ADDENDUM NO**. 1**
ISSUE DATE: **August 5, 2025**

RE: **GRAINGER HALL DINING EXPANSION AND RENOVATION**
UNIVERSITIES OF WISCONSIN - MADISON
MADISON, WISCONSIN
UW-Madison Project No. 9950-2307 / UWSA Project No. A-24-004

BID OPENING: **MEP Bid – 2:00 P.M., August 19, 2025.**
GPC Bid – 2:00 P.M., September 4, 2025.

FROM: **Workshop Architects**
201 E. Pittsburgh Ave. Suite 301
Milwaukee WI 53204

TO: Prospective Bidders

This addendum forms a part of the Contract Documents and modifies the original Contract Documents dated **June 20, 2025,** as noted below. Acknowledge receipt of this Addendum by inserting the number and issue date of this addendum in the blank space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.

This Addendum consists of 51 **page**s.

ANSWERS TO SUBMITTED QUESTIONS:

QUESTION: On sheet S101 the notes call out for the permanent ers [earth retention system] that we are to take into account the adjacent foundation loading. Can the structural engineer provide the loading of the existing foundations on the S101 plan page that are to be taken into account when designing the permanent eras [earth retention system]?

RESPONSE: Refer to existing structural drawings for assumed soil bearing pressures and footing geometry/elevations.

Structural drawings reference 01/05/2009 RECORD DRAWINGS – (**01-05-2009 RECORD DRAWINGS Grainger Hall structural drawings.pdf**) and 11/3/93 AS-BUILT DRAWINGS – (**11-3-93 AS-BUILT drawings Grainger Hall structural drawings.pdf**) for existing structural drawings.

EXISTING STRUCTURAL DRAWINGS FOR REFERENCE ONLY CAN ACCESSED TROUGH BOX FOLDER LOCATED AT: https://app.box.com/s/493q0hyc1y2pj0f9k4eh60uveencdgfm
The existing drawings are being provided for bidding purposes only. Layouts and other information on these drawings have not been confirmed with actual conditions. The existing conditions will need to be field verified by the contractor. Existing drawings provided are scans of the original. Do not scale from drawings. Refer to project general requirements, drawings, and specifications for additional information.

CONTRACTOR QUESTION: [Sheet S101 - Sheet Notes] Note 8 e. calls out the max thickness of the ers [earth retention system] perpendicular to the plane shall be 16".

a. With the requirements provided of the vertical loading, that the ers [earth retention system] must be a cantilevered system, that the deflection is ¼" or less an ers [earth retention system] system with 16" max thickness is not feasible.

RESPONSE: The term cantilevered has been removed from the temporary earth retention system (ERS) description, as the design team is not requiring a cantilevered earth retention system (ERS) system, though a cantilevered system would be acceptable. The intent was to clarify that tiebacks or additional structural beyond the earth retention system (ERS) would not be acceptable.

i. In the temporary condition, there is no objection to providing temporary bracing (means/methods designed/provided by the contractor).
ii. In the final condition the earth retention system (ERS) noted on S101 may be considered braced by the reinforced concrete (RC) cap beam and adjacent Level 1 slab

CONTRACTOR QUESTION:

b. [Sheet S101 - Sheet Notes 8 – Note E] Can this 16" requirement be relaxed if the other requirements need to be accounted for?

RESPONSE: Sheet notes on sheet S101 have been updated to allow for maximum 3/8" allowable lateral deflection. Bidders should maintain the maximum 16" thickness.

CONTRACTOR QUESTION:

c. Or can the structural engineer design a retaining wall as the permanent structure and the ers [earth retention system] be for the temporary situation?

RESPONSE: The earth retention system (ERS) design to be maintained per bid documents.

QUESTION: For the internal face of the mechanical room (concrete) that will be attached to the permanent ers [earth retention system], please confirm what the loading imparted onto the ers [earth retention system] will be?

RESPONSE: 6" reinforced concrete (RC) wall at interior of north/south/east earth retention system (ERS) wall as noted on 2/S101 and 2/S330 is non-load bearing and is supported vertically by the mechanical room slab-on-grade. At a minimum, 6" RC wall to be laterally braced at t/wall.

QUESTION: Specifications state that the AV devices and accessories shall be provided and installed by the Owner. Please clarify the contractor's scope for the AV system.

RESPONSE: Contractor scope includes all conduits, raceways, boxes, and receptacles for the AV equipment. AV equipment and cabling for AV equipment will be owner furnished, and owner installed by owner's vendor.

SUBSTITUTIONS:

Substitutions are not reviewed during bidding but after contracts are awarded and through the construction period. Submit a Substitution Request as part of the submittal review process at which time the design team and owner will review your request and either accept or reject the request.

CHANGES TO THE DRAWINGS:

C050 - TRAFFIC CONTROL PLAN

The construction staging area on Brooks Street shall be reduced by half. New Staging area, E/W boundary, to be from eastern curb to the centerline of Brooks Street. The N/S boundary stays the same.

S101 – LEVEL 1 FRAMING PLAN

Revision to plan note 8

A401 - ENLARGED PLANS, SECTIONS & DETAILS – PLENARY

Ramp length increased to 20'-0"

Stair to raised platform adjusted to include clear 4'-0" by 4'-0" landings.

A405 - ENLARGED SHAFT PLANS & SECTIONS

Detail 5/A405 - Remove reference to 2-hour firewrap above level 4. Ther will be no firewrap at this location. Add fire/smoke dampers at floor penetrations on level 2, level 4 and level 5. See mechanical references in the addendum.

M201B – FIRST FLOOR DUCTWORK PLAN – AREA B

a. Added fire/smoke damper.
b. Revised sheet keynote 4 to reflect smoke detector requirement.

M201C – FIRST FLOOR DUCTWORK PLAN – AREA C

a. Added fire/soke damper.
b. Revised pull station location.
c. Revised notes 3, 4, & 5 to reflect insulation changes.

M204B – FORTH FLOOR DUCTWORK PLAN – AREA B

a. Added fire/soke damper.

M205B – FIFTH FLOOR DUCTWORK PLAN – AREA B

a. Added fire/soke damper.
b. Revised sheet keynote 1 to reflect VFD criteria.

M501 – EXHAUST AIR FLOW RISER DIAGRAM

a. Added fire/smoke dampers.

M604 – MECHANICAL DETAILS

a. Added fire/smoke damper details.

M700 – MECHANICAL SCHEDULES

a. Revised horsepower on EF-17.
b. Updated VFD schedule to reflect EF-17 change.
c. Revised minimum cfm for exhaust fans.

M701 – MECHANICAL SCHEDULES

a. Added fire/smoke damper schedule.

M702 – MECHANICAL SCHEDULES

a. Revised Electrical Equipment Schedule for EF-17 change.

E001 – ELECTRICAL ABBREVIATIONS, CODES AND DESIGNATIONS

a. Updated Sheet List

E216B – SIXTH FLOOR POWER PLAN – AREA B

b. Updated Sheet List

E231B – FIRST FLOOR FIRE ALARM PLAN – AREA B

a. Add a duct smoke detector.

E234B – FOURTH FLOOR FIRE ALARM PLAN – AREA B

a. Add a duct smoke detector.

E235B – FIFTH FLOOR FIRE ALARM PLAN – AREA B

b. Add a duct smoke detector.

E600 – ELECTRICAL SCHEDULES

c. Add, removed and edited Types.

E610 – ELECTRICAL SCHEDULES

a. Updated schedules.
b. Added keyed note.

E614 – ELECTRICAL SCHEDULES

a. Updated schedules.

CHANGES TO THE SPECIFICATION VOLUME 1 GPC and VOLUME 1 MEP
GPC (General Prime Contractor) BID DOCUMENTS
MEP (Mechanical, Electrical, Plumbing, and Fire Protection) BID DOCUMENTS

GPC INVITATION TO BID

Page A-1 - Line 11 Change to bid opening "BID OPENING for GENERAL PRIME CONTRACTOR BIDDERS: 2:00 P.M., **September 4, 2025."**

BID FORM – GENERAL PRIME CONTRACTOR (GPC)

Page C-1 - Line 11 Change to "General Prime Contractor (GPC) Bid Opening: 2:00 P.M., **September 4, 2025.**

MEP INVITATION TO BID

Page A-1 - Line 11 Change to bid opening "BID OPENING for GENERAL PRIME CONTRACTOR BIDDERS: 2:00 P.M., **September 4, 2025."**

CHANGES TO THE TECHNICAL SPECIFICATIONS BID DOCUMENTS
(DIVISIONS 2 THRU 33):

Division 07 – THERMAL AND MOISTURE PROTECTION

07 21 00 - THERMAL INSULATION

Under FOAM PLASTIC BOARD INSULATION MATERIALS, for Polyisocyanurate Board, Glass-Fiber-Mat Faced material - Atlas Energy Shield Rboard has been renamed by the manufacture to Energy Shield CGF or CGF Pro

Division 23 – HEATING VENTILATING AND AIR CONDITIONING

23 07 00 HVAC Insulation

a. Updated insulation for condensate ductwork and plenum slot diffusers.

23 33 00

a. Added fire/smoke dampers.

Division 32 – EXTERIOR IMPROVEMENTS

32 36 00 - EXTERIOR SITE FURNISHINGS AND SPECIALTY ITEMS

Add StormTank Urban Roots System under other possible manufacturers, as an approved product and manufacturer for the MODULAR SOIL VAULT.

ATTACHMENTS:

S101 – LEVEL 1 FRAMING PLAN
A401 - ENLARGED PLANS, SECTIONS & DETAILS – PLENARY
M201B - FIRST FLOOR DUCTWORK PLAN - AREA B
M201C - FIRST FLOOR DUCTWORK PLAN - AREA C
M204B - FOURTH FLOOR DUCTWORK PLAN - AREA B
M205B - FIFTH FLOOR DUCTWORK PLAN - AREA B

M501 - EXHAUST AIR RISER DIAGRAM
M604 - MECHANICAL DETAILS
M700 - MECHANICAL SCHEDULES
M701 - MECHANICAL SCHEDULES
M702 - MECHANICAL SCHEDULES
E000 - ELECTRICAL SYMBOLS AND SHEET INDEX
E216B - SIXTH FLOOR POWER PLAN - AREA B
E231B - FIRST FLOOR FIRE ALARM PLAN - AREA B
E234B - FOURTH FLOOR FIRE ALARM PLAN - AREA B
E235B - FIFTH FLOOR FIRE ALARM PLAN - AREA B
E610 - ELECTRICAL SCHEDULES
E614 - ELECTRICAL SCHEDULES
GPC INVITATION TO BID – Page A-1
BID FORM – GENERAL PRIME CONTRACTOR (GPC) – Page C-1
MEP INVITATION TO BID – Page A-1
23 07 00 HVAC INSULATION
23 33 00 AIR DUCT ACCESSORIES

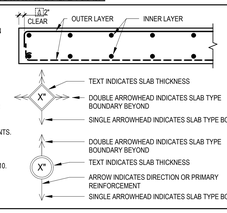
END OF ADDENDUM

The Board of Regents of The Universities of Wisconsin System
C/O UWSA - Capital Planning and Budget,
780 Regent Street, Suite 239
Madison, Wisconsin 53715

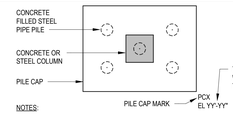
CONCRETE SLAB LEGEND

NOTES:

1. A. SLAB BOTTOM BAR CLEAR COVER 3/4" UON
   B. SLAB TOP BAR CLEAR COVER 3/4" UON
      1. AT EXTERIOR / PARKING SLABS, MAINTAIN 1 1/2" TOP CLEAR COVER
2. TWO-WAY SLAB BAR PLACEMENT:
   1. N-S DIRECTION OUTER LAYER
   2. E-W DIRECTION INNER LAYER
3. SEE TYPICAL SLAB DETAILS (S410 SERIES) FOR MORE INFORMATION.
4. SEE 7/S410 FOR IN-SLAB CONDUIT REQUIREMENTS.
5. AT CONSTRUCTION JOINTS SEE 1/S410.
6. AT WALL AND RE-ENTRANT CORNERS SEE 1/S410.



PILE CAP LEGEND



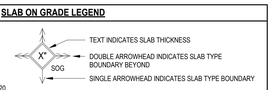
NOTES:

1. T/PILE CAP EL = 1'-6" BELOW T/1ST FLR SLAB ON GRADE UON ON PLAN
2. SEE TYPICAL PILE CAP SCHEDULE AND DETAILS
3. SEE PLAN FOR PILE CAP ORIENTATION
4. CENTER PILE GROUP CENTROID ON COLUMN ABOVE UON

SLAB ON GRADE LEGEND

NOTES:

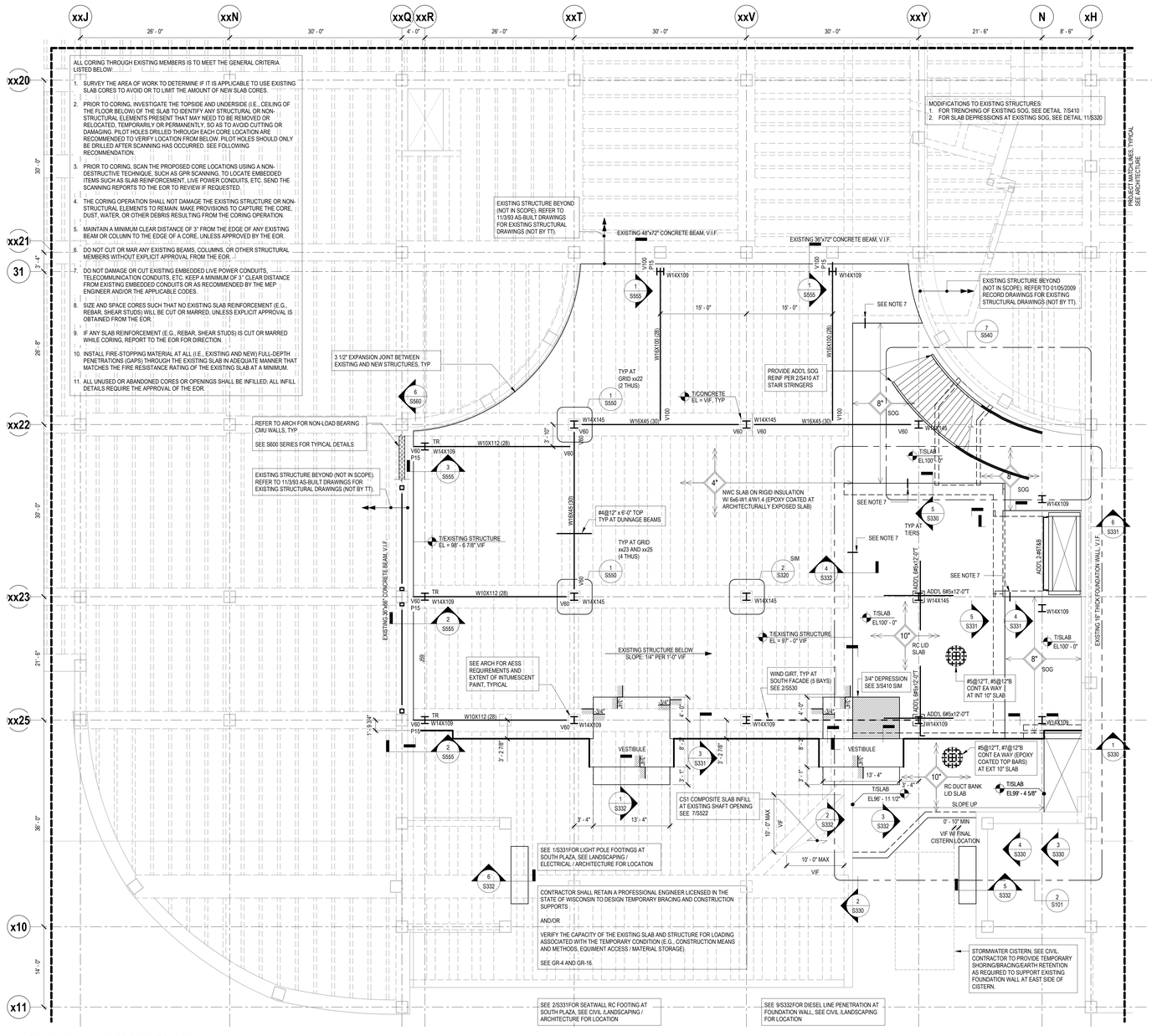
1. SEE TYPICAL SLAB ON GRADE DETAILS (S320 SERIES) FOR MORE INFORMATION.
2. AT CONSTRUCTION JOINTS SEE 1/S320.
3. AT WALL AND RE-ENTRANT CORNERS SEE 8/S320.
4. PROVIDE REINFORCEMENT BELOW AT SOG AND TOPPINGS SLABS UON:
   TYPICAL — 4 PCY MACRO FIBERS
   ARCHITECTURALLY FINISHED 6" SOG — 6x6-W1.4/W1.4 (EPOXY COATED)
   ARCHITECTURALLY FINISHED 8" SOG — 6x6-W2.9/W2.9 (EPOXY COATED)



SHEET NOTES:

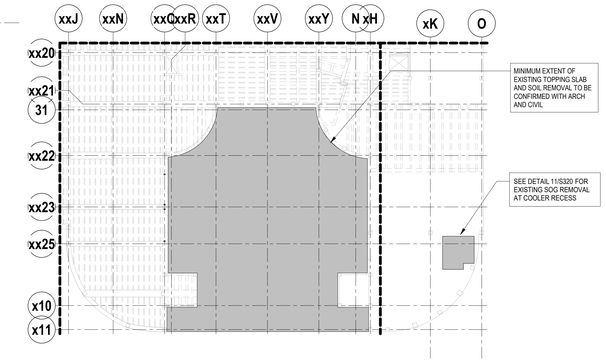
1. T/STRUCTURAL SLAB EL = T/TOPPING SLAB = T/SLAB ON GRADE = 100'-0" UON
   T/STEEL EL = 99'-8" UON
2. FOR ADDITIONAL INFORMATION REFER TO THE FOLLOWING DRAWINGS:
   SEE S-000 SERIES FOR GENERAL NOTES AND LOADING DIAGRAMS
   SEE S-100 SERIES FOR BUILDING FRAMING PLANS
   SEE S-200 SERIES FOR BUILDING AND ISOMETRICS AND ELEVATIONS
   SEE S-300 SERIES FOR FOUNDATION DETAILS
   SEE S-400 SERIES FOR CONCRETE SUPERSTRUCTURE DETAILS
   SEE S-500 SERIES FOR STRUCTURAL STEEL DETAILS
   SEE S-700 SERIES FOR TYPICAL NON-LOAD BEARING MASONRY DETAILS
3. SEE GENERAL NOTES FOR CONCRETE COMPRESSIVE STRENGTH
4. NOTATIONS:
   - INDICATES CHANGE IN T/SLAB OR T/DECK ELEVATION
   - WXX — INDICATES STEEL WIDE FLANGE MEMEBER
   - HSSXX — INDICATES STEEL HSS MEMBER
   - TR — INDICATES COLUMN TRANSFER ABOVE
   - SR-XX — INDICATES HEADED SHEAR STUD REINFORCEMENT, SEE HEADED SHEAR STUD REINFORCEMENT SCHEDULE
   - INDICATES STEEL DECK OR COMPOSITE SLAB SPAN
5. SEE PLAN FOR FOUNDATION ORIENTATION
6. CENTER PILE GROUP GENTROID ON COLUMN ABOVE UON
7. PROVIDE 3/4" DIA. X 1'-8" LONG SMOOTH DOWEL @12" O.C AT SLAB MID-DEPTH AT JOINT BETWEEN SLAB ON GRADE, TOPPING SLAB, AND STRUCTURED SLAB/CAP BEAM, TYPICAL AT LEVEL 1.
8. PERMANENT EARTH RETENTION SYSTEM (ERS) (E.G., SHEET PILES, SOLDIER PILES/LAGGING, ETC.) WITHOUT TIEBACKS BY CONTRACTOR.
   A. CONNECTION TO BASE STRUCTURE (E.G., RC CAP BEAM) TO BE COORDINATED WITH FINAL ERS SELECTION.
   B. ERS TO BE DESIGNED FOR LATERAL OVERBURDEN LOADING FROM ADJACENT NEW AND EXISTING FOUNDATIONS. SEE EXISTING STRUCTURE DRAWINGS FOR FOUNDATION DIMENSIONS AND ASSUMED BEARING PRESSURE.
   C. ERS TO BE DESIGNED FOR VERTICAL SERVICE LEVEL LINE LOADS AT TIERS OF 3.0 KLF DEAD LOAD AND 2.0 KLF LIVE LOAD.
   D. 3/8" MAXIMUM ALLOWABLE LATERAL DEFLECTION AT ERS, TYPICAL.
   E. ERS THICKNESS PERPENDICULAR TO PLANE OF ERS TO BE 16" MAXIMUM.
   F. 3" MAXIMUM INSTALLATION TOLERANCE PERPENDICULAR TO PLANE OF ERS.
   G. CONTRACTOR TO COORDINATE ERS PENETRATION SIZE AND LOCATION WITH EXISTING UTILITIES AND/OR MEP ENGINEER REQUIREMENTS.

   TEMPORARY ERS SYSTEMS ARE NOT SHOWN AND ARE THE RESPONSIBILITY OF THE CONTRACTOR, SEE GENERAL NOTE GN-3 AND FN-4.



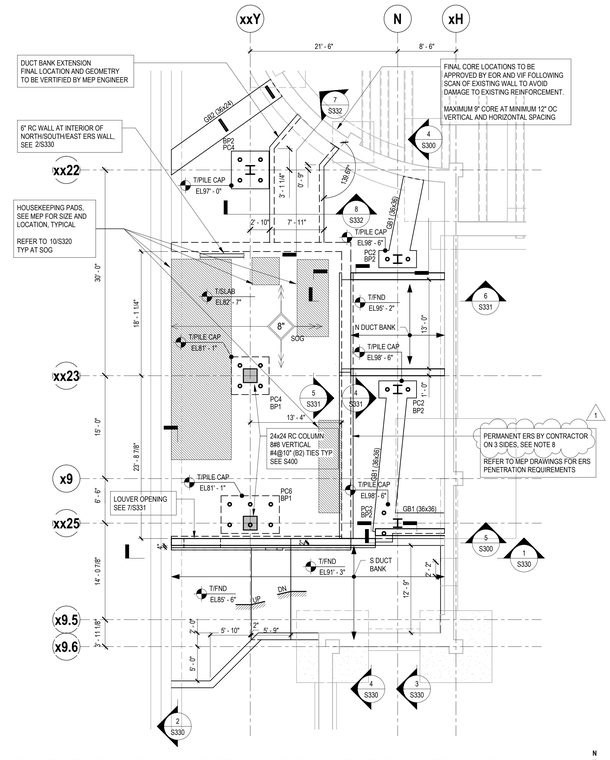
1 LEVEL 1 FRAMING PLAN

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



3 LEVEL 1 KEY PLAN

SCALE: 1/32" = 1'-0"



2 BASEMENT PARKING LEVEL-1 AND FOUNDATION PARTIAL PLAN

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

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975 UNIVERSITY AVE
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GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
LEVEL 1 FRAMING PLAN

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM 1

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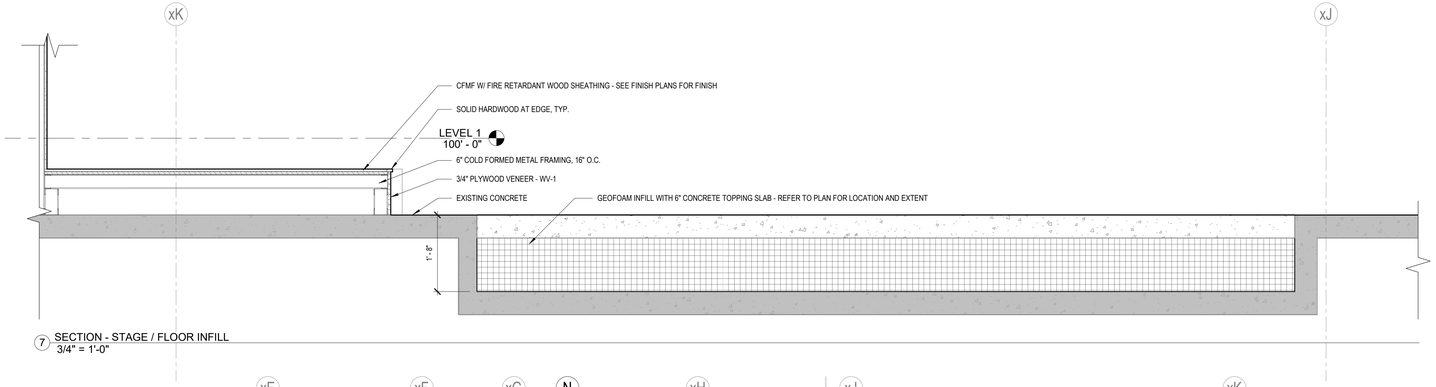
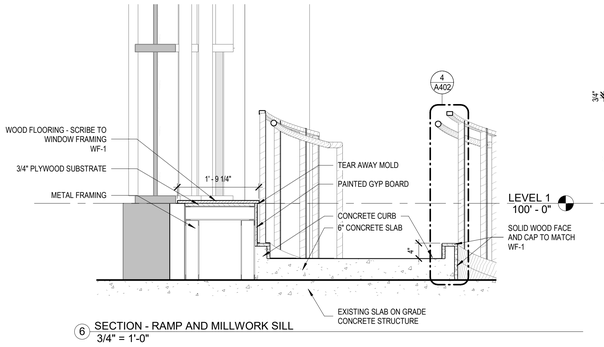
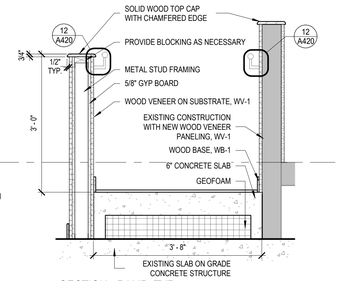
Issued For	BID DOCUMENTS
Date Issued	06/20/2025
Sheet Number	S101



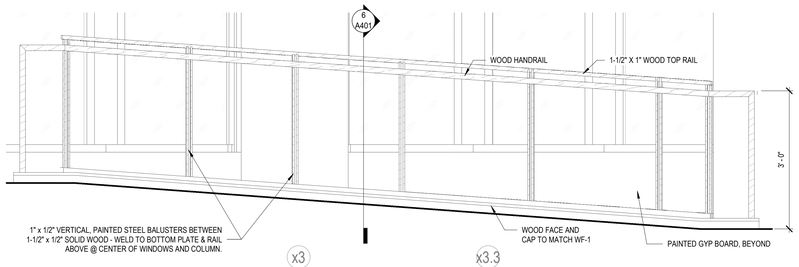
7 SECTION - STAGE / FLOOR INFILL
3/4" = 1'-0"



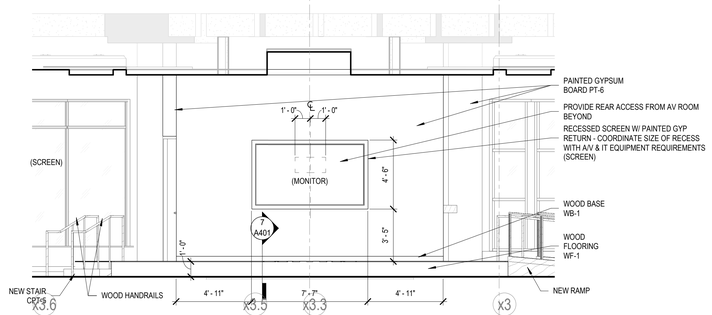
6 SECTION - RAMP AND MILLWORK SILL
3/4" = 1'-0"



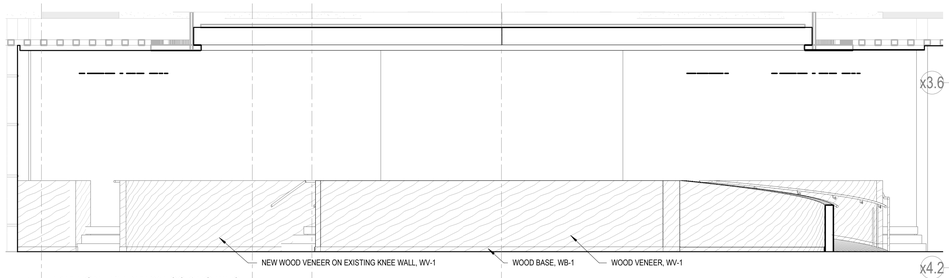
5 SECTION - RAMP, TYP.
3/4" = 1'-0"



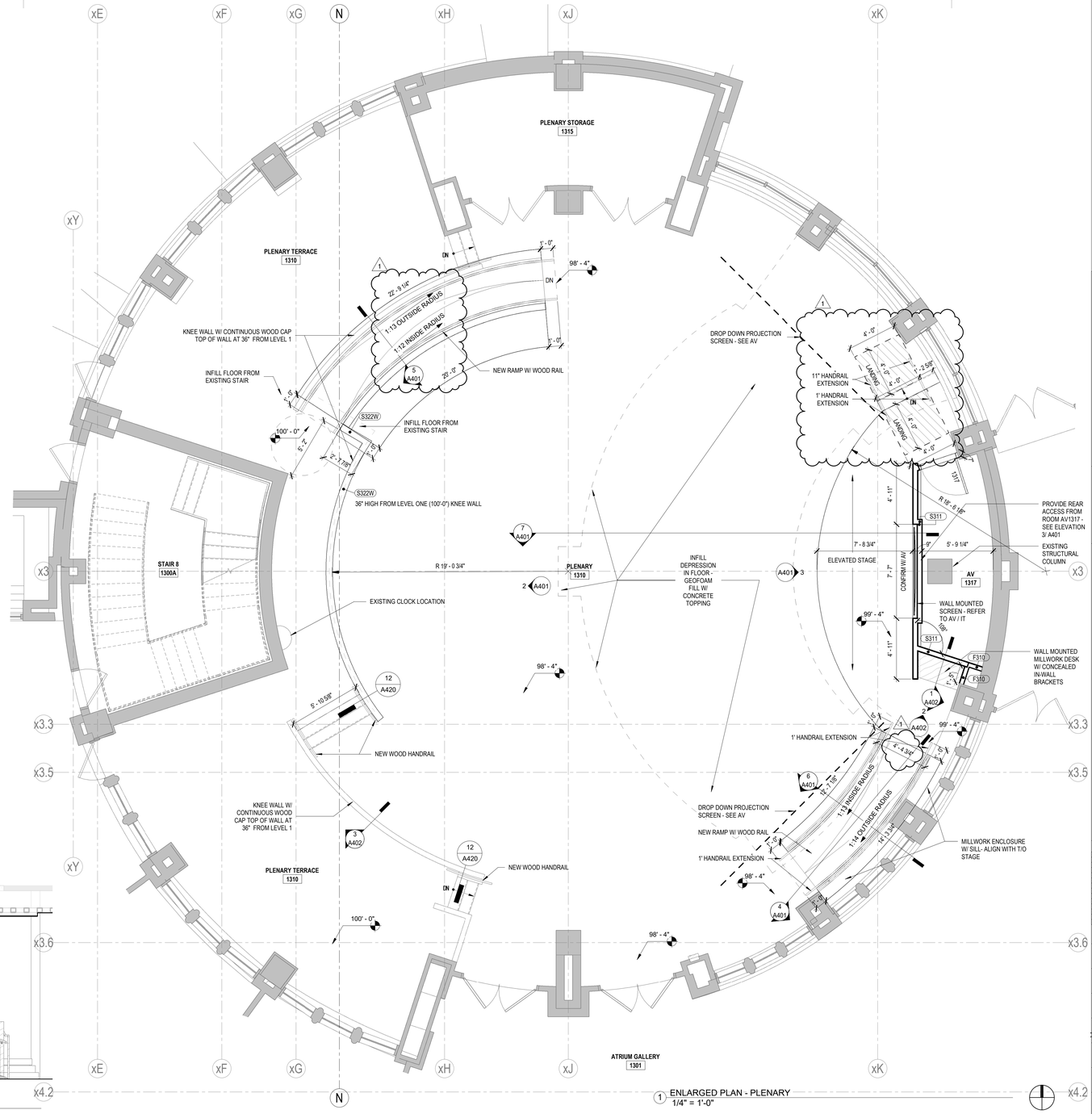
4 TYPICAL RAMP HANDRAIL ELEVATION
3/4" = 1'-0"



3 ELEVATION - PLENARY STAGE
1/4" = 1'-0"



2 ELEVATION - PLENARY LOOKING WEST
1/4" = 1'-0"



1 ENLARGED PLAN - PLENARY
1/4" = 1'-0"

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Sheet Title:
ENLARGED PLANS, SECTIONS & DETAILS - PLENARY

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM 1

Graphic Scale	AS INDICATED
UWSA Number	A-24-004
Volume Number	1
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Date Issued	06/20/2025
Sheet Number	A401

8/5/2025 9:58:23 AM

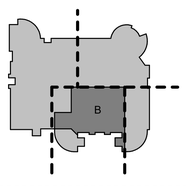
SHEET NOTES

A. ALL BRANCH DUCT SIZES ARE SIZED FOR THE AIR TERMINAL UNIT OR GRILLE NECK CONNECTION, UNLESS NOTED OTHERWISE.
B. PROVIDE MANUAL BALANCING DAMPERS IN ALL BRANCH DUCTS FOR MEANS OF BALANCING, WHETHER SHOWN ON THE PLANS OR NOT.
C. REBALANCE ALL EXISTING AIR TERMINALS, DIFFUSERS, REGISTERS AND GRILLES, WITHIN PROJECT SCOPE.

KEYED NOTES

1. PROVIDE AND INSTALL UPDATED TEMPERATURE SENSOR AND CONTROLS FOR EXISTING VAV BOX, INCLUDING NEW CONTROLS WIRING. REBALANCE AIRFLOW TO AIR TERMINAL AS NEEDED. PLEASE REFER TO AIR TERMINAL SCHEDULE FOR MORE INFORMATION.
2. THIS TCP SERVES FIRST FLOOR (AREA B) AND SECOND FLOOR WINTER GARDEN.
3. GARAGE EXHAUST AND RELIEF AIR DISCHARGE AREA WELL. SEE ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR MORE INFORMATION.
4. INSTALL SMOKE DETECTOR AT THE TOP POSITION OF THE DUCTWORK
5. CAP OFF CROSS LINEAR DIFFUSER. BLANK OFF PORTIONS THAT ARE INACTIVE.
6. SPACE IS UTILIZING UNDERCUT DOOR FOR MEANS TO TRANSFER AIR. SEE ARCHITECTURAL DRAWINGS FOR UNDERCUT DOOR INFORMATION.

1 FIRST FLOOR DUCTWORK PLAN
1/8" = 1'-0"



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UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
FIRST FLOOR DUCTWORK PLAN - AREA B

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM #1

Graphic Scale	0' 2' 4' 8' 12'
UWSA Number	A-24-004
Volume Number	2
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Date Issued	06/20/2025
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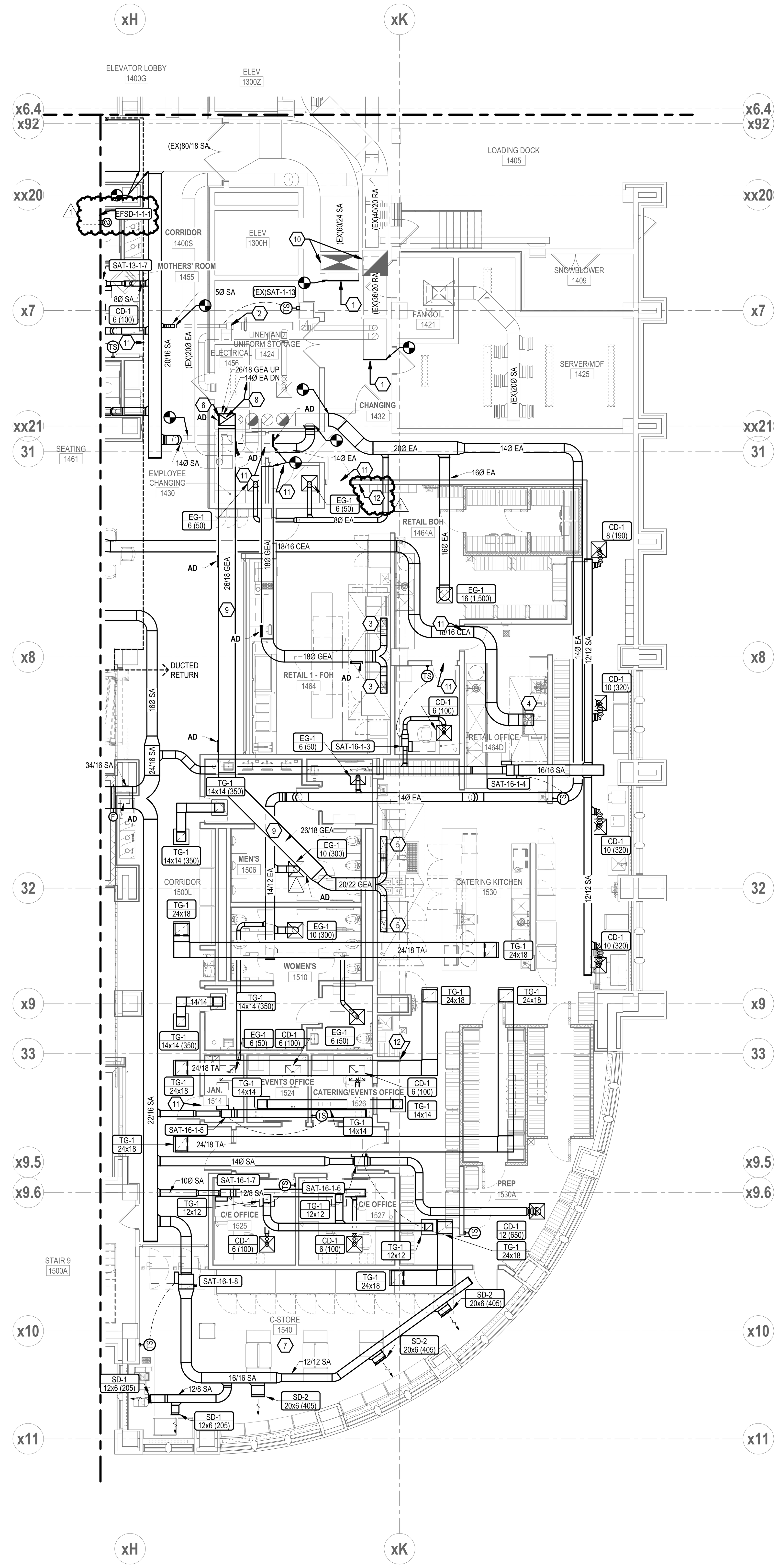


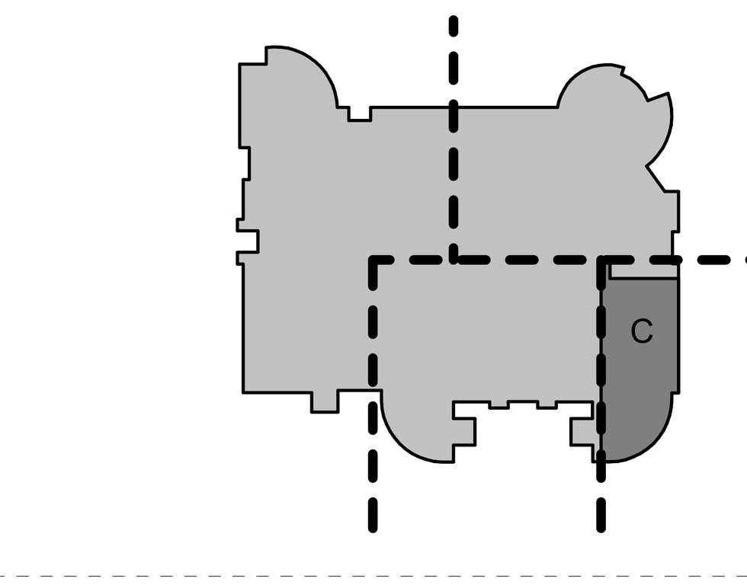
1 FIRST FLOOR DUCTWORK PLAN
1/8" = 1'-0"

SHEET NOTES

A. ALL BRANCH DUCT SIZES ARE SIZED FOR THE AIR TERMINAL UNIT OR GRILL NECK CONNECTION, UNLESS NOTED OTHERWISE.
B. PROVIDE MANUAL BALANCING DAMPERS IN ALL BRANCH DUCTS FOR MEANS OF BALANCING, WHETHER SHOWN ON THE PLANS OR NOT.
C. REBALANCE ALL EXISTING AIR TERMINALS, DIFFUSERS, REGISTERS AND GRILLES, WITHIN PROJECT SCOPE.

KEYED NOTES

1. CAP EXISTING DUCTWORK AND PROVIDE INSULATION. END CAP AND INSULATION TO MATCH EXISTING CONDITIONS.
2. PROVIDE AND INSTALL UPDATED TEMPERATURE SENSOR AND CONTROLS FOR EXISTING VAV BOX, INCLUDING NEW CONTROLS WIRING. REBALANCE AIRFLOW TO AIR TERMINAL AS NEEDED. PLEASE REFER TO AIR TERMINAL SCHEDULE FOR MORE INFORMATION.
3. SEE DETAIL #9/M602 FOR CONNECTION DETAIL. PROVIDE 2 HOUR FIRE WRAP FROM HOOD CONNECTION TO BUILDING ROOF PENETRATION.
4. SEE DETAIL #9/M602 FOR CONNECTION DETAIL.
5. SEE DETAIL #9/M602 FOR CONNECTION DETAIL. PROVIDE 2 HOUR FIRE WRAP FROM HOOD CONNECTION TO BUILDING ROOF PENETRATION.
6. ARCHITECTURAL ACCESS PANEL FOR ACCESS TO VERTICAL GREASE EXHAUST DUCTWORK.
7. NO CEILING IN THE SPACE, BLACK GRID ONLY. ALL MECHANICAL UTILITIES IN THIS SPACE TO BE PAINTED BLACK.
8. 14" DIA. GENERAL EXHAUST DUCT DOWN TO FLOOR BELOW. THIS INCLUDES FIRESMOKE DAMPER AND ACCESS DOOR AT SHAFT PENETRATIONS (WALL AND FLOOR). SEE DRAWING M501 FOR MORE INFORMATION.
9. GREASE EXHAUST DUCTWORK TO SLOPE BACK TO HOOD AT AN 8.3 PERCENT SLOPE (ONE UNIT VERTICAL IN 12 UNITS HORIZONTAL).
10. CONSTRUCTION SHUTDOWN WILL REQUIRE COORDINATION FIRE/SMOKE DAMPER (DAMPERS IN VERTICAL POSITION) CLOSERS WITH OWNERS REP AND GENERAL CONTRACTOR.
11. SPACE IS UTILIZING UNDERCUT DOOR FOR MEANS TO TRANSFER AIR. SEE ARCHITECTURAL DRAWINGS FOR UNDERCUT DOOR INFORMATION.
12. LOCATION FOR MANUAL PULL STATION FOR TYPE I HOOD. SEE KITCHEN DWGS FOR MORE INFORMATION.



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MILWAUKEE, WI 53204

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3636 N. 124TH STREET
WAUWATOSA, WI 53222

SAIKI DESIGN LANDSCAPE
1110 S PARK STREET
MADISON, WI 53715

THORNTON TOMASETTI STRUCTURAL
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RING & DUCHATEAU MEP / FP
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BROOKFIELD, WI 53045

RIPPE ASSOCIATES FOOD SERVICE
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SHEN MILSOM & WILKE AV / IT
125 S. WACKER DRIVE, SUITE 1510
CHICAGO, IL 60606

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GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
FIRST FLOOR DUCTWORK PLAN - AREA C

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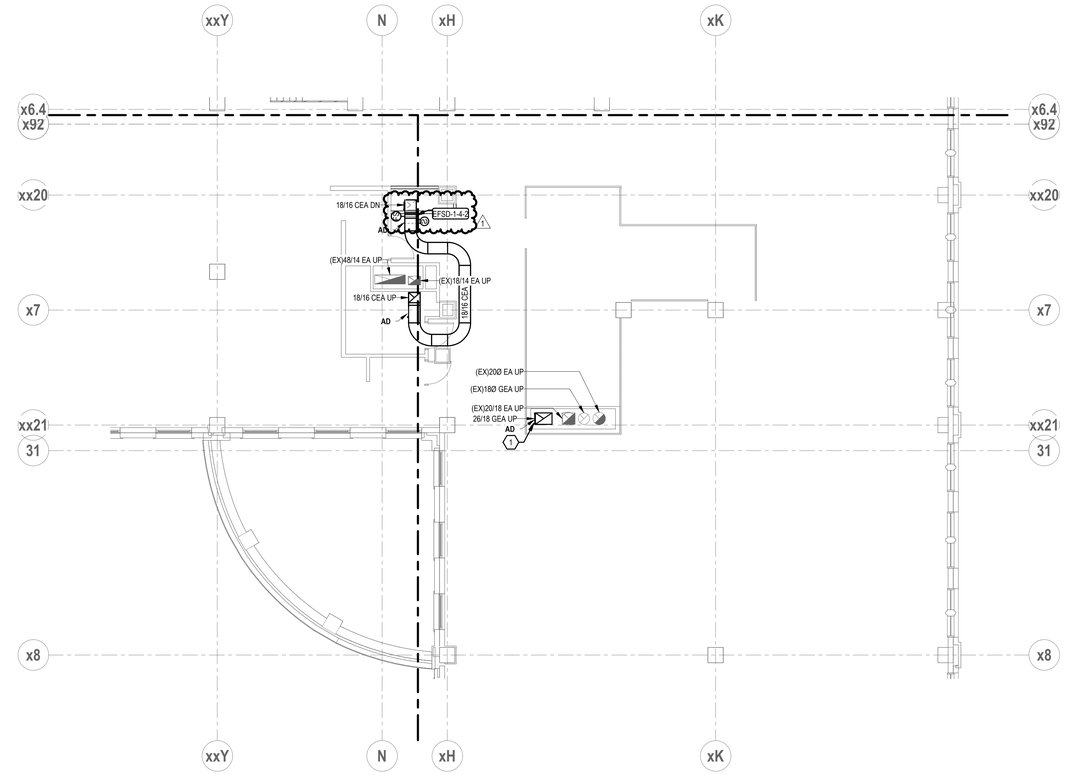


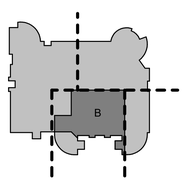
1 FOURTH FLOOR MECHANICAL PLAN
1/8" = 1'-0"

SHEET NOTES

A. ALL BRANCH DUCT SIZES ARE SIZED FOR THE AIR TERMINAL UNIT OR GRILL NECK CONNECTION, UNLESS NOTED OTHERWISE.
B. PROVIDE MANUAL BALANCING DAMPERS IN ALL BRANCH DUCTS FOR MEANS OF BALANCING, WHETHER SHOWN ON THE PLANS OR NOT.
C. REBALANCE ALL EXISTING AIR TERMINALS, DIFFUSERS, REGISTERS AND GRILLES, WITHIN PROJECT SCOPE.

KEYED NOTES

1. ARCHITECTURAL ACCESS PANEL FOR ACCESS TO VERTICAL GREASE EXHAUST DUCTWORK.



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Sheet Title:
FOURTH FLOOR DUCTWORK PLAN - AREA
B

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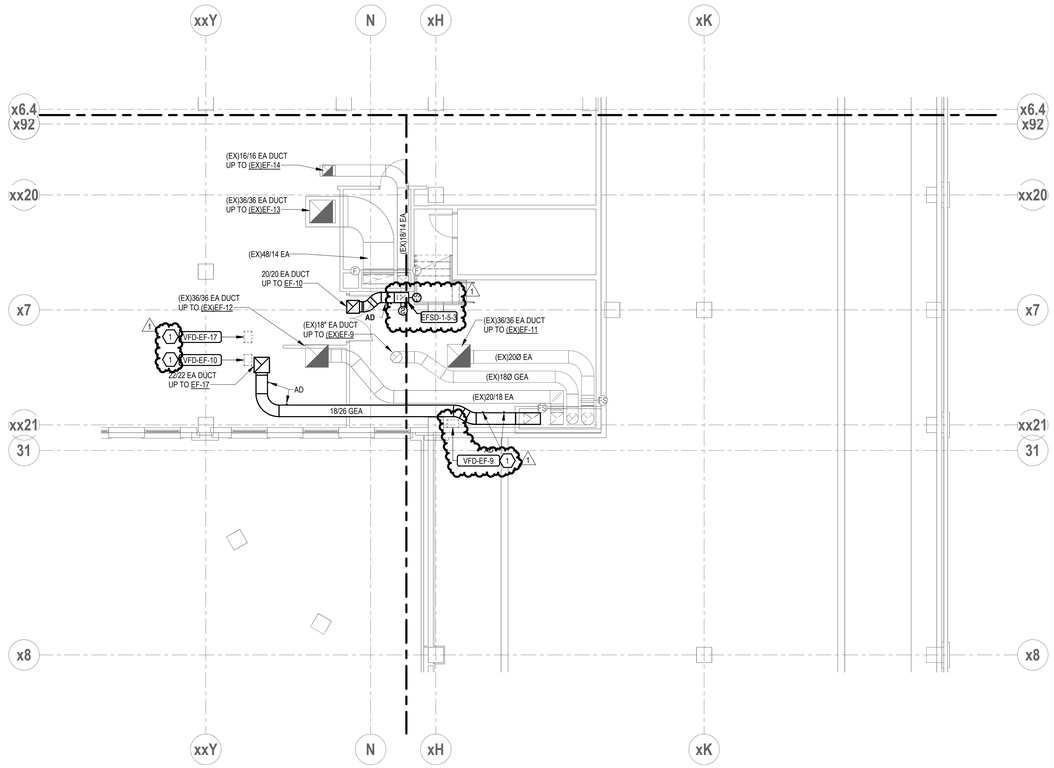


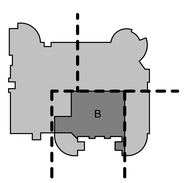
1 FIFTH FLOOR MECHANICAL PLAN
1/8" = 1'-0"

SHEET NOTES

A. ALL BRANCH DUCT SIZES ARE SIZED FOR THE AIR TERMINAL UNIT OR GRILL NECK CONNECTION, UNLESS NOTED OTHERWISE.
B. PROVIDE MANUAL BALANCING DAMPERS IN ALL BRANCH DUCTS FOR MEANS OF BALANCING, WHETHER SHOWN ON THE PLANS OR NOT.
C. REBALANCE ALL EXISTING AIR TERMINALS, DIFFUSERS, REGISTERS AND GRILLES, WITHIN PROJECT SCOPE.

KEYED NOTES

1. COORDINATE VFD LOCATION WITH EXISTING UTILITY PANELS.



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Sheet Title:
FIFTH FLOOR DUCTWORK PLAN - AREA B

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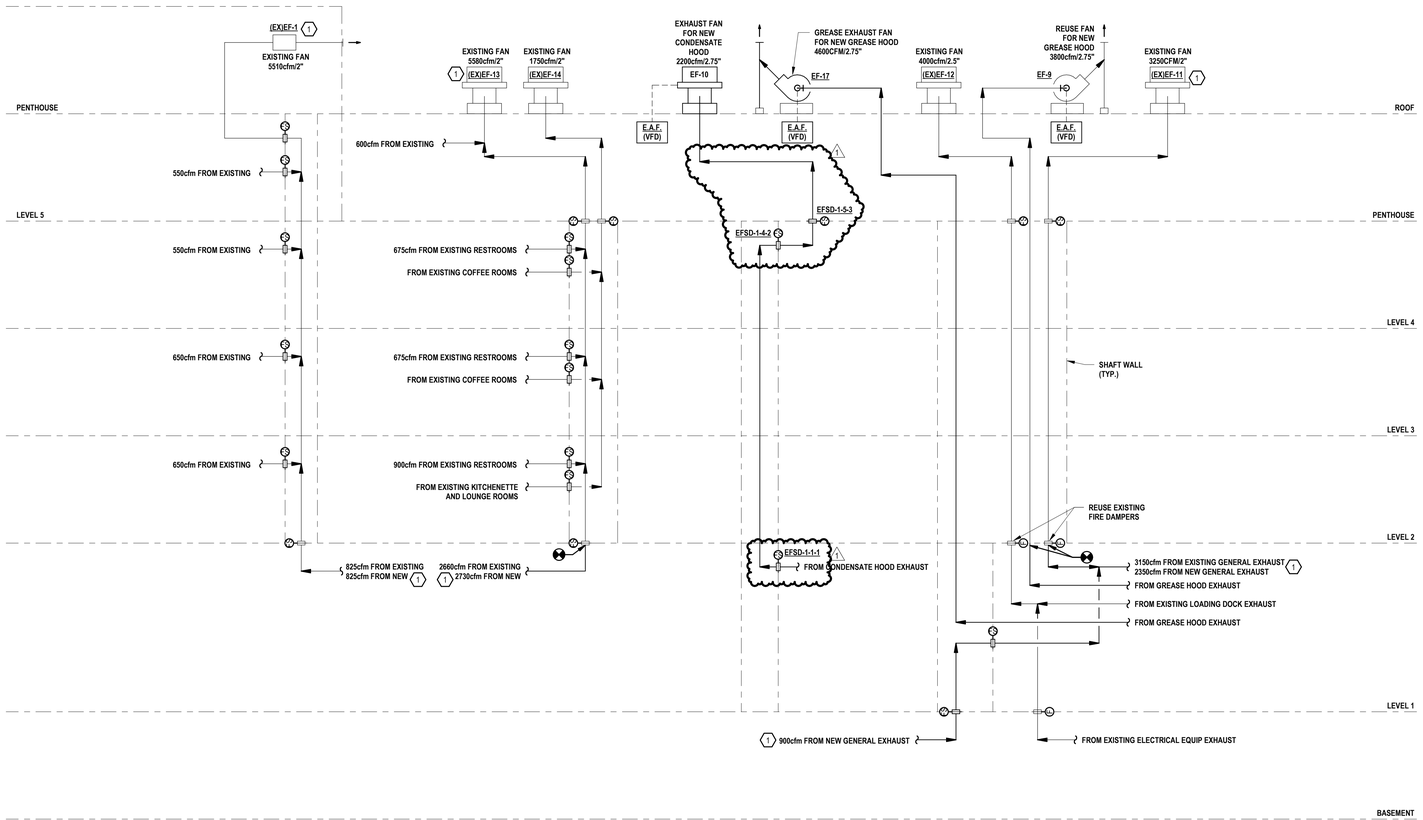
SHEET NOTES

A. MECHANICAL CONTRACTOR IS RESPONSIBLE TO TEST AND BALANCE EXISTING IMPACTED SYSTEMS PRIOR TO CONSTRUCTION, AS WELL AS TEST AND BALANCING SYSTEMS UPON CONSTRUCTION COMPLETION. SEE SPECIFICATION SECTION 23 05 93 PART 3 EXECUTION.

KEYED NOTES

1. REBALANCE DAMPERS AND FANS FOR NEW AIRFLOW DIFFERENCES.



1 EXHAUST AIRFLOW RISER DIAGRAM
NOT TO SCALE

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WORKSHOP ARCHITECTS 201 E PITTSBURGH AVE #301 MILWAUKEE, WI 53204	ARCHITECT
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THORNTON TOMASETTI 320 E BUFFALO ST #603 MILWAUKEE, WI 53202	STRUCTURAL
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RIPPE ASSOCIATES 10650 RED CIRCLE DR, STE. 100 MINNEAPOLIS, MN 55343	FOOD SERVICE
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Sheet Title:
EXHAUST AIR RISER DIAGRAM

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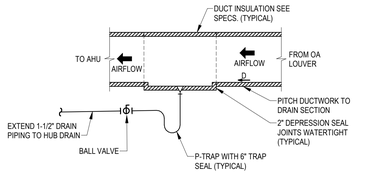
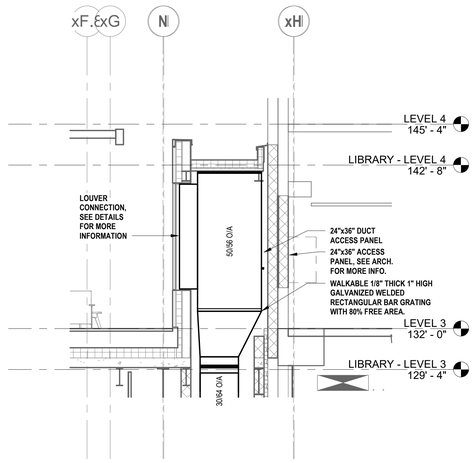
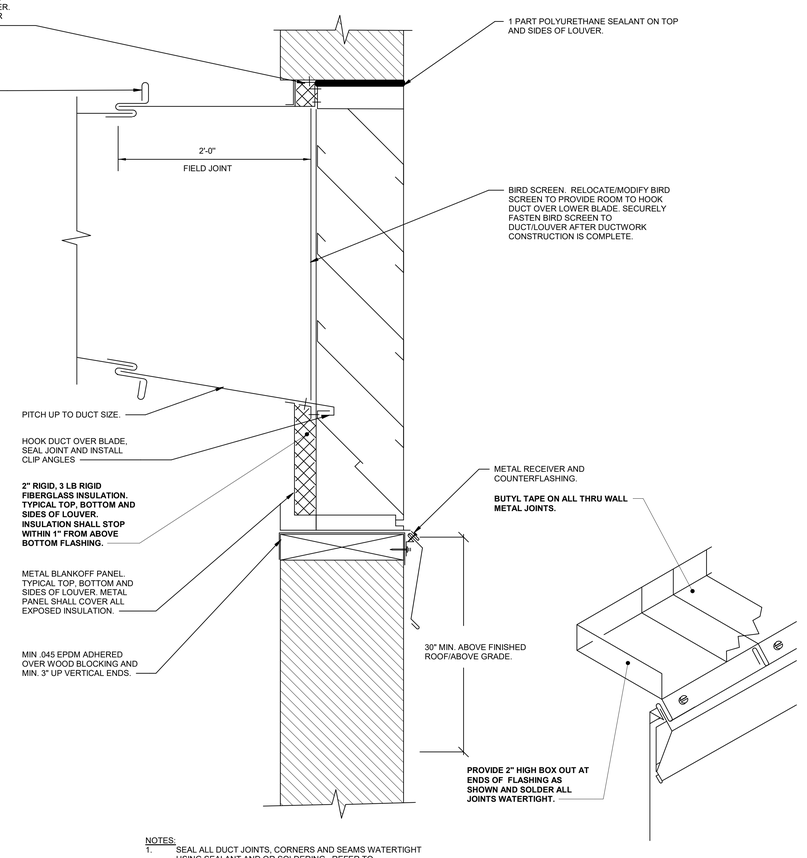


6 DUCTWORK DRAIN SECTION DETAIL
NOT TO SCALE

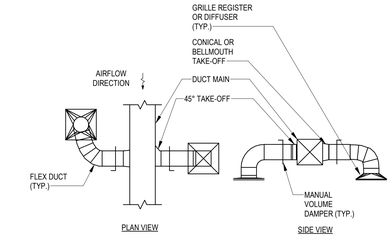


7 SEATING LOUVER CONNECTION SECTION
1/4" = 1'-0"



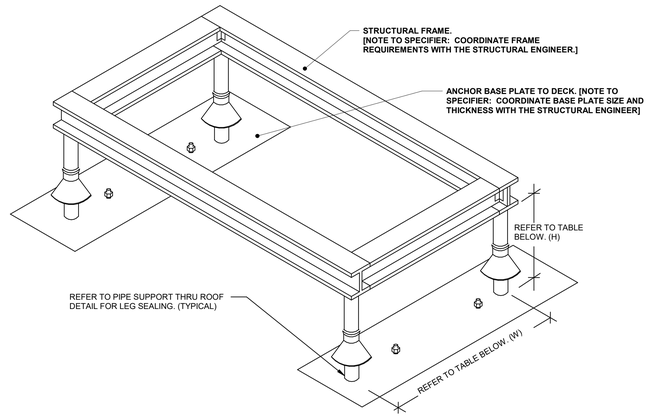
NOTES:
1. SEAL ALL DUCT JOINTS, CORNERS AND SEAMS WATERTIGHT USING SEALANT AND OR SOLDERING. REFER TO SPECIFICATION SECTION 23 31 00 FOR ACCEPTABLE SEALANTS TO BE UTILIZED IN DUCT SYSTEMS.
2. MAINTENANCE ACCESS TO LOUVER WILL BE FROM INSIDE VERTICAL DUCT. SEE FLOOR PLANS AND SECTION FOR MORE INFORMATION.

4 LOUVER INSTALLATION DETAIL
NOT TO SCALE



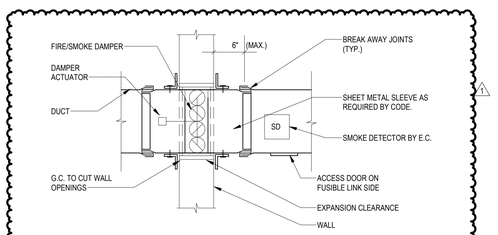
NOTES:
1. PROVIDE MANUAL VOLUME DAMPERS IN ALL BRANCH DUCTS SERVING SUPPLY, RETURN AND EXHAUST DUCT TAKE-OFFS FOR EACH GRILLE, REGISTER OR DIFFUSER.
2. BALANCE GRILLES, REGISTERS AND DIFFUSERS TO AIRFLOWSSHOWN ON DRAWINGS.

1 MANUAL VOLUME DAMPER DETAIL
NOT TO SCALE



WIDTH OR LENGTH OF EQUIPMENT/SUPPORT (W)	HEIGHT OF LEGS ABOVE FINISHED ROOF (H)
UP TO 36"	18"
37" AND UP	36"

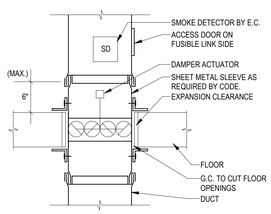
2 EQUIPMENT ROOF SUPPORT STAND DETAIL
NOT TO SCALE



NOTE:
- DAMPER INSTALLATION MUST MEET U/L AND NFPA REQUIREMENTS.

- H&V CONTRACTOR TO FURNISH ACCESS DOOR FOR PLASTER OR SPLINE TYPE CEILING FOR ACCESS TO DAMPER. G.C. TO INSTALL ACCES DOOR.

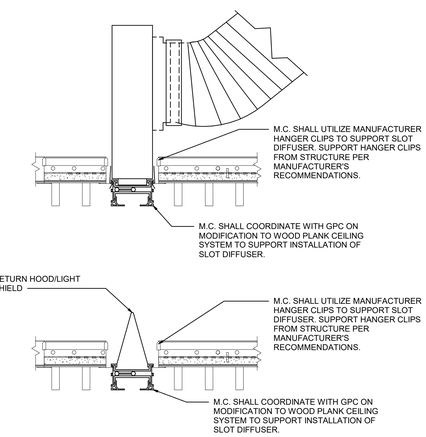
8 FIRE/SMOKE DAMPER WALL INSTALLATION DETAIL
NOT TO SCALE



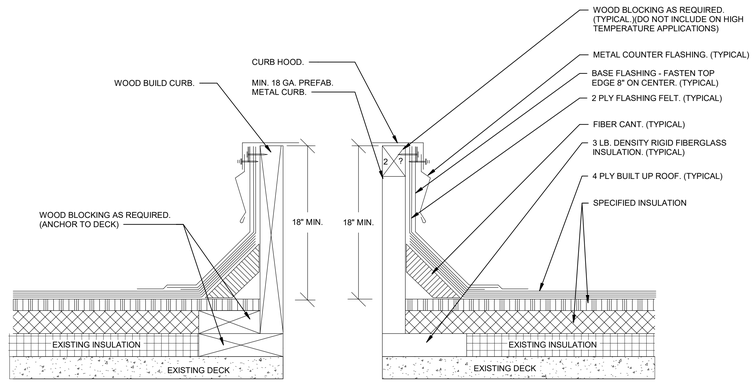
NOTE:
- DAMPER INSTALLATION MUST MEET U/L AND NFPA REQUIREMENTS.

- H&V CONTRACTOR TO FURNISH ACCESS DOOR FOR GYPSUM WALL FOR ACCESS TO DAMPER. G.C. TO INSTALL ACCES DOOR.

9 FIRE/SMOKE DAMPER INSTALLATION DETAIL
NOT TO SCALE



5 WOOD PLANK CEILING DETAIL - LINEAR SLOT
NOT TO SCALE



3 ROOF CURB DETAIL (BUILT UP ROOF)
12" = 1'-0"

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Sheet Title:
MECHANICAL DETAILS

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AIR HANDLING UNIT SCHEDULE (AHU)

NO.	LOCATION	POSITION 1	POSITION 2	POSITION 3	POSITION 4	POSITION 5	POSITION 6	POSITION 7	POSITION 8	POSITION 9	REMARKS
8	MECH ROOM P133	RRF	IMB	AB	F	FB/HC	AS	CC	AS	SAF	(1)

NOTES:
(1) REFER TO INDIVIDUAL COMPONENT SCHEDULES FOR CAPACITIES AND FLOWS.

POSITOINS ARE LISTED IN DIRECTION OF AIRFLOW THRU UNIT.

ABBREVIATIONS (POSITIONS LISTED IN DIRECTION OF AIR FLOW FROM SUCTION TO DISCHARGE OF UNIT)

AB: AIR BLENDER
AS: ACCESS SECTION
CB: COIL BYPASS
CC: COOLING COIL
DB: DIFFUSER...
DP: DISCHARGE PLUNUM
DS: DUCT SECTION
EFB: EXTERNAL FACE &...
F: FILTER
FB/HC: FACE & BYPASS/ HEATING COIL...
IMB: INTAKE/MIXING BOX
H: HUMIDIFER
HC: HEATING COIL
HRD: HEAT RECOVERY DEVICE
IFB: INTERNAL FACE & BYPASS
IS: INSPECTION SECTION
ME: MOISTURE ELIMINATOR
RRF: RETURN/ RELIEF FAN
SAF: SUPPLY AIR FAN

VARIABLE FREQUENCY DRIVE SCHEDULE

SERVICE	LOCATION	VOLTAGE/PHASE	MOTOR BHP	MOTOR HP	INTEGRAL BYPASS	REMARKS
VFD-SF-16A	MECH ROOM...	480/3	16.47	25	NO	
VFD-SF-16B	MECH ROOM...	480/3	16.47	25	NO	
VFD-RF-9A	MECH ROOM...	480/3	4.08	7.5	NO	
VFD-RF-9B	MECH ROOM...	480/3	4.08	7.5	NO	
VFD-EF-9	5TH FLOOR	480/3	1.98	2.5	YES	
VFD-EF-10	5TH FLOOR	480/3	1.98	2.5	YES	
VFD-EF-17	5TH FLOOR	480/3	3.13	5	YES	

SUPPLY FAN ARRAY SCHEDULE (SF)

NO.		LOCATION	SERVICE	FAN ARRAY						INDIVIDUAL FANS						MANUFACTURER	REMARKS
				TOTAL CFM	MIN. CFM	TSP (IN WC)	ESP (IN WC)	MAX. BHP	CONNECTED MOTOR HP	QTY.	MAX. CFM	MIN. CFM	WIDE	HIGH	CLASS	MOTOR HP	
AHU-8	16A	MECH ROOM...	ADDITION/REMODEL	12,500	6,500	6.00	3-	17	25	1	12,000	3,250	2	1	II	25	TRANE	(1,2)
AHU-8	16B	MECH ROOM...	ADDITION/REMODEL	12,500	6,500	6.00	3-	17	25	1	12,000	3,250	2	1	II	25	TRANE	(1,2)

NOTES:
(1) FULLY REDUNDANT SUPPLY FAN.
(2) ONE VFD FOR EACH FAN. TWO TOTAL.
(3) REFER TO M500 FOR EXISTING AND NEW AIRFLOW...

RETURN-RELIEF FAN SCHEDULE (RF)

NO.	LOCATION	SERVICE	TOTAL CFM	MIN. CFM	TSP (IN WC)	ESP (IN WC)	DISCH. ARR.	CLASS	FAN TYPE	FAN DIA. (IN)	FAN RPM	MOTOR			CAPACITY CONTROL	CONTROL DAMPERS	MANUFACTURER	REMARKS
												MAX. BHP	HP	DRIVE				
9A	MECH ROOM P133	RETURN AIR	6,250	0	2 1/2	2-	PLEN	I	PLENUM	22.25	1,673	4.08	7 1/2	DIRECT	VFD	MOD	GREENHECK	50% AIRFLOW CAPACITY
9B	MECH ROOM P133	RETURN AIR	6,250	0	2 1/2	2-	PLEN	I	PLENUM	22.25	1,673	4.08	7 1/2	DIRECT	VFD	MOD	GREENHECK	50% AIRFLOW CAPACITY

EXHAUST FAN SCHEDULE (EF)

NO.	LOCATION	SERVICE	TOTAL CFM	MIN. CFM	TSP (IN WC)	DISCH. ARR.	CLASS	FAN TYPE	FAN DIA. (IN)	FAN RPM	MOTOR			CAPACITY CONTROL	CONTROL DAMPERS	MANUFACTURER	MODEL	REMARKS
											MAX. BHP	HP	DRIVE					
EF-9	ROOF	GREASE HOOD	3,800	0	3 1/4	VERT.	I	SWSI	16.5	1,750	1.98	2 1/2	BELT	VFD	MOD	TWIN CITY	BCVR-165	1, 2
EF-10	ROOF	CONDENSATE...	2,200	0	2 3/4	VERT.	I	UPBLAST	-	1,750	1.98	2 1/2	BELT	VFD	MOD	GREENHECK	CUBE-240XP	-
EF-17	ROOF	GREASE HOOD	4,600	0	3	VERT.	I	SWSI	18	1,921	3.13	5-	DIRECT	VFD	MOD	GREENHECK	USF-18	-

NOTES:
(1) REUSE EXISTING GREASE EXHAUST FAN #9.
(2) REBALANCE AND RESHEAVE AS NEEDED.
(3) REFER TO M501 FOR EXISTING AND NEW AIRFLOW INFORMATION.

DESTRATIFICATION FAN SCHEDULE (DF)

NO.	LOCATION	SERVICE	FAN					MOUNTING HEIGHT (FT)	ACCESSORIES	MANUFACTURER	MODEL	REMARKS
			CFM	DIA. (IN)	RPM	TYPE	WATTS					
1	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
2	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
3	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
4	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
5	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
6	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
7	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)
8	WINTER GARDEN-1-1300A-1	WINTER GARDEN-1	547	16.25	1,650	SUSPENDED	45	22.5	SPEED CONTROL	AIRIUS	S-25-SP-SH-277-W	(1)

NOTES:
(1) FAN UTILIZES FAN HOUSING THAT INTEGRATES WITH DROP CEILING INSTALLATION.

AIR HANDLING UNIT HEATING COIL SCHEDULE - STEAM (HC)

NO.	SERVICE	TOTAL CFM	HEAT CFM	EAT (°F)	LAT (°F)	MAX. APD [1]	CAP. (MBH)	STEAM		SIZE (FT)		FACE VELOCITY (FPM)	ROWS	MAX. FPF	COIL TYPE	MANUFACTURER	REMARKS
								PRESS. (PSIG)	CAPACITY (LBS/HR)	HEIGHT	LENGTH						
HC-1	AHU-8	12,500	12,500	-15	58.7	0.476	1,000	5	1,040	4.5	7.67	601	4	6	VFB	TRANE	-

NOTES:
[1] MAXIMUM APD BASED ON TOTAL CFM.

AIR HANDLING UNIT COOLING COIL SCHEDULE - WATER (CC)

NO.	SERVICE	TOTAL CFM	EAT (°F)		LAT (°F)		MAX. APD (IN WC)	CAP. (TONS)	CAP. (MBH)	FLUID				FACE			ROWS	MAX. FPF	FLUID TYPE	MANUFACTURER	REMARKS
			DB	WB	DB	WB				GPM	EWT (°F)	LWT (°F)	WPD (FT)	HEIGHT (FT)	LENGTH (FT)	VELOCITY (FPM)					
CC-1	AHU-8	12,500	87.0	75.0	52.0	51.9	0.60	80	961	137	45	59	13.0	57	88	358	8	120	WATER	TRANE	-

SILENCER SCHEDULE (S)

NO.	SERVICE	CFM	DIMENSIONS				VELOCITY (FPM)	MAX. APD (IN WC)	CONFIG.	LINING	ATTENUATION PER OCTAVE BAND (RE 10-12 WATTS)								MANUFACTURER	MODEL	REMARKS
			LENGTH (FT)	WIDTH (IN)	HEIGHT (IN)	AREA (FT²)					1	2	3	4	5	6	7	8			
1	SUPPLY AIR	12,000	ELBOW	3	2.5	7	1,778	0.3	ELBOW	TEDLAR	5	6	9	12	20	26	23	17	VIBRO ACOUSTICS	RD	-
2	RETURN AIR	6,500	ELBOW	1.67	2.5	4	1,730	0.3	ELBOW	TEDLAR	5	6	10	12	19	26	23	18	VIBRO ACOUSTICS	RD	-

AIR FLOW MEASURING STATION SCHEDULE (AFMS)

NO.	SERVICE	MAX. CFM	MIN. CFM	MAX. VEL. (FPM)	MIN. VEL. (FPM)	MAX. APD (IN WC)	DUCT SIZE (IN)		MOUNTING	MANUFACTURER	REMARKS
							H	W			
19	SF-16A	12,000	3,250	6,750	1,828	0.1	16	16	FAN INLET	-	
20	SF-16B	12,000	3,250	6,750	1,828	0.1	16	16	FAN INLET	-	
21	RF-9	12,000	0	6,750	0	0.1	16	16	FAN INLET	-	

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GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

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CHILLED WATER HEAT EXCHANGER SCHEDULE (CX)

NO.	SERVICE	TYPE	CHILLED WATER				PROCESS CHILLED WATER				HEIGHT (IN)	WIDTH (IN)	DEPTH (IN)	HTG. SURFACE (FT2)	FOUL FACTOR	NO. OF PASSES	MANUFACTURER	MODEL	REMARKS
			GPM	EWT (°F)	LWT (°F)	WPD (PSI)	GPM	EWT (°F)	LWT (°F)	WPD (PSI)									
1A	PROCESS CHILLED WATER	PLATE	20	45	55	3.6	20	70	60	4.4	24.3	7.5	4.6	19	0	1	B&G	BP422-20	-
1B	PROCESS CHILLED WATER	PLATE	20	45	55	3.6	20	70	60	4.4	24.3	7.5	4.6	19	0	1	B&G	BP422-20	-

FAN COIL UNIT SCHEDULE - WATER (FCU)

NO.	LOCATION	FAN				HEATING							COOLING										MANUFACTURER	MODEL	REMARKS
		CFM	ESP (IN WC)	HP	MAX. NC	EAT (°F)	LAT (°F)	TOTAL MBH	EWT (°F)	LWT (°F)	GPM	BRANCH PIPE	EDB (°F)	EWB (°F)	LDB (°F)	LWB (°F)	SENS. MBH	TOTAL MBH	EWT (°F)	LWT (°F)	GPM	BRANCH PIPE			
8	MECH ROOM P133	400	1	0.55	-	60	95	15.2	180	150.0	1.0	3/4	80	67	58	58	9.6	12	44	54.1	2.4	3/4	TRANE	BCHE012	-

GRILLE SCHEDULE

NO.	TYPE	GRILLE FACE (IN)	CFM RANGE	SIZE (IN)		MAX. NC	MATERIAL	FINISH	FRAME	DAMPER	MOUNTING HEIGHT	OPTIONS	MANUFACTURER	MODEL	REMARKS
				SQ.	ROUND										
CD-1	PLAQUE	24x24	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	SEE CEILING...	NO	CEILING	-	PRICE	SPD	(2)
SD-1	SIDEWALL	-	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	F	NO	SIDEWALL	-	PRICE	600	-
SD-2	SIDEWALL	-	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	F	NO	SIDEWALL	-	PRICE	600	-
LD-1	LINEAR-1" 2 SLOT	4.25x48	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	SOFFIT	-	PRICE	SDS100	-
LD-2	LINEAR-.5" 2 SLOT	3.25X24	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	SOFFIT	-	PRICE	SDS50	-
LD-3	LINEAR-1" 2 SLOT	4.25x60	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	SOFFIT	-	PRICE	SDS100	-
LD-4	LINEAR-1.5" 2 SLOT	7.375"	60 CFM / L.F.	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	SOFFIT	-	PRICE	CFC/CFP	(1)
LD-5	LINEAR-1" 2 SLOT	4.25x48	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	CEILING	-	PRICE	SDS100	-
LD-6	LINEAR-1" 2 SLOT	4.25x48	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	SOFFIT	-	PRICE	SDS100	-
RG-1	PERFORATED	24x24	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	SEE CEILING...	NO	CEILING	-	PRICE	PDR	-
RG-2	SIDEWALL	-	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	F	NO	SIDEWALL	-	PRICE	600	-
EG-1	PERFORATED	24x24	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	SEE CEILING...	NO	CEILING	-	PRICE	PDR	-
EG-2	SIDEWALL	-	SEE PLANS	SEE...	SEE PLANS	30	ALUM.	W	F	NO	SIDEWALL	-	PRICE	600	-
TG-1	PERFORATED	24x24	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	SEE CEILING...	NO	CEILING	-	PRICE	PDR	-
TG-2	SIDEWALL	-	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	F	NO	SIDEWALL	-	PRICE	600	-
TG-3	LINEAR	-	SEE PLANS	SEE...	SEE PLANS	30	STL.	W	3/4" FRAME	NO	SIDEWALL	-	PRICE	600	-

OPTIONS:
1- OPPOSED BLADE DAMPER
2- BUTTERFLY DAMPER
3- FIRE DAMPER
4- COMBINATION...
5- EQUALIZING GRID
6- RADIAL
7- FILTER

ABBREVIATIONS:
A- ANODIZED
ALU... ALUMINUM
E- ENAMEL/EPOXY
EG- EXHAUST GRILLE
PERF.- PERFORATED GRILLE
RG- RETURN GRILLE
SUPPLY GRILLE
SATIN POLISH
STAINLESS STEEL
STL.- STEEL
TG- TRANSFER...
W- WHITE

FRAME:
C- CHANNEL
F- FLANGE
L- LAY-IN
SI- SNAP-IN
T- TEGULAR

NOTES:
(1) BLANK OFF UNUSED PORTION.
(2) IF DIFFUSERS DO NOT SHOW AIRFLOW ARROWS, ASSUME 4-WAY THROW.

RADIANT CEILING PANEL SCHEDULE - WATER (RCP)

NO.	LOCATION	HEATING				COOLING				PANEL SIZE		MAX WPD (FT)	BRANCH PIPE (IN)	MANUFACTURER	MODEL	REMARKS
		CAP. (BTU/FT)	EWT (°F)	LWT (°F)	GPM (PER FT)	CAP. (MBH)	EWT (°F)	LWT (°F)	GPM	LENGTH (IN)	WIDTH (IN)					
1	SEE PLANS	439	180	170	0.09	-	-	-	-	108	36	5	3/4	AIR-TITE	AR-X	-

WATER PRESSURE REGULATING VALVE SCHEDULE (WPRV)

NO.	LOCATION	SERVICE	CAPACITY (GPM)	INLET PRESS. (PSIG)	OUTLET PRESS. (IN)	SIZE (IN)	MANUFACTURER	MODEL	REMARKS
1	MECH ROOM P133	PROCESS CHILLED WATER	2	80	1/2	1/2	WATTS	LFU5B-73	SYSTEM FILL
2	MECH ROOM P133	CHILLED WATER	20	80	1/2	1 1/2	WATTS	LFU5B-73	CITY WATER BACK UP

FIRE/SMOKE DAMPER SCHEDULE (EFSD)

NO.	LOCATION	DUCT				AIR SYSTEM		LEAKAGE CLASS [1]	FIRE RATING	PRE-FAB. SLEEVE	SMOKE DETECTOR	MANUFACTURER	MODEL	REMARKS
		SIZE (IN)		CFM	VEL. (FPM)	FAN	TEMP. (°F)							
		H	W											
1-1-1	1ST FLOOR	16	18	2,200	1,100	EF-10	350	III	1.5	YES	YES	RUSKIN	FSD35SS	-
1-4-2	4TH FLOOR	16	18	2,200	1,100	EF-10	350	III	1.5	YES	YES	RUSKIN	FSD35SS	-
1-5-3	5TH FLOOR	16	18	2,200	1,100	EF-10	350	III	1.5	YES	YES	RUSKIN	FSD35SS	-

NOTES:
[1] REUSABLE/RESETTABLE TYPE.
[2] PER U.L. STANDARD 555 & 555S

PUMP SCHEDULE (PCP)

NO.	SERVICE	FLUID		PUMP						MOTOR		SPEED CONTROL TYPE	REMARKS
		TEMP. (°F)	TYPE	GPM	MIN. GPM	HEAD (FT)	NPSH AVAIL. (FT)	MIN. EFF. (%)	TYPE	RPM	HP		
15A	PROCESS CHILLED WATER	60	WATER	20	8	30	-	30%	IN-LINE	2,500	1	ECM	-
15B	PROCESS CHILLED WATER	60	WATER	20	8	30	-	30%	IN-LINE	2,500	1	ECM	-

AIR SEPERATOR SCHEDULE (AS)

NO.	SERVICE	FLUID TYPE	TYPE	SIZE (IN)	FLOW RATE (GPM)	PRESSURE DROP (FT HD)	MANUFACTURER	MODEL	REMARKS
3	PROCESS CHILLED WATER	COLD WATER	AIR & DIRT	2"	20	0.2	BELL AND GOSSETT	CRSN-2G	-

EXPANSION TANK SCHEDULE (ET)

NO.	SERVICE	FLUID TYPE	TYPE	TANK VOLUME (GAL)	EXPANSION VOLUME (GAL)	DIAMETER (IN)	VERT. TANK. HEIGHT (IN)	PIPE CONN. (IN)	SUPPORT	MANUFACTURER	MODEL	REMARKS
1	PCW	COLD WATER	BLADDER	10	-	12	24	3/4"	CONCRETE PAD	BELL & GOSSETT	B35	-

WATER FILTER SCHEDULE (WF)

NO.	LOCATION	SERVICE	HOUSING						FILTER CARTRIDGES					REMARKS
			MATERIAL	ASME STAMP	FLOW (GPM)	WPD (FT)	INLET SIZE (IN)	OUTLET SIZE (IN)	QTY.	MEDIA TYPE	CARTRIDGE LENGTH (IN)	WPD (FTHD)		
												CLEAN	DIRTY	
1	MECH ROOM P133	PCW	CARBON STEEL	YES	26	1	1 1/2	1 1/2	1	CARTRIDGE	10	2	12	-
2	MECH ROOM P133	PCW	CARBON STEEL	YES	5	1	3/4	3/4	1	CARTRIDGE	10	2	12	-

WATER SAFETY RELIEF VALVE SCHEDULE (WSRV)

NO.	LOCATION	SERVICE	CAPACITY (GPM)	PRESS. SETTING (PSIG)	INLET SIZE (IN)	OUTLET SIZE (IN)	MANUFACTURER	MODEL	REMARKS
1	MECH ROOM P133	PROCESS CHILLED WATER	-	65	1/2	1/2	KUNKLE	900 SERIES	-

CONDENSATE PUMP SCHEDULE (CP)

NO.	LOCATION	TYPE	SYSTEM CAPACITY	FLUID		RECEIVER			PUMP					MANUFACTURER	MODEL	REMARKS
				TEMP. (°F)	TYPE	CAP. (GAL)	MATERIAL	INLET SIZE (IN)	GPM	DISCH. PRESS. (PSIG)	RPM	QTY.	HP (EA)			
CP-2	MECH ROOM P133	DUPLEX	2,250	212	CONDENSATE	23	CAST IRON	2	9	30	3,500	2	3/4	BELL & GOSSETT	SERIES CB	-

CABINET UNIT HEATER SCHEDULE - WATER (CUH)

NO.	LOCATION	FAN				COIL							BRANCH PIPE (IN)	UNIT CONFIGURATION	RECESS (IN)	HEIGHT ABV. FLR. (IN)	ACCESSORIES				MANUFACTURER	MODEL	REMARKS
		CFM	ESP (IN WC)	RPM	HP	EAT (°F)	LAT (°F)	CAP. (MBH)	GPM	WPD (FT)	EWT (°F)	LWT (°F)					SUB BASE	FALSE BACK	RECESSED FLANGES	PROJECTIO N...			
23	VESTIBULE 1500T	600	0.3	1,450	1/6	60	100	63.2	7.0	16.3	180	160	1-	VERT. RECESSED	9"	9"	NO	NO	NO	NO	TRANE	FFHBO6O	
24	VESTIBULE 1500S	600	0.3	1,450	1/6	60	100	63.2	7.0	16.3	180	160	1-	VERT. RECESSED	9"	9"	NO	NO	NO	NO	TRANE	FFHBO6O	
25	COMMONS 3447	700	0.3	1,538	0.195	60	100	30.0	0.8	0.9	180	120	3/4	HORZ. RECESSED	9"	108	NO	NO	NO	NO	TRANE	FFEBO6O	
26	CORRIDOR 3500L	700	0.3	1,538	0.195	60	100	30.0	0.8	0.9	180	120	3/4	HORZ. RECESSED	9"	108	NO	NO	NO	NO	TRANE	FFEBO6O	

FINNED TUBE RADIATION SCHEDULE - WATER (FTR)

NO.	LOCATION	BTUH PER FT	GPM PER FT	EWT (°F)	LWT (°F)	EAT (°F)	ROWS	ELEMENT			CABINET (IN)			MOUNTING HEIGHT (IN)	BRANCH PIPE (IN)	MANUFACTURER	MODEL	REMARKS
								TYPE	SIZE	LENGTH	H	D	L					
1	SEE PLANS	1160	0.1	180	160	65	1	-	4 1/4" X 4 1/4"	SEE PLANS	SEE ARCHITECTURAL DWGS			TOP OF SILL	3/4	RITTLING	-	(1,2)

NOTES:
(1) LENGTH OF ELEMENT IS INICATED ON FLOOR PLANS. FULL UNIT CAPACITIES CAN BE ACHIEVED BY MULTIPLING LENGTH OF ELEMENT AND BTUH PER FOOT (ABOVE).
(2) MOUNT ELEMENT AS HIGH AS POSSIBLE IN ARCHITECTURAL ENCLOSURE.

STEAM TRAP SCHEDULE (ST)

NO.	LOCATION	EQUIPMENT SERVED	EQUIPMENT LOAD (LBS/HR)	TRAP CAPACITY (LBS/HR)	STEAM PRESS. (PSIG)	TRAP SIZE (IN)	TRAP TYPE	REMARKS
1	BASEMENT MECHANICAL ROOMS	LPS DRIP LEG	250	490	15	3/4	F&T	-
2	MECH ROOM - P133	STEAM COIL	950	2,950	15	2	F&T	-
3	MECH ROOM - P133	STEAM COIL	200	754	15	1	TT	-

NOTES:
1. SEE PLANS, SCHEDULES, AND DETAILS FOR QUANTITIES.
2. ABREVIATIONS:
F&T: FLOAT & THERMOSTATIC TRAP
T.T.: THERMOSTATIC TRAP

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EQUIPMENT ELECTRICAL SCHEDULE

EQUIPMENT			ELECTRICAL DATA							MOTOR CONTROLLER								DISCONNECT AT EQUIPMENT					SCCR (kA)	REMARKS
NO.	LOCATION	TYPE	V	PH	HP	KW	FLA	MCA	MOP	EMERG. POWER	LOCATION	TYPE	DISCONNECT	VFD RESTART	FURN. BY	INST. BY	WIRE BY	ACCESSORIES			TYPE	FURN. BY	INST. BY	WIRE BY		
AHU-8-SF-16A	MECH ROOM P133	SUPPLY FAN ARRAY	480	3	25	-	-	-	-	YES	MECH. ROOM	VFD (NO BYPASS)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	-	-	-	-	-	-
AHU-8-SF-16B	MECH ROOM P133	SUPPLY FAN ARRAY	480	3	25	-	-	-	-	YES	MECH. ROOM	VFD (NO BYPASS)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	-	-	-	-	-	-
AHU-8 SERVICE	MECH ROOM P133	SERVICE LIGHTS	120	1	-	-	-	-	15	YES	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
RF-9A	MECH ROOM P133	RETURN AIR FAN	480	3	7 1/2	-	-	-	-	YES	MECH. ROOM	VFD (NO BYPASS)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(INDOOR)	(NF)	EC	EC	EC	-	
RF-9B	MECH ROOM P133	RETURN AIR FAN	480	3	7 1/2	-	-	-	-	YES	MECH. ROOM	VFD (NO BYPASS)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(INDOOR)	(NF)	EC	EC	EC	-	
EF-9	ROOF	CENTRIFIGUAL EXHAUST FAN	480	3	2 1/2	-	-	-	-	NO	PENTHOUSE	VFD (BYPASS-SOFT START)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(OUTDOOR)	(NF)	EC	EC	EC	-	(1)
EF-10	ROOF	UPBLAST EXHAUST FAN	480	3	2 1/2	-	-	-	-	YES	PENTHOUSE	VFD (BYPASS-SOFT START)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(OUTDOOR)	(NF)	EC	EC	EC	-	(2)
EF-17	ROOF	CENTRIFIGUAL EXHAUST FAN	480	3	5	-	-	-	-	NO	PENTHOUSE	VFD (BYPASS-SOFT START)	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(OUTDOOR)	(NF)	EC	EC	EC	-	
DF-1	WINTER GARDEN-1	DESTRATIFICATION	277	1	-	0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-2	WINTER GARDEN-1	DESTRATIFICATION	277	1	-	0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-3	WINTER GARDEN-1	DESTRATIFICATION	277	1	-	0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-4	WINTER GARDEN-1	DESTRATIFICATION	277	1	-	0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-5	WINTER GARDEN-1	DESTRATIFICATION	277	1	-	0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-6	WINTER GARDEN-1	DESTRATIFICATION	277	1		0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-7	WINTER GARDEN-1	DESTRATIFICATION	277	1		0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
DF-8	WINTER GARDEN-1	DESTRATIFICATION	277	1		0.045	-	-	-	NO	WINTER GARDEN 1	MANUAL	NO	NO	MC	EC	EC	-	-	-	-	-	-	-	-	-	
PCP-15A	MECH ROOM P133	INLINE PUMP	208	3	1	-	-	-	-	NO	MECH. ROOM	MANUAL	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(INDOOR)	(NF)	EC	EC	EC	-	
PCP-15B	MECH ROOM P133	INLINE PUMP	208	3	1	-	-	-	-	NO	MECH. ROOM	MANUAL	YES	NO	MC	EC	EC	(HOA)	(PL)	(PB)	(INDOOR)	(NF)	EC	EC	EC	-	
CP-2	MECH ROOM P133	STEAM CONDENSATE PUMP	208	3	1/2	-	-	-	-	NO	MECH. ROOM	MAGNETIC	NO	NO	MFR	MFR	EC	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	(3)
FCU-8	MECH ROOM P133	FAN COIL UNIT	208	1	0.55	-	-	-	-	NO	MECH. ROOM	MANUAL	NO	NO	MFR	MFR	EC	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CUH-23	VESTIBULE 1500T	CABINET UNIT HEATER	120	1	1/6	-	-	-	-	NO	VESTIBULE 1500T	MANUAL	NO	NO	MFR	MFR	EC	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CUH-24	VESTIBULE 1500S	CABINET UNIT HEATER	120	1	1/6	-	-	-	-	NO	VESTIBULE 1500S	MANUAL	NO	NO	MFR	MFR	EC	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CUH-25	COMMONS 3447	CABINET UNIT HEATER	120	1	0.195	-	-	-	-	NO	COMMONS 3447	MANUAL	NO	NO	MFR	MFR	EC	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CUH-26	CORRIDOR 3500L	CABINET UNIT HEATER	120	1	0.195	-	-	-	-	NO	CORRIDOR 3500L	MANUAL	NO	NO	MFR	MFR	EC	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
TCP-1	MECH ROOM P133	TEMPERATURE CONTROL PANEL	120	1	-	-	-	-	20	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
TCP- 2	STORAGE 1225	TEMPERATURE CONTROL PANEL	120	1	-	-	-	-	20	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
TCP-3	STORAGE 1297	TEMPERATURE CONTROL PANEL	120	1	-	-	-	-	20	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
VAV BOXES	VARIOUS	VAV BOXES	24	1	-	-	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CONTROL DAMPERS	MECH ROOM P133	CONTROL DAMPERS	24	1	-	-	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
SMOKE DAMPERS	MECH ROOM P133	SMOKE DAMPERS	24	1	-	-	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CONTROL VALVES	MECH ROOM P133	WATER CONTROL VALVES	24	1	-	-	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
CW FLOW METER	EXTG MECH ROOM	WATER METER	120	1	-	-	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	
PUMPED CONDENSATE FLOW METER	EXTG MECH ROOM	STEAM METER	120	1	-	-	-	-	-	NO	-	-	-	-	-	-	-	-	-	-	(INDOOR)	(NF)	EC	EC	EC	-	

ABBREVIATIONS:

MC MECHANICAL CONTRACTOR
EC ELECTRICAL CONTRACTOR
MFR MANUFACTURER
TCC TEMPERATURE CONTROL CONTRACTOR
FLA FULL LOAD...
MCA MIN. CIRCUIT AMPS
MOP MAX. OVERCURRENT PROTECTION
VFD VARIABLE FREQUENCY DRIVE
MCC MOTOR CONTROL CENTER

ACCESSORIES:

(HOA) HAND-OFF-AUTO
(PL) PILOT LIGHT
(PB) PUSH BUTTON

DISCONNECT TYPE:

(OUTDOOR) WEATHER PROOF
(INDOOR) NON-WEATHER PROOF
(F) FUSED
(NF) NON-FUSED

NOTES:

G1. SEE SPECIFIC EQUIPMENT SCHEDULES FOR ADDITIONAL INFORMATION.
G2. THE SHORT CIRCUIT CURRENT RATING (SCCR) IS THE MINIMUM CALCULATED VALUE OF FAULT CURRENT AMPACITY REQUIRED FOR THIS PIECE OF EQUIPMENT. THIS CONTRACTOR SHALL PROVIDE EQUIPMENT WITH A SHORT CIRCUIT CURRENT RATING EQUAL TO OR GREATER THAN THE VALUE INDICATED, INCLUDING ANY ASSOCIATED MOTOR CONTROLLERS, CONTROL PANELS, FUSIBLE DISCONNECT SWITCHES, ETC. EQUIPMENT NAMEPLATE SHALL CLEARLY INDICATE THE SCCR RATING FOR THE EQUIPMENT AS REQUIRED TO MEET ALL APPLICABLE CODES AND RECOGNIZED QUALIFIED ELECTRICAL TESTING LABORATORIES (ETL).
(1) REUSE EXISTING EXHAUST FAN.
(2) REPLACING EXISTING EXHAUST FAN.
(3) DUPLEX PUMP SKID TO A SINGLE POWER POINT CONNECTION.

AIR TERMINALS

NO.	SERVICE	AIRFLOW				COIL								BRANCH PIPE SIZE (IN)	BRANCH INLET DIA. (IN)	BOX OUTLET DUCT SIZE (IN)	OCCUPANCY SENSOR		AHU SERVED BY	MANUFACTURER	MODEL	REMARKS
		MAX. CFM	MIN. CFM	HEATING CFM	APD (IN WC)	EAT (°F)	LAT (°F)	HL (MBH)	CAP. (MBH)	GPM	EWT (°F)	LWT (°F)	WPD (FT)				BAS CONTROL	PROVIDED BY				
SAT-1-1-1	1200K - HALLWAY	300	300	300	0.4	55	85	0.0	9.8	1.0	180	160	4	3/4	10	12x10	YES	EC	BUAC-1	PRICE	SDV-8	-
SAT-1-1-2	1250 - PRIVATE DINING	2,400	665	665	0.4	55	85	0.0	21.6	2.2	180	160	4	3/4	18	24x18	YES	EC	BUAC-1	PRICE	SDV-16	-
SAT-1-1-3	1250A - CATERING SUPPORT	175	175	175	0.4	55	85	0.0	5.7	0.6	180	160	4	3/4	8	12x8	YES	EC	BUAC-1	PRICE	SDV-6	-
SAT-1-1-4	1266 - FIREPLACE LOUNGE	600	320	320	0.4	55	85	0.0	10.4	1.0	180	160	4	3/4	12	14x12	YES	EC	BUAC-1	PRICE	SDV-10	-
SAT-1-1-5	1290 - PRIVATE CO-WORKING	630	160	160	0.4	55	85	0.0	5.2	0.5	180	160	4	3/4	12	14x12	YES	EC	BUAC-1	PRICE	SDV-10	-
SAT-1-1-6	1290A, 1290B - WORKSTATIONS	100	40	40	0.4	55	85	0.0	1.3	0.1	180	160	4	3/4	6	12x8	YES	EC	BUAC-1	PRICE	SDV-6	-
SAT-1-1-7	1290C, 1290D, 1290E - OFFICES	225	90	90	0.4	55	85	0.0	2.9	0.3	180	160	4	3/4	8	12x8	YES	EC	BUAC-1	PRICE	SDV-8	-
SAT-1-1-8	1290F, 1290G, 1290H - OFFICES	225	90	90	0.4	55	85	0.0	2.9	0.3	180	160	4	3/4	8	12x8	YES	EC	BUAC-1	PRICE	SDV-8	-
SAT-1-1-9	1297 - STORAGE	180	180	180	0.4	55	85	2.6	5.9	0.6	180	160	4	3/4	8	12x8	YES	EC	BUAC-1	PRICE	SDV-6	-
EX-SAT-1E-9	CORRIDOR 1200R	200	60	200	0.4	55	85	0.0	6.5	0.7	180	160	4	3/4	8	12x8	YES	EC	BUAC-1	-	-	(4)
SAT-13-1-1	1230 - SEATING, 1230C - COUNTER, 1230D-CORRIDOR	910	310	310	0.4	55	85	0.0	10.1	1.0	180	160	4	3/4	12	14x12	YES	EC	AHU-6&7	PRICE	SDV-10	-
SAT-13-1-2	1231 - SEATING, 1230C - COUNTER, 1230D-CORRIDOR	1,200	1,100	1,100	0.4	55	85	15.5	35.8	3.6	180	160	4	3/4	14	16x15	YES	EC	AHU-6&7	PRICE	SDV-12	-
SAT-13-1-3	1232 - SEATING, 1230C - COUNTER, 1230D-CORRIDOR	515	200	200	0.4	55	85	0.0	6.5	0.7	180	160	4	3/4	10	12x10	YES	EC	AHU-6&7	PRICE	SDV-8	-
SAT-13-1-4	1230B - STARBUCKS BOH	440	440	440	0.4	55	85	0.0	14.3	1.4	180	160	4	3/4	10	12x10	YES	EC	AHU-6&7	PRICE	SDV-8	-
SAT-13-1-5	1329 - CATERING SUPPORT	120	70	70	0.4	55	85	0.0	2.3	0.2	180	160	4	3/4	6	12x8	YES	EC	AHU-6&7	PRICE	SDV-6	-
SAT-13-1-6	1310 - PLENARY	3,300	1,125	1,125	0.4	55	85	0.0	36.6	3.7	180	160	4	3/4	24x16	38x18	YES	EC	AHU-6&7	PRICE	SDV-24/16	(2)
SAT-13-1-7	MOTHERS' ROOM 1455	100	50	100	0.4	55	85	0.0	3.3	0.3	180	160	4	3/4	6	12x8	YES	EC	AHU-6&7	PRICE	SDV-6	(3)
(EX) SAT-1-12	1450 - COMMONS	600	250	250	0.4	55	85	0.0	8.1	0.8	180	160	4	3/4	12	14x12	YES	EC	AHU-6&7	-	-	(4)
(EX) SAT-1-11	1451 - COMMONS	500	200	200	0.4	55	85	0.0	6.5	0.7	180	160	4	3/4	10	12x10	YES	EC	AHU-6&7	-	-	(4)
SAT-16-1-11	WINTER GARDEN-1 - 1300A-1	2,270	860	2,270	0.4	55	85	21.7	73.9	7.4	180	160	4	1	18	24x18	YES	EC	AHU-8	PRICE	SDV-16	(3)
SAT-16-1-10	WINTER GARDEN-1 - 1300A-1	1,160	430	1,160	0.4	55	85	10.8	37.8	3.8	180	160	4	3/4	14	16x15	YES	EC	AHU-8	PRICE	SDV-12	(3)
SAT-16-1-9	WINTER GARDEN-1 - 1300A-1	2,270	860	2,270	0.4	55	85	21.7	73.9	7.4	180	160	4	1	18	24x18	YES	EC	AHU-8	PRICE	SDV-16	(3)
SAT-16-1-13	WINTER GARDEN-1 - 1300A-1	1,000	370	1,000	0.4	55	85	0.0	32.6	3.3	180	160	4	3/4	14	16x15	YES	EC	AHU-8	PRICE	SDV-12	(3)
SAT-16-1-1	WINTER GARDEN-1 - 1300A-1	1,600	600	1,600	0.4	55	85	0.0	52.1	5.2	180	160	4	1	16	20x18	YES	EC	AHU-8	PRICE	SDV-14	(3)
SAT-16-1-3	RETAIL OFFICE - 1464D	100	40	100	0.4	55	85	0.0	3.3	0.3	180	160	4	3/4	6	12x8	YES	EC	AHU-8	PRICE	SDV-6	(3)
SAT-16-1-4	CATERING KITCHEN - 1530	1,300	1,300	1,300	0.4	55	85	18.9	42.9	4.3	180	160	4	1	14	16x15	YES	EC	AHU-8	PRICE	SDV-12	(3)
SAT-16-1-6	PREP - 1530A	650	380	650	0.4	55	85	9.5	21.5	2.1	180	160	4	3/4	12	14x12	YES	EC	AHU-8	PRICE	SDV-10	(3)
SAT-16-1-8	1445 - C-STORE	1,625	690	1,625	0.4	55	85	17.0	52.9	5.3	180	160	4	1	16	20x18	YES	EC	AHU-8	PRICE	SDV-14	(3)
SAT-16-1-12	HUDDLE - 1501, HUDDLE - 1502	200	100	200	0.4	55	85	0.0	6.5	0.7	180	160	4	3/4	8	12x8	YES	EC	AHU-8	PRICE	SDV-8	(3)
SAT-16-1-5	EVENTS OFFICE - 1524, CATERING/EVENTS OFFICE - 1526	200	60	200	0.4	55	85	0.0	6.5	0.7	180	160	4	3/4	8	12x8	YES	EC	AHU-8	PRICE	SDV-8	(3)
SAT-16-1-7	C/E OFFICE - 1525, C/E OFFICE - 1527	200	60	200	0.4	55	85	0.0	6.5	0.7	180	160	4	3/4	8	12x8	YES	EC	AHU-8	PRICE	SDV-8	(3)

VAV BOX SCHEDULE NOTES:

1. PROVIDE DDC CONTROLS FOR ALL NEW VAV BOXES. COORDINATE ALL NEW POWER SUPPLY AND TEMPERATURE CONTROL PANEL POWER WITH ELECTRICAL CONTRACTOR.
2. SAT-1310 IS REPLACING PREVIOUS AIR TERMINAL VAV-1-3.
3. REHEAT COIL IS SIZED FOR MAX CFM TO ALLOW FOR MAKE AIR TO KITCHEN HOOD(S) RESET.
4. EXISTING BOX REUSED. REBALANCE AIRFLOWS PER SCHEDULE.

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WORKSHOP ARCHITECTS — ARCHITECT
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Board of Regents of the
University of Wisconsin System
c/o UW System Administration

Project Location:
975 UNIVERSITY AVE
MADISON, WISCONSIN 53706

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
MECHANICAL SCHEDULES

Revisions:

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1	8/5/2025		ADDENDUM #1

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ELECTRICAL SYMBOL LEGEND

GENERAL NOTE FOR LIGHT FIXTURE SYMBOLS.

THE MOUNTING TYPE OF LIGHT FIXTURES IS INDICATED IN THE SYMBOLS ON THE DRAWINGS AS FOLLOWS:
- NO CENTER DOT INDICATES FIXTURE IS RECESSED.
- FILLED CENTER DOT INDICATES FIXTURE IS SURFACE/PENDANT MOUNTED.

REFER TO LIGHT FIXTURE SCHEDULE AND LIGHTING PLAN NOTES FOR FURTHER INFORMATION.

SYMBOL	DESCRIPTION
	SQUARE/RECTANGULAR LIGHTING FIXTURE
	LINEAR LIGHTING FIXTURE
	ROUND/RING LIGHTING FIXTURE
	WALL WASH LIGHTING FIXTURE
	CEILING FAN LIGHTING FIXTURE
	WALL-MOUNTED FIXTURES
	DIRECTIONAL LIGHT, TRACK, FLOOD
	LIGHT TRACK
	LOW VOLTAGE LINEAR LIGHT
	EMERGENCY LIGHTING UNIT, CEILING-MOUNTED, INTEGRAL BATTERY
	EMERGENCY LIGHTING UNIT, CEILING-MOUNTED, REMOTE BATTERY
	EMERGENCY BATTERY UNIT, WALL-MOUNTED, INTEGRAL BATTERY
	EMERGENCY BATTERY UNIT, WALL-MOUNTED, REMOTE BATTERY
	EXIT LIGHT, CEILING-MOUNTED, SHADING AND ARROWS INDICATE FACES AND DIRECTION
	EXIT LIGHT, WALL-MOUNTED, SHADING AND ARROWS INDICATE FACES AND DIRECTION
	EXIT/EBU COMBO
	POLE/AREA LIGHTS
	POST-TOP AREA LIGHT
	BOLLARD LIGHT
	SOLID HATCH INDICATES LIGHT ON AN LIFE SAFETY/EMERGENCY CIRCUIT
	DIAGONAL HATCH INDICATES LIGHT ON A CRITICAL/OPTIONAL CIRCUIT
	PARTIAL DIAGONAL HATCH INDICATES PART OF LIGHT ON A NORMAL CIRCUITAND PART OF LIGHT ON A CRITICAL/OPTIONAL CIRCUIT
S	SINGLE POLE SWITCH
S3	3-WAY SWITCH
S4	4-WAY SWITCH
SK	KEYED SWITCH
SPL	SWITCH W/PILOT
SDLS	DUAL LEVEL SWITCH
	DIMMER SWITCH
	SURGICAL LIGHT CONTROL
	MOMENTARY CONTACT SWITCH
	DIGITAL DISTRIBUTED IN-ROOM SWITCH
	DIGITAL DISTRIBUTED IN-ROOM DIMMER SWITCH
SO##	REFER TO SEQUENCE OF OPERATIONS IN SPECIFICATIONS 26 09 29 OR SEQUENCE OF OPERATION SCHEDULE
OS	OCCUPANCY SENSOR W/ MANUAL SWITCH WALL MOUNT
DS	DAYLIGHT SENSOR WALL MOUNT
T	TIME CLOCK - SEE TIME CLOCK SCHEDULE
TS	TIME CONTROL SWITCH
P	PHOTO-CELL
LV	LOW VOLTAGE SWITCH STATION - SEE LOW VOLTAGE SWITCHING STATION SCCHEDULE
D	DIGITAL DISTRIBUTED LOW VOLATGE SWITCH STATION SCHEDULE - SEE DISTRIBUTED LOW VOLTAGE SWITCH STATION SCHEDULE
W	WIRELESS SWITCH - LINE VOLTAGE SOURCE
SS	SWITCH STATION - SEE SWITCH STATION SCHEDULE
C	CONTACTOR - SEE CONTACTOR SCHEDULE
UL	UL924 EMERGENCY LIGHTING CONTROL DEVICE WALL MOUNT
LCP/X	LIGHTING CONTROL PANEL
	INDICATES PANEL NAME - SEE LIGHTING CONTROL PANEL SCHEDULE

SYMBOL	DESCRIPTION
XX	SINGLE RECEPTACLE
XX	EXDUPLEX RECEPTACLE
	(GFB) GROUND FAULT BREAKER
	(GFI) GROUND FAULT INTERUPTER
	(IG) ISOLATED GROUND
	(TR) TAMPER RESISTANCE
	(USB) W/ USB CHARGING
	(WP) WEATHERPROOF
XX	DUPLEX RECEPTACLE - MOUNTED AT SPECIAL MOUNTING HEIGHT INDICATED ON DRAWING OR AS INDICATED IN THE ASSOCIATED ARCHITECTURAL ELEVATION.
	INDICATES MOUNTING HEIGHT WHEN SHOWN
	DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER BACKSPLASH
	DUPLEX RECEPTACLE ON EMERGENCY CIRCUIT
	SPLIT DUPLEX RECEPTACLE
	FLOOR DUPLEX RECEPTACLE
	CEILING DUPLEX RECEPTACLE
XX	QUADRAPLEX RECEPTACLE
	(GFB) GROUND FAULT BREAKER
	(GFI) GROUND FAULT INTERUPTER
	(IG) ISOLATED GROUND
	(TR) TAMPER RESISTANCE
	(USB) W/ USB CHARGING
	(WP) WEATHERPROOF
	QUADRAPLEX RECEPT. MOUNTED ABOVE COUNTER BACKSPLASH
XX	QUADRAPLEX RECEPTACLE - MOUNTED AT SPECIAL MOUNTING HEIGHT INDICATED ON DRAWINGS OR AS INDICATED IN THE ASSOCIATED ARCHITECTURAL ELEVATION.
	INDICATES MOUNTING HEIGHT WHEN SHOWN
	FLOOR QUADRAPLEX RECEPTACLE
	CEILING QUADRAPLEX RECEPTACLE
	QUADRAPLEX RECEPTACLE ON EMERGENCY CIRCUIT
	WALL EQUIPMENT CONNECTION - SEE SCHEDULE
	CEILING EQUIPMENT CONNECTION - SEE SCHEDULE
	FLOOR EQUIPMENT CONNECTION - SEE SCHEDULE
	WALL JUNCTION BOX
	FLOOR JUNCTION BOX
	CEILING JUNCTION BOX
	FB - FLOOR BOX PT - POKE THROUGH CT - COUNTER TOP TT - TABLE TOP
	BOX TYPE
FB A 2 2	FLOOR BOX
	NUMBER OF DATA OUTLETS
	NUMBER OF DUPLEX RECEPTACLES
PT A 2 2	POKE THROUGH
MO A 5 6	MULTI ASSEMBLY OUTLETS
	CABLE TRAY
CT 12 4"	INDICATES DEPTH (IN INCHES) INDICATES WIDTH (IN INCHES)
UF 12 3	UNDERFLOOR DUCT
	INDICATES DEPTH (IN INCHES) INDICATES WIDTH (IN INCHES)
T 12 5	TRENCH DUCT
	INDICATES NUMBER OF COMPARTMENTS INDICATES WIDTH (IN INCHES)
W 12 5	WALL DUCT
	INDICATES NUMBER OF COMPARTMENTS INDICATES WIDTH (IN INCHES)
G/1 G	GENERATOR
M XX-1	MOTOR IDENTITY (SEE SCHEDULE)
	SAFETY DISCONNECT SWITCH (NON-FUSED)
	SAFETY DISCONNECT SWITCH (FUSED)
	PUSH BUTTON
T1	TRANSFORMER
	PANELBOARDS. PANELBOARD DOORS MAY BE SHOWN TO INDICATE OPENING SIDE OF RECESSED PANELBOARDS. SEE PANELBOARD IDENTIFICATION FOR DESIGNATION CODES.
	FLOOR CLEARANCE AREA
P	POWER POLE (OPEN OFFICE STYLE)
XX	STATIC GROUND RECEPTACLE
	(GM) GROUND MODULE (PG) POWER GROUND (RI) REMOTE INDICATOR

SYMBOL	DESCRIPTION
	SYSTEMS EQUIPMENT CABINET
X/X	
	(AR) AREA OF REFUGE
	(CA) CABLE TELEVISION
	(CB) CODE BUTTON
	(CC) CLOSED CIRCUIT TELEVISION
	(CLK) CLOCK SYSTEM
	(DB) DOOR BELL
	(DV) DIGITAL TELEVISION
	(EC) EMERGENCY COMMUNICATION
	(FA) FIRE ALARM
	(HP) HOUSE PAGING
	(IC) INTERCOM
	(ID) INTRUSION DETECTION
	(IS) INFANT SECURITY
	(LM) LOCAL MUSIC
	(LP) LOCAL PAGING
	(MA) MASTER ANTENNAE TELEVISION
	(MN) MASS NOTIFICATION
	(MS) MUSIC SYSTEM
	(NC) NURSE CALL
	(P1) PROCEDURE ROOM -TWO WAY COMMUNICATION
	(P2) PROCEDURE ROOM -MUSIC SYSTEM
	(PA) PUBLIC ADDRESS
	(SA) SECURITY ACCESS
	(SC) SYSTEM CLOCK
	(TC) TELECOMMUNICATIONS
	(TV) TELEVISION
	(VD) VOICE DATA
	(WR) WIRED RADIO
	(AN) ANNUNCIATOR
	(BB) BACKBOARD
	(CP) CONTROL PANEL
	(ER) EQUIPMENT RACK
	(TC) TERMINAL CABINET
	(WF) WALL FIELD
	(NAC) NOTIFICATION APPLIANCE PANEL
XX	ANTENNA
	(BO) BY OTHERS
	(DA) DISTRIBUTED ANTENNA SYSTEM (DAS)
	(DR) DIRECTIONAL
	(FR) FIRST RESPONDER RADIO
	(MD) MULTIDIRECTIONAL
	(OD) OMNI DIRECTIONAL
XX	FIRE ALARM WALL MOUNT
XX	FIRE ALARM CEILING MOUNT
	(CMX) CONTROL MODULE. X DENOTES SPECIFIC UNIT. SEE CONTROL MODULE SCHEDULE
	(CO) CHIME ONLY
	(COD) CARBON MONOXIDE DETECTOR
	(CV1) CHIME W/ 15 CANDELA STROBE
	(CV2) CHIME W/ 30 CANDELA STROBE
	(CV3) CHIME W/ 75 CANDELA STROBE
	(CV4) CHIME W/ 110 CANDELA STROBE
	(DH) DOOR HOLDER
	(DI) IONIZATION SMOKE DETECTOR (DUCT)
	(DP) PHOTOMETRIC SMOKE DETECTOR (DUCT)
	(HC) HEAT/COMBINATION (RATE OF RISE/FIXED)
	(HF) HEAT DETECTOR (FIXED)
	(HO) HORN ONLY
	(HR) HEAT DETECTOR (RATE OF RISE)
	(HV1) HORN W/ 15 CANDELA STROBE
	(HV2) HORN W/ 30 CANDELA STROBE
	(HV3) HORN W/ 75 CANDELA STROBE
	(HV4) HORN W/ 110 CANDELA STROBE
	(MMX) MONITOR MODULE - SEE MONITOR MODULE SCHEDULE (X DENOTES SPECIFIC UNIT)
	(PS) PULL STATION
	(RE) RE-ENTRANT HORN
	(SB) SOUNDER BASE
	(SI) IONIZATION SMOKE DETECTOR
	(SO) SPEAKER ONLY
	(SP) PHOTOELECTRIC SMOKE DETECTOR
	(MSO) MASS NOTIFICATION SPEAKER ONLY
	(MSV1) MASS NOTIFICATION SPEAKER W/ 15 CANDELA STROBE
	(MSV2) MASS NOTIFICATION SPEAKER W/ 30 CANDELA STROBE
	(MSV3) MASS NOTIFICATION SPEAKER W/ 75 CANDELA STROBE
	(MSV4) MASS NOTIFICATION SPEAKER W/ 110 CANDELA STROBE
	(MV1) MASS NOTIFICATION DEVICE W/ 15 CANDELA STROBE
	(MV2) MASS NOTIFICATION DEVICE W/ 30 CANDELA STROBE
	(MV3) MASS NOTIFICATION DEVICE W/ 75 CANDELA STROBE
	(MV4) MASS NOTIFICATION DEVICE W/ 110 CANDELA STROBE
	(SV1) SPEAKER W/ 15 CANDELA STROBE
	(SV2) SPEAKER W/ 30 CANDELA STROBE
	(SV3) SPEAKER W/ 75 CANDELA STROBE
	(SV4) SPEAKER W/ 110 CANDELA STROBE
	(VO) VISUAL UNIT ONLY
	(VO1) VISUAL UNIT ONLY, 15 CANDELA STROBE
	(VO2) VISUAL UNIT ONLY, 30 CANDELA STROBE
	(VO3) VISUAL UNIT ONLY, 75 CANDELA STROBE
	(VO4) VISUAL UNIT ONLY, 110 CANDELA STROBE
W	WALL PHONE OUTLET
	TELECOMMINCATIONS OUTLET MOUNTED ABOVE COUNTER BACKSPLASH
XX	TELECOMMINCATIONS OUTLET - MOUNTED AT SPECIAL MOUNTING HEIGHT INDICATED ON DRAWING OR AS INDICATED IN THE ASSOCIATED ARCHITECTURAL ELEVATION.
	INDICATES MOUNTING HEIGHT WHEN SHOWN
#TYPE	TELECOMMINCATIONS OUTLET
	SEE TELECOMMUNICATIONS HORIZONTAL CABLING SCHEDULE FOR ADDITIONAL INFORMATION.
	INDICATES JACK/CABLE QUANTITY
	FLOOR TELECOMMUNICATIONSOUTLET
XX	CEILING TELECOMMUNICATIONS OUTLET
	(WAP) WIRELESS ACCESS POINT
XX	CLOCK SYSTEM
	(A1) 12" ANALOG CLOCK, SINGLE FACE
	(A2) 9" ANALOG CLOCK, SINGLE FACE
	(A3) 12" ANALOG CLOCK, DOUBLE FACE
	(A4) 9" ANALOG CLOCK, DOUBLE FACE
	(D1) DIGITAL CLOCK, HR:MIN:SEC
	(D2) DIGITAL CLOCK, HR:MIN
	(ET) DIGITAL CLOCK, ELAPSED TIMER
	(EC) ELAPSED TIMER CONTROL
PLY	PLYWOOD
	DATA RACK
	GROUND BAR

SYMBOL	DESCRIPTION
XX	SECURITY, ACCESS CONTROL AND DOOR MONITORING WALL MOUNT
XX	SECURITY, ACCESS CONTROL AND DOOR MONITORING CEILING MOUNT
	(CR) CARD READER
	(CXX) CLOSED CIRCUIT CAMERA - SEE CAMERA SCHEDULES (XX-DENOTES SPECIFIC UNIT)
	(DB) DURESS BUTTON
	(DC) DOOR CONTACT
	(EL) ELECTRONIC LATCH/LOCK
	(ES) ELECTRIC STRIKE
	(GB) GLASS BREAK DETECTOR
	(KE) KEYLESS ENTRY
	(KP) KEYPAD - SECURITY SYSTEM
	(KS) KEYED SWITCH
	(LM) LATCHBOLT MONITOR
	(MD) MOTION SENSOR - DUAL TECHNOLOGY
	(MI) MOTION SENSOR - INFRARED
	(ML) MAGNETIC LOCK
	(MO) CLOSED CIRCUIT TELEVISION MONITOR
	(MU) MOTION SENSOR - ULTRASONIC
	(RC) CLOSED CIRCUIT TELEVISION REMOTE CAMERA CONTROLS
	(RM) REQUEST FOR EXIT - MOTION
	(RP) REQUEST FOR EXIT PUSH BUTTON
	(VC) VIDEO RECORDER
XX	INTRUSION DETECTION AND DOOR MONITORING WALL MOUNT
XX	INTRUSION DETECTION AND DOOR MONITORING CEILING MOUNT
	(DB) DURESS BUTTON
	(DC) DOOR CONTACT
	(GB) GLASS BREAK DETECTOR
	(KP) KEYPAD - SECURITY SYSTEM
	(KS) KEYED SWITCH
	(LM) LATCHBOLT MONITOR
	(MD) MOTION SENSOR - DUAL TECHNOLOGY
	(MI) MOTION SENSOR - INFRARED
	(ML) MAGNETIC LOCK
	(MU) MOTION SENSOR - ULTRASONIC
	(RM) REQUEST FOR EXIT - MOTION
	(RP) REQUEST FOR EXIT PUSH BUTTON
XX	DOOR HARDWARE - SEE DETAILS, ARCHITECTURAL PLANS AND SPECIFICATIONS. DEVICES FURNISHED BY OTHERS: ROUGH-IN AND WIRING BY EC.
	(AA) AUTODOOR ACTUATOR (PUSH PLATE)
	(AM) AUTODOOR ACTUATOR (MOTION SENSOR)
	(AO) AUTODOOR OPERATOR
	(ED) ELECTRIC EXITING DEVICE
	(DE) DELAYED EGRESS MODULE
	(EL) ELECTRONIC LATCH/LOCK
	(ES) ELECTRIC STRIKE
	(KS) KEY SWITCH
	(ML) MAGNETIC LOCK
	(PS) POWER SUPPLY
	(PT) POWER TRANSFER HINGE
	(RL) RELAY MODULE
	(RM) SEPARATELY MOUNTED REQUEST TO EXIT MOTION SENSOR NOT ASSOCIATED WITH SECURITY SYSTEM
XX	PAGING AND SOUND SYSTEMS RECESSED WALL MOUNT
XX	PAGING AND SOUND SYSTEMS SURFACE WALL MOUNT
XX	PAGING AND SOUND SYSTEMS RECESSED CEILING MOUNT
XX	PAGING AND SOUND SYSTEMS SURFACE CEILING MOUNT
	(DB/SP) DOORBELL SPEAKER
	(DP/SP) DEPARTMENT PAGING SPEAKER
	(HP/SP) HOSPITAL PAGING SPEAKER
	(HW/SP) HOSPITAL WIDE PAGING & WIRED RADIO SPEAKER
	(LM/SP) LOCAL MUSIC SPEAKER
	(PC/MP) PROCEDURE ROOM COMMUNICATIONS CEILING MOUNTED MICROPHONE
	(PC/SP) PROCEDURE ROOM COMMUNICATIONS SPEAKER
	(TS/SP) TELEVISION SYSTEM SPEAKER
	(WR/SP) WIRED RADIO SPEAKER
	(PM/SP) PROCEDURE ROOM MUSIC SPEAKER
	(DB/PB) DOORBELL PUSH BUTTON
	(DP/MP) DEPARTMENT PAGING MICROPHONE OUTLET
	(DP/VC) DEPARTMENT PAGING VOLUME CONTROL
	(HP/MP) HOSPITAL PAGING MICROPHONE OUTLET
	(HP/VC) HOSPITAL PAGING VOLUME CONTROL
	(HW/MP) HOSPITAL PAGING & WIRED RADIO MICROPHONE OUTLET
	(HW/VC) HOSPITAL PAGING & WIRED RADIO VOLUME CONTROL
	(HW/VS) HOSPITAL PAGING & WIRED RADIO VOLUME CONTROL WITH STATION SELECTOR
	(LM/VC) LOCAL MUSIC SYSTEM VOLUME CONTROL
	(PC/MP) PROCEDURE ROOM COMMUNICATIONS MICROPHONE
	(TS/VC) TELEVISION SYSTEM VOLUME CONTROL
	(WR/VC) WIRED RADIO VOLUME CONTROL
	(WR/VS) WIRED RADIO VOLUME CONTROL WITH STATION SELECTOR

SYMBOL	DESCRIPTION
XX	AREA OF REFUGE WALL MOUNT
XX	AREA OF REFUGE CEILING MOUNT
	(CS) CALL STATION
XX	EMERGENCY COMMUNICATION
	(CS) CALL STATION
XX	RFID SYSTEM WALL MOUNT
XX	RFID SYSTEM CEILING MOUNT
	(CL) COLLECTOR
	(CN) CONCENTRATOR
	(IR) INFRARED SENSOR (CEILING MOUNTED)
	(RF) RF SENSOR (CEILING MOUNTED)
	(BD) BADGE DROP BOX
	(BC) BADGE STORAGE CABINET
XX	NURSE CALL WALL MOUNT
XX	NURSE CALL CEILING MOUNT
	(A1) AUDIO/VISUAL SINGLE PATIENT STATION W/ CALL CORD
	(A2) AUDIO/VISUAL SINGLE PATIENT STATION W/ PILLOW SPEAKER
	(A3) AUDIO/VISUAL DOUBLE PATIENT STATION W/ CALL CORD
	(A4) AUDIO/VISUAL DOUBLE PATIENT STATION W/ PILLOW SPEAKER
	(AS) AUDIO/VISUAL BUS STATION
	(AN) ANNUNCIATOR
	(CB) CODE BUTTON
	(DL) DOME LIGHT
	(DS) DUTY STATION
	(ES) EMERGENCY STATION
	(ESA) EMERGENCY STATION WITH AUDIO
	(EW) EMERGENCY STATION - WET LOCATION
	(MCL) MINI-CORRIDOR LIGHT
	(MS) MASTER STATION
	(NL) NURSE LOCATOR
	(PC) PULL CORD
	(PCA) PULL CORD WITH AUDIO
	(RS) ROOM STATUS SWITCH
	(SA) STAFF ASSIST
	(SB) STAFF ASSIST/CODE BUTTON
	(SC) SIDE COMMUNICATIONS RECEPTACLE FOR BED CONNECTION
	(SS) STAFF STATION
	(ST) STAFF TERMINAL
	(STP) STAFF TERMINAL PROVISION
	(TV) NURSE CALL TELEVISION INTERFACE
	(V1) VISUAL ONLY SINGLE PATIENT STATION W/ CALL CORD
	(V2) VISUAL ONLY SINGLE PATIENT STATION W/ PILLOW SPEAKER
	(V3) VISUAL ONLY DOUBLE PATIENT STATION W/ CALL CORD
	(V4) VISUAL ONLY DOUBLE PATIENT STATION W/ PILLOW SPEAKER
	(VS) VISUAL ONLY PUSH FOR HELP/PATIENT STATION W/ CALL CORD
	(V6) VISUAL ONLY PUSH FOR HELP/PATIENT STATION W/ PILLOW SPEAKER
	(ZL) ZONE LIGHT
XX	INFANT SECURITY
	(AR) ALARM RECEIVER - PLENUM LOCATION
	(BS) BYPASS SWITCH (KEY, PUSH BUTTON, CODE)
	(CU) CONTROL UNIT
	(EE) ELEVATOR ACCESS BYPASS CONTROL ENCLOSURE
	(ER) EXIST ALARM RECEIVERS
	(EU) EXIT ALARM CONTROL UNIT
	(IC) IDENTIFICATION CONSOLE
	(IP) IDENTIFICATION PRINTER
	(RS) REED SWITCH (DOOR)
	(SA) STALL ALERT GRAPHIC PANEL
XX	LIGHTNING PROTECTION
	(ATH) AIR TERMINAL ROOF DECK
	(ATV) AIR TERMINAL PARAPET
	(GRD) GROUND TO DOWN CONDUCTOR
	(GRS) GROUND TO BUILDING STEEL
	(RPD) ROOF PENETRATION TO DOWN CONDUCTOR
	(RPS) ROOF PENETRATION TO BUILDING STEEL

GRAPHICAL REPRESENTATION OF PHASING, TYPICAL FOR ALL SYMBOLS.

EXISTING TO REMAIN	RELOCATED	DEMOLISHED
(M) XX-1	(M) XX-1	(M) XX-1

- EXISTING TO REMAIN
- EXISTING TO BE REMOVED
- NEW
- ITEM TO BE REMOVED
- AREA NOT IN CONTRACT

REVISION NUMBER - SHOWN ON PLANS

- NUMBER OF DETAIL ON SHEET
- NUMBER OF SHEET WHERE DETAIL APPEARS
- KEYED NOTE
- Room 6 — ROOM NAME AND NUMBER
- INDICATES DETAIL DESIGNATOR
- SEE SECTION DETAIL
- INDICATES SHEET NUMBER

DFD FIRE ALARM SYMBOLS

SYMBOL	DESCRIPTION
FACP	NEW FIRE ALARM CONTROL PANEL
#FACP	EXISTING FIRE ALARM CONTROL PANEL
FAUD	NEW FIRE ALARM ANNUNCIATOR PANEL
#FAUD	EXISTING FIRE ALARM ANNUNCIATOR PANEL
	NEW FIRE ALARM PULL STATION
	EXISTING FIRE ALARM PULL STATION
H	NEW FIRE ALARM HORN
H	EXISTING FIRE ALARM HORN
M	NEW FIRE ALARM MINI HORN
S	NEW FIRE ALARM SPEAKER
S	EXISTING FIRE ALARM SPEAKER
H/S	NEW FIRE ALARM HORN/STROBE, (#) IS CANDELA RATING
H/S	EXISTING FIRE ALARM HORN/STROBE, (#) IS CANDELA RATING
S/S	NEW FIRE ALARM SPEAKER/STROBE, (#) IS CANDELA RATING
S/S	EXISTING FIRE ALARM SPEAKER/STROBE, (#) IS CANDELA RATING
#	NEW CEILING MOUNT FIRE ALARM SPEAKER/STROBE, (#) IS CANDELA RATING
	NEW CEILING MOUNT FIRE ALARM SPEAKER
#	NEW CEILING MOUNT FIRE ALARM STROBE, (#) IS CANDELA RATING
	NEW SUPERVISED FIRE ALARM HORN LOUDSPEAKER
S	NEW FIRE ALARM STROBE, (#) IS CANDELA RATING
S	EXISTING FIRE ALARM STROBE, (#) IS CANDELA RATING
	NEW INTELLIGENT PHOTOELECTRIC SMOKE DETECTOR
	EXISTING SMOKE DETECTOR
ER	NEW INTELLIGENT PHOTOELECTRIC SMOKE DETECTOR FOR ELEVATOR RECALL
ER	EXISTING INTELLIGENT PHOTOELECTRIC SMOKE DETECTOR FOR ELEVATOR RECALL
	NEW INTELLIGENT 135F FIXED & RATE HEAT DETECTOR
	EXISTING INTELLIGENT 135F FIXED & RATE HEAT DETECTOR
#	NEW CONVENTIONAL FIXED TEMP HEAT DETECTOR, (#) IS TEMP RATING
#	EXISTING CONVENTIONAL FIXED TEMP HEAT DETECTOR, (#) IS TEMP RATING
	NEW INTELLIGENT PHOTOELECTRIC DUCT SMOKE DETECTOR
	EXISTING INTELLIGENT PHOTOELECTRIC DUCT SMOKE DETECTOR
MM	NEW MONITOR MODULE
CM	NEW CONTROL MODULE
DH	NEW MAGNETIC DOOR HOLDER
EB	EXISTING MAGNETIC DOOR HOLDER
TS	NEW SPRINKLER TAMPER SWITCH
ET	EXISTING SPRINKLER TAMPER SWITCH
FS	NEW SPRINKLER FLOW SWITCH
EF	EXISTING SPRINKLER FLOW SWITCH
EDS	NEW ELECTRIC DOOR STRIKE
ES	EXISTING ELECTRIC DOOR STRIKE
	NEW FIRE FIGHTERS TELEPHONE HAND SET
	EXISTING FIRE FIGHTERS TELEPHONE HAND SET
	NEW FIRE FIGHTERS TELEPHONE JACK
	EXISTING FIRE FIGHTERS TELEPHONE JACK
FSS	EXISTING FIRE SUPPRESSION SYSTEM
FS	NEW FAN SHUTDOWN RELAY
S	EXISTING FAN SHUTDOWN RELAY
PS	NEW PRESSURE SWITCH
ES	EXISTING PRESSURE SWITCH
SD	NEW SMOKE DAMPER
SD	EXISTING SMOKE DAMPER
RTSD	REMOTE TEXT SWITCH W/ INDICATOR
FAR	KEYED FIRE ALARM RESET SWITCH
FATP	NEW FIRE ALARM TRANSPONER PANEL
#ATP	EXISTING FIRE ALARM TRANSPONER PANEL

ELECTRICAL SHEET INDEX

WORKSHOP ARCHITECTS INC
WORKSHOP
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THORNTON TOMASETTI — STRUCTURAL
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RING & DUCHATEAU — MEP / FP
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RIPPE ASSOCIATES — FOOD SERVICE
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Board of Regents of the University of Wisconsin c/o UW System Administration

Project Location:
975 UNIVERSITY AVE
MADISON, WISCONSIN 53706

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title: ELECTRICAL SYMBOLS AND SHEET INDEX

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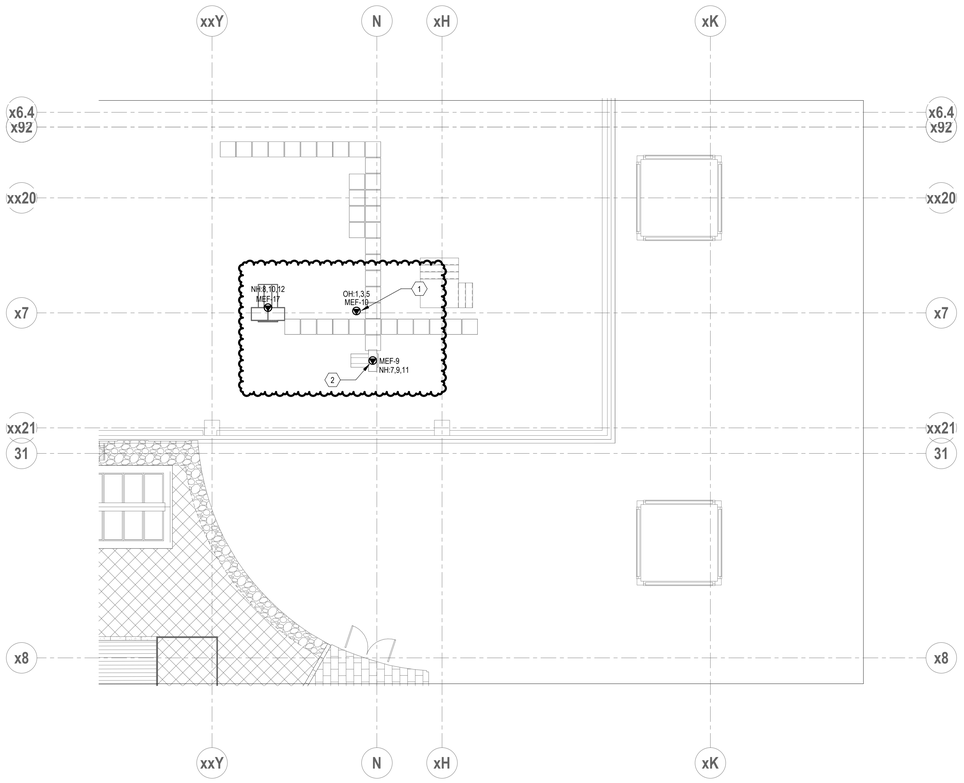


1 SIXTH FLOOR POWER PLAN - AREA B
1/8" = 1'-0"

PROJECT NORTH

SHEET NOTES

A. REFER TO ARCHITECTURAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS AND MOUNTING HEIGHTS OF ALL ELECTRICAL DEVICES PRIOR TO COMMENCING INSTALLATION.

B. CIRCUIT NUMBERS INDICATED DO NOT REFLECT THE ACTUAL POSITION OF THE CIRCUIT BREAKERS IN THE PANEL; RATHER, THE NUMBERS INDICATE WHICH DEVICES ARE CONNECTED TO A COMMON CIRCUIT.

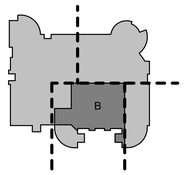
C. EXISTING TO REMAIN, "EX", ON THIS PLAN REFERS TO THE STATUS OF BASIC ELECTRICAL DEVICES. THERE MAY BE SOME WORK REQUIRED IN THESE SPACES INVOLVING BACK-FEEDING EXISTING CIRCUITS OR OTHER MODIFICATIONS. SEE ALL DOCUMENTS THAT MAKE UP THIS CONTRACT FOR THE TOTAL EXTENT OF WORK REQUIRED IN ALL SPACES.

D. SERVE ALL 480/277 VOLT, NORMAL BRANCH CIRCUITS "NH" WITHIN THIS BOUNDRY FROM PANEL "H5C", UNLESS OTHERWISE INDICATED.

E. SERVE ALL 480/277 VOLT, 702 BRANCH CIRCUITS "OH" WITHIN THIS BOUNDRY FROM PANEL "EH5", UNLESS OTHERWISE INDICATED.

KEYNOTES

1. EXISTING MEF-10 IS BEING REMOVED AND REPLACE WITH A NEW EXAUST FAN IN THE SAME LOCATION.
2. EXISTING MEF-9 IS REMAINING IN PLACE BUT THE FEEDER IS TO BE REPLACE TO ALLOW FOR THE NEW MOTOR CONTROLLER AND DISCONNECT TO BE INSTALLED.



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UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
SIXTH FLOOR POWER PLAN - AREA B

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SHEET NOTES

A. REFER TO ARCHITECTURAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS AND MOUNTING HEIGHTS OF ALL ELECTRICAL DEVICES PRIOR TO COMMENCING INSTALLATION.

B. EXISTING TO REMAIN, "EX", ON THIS PLAN REFERS TO THE STATUS OF BASIC ELECTRICAL DEVICES. THERE MAY BE SOME WORK REQUIRED IN THESE SPACES INVOLVING BACK-FEEDING EXISTING CIRCUITS OR OTHER MODIFICATIONS. SEE ALL DOCUMENTS THAT MAKE UP THIS CONTRACT FOR THE TOTAL EXTENT OF WORK REQUIRED IN ALL SPACES.

KEYNOTES

1. TIE SMOKE DETECTOR WITHIN ELEVATOR LOBBY INTO THE ELEVATOR CONTROL SYSTEM.

1 FIRST FLOOR FIRE ALARM PLAN
1/8" = 1'-0"

PROJECT NORTH

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UNIVERSITY OF WISCONSIN - MADISON
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Sheet Title:
FIRST FLOOR FIRE ALARM PLAN - AREA B

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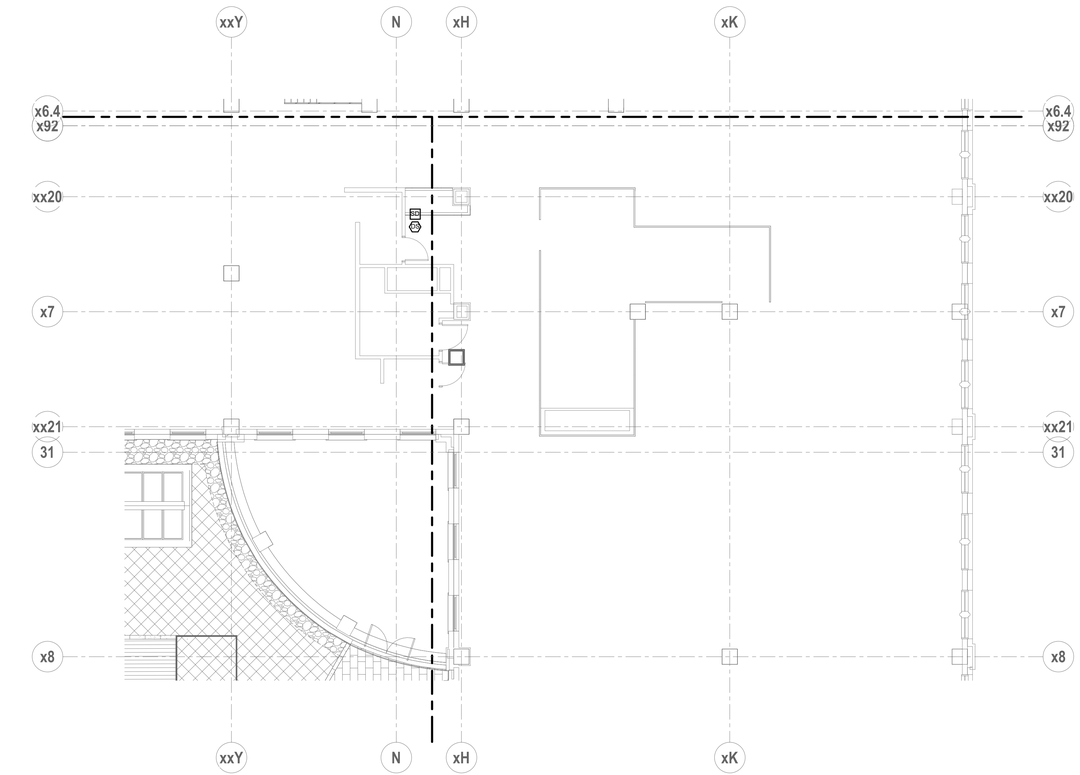


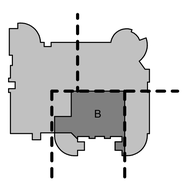
1 FOURTH FLOOR FIRE ALARM PLAN
1/8" = 1'-0"

PROJECT NORTH

SHEET NOTES

A. REFER TO ARCHITECTURAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS AND MOUNTING HEIGHTS OF ALL ELECTRICAL DEVICES PRIOR TO COMMENCING INSTALLATION.

B. EXISTING TO REMAIN, "EX", ON THIS PLAN REFERS TO THE STATUS OF BASIC ELECTRICAL DEVICES. THERE MAY BE SOME WORK REQUIRED IN THESE SPACES INVOLVING BACK-FEEDING EXISTING CIRCUITS OR OTHER MODIFICATIONS. SEE ALL DOCUMENTS THAT MAKE UP THIS CONTRACT FOR THE TOTAL EXTENT OF WORK REQUIRED IN ALL SPACES.



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MADISON, WISCONSIN 53706

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
FOURTH FLOOR FIRE ALARM PLAN - AREA B

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM #1

Graphic Scale	0' 2' 4' 8' 12'
UWSA Number	A-24-004
Volume Number	2
MSN Number	9950-2307
Issued For	BID DOCUMENTS
Date Issued	06/20/2025
Sheet Number	E234B

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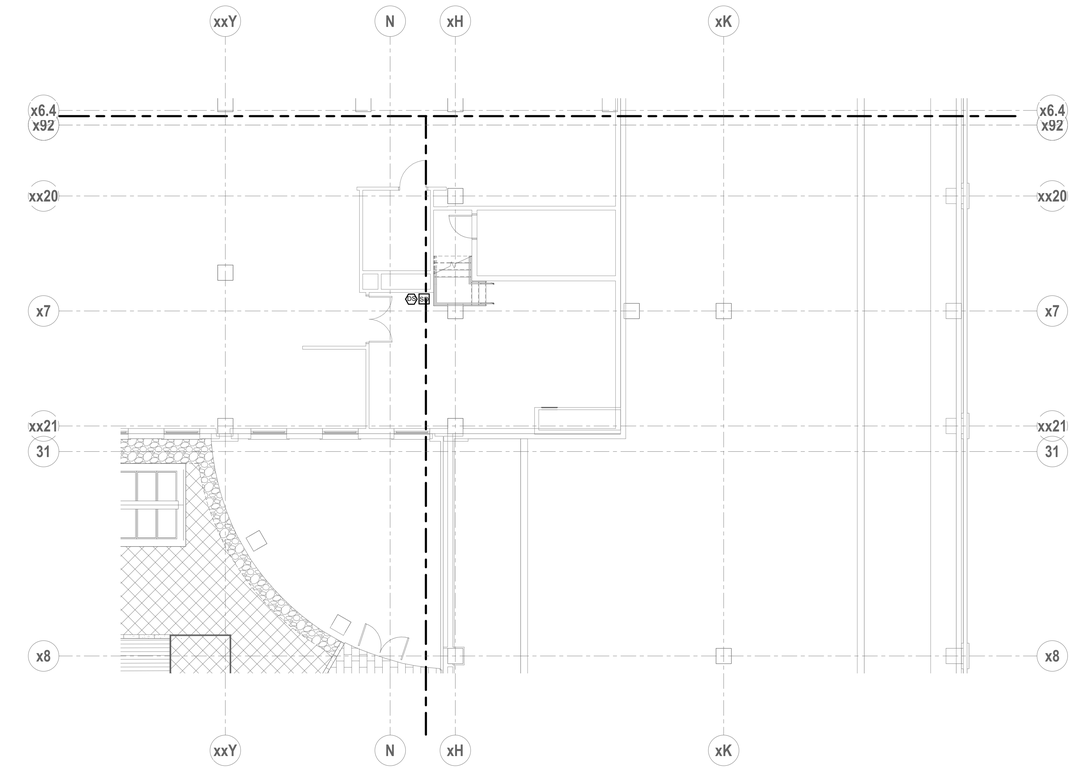


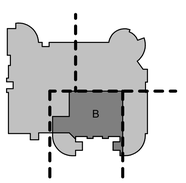
1 FIFTH FLOOR FIRE ALARM PLAN
1/8" = 1'-0"

PROJECT NORTH

SHEET NOTES

A. REFER TO ARCHITECTURAL PLANS, ELEVATIONS, AND DETAILS FOR LOCATIONS AND MOUNTING HEIGHTS OF ALL ELECTRICAL DEVICES PRIOR TO COMMENCING INSTALLATION.

B. EXISTING TO REMAIN, "EX", ON THIS PLAN REFERS TO THE STATUS OF BASIC ELECTRICAL DEVICES. THERE MAY BE SOME WORK REQUIRED IN THESE SPACES INVOLVING BACK-FEEDING EXISTING CIRCUITS OR OTHER MODIFICATIONS. SEE ALL DOCUMENTS THAT MAKE UP THIS CONTRACT FOR THE TOTAL EXTENT OF WORK REQUIRED IN ALL SPACES.



WORKSHOP
WORKSHOP ARCHITECTS INC
201 E PITTSBURGH AVE #301
MILWAUKEE WI 53204

WORKSHOP ARCHITECTS ARCHITECT
201 E PITTSBURGH AVE #301
MILWAUKEE, WI 53204

K. SINGH & ASSOCIATES CIVIL
3636 N. 124TH STREET
WAUWATOSA, WI 53222

SAIKI DESIGN LANDSCAPE
1110 S PARK STREET
MADISON, WI 53715

THORNTON TOMASETTI STRUCTURAL
320 E BUFFALO ST #603
MILWAUKEE, WI 53202

RING & DUCHATEAU MEP / FP
17400 W CAPITOL DRIVE
BROOKFIELD, WI 53045

RIPPE ASSOCIATES FOOD SERVICE
10650 RED CIRCLE DR, STE. 100
MINNEAPOLIS, MN 55343

SHEN MILSOM & WILKE AV / IT
125 S. WACKER DRIVE, SUITE 1510
CHICAGO, IL 60606

Board of Regents of the
University of Wisconsin
c/o UW System Administration

Project Location:
975 UNIVERSITY AVE
MADISON, WISCONSIN 53706

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
FIFTH FLOOR FIRE ALARM PLAN - AREA B

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM #1

Graphic Scale	0' 2' 4' 8' 12'
UWSA Number	A-24-004
Volume Number	2
MSN Number	9950-2307
Issued For	BID DOCUMENTS
Date Issued	06/20/2025
Sheet Number	E235B

8/5/2025 10:33:27 AM

EQUIPMENT SCHEDULE - MECHANICAL

EQUIPMENT		LOCATION				LOAD			FED FROM			OCPD			FEEDER				MOTOR STARTER						DISCONNECT SWITCH						CONNECTION			
ID	DESCRIPTION	NAME	NO	VOLTAGE	PHASE	HP	FLA	KVA	PANEL	CIRCUIT	BRANCH	TYPE	SIZE	POLE	QTY	PHASE	GRD	COND	FURN BY	INST BY	WIRE BY	LOC	TYPE	OPTIONS	FURN BY	INST BY	WIRE BY	LOC	OPTIONS	SCCR	NEMA TYPE	OPTIONS	MTG HEIGHT	NOTES
MAHU-8 SERVICE	SERVICE LIGHTS	MECH.	P133	120	1	0	5	0.6	ELPB	OL:3	702	CB	20	1	1	#12	#12	3/4"						-	EC	EC	EC	NU	7			6	0"	
MAHU-8-SF-1A	SUPPLY FAN ARRAY	MECH.	P133	480	3	25	34	28.3	EHPB	OH:7,9,11	702	CB	70	3	3	#4	#8	1-1/4"	MC	EC	EC	NU	VFDN	-	EC	EC	EC	NU	7			6	0"	
MAHU-8-SF-1B	SUPPLY FAN ARRAY	MECH.	P133	480	3	25	34	28.3	EHPB	OH:13,15,17	702	CB	70	3	3	#4	#8	1-1/4"	MC	EC	EC	NU	VFDN	-	EC	EC	EC	NU	7			6	0"	
MCP-1	STEAM CONDENSATE PUMP	MECH.	P133	208	3	0.5	2.4	0.9	LPC (EXISTING)	NL:13,15,17	N	CB	20	3	3	#12	#12	3/4"	MFR	MFR	EC	OU	MAN	-	EC	EC	EC	NU	7			6	0"	
MCUH-1	CABINET UNIT HEATER	VEST.	1500T	120	1	0.17	4.4	0.5	L1C (EXISTING)	NL:61	N	CB	20	1	1	#12	#12	3/4"	MFR	MFR	EC	OU	MAN	-	EC	EC	EC	NU	7			6	0"	
MCUH-2	CABINET UNIT HEATER	VEST.	1500S	120	1	0.17	4.4	0.5	L1C (EXISTING)	NL:63	N	CB	20	1	1	#12	#12	3/4"	MFR	MFR	EC	OU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-1	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-2	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-3	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-4	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-5	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-6	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-7	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MDF-8	DESTRATIFICATION FAN	WINTER GARDEN-2	1300A-2	277	1	0	0.2	0	H2C (EXISTING)	NH:5	N	CB	20	1	1	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MEF-9	CENTRIFIGUAL EXHAUST FAN EXISTING	ROOF		480	3	2.5	4.8	4	H5C	NH:7,9,11	N	CB	15	3	3	#12	#12	3/4"	MC	EC	EC	NU	VFDS	-	EC	EC	EC	NU	7			6	0"	1
MEF-10	UPBLAST EXHAUST FAN	ROOF		480	3	2.5	4.8	4	EH5 (EXISTING)	OH:1,3,5	702	CB	15	3	3	#12	#12	3/4"	MC	EC	EC	NU	VFDS	-	EC	EC	EC	NU	7			6	0"	
MEF-17	CENTRIFIGUAL EXHAUST FAN	ROOF		480	3	5	7.6	6.3	H5C	NH:8,10,12	N	CB	15	3	3	#12	#12	3/4"	MC	EC	EC	NU	VFDS	-	EC	EC	EC	NU	7			6	0"	
MFCU-8	FAN COIL UNIT	MECH.	P133	120	1	0.33	7.2	0.9	LPC (EXISTING)	NL:19	702	CB	20	1	1	#12	#12	3/4"	MFR	MFR	EC	OU	MAN	-	EC	EC	EC	NU	7			6	0"	
MPCP-15A	INLINE PUMP	MECH.	P133	208	3	1	4.6	1.7	LPC (EXISTING)	NL:1,3,5	N	CB	20	3	3	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MPCP-15B	INLINE PUMP	MECH.	P133	208	3	1	4.6	1.7	LPC (EXISTING)	NL:7,9,11	N	CB	20	3	3	#12	#12	3/4"	MC	EC	EC	NU	MAN	-	EC	EC	EC	NU	7			6	0"	
MRF-9	RETURN AIR FAN	MECH.	P133	480	3	7.5	11	9.1	EHPB	OH:1,3,5	702	CB	20	3	3	#8	#10	1"	MC	EC	EC	NU	VFDM	-	EC	EC	EC	NU	7			6	0"	
MRF-9	RETURN AIR FAN	MECH.	P133	480	3	7.5	11	9.1	EHPB	OH:19,21,23	702	CB	20	3	3	#8	#10	1"	MC	EC	EC	NU	VFDM	-	EC	EC	EC	NU	7			6	0"	
MTCP-2	TEMPERATURE CONTROL PANEL	MECH.	P133	120	1	0	4.2	0.5	ELPB	OL:1	702	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
MTCP-2	TEMPERATURE CONTROL PANEL	STORAGE	1225	120	1	0	4.2	0.5	1/T R (EXISTING)	NL:35	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
MTCP-3	TEMPERATURE CONTROL PANEL	STORAGE	1297	120	1	0	4.2	0.5	1/S (EXISTING)	NL:37	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	

KITCHEN EQUIPMENT SCHEDULE - TYPICAL

EQUIPMENT		LOCATION				LOAD			FED FROM			OCPD			FEEDER				MOTOR STARTER						DISCONNECT SWITCH						CONNECTION			
ID	DESCRIPTION	NAME	NO	VOLTAGE	PHASE	HP	FLA	KVA	PANEL	CIRCUIT	BRANCH	TYPE	SIZE	POLE	QTY	PHASE	GRD	COND	FURN BY	INST BY	WIRE BY	LOC	TYPE	OPTIONS	FURN BY	INST BY	WIRE BY	LOC	OPTIONS	SCCR	NEMA TYPE	OPTIONS	MTG HEIGHT	NOTES
K21	ICE DISPENSER W/SODA HEADS	RETAIL 1 - FOH	1464	120	1	0	3.5	0.4	LCP "A"	KNL:3	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K22	ICE MAKER	RETAIL 1 - FOH	1464	208	1	0	9.5	2	LCP "A"	KNL:5,7	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		6-20R	-	0"	
K23	SODA SYSTEM CARBONATOR	RETAIL 1 - FOH	1464	120	1	0	7.2	0.9	LCP "A"	KNL:1	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K28	REFRIGERATED DISPLAY CASE, SLIDE IN COUNTER	RETAIL 1 - FOH	1464	120	1	0	9.7	0.8	LCP "A"	KNL:9	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	2' - 10"	
K29	P.O.S. SYSTEM	RETAIL 1 - FOH	1464	120	1	0	5	0.6	LCP "A"	KNL:11	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K31	UNDERCOUNTER REFRIGERATOR, 1-SEC.	RETAIL 1 - FOH	1464	120	1	0	2	0.2	1LKR	NL:7	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K33	UNDERCOUNTER REFRIGERATOR, 1-SEC.	RETAIL 1 - FOH	1464	120	1	0	2	0.2	1LKR	NL:5	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K34	DROP-IN COLD PAN, 4-WELL	RETAIL 1 - FOH	1464	120	1	0	5.9	0.5	LCP "A"	KNL:2	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K35	DROP-IN HOT PAN, 4-WELL	RETAIL 1 - FOH	1464	208	1	0	16	3.8	LCP "A"	KNL:4,6	N	CB	25	2	2	#10	#10	3/4"	-	-	-	-	-	-	-	-	-	-	-		6-30R	-	0"	
K36	TORTILLA WARMER GRILL	RETAIL 1 - FOH	1464	208	1	0	7.5	1.8	LCP "A"	KNL:8,10	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		6-20R	-	0"	
K37	HEATED HOLDING CABINET	RETAIL 1 - FOH	1464	120	1	0	16	1.9	1LKR	NL:9	N	CB	25	1	1	#10	#10	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	6' - 4"	
K37	HEATED HOLDING CABINET	RETAIL 1 - FOH	1464	120	1	0	16	1.9	1LKR	NL:11	N	CB	25	1	1	#10	#10	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	6' - 4"	
K38	EXHAUST HOOD (TYPE 1)	RETAIL 1 - FOH	1464	120	1	0	0.8	0.1	1LKR	NL:29	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	9' - 4"	
K40	UNDERCOUNTER REFRIGERATOR, 1-SEC.	RETAIL 1 - FOH	1464	120	1	0	2.3	0.3	1LKR	NL:3	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K41A	VERTICAL BROILER, ELECTRIC	RETAIL 1 - FOH	1464	208	1	0	17.5	3.6	1LKR	NL:13,15	N	CB	25	2	2	#10	#10	3/4"	-	-	-	-	-	-	-	-	-	-	-		6-30R	-	0"	
K42	FIRE PROTECTION SYSTEM	RETAIL 1 - FOH	1464	120	1	0	4.2	0.5	1LKR	NL:24	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K43A	DEMAND CONTROL VENTILATION SYSTEM	RETAIL 1 - FOH	1464	120	1	0	4.2	0.5	1LKR	NL:22	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K43B	VFD - EXHAUST	RETAIL 1 - FOH	1464	208	3	0	10.6	3.8	1LKR	NL:23,25,27	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K44A	CONVECTION OVEN, 2-SEC., ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	14	11	1HKR	NH:1,3,5	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K44B	CONVECTION OVEN, 2-SEC., ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	14	11	1HKR	NH:9,11,13	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K45	COUTERTOP GRIDDLE, ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	19.5	10.8	1HKR	NH:17,19,21	N	CB	25	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K46A	COUTERTOP GRIDDLE, ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	19.5	16.2	1HKR	NH:18,20,22	N	CB	25	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K46B	COUTERTOP GRIDDLE, ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	19.5	10.8	1HKR	NH:10,12,14	N	CB	25	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K47	UNDERCOUNTER WARMING CABINET	RETAIL 1 - FOH	1464	120	1	0	9	1.1	1LKR	NL:1	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K48A	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	20	17	1HKR	NH:25,27,29	N	CB	30	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K48B	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	RETAIL 1 - FOH	1464	120	1	0	5	0.6	1LKR	NL:19	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	
K48C	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	RETAIL 1 - FOH	1464	480	3	0	20	17	1HKR	NH:2,4,6	N	CB	30	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K49	AUTOMATIC LAVITORY			120	1	0	2	0.2	1/T R (EXISTING)	NL:9	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K49	AUTOMATIC LAVITORY	CATERING SUPPORT	1250A	120	1	0	2	0.2	1/S (EXISTING)	NL:19	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K49	AUTOMATIC LAVITORY	RETAIL 1 - FOH	1464	120	1	0	2	0.2	1LKR	NL:41	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K49	AUTOMATIC LAVITORY	RETAIL BOH	1464A	120	1	0	2	0.2	1LKR	NL:41	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K49	AUTOMATIC LAVITORY	CATERING KITCHEN	1530	120	1	0	2	0.2	1LKC	NL:50	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K49	AUTOMATIC LAVITORY	CATERING KITCHEN	1530	120	1	0	2	0.2	1LKC	NL:50	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 7"	
K49	AUTOMATIC LAVITORY	CATERING KITCHEN	1530	120	1	0	2	0.2	1LKC	NL:50	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K49	AUTOMATIC LAVITORY	SERVICE KIOSK	3570	120	1	0	2	0.2	L3C (EXISTING)	NL:9	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	4	1' - 6"	
K52	REACH-IN FREEZER, 2-SEC.	RETAIL 1 - FOH	1464	120	1	0	9.4	1.1	1LKR	NL:20	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	
K53	FOOD PICK-UP LOCKERS	CORRIDOR	1500L	120	1	0	10.8	1.3	1LKR	NL:18	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	
K55	WALK-IN REFRIGERATOR	RETAIL BOH	1464A	120	1	0	16	1.9	1LKR	NL:16	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	9' - 6"	
K56	RACKED REFRIGERATION SYSTEM	MECH.	P133	480	3	9.8	29	24.1	HPC (EXISTING)	NH:1,3,5	N	CB	40	3	3	#8	#10	1"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K57A	REFRIGERATED SYSTEM COIL	RETAIL BOH	1464A	120	1	0	1.8	0.2	1LKR	NL:14	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	8' - 0"	
K57B	REFRIGERATED SYSTEM COIL	RETAIL BOH	1464A	208	1	0	1.8	0.4	1LKR	NL:10,12	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	8' - 0"	
K57C	REFRIGERATED SYSTEM COIL	CATERING KITCHEN	1530	120	1	0	1.8	0.2	1LKC	NL:7	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	8' - 0"	
K57D	FREEZER SYSTEM COIL	CATERING KITCHEN	1530	208	1	0	9.1	1.9	1LKC	NL:9,11	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	8' - 0"	
K65	DISPOSEER	RETAIL BOH	1464A	208	3	0	6.6	2.4	1LKR	NL:2,4,6	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K80	WASTE OIL COLLECTION SYSTEM	LOADING DOCK	1405	120	1	0	15	1.8	1LKC	NL:44	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K81	FRESH OIL SYSTEM	LOADING DOCK	1405	120	1	0	15	1.8	1LKC	NL:46	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K88	WALK-IN REFRIGERATOR/FREEZER COMPLEX	CATERING KITCHEN	1530	120	1	0	16	1.9	1LKC	NL:13	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	9' - 6"	
K88	WALK-IN REFRIGERATOR/FREEZER COMPLEX	CATERING KITCHEN	1530	120	1	0	16	1.9	1LKC	NL:15	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	9' - 6"	
K94	REACH-IN BLAST CHILLER	CATERING KITCHEN	1530	208	3	0	25.4	5.3	1LKC	NL:17,19,21	N	CB	35	3	3	#8	#10	3/4"	-	-	-	-	-	-	-	-	-	-	-		14-30R	-	0"	
K95	EXHAUST HOOD (TYPE 1)	CATERING KITCHEN	1530	120	1	0	0.8	0.1	1LKC	NL:31	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K97	FIRE PROTECTION SYSTEM	CATERING KITCHEN	1530	120	1	0	4.2	0.5	1LKC	NL:8	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K98A	DEMAND CONTROL VENTILATION SYSTEM	CATERING KITCHEN	1530	120	1	0	4.2	0.5	1LKC	NL:33	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K98B	VFD - EXHAUST	CATERING KITCHEN	1530	208	3	0	10.6	3.8	1LKC	NL:2,4,6	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K99A	COMBI OVEN, 2-SEC., ELECTRIC	CATERING KITCHEN	1530	480	3	0	27	22.4	1HKC	NH:1,3,5	N	CB	35	3	3	#8	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K99A	COMBI OVEN, 2-SEC., ELECTRIC	CATERING KITCHEN	1530	480	3	0	27	22.4	1HKC	NH:17,19,21	N	CB	35	3	3	#8	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K99B	COMBI OVEN, 2-SEC., ELECTRIC	CATERING KITCHEN	1530	480	3	0	27	22.4	1HKC	NH:9,11,13	N	CB	35	3	3	#8	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K99B	COMBI OVEN, 2-SEC., ELECTRIC	CATERING KITCHEN	1530	480	3	0	26.9	22.4	1HKC	NH:25,27,29	N	CB	35	3	3	#8	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	3' - 0"	
K103	INDUCTION RANGE W/CONVECTION OVEN	CATERING KITCHEN	1530	208	3	0	82.2	26.8	1LKC	NL:53,55,57	N	CB	125	3	3	#1	#6	1-1/2"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K104	MULTI-FUNTIONAL TILTING FRY PAN, 2-PAN	CATERING KITCHEN	1530	480	3	0	27.7	23	1HKC	NH:33,35,37	N	CB	35	3	3	#8	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K106A	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	CATERING KITCHEN	1530	480	3	0	17	14	1HKC	NH:14,16,18	N	CB	25	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K106B	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	CATERING KITCHEN	1530	120	1	0	5	0.6	1LKC	NL:27	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K106C	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	CATERING KITCHEN	1530	480	3	0	17	14	1HKC	NH:22,24,26	N	CB	25	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K106D	FRYER W/FILTER, 2-SEC. & DUMP STATION, ELECTRIC	CATERING KITCHEN	1530	120	1	0	9	1.1	1LKC	NL:23	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K112	UNDERCOUNTER FREEZER, 2-SEC.	CATERING KITCHEN	1530	120	1	0	3.2	0.4	1LKC	NL:37	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K113	UNDERCOUNTER REFRIGERATOR, 2-SEC.	CATERING KITCHEN	1530	120	1	0	2	0.2	1LKC	NL:35	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K117A	DISPOSER	CATERING KITCHEN	1530	208	3	0	6.6	2.4	1LKC	NL:10,12,14	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K117B	DISPOSER	CATERING KITCHEN	1530	208	3	0	6.6	2.4	1LKC	NL:32,34,36	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K122	FOOD PROCESSOR	CATERING KITCHEN	1530	120	1	0	7	0.8	1LKC	NL:41	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	-2"	
K123	MOBILE HEATED CABINET	CATERING KITCHEN	1530	120	1	0	12	1.4	1LKC	NL:20	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K123	MOBILE HEATED CABINET	CATERING KITCHEN	1530	120	1	0	12	1.4	1LKC	NL:18	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K123	MOBILE HEATED CABINET	CATERING KITCHEN	1530	120	1	0	12	1.4	1LKC	NL:16	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K124	COLD FOOD TRANSPORT CABINET	CATERING KITCHEN	1530	120	1	0	12	1.4	1LKC	NL:45	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K124	COLD FOOD TRANSPORT CABINET	CATERING KITCHEN	1530	120	1	0	12	1.4	1LKC	NL:43	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K125	ICE MAKER	CATERING KITCHEN	1530	208	1	0	14.4	3	1LKC	NL:22,24	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		6-20R	-	0"	
K134	COFFEE BREWER URN	CATERING KITCHEN	1530	208	1	0	30	6.2	1LKC	NL:26,28	N	CB	40	2	2	#8	#10	1"	-	-	-	-	-	-	-	-	-	-	-		6-30R	-	0"	
K135	WATER DISPENSING SYSTEM	CATERING KITCHEN	1530	120	1	0	15	1.8	1LKC	NL:30	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K136	POT & PAN SINK W/AGITATOR	CATERING KITCHEN	1530	208	3	0	23	5	1LKC	NL:47,49,51	N	CB	30	3	3	#10	#10	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	1' - 6"	
K140	DISPOSER	CATERING KITCHEN	1530	208	3	0	6.6	2.4	1LKC	NL:38,40,42	N	CB	20	3	3	#12	#12	3/4"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K142A	DISHMACHINE, CONVEYOR TYPE	CATERING KITCHEN	1530	480	3	0	29.9	45.3	1HKC	NH:2,4,6	N	CB	40	3	3	#8	#10	1"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K142B	DISHMACHINE, CONVEYOR TYPE	CATERING KITCHEN	1530	480	3	0	31.6	26.3	1HKC	NH:8,10,12	N	CB	40	3	3	#8	#10	1"	-	-	-	-	-	-	EC	EC	EC	NU	7			6	0"	
K164	RECH -IN REFRIGERATOR, 1-SEC.	CATERING SUPPORT	1250A	120	1	0.16	2	0.2	1/S (EXISTING)	NL:23	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	
K165	ROLL-IN REFRIGERATOR, 1-SEC.	CATERING SUPPORT	1250A	120	1	0.33	8.9	1.1	1/S (EXISTING)	NL:21	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	
K167	MOBILE HEATED CABINET	CATERING SUPPORT	1250A	120	1	0	12	1.4	1/S (EXISTING)	NL:25	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	
K180	REFRIGERATED MERCHANDISER, 3-SEC.	C-STORE	1540	208	1	0	10.6	2.2	1LCS	NL:15,17	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	7' - 0"	
K180	REFRIGERATED MERCHANDISER, 3-SEC.	C-STORE	1540	208	1	0	10.6	2.2	1LCS	NL:19,21	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	7' - 0"	
K180	REFRIGERATED MERCHANDISER, 3-SEC.	C-STORE	1540	208	1	0	10.6	2.2	1LCS	NL:23,25	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K182	FREEZER MERCHANDISER, 3-SEC.	C-STORE	1540	208	1	0	13.8	2.9	1LCS	NL:27,29	N	CB	20	2	2	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	7' - 0"	
K192A	ESPRESSO CAPPUCCINO MACHINE	C-STORE	1540	208	1	0	23	4.8	1LCS	NL:5,7	N	CB	30	2	2	#10	#10	3/4"	-	-	-	-	-	-	-	-	-	-	-		6-30R	-	4' - 0"	
K192B	FLAVOR STATION	C-STORE	1540	120	1	0	1.8	0.2	1LCS	NL:3	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K192C	REFRIGERATOR	C-STORE	1540	120	1	0	1.7	0.2	1LCS	NL:3	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	0"	
K208	ACCELERATED OVEN	SERVICE KIOSK	3570	208	1	0	30	6.2	L3C (EXISTING)	NL:15,17	N	CB	40	2	2	#8	#10	1"	-	-	-	-	-	-	-	-	-	-	-		6-30R	-	0"	
K224	ROLL-IN REFRIGERATOR, 1-SEC.			120	1	0	8.9	1.1	1/T R (EXISTING)	NL:13	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	7' - 8"	
K226	MOBILE HEATED CABINET			120	1	0	11.7	1.4	1/T R (EXISTING)	NL:11	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R	-	1' - 6"	

AV EQUIPMENT SCHEDULE - TYPICAL

EQUIPMENT		LOCATION				LOAD			FED FROM			OCPD			FEEDER				MOTOR STARTER						DISCONNECT SWITCH						CONNECTION			
ID	DESCRIPTION	NAME	NO	VOLTAGE	PHASE	HP	FLA	KVA	PANEL	CIRCUIT	BRANCH	TYPE	SIZE	POLE	QTY	PHASE	GRD	COND	FURN BY	INST BY	WIRE BY	LOC	TYPE	OPTIONS	FURN BY	INST BY	WIRE BY	LOC	OPTIONS	SCCR	NEMA TYPE	OPTIONS	MTG HEIGHT	NOTES
AVAVIO-01	AV INPUT/OUTPUT PLATE - PRESS PLATE	PLENARY	1310	120	1	0	1.5	0.2	1/T R (EXISTING)	NL:33	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVAVIO-03	AV INPUT/OUTPUT PLATE - PRESS PLATE	SFP	SFP	120	1	0	1.5	0.2	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVAVIO-04	AV INPUT/OUTPUT PLATE - WINTER GARDEN REAR	WINTER GARDEN	1566	120	1	0	3	0.4	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVAVIO-05	AV INPUT/OUTPUT PLATE - WINTER GARDEN REAR	WINTER GARDEN	1566	120	1	0	3	0.4	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVERK-01	40RU EQUIPMENT RACK	AV	1317	120	1	0	12.5	1.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVERK-02	40RU EQUIPMENT RACK	STORAGE/SUPPORT	1250B	120	1	0	12.5	1.5	1/S (EXISTING)	NL:33	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVFPD-01	55" FLAT PANEL VIDEO DISPLAY	SFP	SFP	120	1	0	4.2	0.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVFPD-01A	MONITOR	WINTER GARDEN	1566	120	1	0	2.1	0.3	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		5' - 6"	
AVFPD-02	75" FLAT PANEL VIDEO DISPLAY	PRIVATE DINING	1250	120	1	0	4.2	0.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		5' - 4"	
AVFPD-03	98" FLAT PANEL VIDEO DISPLAY	PLENARY	1310	120	1	0	4.2	0.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		6' - 6"	
AVFPD-04	MONITOR	COMMONS	1451	120	1	0	4.2	0.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		5' - 0"	
AVINP-01	AV INPUT/OUTPUT PLATE - PRESS PLATE	PRIVATE DINING	1250	120	1	0	1.5	0.2	1/S (EXISTING)	NL:9	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		1' - 6"	
AVLED-01	LED VIDEO WALL	WINTER GARDEN	1566	120	1	0	15	1.8	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		4' - 0"	
AVSCRN-01	PROJECTION SCREEN, TYPE-1	CIRCULATION	1310A	120	1	0	4.2	0.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		0"	
AVSCRN-02	PROJECTION SCREEN, TYPE-1	PRIVATE DINING	1250	120	1	0	6.3	0.8	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		0"	
AVSPK-03	LOUDSPEAKER ARRAY, SURFACE MOUNT	CIRCULATION	1310A	120	1	0	2.1	0.3	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		8' - 0"	
AVSPK-04	SPEAKER	SEATING	1500E	120	1	0	2.1	0.3	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		8' - 0"	
AVVPJ-01	VIDEO PROJECTOR, TYPE-1	PLENARY	1310	120	1	0	4.2	0.5	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		0"	
AVVPJ-02	VIDEO PROJECTOR, TYPE-2	PRIVATE DINING	1250	120	1	0	6.3	0.8	SFP	SFP	N	CB	20	1	1	#12	#12	3/4"	-	-	-	-	-	-	-	-	-	-	-		5-20R		0"	

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EQUIPMENT SCHEDULE ABBREVIATIONS

N = NORMAL BRANCH
LS = ARTICLE 517, LIFE SAFTY BRANCH
CR = ATRICLE 517, CRITICAL BRANCH
EQ = ARTICLE 517, EQUIPMENT BRANCH
700 = ARTICLE 700, EMERGENCY BRANCH
701 = ARTICLE 701, LEGALLY REQUIRED STANDBY BRANCH
702 = ARTICLE 702, OPTIONAL STANDYBY BRANCH
UPS = UNINTERRUPTIBLE POWER SUPPLY

OCPD = OVERCURRENT PROTECTIVE DEVICE
CB = CIRCUIT BREAKER
F = FUSE

BOL = BUILT-IN OVERLOAD
CS = COMBINATION MAGNETIC MOTOR CONTROLLER
ECM = ELECTRICALLY COMMUTATED MOTOR
MAG = MAGNETIC MOTOR CONTROLLER
MAN = MANUAL MOTOR CONTROLLER
RVS = REDUCED VOLTAGE MOTOR CONTROLLER
SS = SOLID-STATE MOTOR CONTROLLER
WD = WYE-DELTA MOTOR CONTROLLER
PW = PART-WINDING MOTOR CONTROLLER
VFDM = VARIABLE FREQUENCY DRIVE, MAGNETIC STARTER BYPASS
VFDN = VARIABLE FREQUENCY DRIVE, NO BYPASS
VFDS = VARIABLE FREQUENCY DRIVE, SOLID-STATE STARTER BYPASS
SPC = SEE SPECIFICATIONS

IN = IN UNIT
NU = NEAR UNIT
OU = ON UNIT
NO = ROOM NUMBER
R = ROOF

EC = ELECTRICAL CONTRACTOR
FS = FOOD SERVICE EQUIP. CONTRACTOR
GC = GENERAL CONTRACTOR
MC = MECHANICAL CONTRACTOR
MFR = MANUFACTURER
OWN = OWNER
PC = PLUMBING CONTRACTOR

SA = SEE ARCHITECTURAL DRAWINGS
SD = SEE ELECTRICAL DRAWINGS
SFS = SEE FOOD SERVICE PLANS

EQUIPMENT SCHEDULE OPTIONS

1 = SINGLE RECEPTACLE
2 = DUPLEX RECEPTACLE
3 = QUADRUPLEX RECEPTACLE
4 = GFCI RECPETACLE
5 = GFCI CIRCUIT BREAKER
6 = HARDWIRED, DIRECT CONNECTION
7 = NON-FUSIBLE DISCONNECT SWITCH
8 = FUSIBLE DISCONNECT SWITCH
9 = TOGGLE DISCONNECT SWITCH
10 = LOCKABLE, MOTOR RATED DISCONNECT SWITCH
11 = WEATHERPROOF, NEMA 3R ENCLOSURE
12 = VERIFY WITH MANUFACTURER PRIOR TO INSTALLATION

EQUIPMENT SCHEDULE GENERAL NOTES

A. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH OTHER TRADES TO AVOID CONFILTS AND TO VERIFY ALL EQUIPMENT CONNECITON REQUIREMENTS AND CLEARANCE OF ACCESS POINTS AND DOORS PER THE NEC AND MANUFACTURER REQUIREMENTS.

B. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING A COMPLETE ELECTRICAL SYSTEM PER CONTRACT DOCUMENTS AND ENSURING THE SYSTEM IS OPERATIONAL UPON JOB COMPLETION.

C. PROVIDE ALL POWER WIRING INCLUDING ALL CIRCUITRY CARRYING ELECTRICAL ENERGY FROM PANELBOARD OR OTHER SOURCE THROUGH STATERS AND DISCONNECTS TO MOTORS, PACKAGED EQUIPMENT, OR PACKAGED CONTROLS PANELS. PROVIDE ALL WIRING BETWEEN CONTROL PANELS AND MOTORS. INCLUDE STARTERS, DISCONNECTS, AND OVERLOAD PROTECTION IF NOT INCLUDED IN SPECIFICATIONS. COORDINATE WITH EQUIPMENT SUPPLIER.

D. VERIFY ELECTRICAL REQUIREMNTS INCLUDING VOLTAGE, HORSEPOWER, STARTER TYPE, AND DISCONNECTING MEANS FOR MOTORS AND EQUIPMENT PRIOR TO ORDERING CIRCUIT BREAKERS, DISCONNECTS SWITCHES, AND STARTERS.

E. THE SHORT CIRCUIT CURRENT RATING (SCCR) IS THE MINIMUM CALCULATED VALUE OF FAULT CURRENT AMPACITY REQUIRED FOR THIS PIECE OF EQUIPMENT. THE RESPECTIVE CONTRACTOR PROVIDING THIS PIECE OF EQUIPMENT SHALL PROVIDE EQUIPMENT WITH A SHORT CIRCUIT CURRENT RATING EQUAL TO OR GREATER THAN THE VALUE INDICATED, INCLUDING ANY ASSOCIATED MOTOR CONTROLLERS, CONTROL PANELS, FUSIBLE DISCONNECT SWITCHES, ECT. EQUIPMENT NAMEPLATE SHALL CLEARLY INDICATE THE SCCR RATING FOR THE EQUIPMENT AS REQUIRED TO MEET ALL APPLICABLE CODES AND RECOGNIZED QUALIFIED ELECTRICAL TESTING LABORATORES (ETL).

F. WHERE A 5KA SCCR RATING IS INDICATED FOR ANY GIVEN PIECE OF EQUIPMENT, EC SHALL PROVIDE A MINIMUM FEEDER LENGTH TO REDUCE THE AVAILABLE SCCR TO 5KA OR LESS UNLESS OTHERWISE INDICATED. REFER TO THE SHORT CIRCUIT CURRENT RATING SCHEDULES TO DETERMINE THE MINIMUM FEEDER LENGTH REQUIRED.

G. WIRING ID COLUM INDICATES THE TYPE OF FEEDER, MOTOR FEEDER, OR BRANCH CIRCUIT REQUIRED TO SERVE THE RESPECTIVE PIEVE OF EQUIPMENT. REFER TO THE RESPECTIVE SCHEDULE INDICATED BY THE PREFIX (F = FEEDER SCHEDULE, M = MOTOR FEEDER SCHEDULE, B = BRANCH CIRCUIT SCHEDULE) AND UNIQUE INDENTIFIER FOR CONDUCTOR AND CONDUIT INFORMATION.

H. WHERE THE HORSEPOWER (HP) COLUMN INDIACTES A ZERO (0), THERE IS NO STANDARD HP RATING ASSOCIATED WITH THIS EQUIPMENT. THE OCPD AND CONDUCTOR SIZING ARE BASED UPON THE FLA, KVA, AND/OR VENDOR PROVIDED POWER REQUIREMENTS.

I. PROVIDE A 20 AMP, 125V WEATHER-RESISTANT GFCI RECEPTACLE WITH A WEATHERPROOF IN-USE ENCLOSURE MOUNTED ADJACENT TO ALL HEATING, AIR CONDITIONING, AND REFRIGERATION EQUIPMENT INSTALLED ON THE EXTERIOR OF THE BUILDING OR ROOFTOP.

EQUIPMENT SCHEDULE KEYED NOTES

1. THIS EXHAUST FAN IS EXISTING TO REMAIN WITH NEW FEEDER TO ALLOW FOR NEW MOTOR CONTROLLER AND DISCONNECT TO BE INSTALLED.

WORKSHOP
WORKSHOP ARCHITECTS, INC

201 E PITTSBURGH AVE #301
MILWAUKEE WI 53204

WORKSHOP ARCHITECTS 201 E PITTSBURGH AVE #301 MILWAUKEE, WI 53204	ARCHITECT
K. SINGH & ASSOCIATES 3636 N. 124TH STREET WAUWATOSA, WI 53222	CIVIL
SAIKI DESIGN 1110 S PARK STREET MADISON, WI 53715	LANDSCAPE
THORNTON TOMASETTI 320 E BUFFALO ST #603 MILWAUKEE, WI 53202	STRUCTURAL
RING & DUCHATEAU 17400 W CAPITOL DRIVE BROOKFIELD, WI 53045	MEP / FP
RIPPE ASSOCIATES 10650 RED CIRCLE DR, STE. 100 MINNEAPOLIS, MN 55343	FOOD SERVICE
SHEN MILSOM & WILKE 125 S. WACKER DRIVE, SUITE 1510 CHICAGO, IL 60606	AV / IT

Board of Regents of the
University of Wisconsin
c/o UW System Administration

Project Location:
975 UNIVERSITY AVE
MADISON, WISCONSIN 53706

GRAINGER HALL DINING EXPANSION AND
RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
ELECTRICAL SCHEDULES

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM #1

Graphic Scale	NO SCALE
UWSA Number	A-24-004
Volume Number	2
MSN Number	9950-2307
Issued For	BID DOCUMENTS
Date Issued	06/20/2025
Sheet Number	E610

PANEL: 1/S (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 100 A MAIN CB
PANEL BUS AMPS: 100 AMPS
PANEL TYPE:

PANEL LOCATION: STORAGE 1297
BRANCH:
VOLTAGE: 120/208 1 Ø 3 W
S.C.C.R: 10,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NL:1	RCPT RM 1290B, 1290A WORKSTATION		20 A	1	1.44						NL:2
NL:3	RCPT RM 1290D, 1290C OFFICE		20 A	1		1.44					NL:4
NL:5	RCPT RM 1290F, 1290E OFFICE		20 A	1	1.44						NL:6
NL:7	RCPT RM 1290G, 1290H OFFICE		20 A	1		1.44					NL:8
NL:9	RCPT RM 1250 PRIVATE DINING		20 A	1	1.26						NL:10
NL:11	RCPT PRIVATE CO-WORKING 1290		20 A	1		1.08					NL:12
NL:13	TPRT RM 1290 PRIVATE CO-WORKING		20 A	1	0						NL:14
NL:15	AVFPD-01 RM 1290 PRIVATE CO-WORKING		20 A	1		1					NL:16
NL:17	SCREEN/PROJECTOR RM 1250 PRIVATE...		20 A	1	1.5						NL:18
NL:19	RCPT RM 1250A CATERING SUPPORT		20 A	1		0.96					NL:20
NL:21	K165 - ROLL-IN REFRIGERATOR		20 A	1	1.07						NL:22
NL:23	K164 - UNDERCOUNTER REFIGERATOR		20 A	1		0.23					NL:24
NL:25	K167 - MOBILE HEATED CABINET		20 A	1	1.4						NL:26
NL:27	RCPT RM 1290 PRIVATE CO-WORKING		20 A	1		0.36					NL:28
NL:29	AVFPD-02 RM 1250 PRIVATE DINING		20 A	1	1.5						NL:30
NL:31	AVAVIO-03 RM 1250 PRIVATE DINING		20 A	1		0.18					NL:32
NL:33	Equipment STORAGE/SUPPORT 1250B		20 A	1	1.5						NL:34
NL:35	SCREEN/PROJECTOR RM 1250 PRIVATE...		20 A	1		1.5					NL:36
NL:37	Equipment STORAGE 1297		20 A	1	0.5						NL:38
NL:39											NL:40
NL:41											NL:42
				Total Load:	11.608 kVA	8.19 kVA					
				Total Amps:	107.2 A	78.8 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
Equipment	10.798 kVA	10.798 kVA		
RCPT	9 kVA	9 kVA	**CONNECTED LOAD:**	19.798 kVA
			N.E.C. DEMAND LOAD:	19.798 kVA
			CONNECTED CURRENT:	95.2 A
			N.E.C. DEMAND CURRENT:	95.2 A

NOTES:

PANEL: EH5 (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 100 A MAIN CB
PANEL BUS AMPS: 100 AMPS
PANEL TYPE:

PANEL LOCATION:
BRANCH:
VOLTAGE: 480Y/277 3 Ø 4 W
S.C.C.R: 14,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
OH:1					1.33							OH:2
OH:3	MEF-10		15 A	3		1.33						OH:4
OH:5							1.33					OH:6
OH:7												OH:8
OH:9												OH:10
OH:11												OH:12
OH:13												OH:14
OH:15												OH:16
OH:17												OH:18
OH:19												OH:20
OH:21												OH:22
OH:23												OH:24
OH:25												OH:26
OH:27												OH:28
OH:29												OH:30
OH:31												OH:32
OH:33												OH:34
OH:35												OH:36
OH:37												OH:38
OH:39												OH:40
OH:41												OH:42
				Total Load:	1.33 kVA	1.33 kVA	1.33 kVA					
				Total Amps:	4.8 A	4.8 A	4.8 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
Equipment	3.991 kVA	3.991 kVA		
			CONNECTED LOAD:	3.991 kVA
			N.E.C. DEMAND LOAD:	3.991 kVA
			CONNECTED CURRENT:	4.8 A
			N.E.C. DEMAND CURRENT:	4.8 A

NOTES:

PANEL: H5C

FED FROM:
MAIN SIZE, TYPE: 100 A MAIN CB
PANEL BUS AMPS: 100 AMPS
PANEL TYPE:

PANEL LOCATION:
BRANCH:
VOLTAGE: 480Y/277 3 Ø 4 W
S.C.C.R: 35,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NH:1												NH:2
NH:3												NH:4
NH:5												NH:6
NH:7					1.33	2.11						NH:8
NH:9	MEF-9		15 A	3		1.33	2.11					NH:10
NH:11								3	15 A		MEF-17	NH:12
NH:13							1.33	2.11				NH:14
NH:15												NH:16
NH:17												NH:18
NH:19												NH:20
NH:21												NH:22
NH:23												NH:24
NH:25												NH:26
NH:27												NH:28
NH:29												NH:30
NH:31												NH:32
NH:33												NH:34
NH:35												NH:36
NH:37												NH:38
NH:39												NH:40
NH:41												NH:42
				Total Load:	3.436 kVA	3.436 kVA	3.44 kVA					
				Total Amps:	12.4 A	12.4 A	12.4 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
Equipment	10.309 kVA	10.309 kVA		
			CONNECTED LOAD:	10.309 kVA
			N.E.C. DEMAND LOAD:	10.309 kVA
			CONNECTED CURRENT:	12.4 A
			N.E.C. DEMAND CURRENT:	12.4 A

NOTES:

PANEL: L3C (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 225 A MAIN CB
PANEL BUS AMPS: 150 AMPS
PANEL TYPE:

PANEL LOCATION: ELECTRICAL 3446
BRANCH:
VOLTAGE: 208Y/120 3 Ø 4 W
S.C.C.R: 10,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NL:1	RCPT ROOF TERRACE		20 A	1	0.54							NL:2
NL:3	RCPT ROOF TERRACE		20 A	1		0.54						NL:4
NL:5	RCPT ROOF TERRACE		20 A	1			0.54					NL:6
NL:7	RCPT		20 A	1	0.36							NL:8
NL:9	RCPT SERVICE KIOSK 3570		20 A	1		1.37						NL:10
NL:11	RCPT SERVICE KIOSK 3570		20 A	1			0.53					NL:12
NL:13	RCPT SERVICE KIOSK 3570		20 A	1	1.92							NL:14
NL:15	Equipment SERVICE KIOSK 3570		40 A	2		3.1						NL:16
NL:17							3.1					NL:18
NL:19	LITES		20 A	1	0.13							NL:20
NL:21	Equipment		20 A	1		0.5						NL:22
NL:23	CUH-25		20 A	1			0.7					NL:24
NL:25	MCUH-26		20 A	1	0							NL:26
NL:27												NL:28
NL:29												NL:30
NL:31												NL:32
NL:33												NL:34
NL:35												NL:36
NL:37												NL:38
NL:39												NL:40
NL:41												NL:42
NL:43												NL:44
NL:45												NL:46
NL:47												NL:48
NL:49												NL:50
NL:51												NL:52
NL:53												NL:54
NL:55												NL:56
NL:57												NL:58
NL:59												NL:60
NL:61												NL:62
NL:63												NL:64
NL:65												NL:66
NL:67												NL:68
NL:69												NL:70
NL:71												NL:72
NL:73												NL:74
NL:75												NL:76
NL:77												NL:78
NL:79												NL:80
NL:81												NL:82
NL:83												NL:84
				Total Load:	2.953 kVA	5.508 kVA	4.86 kVA					
				Total Amps:	24.6 A	48.3 A	43 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
LITES	0.133 kVA	0.167 kVA		
Equipment	7.636 kVA	7.636 kVA	**CONNECTED LOAD:**	13.325 kVA
RCPT	5.556 kVA	5.556 kVA	**N.E.C. DEMAND LOAD:**	13.359 kVA
			CONNECTED CURRENT:	37 A
			N.E.C. DEMAND CURRENT:	37.1 A

NOTES:

PANEL: LPC (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 100 A MAIN CB
PANEL BUS AMPS: 100 AMPS
PANEL TYPE:

PANEL LOCATION: STOR. B1305
BRANCH:
VOLTAGE: 208Y/120 3 Ø 4 W
S.C.C.R: 10,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NL:1					0.55							NL:2
NL:3	MPCW-1 MECH. P133		20 A	3		0.55						NL:4
NL:5							0.55					NL:6
NL:7					0.55							NL:8
NL:9	MPCW-2 MECH. P133		20 A	3		0.55						NL:10
NL:11							0.55					NL:12
NL:13					0.29							NL:14
NL:15	MCP-1 MECH. P133		20 A	3		0.29						NL:16
NL:17							0.29					NL:18
NL:19	MFCU-1 MECH. P133		20 A	1	0.86							NL:20
NL:21												NL:22
NL:23												NL:24
NL:25												NL:26
NL:27												NL:28
NL:29												NL:30
NL:31												NL:32
NL:33												NL:34
NL:35												NL:36
NL:37												NL:38
NL:39												NL:40
NL:41												NL:42
				Total Load:	2.257 kVA	1.393 kVA	1.39 kVA					
				Total Amps:	18.8 A	11.6 A	11.6 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
Equipment	5.043 kVA	5.043 kVA		
			CONNECTED LOAD:	5.043 kVA
			N.E.C. DEMAND LOAD:	5.043 kVA
			CONNECTED CURRENT:	14 A
			N.E.C. DEMAND CURRENT:	14 A

NOTES:

PANEL: H2C (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 100 A MLO
PANEL BUS AMPS: 100
PANEL TYPE:

PANEL LOCATION: ELECTRICAL 2466
BRANCH:
VOLTAGE: 480Y/277 3 Ø 4 W
S.C.C.R: 10,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NH:1	WINTER GARDEN-2 1300A-2		20 A	1	3.64							NH:2
NH:3	L WINTER GARDEN-2 1300A-2		20 A	1		0.72						NH:4
NH:5	DESTRATIFICATION FAN		20 A	1			0.36					NH:6
NH:7												NH:8
NH:9												NH:10
NH:11												NH:12
NH:13												NH:14
NH:15												NH:16
NH:17												NH:18
NH:19												NH:20
NH:21												NH:22
NH:23												NH:24
NH:25												NH:26
NH:27												NH:28
NH:29												NH:30
NH:31												NH:32
NH:33												NH:34
NH:35												NH:36
NH:37												NH:38
NH:39												NH:40
NH:41												NH:42
				Total Load:	3.638 kVA	0.718 kVA	0.36 kVA					
				Total Amps:	13.3 A	2.8 A	1.3 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
LITES	2.14 kVA	2.674 kVA		
Equipment	0.36 kVA	0.36 kVA	**CONNECTED LOAD:**	4.716 kVA
L	2.217 kVA	2.771 kVA	**N.E.C. DEMAND LOAD:**	5.805 kVA
			CONNECTED CURRENT:	5.7 A
			N.E.C. DEMAND CURRENT:	7 A

NOTES:

PANEL: H3C (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 225 A MLO
PANEL BUS AMPS: 250 AMPS
PANEL TYPE:

PANEL LOCATION: ELECTRICAL 3446
BRANCH:
VOLTAGE: 480Y/277 3 Ø 4 W
S.C.C.R: 14,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NH:1	LITES		20 A	1	0.38							NH:2
NH:3												NH:4
NH:5												NH:6
NH:7												NH:8
NH:9												NH:10
NH:11												NH:12
NH:13												NH:14
NH:15												NH:16
NH:17												NH:18
NH:19												NH:20
NH:21												NH:22
NH:23												NH:24
NH:25												NH:26
NH:27												NH:28
NH:29												NH:30
NH:31												NH:32
NH:33												NH:34
NH:35												NH:36
NH:37												NH:38
NH:39												NH:40
NH:41												NH:42
				Total Load:	0.384 kVA	0 kVA	0 kVA					
				Total Amps:	1.4 A	0 A	0 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
LITES	0.384 kVA	0.48 kVA		
			CONNECTED LOAD:	0.384 kVA
			N.E.C. DEMAND LOAD:	0.48 kVA
			CONNECTED CURRENT:	0.5 A
			N.E.C. DEMAND CURRENT:	0.6 A

NOTES:

PANEL: L2C (EXISTING)

FED FROM:
MAIN SIZE, TYPE: 100 A MAIN CB
PANEL BUS AMPS: 225 AMPS
PANEL TYPE:

PANEL LOCATION: ELECTRICAL 2466
BRANCH:
VOLTAGE: 208Y/120 3 Ø 4 W
S.C.C.R: 10,000 AMPS...
MOUNTING: SURFACE
PANEL OPTIONS:

CKT	LOAD DESCRIPTION	NOTE	OCPD	POLES	A	B	C	POLES	OCPD	NOTE	LOAD DESCRIPTION	CKT
NL:1	LITES WINTER GARDEN-2 1300A-2		20 A	1	0.27							NL:2
NL:3												NL:4
NL:5												NL:6
NL:7												NL:8
NL:9												NL:10
NL:11												NL:12
NL:13												NL:14
NL:15												NL:16
NL:17												NL:18
NL:19												NL:20
NL:21												NL:22
NL:23												NL:24
NL:25												NL:26
NL:27												NL:28
NL:29												NL:30
NL:31												NL:32
NL:33												NL:34
NL:35												NL:36
NL:37												NL:38
NL:39												NL:40
NL:41												NL:42
				Total Load:	0.268 kVA	0 kVA	0 kVA					
				Total Amps:	2.2 A	0 A	0 A					

LOAD CLASSIFICATION	CONNECTED LOAD	N.E.C. DEMAND LOAD	PANEL TOTALS	
LITES	0.268 kVA	0.334 kVA		
			CONNECTED LOAD:	0.268 kVA
			N.E.C. DEMAND LOAD:	0.334 kVA
			CONNECTED CURRENT:	0.7 A
			N.E.C. DEMAND CURRENT:	0.9 A

NOTES:

WORKSHOP
WORKSHOP ARCHITECTS INC
201 E PITTSBURGH AVE #301
MILWAUKEE WI 53204

WORKSHOP ARCHITECTS ARCHITECT
201 E PITTSBURGH AVE #301
MILWAUKEE, WI 53204

K. SINGH & ASSOCIATES CIVIL
3636 N. 124TH STREET
WAUWATOSA, WI 53222

SAIKI DESIGN LANDSCAPE
1110 S PARK STREET
MADISON, WI 53715

THORNTON TOMASETTI STRUCTURAL
320 E BUFFALO ST #603
MILWAUKEE, WI 53202

RING & DUCHATEAU MEP / FP
17400 W CAPITOL DRIVE
BROOKFIELD, WI 53045

RIPPE ASSOCIATES FOOD SERVICE
10650 RED CIRCLE DR, STE. 100
MINNEAPOLIS, MN 55343

SHEN MILSOM & WILKE AV / IT
125 S. WACKER DRIVE, SUITE 1510
CHICAGO, IL 60606

Board of Regents of the
University of Wisconsin
c/o UW System Administration

Project Location:
975 UNIVERSITY AVE
MADISON, WISCONSIN 53706

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN 53706

Sheet Title:
ELECTRICAL SCHEDULES

Revisions:

No.	Date:	By:	Description:
1	8/5/2025		ADDENDUM #1

Graphic Scale	NO SCALE
UWSA Number	A-24-004
Volume Number	2
MSN Number	9950-2307
Issued For	BID DOCUMENTS
Date Issued	06/20/2025
Sheet Number	E614

8/5/2025 10:33:27 AM

GPC INVITATION TO BID (Rev 04/2024)

THE BOARD OF REGENTS OF THE UNIVERSITY OF WISCONSIN SYSTEM

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITIES OF WISCONSIN – MADISON
MADISON, WISCONSIN

UW- Madison Project No. 9950-2307 / UWSA Project No. A-24-004

BID OPENING for MEP BIDDERS: 2:00 P.M., August 19, 2025.
BID OPENING for GENERAL PRIME CONTRACTOR BIDDERS: 2:00 P.M., September 4, 2025.

OWNER: The Board of Regents of the Universities of Wisconsin System hereinafter termed the Owner.

NOTICE: All potential bidders must be certified by DOA prior to submitting bids on UW-Managed construction projects. All bids received from contractors who are not certified will be rejected. Contractor certification applications and instructions for completing the form may be obtained from the DOA Website DFD Contractor Certification page: https://doa.wi.gov/Pages/DoingBusiness/ContractorCertification.aspx .

This project is being let using a single prime bidding and contracting process. the Owner will publicly bid the applicable mechanical, electrical, plumbing, and fire protection (MEP) divisions of work **first.** Within five (5) days of the MEP bid opening, the Owner will identify a lowest, qualified, responsible, certified bidder in each applicable MEP division of work. These successful MEP bids must be included in all general prime contractor bids received. The owner will enter into a single contract with the lowest, qualified, responsible, certified general prime contractor and this general prime contractor shall enter into subcontracts with the successful MEP bidders. If a project does not include any mechanical, electrical, plumbing, or fire protection divisions of work, the Owner will bid one bid package for all work to general prime contractors.

The Universities of Wisconsin System Administration (UWSA) will ONLY be accepting construction bidding documents as follows:

- **PDF scanned file of all required bid documents, including bid and bid bond forms with an either original wet signatures or digital electronic signatures emailed to UWSA Bid Submissions at uwsabidsubmissions@wisconsin.edu.** If submitting documents with electronic signatures, further information and requirements are in the following bullets.
- Include Project Name, Project Number, Project Location, Category of Work being bid on, Bid Date, and the Name and Address of Bidder within email submission.
- For documents that require a seal, please darken these scans for better visibility.
- For bids including a cashier's/certified check, please scan front and back of check and include with submission.
- Bidders may submit PDFs of bonds and powers of attorney containing e-signatures, e-corporate seals, and e-notaries affixed to each document in accordance with the Surety's obligations. **Telephone numbers are required for all electronic signatories** for oral verification as needed. Wisconsin law permits the use of remote online notarization if it is performed **using technology providers that have been approved by the Department of Financial Institutions (DFI)**. If a remote online notarization is used, it is the responsibility of the contractor and its Surety to ensure that the technology provider has been approved by DFI.
- Bidders may submit bid forms containing electronic signatures, but those signatures must be obtained using approved software in order to be accepted. **DocuSign software and Adobe Digital Signature software are approved for e-signatures** for submission of bids. Use of any other e-signature software will require additional verification and the bidder must obtain approval at least three (3) business days prior to submission of bids. Please contact Lindsay.woznick@wisconsin.edu first regarding any proposed electronic signature software.

UWSA will NO LONGER accept bids via third party delivery (UPS, FEDEX, or DHL) or bids being dropped off in person.

BID FORM – GENERAL PRIME CONTRACTOR (GPC) (Rev 04/2024)
THE BOARD OF REGENTS OF THE UNIVERSITY OF WISCONSIN SYSTEM
s.16.855 Wis. Stats.

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITY OF WISCONSIN - MADISON
MADISON, WISCONSIN

UW- Madison Project No. 9950-2307 / UWSA Project No. A-24-004

General Prime Contractor (GPC) Bid Opening: 2:00 P.M., September 4, 2025.

To: Universities of Wisconsin System Administration (UWSA)

We_____ (a joint venture) (a corporation) (a partnership) (an individual) (Cross out inapplicable)

Of_____
Street City State Zip

hereby agree to execute a contract with the Board of Regents of the Universities of Wisconsin System (the Owner) and a subcontract with all successful MEP Bidders identified by the Owner and listed in this bid, and to furnish satisfactory separate 100% Performance Bond and 100% Payment Bond in the amount specified no later than ten (10) days of the contract offer, and to provide all labor and material required for the construction of the project designated above, for the prices hereinafter set forth, in strict accordance with the Contract Documents prepared by **Workshop Architects, 201 E. Pittsburgh Ave., Suite 301, Milwaukee, Wisconsin, 53204** for the Owner and dated **June 20, 2025.**

Contact Instructions:
(For use by Owner to offer contract to the successful bidders)

Contact name:_____

Title:_____

Telephone Number:_____

Email address:_____

IMPORTANT: BEFORE SUBMITTING YOUR BID, PLEASE VERIFY THAT:

1. You have been **certified by DOA as a qualified and responsible bidder** for the amount of your bid within the division(s) of work being bid.
2. You have **entered all Bid amounts in numeric characters** (Example: $9,999);
3. You have **acknowledged receipt of all addenda;**
4. You have **signed the Bid Form**
5. You have **included a valid Bid Guarantee** for not less than 10% of the value of the bid as either:
   a) a Bid Bond signed by the contractor and surety and with a Power of Attorney attached, **or**
   b) a Cashier's Check or Bank Check pursuant to Wis stats. s. 779.14(1m)(c)2.b. and 779.14(1s). A Company or Personal Check will not be accepted.

MEP INVITATION TO BID (Rev 04/2024)
THE BOARD OF REGENTS OF THE UNIVERSITIES OF WISCONSIN SYSTEM

GRAINGER HALL DINING EXPANSION AND RENOVATION
UNIVERSITIES OF WISCONSIN - MADISON
MADISON, WISCONSIN

UW-Madison Project No. 9950-2307 / UWSA Project No. A-24-004

BID OPENING for MEP BIDDERS: 2:00 P.M., August 19, 2025.
BID OPENING for GENERAL PRIME CONTRACTOR BIDDERS: 2:00 P.M., September 4, 2025.

OWNER: The Board of Regents of the Universities of Wisconsin System, hereinafter termed the Owner.

NOTICE: All potential bidders must be certified by DOA prior to submitting bids on UW-Managed construction projects. All bids received from contractors who are not certified will be rejected. Contractor certification applications and instructions for completing the form may be obtained from the DOA Website DFD Contractor Certification page: https://doa.wi.gov/Pages/DoingBusiness/ContractorCertification.aspx .

This project is being let using a single prime bidding and contracting process. the Owner will publicly bid the applicable mechanical, electrical, plumbing, and fire protection (MEP) divisions of work **first.** Within five (5) days of the MEP bid opening, the Owner will identify a lowest, qualified, responsible, certified bidder in each applicable MEP division of work. These successful MEP bids must be included in all general prime contractor bids received. No later than five (5) days after the Owner identifies the successful MEP bids, the Owner will publicly open general prime contractor bids. **General prime contractor bids that do not include the successful MEP bids will be rejected.** The owner will enter into a single contract with the lowest, qualified, responsible, certified general prime contractor and this general prime contractor shall enter into subcontracts with the successful MEP bidders.

The Universities of Wisconsin System Administration (UWSA) will ONLY be accepting construction bidding documents as follows:

- **PDF scanned file of all required bid documents, including bid and bid bond forms with an either original wet signatures or digital electronic signatures emailed to UWSA Bid Submissions at uwsabidsumbissions@wisconsin.edu. If submitting** documents with electronic signatures, further information and requirements are in the following bullets.
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- For documents that require a seal, please darken these scans for better visibility.
- For bids including a cashier's/certified check, please scan front and back of check and include with submission.
- Bidders may submit PDFs of bonds and powers of attorney containing e-signatures, e-corporate seals, and e-notaries affixed to each document in accordance with the Surety's obligations. **Telephone numbers are required for all electronic signatories** for oral verification as needed. Wisconsin law permits the use of remote online notarization if it is performed **using technology providers that have been approved by the Department of Financial Institutions (DFI)**. If a remote online notarization is used, it is the responsibility of the contractor and its Surety to ensure that the technology provider has been approved by DFI.
- Bidders may submit bid forms containing electronic signatures, but those signatures must be obtained using approved software in order to be accepted. **DocuSign software and Adobe Digital Signature software are approved for e-signatures** for submission of bids. Use of any other e-signature software will require additional verification and the bidder must obtain approval at least three (3) business days prior to submission of bids. Please contact Lindsay.woznick@wisconsin.edufirst regarding any proposed electronic signature software.

UWSA will NO LONGER accept bids via third party delivery (UPS, FEDEX, or DHL) or bids being dropped off in person at 780 Regent Street.

SECTION 23 07 00
HVAC INSULATION
BASED ON DFD MASTER SPECIFICATION DATED 3/27/2024

P A R T 1 - G E N E R A L

SCOPE

This section includes insulation specifications for heating, ventilating and air conditioning piping, ductwork and equipment. Included are the following topics:

RELATED WORK

Section 01 91 01 or 01 91 02 – Commissioning Process
Section 23 05 00 - Common Work Results for HVAC
Section 23 08 00 - Commissioning of HVAC
Section 23 21 13 - Hydronic Piping
Section 23 22 13 - Steam and Condensate Heating Piping
Section 23 83 16 - Radiant-Heating Hydronic Piping
Section 23 05 29 - Hangers and Supports for HVAC Piping and Equipment
Section 23 31 00 - HVAC Ducts and Casings

REFERENCE

Applicable provisions of Division 1 govern work under this section.

REFERENCE STANDARDS

ASTM B209	Aluminum and Aluminum Alloy Sheet and Plate
ASTM C165	Test Method for Compressive Properties of Thermal Insulations
ASTM C177	Heat Flux and Thermal Transmission Properties
ASTM C195	Mineral Fiber Thermal Insulation Cement
ASTM C240	Cellular Glass Insulation Block
ASTM C302	Density of Preformed Pipe Insulation
ASTM C272	Water Absorption of Core Materials for Sandwich Constructions

ASTM C303	Density of Preformed Block Insulation
ASTM C355	Test Methods for Test for Water Vapor Transmission of Thick Materials
ASTM C449	Mineral Fiber Hydraulic Setting Thermal Insulation Cement
ASTM C518	Heat Flux and Thermal Transmission Properties
ASTM C533	Calcium Silicate Block and Pipe Thermal Insulation
ASTM C534	Preformed Flexible Elastomeric Thermal Insulation
ASTM C547	Mineral Fiber Preformed Pipe Insulation
ASTM C552	Cellular Glass Block and Pipe Thermal Insulation
ASTM C553	Mineral Fiber Blanket and Felt Insulation
ASTM C578	Preformed, Block Type Cellular Polystyrene Thermal Insulation
ASTM C591	Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C610	Expanded Perlite Block and Thermal Pipe Insulation
ASTM C612	Mineral Fiber Block and Board Thermal Insulation
ASTM C921	Properties of Jacketing Materials for Thermal Insulation
ASTM C1136	Flexible Low Permeance Vapor Retarders for Thermal Insulation
ASTM C1728	Standard for Aerogel Insulation
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension
ASTM D1000	Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
ASTM D1621	Standard Test Method for Compressive Properties Of Rigid Cellular Plastics
ASTM D1622	Standard Test Method for Apparent Density of Rigid Cellular Plastics
ASTM D1940	Method of Test for Porosity of Rigid Cellular Plastics
ASTM D2126	Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
ASTM D2240	Standard Test Method for Rubber Property—Durometer Hardness
ASTM D5590	Test Method for Determining the Resistance of Coatings to Fungal Defacement
ASTM E84	Surface Burning Characteristics of Building Materials
ASTM E814	Standard Test Method for Fire Tests of Penetration Firestop Systems
ASTM E2336	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
MICA	National Commercial & Industrial Insulation Standards
NFPA 225	Surface Burning Characteristics of Building Materials
UL 723	Surface Burning Characteristics of Building Materials

QUALITY ASSURANCE

Refer to division 1, General Conditions, Equals and Substitutions

Label all insulating products delivered to the construction site with the manufacturer's name and description of materials.

Insulation systems shall be applied by experienced contractors. Within the past five (5) years, the contractor shall be able to document the successful completion of a minimum of three (3) projects of at least 50% of the size and similar scope of the work specified in this section.

Fluid-applied ductwork insulation is a roofing product that shall be applied only by qualified contractors. Contractor shall be recognized by the manufacturer of the Polyurea 2-part liquid membrane system as an “approved” or “authorized” applicator. Only manufacturer recognized, qualified and authorized Contractor’s whose labor and material are fully covered, without exception, by the manufacturer’s warranty, as required by this section, will be allowed to perform the work. Manufacturer must submit letterhead document verifying the Contractor as an authorized applicator of their product and able to receive the specified warranty.

DESCRIPTION

Furnish and install all insulating materials and accessories as specified or as required for a complete installation. The following types of insulation are specified in this section:

- Pipe Insulation
- Duct Insulation
- Equipment Insulation

Install all insulation in accordance with the latest edition of MICA (Midwest Insulation Contractors Association) Standard and manufacturer's installation instructions. Exceptions to these standards will only be accepted where specifically modified in these specifications, or where prior written approval has been obtained from the Owner’s Project Representative.

DEFINITIONS

Concealed: shafts, furred spaces, space above finished ceilings, utility tunnels and crawl spaces. All other areas, including walk-through tunnels, shall be considered as exposed.

SHOP DRAWINGS
Refer to division 1, General Conditions, Submittals.

Submit a schedule of all insulating materials to be used on the project, including adhesives, fastening methods, fitting materials along with material safety data sheets and intended use of each material. Include manufacturer's technical data sheets indicating density, thermal characteristics, jacket type, and manufacturer's installation instructions. Include copies of the MICA plates that are applicable to this project.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

In addition to the general content specified under GENERAL REQUIREMENTS supply the following additional documentation:

ENVIRONMENTAL REQUIREMENTS
Do not store insulation materials on grade or where they are at risk of becoming wet. Do not install insulation products that have been exposed to water.

Protect installed insulation work with plastic sheeting to prevent water damage.

P A R T 2 - P R O D U C T S

MATERIALS
Manufacturers: Armacell, CertainTeed, Manson, Childers, Dow, Extol, Fibrex, Halstead, Foster, Imcoa, ITW, Johns Manville, Knauf Insulation, Owens-Corning, Pittsburgh Corning, VentureTape or approved equal.

Materials or accessories containing asbestos will not be accepted.

Use composite insulation systems (insulation, jackets, sealants, mastics, and adhesives) that have a flame spread rating of 25 or less and smoke developed rating of 50 or less, with the following exceptions:

Pipe insulation which is not located in an air plenum may have a flame spread rating not over 25 and a smoke developed rating no higher than 450 when tested in accordance with UL 723 and ASTM E84.

INSULATION TYPES
Insulating materials shall be fire retardant, moisture and mildew resistant, and vermin proof. Insulation shall be suitable to receive jackets, adhesives and coatings as indicated.

FLEXIBLE FIBERGLASS INSULATION:
Minimum nominal density of 0.75 lbs. per cu. ft., and thermal conductivity of not more than 0.30 at 75 degrees F mean temperature, rated for maximum service temperature of 250 degrees F.

RIGID FIBERGLASS INSULATION:
Minimum nominal density of 3 lbs. per cu. ft., and thermal conductivity of not more than 0.23 at 75 degrees F mean temperature, 0.25 at 125 degrees F, 0.27 at 150 degrees F, 0.29 at 200 degrees F, 0.32 at 250 degrees F, minimum compressive strength of 25 PSF at 10% deformation, rated for maximum service temperature of 450 degrees F.

SEMI-RIGID FIBERGLASS INSULATION:
Minimum nominal density of 3 lbs. per cu. ft., thermal conductivity of not more than 0.28 at 75 degrees F mean temperature, minimum compressive strength of 25 PSF at 10% deformation, rated for service temperature range of 0 degrees F to 450 degrees F. Insulation fibers perpendicular to jacket and scored for wrapping cylindrical surfaces.

CALCIUM SILICATE INSULATION:
Rigid hydrous calcium silicate, ASTM C533, Type I, minimum dry density of 12.5 lbs. per cu. ft., thermal conductivity of not more than 0.44 at 300 degrees F mean temperature, maximum water absorption of 90% by volume, minimum compressive strength 140 psi at 5% deformation, rated for service temperature range of 0 degrees F to 1,200 degrees F. Material to be visually coded or marked to indicate it is asbestos free.

HIGH TEMPERATURE CALCIUM SILICATE INSULATION:
Rigid hydrous calcium silicate, ASTM C533, Type II, minimum dry density of 12.5 lbs. per cu. ft., thermal conductivity of not more than 0.44 at 300 degrees F mean temperature, maximum water absorption of 90% by volume, minimum compressive strength 140 psi at 5% deformation, rated for service temperature range of 0 degrees F to 1,800 degrees F. Material to be visually coded or marked to indicate it is asbestos free.

ELASTOMERIC INSULATION:
Flexible closed cell, minimum nominal density of 5.5 lbs. per cu. ft., thermal conductivity of not more than 0.28 at 75 degrees F mean temperature, minimum compressive strength of 4.5 psi at 25% deformation, maximum water vapor permeability of 0.08 perm inch, maximum water absorption of 6% by weight, rated for service temperature range of -20 degrees F to 220 degrees F on piping and 180 degrees F where adhered to equipment.

POLYOLEFIN INSULATION:
Flexible closed cell, minimum nominal density of 1.5 lbs. per cu. ft., thermal conductivity of not more than 0.25 at 75 degrees F mean temperature, minimum compressive strength of 5 psi at 25% deformation, maximum water vapor permeability of 0.0 perm inch, maximum water absorption of 0% by weight and volume, rated for service temperature range of -165 degrees F to 210 degrees F.

PHENOLIC INSULATION:
Rigid closed cell, minimum nominal density of 2.2 lbs. per cu. ft., thermal conductivity of not more than 0.13 at 75 degrees F mean temperature, minimum compressive strength of 31 psi parallel and 18 psi perpendicular, maximum water vapor permeability 0.117 perm inch, maximum water absorption of 0.5% by volume, rated for service temperature range of -290 degrees F to 250 degrees F.

EXTRUDED POLYSTYRENE INSULATION:
Rigid closed cell, minimum nominal density of 1.6 lbs. per cu. ft., thermal conductivity of not more than 0.26 at 75 degrees F mean temperature, minimum compressive strength of 20 psi, maximum water vapor permeability of 1.5 perm inch, maximum water absorption of 0.5 % by volume (ASTM C272), rated for service temperature range of -290 degrees F to 165 degrees F.

POLYISOCYANURATE INSULATION:
Rigid closed cell polyisocyanurate, minimum nominal density of 2.0 lbs. per cu. ft., thermal conductivity of not more than 0.19 at 75 degrees F mean temperature aged 180 days, minimum compressive strength of 24 psi parallel and 13 psi perpendicular, maximum water vapor permeability of 4 perm inch, maximum water absorption of 2% by volume, rated for service temperature range of -290 degrees F to 300 degrees F.

CELLULAR GLASS INSULATION:
Rigid closed cell, minimum nominal density of 7.5 lbs. per cu. ft., thermal conductivity of not more than 0.28 at 50 degrees F mean temperature, 0.29 at 75 degrees F mean temperature, 0.38 at 200 degrees F mean temperature, minimum compressive strength of 90 psi, maximum water vapor permeability of 0.0 perm inch, maximum water absorption of 0.2% by volume, rated for service temperature range of -450 degrees F to 900 degrees F.

MINERAL WOOL INSULATION:
Rigid preformed mineral wool, minimum nominal density of 8 lbs. per cu. ft., thermal conductivity of not more than 0.24 at 75 degrees F mean temperature, 0.30 at 200 degrees F, 0.38 at 300 degrees F, minimum compressive strength of 3 psi, maximum wicking of 1%, maximum water adsorption of 1% by volume, rated for service temperature range of -120 degrees F to 1200 degrees F.

Pipe insulation shall be pre-formed in two (2) half cylinder sections. Cut V-groove sheet insulation is not acceptable. Provide three (3) stainless steel bands for each section of insulation.

AEROGEL INSULATION:
Flexible sheet with a minimum nominal density of 11 lbs. per cu. ft., thermal conductivity of not more than 0.146 at 100 degrees F mean temperature, 0.19 at 200 degrees F, 0.22 at 250 degrees F, material shall be hydrophobic, and rated for service temperature range of -40 degrees F to 1200 degrees F.

FIREPROOFING INSULATION:
Mineral wool with nominal density of 8 lbs. per cu. ft., flame spread index of 25, fuel contribution index of 0, and smoke developed index of 0, thermal conductivity of not more than 0.23 at 75 degrees F mean temperature, rated for service temperature range of -120 degrees F to 1200 degrees F. Use rigid or semi-rigid board for duct insulations.

Foil-scrim-polyethylene vapor retarding jacket, factory applied to insulation, maximum permeance of .02 perms.

FIRE RATED INSULATION:
Noncombustible, non-asbestos, non-ceramic fiber, high temperature blanket or board fireproofing insulation, constructed of calcium silicate or calcium/magnesium/silica amorphous wool with 2-hour ASTM E814 "F" and "T" fire ratings, UL or equivalent third party listed, labeled and specifically evaluated for such purpose in accordance with ASTM E2336. Foil-scrim-polyethylene fiberglass reinforced factory applied jacket.

FLUID-APPLIED DUCTWORK INSULATION (FDI):
Pre-approved Manufacturers: Technical Roofing Solutions, Inc.; Volatile Free Inc.; BASF Corp.; Gaco Western Inc. or equal. (Manufacturers must be approved prior to bid opening.)

Coatings shall be U.L. Listed to retain existing system UL ratings when applied as specified in this project.

Silicone enhanced water-borne single component waterproofing elastomeric coating with excellent strength and weathering characteristics.

Final finish coating color shall match existing fluid applied ductwork insulation color or as indicated by A/E.

Performance Values:

PHYSICAL PROPERTY	ASTM TEST METHOD	TYPICAL VALUE
Tensile Strength	D 412	225 psi
Elongation	D 412	200%
Shore A Hardness (inst-5 sec.)	D 2240	65Shore A
Tack-Free Time		10 to 30 Seconds
Service Temperature		-40°F to 300°F
Application Temperature		40°F to 150°F
Tear Resistance	D 264 Die C	65 Pli
Spread of Flame	ASTM E-84	<75 (Smoke<450)

Approved Spray Polyurethane Foam (SPF) used for thermal insulation.

Performance Values:

PHYSICAL PROPERTY	ASTM TEST METHOD	TYPICAL VALUE
Density (nominal)	ASTM D-1622	2.5 pcf
Compressive Strength (min) (parallel to rise)	ASTM D-1621	40 psi
K Factor (Initial)	ASTM C-177	0.15 btu.in/ft2.hr. °F
Closed Cell Content	ASTM D-1940	90%
Dimensional Stability (aged 28 days, % volume change)	ASTM D-2126	<2.5 @ 158ºF/98% RH
Moisture (Perm/Inch)	ASTM C-355	0.8
Spread of Flame* (2 inch thick sample)	ASTM E-84	<75 (Smoke<450)

Final coating shall be a silicone enhanced water-borne elastomeric compatible, fire retardant coating (Flame spread <25 Smoke <50).

Water-Based Epoxy Primer: A two-component, water-based, multi-purpose, easy spreading epoxy primer.

Urethane, high build mastic for applications where high performance, all temperature flexibility, and strength is required.

Urethane-based, low solids, fast drying, penetrating, rust and general-purpose primer.

Highly concentrated, low-sudsing biodegradable cleaner used to remove grease and grime.

Hydrocarbon modified, moisture-cured, urethane coating for use over asphalt products and as a basecoat /primer for silicone enhanced water-borne elastomeric coating.

Other products required by coating manufacturer.

Fluid-Applied Ductwork Insulation Guarantee:
State of Wisconsin Guarantee: Provide written guarantee warranting installation required under contract, to be watertight and free from defects in materials or workmanship for period, as stipulated in guarantee form. *A copy of the required guarantee form is appended hereto.*

Liquid Coating Manufacturer's Warranty:
Provide written manufacturer's (NDL) no-dollar-limit warranty covering installation required under contract, to be watertight and free from defects in materials and workmanship of the silicone enhanced water-borne elastomeric coating and other system components supplied by the manufacturer for a period of fifteen (15) years from date of installation.

Completed project requires installation inspection and approval by the manufacture of the silicone enhanced water-borne elastomeric coating.

> Note: Warranty may not contain clause(s) voiding warranty due to contractor solvency, improper workmanship, contractor error, or contractor failure to follow manufacturer specification(s) and requirements to obtain the warranty requested by this project.

(Contractors Performance-Payment Bond is only required to apply to this trade section during the construction period and the first year of the guarantee period. Said Bond shall not apply to any extended guarantee period beyond the first year. Such extended guarantees are limited to the applicable Contractor and manufacturer as herein specified.)

ADHESIVES, MASTIC, SEALANTS, AND REINFORCING MATERIALS
Products shall be compatible with surfaces and materials on which they are applied and shall be suitable for use at operating temperatures of systems to which they are applied.

FIBERGLASS INSULATION ADHESIVE:
Must comply with ASTM C916, Type II: Foster 85-60, Childers CP-127, Duro Dyne SSG.

VAPOR RETARDING MASTIC:
For below ambient equipment/piping use a water based mastic with a water vapor permeance of less than 0.04 perms at 40 mils dry film thickness per ASTM E 96: Childers CP-34, Foster 30-65 Vapor-Fas, , Knauf Insulation, KI-900 or KI-905, Vimasco 749.

For below ambient equipment/piping use water based, anti-fungal mastic that meets ASTM D 5590 with a 0 growth rating (AF) and a water vapor permeance that is less than 0.013 perms at 43 mils dry film thickness per ASTM E 96 Procedure B: Foster 30-80AF Vapor Safe Mastic or equal.

Anti-fungal mastic to be used in the following locations;

- Exterior locations
- Parking ramps
- Swimming pool equipment rooms
- Chemical storage and hazardous waste storage rooms
- Wet wells
- Sanitary pumping stations
- Food service/kitchen areas
- Walk-in coolers/freezers
- Locker/shower rooms
- Greenhouses
- Meter Pits

WEATHER BARRIER BREATHER MASTIC:
For above ambient equipment/piping use water based mastic with a permeance greater than 1.0 perms at 1/16" dry film thickness per ASTM E96. Foster 46-50 Weatherite, Childers Vi-Cryl CP-10/CP-11, Vimasco WC-5, Knauf Insulation KI-700 or KI-705.

LAGGING ADHESIVE / COATINGS:
For all indoors applications used in conjunction with canvas/glass cloth: Foster 30-36, Childers CP-50A MV1, Vimasco 713.

For all indoor applications used in conjunction with canvas/glass cloth: the coating must be anti-fungal and shall meet ASTM D 5590 with 0 growth rating (AF): Foster 30-36 AF Seal Fas, Childers CP-137 AF Chil-Seal.

Anti-fungal adhesive/coating to be used in the following locations;

- Exterior locations
- Parking ramps
- Swimming pool equipment rooms
- Chemical storage and hazardous waste storage rooms
- Wet wells
- Sanitary pumping stations
- Food service/kitchen areas
- Walk-in coolers/freezers
- Locker/shower rooms
- Greenhouses
- Meter Pits

REINFORCING MESH:
Use Foster 42-24 Mast A Fab, Childers Chil Glas #10 or Pittsburgh Corning PC 79.

METAL JACKETING SEALANT FOR ALL ALUMINUM JACKETING:
Metal jacketing sealants to be non-shrinking and permanently flexible.
Use Foster 95-44 Elastolar, Childers CP-76 Chil-Byl, Pittsburgh Corning 727.
For Polystyrene use Foster 30-45N, or Childers CP-70.

INSULATION JOINT SEALANT:
Joint sealants to be non-shrinking and permanently flexible.
Used on all below ambient piping to prevent moisture ingress.
For Cellular Glass, Polyisocyanurate, Phenolic use Foster 95-44 Elastolar, Childers CP-70 Chil-Byl, Pittsburgh Corning CW Sealant.
For Polystyrene use Foster 30-45N, Childers CP-70.
For Elastomeric use Armaflex 520 or equal.

JACKETS
PVC FITTING COVERS AND JACKETS (PFJ):
White PVC film, gloss finish one side, semi-gloss other side, FS LP-535D, Composition A, Type II, Grade GU. Ultraviolet inhibited indoor/outdoor grade to be used where exposed to high humidity, ultraviolet radiation, in kitchens or food processing areas or installed outdoors. Jacket thickness to be minimum .02" indoors/.03"outdoors for piping 12" and smaller, .03" indoors/.04" outdoors for piping 15" and larger.

ALL SERVICE JACKETS (ASJ):
Heavy duty, fire retardant material with polymer coated white kraft reinforced foil vapor retarder jacket, factory applied to insulation with a self-sealing pressure sensitive adhesive lap, maximum permeance of .02 perms and minimum beach puncture resistance of 50 units.

FOIL SCRIM KRAFT ALL SERVICE JACKETS (FSK):
Glass fiber reinforced foil kraft laminate, factory applied to insulation. Maximum permeance of .02 perms and minimum beach puncture resistance of 25 units.

PROTECTIVE METAL JACKETS (PMJ):
0.016 inch thick aluminum or 0.010 inch thick stainless steel with safety edge for indoor HVAC installations.
0.024 inch thick aluminum or 0.016 inch thick stainless steel with safety edge for Central Plant and Utility installations.

SELF-ADHERING JACKETS (SAJ):
5-ply, self-adhering multiple laminated waterproofing material with reflective aluminum foil, high density polymer films and cold weather acrylic adhesive providing zero (0.0) permeance. Minimum 6 mils material thickness, 25lb puncture resistance when tested in accordance with ASTM D1000 and flame spread/smoke developed rating of 10/20 when tested in accordance with UL 723.

Vapor retarding tape shall be specifically designed and manufactured for use with the self-adhering jacket specified above. Tape shall be provided by the same manufacturer that provides jacketing. Vapor retarding tapes used with self-adhering jackets shall have a maximum permeance of 0.0 perms.

FABRIC REINFORCED MASTIC JACKETS (FMJ):
Glass fiber reinforcing fabric imbedded in weather barrier mastic as per manufacturer's recommended procedure for 2 coat application.

VAPOR RETARDING JACKETS (VRJ):
3 ply composite vapor retarding jacket material with a maximum permeance of 0.0 perms. Material shall not support the growth of mold or mildew. Polyguard Zeroperm or equivalent.

Vapor retarding tape shall be specifically designed and manufactured for use with the vapor retarding jacket specified above. Tape shall be provided by the same manufacturer that provides jacketing. Vapor retarding tapes used with vapor retarding jackets shall have a maximum permeance of 0.0 perms.

INSULATION INSERTS AND PIPE SHIELDS
Manufacturers: B-Line, Pipe Shields, Value Engineered Products.

Construct inserts with calcium silicate or polyisocyanurate (service temperatures below 300 degrees F only), minimum 140 psi compressive strength. Piping 12" and larger, supplement with high density 600 psi structural calcium silicate insert. Provide galvanized steel shield. Insert and shield to be minimum 180 degree coverage on bottom supported piping and full 360 degree coverage on clamped piping. On roller mounted piping and piping designed to slide on support, provide additional load distribution steel plate.

Where contractor proposes shop/site fabricated inserts and shields, submit schedule of materials, thicknesses, gauges and lengths for each pipe size to demonstrate equivalency to pre-engineered/premanufactured product described above. On low temperature systems, high density rigid polyisocyanurate may be substituted for calcium silicate provided insert and shield length and shield gauge are increased to compensate for lower insulation compressive strength.

Precompressed 20# density molded fiberglass blocks, Hamfab or equal, of the same thickness as adjacent insulation may be substituted for calcium silicate inserts with one 1"x6" block for piping through 2-1/2" and three 1"x6" blocks for piping through 4". Submit shield schedule to demonstrate equivalency to pre-engineered/premanufactured product described above.

Wood blocks will not be accepted.

EXPANSION JOINT AND VALVE INSULATION BLANKETS

Manufacturers: Advance Thermal Corporation, TANI Division B.D. Schiffler, Sprinkman and Sons. Site fabricated blankets are not acceptable.

Blanket shall be 16.5 ounces per square yard PTFE (polytetrafluoroethylene) designed for wet and dry steam applications to 600ºF. Jacket shall have coated fabric on both exterior and interior. Wire mesh interior is not acceptable.

The Blankets shall be installed to shed water and have a 3-inch wide cinchable rain flap on each end.

All seams shall be sewn twice with double locked stitching. One seam shall be sewn with 3-ply Nomex and the other with 3-ply stainless steel. Hog rings and staples shall not be used.

The insulation shall be a 2-inch thick, compressed "E" glass fiber with no chemical binders, held in place with 12 gauge stainless quilt pins which do not puncture the inner surface of the blanket.

Blankets shall be designed to allow access to the expansion and ball joints packing cylinder plungers for repacking without removing the blanket.

Removable expansion joint blanket shall be constructed to allow the pipe and rigid insulation to expand/contract with the pipe. Blanket shall have a close fit without sagging or gaps.

Blanket shall allow for normal operation of the valve or joint without removing the cover.

Valve blankets shall come in two pieces and cover the valve yoke (if applicable).

Blankets shall have D-ring, hook and loop or buckle securing straps. Pins and wire or spring and ring securement is not acceptable.

Blankets shall have a stainless steel identifying plaque on the exterior identifying equipment information.

ACCESSORIES

All products shall be compatible with surfaces and materials on which they are applied and be suitable for use at operating temperatures of the systems to which they are applied.

Adhesives, sealants, and protective finishes shall be as recommended by insulation manufacturer for applications specified.

Insulation bands to be 3/4 inch wide, constructed of stainless steel. Minimum thickness to be 0.010 inch for stainless steel.

Tack fasteners to be stainless steel ring grooved shank tacks.

Staples to be clinch style.

Insulating cement to be ANSI/ASTM C195, hydraulic setting mineral wool.

Finishing cement to be ASTM C449.

Fibrous glass or canvas fabric reinforcing used with lagging adhesive shall have a minimum untreated weight of 6 oz./sq. yd.

Fungicidal water base duct liner coating (Foster 40-20 or equal) to be compatible with vapor retarding coating. This product must be EPA registered to be used inside HVAC ducts. Coating must comply with ASTM D 5590 with 0 growth rating.

P A R T 3 - E X E C U T I O N

EXAMINATION

Verify that all piping, equipment, and ductwork are tested and approved prior to installing insulation. Do not insulate systems until testing and inspection procedures are completed.

Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

INSTALLATION

All materials shall be installed by skilled labor regularly engaged in this type of work. All materials shall be installed in strict accordance with manufacturer's recommendations, building codes, and industry standards. Do not install products when the ambient temperature or conditions are not consistent with the manufacturer's recommendations. Surfaces to be insulated must be clean and dry.

Locate insulation and cover seams in the least visible location. All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation.

Install insulation with smooth and even surfaces. Poorly fitted joints or use of filler in voids will not be accepted. Provide neatly beveled and coated terminations at all nameplates, uninsulated fittings, or at other locations where insulation terminates.

Install fabric reinforcing without wrinkles. Overlap seams a minimum of 2 inches.

Use full length material (as delivered from manufacturer) wherever possible. Scrap piecing of insulation or pieces cut undersize and stretched to fit will not be accepted.

All pipe and duct insulation shall be continuous through walls, ceiling or floor openings and through sleeves except where firestop or firesafing materials are required. Vapor retarding jacket shall be maintained continuous through all penetrations.

Provide a continuous unbroken moisture vapor retarding jacket on insulation applied to systems noted below. Attachments to cold surfaces shall be insulated and vapor sealed to prevent condensation.

Provide a complete vapor retarding jacket for insulation on the following systems:

- Cold Water Make-Up
- Chilled Water
- Insulated Duct
- Equipment, ductwork or piping with a surface temperature below 65 degrees F

PROTECTIVE JACKET INSTALLATION

PVC FITTING COVERS AND JACKETS (PFJ):
Lap seams and joints a minimum of 2 inches and continuously seal PVC with welding solvent recommended by jacket manufacturer. Secure PVC fittings with welding solvent on seams and joints. Lap slip joint ends 4" without fasteners where required to absorb expansion and contraction. For sections where vapor retarding jacket is not required, and jacket requires routine removal, tack fasteners may be used. For systems requiring a vapor retarding jacket, apply a 1-1/2" band of mastic over ends, throat, seams and penetrations.

ALL SERVICE JACKETS (ASJ) and FOIL SCRIM KRAFT JACKETS (FSK):
Install according to manufacturer's recommendations using factory supplied lap seals and butt strip seals. In addition to factory adhesive, secure lap seals and tape with clinch type staples.

PROTECTIVE METAL JACKET (PMJ):
Lap seams a minimum of 2 inches. Secure with metal bands for end to end joints, and rivets or sheet metal screws for longitudinal joints. Rivets, screws, and bands to be constructed of the same material as the jacket. For piping with VRJ jacket provide metal bands at 12" centers, rivets and screws cannot be used. Locate longitudinal seams on the side (3:00 O'clock) for exterior applications. Seal laps with 1/8" bead of metal jacketing sealant to prevent water entry.

SELF-ADHERING JACKETS (SAJ):
Install according to manufacturer's recommendations. Cut allowing minimum 4" overlap on ends and 6" on longitudinal joints. Align parallel to surface. Remove release paper and press flat to surface to avoid wrinkles. Rub entire surface with plastic squeegee for full adhesion and sealing at joint overlaps. On exterior applications, provide a bead of compatible caulk along exposed edges.

Piping with self-adhering (SAJ) jackets shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. Piping with a PVC jacket (PFJ) installed over the self-adhering (SAJ) jacket may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

FABRIC REINFORCED MASTIC JACKETS (FMJ):
Glass fiber fabric shall be fitted without wrinkles. Glass fiber fabric shall be sized immediately upon application with lagging adhesive and shall be capable of drying within 6 hrs. Apply adhesive and coating in accordance with manufacturer's recommendations. All seams shall overlap not less than 2".

VAPOR RETARDING JACKETS (VRJ):
Piping with vapor retarding jackets (VRJ) shall have elbows, fittings, valves and butt joints wrapped with 2 layers of vapor retarding tape. For piping without a (PFJ) jacket, wrap jacket with 1" wide vapor retarding tape at 12" centers with a 25% overlap. Piping with a PVC jacket (PFJ) installed over the vapor retarding jackets (VRJ) may be provided with a single, lapped layer of vapor retarding tape for elbows, fittings and valves under the PVC jacket. Vapor retarding tape shall be compatible with the jacket material used.

PIPING, VALVE, AND FITTING INSULATION

GENERAL:
Install insulation with butt joints and longitudinal seams closed tightly. Provide minimum 2" lap on jacket seams and 3" tape on butt joints, firmly cemented with lap adhesive unless otherwise noted. Additionally, secure with clinch style staples along seams and butt joints.

On systems requiring a vapor retarding jacket, seal off all raw ends of insulation and butt joints with vapor retarding mastic at intervals of not more than 20 feet on piping to create a vapor dam. Also provide a vapor dam on each side of valves, unions, and tees. Coat staples, longitudinal and transverse seams with vapor

retarding mastic and on systems requiring vapor retarding jacket, coat insulated elbows, fittings, and valves with vapor retarding mastic.

Install insulation continuous through pipe hangers and supports with hangers and supports on the exterior of insulation. Where a vapor retarding jacket is not required or where roller hangers are not being used, hangers and supports may be attached directly to piping with insulation completely covering hanger or support and jacket sealed at support rod penetration. Where riser clamps are required to be attached directly to piping requiring vapor retarding jacket, extend insulation and vapor retarding jacketing/coating around riser clamp.

Where insulated piping is installed on hangers and supports, the insulation shall be installed continuous through the hangers and supports. High density inserts shall be provided as required to prevent the weight of the piping from crushing the insulation. Pipe shields are required at all support locations. The insulation shall not be notched or cut to accommodate the supporting channels.

Fully insulate all reheat coil piping, fittings and valves (except for unions) up to coil connection to prevent condensation when coil is inactive during cooling season. Provide a vapor proof seal between the pipe insulation and the insulated coil casing.

INSULATION INSERTS AND PIPE SHIELDS:
Provide pipe shields at all hanger and support locations. Rigid insulation inserts shall be installed between the pipe and the insulation shields. Quantity and placement of inserts shall be according to the manufacturer's installation instructions; however, the inserts shall be no less than 12" in length. Inserts shall be of equal thickness to the adjacent insulation and shall be vapor sealed as required for system.

Provide insulation inserts and pipe shields at all hanger and support locations. Inserts may be omitted on 3/4" and smaller copper piping provided 12" long 22 gauge pipe shields are used.

FITTINGS AND VALVES:
Fittings, valves, unions, flanges, couplings and specialties may be insulated with factory molded or built up insulation of the same thickness as adjoining insulation. Where the ambient temperature exceeds 150 degrees F, cover insulation with fabric reinforcing and mastic. Where the ambient temperatures do not exceed 150 degrees, furnish and install PVC fitting covers.

MINERAL FIBER:
Secure each 3' section with three metal bands snip off excess and turn ends over into insulation to prevent exposed sharp edges. Stagger joints where more than one layer is used.

Blanket or batt sheet is NOT allow on valves or at fittings. Fittings shall be insulated with pre-formed sections or field fabricated gored pieces. Gore segments shall be stapled together.

Where multiple layers of insulation are used filament tape is allowed to secure the inner layer of insulation only in pits and accessible areas. In steam box conduit and other inaccessible areas the inner AND outer layer of insulation shall be secured with bands, wire and/or tape are not allowed without written Owner's representative approval.

AEROGEL INSULATION:
Secure each 3' or larger sections with stainless steel bands evenly spaced at 12" and at ends. For elbows use 16 gauge stainless steel or annealed copper tie wires evenly spaced. Twist wire ends, snip off excess and turn ends over into insulation. Stagger joints where more than one layer is used.

ELASTOMERIC AND POLYOLEFIN:
Where practical, slip insulation on piping during pipe installation when pipe ends are open. Miter cut fittings allowing sufficient length to prevent stretching. Completely seal seams and joints for vapor tight installation. For elastomeric insulation, apply full bed of adhesive to both surfaces. For polyolefin, seal factory preglued seams with roller and field seams and joints with full bed of hot melt polyolefin glue to both surfaces. Cover elastomeric insulation on systems operating below 40 degrees F with vapor retarding mastic.

EXTRUDED POLYSTYRENE AND POLYISOCYANURATE:
Fittings, valves, unions, flanges, couplings and specialties shall be insulated with factory molded insulation of the same thickness as adjoining insulation. Secure insulation sections with two wraps of nylon filament tape 9"-12" on center. On single insulation layer systems and on the outer layer of double insulation layer systems, apply a 1/16" thick bead of joint sealant rated for system operating temperatures to the outer edge of all longitudinal and butt insulation joints. For piping service below 20ºF, use two layers of insulation with inner and outer butt and longitudinal joints staggered and offset 90 degrees. Where two layers of insulation

are used, do not use sealant on the inner layer or adhere the inner layer to the outer layer. Apply vapor stop bead of joint sealant between pipe and insulation on both sides of valves, expansion/contraction joints, flanges, thermometers/gauges, attached vent and drain lines. Insulate attached non-circulated lines, control lines, vents, etc. for a minimum distance of 6" from pipe. Cover insulation with a protective jacket as specified below. Do not penetrate protective covering or insulation with mechanical fasteners.

PIPING PROTECTIVE JACKETS

In addition to the jackets specified in the pipe insulation schedule below the following protective jackets are required:

Provide a protective PVC jacket (PFJ) for the following insulated piping:

- Chilled water piping and valves in walk-thru tunnels and valve pits
- Exposed piping in kitchens
- Piping exposed in finished locations
- Exterior refrigeration piping.

Provide a protective PVC (PFJ) or Fabric Reinforced Mastic (FMJ) jacket for the following insulated piping:

- All piping within mechanical rooms.

Provide a protective metal (PMJ) or self-adhering (SAJ) jacket for the following insulated piping:

- Exterior installed refrigeration piping.

Provide a protective metal jacket (PMJ) for the following insulated piping:

- Steam and condensate piping and fittings located in walk-thru tunnels and steam pits.

Provide a protective covering of 2 coats of vapor retarding mastic with fibrous glass or canvas fabric reinforcing (FMJ) for the following insulated piping:

Provide a protective self-adhering (SAJ) jacket for the following insulated piping:

REMOVABLE INSULATION BLANKETS: (EXPANSION SLIP JOINT AND VALVES 2-1/2" AND LARGER)

Provide removable reusable insulated cover on new and existing expansion slip joints, ball joints and valves.

Install blankets to be field removable without tools.

Blankets shall be installed to allow the normal expansion and contraction associated with these systems, without crushing or damaging the blanket.

Expansion Joint blankets shall extend over the adjacent rigid insulation to allow for pipe expansion.

Blankets shall be installed without sagging or gaps.

Blankets shall be installed to shed water.

Steam system will not be allowed to start up until removable jackets are installed.

PIPE INSULATION SCHEDULE:

Provide insulation on new and existing remodeled piping system as indicated in the following schedule:

SERVICE	INSULATION	JACKET	INSULATION THICKNESS BY PIPE SIZE				
			< 1"	1" to < 1-1/2"	1-1/2" to < 4"	4" to < 8"	8" and Larger
Heating Hot Water	Rigid Fiberglass	ASJ	1.5"	1.5"	2"	2"	2"
Chilled Water	Polyisocyanurate / Polystyrene	VRJ or SAJ	1.5"	1.5"	1.5"	1.5"	1.5"
Process Chilled Water	Polyisocyanurate / Polystyrene	VRJ or SAJ	1.5"	1.5"	1.5"	1.5"	1.5"

Cooling Coil Condensate Drain	Rigid Fiberglass	ASJ	0.5”	0.5”	1”	1”	1”
Low Pressure Steam	Rigid Fiberglass	ASJ	2.5”	2.5”	2.5”	3”	3”
In Conduits	Mineral Wool	None	2.5”	2.5”	2.5”	3”	3”
Low Pressure Cond.	Rigid Fiberglass	ASJ	1.5”	1.5”	2”	2”	2”
In Conduits	Mineral Wool	None	1.5”	1.5”	2”	2”	2”
Cond. Pump Disch. In conduits	Mineral Wool	None	1.5”	1.5”	2”	2”	2”

Insulation on all steam distribution systems shall be installed in multiple layers not exceeding 3” in thickness.

The following piping and fittings are not to be insulated:

- Hot water piping inside radiation or cabinet heater enclosures
- Steam Traps
- Piping unions for systems not requiring a vapor retarding Jacket

For systems with fluid temperatures 65° F or less, furnish and install removable elastomeric insulation covers, plugs or caps for all mechanical equipment and devices that require access by balancing contractors or service and maintenance personnel. Examples include but are not limited to: flow sensing devices, circuit setters, manual ball valve air vents, drain valves, blowdown valves, pressure/temperature test plugs, grease fittings, pump bearing caps, equipment labels, etc. Covers shall be tight fitting to ensure a complete vapor retarding barrier.

DUCT INSULATION

GENERAL:

Secure flexible blanket duct insulation on sides and bottom of ductwork over 24" wide with weld pins. Space fasteners 18” on center or less as required to prevent sagging. Compress insulation no more than 25%.

Secure rigid board insulation to ductwork with weld pins. Apply insulation with joints firmly butted together and placed as close as possible to the equipment surface. Pins shall be located a maximum of 3” from each edge and spaced no greater than 12” on center.

Install weld pins without damage to the interior galvanized surface of the duct. Clip pins back to washer and cover penetrations with tape of same material as jacket. Firmly butt seams and joints and cover with 4” tape of same material as jacket. Seal tape with plastic applicator and secure with staples. All joints, seams, edges and penetrations to be fully vapor sealed with vapor retarding mastic.

Stop and point insulation around access doors and damper operators to allow operation without disturbing insulation or jacket material.

External supply duct insulation is not required where ductwork contains continuous 1” acoustical liner. Provide 4” overlap of external insulation over ends of acoustically lined sections.

Where insulated ductwork is supported by trapeze hangers, the insulation shall be installed continuous through the hangers. Drop the supporting channels required to facilitate the installation of the insulation. Where rigid board or flexible insulation is specified, install high density inserts to prevent the weight of the ductwork from crushing the insulation.

Where insulated low temperature (below 45ºF) ductwork is supported by steel metal straps or wire ropes that are secured directly to the duct, the straps or ropes shall be completely covered with insulation and sealed to provide a complete vapor retarding barrier.

Where insulated duct risers are supported by steel channels secured directly to the duct, extend the insulation and vapor retarding jacketing to encapsulate the support channels.

Where ductwork exposed to the weather is insulated with any product other than fluid-applied ductwork insulation, the top surface of the insulation shall be sloped a minimum of ½” per foot to eliminate ponding and create positive drainage off insulation.

Tapered Insulation shall be ASTM C1289, Type II, Class 1, Grade 2; rigid board polyisocyanurate insulation with felt or fibrous mat facing on both sides, factory tapered to 1/2” per foot slope. Tapered insulation board

shall have a start thickness at the perimeter of 1/2”. Tapered insulation board shall be mechanically fastened to ductwork. Tapered insulation applied to rectangular ductwork less than or equal to 24” in width may be sloped from one side. Tapered insulation applied to rectangular ductwork greater than 24” in width shall be sloped in two directions with the high point at the centerline of the duct.

PLENUMS FOR SLOT DIFFUSERS:
All slot/linear diffuser plenums shall be externally insulated.

BREECHING:
Fasten insulation over weld pins and secure with washers. Space fasteners not less than 3” from edge or corner and 12" on center longitudinally and 9" on center in the transverse direction. Clip pins back to washer and cover penetrations with tape of same material as jacket. Firmly butt seams and joints and cover with 4” tape of same material as jacket. Seal tape with plastic applicator and secure with staples.

GREASE DUCTS:
Strictly adhere to manufacturer’s installation instructions and rating requirements for application of fire-stop insulation. Cover all exhaust ducts serving Type I kitchen hoods with fire-stop insulation from a point prior to penetration of ceiling, wall, floor or concealment through building to termination at outside of building. Extend fire-stop insulation through roof curbs.

FLUID-APPLIED DUCTWORK INSULATION (FDI):

Proceed with work only when weather conditions comply with Manufacturer recommendations and other current published data and MSDS information. Do not exceed temperature limitations recommended by coating manufacturer.

The top of ducts insulated with fluid-applied ductwork insulation shall be sloped using tapered insulation prior to applying fluid-applied insulation. Tapered Insulation shall be ASTM C1289, Type II, Class 1, Grade 2; rigid board polyisocyanurate insulation with felt or fibrous mat facing on both sides, factory tapered to 1/2” per foot slope. Tapered insulation board shall have a start thickness at the perimeter of 1/2”. Tapered insulation board shall be mechanically fastened to ductwork. Tapered insulation applied to rectangular ductwork less than or equal to 24” in width may be sloped from one side. Tapered insulation applied to rectangular ductwork greater than 24” in width shall be sloped in two directions with the high point at the centerline of the duct.

Air intake vents, blowers, air conditioning units and evaporative coolers shall be disconnected or otherwise modified to prevent fumes from entering the building or from contaminating the substrate surface with condensate water.

Coordinate scheduling with the Owner in order to relocate or protect vehicles, building occupants and building contents from damage during construction operations.

Existing materials designated to remain, which are damaged or defaced as a result of the work shall be replaced at Contractor's expense to like new condition.

Install all rooftop mounted equipment in a watertight manner and repair any damage to sheet metal or other components related to connection and protection of the system.

Prevent materials from entering and clogging roof drains and conductors. Remove roof drain plugs when no work is taking place or when rain is forecast.

Protection of surfaces:
Take every precaution to prevent water leakage or debris falling into the building interior, or other such occurrences. Contractor is responsible for any damage to the building interior, or contents, during application.

Provide special protection or avoid heavy traffic on completed work or roof surfaces. Temporary walkways and work platforms shall be provided as necessary.

Wall surfaces shall be protected with tarpaulins or other suitable cover to prevent damage, staining or discoloration that might result from operations. Windows, doorways, docks, walkways, etc. may require special protection measures.

Protect building and adjacent area and property within the area from over spray.

Caution:
Installation of primers, polyurethane foam or coatings shall not interfere with the proper function of: Manual Volume Dampers, Turning Vanes, Fire Dampers, Smoke Dampers and Combination Fire/Smoke Dampers, Control Dampers, Smoke Detectors, Access Doors, Duct Pressure Relief Doors, Flashings, Duct Flexible Connections, Sound Attenuators, Hoods for Intake and Exhaust, Louvers, Air Blenders and Air Flow Stations.

Installation of Spray Polyurethane Foam (SPF) Insulation:
When required, install approved polyurethane foam to an average thickness as specified in the duct insulation schedule (1" minimum required) and terminated neatly at designated places.

Mask areas where coating is to be terminated to prevent surface contamination with foam over spray.

Foam spray application shall be limited to that which can be completed to full foam thickness in one day. All exposed foam tie-in end laps and side laps must be primed at the end of each workday.

The completed foam surface shall be smooth to orange peel texture; popcorn texture is not acceptable.

The completed foam surface shall be free of pinholes and/or "glass windows" caused by improper equipment calibration or climatic conditions. The SPF shall not have any soft or spongy areas or areas with hard or brittle strings of improperly proportioned material

Eliminate areas of ponding using approved polyurethane foam to create positive drainage.

Remove protective masking at terminations.

Apply protective coating to foam surface on the same day as polyurethane foam is installed.

The foam shall not be left exposed or uncoated for more than 4 hours. If coating application is delayed beyond that time, consult manufacturer for primer recommendations.

Installation of Coating System:
Do not apply coating when moisture is present on the substrate.
Wind barriers shall be used if wind conditions could affect the quality of the material being applied.

Coating must cover all surfaces completely. An extra pass of coating material may be required at all edges and penetrations.

Base coat(s) and primer(s) shall be allowed to cure before proceeding with subsequent applications.

All coating and primers shall be coated within recommended time period. If application is delayed beyond that time, consult Manufacturer for primer recommendations.

Application Thickness:
15 Year NDL System
Average Application Thickness: Topcoat Average thickness shall be 36 Average TDM (Total Dry Mils), (3.75 gallons per 100 sq. ft. minimum application recommended.)

Application rates must be checked periodically to assure proper coating thickness. This may be done by checking dry film thickness.

Contractor to estimate coating requirements based on actual experience and needs to figure losses due to applicator experience, surface texture, wind, waste, and other factors increasing estimated gallons required.

The total dry mil thickness of all coatings, as well as the total dry mil thickness of the topcoat(s) shall meet the minimums required by Manufacturer.

Application of approved silicone enhanced water-borne elastomeric coating:
Spray apply the approved coating to achieve the required TDM. The polyurea shall completely cover the SPF including all termination, penetrations, expansion joint covers, parapets and flashings. Spray pattern shall overlap the previous pass to insure complete coverage.

To assure complete coverage with approved silicone enhanced water-borne elastomeric coating, applicator needs to figure losses due to over-spray, surface texture and wind and increase the gallons as needed to meet specifications.

Pay special attention to overspray, which can texture or discolor adjoining finished sections. Wind direction should conduct overspray away from finished surfaces.

Spray Equipment:
This product must be applied with plural component spray equipment. The proportioning pump should be a positive displacement type set up in a 1:1 ratio, capable of maintaining dynamic pressure of 1,500 psi and fluid temperatures of 150º F during the maximum output of the proportioner. Fluid spray hoses should be of the dual heated type with temperature controls capable of maintaining 150º F fluid temperatures the full length to the spray gun. The heated hose assembly must be insulated and be high-pressure type with designed working pressure to handle the maximum pressure delivered by the proportioner. The inside lining of the hose assembly must be of a material that is unaffected by the coating or solvents used for cleanup. Contact Manufacturer for specific instructions and spray equipment recommendations.

The silicone enhanced water-borne elastomeric shall not be left exposed or uncoated for more than 4 hours. If fire retardant coating application is delayed beyond that time, consult manufacturer for primer recommendations.

Entire application shall receive a final coat of compatible, fire retardant coating (Flame spread <25 Smoke <50). Minimum thickness shall be no less than that tested for Spread of Flame rating (ASTM E-84 /UL-723).

Refasten all mechanical equipment and remount other rooftop equipment as necessary.

DUCTWORK PROTECTIVE COVERINGS:
In addition to the jackets specified in the duct insulation schedule below the following protective coverings are required:

Provide a protective covering of 2 coats of indoor/outdoor vapor retarding mastic with fibrous glass or canvas fabric covering (FMJ) or self-adhering jacket (SAJ) meeting 25/50 Flame Spread/Smoke Rating.for the following ductwork:

- Ductwork within 8’ of floor, catwalks and mezzanines in mechanical rooms

Provide a protective self-adhering jacket (SAJ) for the following insulated ductwork:

DUCT INSULATION SCHEDULE:
Provide duct insulation on new and existing remodeled ductwork in the following schedule:

SERVICE	INSULATION TYPE	JACKET	THICKNESS
Exhaust ductwork - Moisture Laden Air	***Flexible Fiberglass***	***FSK***	***2”***
Outside air ducts	Rigid Fiberglass	FSK	2"
Slot diffuser plenums	***Flexible Fiberglass***	***FSK***	***1.5”***
Exposed supply ducts*	Rigid Fiberglass	FSK	2"
Concealed supply ducts	Flexible Fiberglass	FSK	1.5"
All Ducts located in unconditioned Attics/Shafts***	Flexible Fiberglass	FSK	3"
Exhaust and relief ducts downstream of motorized backdraft dampers	Rigid Fiberglass	FSK	2"
All ducts exposed to weather	Ext. Polystyrene or Fluid-Applied**	SAJ	3”

Grease ducts serving Type I Kitchen hoods	Fire-Stop	See Spec.	As Req'd. for Specified Hourly Rating
Louver blank-off panels ****	Ext. Polystyrene	SAJ	4"

* Exposed supply branch ducts located in the space they are serving do not require insulation. Exposed supply main ducts running through spaces they serve shall be insulated as exposed supply ducts scheduled above.

** No jacket is required for Fluid-Applied ductwork insulation. The two part Fluid-Applied system serves as insulation and protective jacket.

*** Outside air ductwork between the isolation damper and the outside air intake does not require insulation where it is in an unheated attic.

**** Insulating value of any louver or curb blank off panel needs to meet the building envelope insulating value required by current building code.

EQUIPMENT INSULATION

GENERAL:

Do not insulate over equipment access manholes, fittings, nameplates or ASME stamps. Bevel and seal insulation at these locations.

PROTECTIVE JACKETS:

Provide a protective metal jacket (PMJ) for the following:

- Generator exhaust pipe (that is not concealed in a shaft) and muffler.

SEMI-RIGID FIBERGLASS:

Apply insulation to equipment shells using weld pins, bonding adhesive, banded and wired in place. Fill all joints, seams and depressions with insulating cement to a smooth, even surface. Cover with reinforcing fabric and 2 coats of mastic (FMJ). Use vapor retarding mastic on systems requiring a vapor retarding barrier.

ELASTOMERIC/POLYOLEFIN:

Apply full cover coat of adhesive to surface to be insulated, insulation and edge butt joints. Place insulation with edge joints firmly butted pressing to surface for full adhesion. Seal seams and joints vapor tight.

REMOVABLE COVERS:

Provide insulated easily removable galvanized steel metal boxes for routine service access on the following equipment:

Provide insulated easily removable elastomeric insulation sections for the following equipment:

EQUIPMENT INSULATION SCHEDULE:

Provide equipment insulation as follows:

EQUIPMENT	INSULATION TYPE	JACKET	THICKNESS
Reheat coil casing in exposed supply ducts	Rigid Fiberglass	FSK	2"
Reheat coil casing in concealed supply ducts	Flexible Fiberglass	FSK	1-1/2"
Process Chilled Water Air separators	Elastomeric/Polyolefin	None	1"
Process Chilled Water Pumps	Elastomeric/Polyolefin	None	1"
Heat exchangers	Semi-Rigid Fiberglass	ASJ/PMJ	2"
Condensate receivers (unless otherwise noted)	Semi-Rigid Fiberglass	ASJ/PMJ	2"
Air Handling Unit Casings or attached component sections not factory insulated**	Rigid Fiberglass	ASJ	2"

* Condenser shell only needs to be insulated when condenser is city, lake, or river water cooled or when "free cooling" is used.

** The thickness and type of insulation provided for non-factory fabricated transitions or component sections shall be consistent with the sections constructed at the factory.

*** Protective metal jacket (PMJ) is only required in exposed locations.

CONSTRUCTION VERIFICATION ITEMS

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

END OF SECTION

SECTION 23 33 00
AIR DUCT ACCESSORIES
BASED ON DFD MASTER SPECIFICATION DATED 09/13/2024

P A R T 1 - G E N E R A L

SCOPE

This section includes accessories used in the installation of duct systems. Included are the following topics:

RELATED WORK

Section 23 05 29 – Hanger and Supports for HVAC Piping and Equipment
Section 23 05 48 – Vibration and Seismic Controls for HVAC Piping and Equipment
Section 23 08 00 – Commissioning of HVAC
Section 23 31 00 – HVAC Ducts and Casings

REFERENCE

Applicable provisions of Division 1 govern work under this Section.

REFERENCE STANDARDS

NFPA 90A	Standard for Installation of Air Conditioning and Ventilating Systems
SMACNA	HVAC Duct Construction Standards - Metal and Flexible, 4th Edition, 2020
UL 214	
UL 555 (6th edition)	Standard for Fire Dampers and Ceiling Dampers
UL 555S (4th edition)	Leakage Rated Dampers for Use in Smoke Control Systems

QUALITY ASSURANCE
Refer to division 1, General Conditions, Equals and Substitutions

SHOP DRAWINGS
Refer to division 1, General Conditions, Submittals.

Submit for all accessories and include dimensions, capacities, ratings, installation instructions, and appropriate identification.

Include certified test data on dynamic insertion loss, self-noise power levels, and aerodynamic performance of sound attenuators.

Submit manufacturer's color charts where finish color is specified to be selected by the Architect/Engineer.

OPERATION AND MAINTENANCE DATA
All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

P A R T 2 - P R O D U C T S

MANUAL VOLUME DAMPERS
Manufacturers: Ruskin, Vent Products, Air Balance, or approved equal.

Dampers must be constructed in accordance with SMACNA Fig. 7-4, Fig. 7-5, and notes relating to these figures, except as modified below.

Reinforce all blades to prevent vibration, flutter, or other noise. Construct dampers in multiple sections with mullions where width is over 48 inches. Use rivets or tack welds to secure individual components; sheet metal screws will not be accepted. Provide operators with locking devices and damper position indicators for each damper; use an elevated platform on insulated ducts. Provide end bearings or bushings for all volume damper rods penetrating ductwork constructed to a 3" w.c. pressure class or above.

TURNING VANES
Manufacturers: Aero Dyne, Anemostat, Barber-Colman, Hart & Cooley, or approved equal.

Construct turning vanes and runners for square elbows in accordance with SMACNA Fig. 4-3 and Fig. 4-4 except use only airfoil type vanes. Construct turning vanes for short radius elbows and elbows where one dimension changes in the turn in accordance with SMACNA Chart 4-1 and Fig. 4-10.

FIRE DAMPERS
Manufacturers: Air Balance, Advanced Air, American Warming and Ventilating, Greenheck, Phillips-Aire, Prefco, Ruskin, Safe-Air or approved equal.

STATIC FIRE DAMPERS
Static fire damper assemblies must be UL 555 (6^{th} edition) listed and labeled for static applications (where air systems do not operate during a fire) and meet requirements of NFPA 90A. Damper must be type B curtain type with blades out of the air stream; dampers with blades in the air stream will not be accepted. Damper fire rating to be compatible with the rating of the building assembly in which the damper is used.

DYNAMIC FIRE DAMPERS

Dynamic fire damper assemblies must be UL 555 (6^{th} edition) listed and labeled for dynamic applications (where air systems operate during a fire) and meet requirements of NFPA 90A. Dampers must be type B curtain type with curtain 100% out of air stream. Dampers larger than 30” by 30” or with velocity rating requirements of 3000 fpm or higher, may be multiblade type with blades located in the airstream. Velocity ratings and static pressure ratings as indicated on the drawings. Damper fire rating to be compatible with the rating of the building assembly in which the damper is used.

COMBINATION FIRE/SMOKE DAMPERS
Manufacturers: Ruskin, Johnson Controls, Air Balance, Advanced Air, American Warming and Ventilating, Greenheck, Safe-Air, Phillips-Aire, Prefco, or approved equal.

Combination fire/smoke damper :
Combination fire/smoke damper assemblies to be UL 555(6th edition) and UL 555S(4th edition) listed and labeled, and have a fire rating compatible with the rating of the building assembly in which the damper is used, and be leakage rated at no higher than Class II under UL 555S.

Provide high temperature stainless steel option for moisture laden exhaust air ductwork systems.

Operation:
Provide factory installed electrically operated dampers with linkage arranged so that the damper is closed on loss of power. For electric actuation, provide electric operated dampers with linkage and UL listed operators arranged so that the damper is closed on a loss of power. Where electric actuation is controlled by the DDC system use 0-10 VDC inputs, with stall protection, and with and zero and span adjustments for modulating or 24 VAC for two-position control. Where electric actuation is controlled by the fire alarm system, use 120 VAC actuators. All electric actuators will be provided with overload protection to prevent motor from damage when stall condition is encountered. Locate all operators out of the air stream unless large damper size will not allow. Provide form "C" end switches to indicate damper position.

CONTROL DAMPERS
Control dampers are specified in section 23 09 14.

SMOKE DETECTORS
Smoke detectors are furnished and installed by the Electrical Contractor.

ACCESS DOORS
General:
Access doors to be designed and constructed for the pressure class of the duct in which the door is to be installed. Doors in exposed areas shall be hinged type with cam sash lock. Hinges shall be aluminum or steel full length continuous piano type. Doors in concealed spaces shall be secured in place with cam sash latches. For both hinged and non-hinged doors provide sufficient number of camp sash latches to provide air tight seal when door is closed. Do not use hinged doors in concealed spaces if this will restrict access. Use minimum 1" deep 24 gauge galvanized steel double wall access doors with minimum 24 gauge galvanized steel frames. For non-galvanized ductwork, use minimum 1" deep double wall access door with frame that shall use materials of construction identical to adjacent ductwork. Provide double neoprene gasket that shall provide seals from the frame to the door and frame to the duct. When access doors are installed in insulated ductwork or equipment provide insulated doors with insulation equivalent to what is provided for adjacent ductwork or equipment. Access doors constructed with sheet metal screw fasteners will not be accepted.

Kitchen Exhaust Ducts:
Use insulated, 1-1/2 hour UL 1978 listed and labeled access doors in kitchen exhaust ducts.

FLEXIBLE DUCT
Manufacturers: Anco Products, Clevaflex, Thermaflex, Flexmaster or approved equal.

Factory fabricated, UL 181 listed as a class 1 duct, and having a flame spread of 25 or less and a smoke developed rating of 50 or under in accordance with NFPA 90A.

Suitable for pressures and temperatures involved but not less than a 180°F service temperature and ±2 inch pressure class, depending on the application.

Duct to be composed of polyester film, aluminum laminate or woven and coated fiberglass fabric bonded permanently to corrosion resistant coated steel wire helix. Two-ply, laminated, and corrugated aluminum construction may also be used.

Where duct is specified to be insulated, provide a minimum 1 inch fiberglass insulation blanket with maximum thermal conductance of 0.23 K (75 degrees F.) and vapor barrier jacket of polyethylene or metalized reinforced film laminate. Maximum perm rating of vapor barrier jacket to be 0.1 perm.

FLASHINGS

Provide flashing to completely weatherproof connection of ductwork to louvers. Flashing to be constructed of material similar to louver material.

Flashing and counterflashing for roof curbs will be provided by others.

Flashing and curbs for duct and pipe penetrations of roof assemblies to be in accordance with details.

DUCT FLEXIBLE CONNECTIONS

Material to be fire retardant, be UL 214 listed, and meet the requirements of NFPA 90A.

Connections to be a minimum of 3 inches wide, crimped into metal edging strip, and air tight. Connections to have adequate flexibility and width to allow for thermal expansion/contraction, vibration of connected equipment, and other movement.

General Applications:
Use coated glass fiber fabric for all applications. Material for inside applications other than corrosive environments, fume exhaust, or kitchen exhaust to be double coated with neoprene, air and water tight, suitable for temperatures between -10°F and 200°F, and have a nominal weight of 30 ounces per square yard.

Outdoor Applications:
Material used for outdoor applications other than corrosive environments, fume exhaust, or kitchen exhaust to be double coated with Hypalon¿,air and water tight, suitable for temperatures between -10°F and 250°F, and have a nominal wight of 26 ounces per square yard.

Corrosive Environments:
For corrosive environments or fume exhaust applications indoors or outdoors, use a material coated with Teflon that is air and water tight, suitable for temperatures between -20°F and 500°F, and has a nominal weight of 14 ounces per square yard.

SOUND ATTENUATORS

Manufacturers: Industrial Acoustics Company, Environmental Elements Corporation, Semco, Dynasonics, United McGill, Price, VAW, Vibro Acoustics or approved equal.

Construct of a 22 gauge galvanized steel outer casing, and 26 gauge galvanized, perforated steel inner liner. Seams and joints of outer casing to be air tight.

Fill annular space between outer casing and inner liner with acoustic fill that is inert, inorganic, and of a density sufficient to obtain the specified acoustic performance. Material must meet requirements of NFPA 90A with a flame spread index of 25 or less and smoke developed rating of 50 or less.

Acoustical and aerodynamic performance is indicated on schedules on the drawings.

LOUVERS

Louvers Provided by GPC:
Louvers are specified in the architectural section of these specifications.

AIR BLENDERS

Manufacturers: R-M Products, or approved equal.

Construct units of not less than .08 inch aluminum of all welded construction. Units to be completely fixed devices capable of providing mixed air temperatures within 6°F of the theoretical values.

AIR FLOW STATIONS

Air flow stations are specified in section 23 09 14.

P A R T 3 - E X E C U T I O N

MANUAL VOLUME DAMPERS

Install manual volume dampers in each branch duct and for each grille, register, or diffuser as far away from the outlet as possible while still maintaining accessibility to the damper. Install so there is no flutter or vibration of the damper blade(s).

TURNING VANES
Install turning vanes in all rectangular, mitered elbows in accordance with SMACNA standards and/or manufacturer's recommendations.

Install double wall, airfoil, 2 inch radius vanes in ducts with vane runner length 18" or greater and air velocity less than 2000 fpm. Install double wall, airfoil, 4-1/2 inch radius vanes in ducts with vane runner length 18" or greater and air velocity 2000 fpm or greater.

If duct size changes in a mitered elbow, use single wall type vanes with a trailing edge extension. If duct size changes in a radius elbow or if short radius elbows must be used, install sheetmetal turning vanes in accordance with SMACNA Chart 4-1 and Figure 4-10.

FIRE DAMPERS
Install dampers in strict accordance with manufacturer's installation instructions. Install damper sleeves with retaining angles on both sides of rated partition. Connections of ductwork to fire damper assemblies to be as specified on the installation instructions. Where it is necessary to set dampers out from the rated wall, install a sleeve extension encased in two hour rated fire proofing insulation. Install an access door at each fire damper, located to permit resetting the damper replacing the fusible link.

Manually test each fire damper for proper operation by removing the fusible link. Repair or replace any fire damper that does not close completely. Re-install fusible link after test.

The A/E must coordinate the location of all fire dampers, smoke dampers and combination fire smoke dampers. All dampers must be installed in accessible locations and access to these dampers must be coordinated. The dampers must have adequate access to allow for servicing and testing of the dampers.

COMBINATION FIRE/SMOKE DAMPERS

Combination Fire/Smoke Damper Installation;
Install combination fire/smoke dampers in locations indicated on the drawings in accordance with the manufacturer's instructions. Install an access door adjacent to each damper for inspection and cleaning.

Coordinate damper linkage with operators so the dampers are closed when the air system is not operating.

CONTROL DAMPERS
Install dampers in locations indicated on the drawings, as detailed, and according to the manufacturer's instructions. Install blank-off plates or transitions where required for proper mixing of airstreams in mixing plenums. Provide adequate operating clearance and access to the operator. Install an access door adjacent to each control damper for inspection and maintenance.

SMOKE DETECTORS
Installation and wiring of detectors will be by the Electrical Contractor. Install an access door at each detector location.

When detectors are to be installed within air handling systems, show the intended location on the mechanical drawings and coordinate with the electrical consultant. It is very difficult to properly identify the correct location of detectors on the electrical drawings.

ACCESS DOORS
Install access doors where specified, indicated on the drawings, and in locations where maintenance, service, cleaning or inspection is required. Examples include, but are not limited to motorized dampers, fire and smoke dampers, smoke detectors, fan bearings, heating and cooling coils, filters, valves, and control devices needing periodic maintenance.

Size and numbers of duct access doors to be sufficient to perform the intended service. Minimum access door size shall be 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, or other size as indicated. Install access doors on both inlet and outlet sides of reheat coils as well as other duct mounted coils.

Label fire, smoke and combination fire smoke dampers on the exterior surface of ductwork directly adjacent to access doors using a minimum of 0.5 inch height lettering reading, “SMOKE DAMPER” or “FIRE DAMPER”. Smoke and combination fire smoke dampers shall also include a second line listing the individual damper tag. The tags must be coordinated with the mechanical schedules. Utilize stencils or

manufactured labels. All other forms of identification are unacceptable. All labels shall be clearly visible from the ceiling access point.

FLEXIBLE DUCT

Flexible duct may only be used for final connections of air inlets and outlets at diffuser, register, and grille locations. Where flexible duct is used, it shall be the minimum length required to make the final connections, but no greater than 5 feet in length, and have no more than one (1) 90 degree bend.

Secure inner jacket of flexible duct in place with stainless steel metal band clamp. Secure insulation vapor barrier jacket in place with steel or nylon draw band. Sheetmetal screws and/or duct tape will not be accepted.

Flexible duct used to compensate for misalignment of main duct or branch duct will not be accepted.

Individual sections of flexible ductwork shall be of one piece construction. Splicing of short sections will not be accepted.

Flexible ductwork used as transfer duct shall be sized for a maximum velocity of 300 fpm.

Penetration of any partition, wall, or floor with flexible duct will not be accepted.

FLASHINGS

Flashing for roof curbs, equipment supports or rails located on roof, will be installed by others.

DUCT FLEXIBLE CONNECTIONS

Install at all duct connections to rotating or vibrating equipment, including air handling units (unless unit is internally isolated), fans, or other motorized equipment in accordance with SMACNA Figure 7-8. Install thrust restraints to prevent excess strain on duct flexible connections at fan inlets and outlets; see Related Work.

For applications in corrosive environments or fume exhaust systems, use a double layer of the Teflon¿ coated fabric when making the connector.

SOUND ATTENUATORS

Install sound attenuators in locations indicated on the drawings. Where modular installation is required, install units in a galvanized steel frame equipped with gaskets or seals between modules to prevent bypass of air.

HOODS FOR INTAKE AND EXHAUST

Install in locations indicated on the drawings, coordinating the roof opening location with the General Prime Contractor. Curbs are covered in Section 23 05 29.

LOUVERS

Louvers are furnished and installed by others.

Furnish louvers to the General Prime Contractor for mounting in exterior walls. Connect outside air intake duct to the louver, sealing all connections air and water tight.

Provide bird screen on inside of active louver area where none is provided with louvers. Where louvers are equipped with inside birdscreen, remove screen at all locations where duct connections are not made.

Install insulated metal panel on unused portion of louver. Panels must be sealed weathertight to louver assembly with flashing as required for proper drainage to outside of building. Paint outside surface of panel to match louver prior to installation. Where ductwork is visible through louver when viewed from outside the building, paint inside of duct to match louver color.

AIR BLENDERS

Install air mixing devices where indicated on the drawings and in strict accordance with manufacturer's recommendations.

AIR FLOW STATIONS

Install where indicated on the drawings and/or as scheduled and in accordance with manufacturer's recommendations.

Provide access doors upstream and downstream of all duct mounted air flow stations of the size necessary for maintenance purposes. Minimum access door size shall be 8 x 8 inch size for hand access, 18 x 18 inch size for shoulder access, or other size as indicated on the drawings.

CONSTRUCTION VERIFICATION

Contractor is responsible for utilizing the construction verification checklists supplied under specification Section 23 08 00 in accordance with the procedures defined for construction verification in Section 01 91 01 or 01 91 02.

END OF SECTION