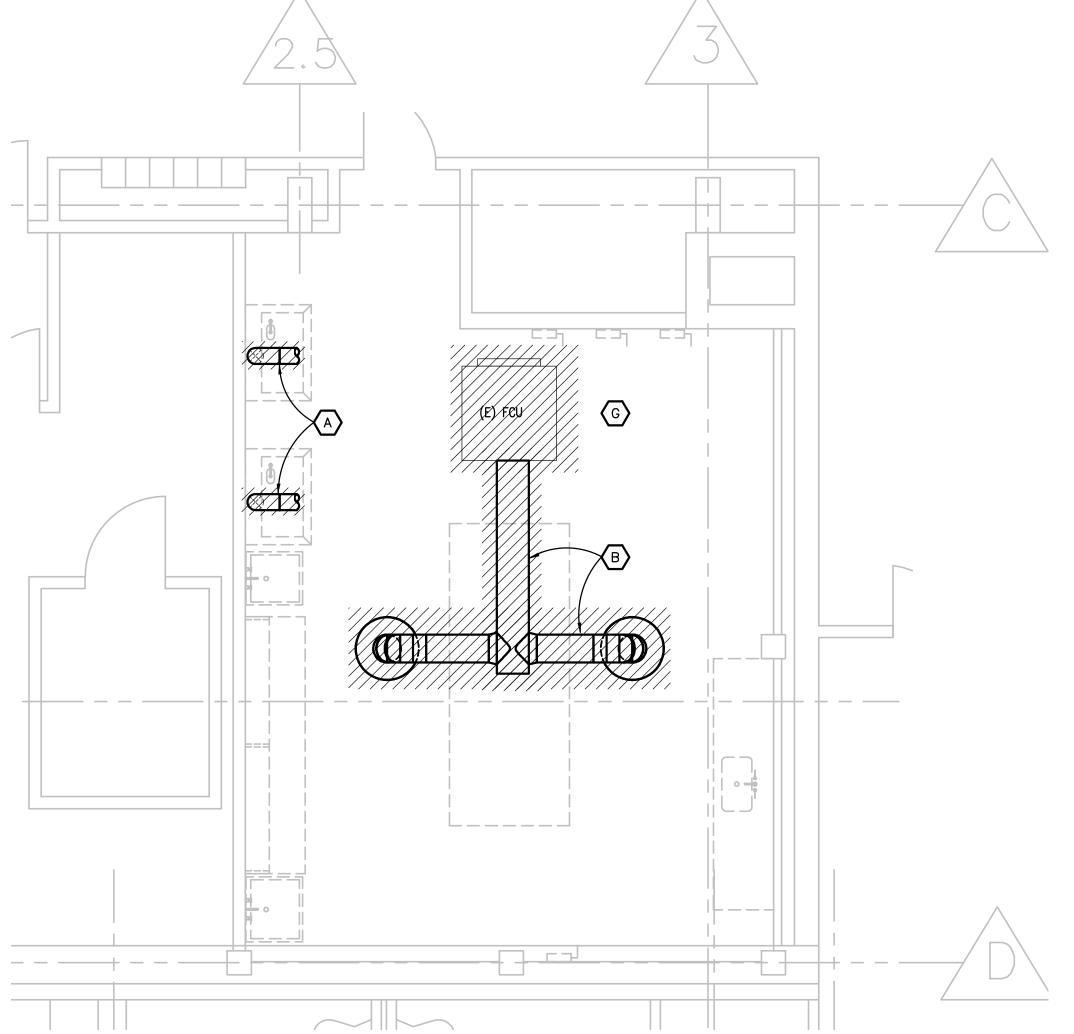
sheet title: PARTIAL SECOND AND THIRD FLOOR SHEET METAL DEMOLITION PLANS

project number: sheet number: MD401 090-250890

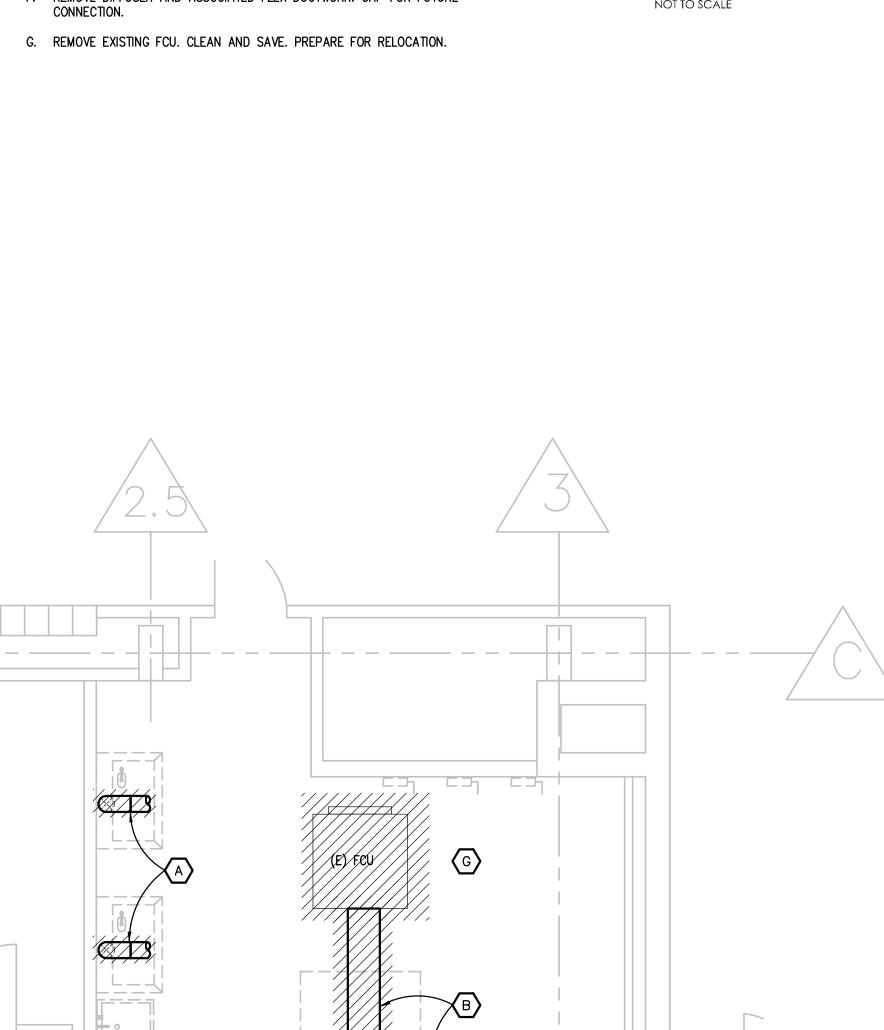
(1156-2: IDesign project number)

PARTIAL 3RD FLOOR HVAC DEMOLITION PLAN - AREA 'B' SCALE: 1/4" - 1" - 0"

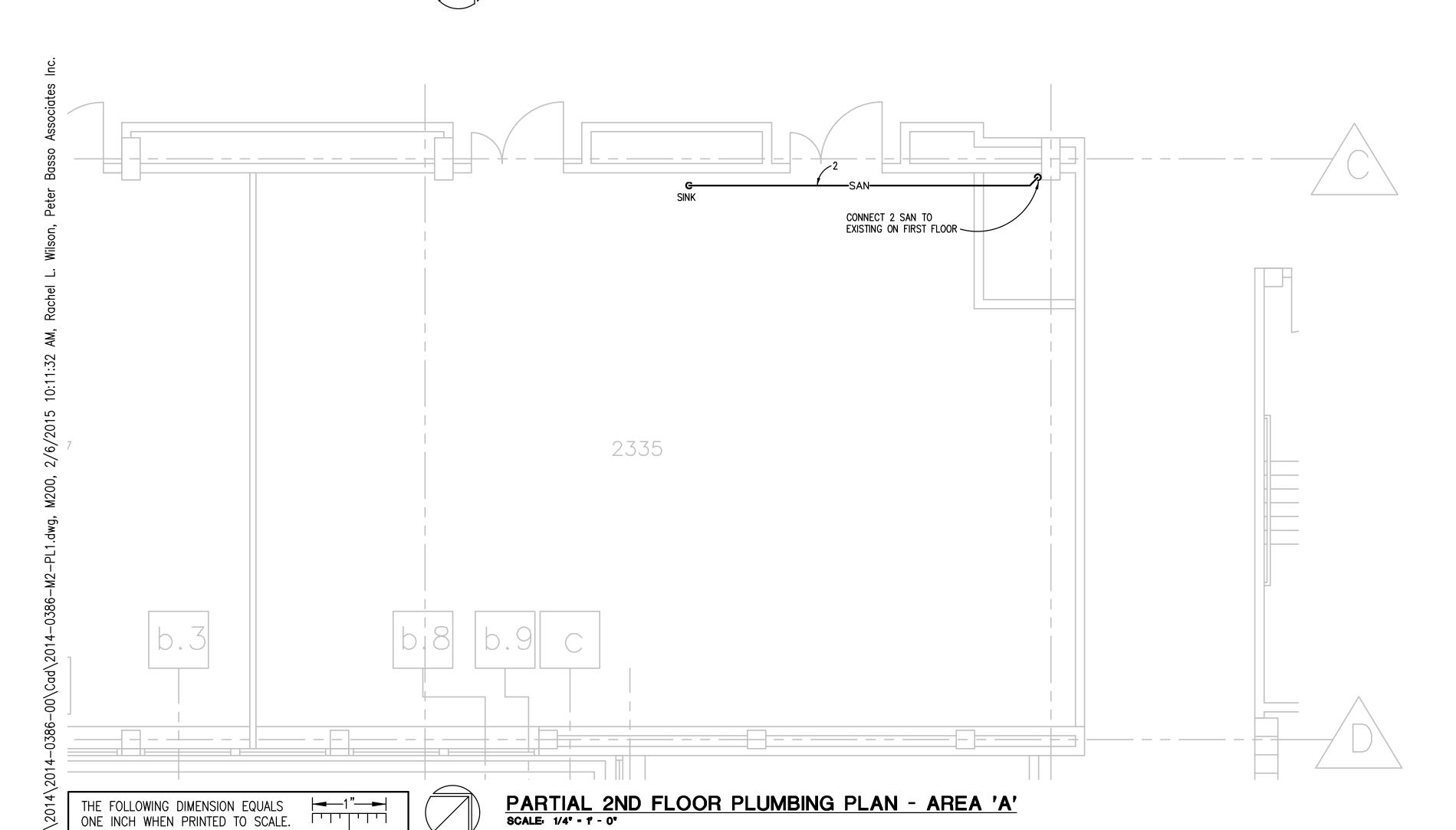




PARTIAL 2ND FLOOR SHEET METAL DEMOLITION PLAN - AREA 'C' SCALE: 1/4" - 1" - 0"

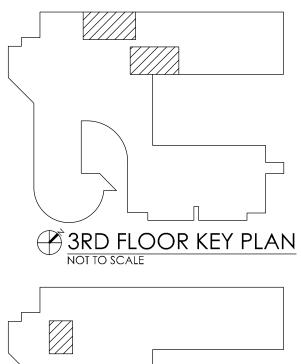


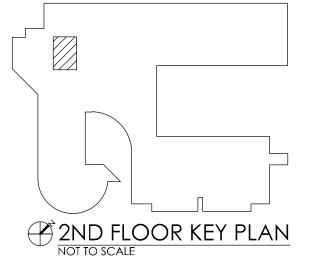
2330.1 2322.3 (E) 3 SAN STACK -2322.2 2330 6. HOT AND COLD WATER PIPING RUN-OUTS TO LAVATORIES AND SINKS SHALL BE WASTE AND VENT PIPING. 2326 1 1/2 V UP 2322.1 PARTIAL 2ND FLOOR PLUMBING PLAN - AREA 'B' SCALE: 1/4° - 1' - 0°

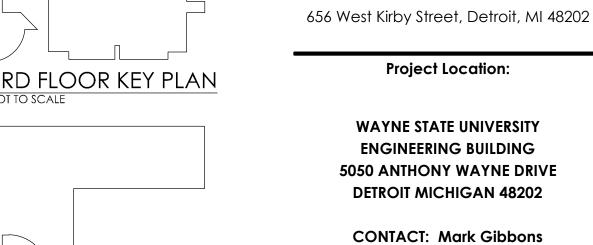


PLUMBING GENERAL NOTES:

- 1. THESE DRAWINGS ARE DIAGRAMMATIC, AND REPRESENT THE GENERAL INTENT AND ARRANGEMENT OF SYSTEMS. THEY ARE NOT TO BE CONSIDERED FABRICATION/COORDINATION/SHOP DRAWINGS. COORDINATION WITH OTHER TRADES IS REQUIRED. PROVIDE THE ADDITIONAL FITTINGS AND OFFSETS THAT WILL BE REQUIRED TO COMPLETE EACH SYSTEM AND TO AVOID INTERFERENCES WITH ALL OTHER SYSTEMS INCLUDING THE STRUCTURE, SHEET METAL, OTHER PIPING SYSTEMS, ELECTRICAL CONDUITS, BUS DUCTS, CABLE TRAY, LIGHT FIXTURES, ETC. AND/OR OTHER SPACE CONSTRAINTS.
- 2. INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.
- 3. COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
- 4. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.
- 5. REFER TO ARCHITECTURAL PLANS FOR DIMENSIONED LOCATIONS OF PLUMBING
- 1/2" UNLESS OTHERWISE NOTED. 7. PLUMBING VENT PIPING THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE
- INSIDE FACE OF PARAPET. 8. PROVIDE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY
- 9. MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".







CONTACT: Mark Gibbons iDesign Solutions, LLC Architects, Scientists and Planners iDesign

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WAYNE STATE UNIVERSITY

Project Location:

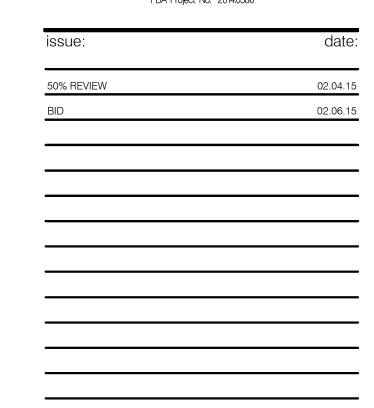
WAYNE STATE UNIVERSITY

ENGINEERING BUILDING **5050 ANTHONY WAYNE DRIVE**

DETROIT MICHIGAN 48202



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coordination checked:	TRS
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approved:	<u>GPI</u>
project:	
Engineering	

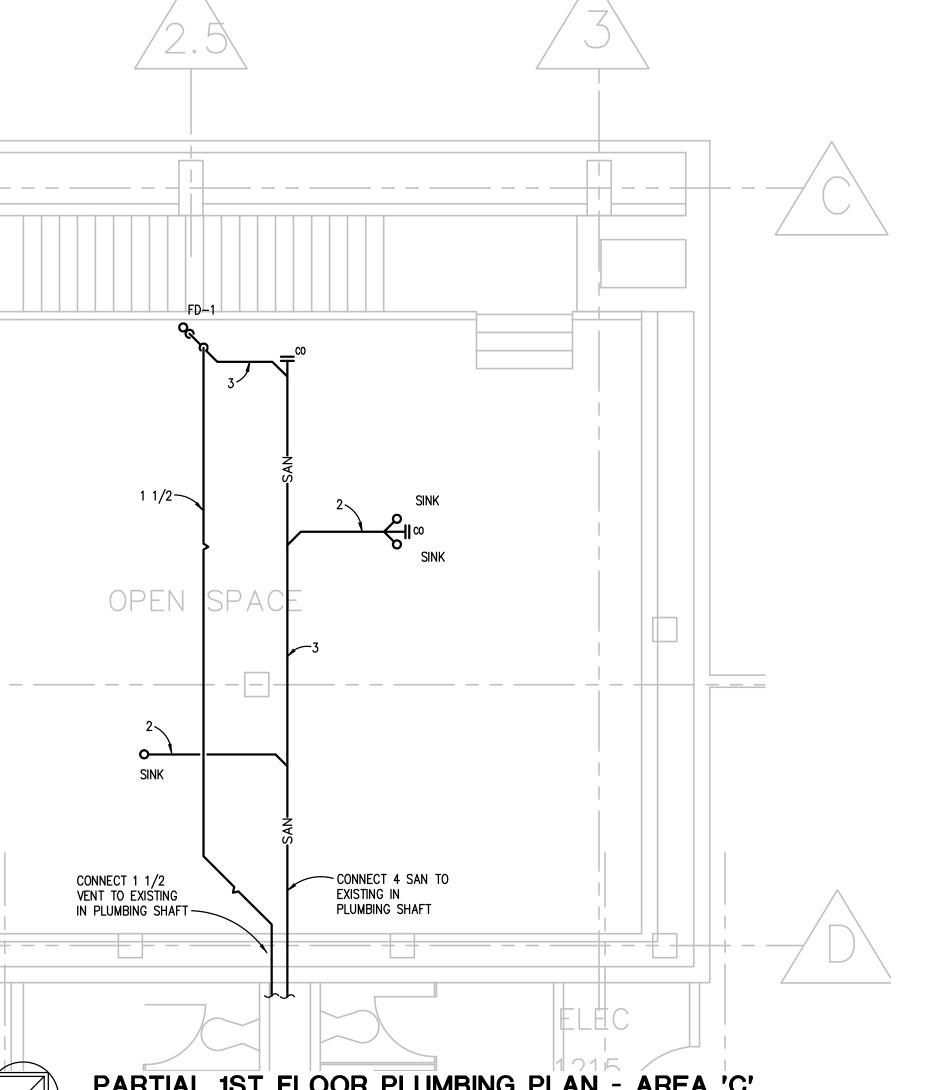
Research Labs -Phase Two

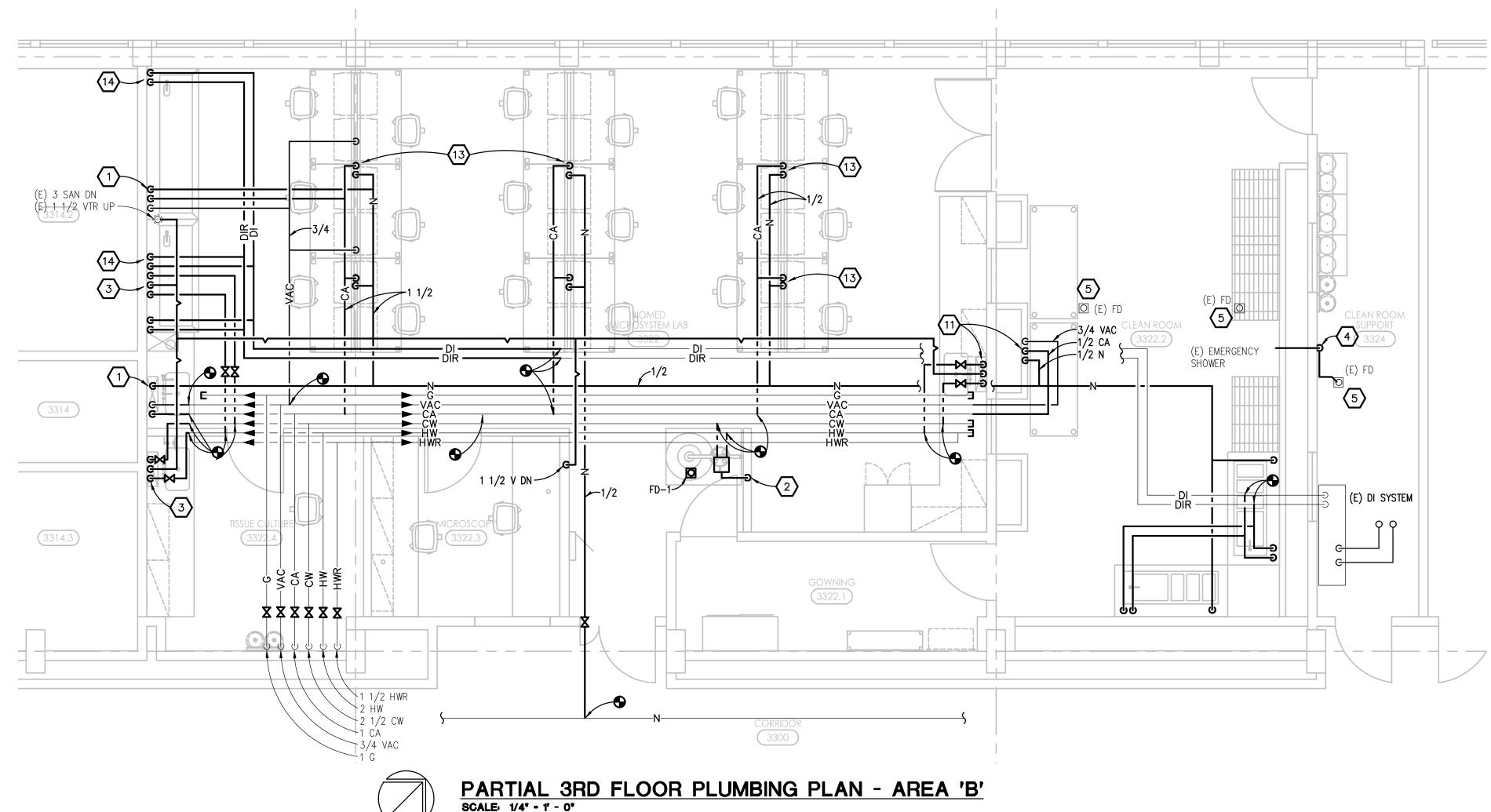
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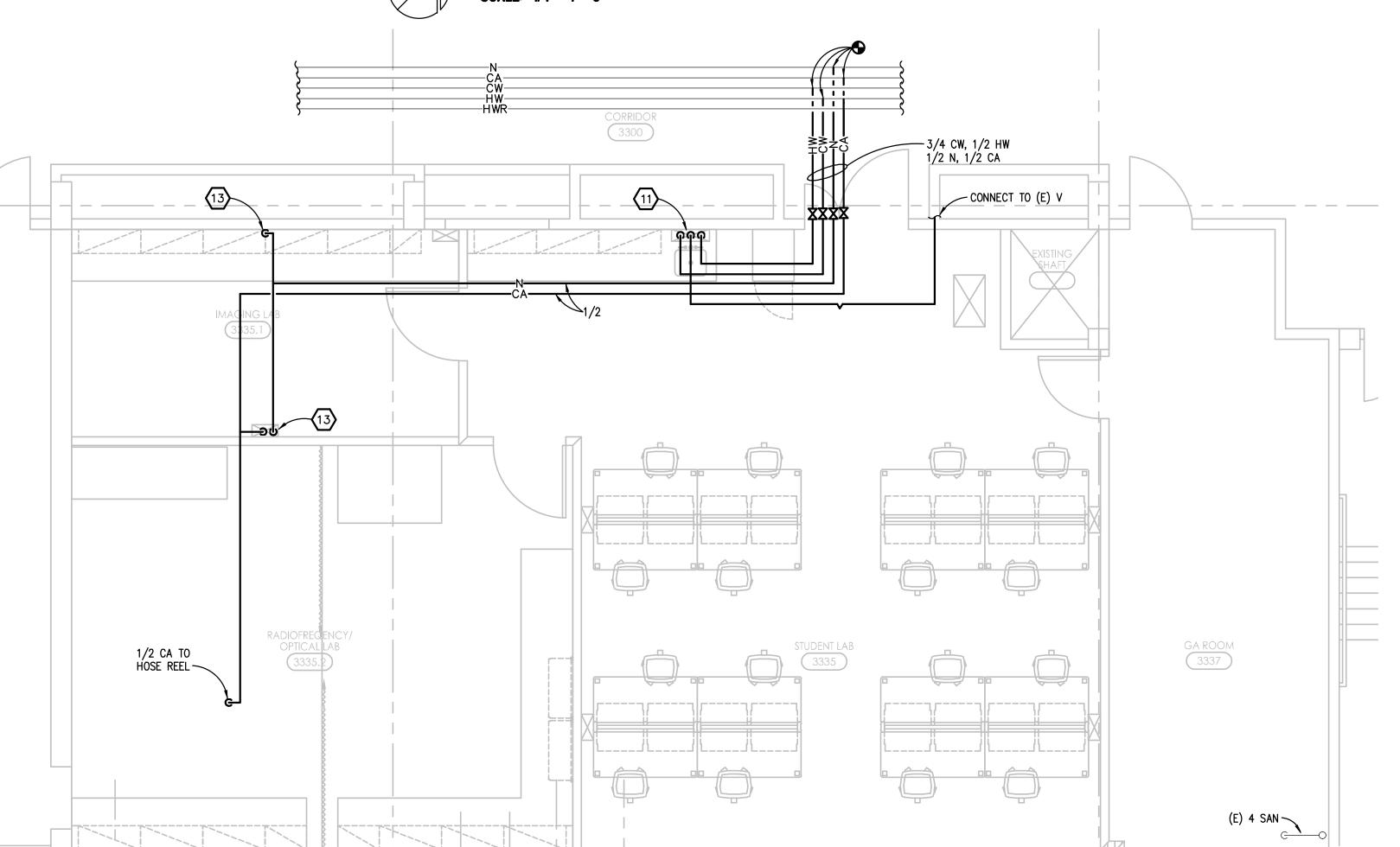
project number: sheet number: M200 090-250890

(1156-2: IDesign project number)

PARTIAL 1ST FLOOR PLUMBING PLAN - AREA 'C'
SCALE: 1/4' - 1' - 0'







PARTIAL 3RD FLOOR PLUMBING PLAN - AREA 'A'
SCALE: 1/4' - 1' - 0'

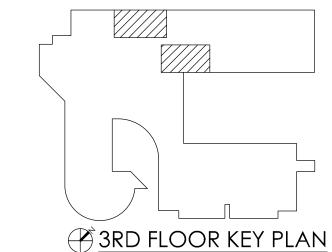
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- 2. INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.
- 3. COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
- 4. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL
- 5. REFER TO ARCHITECTURAL PLANS FOR DIMENSIONED LOCATIONS OF PLUMBING FIXTURES.
- 6. HOT AND COLD WATER PIPING RUN-OUTS TO LAVATORIES AND SINKS SHALL BE 1/2" UNLESS OTHERWISE NOTED.
- 7. PLUMBING VENT PIPING THROUGH ROOF SHALL BE LOCATED A MINIMUM OF 10'-0" FROM ANY FRESH AIR INTAKE LOCATION AND A MINIMUM OF 18" CLEAR FROM THE INSIDE FACE OF PARAPET.
- 8. PROVIDE CODE REQUIRED CLEARANCE FOR ALL CLEANOUTS INSTALLED IN SANITARY WASTE AND VENT PIPING.
- 9. MINIMUM UNDERGROUND PIPE SIZE SHALL BE 3".

(#) CONSTRUCTION KEY NOTES:

- 1. ROUTE NEW 3/4 CA, 3/4 N AND 3/4 VAC FROM EXISTING TO NEW HOOD.
- 2. EXTEND 1 CW & 1 HW TO MIXING VALVE, AND 1 1/4 TW FROM MIXING VALVE TO EMERGENCY EYEWASH/SHOWER. REFER TO EMERGENCY SHOWER AND EYEWASH PIPING DIAGRAM.
- 3. ROUTE 1/2 CW, 1/2 HW AND 1 1/2 V DN TO SINK. ROUTE 1/2 CW AND HW TO MIXING VALVE AND ROUTE TW TO EYEWASH. ROUTE 2 SAN DOWN TO 2ND FLOOR.
- 4. ROUTE SAN FROM EYEWASH THRU WALL AND ROUTE TO EXISTING FLOOR DRAIN. PROVIDE SURE SEAL ON EXISTING FLOOR DRAIN.
- PROVIDE SURE SEAL IN EXISTING FLOOR DRAINS.
- 6. VALVE AND CAP FOR FUTURE.
- 7. CONNECT 1 1/2 V TO EXISTING IN TOILET ROOM CHASE.
- 8. ROUTE 1/2 CW TO FUME HOOD CONNECTION. PROVIDE BALL VALVE AT CONNECTION.
- 9. ROUTE 1/2 CA TO FUME HOOD CONNECTION.
- 10. ROUTE 1/2 CW, 1/2 HW, 1 1/2 V, 3/4 DI/DIR TO SINK AND DI FAUCETS.
- 11. ROUTE 1/2 CW, 1/2 HW, 1 1/2 V TO LAB SINK.
- 12. LAB BOTTLED GAS (OFOI).
- 13. LAB GAS DOWN TO OULET. REFER TO ARCHITECTURAL PLAN FOR FINAL LOCATION.



FIRE PROTECTION GENERAL NOTES:

1. THESE DRAWINGS ARE DIAGRAMMATIC, AND REPRESENT THE GENERAL INTENT AND

TO COMPLETE EACH SYSTEM AND TO AVOID INTERFERENCES WITH ALL OTHER

SYSTEMS INCLUDING THE STRUCTURE, SHEET METAL, OTHER PIPING SYSTEMS,

ELECTRICAL CONDUITS, BUS DUCTS, CABLE TRAY, LIGHT FIXTURES, ETC. AND/OR

INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE

IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND

4. PROVIDE AN AUTOMATIC WET PIPE SPRINKLER SYSTEM IN ACCORDANCE WITH NFPA

5. ACCORDING TO THE MOST RECENT FLOW TEST INFORMATION, THE STATIC PRESSURE

AVAILABLE AT THE CITY WATER MAIN AT THE STREET IS XX PSIG. RESIDUAL PRESSURE WITH XXX GPM FLOWING IS XX PSIG. CONTRACTOR SHALL MAKE HIS OWN

O GPM/SQ FT. OVER THE MOST REMOTE 1500 SQ. FT.

CLASSIFICATION. HYDRAULIC CALCULATIONS SHALL BE BASED ON

FABRICATION/COORDINATION/SHOP DRAWINGS. COORDINATION WITH OTHER TRADES IS

REQUIRED. PROVIDE THE ADDITIONAL FITTINGS AND OFFSETS THAT WILL BE REQUIRED

ARRANGEMENT OF SYSTEMS. THEY ARE NOT TO BE CONSIDERED

ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.

PRESSURE AND FLOW TEST PRIOR TO SYSTEM DESIGN.

3. MINIMUM RUN-OUT PIPE SIZE TO SPRINKLER HEADS SHALL BE 1".

OTHER SPACE CONSTRAINTS.

WAYNE STATE

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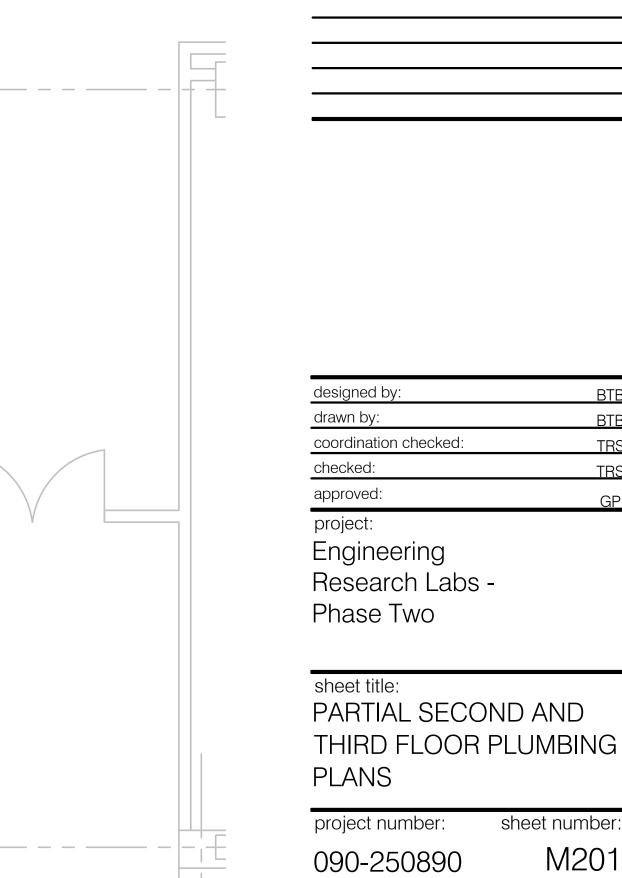
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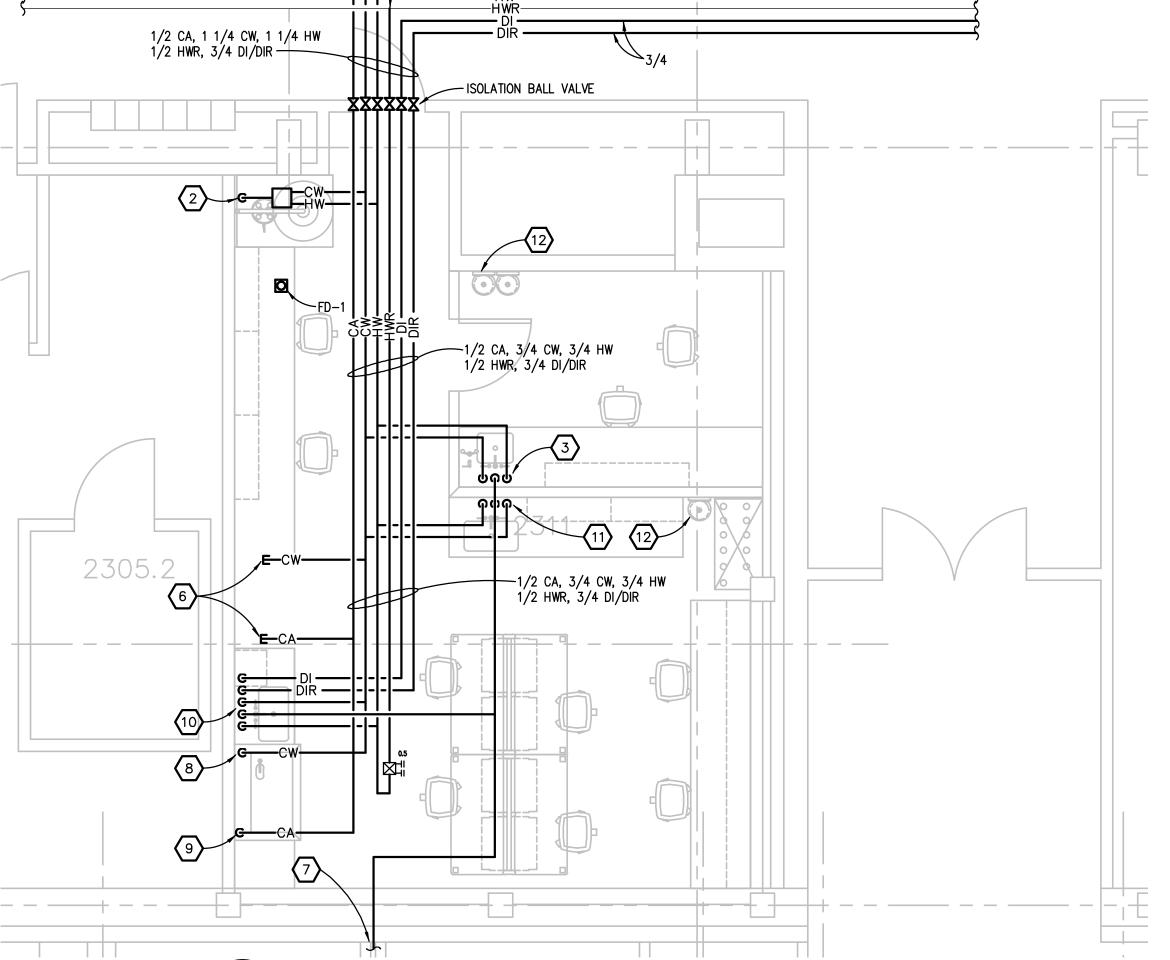
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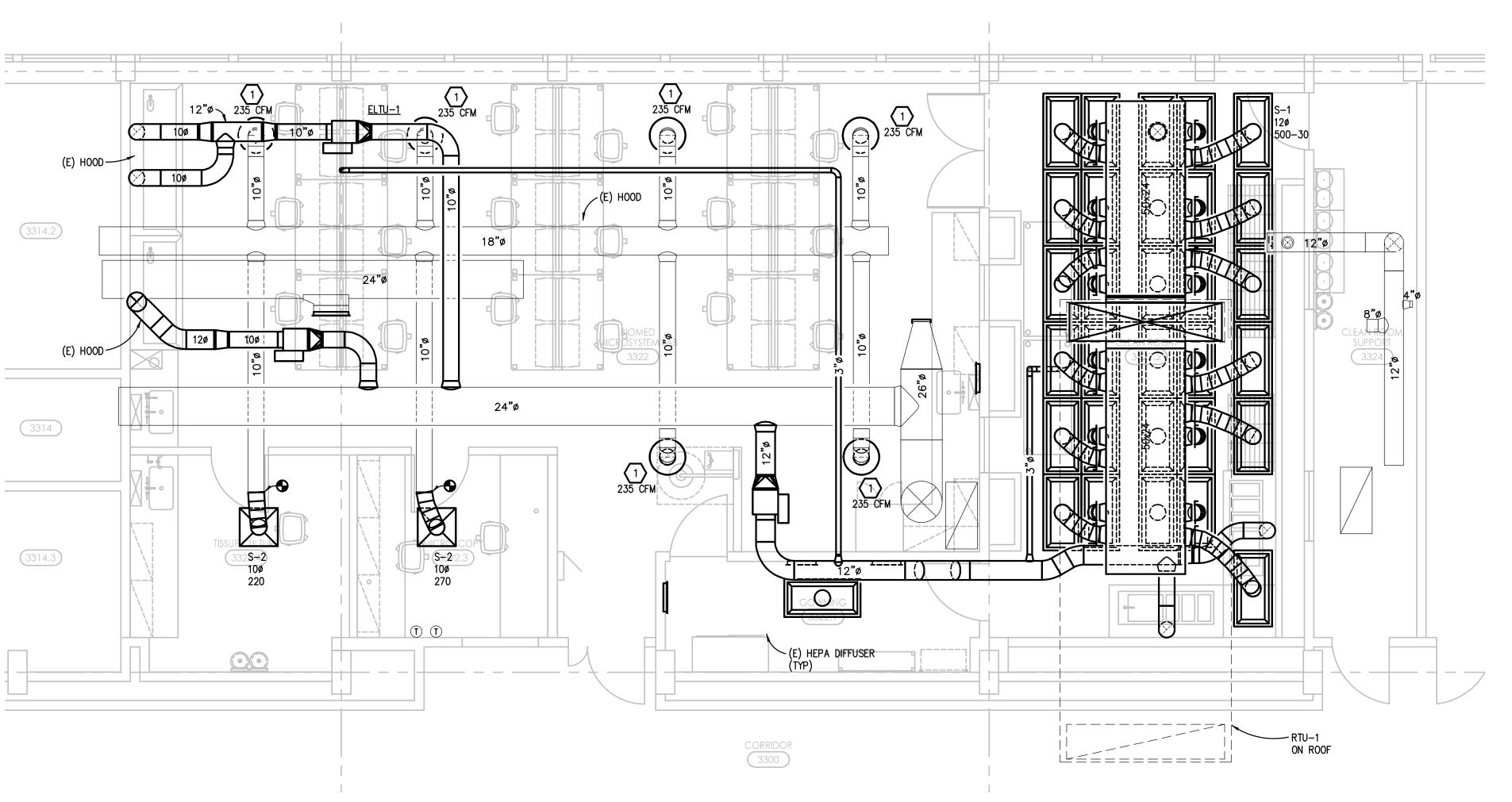
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M201





PARTIAL 2ND FLOOR PLUMBING PLAN - AREA 'C' SCALE: 1/4' - 1' - 0"



SHEET METAL GENERAL NOTES:

- 1. THESE DRAWINGS ARE DIAGRAMMATIC, AND REPRESENT THE GENERAL INTENT AND ARRANGEMENT OF SYSTEMS. THEY ARE NOT TO BE CONSIDERED FABRICATION/COORDINATION/SHOP DRAWINGS. COORDINATION WITH OTHER TRADES IS REQUIRED. PROVIDE THE ADDITIONAL FITTINGS AND OFFSETS THAT WILL BE REQUIRED TO COMPLETE EACH SYSTEM AND TO AVOID INTERFERENCES WITH ALL OTHER SYSTEMS INCLUDING THE STRUCTURE, SHEET METAL, OTHER PIPING SYSTEMS, ELECTRICAL CONDUITS, BUS DUCTS, CABLE TRAY, LIGHT FIXTURES, ETC. AND/OR OTHER SPACE CONSTRAINTS.
- INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.

3. COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT,

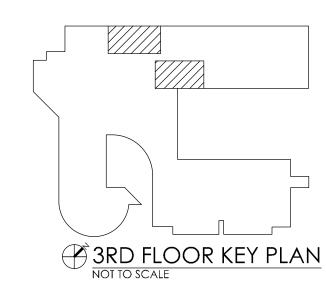
- AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.

 4. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL
- 5. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR DIMENSIONED LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.

EXAMPLE 2 CONSTRUCTION KEY NOTES:

1. BALANCE EXISTING DIFFUSER TO CFM NOTED.

SYSTEMS.



WAYNE STATE UNIVERSITY

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CONTACT: Mark Gibbons

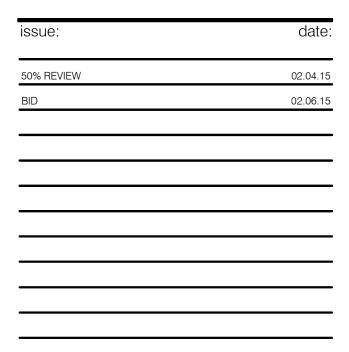
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PBA Project No. 2014,0386



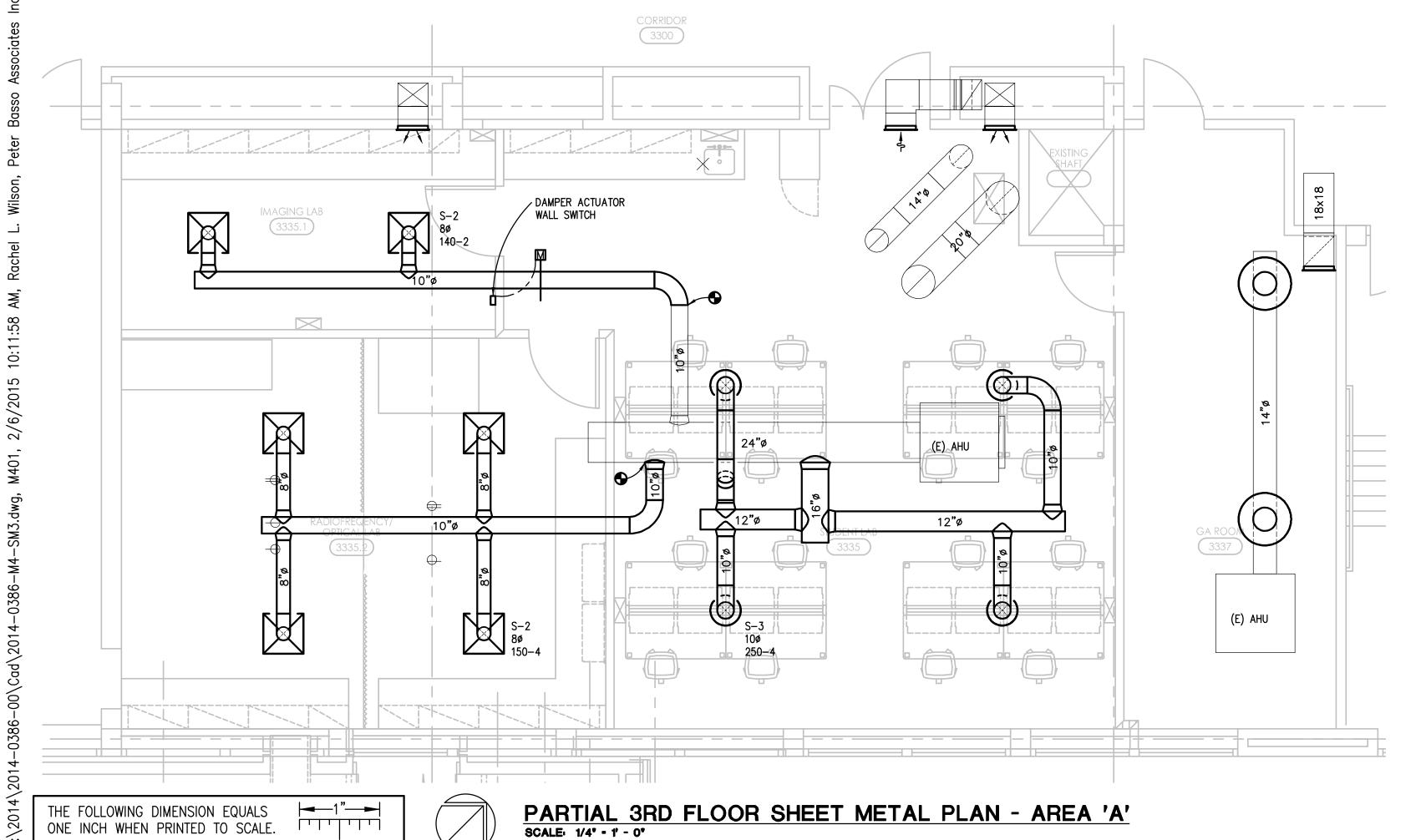
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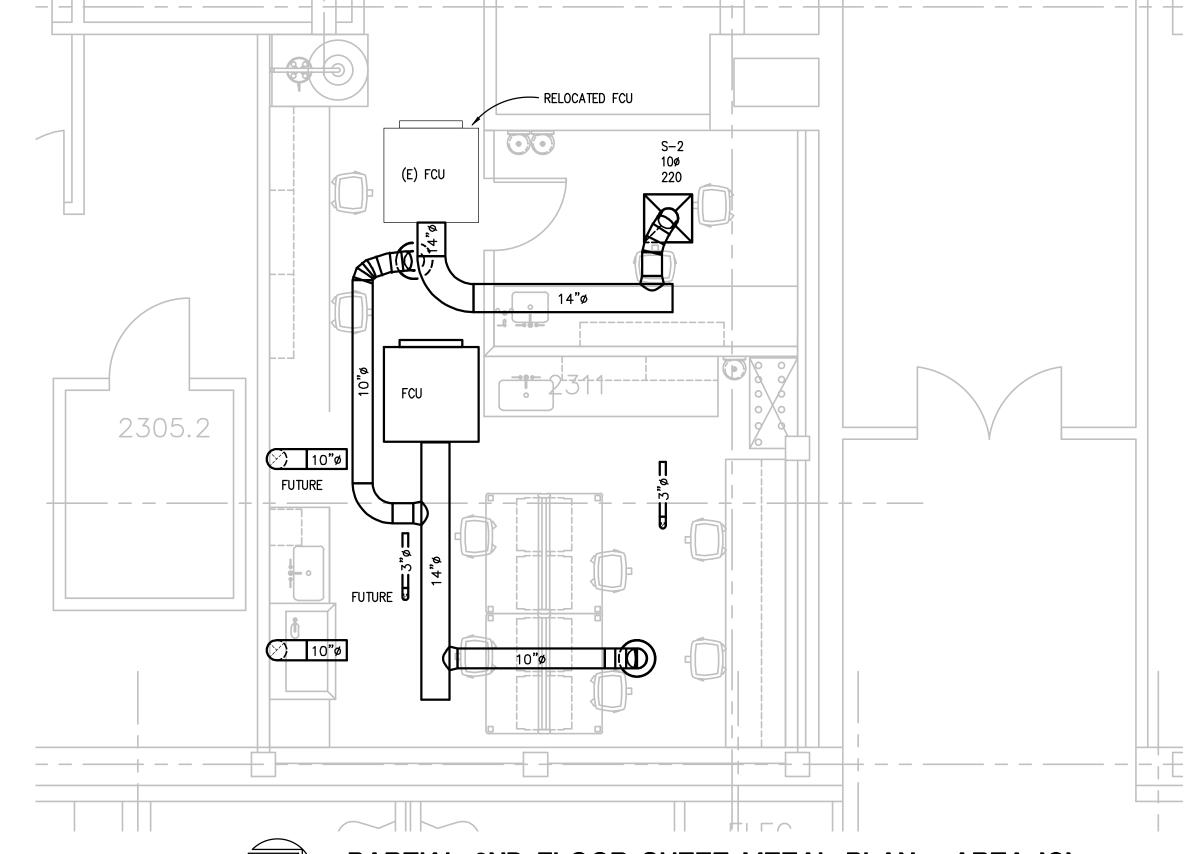
sheet title:
PARTIAL SECOND AND
THIRD FLOOR SHEET
METAL PLANS

project number: sheet number: 090-250890 M401

(1156-2: IDesign project number)

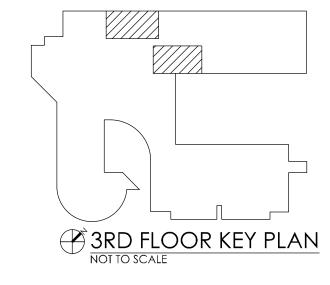
PARTIAL 3RD FLOOR SHEET METAL PLAN - AREA 'B'
SCALE: 1/4' - 1' - 0"





PART SCALE: 1/

PARTIAL 2ND FLOOR SHEET METAL PLAN - AREA 'C' SCALE: 1/4" - 1" - 0"



SHEET METAL GENERAL NOTES:

- 1. THESE DRAWINGS ARE DIAGRAMMATIC, AND REPRESENT THE GENERAL INTENT AND ARRANGEMENT OF SYSTEMS. THEY ARE NOT TO BE CONSIDERED FABRICATION/COORDINATION/SHOP DRAWINGS. COORDINATION WITH OTHER TRADES IS REQUIRED. PROVIDE THE ADDITIONAL FITTINGS AND OFFSETS THAT WILL BE REQUIRED TO COMPLETE EACH SYSTEM AND TO AVOID INTERFERENCES WITH ALL OTHER SYSTEMS INCLUDING THE STRUCTURE, SHEET METAL, OTHER PIPING SYSTEMS, ELECTRICAL CONDUITS, BUS DUCTS, CABLE TRAY, LIGHT FIXTURES, ETC. AND/OR OTHER SPACE CONSTRAINTS.
- 2. INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.
- 3. COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT. AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
- 4. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL
- 5. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR DIMENSIONED LOCATION OF GRILLES, REGISTERS, AND DIFFUSERS.

EXAMPLE 2 CONSTRUCTION KEY NOTES:

1. BALANCE EXISTING DIFFUSER TO CFM NOTED.



656 West Kirby Street, Detroit, MI 48202

Project Location:

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project:	

Engineering Research Labs -Phase Two

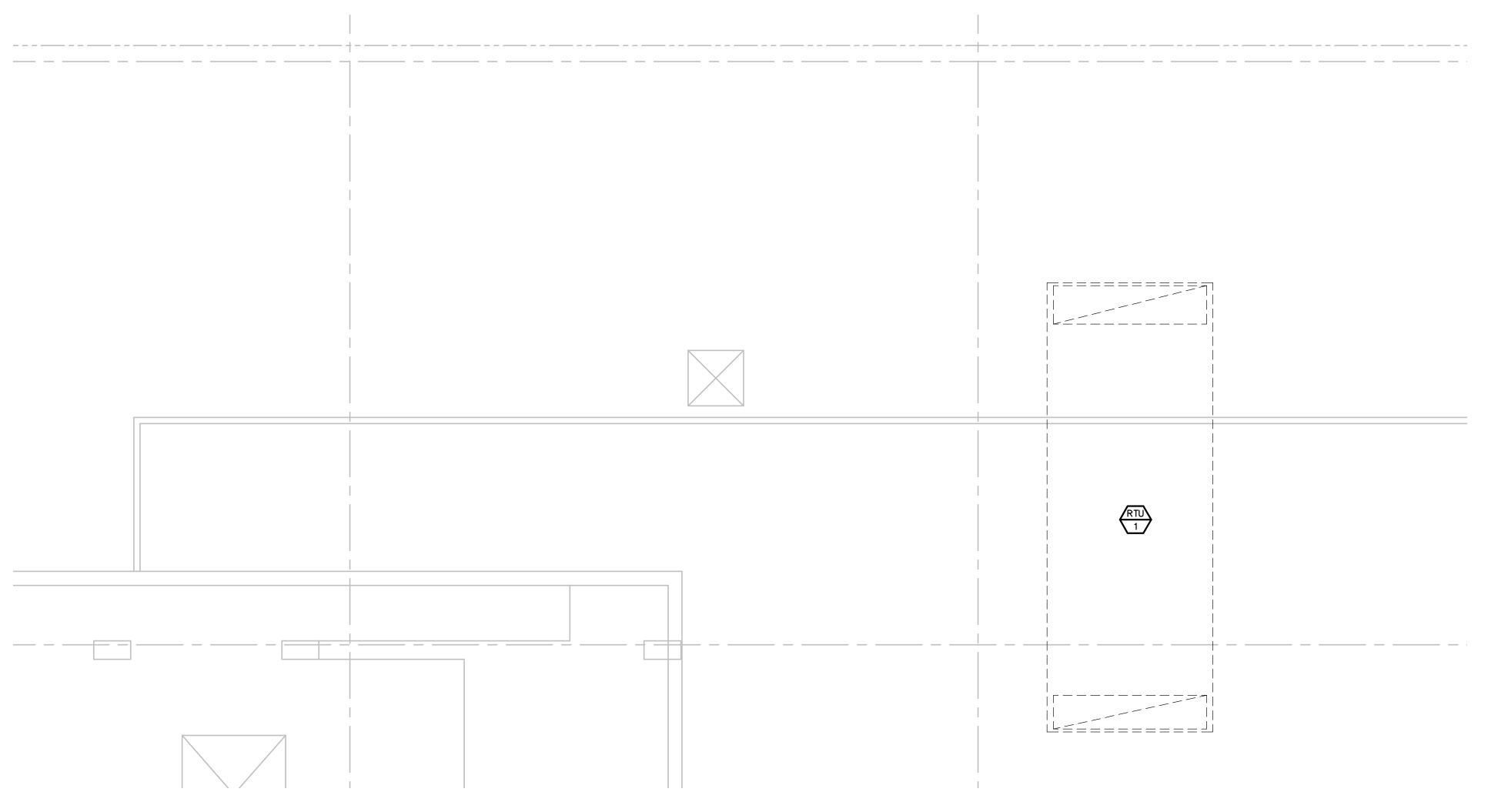
sheet title: **ROOF MECHANICAL** PLAN

project number: sheet number:

090-250890

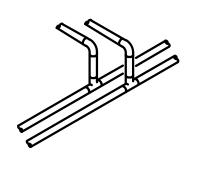
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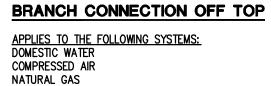
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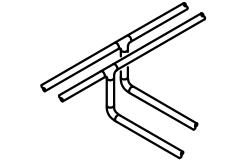


THE FOLLOWING DIMENSION EQUALS
ONE INCH WHEN PRINTED TO SCALE.





LABORATORY GASES

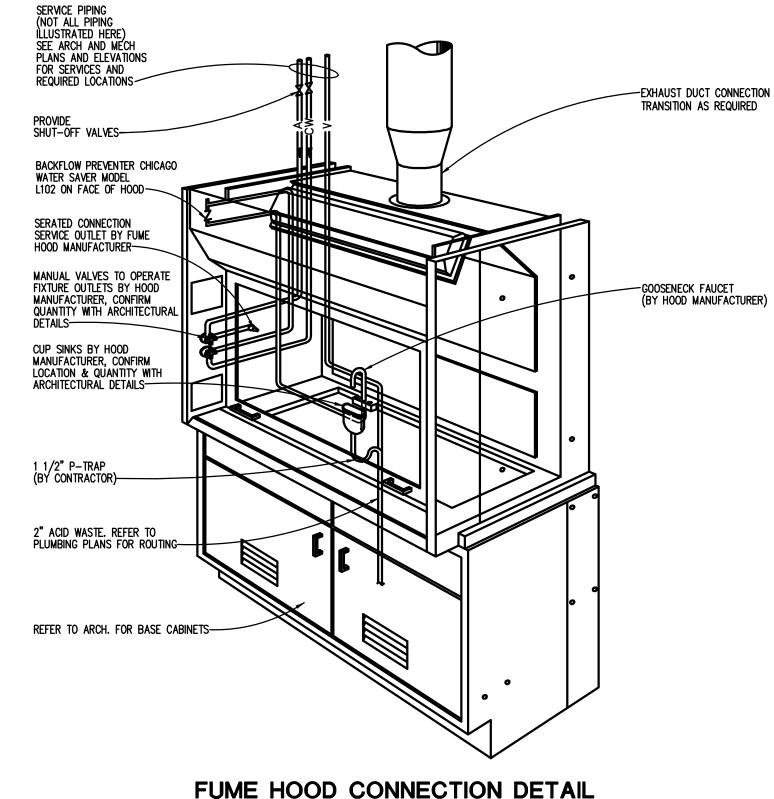


BRANCH CONNECTION OFF BOTTOM APPLIES TO THE FOLLOWING SYSTEMS: HOT WATER HEATING

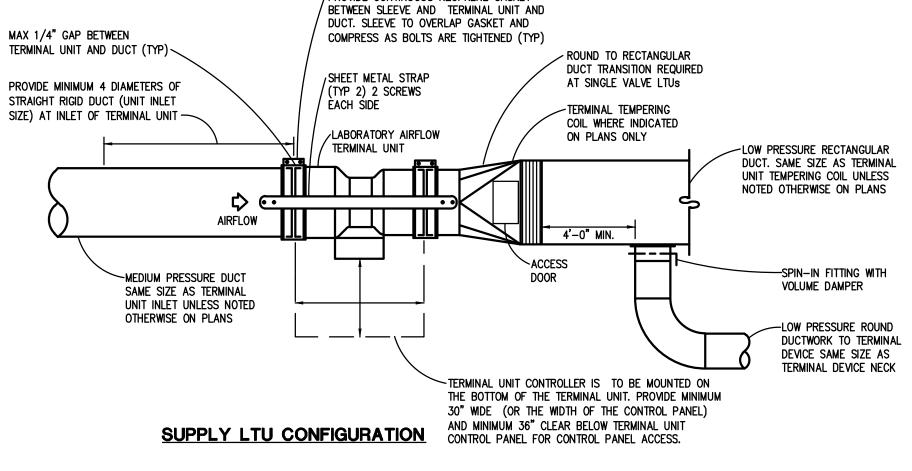
NOTE: BOTTOM AS INDICATED OR SIDE CONNECTION IS ACCEPTABLE. CONNECTION ABOVE CENTERLINE OF MAINS IS NOT ACCEPTABLE.

CHILLED WATER

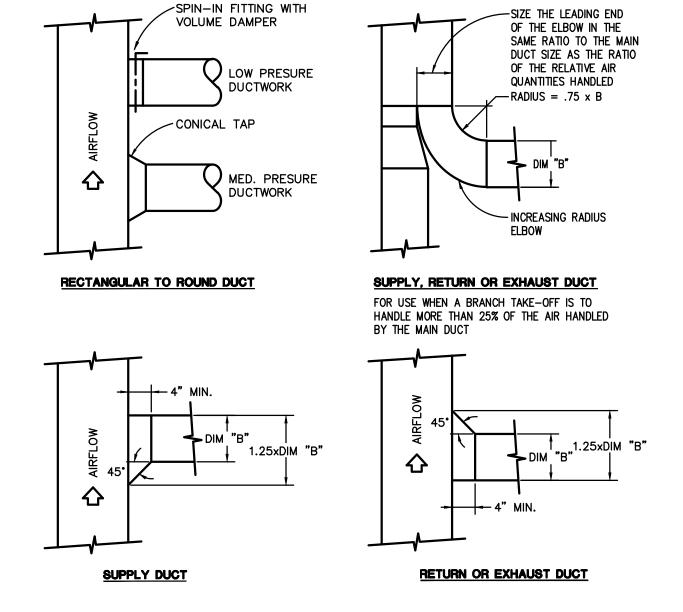
TYPICAL BRANCH TAKE-OFF **CONNECTION PIPING DETAIL**



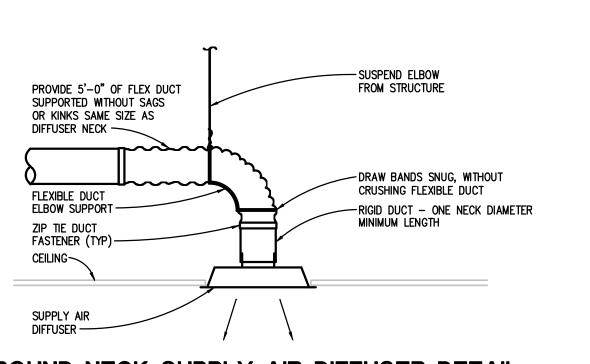




LABORATORY AIRFLOW TERMINAL UNIT (LTU) DETAIL NO SCALE



RECTANGULAR DUCT BRANCH TAKE-OFF DETAILS



CONNECTOR SLEEVE —

MAX 1/4" GAP BETWEEN TERMINAL

UNIT AND DUCT (TYP) -

→MED PRESSURE DUCT, SAME

EXHAUST LTU CONFIGURATION

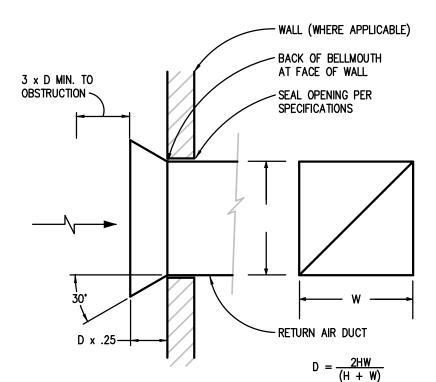
SIZE AS TERMINAL UNIT

OUTLET UNLESS NOTED

OTHERWISE ON PLANS.

DIA. AS REQUIRED

ROUND NECK SUPPLY AIR DIFFUSER DETAIL



-BOLT AND NUT (TYPICAL FOR 2 ÈACH SLEEVE)

- LOW PRESSURE DUCT, SAME SIZE

TRANSITION AND CONNECT TO

ETC. AS INDICATED ON PLANS.

FUME HOODS, EXHAUST DEVICES,

-PROVIDE MINIMUM 4 DIAMETERS OF

STRAIGHT RIGID DUCT (UNIT INLET

SIZE) AT INLET OF TERMINAL UNIT

AS TERMINAL UNIT INLET.

SLEEVE JOINT DETAIL

SHEET METAL STRAP (TYP 2)

-TERMINAL UNIT CONTROLLER IS TO BE MOUNTED ON THE BOTTOM OF THE TERMINAL

PANEL FOR CONTROL PANEL ACCESS.

UNIT. PROVIDE MINIMUM 30" WIDE (OR THE

WIDTH OF THE CONTROL PANEL) AND MINIMUM

36" IN CLEAR BELOW TERMINAL UNIT CONTROL

2 SCREWS EACH SIDE (S.S. FOR FUME HOOD SERVICE)

PROVIDE CONTINUOUS NEOPRENE GASKET
BETWEEN SLEEVE AND TERMINAL UNIT AND

DUCT. SLEEVE TO OVERLAP GASKET AND

COMPRESS AS BOLTS ARE TIGHTENED (TYP)

/LABORATORY AIRFLOW

TERMINAL UNIT

, PROVIDE CONTINUOUS NEOPRENE GASKET

RETURN AIR BELLMOUTH DETAIL

WAYNE STATE UNIVERSITY

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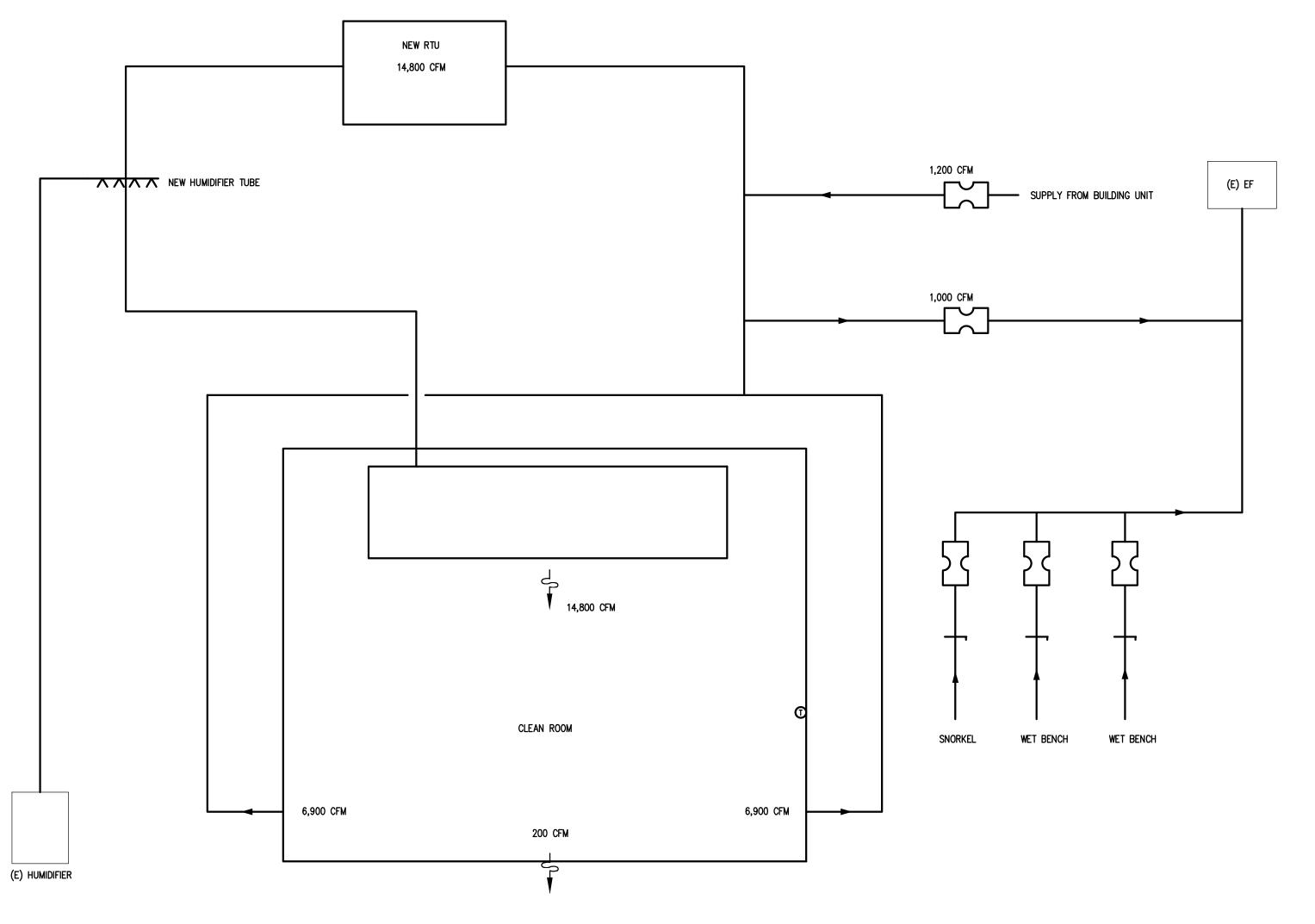
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approved:	<u>GPI</u>
project:	

Engineering Research Labs -Phase Two

sheet title:

MECHANICAL DETAILS AND DIAGRAMS

sheet number: project number: M601 090-250890



THERMOSTATIC MIXING VALVE SCHEDULE							
UNIT IDENTIFICATION	MINIMUM FLOW GPM	MAXIMUM FLOW GPM	PRESSURE DROP AT MAXIMUM FLOW PSIG	MODEL NUMBER	REMARKS		
MV-1	1.5	8	30	S19-2000			
MV-2	2	36	30	S19-2100			

NOTE:

1. MODEL NUMBERS ARE BRADLEY UNLESS OTHERWISE NOTED.

PLUMBING CONNECTION SCHEDULE								
UNIT IDENTIFICATION	CW INCHES	HW INCHES	SAN INCHES	VENT INCHES	REMARKS			
SINK	3/4	3/4	1 1/2	1 1/2	ARCHITECTURAL PROVIDED SINK & POINT OF USE DILUTION TANK			
FD-1	-	ı	3	1 1/2				
EEW	1/2	1/2	_	_				
ESH	1	1	_	_				

NOTE: INDIVIDUAL WATER LINE BRANCHES, WASTE LINES, VENTS, AND TRAPS FOR CONNECTION TO INDIVIDUAL FIXTURES, FIXTURE FITTINGS, AND SPECIALTIES SHALL BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE OR AS INDICATED ON DRAWINGS, WHICHEVER IS GREATER.

SCHEDULES GENERAL NOTES:

TYPICAL FOR ALL SCHEDULE SHEETS:

- 1. REFER TO ELECTRICAL STANDARD SCHEDULES, ONE LINE DIAGRAM AND PANEL SCHEDULES FOR ADDITIONAL ELECTRICAL INFORMATION
- 2. PROVIDE THE FOLLOWING FACTORY-WIRED ELECTRICAL OPTIONS/ACCESSORIES WHERE INDICATED IN SCHEDULE:
- A NON-FUSED DISCONNECT SWITCH
- B UNIT SHALL BE SINGLE POINT ELECTRICAL CONNECTION WITH FACTORY INSTALLED DISCONNECTING MEANS AND ALL REQUIRED STARTERS AND

SHALL BE FOR THE REMAINDER OF THE UNIT.

- C SERVICE RECEPTACLE D - FUSED DISCONNECT SWITCH
- E COMBINATION STARTER F - UNIT SHALL HAVE (2) SINGLE POINT CONNECTIONS WITH FACTORY INSTALLED DISCONNECTING MEAN'S AND ALL REQUIRED STARTERS AND CONTROLS. (1)

CONNECTION SHALL BE FOR CONDENSING SECTION AND (1) CONNECTION

- 3. FOR MODULATION/CONTROL TYPE COLUMN, "VFC" INDICATES VARIABLE FREQUENCY CONTROLLERS, "AUTO" INDICATES AUTOMATIC OPERATION (CONTROLLED BY TEMPERATURE CONTROLS OR SELF CONTAINED CONTROLS), "MANUAL" INDICATES
- 4. IF VARIABLE FREQUENCY CONTROLLERS ARE INDICATED TO BE PROVIDED AND ARE NOT INSTALLED INTEGRAL TO THE UNIT, VARIABLE FREQUENCY CONTROLLERS SHALL BE SUPPLIED BY THE MECHANICAL CONTRACTOR (UNLESS OTHERWISE NOTED) AND INSTALLED BY THE ELECTRICAL CONTRACTOR INCLUDING THE LINE SIDE AND LOAD SIDE WIRING TO THE MOTOR AND INCLUDING MISCELLANEOUS STEEL REQUIRED FOR THE SUPPORT AND MOUNTING OF THE VFC. REFER TO FLOOR PLANS FOR
- 5. WHERE EQUIPMENT IS INDICATED TO HAVE A SINGLE POINT ELECTRICAL CONNECTION, THAT EQUIPMENT SHALL COME COMPLETE WITH FACTORY INSTALLED STARTERS, MOTOR OVERLOAD PROTECTION, CONTACTORS, FUSING AND ALL NECESSARY INTERNAL WIRING AND CONTROLS. PROVIDE A FACTORY MOUNTED UNIT DISCONNECTING MEANS WHERE THE ELECTRICAL CONTRACTOR SHALL MAKE SINGLE POINT CONNECTION. INSTALL PACKAGED EQUIPMENT SUCH THAT THE ELECTRICAL CONNECTION AND CONTROLS ARE ACCESSIBLE AND HAVE CLEARANCES MEETING THE NATIONAL ELECTRICAL CODE.
- 6. WHERE PACKAGED EQUIPMENT IS PROVIDED, NAMEPLATE MUST INDICATE MAXIMUM OVERCURRENT PROTECTION BY HACR RATED CIRCUIT BREAKERS OR FUSES. IF FUSE PROTECTION ONLY IS INDICATED, PROVIDE A FUSIBLE DISCONNECT AND FUSES WITH
- 7. WHERE EQUIPMENT IS DESIGNATED BY MANUFACTURER AND MODEL NUMBER, THIS IS THE BASIS OF DESIGN. IF THE CONTRACTOR ELECTS TO PROVIDE EQUIPMENT BY OTHER SPECIFIED MANUFACTURERS OR PROPOSED ALTERNATE EQUIPMENT BY THE BASIS OF DESIGN MANUFACTURER, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REVISIONS TO ELECTRICAL REQUIREMENTS, STRUCTURAL LOADING, OR ARCHITECTURAL APPURTENANCES AND SHALL INCLUDE THE COST OF SUCH revisions in his bid.
- 8. WHERE EQUIPMENT IS SCHEDULED TO INCLUDE A SERVICE RECEPTACLE, PROVIDE A FACTORY MOUNTED SERVICE RECEPTACLE WITH APPROPRIATE FUSES AND TRANSFORMERS CONNECTED ON THE LINE SIDE OF THE UNIT DISCONNECT. PROVIDE A NAMEPLATE ON THE DISCONNECT SWITCH INDICATING THE PRESENCE OF LIVE POWER TO THE SERVICE RECEPTACLE WHEN HE UNIT DISCONNECT IS IN THE OFF
- 9. SIZE ALL EQUIPMENT FEEDERS BASED ON THE LISTED MOP (MAXIMUM OVERCURRENT PROTECTION). REFER TO THE FEEDER AND BRANCH CIRCUIT SIZING SCHEDULE ON THE ELECTRÍCAL STANDARD SCHEDULES SHEET.

AIRFLOW DIAGRAM

GRILLE, REGISTER, AND DIFFUSER SCHEDULE								
UNIT IDENTIFICATION	FACE SIZE	NECK SIZE	FRAME TYPE	ACCESSORY	CONSTRUCTION	FINISH	MODEL NUMBER	REMARKS
S-1	24x48	SEE PLANS	NOTE 2		STEEL	WHITE	TRITEC	
S-2	24x24	SEE PLANS	NOTE 2		STEEL	WHITE	OMNI	
S-3	29	SEE PLANS	NOTE 2		STEEL	WHITE	TMRA	

MODEL NUMBERS ARE TITUS UNLESS OTHERWISE NOTED.
 COORDINATE FRAME TYPE WITH ARCHITECT.

	LABORATORY AIRFLOW TERMINAL UNIT SCHEDULE																
UNIT IDENTIFICATION	AIRFLOW RANGE		AIRFLOW RANGE		AIRFLOW RANGE		AIRFLOW RANGE		AIRFLOW RANGE		INLET STATIC PRESSURE MAXIMUM	NUMBER VALVES PER UNIT	DUCT CO	ONNECTIONS	COATING	MODEL NUMBER	REMARKS
IDENTIFICATION	MINIMUM CFM	MAXIMUM CFM	IN. W.G.	T EX SIMI	INLET SIZE INCHES	OUTLET SIZE INCHES											
ELTU-1	840	840	0.01	1	10	10		APOGEE									
ELTU-2	610	610	0.01	1	10	10		APOGEE									
ELTU-3	2040	2040	0.01	1	16	16		APOGEE									
ELTU-4	400	400	0.01	1	12	12		APOGEE									

1. MODEL NUMBERS ARE SIEMENS UNLESS OTHERWISE NOTED. 2. MINIMUM AIRFLOW SHALL BE SET TO THE CFM INDICATED ON FLOOR PLANS.

- 3. BOXES SERVING LABORATORY FUME HOODS, BIO-SAFETY CABINETS, SNORKEL EXHAUST HOODS, ETC. SHALL BE PHENOLIC COATED ON
- THE BOX INTERIOR SURFACES REFER TO SPECIFICATIONS.

	ROOFTOP AIR CONDITIONING UNIT SCHEDULE																																
UNIT I.D.	AREA SERVED			SUP	PLY FAN					ELE	CTRIC HEATING (COIL		FILTE	r sectio	N		FILTER	SECTION			CURB		MAXIMUM (JNIT DIMENS		MAXIMUM UNIT OPERATING			ELECTRI		MODEL NO.	NOTES
		AIRFLOW CFM	MINIMUM OUTSIDE AIR	E.S.P. IN. W.G.		FAN SPEED RPM	BHP		CAPA (ME	3H)	HEATING ELEMENT KW	Final Air Temp 'f	TYPE	MERV	AIK I	PRESS. ROP				SS. DROP		TYPE	HEIGHT	LENGTH	HEIGHT (WITH CURB)		WEIGHT LBS. (WITH CURB)		PHASE	FLA	MOP		
			FLOW CFM						INPUT	OUTPU T					INITIAL IN. W.G.	FINAL IN. W.G.		MERV	INITIAL IN. W.G.	FINAL In. W.G.	STANDARD	VIBRATION ISOLATION SPRING CURB NOTE 7			33 <u>5</u>								
RTU-1	CLEAN RM	16,000	-	2	5.0	1331	19.5	25	-	341.30	100	74.82	BAG	merv	_	-	HEPA	99.9	-	-	NO	YES	24"	23'-11 9/16"	5'-2 7/8"	8'-8"	748	208	3	66.4	125	39MW	

NOTE:
1. REFER TO SCHEDULES GENERAL NOTES.
2. MODEL NUMBERS ARE CARRIER UNLESS OTHERWISE NOTED

3. MERV DESIGNATES THE "MINIMUM EFFICIENCY REPORTING VALUE" AS EVALUATED UNDER ASHRAE STANDARD 52.2 1999.

4. AIR HANDLING UNIT TOTAL STATIC PRESSURE FOR VARIABLE AIR VOLUME SYSTEMS IS BASED ON THE FILTER DIRTY AIR PRESSURE DROP AND AVERAGE/MIDLIFE FILTER AIR PRESSURE DROP FOR CONSTANT VOLUME SYSTEMS UNLESS NOTED OTHERWISE.

5. REFER TO VIBRATION ISOLATOR APPLICATION SCHEDULE.

	PLUMBING FIXTURE SCHEDULE											
UNIT IDENTIFICATION	MANUFACTURER MODEL			FLOOR DRAINS			ACCESSORIES AND FEATURES	REMARKS				
	NUMBER	PATTERN	BODY MATERIAL	TOP SHAPE	OUTLET FITTING	COATING	ACCESSORIES AND FEATURES					
FD-1	J.R. SMITH 2005Y-A	FLOOR DRAIN	GRAY IRON	ROUND	GRAY IRON	ENAMEL	SEEPAGE FLANGE, CLAMPING DEVICE	50 NICKEL BRONZE TOP STRAINER AND COMPLETE W/TRAP SEAL PROTECTION DEVICE ("SURESEAL"), REFER TO SPECIFICATIONS.				
APPROVED MANUFACTURE FLOOR DRAINS — J.R. SM	RS: ITH.				-		-					

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project: Engineering Research Labs -Phase Two

sheet title: MECHANICAL SCHEDULES

project number:

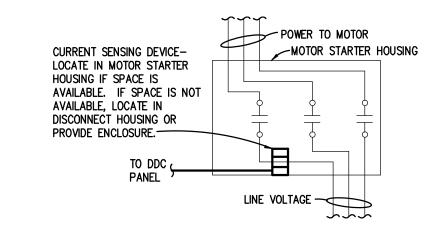
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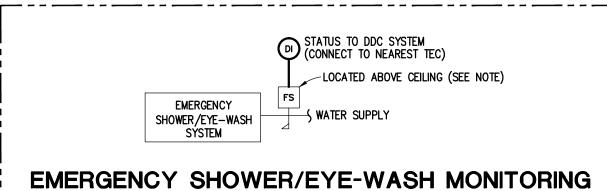
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TEMPERATURE CONTROL - SYMBOLS LIST

EMATIC SYI	MBOLS	SCHEMATIC SY	MBOLS (CONT.)	WIRING SYMBO	OLS (CONT.)
<u>YMBOL</u>	DESCRIPTION	<u>SYMBOL</u>	DESCRIPTION	<u>SYMBOL</u>	DESCRIPTION
4	AQUASTAT, STRAP ON BULB	DD	SMOKE DETECTOR - DUCT MOUNTED	O H ∡ A	
02	CARBON DIOXIDE SENSOR - WALL MOUNTED	SD	SMOKE DETECTOR - SPACE MOUNTED		SWITCH - 3 POSITION SELECTOR HAND/OFF/AUTO
s	CURRENT SWITCH	s/s	START/STOP RELAY	~ ∘	SWITCH - MANUAL SPST, NO
	DAMPER - OPPOSED BLADE	SPT	STATIC PRESSURE TRANSMITTER		SWITCH - MANUAL SPSI, NU
	DAMPER — PARALLEL BLADE	SP	STATIC PRESSURE SENSOR OR PROBE	0-0	SWITCH - MANUAL SPST, NC
	DAMPER MOTOR	SW	SWITCH	~_0	SWITCH — MANUAL SPDT
 ^у т]	DIFFERENTIAL PRESSURE TRANSMITTER		TEMPERATURE SENSOR - RIGID ELEMENT IN WE	ш о	SINTON WANDAL SI DI
s	DIFFERENTIAL PRESSURE SWITCH		TEMPERATURE SENSOR - DUCT MOUNTED AVG		SWITCH - PRESSURE & VACUUM, NO
	FIRE ALARM SYSTEM, ADDRESSABLE CONTROL MODULE		TEMPERATURE SENSOR - DUCT MOUNTED RIGID	ELEMENT	SWITCH - PRESSURE & VACUUM, NC
j	FLOW METER	(†)	THERMOSTAT OR TEMPERATURE SENSOR (AS DEFINED ON TC DRAWINGS)	~ <u>~</u> ~	SWITCH - TEMPERATURE ACTUATED, N
]4	FLOW SWITCH	XF	TRANSFORMER	<u></u>	SWITCH - TEMPERATURE ACTUATED, N
} ~~	FREEZESTAT	K	VALVE - 2 WAY CONTROL VALVE	-∕x-	THERMAL OVERLOAD, SINGLE PHASE
	GAUGE - PRESSURE	₹	VALVE - 3 WAY CONTROL VALVE	OL'S	
٦ _	GUARD FOR STAT OR SENSOR	VFC	VARIABLE FREQUENCY CONTROLLER	- 	- THERMAL OVERLOAD CONTACTS - 3 P
	LINE - ELECTRIC	WIRING SYMBO	<u>L8</u>	$\frac{\omega}{m}$	TRANSFORMER
	LINE - PNEUMATIC	<u>SYMBOL</u>	DESCRIPTION	o	WRE TERMINATION AT DEVICE
	MOTOR STARTER	_(M/S)	COIL - MOTOR STARTER CONTACTOR	+	WIRE TO WIRE TERMINATION
]	OCCUPANCY SENSOR	- \-	COIL — EP OR SOLENOID VALVE	-	WRING NOT CONNECTED
]	RELAY, ELECTRIC	બ ├•	CONTACT - INSTANT OPERATING, NO	MIDNG TEDM	8
)	SIGNAL - DDC/BAS, ANALOG INPUT	·//•	CONTACT - INSTANT OPERATING, NC	<u>WIRING TERMS</u> <u>ABBREVIATION</u>	<u>DESCRIPTION</u>
)	SIGNAL - DDC/BAS, ANALOG OUTPUT	<u></u>	GROUND	SPST	SINGLE POLE SINGLE THROW
)	SIGNAL - DDC/BAS, DIGITAL INPUT	-		SPDT DPST	SINGLE POLE DOUBLE THROW DOUBLE POLE SINGLE THROW
)	SIGNAL - DDC/BAS, DIGITAL OUTPUT	9	MOTOR, SINGLE PHASE	DPDT	DOUBLE POLE DOUBLE THROW
	SIGNAL - PACKAGED EQUIPMENT, ANALOG INPUT			NO NC	NORMALLY OPEN NORMALLY CLOSED
7				110	HOMBALLI OLOGED
7	SIGNAL — PACKAGED EQUIPMENT, ANALOG OUTPUT		NOTES:		
7	SIGNAL — PACKAGED EQUIPMENT, DIGITAL INPUT				N MAY NOT APPLY TO THIS PROJECT.
	SIGNAL - PACKAGED EQUIPMENT, DIGITAL OUTPUT				DRAWING MO.1 FOR ADDITIONAL S ON TEMPERATURE CONTROL DRAW



CURRENT SWITCH INSTALLATION DETAIL



EMERGENCY SHOWER/EYE-WASH MONITORING

REFER TO PLUMBING FLOOR PLANS ON M2 DRAWING SERIES FOR QUANTITY AND LOCATIONS

FLOW SWITCH WITH DRY CONTACT FOR REMOTE MONITORING SHALL BE PROVIDED WITH EMERGENCY SHOWER/EYE-WASH SYSTEMS AND INSTALLED BY MECHANICAL CONTRACTOR. COORDINATE WIRING REQUIREMENTS WITH SYSTEM SUPPLIER.

SEQUENCE OF OPERATION:

SYSTEM HAS BEEN ACTIVATED.

DDC SYSTEM SHALL MONITOR EACH EMERGENCY SHOWER/EYE-WASH SYSTEM FOR FLOW STATUS AND ALERT BUILDING AUTOMATION SYSTEM OPERATORS WHEN A SHOWER/EYE-WASH

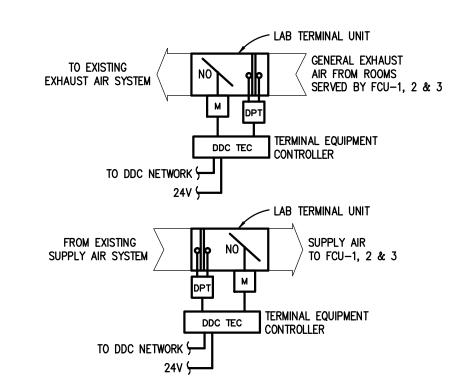
ALTERNATE #5

GENERAL NOTES

- 1. THESE GENERAL NOTES SHALL BE APPLICABLE FOR ALL TC DRAWINGS.
- 2. "PROVIDE" IS DEFINED AS "FURNISH AND INSTALL".
- 3. CONTRACTOR SHALL BE RESPONSIBLE TO COMPLY WITH ALL APPLICABLE CODES AND STANDARDS.
- 4. FOR TEMPERATURE CONTROL DRAWINGS ONLY: ALL DETAILED INFORMATION IDENTIFIED WITH HEAVY LINE WEIGHT SHALL BE PROVIDED BY TEMPERATURE CONTROL SYSTEM PROVIDER AND/OR INSTALLING CONTRACTOR. ALL OTHER INFORMATION IDENTIFIED WITH LIGHT LINE WEIGHT SHALL BE PROVIDED BY OTHER TRADES.
- 5. ALL CONTROL SCHEMATICS AND WIRING DIAGRAMS ARE FOR THE CLARIFICATION OF EQUIPMENT INTERLOCKING FUNCTIONS AND THE INTERFACE OF VARIOUS CONTRACTORS'S WORK AND SHALL NOT BE MISTAKEN AS SHOP DRAWINGS FOR ACTUAL INSTALLATION.
- 6. TC SYSTEM PROVIDER SHALL PROVIDE DDC CONTROLLERS AS REQUIRED TO MEET INTENT OF DESIGN DOCUMENTS. REFER TO THE PLANS FOR THE DDC FUNCTIONS THAT APPLY TO EACH MECHANICAL SYSTEM.
- 7. ALL TC PROVIDED COMPONENTS AND ALL TC CONTRACTOR INSTALLED WIRING SHALL BE LABELED PER SPECIFICATIONS.
- 8. ALL WIRING AND SYSTEM CONTROL VOLTAGES SHALL BE IN ACCORDANCE WITH THE EQUIPMENT MANUFACTURER'S RECOMMENDATION AND THE ELECTRICAL SPECIFICATIONS.
- 9. FAN MOTOR STARTERS, STARTER WIRING, CONTROL VOLTAGE TRANSFORMERS AND ASSOCIATED POWER WIRING SHALL BE PROVIDED BY OTHER TRADES.
- 10. ALL DDC AND CONTROL INTERLOCK WIRING SHALL BE BY TC INSTALLING CONTRACTOR UNLESS OTHERWISE NOTED. COORDINATE WITH MOTOR STARTER SUPPLIERS TO DETERMINE EXACT WIRING REQUIREMENTS AND TERMINATION POINTS.
- 11. ALL DDC AND CONTROL INTERLOCK WIRING BETWEEN COMPONENTS SHALL BE INSTALLED WITHOUT INTERMEDIATE STOPS. WIRE SPLICING AT INTERMEDIATE TERMINAL STRIPS IS NOT ACCEPTABLE.
- 12. ALL ELECTRICAL WRING AND RACEWAY SYSTEMS SHALL COMPLY WITH ELECTRICAL SPECIFICATION REQUIREMENTS. WHERE RACEWAY IS REQUIRED, TWO SEPARATE ELECTRICAL RACEWAY SYSTEMS SHALL BE PROVIDED: ONE FOR 120V WIRING AND THE OTHER FOR 24V WIRING.
- 13. TC INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR ALL POWER SUPPLIES REQUIRED FOR TC SYSTEM UNLESS OTHERWISE NOTED. REFER TO ELECTRICAL PANEL SCHEDULES FOR SPARE CIRCUITS IF NOTED; OTHERWISE, FIELD VERIFY AVAILABLE SPARE CIRCUIT...
- 14. TC INSTALLING CONTRACTOR SHALL VERIFY EXACT LOCATION OF ALL FIELD MOUNTED
- 15. SPACE TEMPERATURE SENSORS SHALL BE MOUNTED 4'-0" ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE.
- 16. REMOTELY MOUNTED FIELD DEVICES SUCH AS RELAYS, CONTROL TRANSFORMERS, ETC., SHALL BE HOUSED IN AN ENCLOSURE PROVIDED BY THE TC INSTALLING CONTRACTOR.
- 17. CONTROL TRANSFORMERS WHEN REQUIRED SHALL BE SIZED FOR 150% OF ACTUAL
- 18. CURRENT SWITCHES USED FOR OPERATIONAL STATUS SHALL HAVE CURRENT

THRESHOLD SETPOINT ADJUSTED TO INDICATE BELT OR DRIVE FAILURE.

- 19. ALL CONTROL VALVES AND ASSOCIATED CONTROL ACTUATORS IDENTIFIED ON TO DRAWINGS SHALL BE FURNISHED BY TC SYSTEM PROVIDER UNLESS OTHERWISE NOTED.
- 20. ALL CONTROL VALVES FURNISHED BY THE TC SYSTEM PROVIDER SHALL BE INSTALLED BY THE MECHANICAL CONTRACTOR. ALL PIPE PENETRATIONS AND BASIC FITTINGS REQUIRED FOR SENSOR INSTALLATIONS SHALL BE PROVIDED BY MECHANICAL
- 21. ALL INSTRUMENTATION TUBING REQUIRED FOR DPS AND DPT COMPONENT INSTALLATIONS SHALL BE PROVIDED BY TC INSTALLING CONTRACTOR.
- 22. TC INSTALLATION CONTRACTOR SHALL FIELD MOUNT ALL REQUIRED PACKAGED CONTROL COMPONENTS FURNISHED BY EQUIPMENT SUPPLIERS WHERE INDICATED. ALL REQUIRED 24V AND 120V FIELD WIRING SHALL BE PROVIDED BY TC INSTALLATION CONTRACTOR UNLESS NOTED OTHERWISE. TC INSTALLATION CONTRACTOR SHALL COORDINATE SPECIFIC SYSTEM WIRING REQUIREMENTS WITH PACKAGED EQUIPMENT SUPPLIERS.

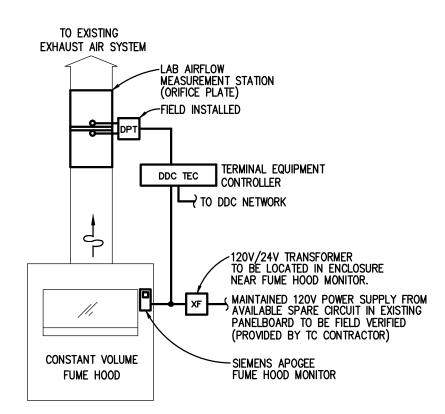


LAB CONTROL - CAV SA & GEN EA

REFER TO TERMINAL UNIT APPLICATION SCHEDULES FOR AIRFLOW SETPOINTS. REFER TO FLOOR PLANS FOR LTU LOCATIONS.

SEQUENCE OF OPERATION:

LAB CONTROLLERS SHALL MAINTAIN CONSTANT VOLUME SUPPLY AIR AND EXHAUST AIRFLOW SETPOINTS.

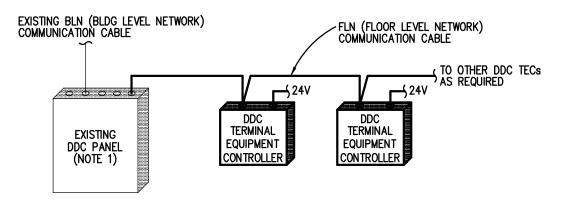


FUME HOOD MONITOR FIELD WIRING

<u>Notes:</u>

REFER TO FLOOR PLANS FOR FUME HOOD LOCATION. **SEQUENCE OF OPERATION:**

- 1. FUME HOOD SHALL OPERATE CONTINUOUSLY. UPON LOSS OF AIRFLOW FOR CONSTANT VOLUME FUME HOOD, LOCAL FUME HOOD MONITOR LOCAL ALARM SHALL SOUND.
- 2. FUME HOOD AIR FLOW SHALL BE MONITORED BY DDC.



DDC SYSTEM ARCHITECTURE

NO SCALE NOTES:

- EXISTING BUILDING AUTOMATION SYSTEM (BAS) IS SIEMENS APOGEE. NEW DDC SYSTEM COMPONENTS SHALL BE PROVIDED BY SIEMENS AND CONNECTED TO EXISTING BAS LOCATED IN THE EXISTING BUILDING ADDITION. SIEMENS SHALL UPGRADE THE EXISTING BAS FRONT-END HARDWARE/SOFTWARE/DATABASE AS NECESSARY TO ACCOMMODATE
- 2. REFER TO TEMPERATURE CONTROL SCHEMATICS FOR THE REQUIRED POINTS ASSOCIATED FOR EACH SYSTEM.
- 3. ELECTRICAL CONTRACTOR SHALL INSTALL ALL NEW TC COMPONENTS AND PROVIDE WRING PER SIEMENS SHOP DRAWINGS AND AS COORDINATED WITH SIEMENS PROJECT REPRESENTATIVE INCLUDING NETWORK COMMUNICATION INTERFACE TO EXISTING TO COMPONENTS. ELECTRICAL CONTRACTOR SHALL FIELD VERIFY LOCATIONS AND COORDINATE WITH OTHER TRADES.
- 3. TC CONTRACTOR SHALL PROVIDE REQUIRED 120V/24V POWER SUPPLY TRANSFORMER(S) FOR CONTROLLERS AND OTHER CONTROL COMPONENTS AS REQUIRED. ELECTRICAL CONTRACTOR SHALL PROVIDE REQUIRED 120V POWER SUPPLIES FROM DEDICATED AND/OR SPARE CIRCUITS IDENTIFIED ON ELECTRICAL PANEL SCHEDULES. COORDINATE WITH ELEC CONTRACTOR. REFER TO ELECTRICAL DWGS FOR PANEL SCHEDULES AND PANEL LOCATIONS.
- 4. 24V TRANSFORMERS REQUIRED FOR TERMINAL UNIT DDC CONTROLLERS SHALL BE LOCATED IN MECHANICAL OR ELECTRICAL ROOMS - COORDINATE LOCATIONS. MAXIMUM TRANSFORMER SIZE SHALL BE 100VA. PROVIDE ENCLOSURE(S) FOR TRANSFORMERS.

656 West Kirby Street, Detroit, MI 48202

Project Location:

WAYNE STATE UNIVERSITY ENGINEERING BUILDING **5050 ANTHONY WAYNE DRIVE DETROIT MICHIGAN 48202**

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project:	

Engineering Research Labs Phase Two

sheet title: TEMPERATURE CONTROLS

sheet number: project number: M801 090-250890

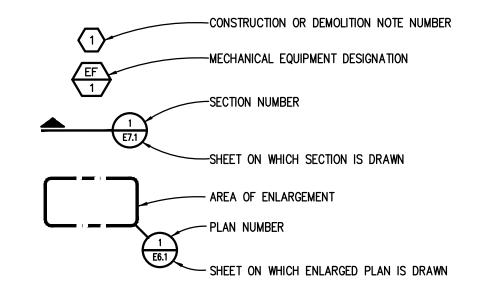
ELECTRICAL DRAWING INDEX

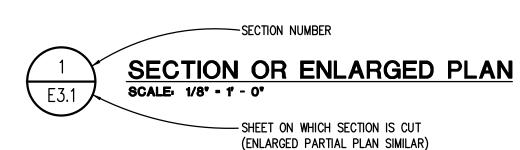
ELECTRICAL STANDARDS AND DRAWING INDEX ELECTRICAL STANDARD SCHEDULES AND PANEL SCHEDULES THIRD FLOOR ELECTRICAL DEMOLITION PLAN SECOND FLOOR ELECTRICAL PLANS THIRD FLOOR LIGHTING PLAN THIRD FLOOR POWER AND AUXILIARY SYSTEMS PLAN

ELECTRICAL ABBREVIATION LIST

ABBREVIATION DESCRIPTION ABBREVIATION DESCRIPTION KILOVOLT PUSHBUTTON STATION KILOVOLT - AMPERES KILOWATT KILOWATT - HOURS KWH POTENTIAL TRANSFORMER POWER DISTRIBUTION PANEL LIGHTNING ARRESTOR RECEPT. RECEPTACLE LIGHTING PANEL RECEPTACLE DISTRIBUTION PANEL LIGHTING DISTRIBUTION PANEL RECEPTACLE PANEL MAXIMUM RSC RIGID STEEL CONDUIT MAIN CIRCUIT BREAKER SCHED SCHEDULE MOTOR CONTROL CENTER SWITCH MAIN DISTRIBUTION PANEL SWBD SWITCHBOARD MECH MECHANICAL SWGR SWITCHGEAR MINIMUM TERMINAL BOX MISC. MISCELLANEOUS TELECOM **TELECOMMUNICATIONS** MAIN LUGS ONLY TAMPER RESISTANT MOUNTED MOUNTING TELEPHONE TERMINAL BACKBOARD TTB **NEUTRAL** U.O.N. UNLESS OTHERWISE NOTED NORMALLY CLOSED UPSTAGE NATIONAL ELECTRICAL CODE VOLTS NON-FUSIBLE NOT IN CONTRACT **WEATHERPROOF** NIGHT LIGHT NORMALLY OPEN TRANSFORMER NOT TO SCALE EXPLOSION PROOF ON CENTER EXISTING OWNER FURNISHED. OFCI RELOCATED CONTRACTOR INSTALLED OFOI OWNER FURNISHED, OWNER INSTALLED

STANDARD METHODS OF NOTATION





	HEAVY LINE WEIGHT INDICATES NEW WORK
	LIGHT LINE WEIGHT INDICATES EXISTING EQUIPMENT OR REFERENCED INFORMATION
	GRAY LINE INDICATES BACKGROUND INFORMATION
	THIN GRAY LINE INDICATES CEILING GRID
	DASHED LINES INDICATE CONDUIT ROUTED IN OR BELOW SLAB OR GRADE
'//////////////////////////////////////	HATCH MARKS INDICATE FOLIDMENT TO

DRAWING INDEX

090-250890

(1156-2: IDesign project number)

WAYNE STATE UNIVERSITY

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Project Location:

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coordination checked:	MSG
checked:	MSG
approved:	JAM
project:	
Engineering	

sheet title: **ELECTRICAL** STANDARDS AND

Research Labs -

Phase Two

sheet number: project number: E001

STANDARD MOUNTING HEIGHTS

IN CMU WALLS BEHIND FURNITURE PARTITION SYSTEM

| OF BOX, U.O.N. 18" A.F.F. TO

24" A.F.F. TO TOP OR 48" A.F.F IN CENTER OF BOX, MECHANICAL ROOMS

1 ♦ ♦ ₩ ▽ **™**

8" ABOVE COUNTER TO

CENTER OF BOX, U.O.N.

48" A.F.F. TO TOP

OF BOX, U.O.N.

96" A.F.F. TO TOP OF BOX OR 6" BELOW CEILING, WHICHEVER IS LESS,

COORDINATE MOUNTING HEIGHTS WITH ARCHITECT

6'-6" A.F.F. TO TOP OF ENCLOSURE, U.O.N.

TIEAVI LINE WEIGHT INDICATES NEW WO
 LIGHT LINE WEIGHT INDICATES EXISTING EQUIPMENT OR REFERENCED INFORMATI
GRAY LINE INDICATES BACKGROUND INF
 THIN GRAY LINE INDICATES CEILING GRI
 DASHED LINES INDICATE CONDUIT ROUT IN OR BELOW SLAB OR GRADE
 HATCH MARKS INDICATE FOUIPMENT TO

BE DISCONNECTED AND REMOVED. CIRCUIT HOMERUN

↑6" A.F.F. HORIZONTALLY

TO TOP OF BOX, U.O.N.

* = SEE NOTE 4

NOTES:

1. CONTRACTOR TO SIZE FEEDERS AND BRANCH CIRCUITS BASED ON THIS SCHEDULE AND OVER CURRENT DEVICE SIZE, UNLESS NOTED OTHERWISE.
2. CONTRACTOR MAY COMBINE 20A CIRCUITS AS NOTED IN SPECIFICATION.
3. CONDUCTORS ARE BASED ON THHN/THWN UP TO AND INCLUDING #4/O. LARGER THAN #4/O ARE BASED ON TYPE XHHW.

4. CONDUCTORS ARE BASED ON 90°C, 600V. INSULATED COPPER WIRE APPLIED AT 75°C FOR TERMINATION RATED 60°C, USE CONDUCTORS AND CONDUIT SIZES INDICATED IN PARENTHESES.

5. CONDUIT SIZES ARE VALID FOR EMT OR RGS. CONDUIT SIZES SHALL BE ADJUSTED AS REQUIRED FOR OTHER TYPES OF CONDUIT.

6. ELECTRICAL CONTRACTOR TO COORDINATE WITH MECHANICAL CONTRACTOR AND PROVIDE REQUIRED WIRE SIZES TO ACCOMMODATE MECHANICAL EQUIPMENT LUG

SIZES.
7. SIZE OF DISCONNECT SWITCH LOCATED AT EQUIPMENT SHALL BE SIZED BASED UPON OVERCURRENT PROTECTION OF THAT DEVICE.

8. OBTAIN APPROVAL FROM ENGINEER PRIOR TO INSTALLING DIFFERENT SIZE/QUANTITY OF CONDUCTORS TO OBTAIN AN EQUIVALENT AMPACITY.

9. SPLICE FROM ALUMINUM TO COPPER PRIOR TO ENTERING EQUIPMENT LISTED FOR USE WITH COPPER CONDUCTORS ONLY OR USE COPPER CONDUCTORS FOR THE ENTIRE LENGTH OF FEEDER.

	SPECIAL RECEPTACLES
TYPE	DESCRIPTION
∲	125V, 30A, SINGLE PHASE, LOCKING RECEPTACLE, 2 POLE, 3 WIRE (NEMA L5-30R)
\$	250V, 20A, SINGLE PHASE, LOCKING RECEPTACLE, 2 POLE, 3 WIRE (NEMA L6-20R)
\$	250V, 30A, SINGLE PHASE, LOCKING RECEPTACLE, 2 POLE, 3 WIRE (NEMA L6-30R)
�	250V, 20A, THREE PHASE, LOCKING RECEPTACLE, 3 POLE, 4 WIRE (NEMA L15-20R)
\$	250V, 30A, THREE PHASE, LOCKING RECEPTACLE, 3 POLE, 4 WIRE (NEMA L15-30R)
\$	208Y/120V, 30A, THREE PHASE, LOCKING RECEPTACLE, 4 POLE, 5 WIRE (NEMA L21-30R)
\$	125/ 250V SINGLE PHASE RECEPTACLE, 3 POLE, 4 WIRE (NEMA 14-30R)
\$	125/ 250V SINGLE PHASE RECEPTACLE, 3 POLE, 4 WIRE (NEMA 14-50R)
	250V, 50A, THREE PHASE, LOCKING RECEPTACLE, 3 POLE, 4 WIRE (NEMA L15-50R)

	OCCUPANCY SENSOR LEGEND
TYPE	DESCRIPTION
OS _A	360° CEILING MOUNTED DUAL TECHNOLOGY OCCUPANCY SENSOR
os _B	90° CEILING/WALL MOUNTED DUAL TECHNOLOGY OCCUPANCY SENSOR
os _c	360° CEILING MOUNTED PASSIVE INFRARED OCCUPANCY SENSOR
os _D	360° CEILING MOUNTED ULTRASONIC OCCUPANCY SENSOR
os _E	360° CEILING MOUNTED ULTRASONIC OCCUPANCY SENSOR - CORRIDOR OPTIMIZED
So	WALL SWITCH PASSIVE INFRARED OCCUPANCY SENSOR
S02	WALL SWITCH PASSIVE INFRARED OCCUPANCY SENSOR - DUAL LEVEL SWITCHING
Do	WALL DIMMER SWITCH INFRARED OCCUPANCY SENSOR

В	BRANCH CIF		LTAGE DRO LE PHASE		SCHEDUL	E
BRANCH	WIRE SIZE	M	IAXIMUM BRAN	ICH CIRCUIT LI	ENGTH (IN FEE	T)
CKT RATING (A)	(AWG)	120V	208V	240V	277V	480V
20A	12	83	143	165	191	331
	10	128	222	256	295	511
	8	201	348	402	464	804
	6	313	542	625	721	1250
30A	10	85	148	170	197	341
	8	134	232	268	309	536
	6	208	361	417	481	833
	4	313	542	625	721	1250

1. THE ABOVE TABLE VALUES ARE BASED ON COPPER CONDUCTORS, IN STEEL CONDUIT, WITH A LOAD POWER FACTOR OF 0.85 PER NEC CHAPTER 9, TABLE 9.

2. PROVIDE BRANCH CIRCUIT CONDUCTORS AS INDICATED IN THE TABLE ABOVE FOR ALL LIGHTING AND RECEPTACLE BRANCH CIRCUITS. WHERE BRANCH CIRCUITS SERVE DEDICATED EQUIPMENT, THE CONTRACTOR MAY PERFORM VOLTAGE DROP CALCULATIONS BASED ON ACTUAL EQUIPMENT CONNECTED LOAD AND PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO A MAXIMUM OF 3%.

3. CONDUCTOR SIZES ARE BASED ON MAXIMUM OF 9 CURRENT CARRYING CONDUCTORS IN A SINGLE CONDUIT.

4. LIMITS FOR CONDUCTOR LENGTHS SHOWN ARE BASED ON A MAXIMUM BRANCH CIRCUIT LOADING OF 64% OF THE BRANCH BREAKER RATING AND A MAXIMUM OF 3 PERCENT VOLTAGE DROP TO COMPLY WITH ASHRAE/IES 90.1 -1999 AND THE NEC. FOR CIRCUITS LOADED GREATER THAN 64% OF BRANCH BREAKER RATING, THE CONTRACTOR SHALL PROVIDE CONDUCTORS APPROPRIATELY SIZED TO LIMIT VOLTAGE DROP TO 3%.

MOTOR HP	SWITCH/ FUSE	CIRCUIT BREAKER	STARTER SIZE/TYPE	MOTOR DISCONNE (NOTE 3)
1/2	30/3A	15A	1	30A
3/4	30/3A	15A	1	30A
1	30/6A	15A	1	30A
1 1/2	30/6A	15A	1	30A
2	30/6A	15A	1	30A
3	30/10A	15A	1	30A
5	30/15A	15A	1	30A
7 1/2	30/20A	20A	1	30A
10	30/20A	25A	1	30A
15	30/30A	40A	2	30A
20	60/40A	60A	2	60A
25	60/50A	70A	2	60A
30	60/60A.	80A	3	60A
40	100/80A.	90A	3	100A
50	100/100A.	100A	3	100A
60	200/125A.	125A	4	200A
75	200/150A.	150A	4	200A
100	200/200A.	200A	4	200A
125	200/200A.	225A	5	200A
150	400/250A.	250A	5	400A
200	400/350A.	350A	5	400A

BASED ON MOTOR FULL LOAD AMPERES AS PROVIDED BY THE N.E.C.
 BASED ON MOTOR RUNNING OVERLOAD PROTECTIONS PROVIDED BY THERMAL OVERLOAD

3. WHERE THE STARTER IS LOCATED REMOTE FROM THE MOTOR, PROVIDE DISCONNECT LOCATED AT THE MOTOR, SIZE AS INDICATED.

RACEWAY		AC/MC CABLE	ELECTRICAL METALLIC TUBING (EMT)		FLEXIBLE METAL CONDUIT (FMC)	INTERMEDIATE METAL CONDUIT (IMC)	LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)	RIGID STEEL CONDUIT	
ND00R	EXPOSED NOT SUBJECT TO PHYSICAL DAMAGE — UNFINISHED SPACES		Х						
	EXPOSED NOT SUBJECT TO PHYSICAL DAMAGE — FINISHED SPACES			Х					
	CONCEALED IN CEILINGS, INTERIOR WALL AND PARTITIONS	Х	Х						NOT TO EXCEED 6'-0" IN CEILING SPACE
	CONNECTED TO VIBRATING EQUIPMENT				Х		Х		EQUIPMENT INCLUDING: TRANSFORMERS, HYDRAULIC PNEUMATIC, ELECTRIC SOLENOID, MOTOR DRIVEN EQUSE LFMC IN DAMP/WET LOCATIONS
	DAMP AND WET LOCATIONS		Г			Х		Х	

1. 'X' INDICATES ACCEPTABLE SELECTION. 2. REFER TO "CONDUCTORS AND CABLES" SPECIFICATION FOR APPLICATION LIMITATIONS OF AC/MC CABLE.

					P	ANELB	OARD	(E)P.P-	В					
#	LOAD TYPE	DESCRIPTION	CB TYPE	СВ	VA	ØA	ØB	ØC	VA	СВ	CB TYPE	DESCRIPTION	LOAD TYPE	#
1	R	LAB BENCH: LAB 3322	EXIST	20	1000	2000			1000	20	EXIST	FUME HOOD: LAB 3322	NC	2
3	R	LAB BENCH: LAB 3322	EXIST	20	1000		2000		1000	20	EXIST	FUME HOOD: LAB 3322	NC	4
5	R	LAB BENCH: LAB 3322	EXIST	20	1000			2000	1000	20	EXIST	FUME HOOD: LAB 3322	NC	6
7	R	LAB BENCH: LAB 3322	EXIST	20	1000	2000			1000	20	EXIST	FUME H000: LAB 3322	NC	8
9	R	LAB BENCH: LAB 3322	EXIST	20	1000		1000							10
11	R	LAB BENCH: LAB 3322	EXIST	20	1000			1000		20	EXIST	SPARE		12
13	R	LAB BENCH: LAB 3322	EXIST	20	1000	1000]				14
15	R	LAB BENCH: LAB 3322	NEW	20	1000		1000							16
17	R	LAB BENCH: LAB 3322	NEW	20	1000			1000		30	EXIST	BUSS-LINE (OVERHEAD)		18
19	R	LAB BENCH: LAB 3322	NEW	20	1000	1000]				20
21	R	LAB BENCH: LAB 3322	NEW	20	1000		1900		900	20	NEW	GENERAL RECEPTS.: LAB 3322	R	22
23	R	LAB BENCH: LAB 3322	NEW	20	1000			1900	900	20	NEW	GENERAL RECEPTS.: LAB 3322	R	24
25	NC	INCUBATOR: TISSUE CULTURE 3322.4	NEW	20	1200	2100			900	20	NEW	GENERAL RECEPTS.: LAB 3322	R	26
27	NC	INCUBATOR: TISSUE CULTURE 3322.4	NEW	20	1200		2100		900	20	NEW	GENERAL RECEPTS.: LAB 3322	R	28
29	NC	BIOSAFETY CABINET: TISSUE CULTURE 3322.4	NEW	20	1000			1540	540	20	NEW	GENERAL RECEPTS.: TISSUE CULTURE 3322.4	R	30
31	C	REFRIGERATOR: LAB 3322	NEW	20	500	1040			540	20	NEW	GENERAL RECEPTS.: TISSUE CULTURE 3322.4	R	32
33	С	REFRIGERATOR: LAB 3322	NEW	20	500		1220		720	20	NEW	GENERAL RECEPTS.: MICROSCOPY 3322.3	R	34
35	NC	OVEN: LAB 3322	NEW	20	1500			2220	720	20	NEW	GENERAL RECEPTS.: MICROSCOPY 3322.3	R	36
37		SPARE	NEW	20		265.2			265	20	NEW	LGT.: RMS. 3322.3, 3322.4	L	38
39		SPARE	NEW	20						20	NEW	SPARE		40
41		SPARE	NEW	20						20	NEW	SPARE		42
						9405.2	9220	9660						
						ØA	ØB	ØC	_					
	DANE	BOARD INFORMATION	DDANGU 4	NECHIT CO	NNECTED L	nan.			EEEUCD OF	MAND LOAD:		OVERCURRENT LOAD: NOTES:		
						arut.	4000							
	VOLTAG	E:		us load (Tinuous li			1000 8900		125% 100%	1250 8900	•	(100% <u>1250</u> (100% 8900		_

		ØA ØB	ØC			
PANELBOARD INFORMATION	BRANCH CIRCUIT CONNECTED LOAD	<u>t.</u>	FEEDER DE	MAND LOAD:	OVERCURRENT LOAD:	NOTES:
VOLTAGE: 208Y/120	CONTINUOUS LOAD (C):	1000	X 125%	1250	X 100% 1250	
BUS AMPACITY: 225A	NON-CONTINUOUS LOAD (NC):	8900	_ X 100%	8900	X 100% 8900	
MAIN TYPE: 200A MCB	KITCHEN LOAD (K):		_ X 100%		X 100%	
MINIMUM A.I.C.: 10,000	RECEPTACLE BASE LOAD (R):	10000	X 100%	10000	X 100% 10000	
MOUNTING: SURFACE	RECEPTACLE DEMAND LOAD (R):	8120	_ X 50%	4060	X 100% 4060	
	lighting load (L):		_ X 100%		X 125%	
PANELBOARD LOCATION	TRACK LIGHTING (T):		(150VA/2FT)		X 125%	
	MOTORS, HIGHEST LOAD (MH):		_ X 125%		X 100%	
	MOTORS, REMAINING LOAD (M):		_ X 100%		X 100%	
	TO*	TAL(KVA): 28.02	TOTAL(KVA):	24.21	TOTAL(KVA): 24.21	
	TOTA	AL (AMPS): 77.78	TOTAL (AMPS):	67.20	TOTAL (AMPS): 67.20	
Copyright 2014 by Peter Basso Associates, Inc						<u> </u>

		1				r	ANELD	OARD (ix/F.F.	· .						_
#	LOAD TYPE	DESCRIPTION		CB TYPE	CB	VA	ØA	ØB	ØC	VA	CB	CB TYPE	DESCRIPTION		LOAD TYPE	
1	NC					4000	5500			1500					NC	1
3	NC	RTA: CLEAN ROOM 332	2.2	EXIST	50	4000		5500		1500	20	EXIST	02 PLASMA: CLEAN ROOM	3322.2	NC	7
5	NC	1				4000			5500	1500					NC	
7	NC	PARAYLENE COATER.: (LEAN ROOM 3322.2	EXIST	20	1000	1000									
9	NC	PARAYLENE V.P.: CLEA	N ROOM 3322.2	EXIST	20	1000		1000			30	EXIST	SPARE			
11	NC	PARAYLENE CHILLER: C	LEAN ROOM 3322.2	EXIST	20	1000			1000							
13	NC	PARAYLENE CVD: CLEA	N DOOM 3322 2	EXIST	30	2500	4000			1500	20	EXIST	WET PROCESSING CABINET:	O FAN DOOM 3322.2	NC	
15	NC	PARATLENE CVD: CLEA	N ROUM 3322.2	EXIST	30	2500		4000		1500	2	EVISI	WET PROCESSING CABINET:	CLEAN ROOM 3322.2	NC	Ī
17	NC	RTA CHILLER: CLEAN R	OOM 3322.2	EXIST	20	1000			2500	1500	20	EXIST	WET PROCESSING CABINET:	CIEMI BOOM 3322.2	NC	
19	NC	H.P. CANISTER: CLEAN	ROOM 3322.2	EXIST	20	500	2000			1500	2	EXIST	WET PROCESSING CABINETS	CLEAN ROOM 3322.2	NC	
21								1500		1500	20	EXIST	CVD RF GENERATOR: CLEA	N BOOM 3322.2	NC	
23		SPARE		EXIST	20				1500	1500	20	ENIO	OND RESIDENCE CLEA	IN NOUN JJZZZ	NC	,
25											20	EXIST	SPARE			
27	R	GENERAL RECEPTS.: CL	EAN ROOM 3322.2	EXIST	20	900		900			20	EAIST	STARE			
29	R	GENERAL RECEPTS.: CL	EAN ROOM 3322.2	EXIST	20	720			720		20	EXIST	SPARE			
31	R	GENERAL RECEPTS.: CL	EAN ROOM 3322.2	EXIST	20	720	720				20	EAIJI	ST AIRE			
33		SPARE		EXIST	20											
35		SPARE		EXIST	20						20	EXIST	SPARE			
37		SPARE		EXIST	20											
39		SPARE		EXIST	20								SPACE			
41		SPACE											SPACE			
							13220	12900	11220							
							ØA	ØB	ØC							
	PANELE	OARD INFORMATION		BRANCH	CIRCUIT CO	NNECTED L	OAD:			FEEDER DEI	MAND LOAD:		OVERCURRENT LOAD:	NOTES:		
	VOLTAG		120	·	US LOAD (x	125%		_	100%			
		IPACITY: 225	iA			OAD (NC):		35000		100%	35000	-	100% 35000			_
	MAIN T		 -	KITCHEN						100%		-	100%			_
		4 A.I.C.: 10,0			LE BASE I	OAD (R):		2340			2340	-	100% 2340			_
	MOUNT		ACE			D LOAD (R)	Ŀ			50%		_	100%			_
			<u></u>	LIGHTING		(1)	,			100%		-	125%			_
	PANELE	OARD LOCATION			CHTING (T)					150VA/2FT)		-	125%			_
		<u> </u>			HIGHEST L					125%		-	100%			_
				-		LOAD (M):				100%		-	100%			_
						(TOTAL(KVA):	37.34		TOTAL(KVA):	37.34	-	TOTAL(KVA): 37.34	-		_

					Р	ANELB	OARD (E)RPE	H4			
#	LOAD TYPE	DESCRIPTION	CB TYPE	СВ	VA	ØA	ØB	ØC	VA	СВ	CB TYPE DESCRIPTION LOAD TYPE	•
ı	R				1000	2000			1000		R	
,	R	CORD REEL: LAB 335.2	EXIST	20	1000		2000		1000	20	EXIST RECEPT.: LAB 3335.2	
5	R				1000			2000	1000		R	(
'	R	CORD REEL: LAB 335.2	NEW	20	1000	2762.5			1763	20	NEW LGT:. RMS 3335, 3335.1, 3335.2, 3337	1
,	R	CORD REEL: LAB 335.2	NEW	20	1000		1000			20	NEW SPARE	1
1	R	CORD REEL: LAB 335.2	NEW	20	1000			1000		20	NEW SPARE	1
3	R	-CORD REEL: LAB 335.2	EXIST	20	1000	1000				20	NEW SPARE	1
15	R	OND NEEL END SOME	LAIGI		1000		2080		1080	20	EXIST GENERAL RECEPTS: IMAGINING LAB 3335.1, 3335	1
7	NC	ANTI-VIBRATION TABLE: IMAGING LAB 335.1	EXIST	20	1000			2080	1080	20	EXIST GENERAL RECEPTS: IMAGINING LAB 3335.1, 3335	1
9	NC	ANTI-VIBRATION TABLE: IMAGING LAB 335.1	EXIST	20	1000	1900			900	20	EXIST GENERAL RECEPTS: IMAGINING LAB 3335.1, 3335	2
21	C	SERVER: LAB 3335.2	EXIST	20	1000		1900		900	20	EXIST GENERAL RECEPTS: LAB3335.2	2
23	R	BENCH: STUDENT LAB 3335	EXIST	20	720			1620	900	20	EXIST GENERAL RECEPTS: LAB3335.2	2
25	R	BENCH: STUDENT LAB 3335	EXIST	20	720	1620			900	20	EXIST GENERAL RECEPTS: LAB3335.2	2
27	R	BENCH: STUDENT LAB 3335	EXIST	20	720		1620		900	20	EXIST GENERAL RECEPTS: LAB3335.2	2
9	R	BENCH: STUDENT LAB 3335	EXIST	20	720			1800	1080	20	EXIST GENERAL RECEPTS: GA ROOM 3337 R	3
31	R	BENCH: STUDENT LAB 3335	EXIST	20	720	1800			1080	20	EXIST GENERAL RECEPTS: GA ROOM 3337 R	3
33	R	BENCH: STUDENT LAB 3335	EXIST	20	720		1800		1080	20	EXIST GENERAL RECEPTS: GA ROOM 3337 R	3
5	R	BENCH: STUDENT LAB 3335	EXIST	20	720			720			EXIST SPARE	3
57	R	BENCH: STUDENT LAB 3335	EXIST	20	720	720					EXIST SPARE	3
9		SPARE	EXIST								EXIST SPARE	4
11		SPARE	EXIST								EXIST SPARE	4
						11802.5	10400	9220				
	PANELE	IOARD INFORMATION	BRANCH	CIRCUIT CO	INNECTED L	ØA OAD:	ØB	ØC	FEEDER DE	MAND LOAD:	OVERCURRENT LOAD: NOTES:	
	VOLTAG	E: 208Y/120	CONTINU	DUS LOAD ((C):		1000	х	(125%	1250	X 100% 1250	
	BUS AM	MPACITY: 225A	NON-CO	NTINUOUS L	OAD (NC):		2000	×	(100%	2000	X 100% 2000	_
	MAIN T	YPE: 200A MCB	KITCHEN	LOAD (K):	• •			. х	(100%		X 100%	-
	MINIMUI	M A.I.C.: 10,000	RECEPTA	CLE BASE L	LOAD (R):		10000	. х	(100%	10000	X 100% 10000	-
	MOUNTI	NG: SURFACE	RECEPTA	CLE DEMAN	D LOAD (R):	16660	. х	50%	8330	X 100% 8330	_
			LIGHTING	LOAD (L):	•	-	1763	. х	(100%	1763	X 125% 2203	_
	PANELE	IOARD LOCATION		GHTING (T):	:				150VA/2FT)		X 125%	_
			MOTORS.	HIGHEST L	OAD (MH):			×	(125%		X 100%	_
•			-	REMAINING		:		•	(100%		X 100%	-
•						TOTAL(KVA):	31.42	-	TOTAL(KVA):	23.34	TOTAL(KVA): 23.78	-
						TOTAL (AMPS):		-	OTAL (AMPS):		TOTAL (AMPS): 66.02	-
ю	ight 20	014 by Peter Basso Associates, Inc						•	v •/·			-

					P	ANELB	OARD (E)RPE\	/3						
#	LOAD TYPE	DESCRIPTION	CB TYPE	СВ	VA	ØA	Ø8	ØC	VA	СВ	CB DE	SCRIPTION		LOAD TYPE	1
1	С	REFRIGERATOR: TISSUE CULTURE 2311.1	EXIST	20	500	2300			1800	20	EXIST LA	B BENCH: LAB 2311		R	1
3	C	INCUBATOR: TISSUE CULTURE 2311.1	EXIST	20	500		1000		500	20	EXIST HP	LC: LAB 2311		R	1
5	NC	BIOSAFETY CABINET: TISSUE CULTURE 2311.1	EXIST	20	500			2300	1800	20	EXIST OV	EN: LAB 2311		R	
7	R	CENTRIFUGE: TISSUE CULTURE 2311.1	EXIST	20	200	700			500	20	EXIST DN	A CYNTEHESIZER: LAB 2311		R	1
9	R	CYTOMETER: LAB 2311	EXIST	20	200		1100		900	20	EXIST GE	NERAL RECEPTS.: LAB 2311		R	1
11	NC	(FUTURE) FUME HOOD: LAB 2311	EXIST	20	1000			1900	900	20	EXIST GE	NERAL RECEPTS.: LAB 2311		R	1
13	NC	(FUTURE) FUME HOOD: LAB 2311	EXIST	20	1000	1720			720	20	EXIST GE	NERAL RECEPTS.: LAB 2311		R	1
15	NC	FUME HOOD: LAB 2311	EXIST	20	1000		1900		900	20	EXIST GE	NERAL RECEPTS.: LAB 2311.	l	R	1
17	NC	FUME H000: LAB 2311	EXIST	20	1000			1720	720	20	EXIST GE	NERAL RECEPTS.: LAB 2311.	1	R	1
19	R	LAB BENCH: LAB 2311	EXIST	20	1800	1800				20	EXIST SP.	ARE			2
21		SPARE	NEW	20						20	NEW SP	ARE			2
23		SPARE	NEW	20						20	NEW SP	ARE			2
25		SPARE	NEW	20						20	NEW SP.	ARE			2
27		SPARE	NEW	20						20	NEW SP	ARE			2
29		SPARE	NEW	20						20	NEW SP.	ARE			3
31		SPACE									SP	ACE			3
33		SPACE									SP	ACE			3
35		SPACE									SP	ACE			3
37		SPACE									SP	ACE			3
39		SPACE									SP	ACE			4
41		SPACE									SP	ACE			4
						6520	4000	5920							
						ØA	ØB	ØC	=						
	PANELB	OARD INFORMATION	BRANCH	CIRCUIT CO	NNECTED L	OAD:			FEEDER DE	MAND LOAD:		OVERCURRENT LOAD:	NOTES:		
	VOLTAG	E: 208Y/120	CONTINUO	DUS LOAD ((C):		1000	x	125%	1250	X 100	0% 1250			_
	BUS AM	PACITY: 225A	NON-COM	ITINUOUS L	OAD (NC):		4500	X	100%	4500	X 100	0% <u>4500</u>			
	MAIN T	YPE: <u>200A MCB</u>	KITCHEN	LOAD (K):				X	100%		X 100	ox			_
	MINIMUN	A A.I.C.: 10,000	RECEPTA	CLE BASE L	LOAD (R):		10000	х	100%	10000	X 100	0% <u>10000</u>			_
	MOUNTI	NG: SURFACE	RECEPTA	CLE DEMAN	D LOAD (R)):	940	X	50%	470	X 100	0% <u>470</u>			_
			LIGHTING	LOAD (L):				X	100%		X 125	5X			_
	<u>Panelb</u>	OARD LOCATION	TRACK LI	GHTING (T):	:			(1	150VA/2FT)		X 12	5X			_
			MOTORS,	HIGHEST L	OAD (MH):			x	125%		X 100	ox			_
									4000		X 100	Ner			
			MOTORS,	REMAINING	LOAD (M):			Х	100%		A 104				_
			MOTORS,	REMAINING	LOAD (M):	TOTAL(KVA):	16.44		TOTAL(KVA):	16.22		DTAL(KVA): 16.22			-

NOTE: SOME SYMBOLS AND ABBREVIATIONS SHOWN MAY NOT APPLY TO THIS PROJECT.

656 West Kirby Street, Detroit, MI 48202

Project Location:

WAYNE STATE UNIVERSITY ENGINEERING BUILDING **5050 ANTHONY WAYNE DRIVE DETROIT MICHIGAN 48202**

CONTACT: Mark Gibbons

iDesign Solutions, LLC Architects, Scientists and Planners

iDesign

Scientific Facilities & Laboratory Design 400 Water Street, Suite LL1 Rochester, MI 48307 248-440-7310 info@iDesign-Solutions.info www.iDesign-Solutions.info



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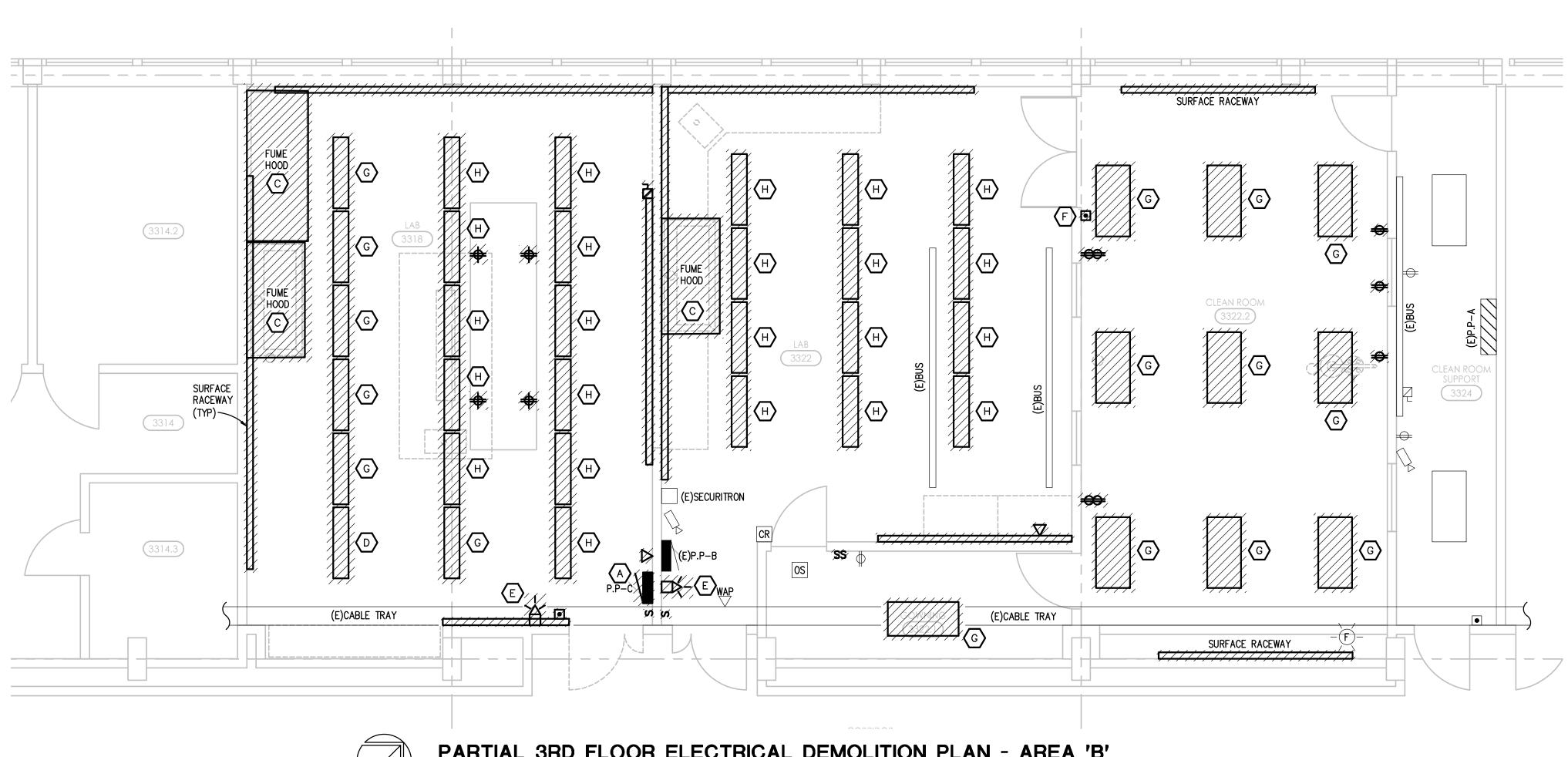
issue:	date:
50% REVIEW	02.04.15
BID	02.06.15

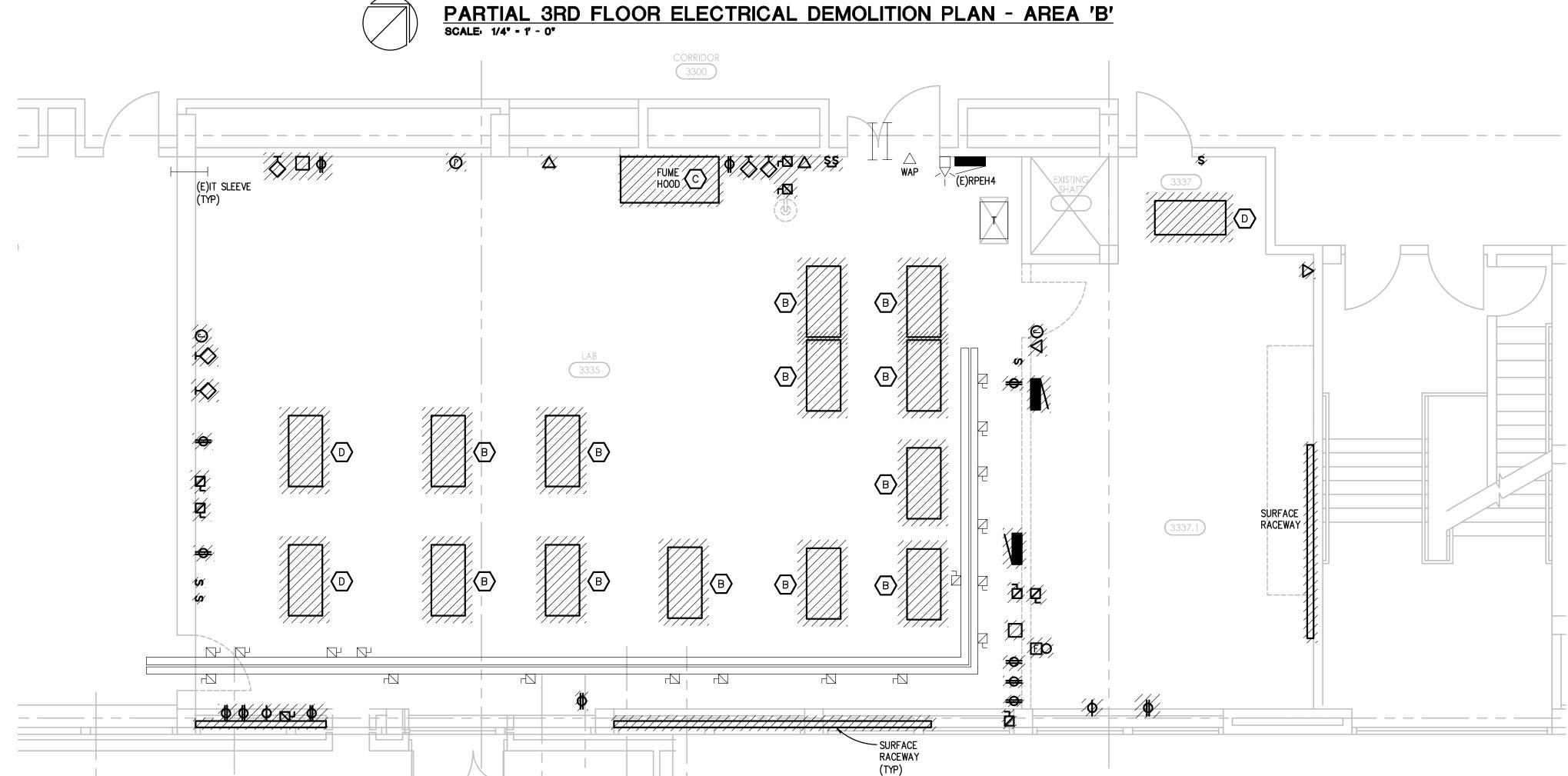
designed by:	WGH_
drawn by:	WGH
coordination checked:	MSG
checked:	MSG
approved:	JAM_
project:	
Engineering	
Research Labs -	

sheet title: ELECTRICAL STANDARD SCHEDULES AND PANEL SCHEDULES

Phase Two

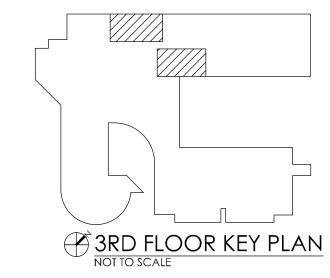
project number: sheet number: E002 090-250890





PARTIAL 3RD FLOOR ELECTRICAL DEMOLITION PLAN - AREA 'A'

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE.



GENERAL NOTES:

- 1. VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
- 2. EXAMINE THE DRAWINGS OF OTHER TRADES AND BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES, WHETHER OR NOT SPECIFICALLY INDICATED.
- 3. REMOVE LIGHTING FIXTURES AND ELECTRICAL DEVICES AS INDICATED ON PLAN WITH CROSS HATCHING. DEMOLITION SHALL INCLUDE, BUT NOT BE LIMITED TO, THOSE
- 4. COORDINATE WITH NEW WORK PLANS, ONE LINE DIAGRAMS AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
- 5. PROVIDE PROPER SUPPORT FOR EXISTING TO REMAIN CONDUITS AND BOXES WHERE EXISTING SUPPORT IS TO BE REMOVED. RE-ROUTE BRANCH CIRCUIT CONDUITS AND RELOCATE JUNCTION BOXES AS REQUIRED TO FACILITATE INSTALLATION OF NEW EQUIPMENT AND SYSTEMS IN CEILING SPACES.
- 6. REMOVE ALL CONDUIT AND WIRE BACK TO THE SOURCE OR NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
- 7. MAINTAIN ELECTRICAL SERVICE TO ALL LIGHTING FIXTURES, DEVICES AND EQUIPMENT THAT ARE TO REMAIN. EXTEND CONDUIT AND WIRE AS REQUIRED WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM LOADS THAT ARE TO REMAIN.
- 8. DISPOSE OF ALL MATERIALS OFF SITE AND INCLUDE ALL COSTS FOR DISPOSAL IN BID. ALL MATERIALS SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS, INCLUDING TCLP TESTING, PROPER DISPOSAL AND/OR RECYCLING OF FLUORESCENT LAMPS.
- 9. PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED BUT EXISTING WALLS REMAIN INTACT.
- 10. RING OUT AND TAG ALL CIRCUITS AFFECTED BY THIS ALTERATION AT BOTH ENDS. MARK ALL UNUSED CIRCUIT BREAKERS "SPARE".
- 11. PROVIDE UPDATED TYPED-IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS ALTERATION.
- 12. COORDINATE ANY SHUT DOWN OF EXISTING SERVICES AND EQUIPMENT THAT ARE REMAINING IN USE WITH THE OWNER'S REPRESENTATIVE. WHERE EXISTING BUILDING SERVICE IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COSTS TO PERFORM THIS WORK DURING WEEKENDS AND EVENINGS INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER WHERE SHUT DOWNS MUST OCCUR FOR PERIODS LONGER THAN THESE HOURS. COORDINATE ELECTRICAL SHUT DOWNS WITH THE OWNER 72 HOURS PRIOR TO SHUT DOWN.

DEMOLITION NOTES:

- A. DISCONNECT PANELBOARD FEEDER AND REMOVE TO CEILING SPACE. REMOVE PANELBOARD. CLEAN, STORE AND PROTECT PANELBOARD FOR REINSTALLATION IN NEW LOCATION. EXTEND FEEDER TO NEW PANEL LOCATION. REFER TO NEW WORK
- B. REMOVE LIGHT FIXTURE. PROTECT AND STORE FOR REINSTALLATION. REMOVE BRANCH CIRCUIT BACK TO SOURCE.
- C. FUME HOOD REMOVAL BY OTHERS. REMOVE BRANCH CIRCUIT BACK TO SOURCE.
- D. REMOVE LIGHT FIXTURE COMPLETE AND TURN OVER TO OWNER.
- E. REMOVE FIRE ALARM NOTIFICATION APPLIANCE. PROTECT AND STORE FOR REINSTALLATION.
- F. REMOVE EMERGENCY STOP BUTTON. PROTECT AND STORE FOR REINSTALLATION. BRANCH CIRCUIT TO REMAIN AND BE EXTENDED AS REQUIRED.
- G. REMOVE LIGHT FIXTURE COMPLETE AND TURN OVER TO OWNER. BRANCH CIRCUITING
- H. REMOVE LIGHT FIXTURE. PROTECT AND STORE FOR REINSTALLATION. BRANCH CIRCUIT TO REMAIN AND BE EXTENDED AS REQUIRED.



656 West Kirby Street, Detroit, MI 48202

Project Location:

WAYNE STATE UNIVERSITY ENGINEERING BUILDING **5050 ANTHONY WAYNE DRIVE DETROIT MICHIGAN 48202**

CONTACT: Mark Gibbons

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issue:	date
50% REVIEW	02.04.15
BID	02.06.15

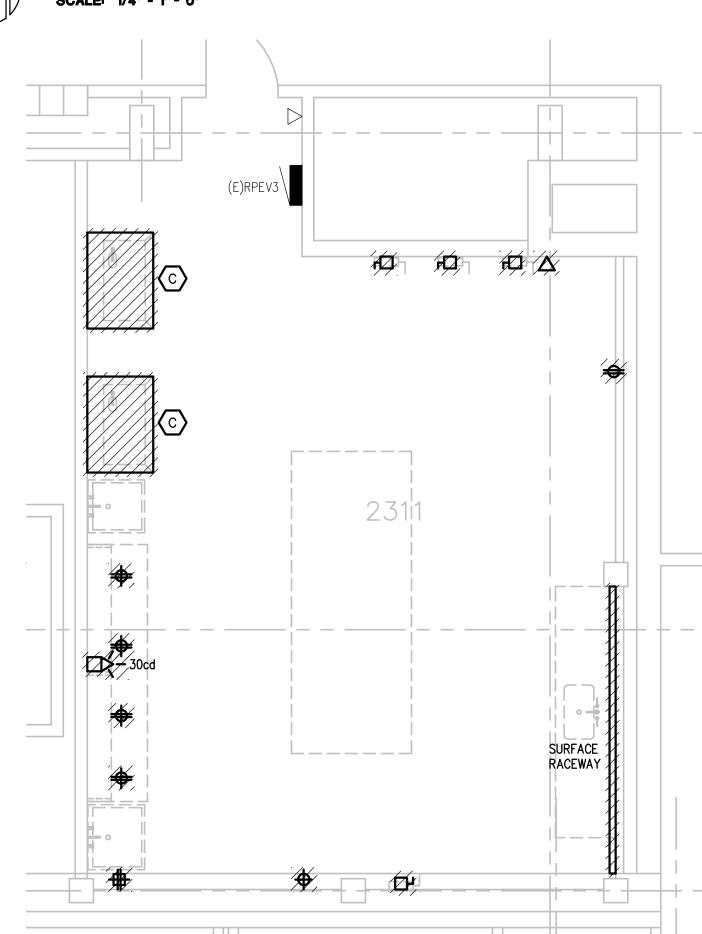
designed by.	WGI
drawn by:	WGI
coordination checked:	MS
checked:	MS0
approved:	JAN
project:	
Engineering	
Research Labs -	

sheet title: THIRD FLOOR ELECTRICAL **DEMOLITION PLAN**

Phase Two

sheet number: project number: ED102 090-250890

PARTIAL 2ND FLOOR LIGHTING DEMOLITION PLAN SCALE: 1/4" - 1' - 0"

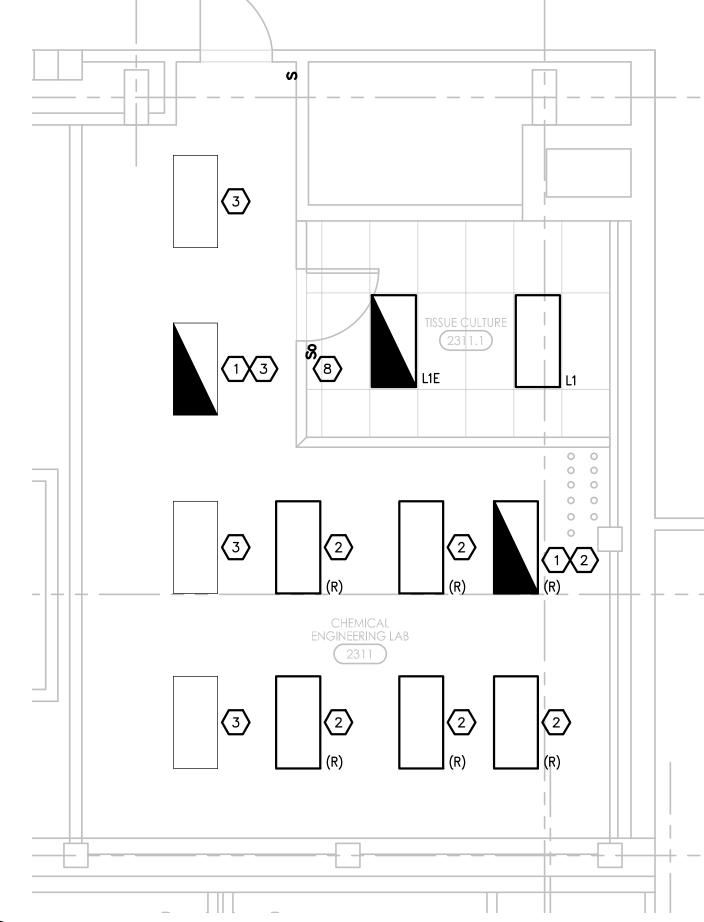


GENERAL NOTES:

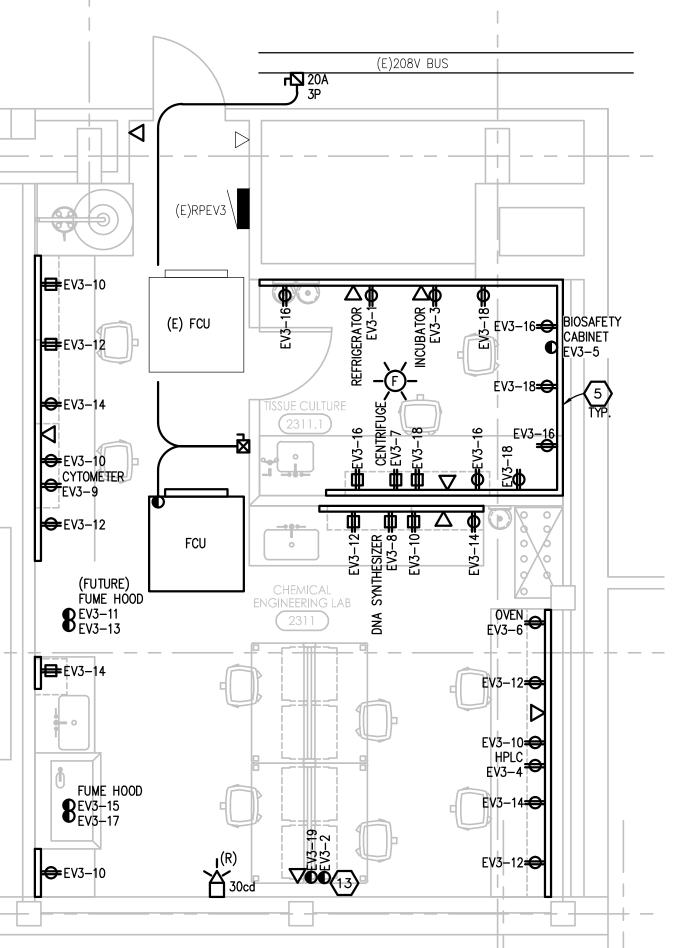
- 1. VISIT THE SITE PRIOR TO SUBMISSION OF BID TO EXAMINE THE EXISTING CONDITIONS AND THE EXTENT OF DEMOLITION WORK.
- 2. EXAMINE THE DRAWINGS OF OTHER TRADES AND BE FAMILIAR WITH THE DEMOLITION REQUIRED BY OTHER TRADES. PERFORM ALL INCIDENTAL ELECTRICAL DEMOLITION AND/OR RELOCATION REQUIRED TO FACILITATE THE DEMOLITION WORK OF OTHER TRADES, WHETHER OR NOT SPECIFICALLY INDICATED.
- 3. REMOVE LIGHTING FIXTURES AND ELECTRICAL DEVICES AS INDICATED ON PLAN WITH CROSS HATCHING. DEMOLITION SHALL INCLUDE, BUT NOT BE LIMITED TO, THOSE DEVICES SHOWN.
- 4. COORDINATE WITH NEW WORK PLANS, ONE LINE DIAGRAMS AND RISER DIAGRAMS FOR EXTENT OF DEMOLITION WORK.
- 5. PROVIDE PROPER SUPPORT FOR EXISTING TO REMAIN CONDUITS AND BOXES WHERE EXISTING SUPPORT IS TO BE REMOVED. RE-ROUTE BRANCH CIRCUIT CONDUITS AND RELOCATE JUNCTION BOXES AS REQUIRED TO FACILITATE INSTALLATION OF NEW EQUIPMENT AND SYSTEMS IN CEILING SPACES.
- 6. REMOVE ALL CONDUIT AND WIRE BACK TO THE SOURCE OR NEAREST UPSTREAM DEVICE REMAINING IN SERVICE.
- 7. MAINTAIN ELECTRICAL SERVICE TO ALL LIGHTING FIXTURES, DEVICES AND EQUIPMENT THAT ARE TO REMAIN. EXTEND CONDUIT AND WIRE AS REQUIRED WHERE DEMOLITION WORK AFFECTS ELECTRICAL SERVICE TO DOWNSTREAM LOADS THAT ARE TO REMAIN.
- 8. DISPOSE OF ALL MATERIALS OFF SITE AND INCLUDE ALL COSTS FOR DISPOSAL IN BID. ALL MATERIALS SHALL BE DISPOSED OF IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS, INCLUDING TCLP TESTING, PROPER DISPOSAL AND/OR RECYCLING OF FLUORESCENT LAMPS.
- 9. PROVIDE BLANK COVER PLATES WHERE SWITCHES AND DEVICES ARE REMOVED BUT EXISTING WALLS REMAIN INTACT.
- 10. RING OUT AND TAG ALL CIRCUITS AFFECTED BY THIS ALTERATION AT BOTH ENDS. MARK ALL UNUSED CIRCUIT BREAKERS "SPARE".
- 11. PROVIDE UPDATED TYPED-IN DIRECTORIES FOR ALL PANELS AFFECTED BY THIS ALTERATION.
- 12. COORDINATE ANY SHUT DOWN OF EXISTING SERVICES AND EQUIPMENT THAT ARE REMAINING IN USE WITH THE OWNER'S REPRESENTATIVE. WHERE EXISTING BUILDING SERVICE IS REQUIRED TO BE SHUT DOWN, INCLUDE ALL ASSOCIATED OVERTIME COSTS TO PERFORM THIS WORK DURING WEEKENDS AND EVENINGS INCLUDE ALL COSTS FOR PROVIDING TEMPORARY POWER WHERE SHUT DOWNS MUST OCCUR FOR PERIODS LONGER THAN THESE HOURS. COORDINATE ELECTRICAL SHUT DOWNS WITH THE OWNER 72 HOURS PRIOR TO SHUT DOWN.

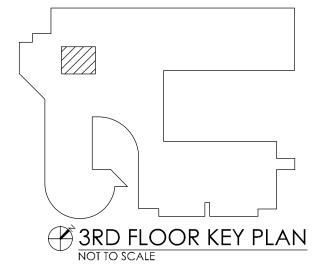
DEMOLITION NOTES:

- A. DISCONNECT PANELBOARD FEEDER AND REMOVE TO CEILING SPACE. REMOVE PANELBOARD. CLEAN, STORE AND PROTECT PANELBOARD FOR REINSTALLATION IN NEW LOCATION. EXTEND FEEDER TO NEW PANEL LOCATION. REFER TO NEW WORK
- B. REMOVE LIGHT FIXTURE. PROTECT AND STORE FOR REINSTALLATION. REMOVE BRANCH CIRCUIT BACK TO SOURCE.
- C. FUME HOOD REMOVAL BY OTHERS. REMOVE BRANCH CIRCUIT BACK TO SOURCE.
- D. REMOVE LIGHT FIXTURE COMPLETE AND TURN OVER TO OWNER.
- E. REMOVE FIRE ALARM NOTIFICATION APPLIANCE. PROTECT AND STORE FOR REINSTALLATION.
- F. REMOVE EMERGENCY STOP BUTTON. PROTECT AND STORE FOR REINSTALLATION. BRANCH CIRCUIT TO REMAIN AND BE EXTENDED AS REQUIRED.
- G. REMOVE LIGHT FIXTURE COMPLETE AND TURN OVER TO OWNER. BRANCH CIRCUITING TO REMAIN.
- H. REMOVE LIGHT FIXTURE. PROTECT AND STORE FOR REINSTALLATION. BRANCH CIRCUIT TO REMAIN AND BE EXTENDED AS REQUIRED.









GENERAL NOTES:

- 1. THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS, BUT ARE NOT TO BE CONSIDERED FABRICATION DRAWINGS. COORDINATE WITH OTHER TRADES, AND PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS, AND OFFSETS.
- 2. INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.
- 3. COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT. AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
- 4. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL
- 5. MOTOR CIRCUIT PROTECTION SHALL BE SIZED IN ACCORDANCE WITH MOTOR CIRCUIT SIZING SCHEDULES SHOWN ON "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS OTHERWISE NOTED.
- 6. COORDINATE THE MOUNTING HEIGHTS OF DEVICES WITH ARCHITECTURAL ELEVATIONS AND THE TRADES INSTALLING THE WORK.
- 7. REFER TO MECHANICAL SCHEDULE SHEETS FOR ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT. PROVIDE ALL CONNECTIONS, STARTERS, DISCONNECTS, ETC. AS REQUIRED BY SCHEDULES AND WHERE NOTED ELSEWHERE. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH SHOP DRAWINGS SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN EQUIPMENT SUBMITTALS AND ELECTRICAL DRAWINGS. WHERE CIRCUIT SIZES ARE SHOWN ON THE ELECTRICAL DRAWINGS THAT DIFFER FROM WHAT IS INDICATED ON THE MECHANICAL SCHEDULES, PROVIDE THE CIRCUIT OF HIGHER AMPACITY.
- 8. ELECTRICAL CONTRACTOR TO PROVIDE CONTROL WIRING FOR MECHANICAL SYSTEMS. PROVIDE CONDUITS, CONDUCTORS, CONTROL TRANSFORMERS, AND 120VAC/240VDC POWER AS REQUIRED FOR TEMPERATURE CONTROLS. ELECTRICAL CONTRACTOR TO INSTALL TEMPERATURE CONTROLS. COORDINATE EXACT REQUIREMENTS WITH MECHANICAL TRADES AND SIEMENS DRAWINGS.
- NEW FIRE ALARM APPLIANCE SHALL BE COMPATIBLE WITH EXISTING NATIONAL TIME AND SIGNAL ALARM SYSTEM. EXISTING FIRE ALARM CONTROL PANEL IS LOCATED IN THE CORRIDOR NEAR LOUNGE 1200 ON FIRST FLOOR. PROVIDE NECESSARY COMPONENTS, MODULES ETC. AS REQUIRED FOR FULLY FUNCTIONAL SYSTEM. RE-TEST AND CERTIFY EXISTING FIRE ALARM SYSTEM AT COMPLETION OF PROJECT.
- 10. ALL EXIT SIGNS SHALL BE CIRCUITED TO THE HOT LEG OF ADJACENT LIGHTING

CONSTRUCTION KEY NOTES:

- 1. PROVIDE EXTERNAL EMERGENCY BATTERY PACK FOR EXISTING FIXTURE. CONNECT TO HOT LEG OF EXISTING CIRCUIT. REFER TO WIRING DIAGRAM ON E7.1.
- 2. REINSTALL PREVIOUSLY REMOVED FIXTURE AT 9'-0" A.F.F. CLEAN AND RE-LAMP AFTER REINSTALLATION. EXTEND EXISTING BRANCH CIRCUITING AS REQUIRED.
- 3. CLEAN AND RE-LAMP EXISTING FIXTURE. REWORK FIXTURE TO BE 9'-0" A.F.F. EXTEND EXISTING LIGHTING BRANCH CIRCUIT AS REQUIRED.
- 4. PROVIDE NEW OCCUPANCY SENSORS AND ASSOCIATED POWER PACK AS INDICATED AND REQUIRED. CONNECT TO EXISTING BRANCH CIRCUIT AND CONTROL. EXTEND CONDUIT AND WIRING AS REQUIRED. REFER TO DETAIL ON E7.1.
- 5. WIREMOLD DS4000 OR ENGINEER APPROVED EQUAL.
- 6. REINSTALL PREVIOUSLY REMOVED FIRE ALARM NOTIFICATION APPLIANCE. SET CANDELA RATING AS INDICATED. PROVIDE NECESSARY COMPONENTS, MODULES, ETC. AS REQUIRED FOR FULLY FUNCTIONAL SYSTEM.
- 7. CIRCUIT EXISTING EMERGENCY STOP TO (R)P.P-C.
- 8. CONNECT TO EXISTING BRANCH CIRCUIT AS REQUIRED.
- 9. SET CANDELA RATING AS INDICATED. PROVIDE NECESSARY COMPONENTS, MODULES, ETC. AS REQUIRED FOR FULLY FUNCTIONAL SYSTEM.
- 10. PROVIDE A 208V, 3φ, 20A CORD REEL FROM REELCRAFT, HUBBELL OR DANIEL WOODHEAD. COORDINATE WITH MANUFACTURER FOR SPECIAL ORDERING. COORDINATE CEILING MOUNTING LOCATION WITH ARCHITECTURAL DRAWINGS AND TRADES.
- 11. PROVIDE A 208V, 10, 20A CORD REEL FROM REELCRAFT, HUBBELL OR DANIEL WOODHEAD. COORDINATE WITH MANUFACTURER FOR SPECIAL ORDERING. COORDINATE CEILING MOUNTING LOCATION WITH ARCHITECTURAL DRAWINGS AND TRADES.
- 12. PROVIDE A 120V 20A CORD REEL FROM REELCRAFT, HUBBELL OR DANIEL WOODHEAD. COORDINATE CEILING MOUNTING LOCATION WITH ARCHITECTURAL DRAWINGS AND TRADES.
- 13. ROUTE FURNITURE BRANCH CIRCUIT AND TELECOMMUNICATION CONDUIT FROM CEILING SPACE DOWN THROUGH CHASE WALL. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS. CONNECT BRANCH CIRCUIT TO FURNITURE POWER BUS. REFER TO DETAIL ON SHEET E701. COORDINATE EXACT REQUIREMENTS WITH FURNITURE MANUFACTURER.
- 14. INSTALL PREVIOUSLY REMOVED EMERGENCY STOP. CIRCUIT EMERGENCY STOP TO ELECTRICAL PANEL (R)P.P-C.
- 15. SERVICE CARRIER PROVIDED BY OTHERS. PROVIDE DEVICES AND CIRCUIT AS
- 16. COORDINATE EXACT LOCATION OF RTU-1 WITH MECHANICAL DRAWINGS AND

Peter Basso Associates Inc CONSULTING ENGINEERS

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Project Location:

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5050 ANTHONY WAYNE DRIVE DETROIT MICHIGAN 48202

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designed by: drawn by: coordination checked: checked: approved: project: Engineering Research Labs -Phase Two

sheet title: SECOND FLOOR **ELECTRICAL PLANS**

sheet number: project number:

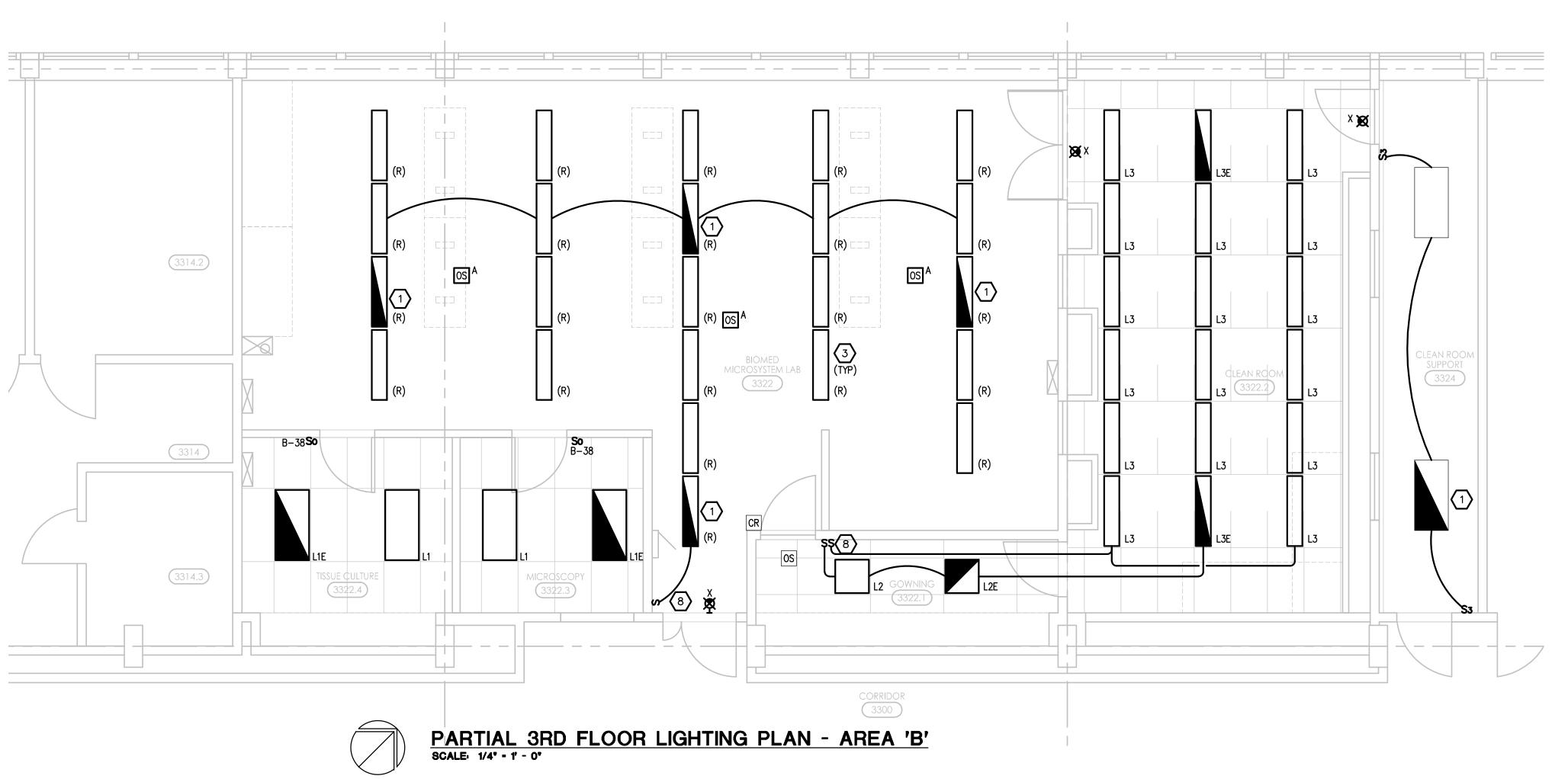
E101 090-250890 (1156-2: IDesign project number)

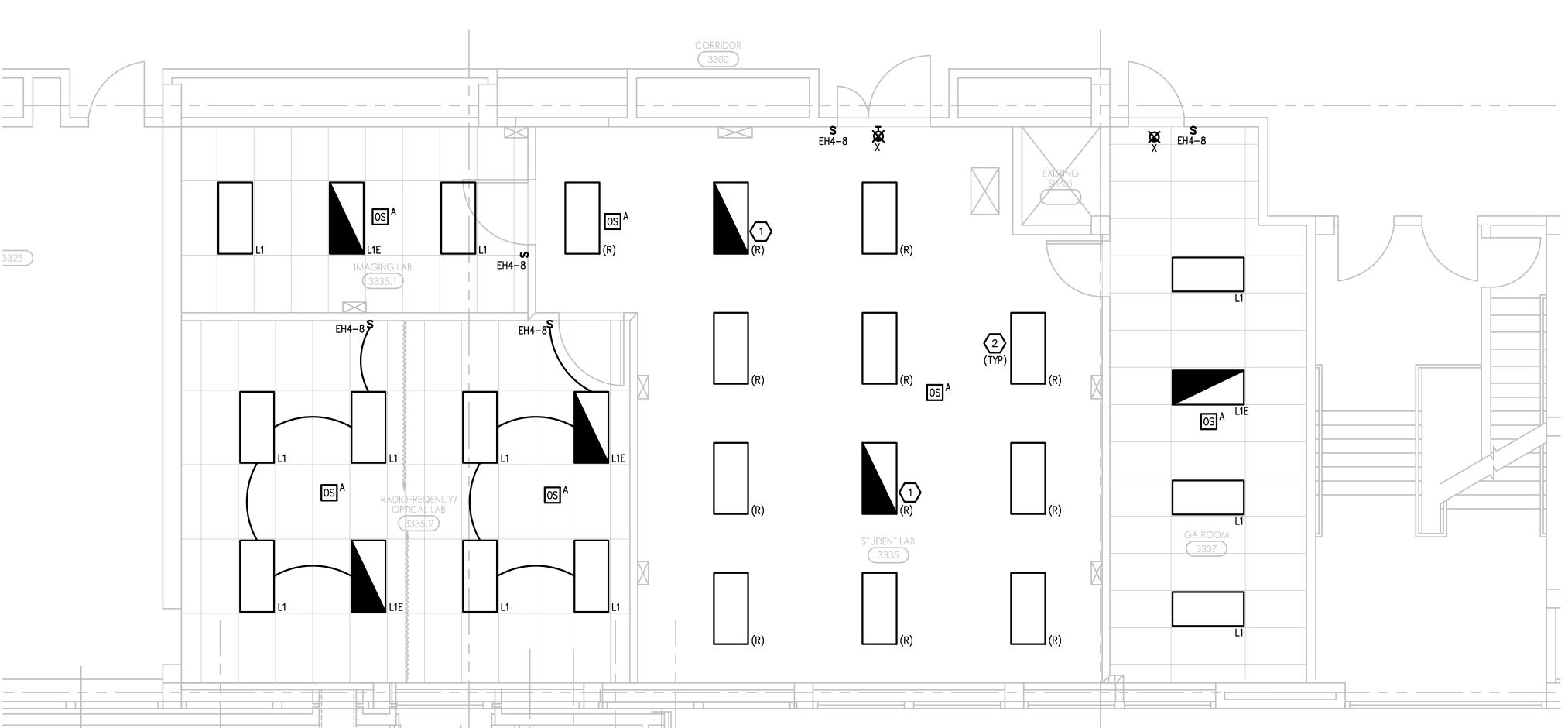
SCALE: 1/4" - 1' - 0"

PARTIAL 2ND FLOOR POWER AND AUXILIARY DEMOLITION PLAN SCALE: 1/4" - 1' - 0"

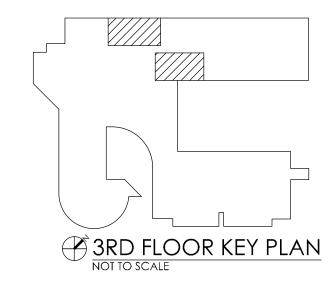
THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE.

PARTIAL 2ND FLOOR POWER AND AUXILIARY NEW WORK PLAN





THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE.



GENERAL NOTES:

- 1. THESE DRAWINGS REPRESENT THE GENERAL EXTENT AND ARRANGEMENT OF SYSTEMS, BUT ARE NOT TO BE CONSIDERED FABRICATION DRAWINGS. COORDINATE WITH OTHER TRADES, AND PROVIDE EACH SYSTEM COMPLETE, INCLUDING ALL NECESSARY COMPONENTS, FITTINGS, AND OFFSETS.
- 2. INSTALL SYSTEMS SUCH THAT REQUIRED CLEARANCE AND SERVICE ACCESS SPACE IS PROVIDED AROUND ALL MECHANICAL AND ELECTRICAL EQUIPMENT, AND AROUND ANY COMPONENTS WHICH REQUIRE SERVICE ACCESS.
- 3. COORDINATE AND PROVIDE ACCESS DOORS WITHIN INACCESSIBLE CEILING, SHAFT, AND CHASE AREAS FOR ALL COMPONENTS WHICH REQUIRE SERVICE ACCESS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
- 4. PROVIDE SUPPLEMENTARY STEEL AS REQUIRED FOR THE PROPER SUPPORT OF ALL SYSTEMS.
- 5. MOTOR CIRCUIT PROTECTION SHALL BE SIZED IN ACCORDANCE WITH MOTOR CIRCUIT SIZING SCHEDULES SHOWN ON "ELECTRICAL STANDARD SCHEDULES DRAWING" UNLESS OTHERWISE NOTED.
- 6. COORDINATE THE MOUNTING HEIGHTS OF DEVICES WITH ARCHITECTURAL ELEVATIONS AND THE TRADES INSTALLING THE WORK.
- 7. REFER TO MECHANICAL SCHEDULE SHEETS FOR ELECTRICAL REQUIREMENTS FOR MECHANICAL EQUIPMENT. PROVIDE ALL CONNECTIONS, STARTERS, DISCONNECTS, ETC. AS REQUIRED BY SCHEDULES AND WHERE NOTED ELSEWHERE. VERIFY REQUIREMENTS OF ALL MECHANICAL EQUIPMENT WITH SHOP DRAWINGS SUBMITTALS. NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN EQUIPMENT SUBMITTALS AND ELECTRICAL DRAWINGS. WHERE CIRCUIT SIZES ARE SHOWN ON THE ELECTRICAL DRAWINGS THAT DIFFER FROM WHAT IS INDICATED ON THE MECHANICAL SCHEDULES, PROVIDE THE CIRCUIT OF HIGHER AMPACITY.
- 8. ELECTRICAL CONTRACTOR TO PROVIDE CONTROL WIRING FOR MECHANICAL SYSTEMS. PROVIDE CONDUITS, CONDUCTORS, CONTROL TRANSFORMERS, AND 120VAC/240VDC POWER AS REQUIRED FOR TEMPERATURE CONTROLS. ELECTRICAL CONTRACTOR TO INSTALL TEMPERATURE CONTROLS. COORDINATE EXACT REQUIREMENTS WITH MECHANICAL TRADES AND SIEMENS DRAWINGS.
- 9. NEW FIRE ALARM APPLIANCE SHALL BE COMPATIBLE WITH EXISTING NATIONAL TIME AND SIGNAL ALARM SYSTEM. EXISTING FIRE ALARM CONTROL PANEL IS LOCATED IN THE CORRIDOR NEAR LOUNGE 1200 ON FIRST FLOOR. PROVIDE NECESSARY COMPONENTS, MODULES ETC. AS REQUIRED FOR FULLY FUNCTIONAL SYSTEM. RE-TEST AND CERTIFY EXISTING FIRE ALARM SYSTEM AT COMPLETION OF PROJECT.
- 10. ALL EXIT SIGNS SHALL BE CIRCUITED TO THE HOT LEG OF ADJACENT LIGHTING BRANCH CIRCUIT.

(#) CONSTRUCTION KEY NOTES:

EXTEND EXISTING LIGHTING BRANCH CIRCUIT AS REQUIRED.

- 1. PROVIDE EXTERNAL EMERGENCY BATTERY PACK FOR EXISTING FIXTURE. CONNECT TO HOT LEG OF EXISTING CIRCUIT. REFER TO WIRING DIAGRAM ON E7.1.
- 2. REINSTALL PREVIOUSLY REMOVED FIXTURE AT 9'-0" A.F.F. CLEAN AND RE-LAMP AFTER REINSTALLATION. EXTEND EXISTING BRANCH CIRCUITING AS REQUIRED.
- 3. CLEAN AND RE-LAMP EXISTING FIXTURE. REWORK FIXTURE TO BE 9'-0" A.F.F.
- 4. PROVIDE NEW OCCUPANCY SENSORS AND ASSOCIATED POWER PACK AS INDICATED AND REQUIRED. CONNECT TO EXISTING BRANCH CIRCUIT AND CONTROL. EXTEND CONDUIT AND WIRING AS REQUIRED. REFER TO DETAIL ON E7.1.
- 5. WIREMOLD DS4000 OR ENGINEER APPROVED EQUAL.
- 6. REINSTALL PREVIOUSLY REMOVED FIRE ALARM NOTIFICATION APPLIANCE. SET CANDELA RATING AS INDICATED. PROVIDE NECESSARY COMPONENTS, MODULES, ETC. AS REQUIRED FOR FULLY FUNCTIONAL SYSTEM.
- 7. CIRCUIT EXISTING EMERGENCY STOP TO (R)P.P-C.
- 8. CONNECT TO EXISTING BRANCH CIRCUIT AS REQUIRED.
- 9. SET CANDELA RATING AS INDICATED. PROVIDE NECESSARY COMPONENTS, MODULES, ETC. AS REQUIRED FOR FULLY FUNCTIONAL SYSTEM.
- 10. PROVIDE A 208V, 3φ, 20A CORD REEL FROM REELCRAFT, HUBBELL OR DANIEL WOODHEAD. COORDINATE WITH MANUFACTURER FOR SPECIAL ORDERING. COORDINATE CEILING MOUNTING LOCATION WITH ARCHITECTURAL DRAWINGS AND TRADES.
- 11. PROVIDE A 208V, 1¢, 20A CORD REEL FROM REELCRAFT, HUBBELL OR DANIEL WOODHEAD, COORDINATE WITH MANUFACTURER FOR SPECIAL ORDERING, COORDINATE CEILING MOUNTING LOCATION WITH ARCHITECTURAL DRAWINGS AND TRADES.
- 12. PROVIDE A 120V 20A CORD REEL FROM REELCRAFT, HUBBELL OR DANIEL WOODHEAD. COORDINATE CEILING MOUNTING LOCATION WITH ARCHITECTURAL DRAWINGS AND TRADES.
- 13. ROUTE FURNITURE BRANCH CIRCUIT AND TELECOMMUNICATION CONDUIT FROM CEILING SPACE DOWN THROUGH CHASE WALL. REFER TO ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS. CONNECT BRANCH CIRCUIT TO FURNITURE POWER BUS. REFER TO DETAIL ON SHEET E701. COORDINATE EXACT REQUIREMENTS WITH FURNITURE MANUFACTURER.
- 14. INSTALL PREVIOUSLY REMOVED EMERGENCY STOP. CIRCUIT EMERGENCY STOP TO ELECTRICAL PANEL (R)P.P-C.
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drawn by:	WGH
coordination checked:	MSG
checked:	MSG
approved:	JAM
oroject:	

Engineering Research Labs -Phase Two

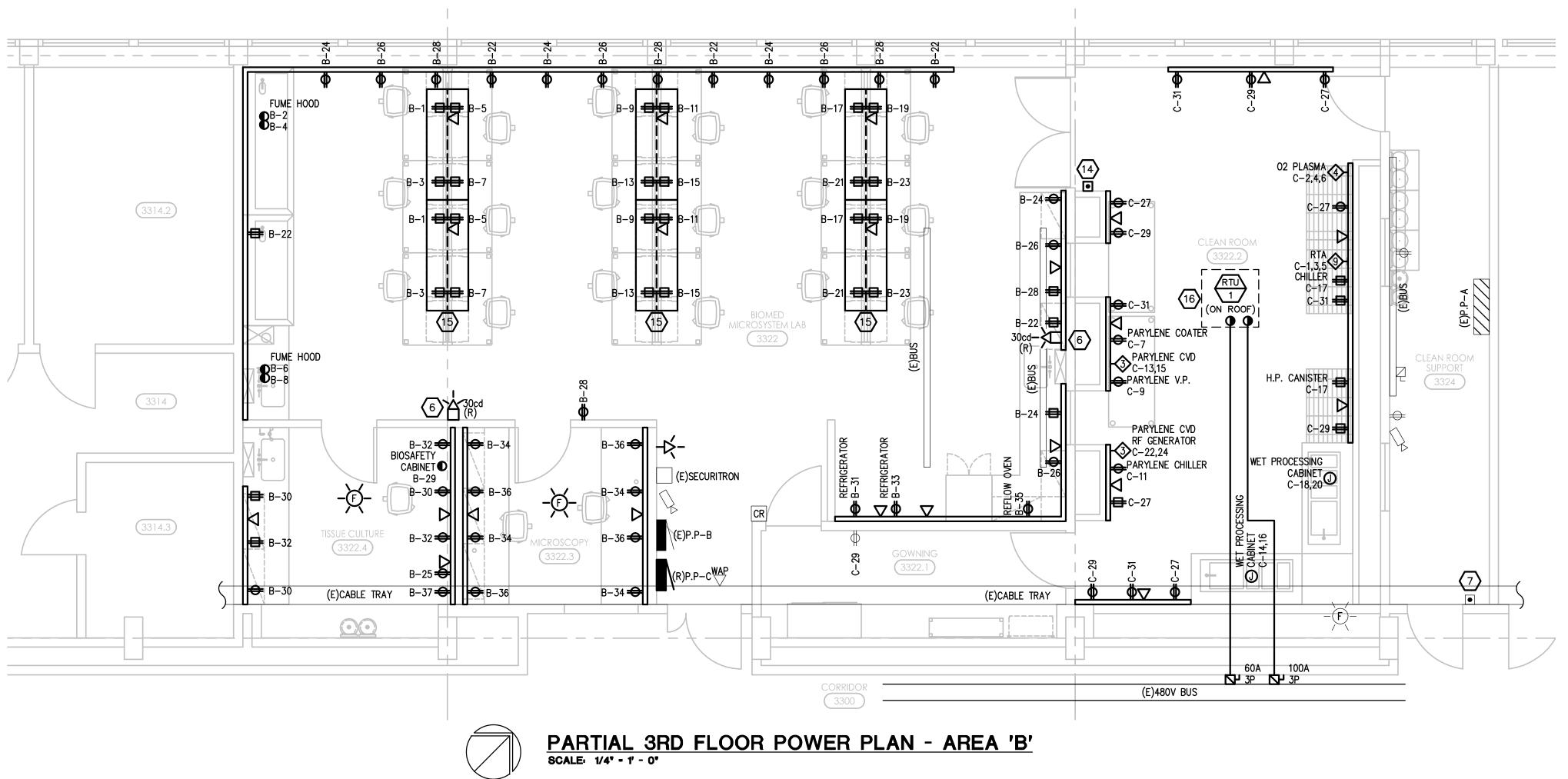
sheet title: THIRD FLOOR LIGHTING PLAN

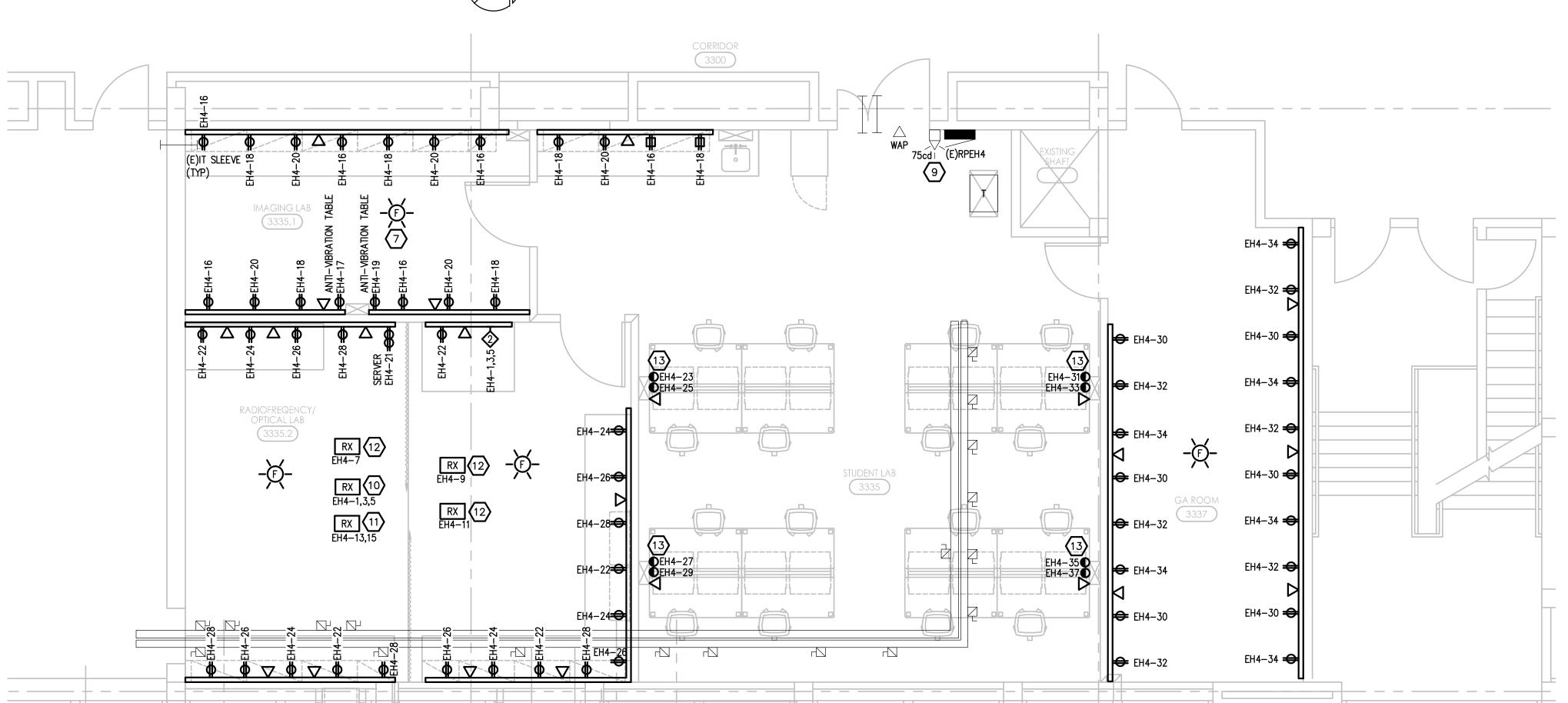
project number: sheet number: 090-250890

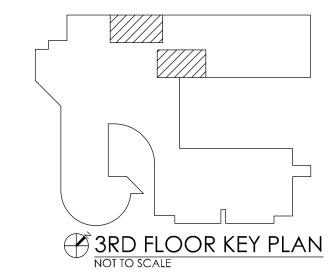
(1156-2: IDesign project number)

E202

				(R)	(R) OS A	(TYP) (R)	OS A L1E	
QENCY/ L LAB	L1	L1E OS A] (R)	(R)	(R)	L1 GA ROOM 3337	
	L1] _(R)	STUDENT LAB 3335 (R)	(R)	(3337) L1	
PA SCAL	RTIAL 3	BRD FLOOF	<u>R LIGHTING</u>	<u> PLAN</u>	- AREA 'A'			







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PBA Project No. 2014.0386

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02.04.15
02.06.15

designed by:	WGH
drawn by:	<u>WGH</u>
coordination checked:	MSG
checked:	MSG
approved:	JAM
project:	

Engineering
Research Labs Phase Two

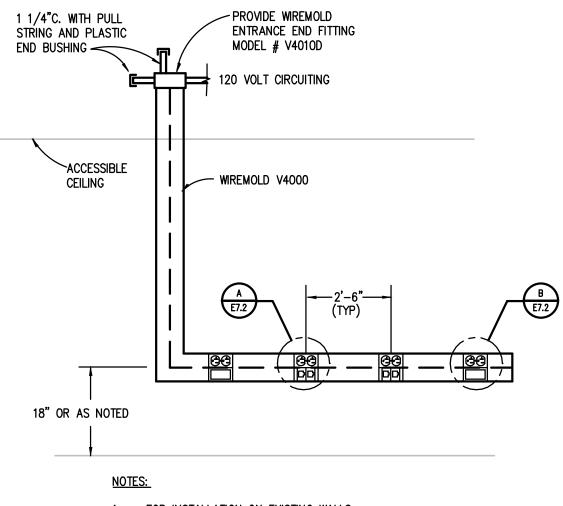
sheet title:
THIRD FLOOR POWER
AND AUXILIARY
SYSTEMS PLAN

project number: sheet number: 090-250890 E302

(1156-2: IDesign project number)

THE FOLLOWING DIMENSION EQUALS ONE INCH WHEN PRINTED TO SCALE.

PARTIAL 3RD FLOOR POWER PLAN - AREA 'A'

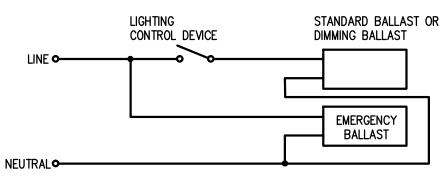


1. FOR INSTALLATION ON EXISTING WALLS

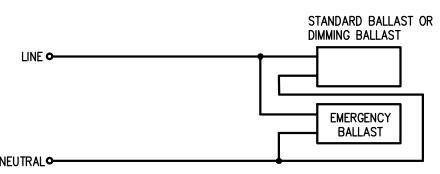
2. IF CEILING IN ROOM IS NOT ACCESSIBLE, ROUTE CONDUIT TO NEAREST ACCESSIBLE CEILING IN DIRECTION OF TELECOM ROOM

SURFACE MOUNTED RACEWAY DETAIL

NO SCALE



SWITCHED (NON-NIGHT LIGHT EMERGENCY FIXTURE)

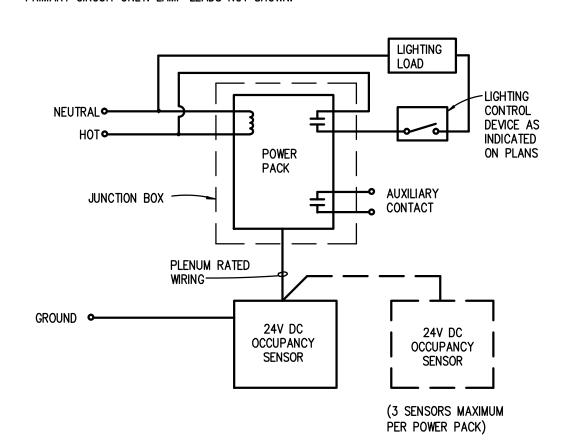


UNSWITCHED (NIGHT LIGHT EMERGENCY FIXTURE)

EMERGENCY BALLAST WIRING DIAGRAM

NO SCALE

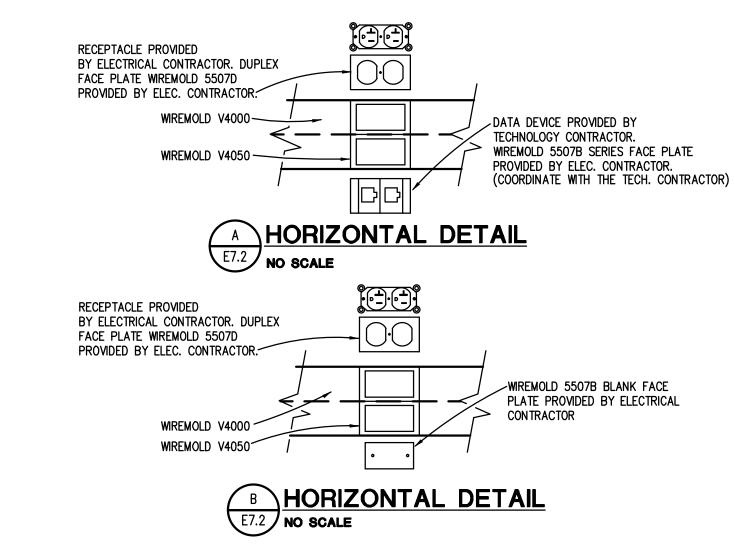
NOTE: PRIMARY CIRCUIT ONLY. LAMP LEADS NOT SHOWN.

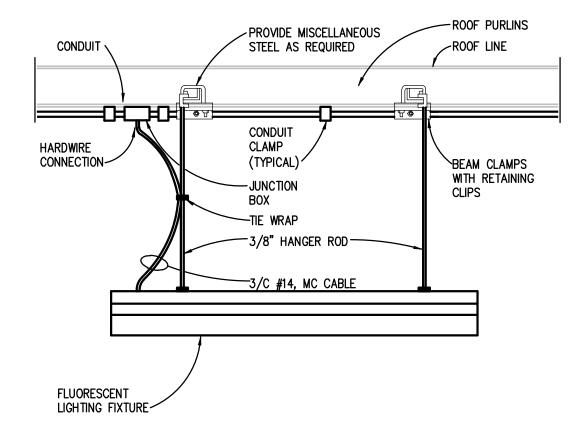


OCCUPANCY SENSOR WIRING DIAGRAM NO SCALE

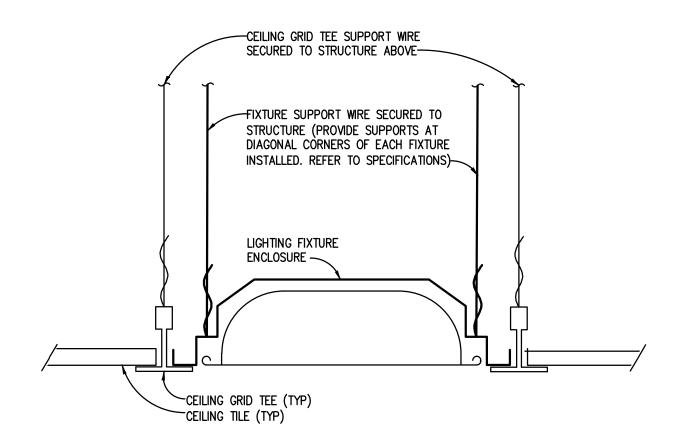
NOTES:

- REFER TO SPECIFICATIONS FOR ACCEPTED MANUFACTURERS. PROVIDE POWER PACKS AND SLAVE PACKS AS REQUIRED FOR SWITCHING AS INDICATED ON
- PLAN. REVISE DETAIL AS REQUIRED BY MANUFACTURER.
- 3. MOUNTING LOCATION PER MANUFACTURER'S RECOMMENDATION. 4. ADJUST SENSITIVITY LEVELS PER THE OWNER REQUIREMENTS.
- 5. PROVIDE FACTORY SUPPORT FOR AIMING/ADJUSTING OF SENSORS.
- 6. PLACE CEILING MOUNTED OCCUPANCY SÉNSORS IN CENTER OF A FULL CEILING TILE, WHERE APPLICABLE.
- SENSOR ADJUSTMENT: BEFORE MAKING ADJUSTMENTS, MAKE SURE ROOM FURNITURE IS INSTALLED, LIGHTING CIRCUITS ARE TURNED ON, AND THE HVAC SYSTEMS ARE IN THE ON POSITION, VAV SYSTEMS SHOULD BE SET TO THEIR HIGHEST AIRFLOW, SET THE LOGIC CONFIGURATION DIP SWITCHES TO "EITHER". EITHER REQUIRES MOTION DETECTION BY ONLY ONE TECHNOLOGY. SET THE TIME DELAY PER OWNERS DIRECTION.

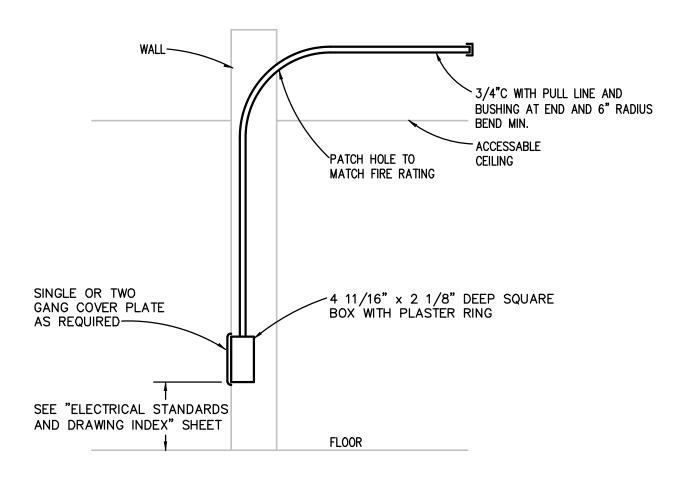




DETAIL OF PENDANT MOUNTED FLUORESCENT LIGHTING FIXTURE NO SCALE



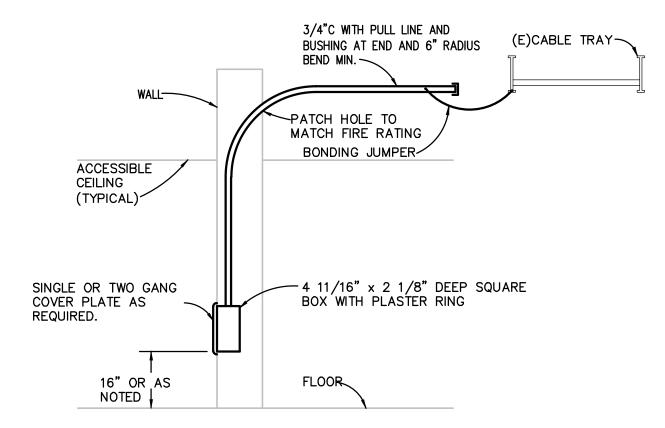
RECESSED LIGHTING FIXTURE **INSTALLATION DETAIL** NO SCALE



TELE/DATA OUTLET DETAIL

NO SCALE NOTES:

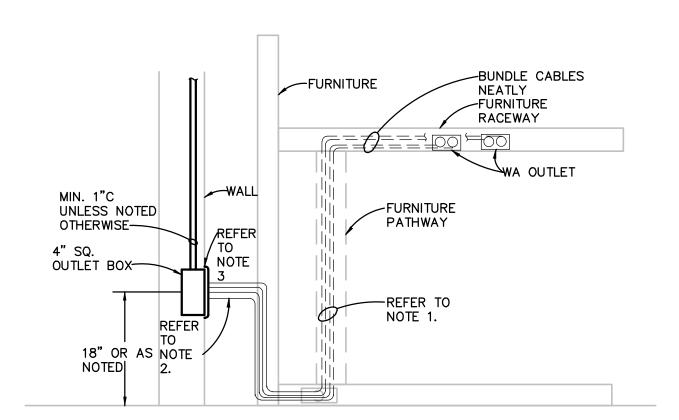
IF CEILING IN ROOM IS NOT ACCESSIBLE ROUTE CONDUIT TO NEAREST ACCESSIBLE CEILING IN DIRECTION OF TELECOM ROOM.



TELE/DATA OUTLET DETAIL

NO SCALE NOTES:

IF CEILING IN ROOM IS NOT ACCESSIBLE ROUTE CONDUIT TO NEAREST ACCESSIBLE CEILING IN DIRECTION OF TELECOM ROOM.



TYPICAL FURNITURE/CASEWORK INFEED DETAIL NO SCALE

NOTES:

- ROUTE CABLING CAREFULLY THROUGH PATHWAYS AND RACEWAYS IN FURNITURE/CASEWORK. PROVIDE PROTECTIVE AND AESTHETIC COVERING ON CABLING FROM OUTLET TO FURNITURE
- IN-FEED POINT. PROVIDE GROMMETED STAINLESS STEEL PLATE. REFER TO SPECIFICATIONS.
- 4. PROVIDE BEND RADIUS OF CONDUITS PER TIA/EIA-569-A.

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coordination checked:	MSG
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approved:	JAM
project:	
Engineering	

Phase Two

Research Labs -

sheet title:

ELECTRICAL DETAILS

sheet number: project number: E701 090-250890