WAYNE STATE UNIVERSITY

WSU REUTHER HBRARY MEP PROJECT No. 2164076

5401 CASS AVENUE, DETROIT, MICHIGAN DESIGN DEVELOPMENT PACKAGE

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.qhafari.com

ARCHITECTURAL SHEET INDEX

SHEET DESCRIPTION G-0.01 COVER SHEET

SHT. INDEX, SYMBOL LIST, LEGENDS, ABBREVIATIONS, & OVERVIEW OF SCOPE PARTIAL BASEMENT AND FIRST FLOOR PLANS — DEMOLITION & NEW WORK

A-5.1 DETAILS

MECHANICAL SHEET INDEX

SHEET DESCRIPTION

MECHANICAL GENERAL INFORMATION & SYMBOLS MECHANICAL BASEMENT PLAN - HVAC DEMOLITION

MECHANICAL FIRST FLOOR PLAN - HVAC DEMOLITION

MECHANICAL SECOND FLOOR PLAN - HVAC DEMOLITION

MECHANICAL THIRD FLOOR PLAN - HVAC DEMOLITION

MECHANICAL FOURTH FLOOR PLAN - HVAC DEMOLITION

MECHANICAL BASEMENT FLOOR PLAN - HYDRONIC DEMOLITION MECHANICAL FIRST FLOOR PLAN - HYDRONIC DEMOLITION

MECHANICAL SECOND FLOOR PLAN - HYDRONIC DEMOLITION

MECHANICAL THIRD FLOOR PLAN - HYDRONIC DEMOLITION

MECHANICAL SECOND FLOOR PLAN - HVAC NEW

MECHANICAL FOURTH FLOOR PLAN - HYDRONIC DEMOLITION

MECHANICAL BASEMENT PLAN - HVAC NEW

MECHANICAL FIRST FLOOR PLAN - HVAC NEW

MECHANICAL THIRD FLOOR PLAN - HVAC NEW

MECHANICAL FOURTH FLOOR PLAN - HVAC NEW

MECHANICAL BASEMENT FLOOR PLAN - HYDRONIC NEW

M-4.1 MECHANICAL FIRST FLOOR PLAN - HYDRONIC NEW

M-4.2 MECHANICAL SECOND FLOOR PLAN - HYDRONIC NEW

M-4.3 MECHANICAL THIRD FLOOR PLAN - HYDRONIC NEW

M-4.4 MECHANICAL FOURTH FLOOR PLAN - HYDRONIC NEW

M-5.1 DETAILS

M-5.2 DETAILS

MECHANICAL SCHEDULES

M-7.1 MECHANICAL CONTROLS

M-7.2 MECHANICAL CONTROLS

M-7.3 MECHANICAL CONTROLS

M-7.4 MECHANICAL CONTROLS M-7.5 MECHANICAL CONTROLS

M-7.6 MECHANICAL CONTROLS

ELECTRICAL SHEET INDEX

SHEET DESCRIPTION

E-0.1 ELECTRICAL SYMBOL, ABBREVIATIONS, NOTES & SCHEDULES

E-1.0 ELECTRICAL BASEMENT FLOOR PLAN - DEMOLITION ELECTRICAL FIRST FLOOR PLAN - DEMOLITION

ELECTRICAL SECOND FLOOR PLAN - DEMOLITION

ELECTRICAL THIRD FLOOR PLAN - DEMOLITION

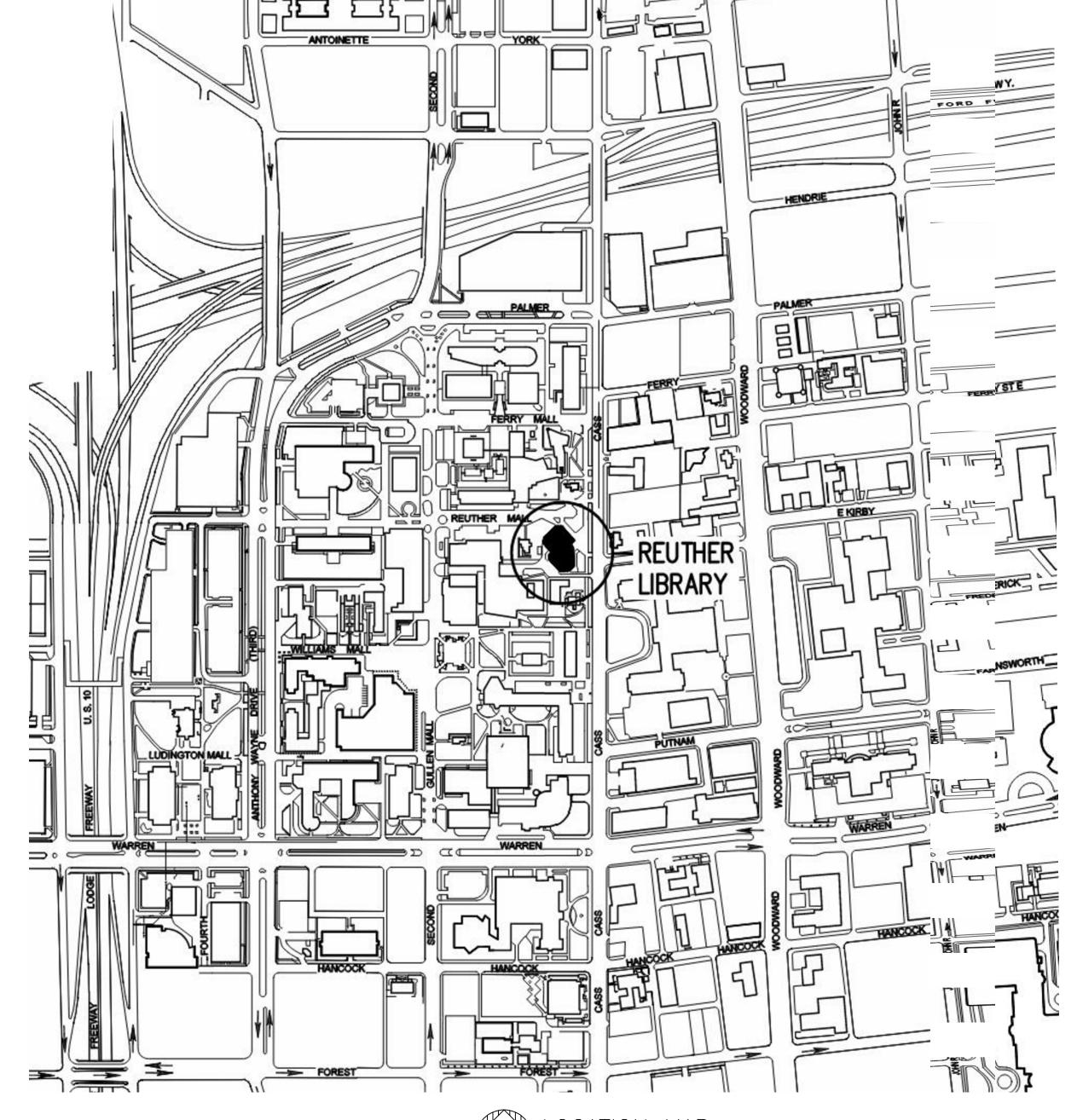
ELECTRICAL FOURTH FLOOR PLAN - DEMOLITION

ELECTRICAL BASEMENT FLOOR PLAN - NEW ELECTRICAL FIRST FLOOR PLAN - NEW

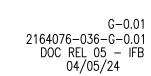
E-2.2 ELECTRICAL SECOND FLOOR PLAN - NEW

ELECTRICAL THIRD FLOOR PLAN - NEW

E-2.4 ELECTRICAL FOURTH FLOOR PLAN - NEW E-6.1 ELECTRICAL PANEL SCHEDULES







ACADFILE:

ISSUED FOR: DATE:

REFERENCE SYMBOLS

PLAN IDENTIFICATION

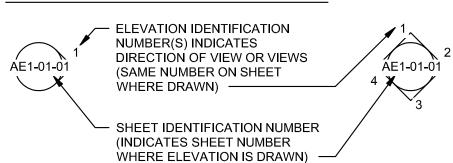


TITLE IDENTIFICATION

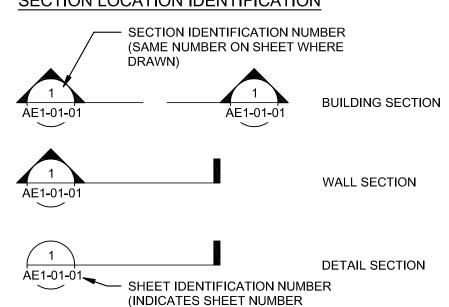
 SECTION IDENTIFICATION NUMBER (SAME NUMBER ON SHEET WHERE REFERENCED) **VIEW TITLE AE1-01-01** ALE: 1/8" = 1'-0" SHEET IDENTIFICATION NUMBER

(INDICATES SHEET NUMBER WHERE DETAIL IS TYPICALLY REFERENCED - NOT ALL INCLUSIVE)

ELEVATION LOCATION IDENTIFICATION



SECTION LOCATION IDENTIFICATION

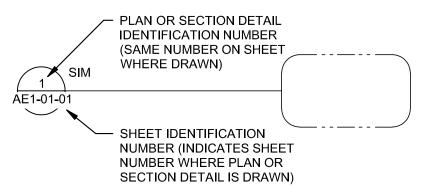


ELEVATION INDICATION - (FLOORS, ETC...)

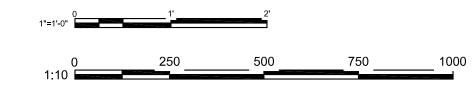
WHERE SECTION IS DRAWN)



DETAIL LOCATION IDENTIFICATION



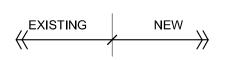
GRAPHIC SCALE



PARTITION TYPE INDICATION



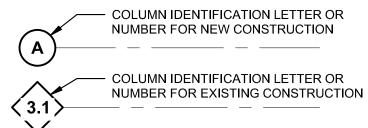
MATERIAL OR WORK DIVISION INDICATION



MATCH LINE INDICATION

MATCH LINE - SEE SHEET AE1-01-01

COLUMN INDICATION



ROOM NAME AND NUMBER INDICATION



DOOR NUMBER INDICATION

1000 (1000)

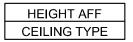
WINDOW NUMBER INDICATION



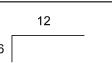
LOUVER NUMBER INDICATION

(101A) L101A

CEILING TAG



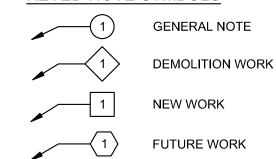
ROOF OR RAMP PITCH INDICATION



ROOF OR RAMP SLOPE INDICATION

SLOPE

KEYED NOTE SYMBOLS



LIFE SAFETY SYMBOLS

FIRE EXTINGUISHER TAG



OCCUPANCY TAG OPTION 1



OCCUPANCY TAG OPTION 2

<u>150 SF</u>=# P

OCCUPANCY DOOR EXIT



AREA NAME AND NUMBER INDICATION

AREA NAME 150 SF

FLOOR FINISH TAG



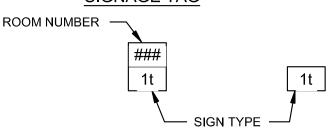
CASEWORK TAG

CW-01

PLUMBING ACCESSORY TAG

PA-01

SIGNAGE TAG



REVISION INDICATION



ARCHITECTURAL GENERAL NOTES

- 1. ALL WORK IS TO BE COMPLETED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS WHICH INCLUDES THE DRAWINGS AND SPECIFICATIONS. THE SPECIFICATIONS INCLUDE ADDITIONAL INFORMATION AND REQUIREMENTS WHICH AUGMENT THE DRAWINGS.
- 2. SUBMIT IN WRITING ALL DRAWING AND SPECIFICATION RELATED QUESTIONS, CLARIFICATIONS, SUBSTITUTIONS AND REQUEST FOR CHANGES TO THE ARCHITECT/ENGINEER AND OWNER, FOLLOW PROCEDURES OUTLINED WITHIN THE GENERAL CONDITIONS.
- 3. THE WORK INSTALLED AS PART OF THIS CONTRACT SHALL COMPLY WITH ALL APPLICABLE BUILDING CODES AND ORDINANCES.
- 4. DRAWING INFORMATION WITHIN EXISTING BUILDINGS MAY NOT BE COMPLETE DUE TO CONCEALED CONDITIONS AND LACK OF PRIOR BUILDING ACCESS. FIELD VERIFY ALL EXISTING CONDITIONS AND DIMENSIONS. WHERE EXISTING CONDITIONS DEVIATE AND WILL AFFECT THE PROPOSED WORK, SUBMIT FOR CLARIFICATION. EXISTING CONDITIONS SHOWN OUTSIDE OF THE CONTRACT
- AREA ARE RELATIVE AND FOR REFERENCE ONLY. 5. DRAWINGS ARE NOT TO SCALE, DO NOT SCALE THE DRAWINGS.
- 6. THE CONTRACT DOCUMENTS INCLUDE DRAWINGS AND SPECIFICATIONS FOR NUMEROUS DISCIPLINES; CIVIL, STRUCTURAL, ARCHITECTURAL, MECHANICAL, FIRE PROTECTION, ELECTRICAL, PLUMBING, VOICE/DATA AND OTHER SYSTEMS. REVIEW AND COORDINATE WITH ALL DRAWINGS AND SPECIFICATIONS.
- 7. SECTIONS AND DETAILS ARE INTENDED TO BE TYPICAL (TYP), UNLESS NOTED OTHERWISE. DEVIATIONS ARE NOTED AS SIMILAR (SIM).
- 8. REFER TO THE APPROVED SUBMITTAL DRAWINGS FOR EQUIPMENT, FURNITURE AND FURNISHING DIMENSIONS AND OTHER DETAILED INFORMATION.
- 9. DIMENSIONS FOR WALLS AND PARTITIONS FOR CRITICAL HOLD OR CLEAR DIMENSIONS ARE IDENTIFIED ON THE DRAWINGS. WALL THICKNESSES LISTED ARE ACTUAL AND DO NOT INCLUDE SURFACE FINISHES.
- 10. PROVIDE FIRE EXTINGUISHERS THROUGHOUT THE DEMOLITION AND CONSTRUCTION AREAS AS REQUIRED BY CODE FOR THE DURATION OF WORK. REMOVE AT THE END OF CONSTRUCTION AND REPLACE WITH NEW.

SELECTIVE DEMOLITION, CUTTING AND PATCHING

- 1. WHERE PORTIONS OF WALLS AND CEILINGS ARE REMOVED, RESTORE THE REMAINING PORTIONS TO MATCH THE ORIGINAL CONSTRUCTION INCLUDING SMOKE AND FIRE RATINGS.
- 2. WHERE PORTIONS OF MASONRY WALLS ARE REMOVED: RESTORE THE REMAINING PORTIONS USING NEW BRICK AND/OR CMU TO MATCH EXISTING, INCLUDING COLOR, SIZES AND COURSING. SUBMIT BRICK SAMPLES TO ARCHITECT/ENGINEER AND OWNER FOR APPROVAL. TOOTH NEW MASONRY INTO EXISTING, MATCH EXISTING BOND PATTERNS.
- 3. WHERE CEILINGS ARE INDICATED TO BE REMOVED, ALSO REMOVE FRAMING MEMBERS, HANGERS AND OTHER RELATED ITEMS. WHERE SELECTIVE DEMOLITION IS INDICATED CONTRACTOR TO PATCH AND REPAIR CEILING AS REQUIRED TO INSTALL NEW MECHANICAL EQUIPMENT.
- 4. WHERE FLOOR FINISHES ARE INDICATED TO BE REMOVED, INCLUDE REMOVAL OF ALL FINISH LAYERS TO EXPOSE THE UNDERLYING SUBSTRATE. FIELD VERIFY NUMBER OF LAYERS.
- 5. SPRAY APPLIED FIRE RESISTIVE MATERIALS WHICH ARE DAMAGED DURING DEMOLITION AND NEW CONSTRUCTION SHALL BE REPAIRED. FIELD VERIFY MATERIAL TYPE AND THICKNESS. MATCH EXISTING FIRE RATING.

FIRE AND SMOKE RATED ASSEMBLIES

- 1. FIRE AND SMOKE RATED ASSEMBLIES ARE TO BE CONTINUOUS FOR THE ENTIRE LENGTH AND HEIGHT OF THE ASSEMBLY. INSTALL IN FULL ACCORDANCE WITH ALL REQUIREMENTS PER THE LISTED TEST. REFER TO THE ARCHITECTURAL DRAWINGS AND SPECIFICATIONS FOR CONSTRUCTION DETAILS AND OTHER INFORMATION.
- 2. STRUCTURAL MEMBERS WHICH SUPPORT FIRE RATED WALLS REQUIRE THE SAME FIRE RATING AS THE WALL, UNLESS NOTED OTHERWISE.
- 3. RECESSED CABINETS, PANELS, AND BACK BOXES WHICH ARE LOCATED IN FIRE RATED ASSEMBLIES SHALL BE INSTALLED TO MAINTAIN THE FIRE RATING. INCLUDING INTUMESCENT FIRE STOP PADS FOR LARGE ITEMS.

PENETRATIONS

- 1. SEAL ALL UTILITY AND STRUCTURAL STEEL PENETRATIONS THROUGH FLOOR AND WALLS AS FOLLOWS:
- A. FLOORS WITH FIRE RATING: FIRESTOPPING SYSTEM, MATCH FIRE RATING OF
- B. FLOORS WITHOUT FIRE RATING: ONE HOUR FIRESTOPPING SYSTEM
- C. WALLS WITH FIRE RATING: FIRESTOPPING SYSTEM, MATCH FIRE RATING OF
- D. WALLS WITHOUT FIRE RATING: ACOUSTICAL SEALANT BOTH SIDES OF WALL; EXCEPT ONE HOUR FIRESTOPPING SYSTEM AT CABLE TRAYS, ELECTRICAL BUSWAYS AND CONDUIT SLEEVES WITH LOW VOLTAGE CABLES
- E. SMOKE BARRIERS: SMOKE AND FIRESTOPPING SYSTEM, TESTED AND APPROVED PER CODE REQUIREMENTS
- F. SOUND RATED ASSEMBLIES: ACOUSTICAL SEALANT BOTH SIDES OF WALL, REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS

APPLICABLE CODES:

MICHIGAN MECHANICAL CODE 2015 MICHIGAN PLUMBING CODE 2015 MICHIGAN ELECTRICAL CODE BASED ON 2017 NATIONAL ELECTRIC CODE (N.E.C.) WITH PART 8 STATE OF MICHIGAN AMENDMENTS. INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS - IEEE

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION AMERICAN NATIONAL STANDARDS INSTITUTE - ANSI MICHIGAN FIRE PREVENTION CODE MICHIGAN ENERGY CODE

N.F.P.A. (WITH MICHIGAN AMENDMENTS) 70- 2017 NATIONAL ELECTRICAL CODE (NEC) 72- NATIONAL FIRE AND SIGNALING CODE 101- LIFE SAFETY CODE 110- STANDARD FOR EMERGENCY AND

STANDBY POWER SYSTEMS

M.I.O.S.H.A. STANDARDS

BUILDING INFORMATION: USE GROUP TYPE OF CONSTRUCTION NUMBER OF STORIES TOTAL BUILDING AREA

BUILDING SCOPE:

FIRE ALARM SYSTEM

73,955 S.F.

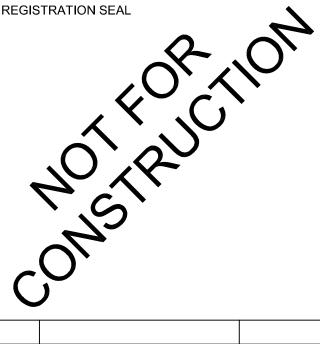
THE REUTHER LIBRARY IS A 73,955 SF, 4 STORY FACILITY. THE ORIGINAL BUILDING WAS BUILD IN 1974 AND A MAJOR ADDITION WAS ADDED IN 1990. THE FACILITY CONTAINS PAPER AND DIGITAL ARCHIVES. THE SCOPE OF WORK INCLUDES REMOVING AND INSTALLING TWO NEW AIR HANDLING UNITS IN THE BASEMENT AND REMOVING NINE EXISTING HUMIFICATION MANIFOLDER THAT ARE IN THE EXISTING SUPPLY DUCTWORK.

SUPPRESSED SPRINKLER SYSTEM (THROUGHOUT) YES

YES

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

17101 MICHIGAN AVENUE **DEARBORN, MI 48126-2736 USA** TEL +1.313.441.3000 www.ghafari.com



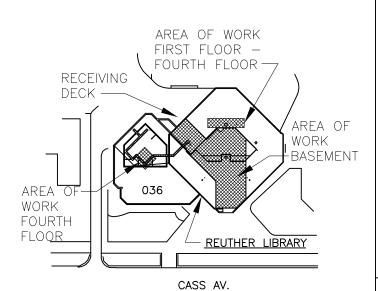
DOC REL 05 - IFB	04/05/
DOC REL 04-95% REVIEW	03/13/:
DOC REL 03 - 100% DD	02/08/
DOC REL 02 - 60% DD	08/10/:

DESIGNER	A. GAUTHIER
DRAWN	A. GAUTHIER
CHECKED	R. BARRY
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

MARK ISSUE

DATE

WSU REUTHER LIBRARY MEP



NO SCALE

5401 CASS AVENUE DETROIT, MICHIGAN

REUTHER LIBRARY

SYMBOL LIST, LEGENDS ABBREVIATIONS OVERVIEW OF SCOPE



These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO.

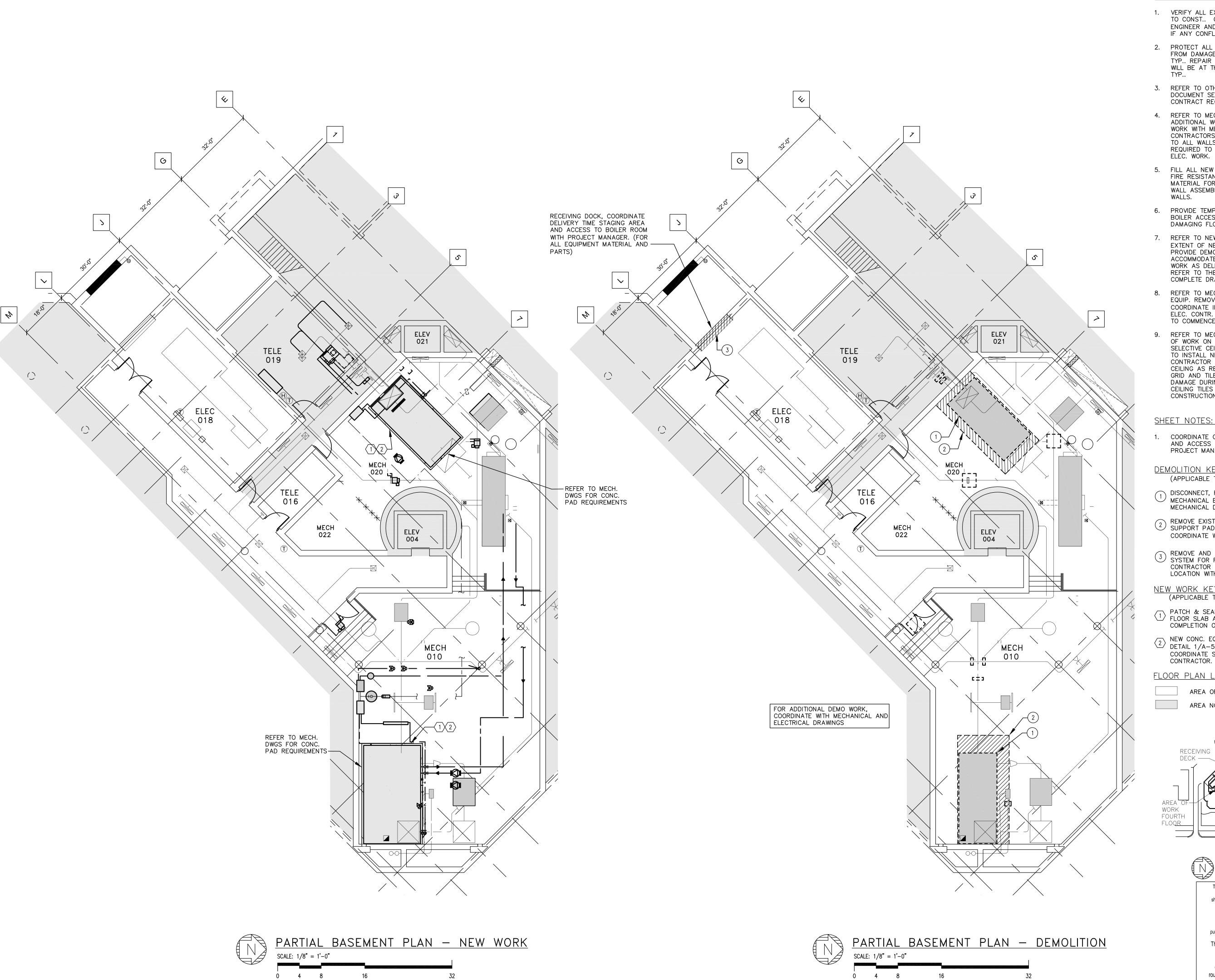
purposes of constructing, using and maintaining this project. These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: <u>036</u> A/E PROJECT NO.

2164076

A - 0.

2164076-036-A001



GENERAL NOTES:

- 1. VERIFY ALL EX. DIMENSIONS IN FIELD PRIOR TO CONST.. CONTRACTORS TO NOTIFY ENGINEER AND/OR ARCHITECT IMMEDIATELY IF ANY CONFLICTS ARISE, TYP..
- PROTECT ALL FINISH WORK TO REMAIN FROM DAMAGE DURING DEMO. AND CONST. TYP.. REPAIR OF DAMAGED EX. FINISHES WILL BE AT THE CONTRACTORS EXPENSE,
- REFER TO OTHER SHEETS OF THIS DOCUMENT SET & SPECS. FOR COMPLETE CONTRACT REQUIREMENTS, TYP...
- 4. REFER TO MECH. AND ELEC. DWGS. FOR ADDITIONAL WORK REQUIRED. COORDINATE WORK WITH MECH. AND ELEC. CONTRACTORS. PROVIDE PATCH AND REPAIR TO ALL WALLS, FLOORS, CEILINGS AS REQUIRED TO ACCOMMODATE MECH. AND ELEC. WORK.
- 5. FILL ALL NEW AND EX. PENETRATIONS WITH FIRE RESISTANT SEALANT AND FIRE SAFE MATERIAL FOR A COMPLETE FIRE RATED WALL ASSEMBLY TYP. AT ALL FIRE RATED
- PROVIDE TEMP. FLOOR PROTECTION ALONG BOILER ACCESS PATHWAY TO AVOID DAMAGING FLOOR, TYP..
- 7. REFER TO NEW WORK DWGS. FOR SIZES AND EXTENT OF NEW INSTALLATIONS/LAYOUTS. PROVIDE DEMO. AS REQUIRED TO ACCOMMODATE THE ENTIRE NEW SCOPE OF WORK AS DELINEATED IN THESE DWGS.. REFER TO THE COVER SHEET FOR THE COMPLETE DRAWING INDEXES.
- REFER TO MECH. & ELEC. DWGS. FOR EQUIP. REMOVAL & NEW LAYOUT. COORDINATE IN FIELD W/ MECH. AND/OR ELEC. CONTR. FOR FINAL LOCATIONS, PRIOR TO COMMENCEMENT OF WORK.
- REFER TO MECH & ELEC DWGS FOR SCOPE OF WORK ON FLOORS 1-4 - WHERE SELECTIVE CEILINGS DEMOLITION IS REQUIRED TO INSTALL NEW MECH & ELEC EQUIPMENT CONTRACTOR TO PATCH AND REPAIR CEILING AS REQUIRED. EXISTING CEILING GRID AND TILES TO BE PROTECTED FROM DAMAGE DURING ALL WORK. REINSTALL ALL CEILING TILES AND GRID AFTER CONSTRUCTION HAS BEEN COMPLETED.

COORDINATE CONTRACTOR STAGING AREA AND ACCESS TO BOILER ROOM WITH PROJECT MANAGER.

DEMOLITION KEYED NOTES: (APPLICABLE THIS SHEET ONLY)

- DISCONNECT, REMOVE AND DEMO EXISTING MECHANICAL EQUIPMENT, COORDINATE W/ MECHANICAL DRAWINGS...
- REMOVE EXISTING MECHANICAL CONCRETE 2 SUPPORT PADS AS INDICATED. COORDINATE W/ MECHANICAL DRAWINGS ..
- REMOVE AND SALVAGE EXISTING LOUVER SYSTEM FOR REINSTALLATION. CONTRACTOR TO COORDINATE STORAGE LOCATION WITH OWNER.

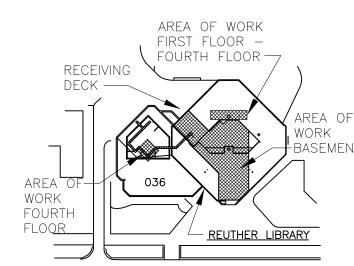
NEW WORK KEYED NOTES: (APPLICABLE THIS SHEET ONLY)

- PATCH & SEAL W/ CONCRETE SEALER COAT FLOOR SLAB AS INDICATED, AFTER COMPLETION OF REPAIR AND PATCHING WORK. PROJECT MGR
- 2 NEW CONC. EQUIPMENT PAD; REFER TO DETAIL 1/A-5.1 FOR MORE INFO. COORDINATE SIZE & LOCATION W/ MECH. CONTRACTOR.

FLOOR PLAN LEGEND

AREA OF WORK

AREA NOT IN CONTRACT (N.I.C.)



NO SCALE

CASS AV.

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO.

purposes of constructing, using and maintaining this project. These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

	DOC REL 05 - IFB	04/05/2
	DOC REL 04-95% REVIEW	03/13/2
	DOC REL 03 - 100% DD	02/08/2
	DOC REL 02 - 60% DD	08/10/2

	DESIGNER	A. GAUTHIER
	DRAWN	A. GAUTHIER
	CHECKED	R. BARRY
	DEPT MGR	V. LALONDE
1		

MARK ISSUE

DATE

WSU REUTHER LIBRARY MEP

K. RUPP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

PARTIAL BASEMENT PLANS DEMOLITION AND NEW WORK

WSU PROJECT #: <u>036-350464</u> WSU BLDG NAME: <u>REUTHER LIBRARY</u> WSU BLDG #: <u>036</u>

A/E PROJECT NO.

2164076

A - 1.1

2164076-036-A101



Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

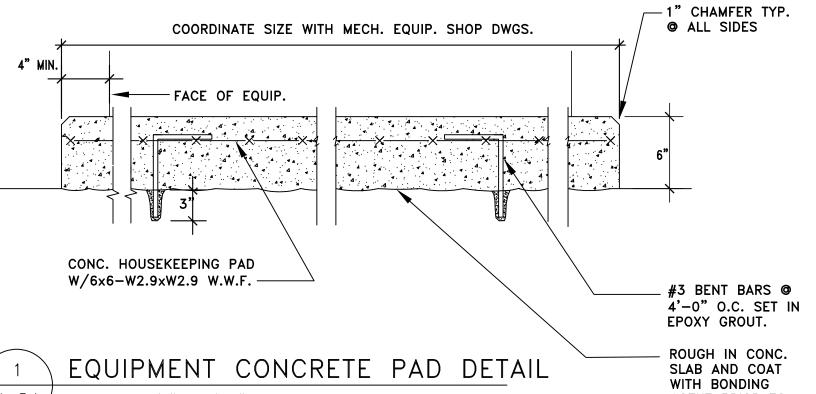
REGISTRATION SEAL

	DOC REL 05 - IFB	04/05/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23

MARK ISSUE DATE

DESIGNER	A. GAUTHIER
DRAWN	A. GAUTHIER
CHECKED	R. BARRY
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

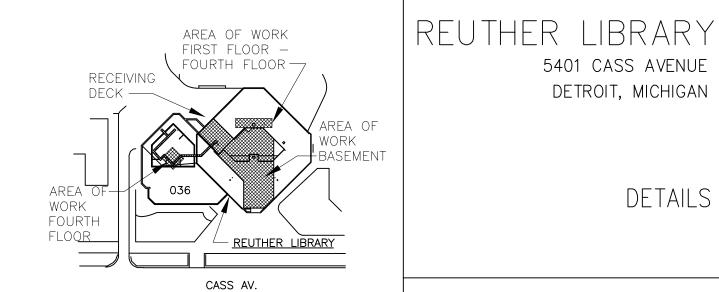


∖ A-5.1 / SCALE: 1 1/2" - 1'-0"

EQUIPMENT CONCRETE PAD DETAIL

NOTES:
1. COORDINATE LOCATION OF PADS WITH MECHANICAL CONTRACTOR. 2. APPLY EPOXY COATING TO ALL EXPOSED CONC. SURFACES OF CONCRETE PAD.

- 3. ALL CONCRETE SHALL BE NORMAL WEIGHT AND HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 4,000 PSI. 4. CONCRETE AGGREGATE SHALL CONFORM TO ASTM C33.
- 5. ALL CEMENTITIOUS MATERIALS SHALL MEET ASTM C150. 6. ALL REINFORCING STEEL SHALL CONFORM TO ASTM A615 GRADE 60. 7. MAXIMUM WATER/CEMENT RATIO SHALL BE 0.45.



DETAILS

5401 CASS AVENUE

DETROIT, MICHIGAN

AGENT PRIOR TO

INSTALLING NEW

CONC. EQUIP. PAD

NO SCALE

DSD grants to the owner a nonexclusive license to

purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional

plan and specification documents that are not

drawings. Final dimensions, equipment access,

coordination is the contractor's responsibility.

routing, miscellaneous fittings, final installation and

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: 036 These documents are instruments of service for use solely A/E PROJECT NO.

with respect to this project. DSD and DSD's consultants 2164076 shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights.

reproduce DSD's instruments of service solely for the SHEET NO. A - 5.1

intended to be used by the contractor as shop | DSD FILE NAME

2164076-036-A501

AEOLIANIIOAL ADDDENIIATIONIO

INSIDE DIAMETER

INTAKE HOOD

MAXIMUM

MINIMUM

NOISE CRITERIA

PRESSURE DROP

RETURN GRILLE RELATIVE HUMIDITY

RELIEF HOOD

SUPPLY FAN

SHEET METAL

SQUARE FEET

STRAINER

TYPICAL

UNIT HEATER

ZONE DAMPER

─ ITEM

- EXISTING

T&P

TYP

TOTAL COOLING (MBH)

TEMPERATURE CONTROL

VARIABLE AIR VOLUME BOX

VARIABLE FREQUENCY DRIVE

HVAC DUCTWORK & DIFFUSER TAGS

TAG | CFM NECK REMARKS

MISCELLANEOUS NOTES

TO BE REMOVED

DETAIL BUBBLE

XXXX PAGE LOCATION INDICATES

DIRECTION OF DETAIL SECTION

XX DETAIL NUMBER

INDICATES PLAN NOTE

INDICATES DEMOLITION NOTE

VARIABLE AIR VOLUME REHEAT BOX

FAN POWERED VARIABLE AIR VOLUME BOX

EXISTING ITEM (EXISTING SUPPLY AIR DUCT)

POINT OF CONNECTION BETWEEN NEW AND

POINT OF EXISTING TO REMAIN AND EXISTING

SUPPLY GRILLE SENSIBLE HEAT (MBH)

ROOF TOP UNIT

SUPPLY DIFFUSER

REQUIRED

RADIANT CEILING PANEL

NOT TO SCALE

PUMP

INVERT ELEVATION

LATENT HEAT (MBH)

LEAVING AIR TEMPERATURE

LEAVING WATER TEMPERATURE

BTU PER HOUR (THOUSAND)

MECHANICAL TRADES CONTRACTOR

PUMPED CONDENSATE RETURN

SATURATED SUCTION TEMPERATURE

TEMPERATURE & PRESSURE RELIEF VALVE

NATIONAL FIRE PROTECTION ASSOCIATION

V	MECHANICAL ABBREVIATIONS			
	AFF AC AHU AS	ABOVE FINISH FLOOR AIR COMPRESSOR AIR HANDLING UNIT AIR SEPARATOR	ID I.E. IAH	
	A.T.C. B	ARCHITECTURAL TRADES CONTRACTOR BOILER	LAT LH LWT	
	B.A.S. CAF CC CFM	BUILDING AUTOMATION SYSTEM COMBUSTION AIR FAN COOLING COIL CUBIC FEET PER MINUTE	MAX MBH MIN M.T.C.	
	CHLR CHP CONV CT CU	CHILLER CONSOLE HEAT PUMP CONVECTOR COOLING TOWER CONDENSING UNIT	N.C. NFPA NTS	
	CUH CV CWP	CABINET UNIT HEATER CONTROL VALVE CHILLED WATER PUMP	P PCR PD	
	DB DFU DIA DN DPR DS	DRY BULB DUCT FURNACE DIAMETER DOWN DAMPER DUCT SILENCER	RCP REQ'D RG RH RLH RTU	
	EAT EF EG E.T.C. EVR EWT EXH EXIST	ENTERING AIR TEMPERATURE EXHAUST FAN EXHAUST GRILLE ELECTRICAL TRADES CONTRACTOR EVAPORATOR ENTERING WATER TEMPERATURE EXHAUST EXISTING	SD SF SG SH SM SQ. FT. SST STR	
	FF FPM	FINISH FLOOR FEET PER MINUTE	TC TCL	

GENERAL HVAC NOTES

- 1. LOCATE EXHAUST OUTLETS OF VENTILATION SYSTEMS, COMBUSTION EQUIPMENT STACKS, & PLUMBING VENTS AT LEAST 10 FEET FROM OUTDOOR AIR INTAKES.
- 2. INSTALL ALL EQUIPMENT, MATERIALS, AND ACCESSORIES PER MANUFACTURERS WRITTEN INSTRUCTIONS.
- 3. ALL EXISTING SYSTEMS (INCLUDING EXHAUST FANS; AIR HANDLING UNITS; PUMPS) THAT SERVES AREAS BEING RENOVATED SHALL BE REBALANCED AS REQUIRED.
- 4. NOTIFY OWNER OF ANY PIPING OR DUCTWORK DEMOLITION THAT MAY AFFECT NORMAL OPERATION OF OTHER AREAS.
- 5. FIELD VERIFY LOCATIONS OF EXISTING PIPING THAT MAY CONFLICT WITH NEW CONSTRUCTION AND RELOCATE AS NEEDED.
- 6. PROVIDE BALANCE DAMPERS FOR EACH DIFFUSER/GRILLE AND BRANCH DUCT.
- 7. PROVIDE FLEXIBLE DUCT IN ACCESSIBLE CEILINGS. 6 FT MAX LENGTH. KEEP BENDS TO A MINIMUM.
- 8. FIRE DAMPERS & COMBINATION FIRE/SMOKE DAMPERS SHALL MATCH RATING OF WALL. UNLESS NOTED OTHERWISE.
- 9. INTERLOCK FIRE/SMOKE DAMPERS BY ELECTRICAL TRADES. PROVE OPEN BEFORE AIR HANDLING UNITS FAN(S) START.
- 10. SMOKE DETECTORS SHALL BE FURNISHED AND CONNECTED BY ELECTRICAL CONTRACTOR, INSTALLATION BY MECHANICAL CONTRACTOR.
- 11. ALL REHEAT COIL HS&R RUNOUT PIPES SHALL BE 3/4" UNLESS OTHERWISE NOTED.
- 12. PROVIDE ACCESS PANELS ON EACH SIDE OF REHEAT COILS.
- 13. PROVIDE 5 FT MIN BEFORE ANY DUCT TAKEOFF FOR DUCTWORK DOWNSTREAM OF VAV BOXES.
- 14. PROVIDE 1 1/2 DUCT DIAMETERS MIN. DUCT LENGTH OF HIGH PRESSURE BRANCH DUCTWORK ON THE UPSTREAM SIDE OF VAV BOXES.
- 15. COORDINATE LOUVER SIZES WITH ARCHITECTURAL TRADES PRIOR TO CONSTRUCTION.
- 16. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER DISCIPLINES PRIOR TO CONSTRUCTION TO AVOID CONFLICTS.
- 17. PROVIDE MANUAL AIR VENTS WITH 3/4" HOSE CONNECTION AT ALL HIGH POINTS.
- 18. OFFSET PIPING TO ACCOMMODATE LARGE DUCTWORK.

- 19. THE CONTRACTOR SHALL FIELD VERIFY THE SIZES, LOCATION, ELEVATIONS, AND DETAILS OF ALL EXISTING CONDITIONS THAT MAY AFFECT THE WORK.
- 20. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE INTEGRITY OF ALL EQUIPMENT AND MATERIALS IN A "NEW" CONDITION DURING CONSTRUCTION.
- 21. ALL WORK SHALL BE PERFORMED BY LICENSED CONTRACTORS AND SUBCONTRACTORS AS REQUIRED BY LAW.
- 22. ALL WORK SHALL CONFORM TO MICHIGAN MECHANICAL CODE, LATEST APPLICABLE EDITION.
- 23. CONTRACTOR SHALL USE LOW PRESSURE LOSS DUCT FITTINGS IN ACCORDANCE WITH SMACNA. (WYES, RADIUSED OR VANED TEES, ETC.) DUCTWORK SHALL BE GALVANIZED SHEET METAL, MIN. 26 GA.
- 24. ALL DUCT DIMENSIONS SHOWN ARE INSIDE CLEAR DIMENSION. INCREASE DUCT SIZE FOR LINING.
- 25. CONSTRUCT ALL TRANSFER DUCTS W/ 1-INCH THICK LINING.
- ALL EXPOSED ROUND DUCTWORK SHALL BE SPIRAL.
- 27. LINE 10'-0" OF SUPPLY DUCTWORK AFTER EACH VAV BOX.
- 28. ALL EXTERNALLY ISOLATED HVAC EQUIPMENT SHALL HAVE FLEXIBLE DUCT CONNECTORS.
- 29. ALL CONDENSATE DRAIN PIPING SET @ MIN. 1% SLOPE.
- 30. ALL CONDENSATE DRAIN PIPING TO TERMINATE TO DRAIN VIA AIR GAP.
- 31. IF THERE IS CONFLICTING INFORMATION IN THE PLANS OR SPECIFICATIONS THE MORE STRINGENT AND GREATER COST ITEM SHALL BE USED.
- 32. DRAWINGS INDICATE REQUIRED SIZES AND POINTS OF TERMINATION OF PIPES AND DUCTS AND SUGGESTED ROUTES. IT IS NOT INTENTION OF DRAWINGS TO INDICATE ALL NECESSARY OFFSETS. INSTALL WORK IN MANNER TO CONFORM TO STRUCTURE, AVOID OBSTRUCTIONS, PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR. DO NOT SCALE FROM DRAWINGS.
- 33. ABUSE OF THE REQUEST FOR INFORMATION (RFI) PROCESS WILL NOT BE TOLERATED. RFI'S REQUESTING INFORMATION ALREADY CONTAINED IN THE DESIGN DOCUMENTS, INVOLVING MEANS AND METHODS OF CONSTRUCTION, COORDINATION OF WORK BETWEEN TRADES, OR ITEMS NOT PREVIOUSLY AND THOROUGHLY INVESTIGATED AND RESEARCHED BY THE GENERAL CONTRACTOR WILL BE RETURNED UNANSWERED TO THE GENERAL CONTRACTOR. ALLOW TWO WEEKS FOR RFI RESPONSES FROM THE DESIGN TEAM.

MECHANICAL SYMBOLS LEGEND

HEATING, VENTILATION, & AIR CONDITIONING

FINNED TUBE RADIATION

GAS FIRED RADIANT HEATER

FURNACE

GRILLE

HUMIDIFIER

HEAD (FT)

HEATING

HVAC DUCTWORK SYMBOLS

HEATING COIL

HORSE POWER

HORIZONTAL HEAT PUMP

HEATING WATER PUMP

HEAT EXCHANGER

FTR

HVAC

HWP

SUPPLY AIR DUCT RISER RETURN AIR DUCT RISER OUTSIDE AIR DUCT RISER (AS NOTED) EXHAUST AIR DUCT INSULATED DUCTWORK (AS NOTED) SUPPLY AIR DIFFUSER (SQUARE) SUPPLY AIR DIFFUSER (INLINE) TURNING VANES SURFACE MTD. GRILLE SUPPLY AIR DIFFUSER (ROUND) 90° TEE W/45° APPROACH CONICAL TAKE-OFF CONICAL TAKE-OFF W/ DAMPER BALANCE DAMPER RETURN AIR DUCT BOOT ECCENTRIC REDUCER CONCENTRIC REDUCER VERTICAL FIRE DAMPER EXISTING VERTICAL FIRE DAMPER HORIZONTAL FIRE DAMPER

EXISTING HORIZONTAL FIRE DAMPER

DUCT SMOKE DETECTOR, INSTALLED BY M.T.C.,

VERTICAL SMOKE DAMPER

HORIZONTAL SMOKE DAMPER VERTICAL FIRE / SMOKE DAMPER HORIZONTAL FIRE / SMOKE DAMPER

PROVIDED & WIRED BY E.T.C.

ROOF MOUNTED EXHAUST FAN

CEILING EXHAUST FAN

UNIT HEATER

DEMOLITION

_ _ _ _ _ _ _

HVAC PIPING

CVVO	CHILLED WATER SOLT ET
——CWR——	CHILLED WATER RETURN
CD	CONDENSATE DRAIN
—— CTS ——	CONDENSER WATER SUPPLY
—— CTR ——	CONDENSER WATER RETURN
cs	COOLING TOWER WATER SUPPLY
——CR——	COOLING TOWER WATER RETURN
DX	DIRECT EXPANSION
— HPS —	HEAT PUMP WATER SUPPLY
— HPR —	HEAT PUMP WATER RETURN
——HS ——	HEATING WATER SUPPLY
——HR ——	HEATING WATER RETURN
s	SUCTION (REFRIGERANT)
L	LIQUID (REFRIGERANT)
—— DXS ——	SUCTION (DIRECT EXPANSION)
—— DXL ——	LIQUID (DIRECT EXPANSION)
— LPS —	LOW PRESSURE STEAM (0-20 LBS.)
—MPS —	MEDIUM PRESSURE STEAM (21-75 LBS.)
—— HPS ——	HIGH PRESSURE STEAM (76 LBS. & ABV.)
sc	STEAM CONDENSATE (GRAVITY)
SCP	PUMPED STEAM CONDENSATE

- - SC (BF) - - STEAM CONDENSATE BOILER FEED

—— CW——— COLD WATER

HVAC PIPING VALVES

——⋈——	GATE VALVE		FLOW DIRECTION
—⋈—	GAS COCK		PIPING DROP
_₹	CHECK VALVE	+ O	PIPING RISE
	BALANCE COCK		INLINE PIPING DROP
⊗⊦	CIRCUIT SETTER		INLINE PIPING RISE
——ऄ——	TWO-WAY CONTROL VALVE	<u>,†,</u>	PIPING TEE
	THREE-WAY CONTROL VALVE	<u> </u>	PIPING ELBOW
W	GLOBE VALVE	Щ	THERMOMETER
	BALL VALVE	$-\!$	PUMP
₩	SOLENOID VALVE	─ ─	UNION
——\⊗F	EXPANSION VALVE WITH THERMOSTATIC BULB	`	PIPE ANCHOR
	PLUG VALVE		PIPE GUIDE
—-ю́——	BUTTERFLY VALVE		BACK FLOW PREVE
— \$	RELIEF VALVE	——	PIPE CAP
~ ~ ~	HOSE & DRAIN END VALVE	─	PIPE BREAK
<u>₽</u>	PRESSURE RELIEF VALVE	T	THERMOMETER WE
&	PRESSURE REDUCING VALVE		EXPANSION LOOP
—N—	TRIPLE DUTY VALVE		EXPANSION COMPE
	GAS PRESSURE REGULATOR	——FT——	FLOAT & THERMOS
	STRAINER (BLOW-OFF)	BT	INVERTED BUCKET
	OTTO MINERY (DEOVE-OFF)		

HVAC DUCTWORK

—— SA ——	SUPPLY AIR DUCT
—— X-SA ——	EXIST SUPPLY AIR DUCT
——RA ——	RETURN AIR DUCT
X-RA	EXIST RETURN AIR DUCT
——OA ——	OUTSIDE AIR DUCT
—— X - OA ——	EXIST OUTSIDE AIR DUCT
—— EA ——	EXHAUST AIR DUCT
—— X - ЕА ——	EXIST EXHAUST AIR DUCT

	PIPING DROP
——ю	PIPING RISE
	INLINE PIPING DROP
	INLINE PIPING RISE
, † ,	PIPING TEE
<u>t,</u>	PIPING ELBOW
Щ	THERMOMETER
	PUMP
—— ——	UNION
X	PIPE ANCHOR
	PIPE GUIDE
─	BACK FLOW PREVENTER
	PIPE CAP
	PIPE BREAK
T	THERMOMETER WELL
	EXPANSION LOOP
	EXPANSION COMPENSATOR
——_FT——	FLOAT & THERMOSTATIC STEAM TRAP
——BT——	INVERTED BUCKET STEAM TRAP

HVAC PIPING SYMBOLS

TEMPERATURE CONTROL SYMBOLS

/ \/ \ DAMPER BLADES

т	\bigcirc	THERMOSTAT
R DUCT	\bigcirc P	PROGRAMMABLE THERMOSTAT
т	\bigcirc N	THERMOSTAT (W/ NIGHT SETBACK)
IR DUCT	S	ROOM SENSOR
СТ	\bigoplus	HUMIDISTAT
AIR DUCT	P	PRESSURE GAUGE
CT	<u>M</u> -	DAMPER (ELECTRIC OPERATION)
AIR DUCT	M-	DAMPER (PNEUMATIC OPERATION)

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE **DEARBORN, MI 48126-2736 USA** TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

	DOC REL 05 - IFB	04/08/2
	DOC REL 04-95% REVIEW	03/13/2
	DOC REL 03 - 100% DD	02/08/2
·	DOC REL 02 - 60% DD	08/10/2

	DESIGNER	E. ERNVALL
	DRAWN	E. ERNVALL
	CHECKED	C. TRIERWEILER
	DEPT MGR	V. LALONDE
	PROJECT MGR	K. RUPP
1		

DATE

MARK ISSUE

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANICAL GENERAL INFORMATION & SYMBOLS

WSU PROJECT #: 036-350464 WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: <u>036</u>

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

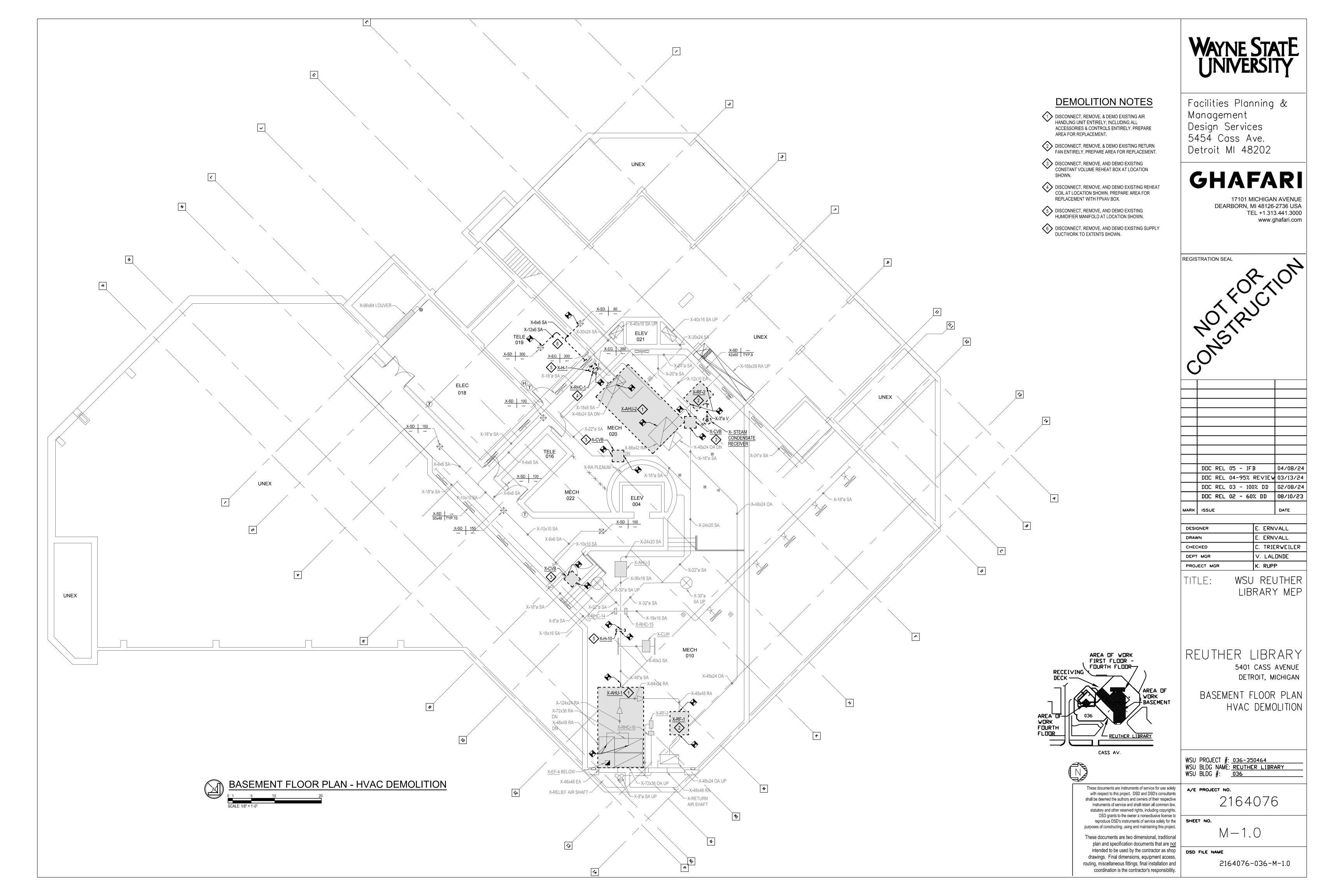
These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

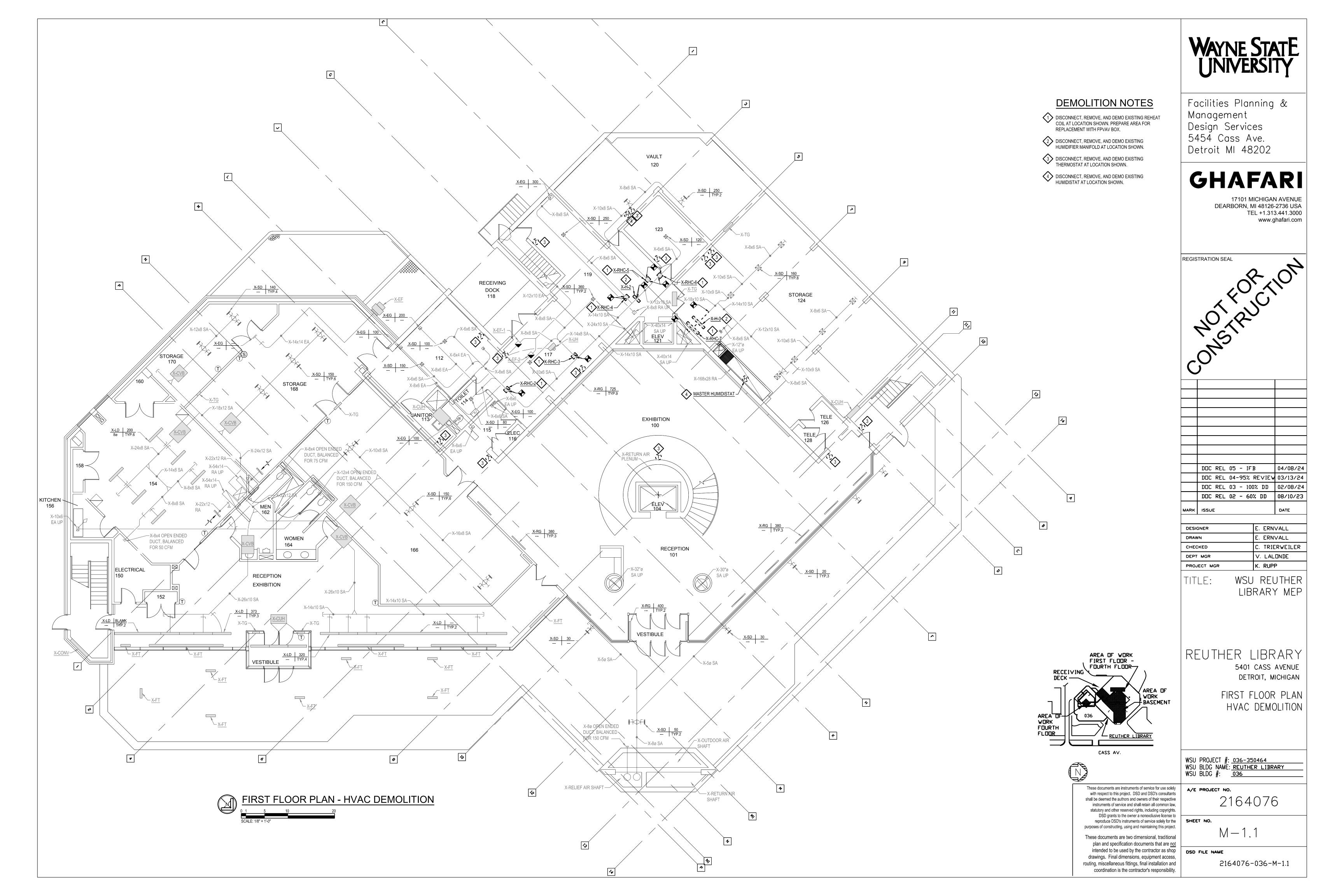
coordination is the contractor's responsibility.

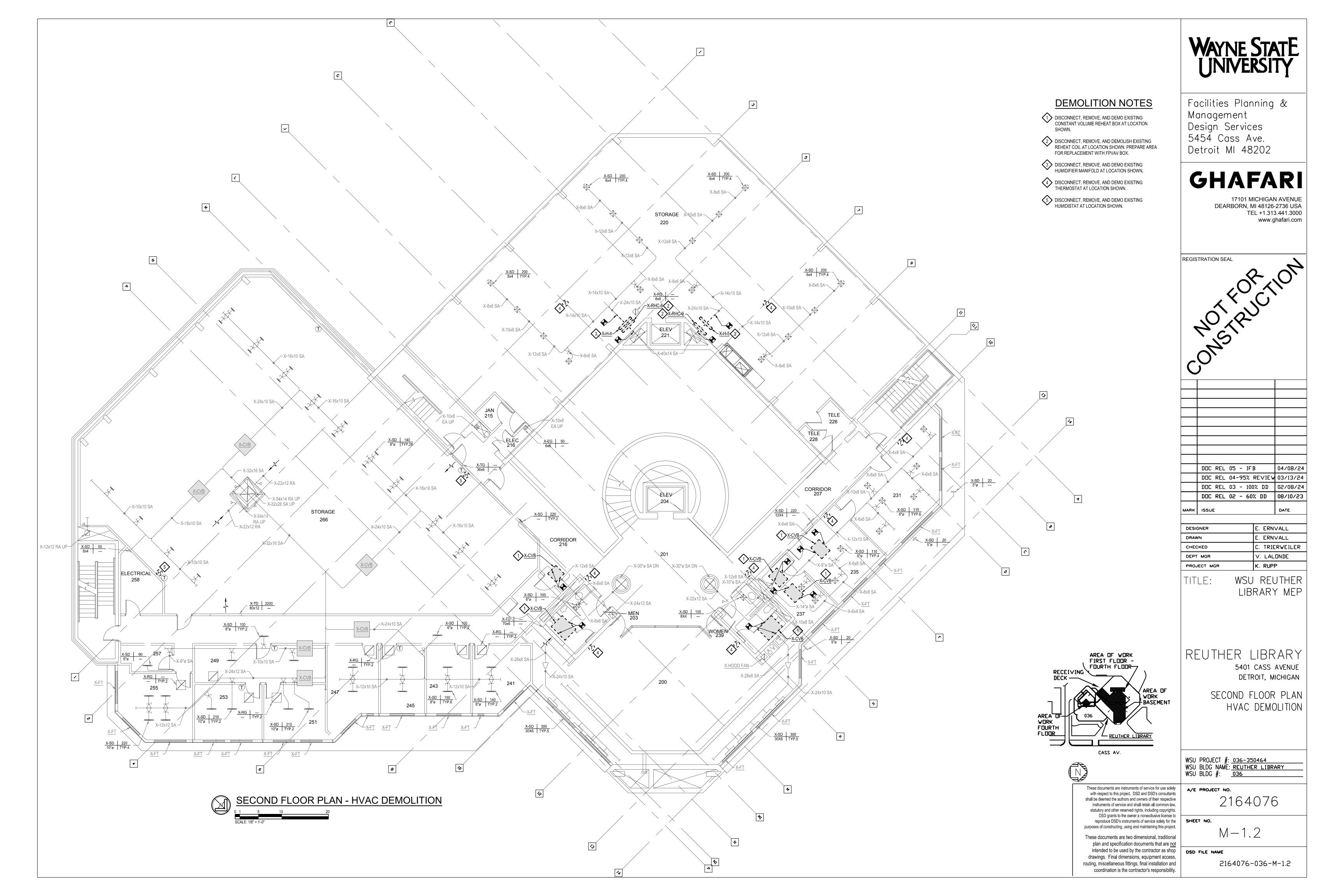
A/E PROJECT NO. 2164076

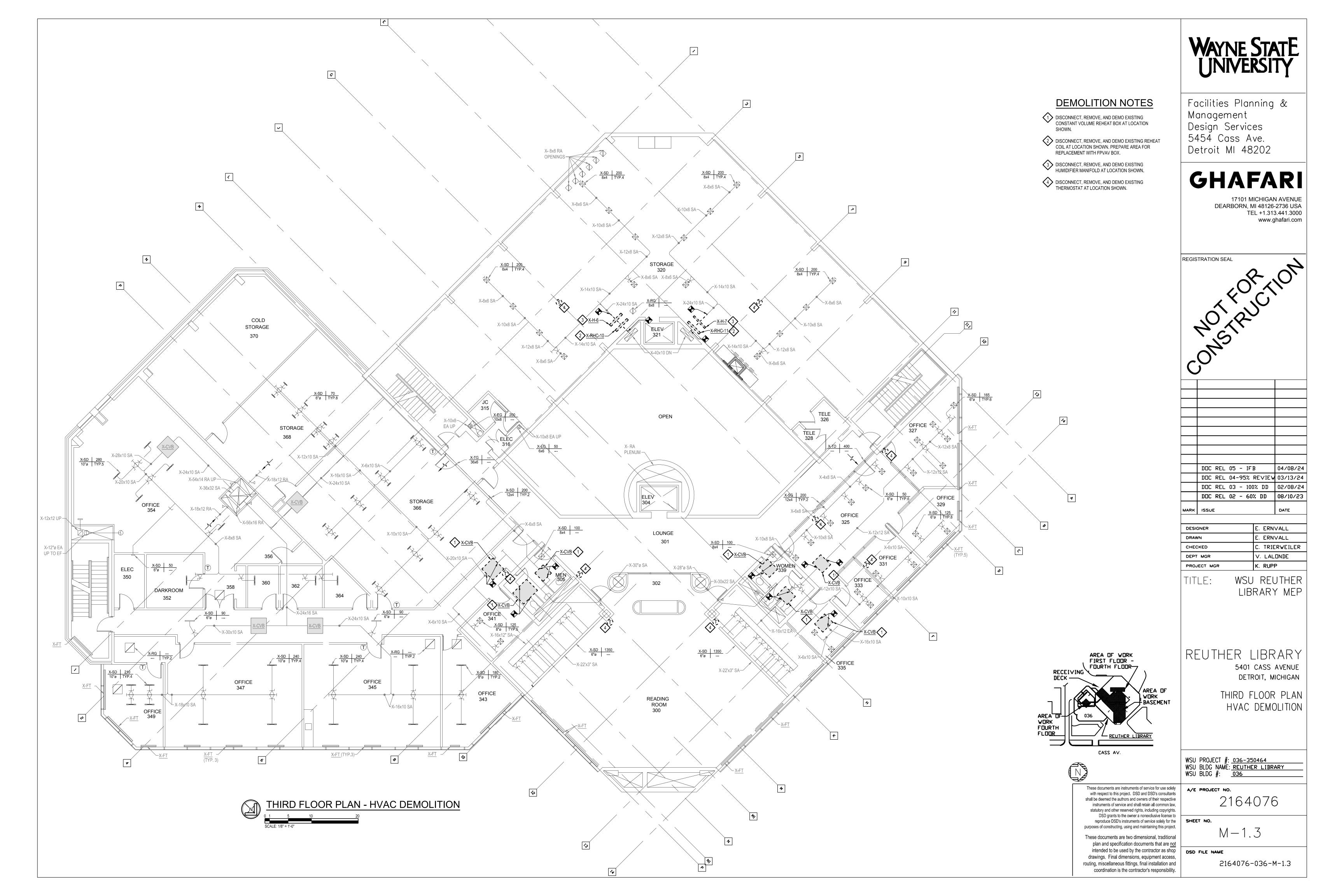
M - 0.1

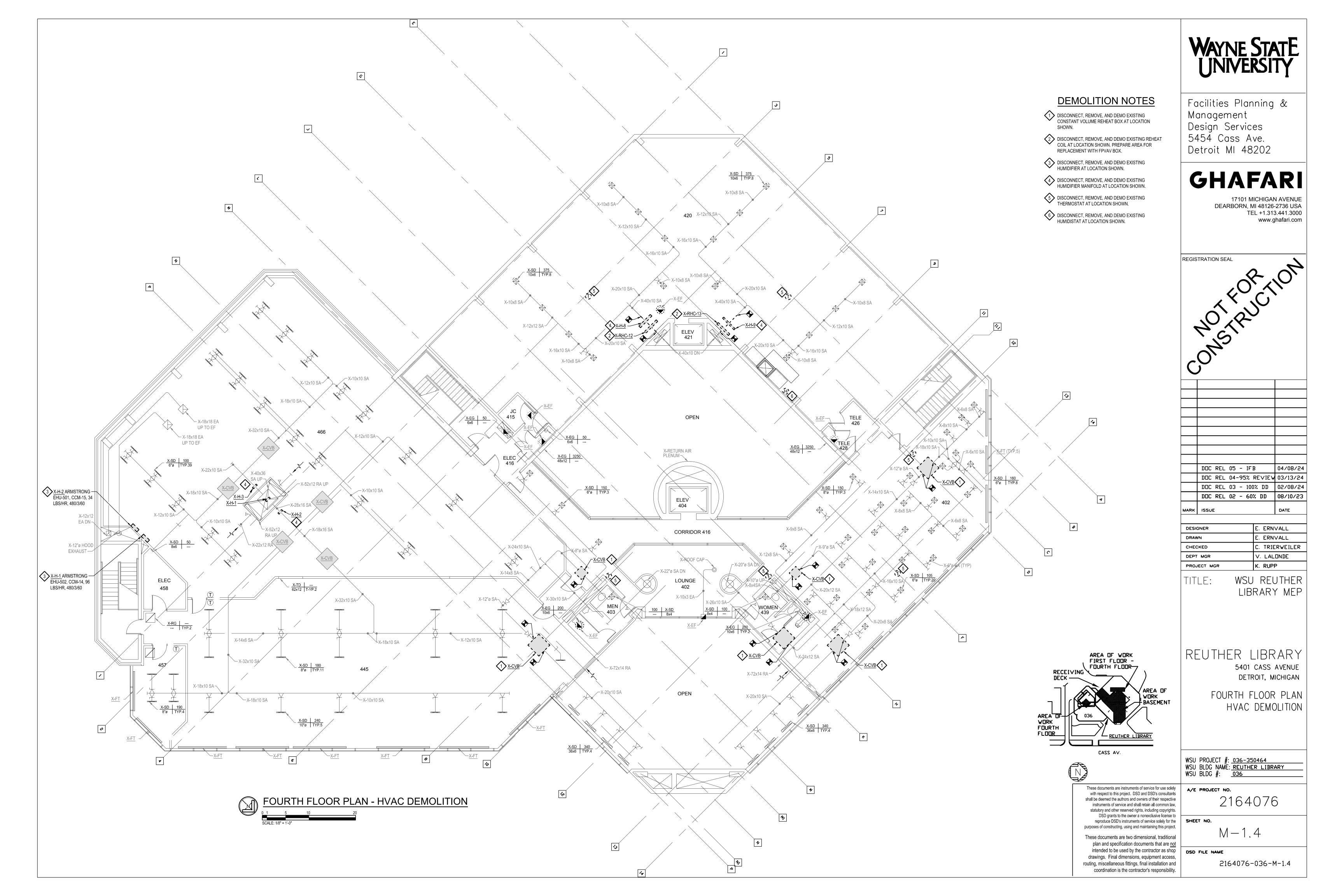
2164076-036-M-0.1

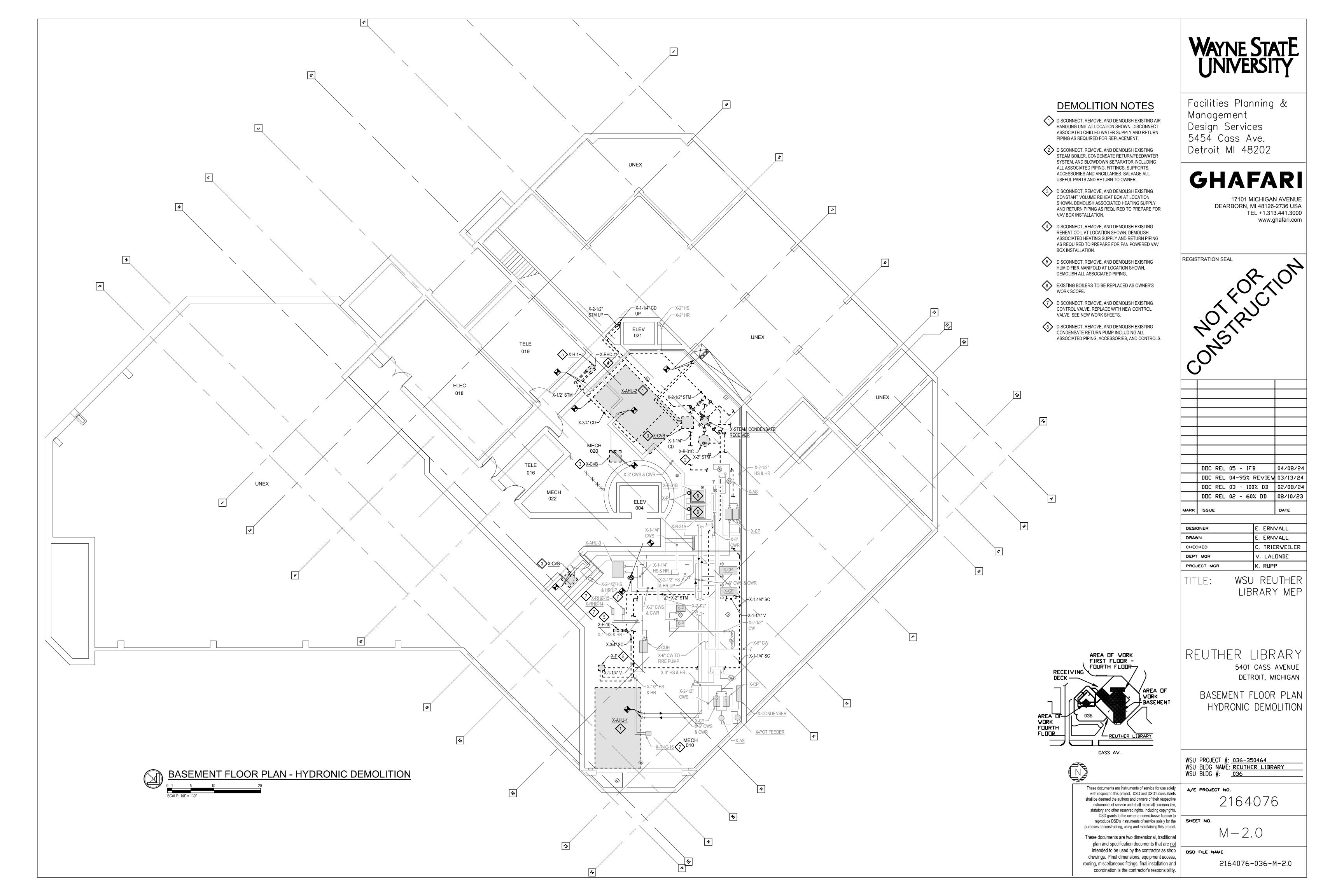


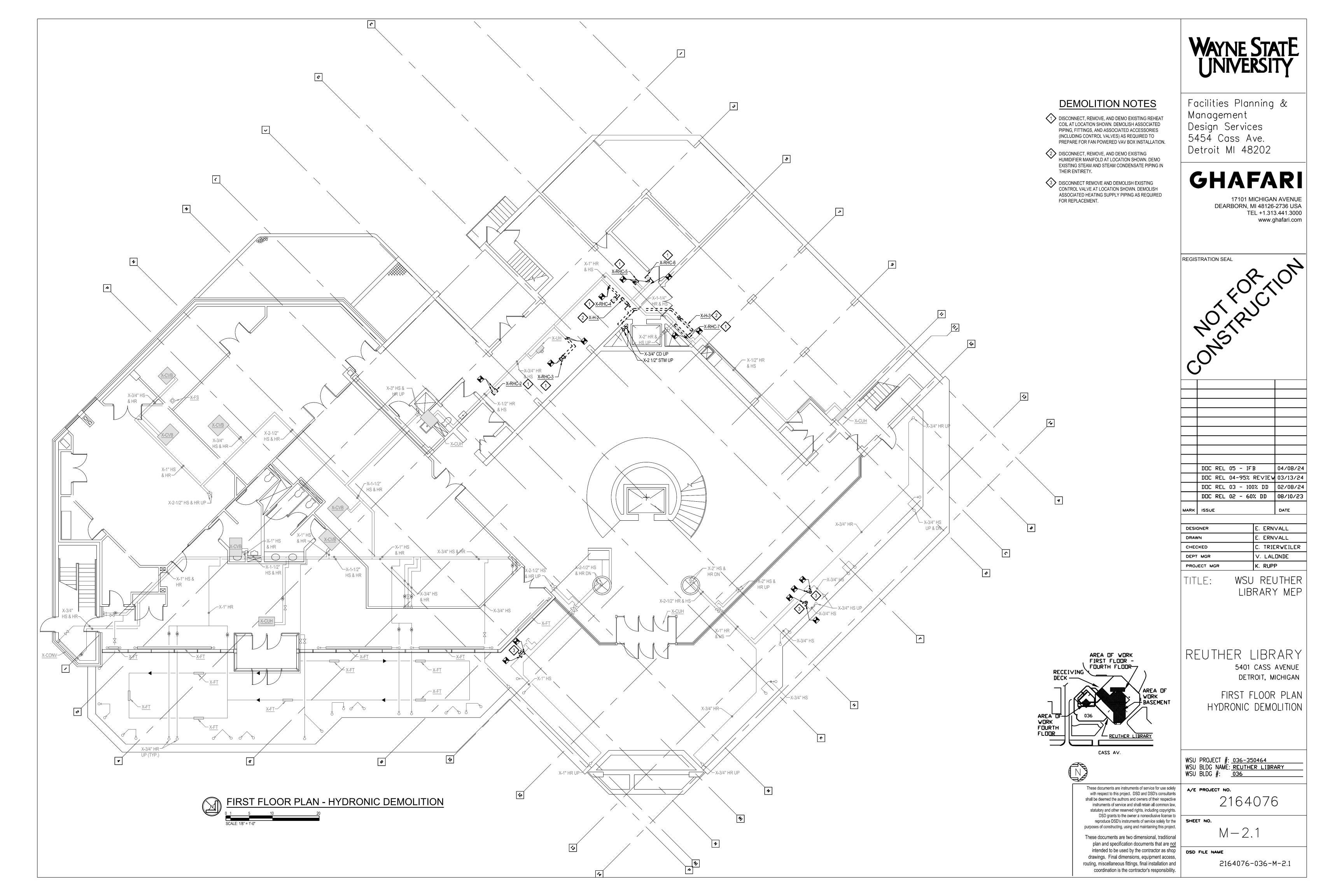


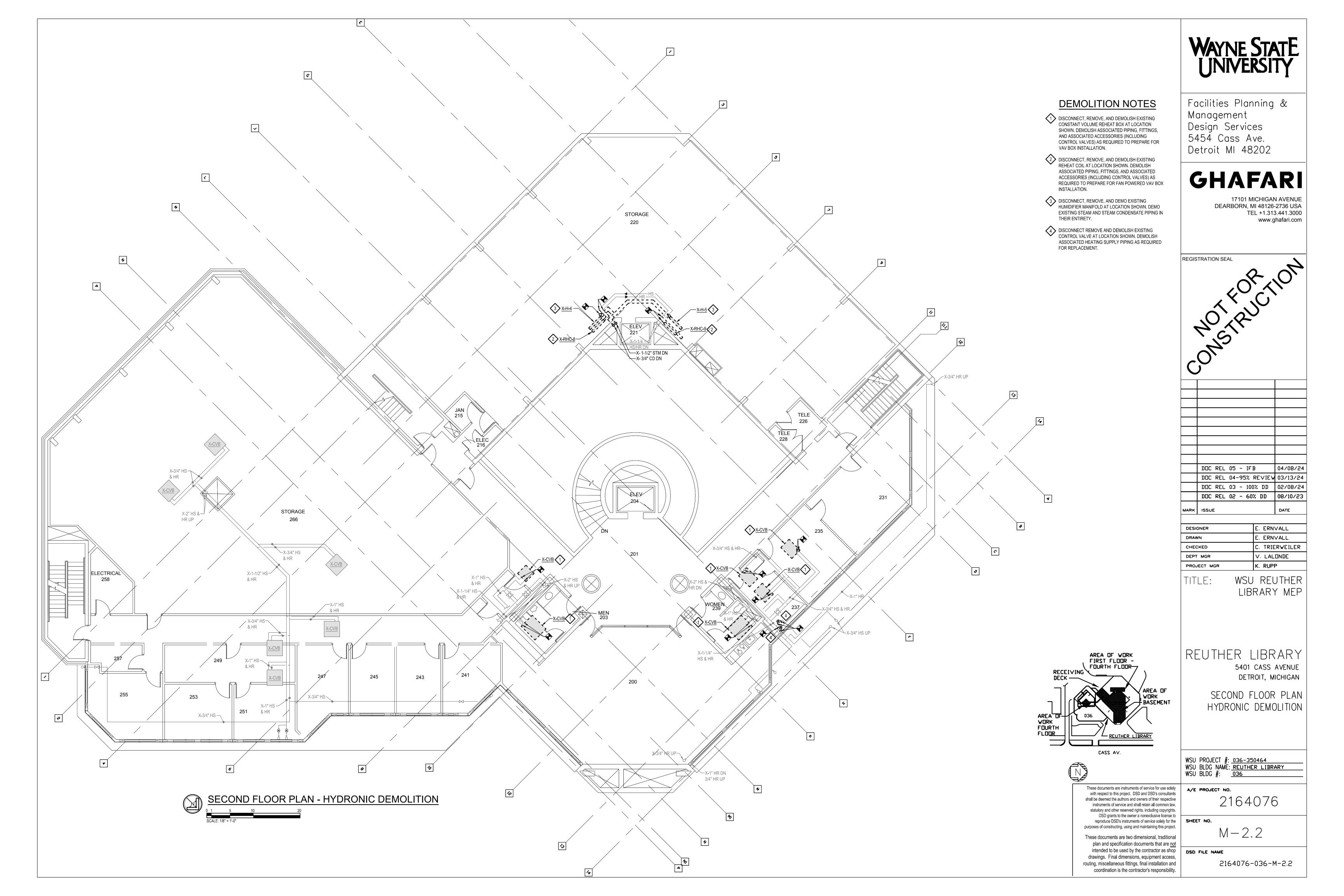


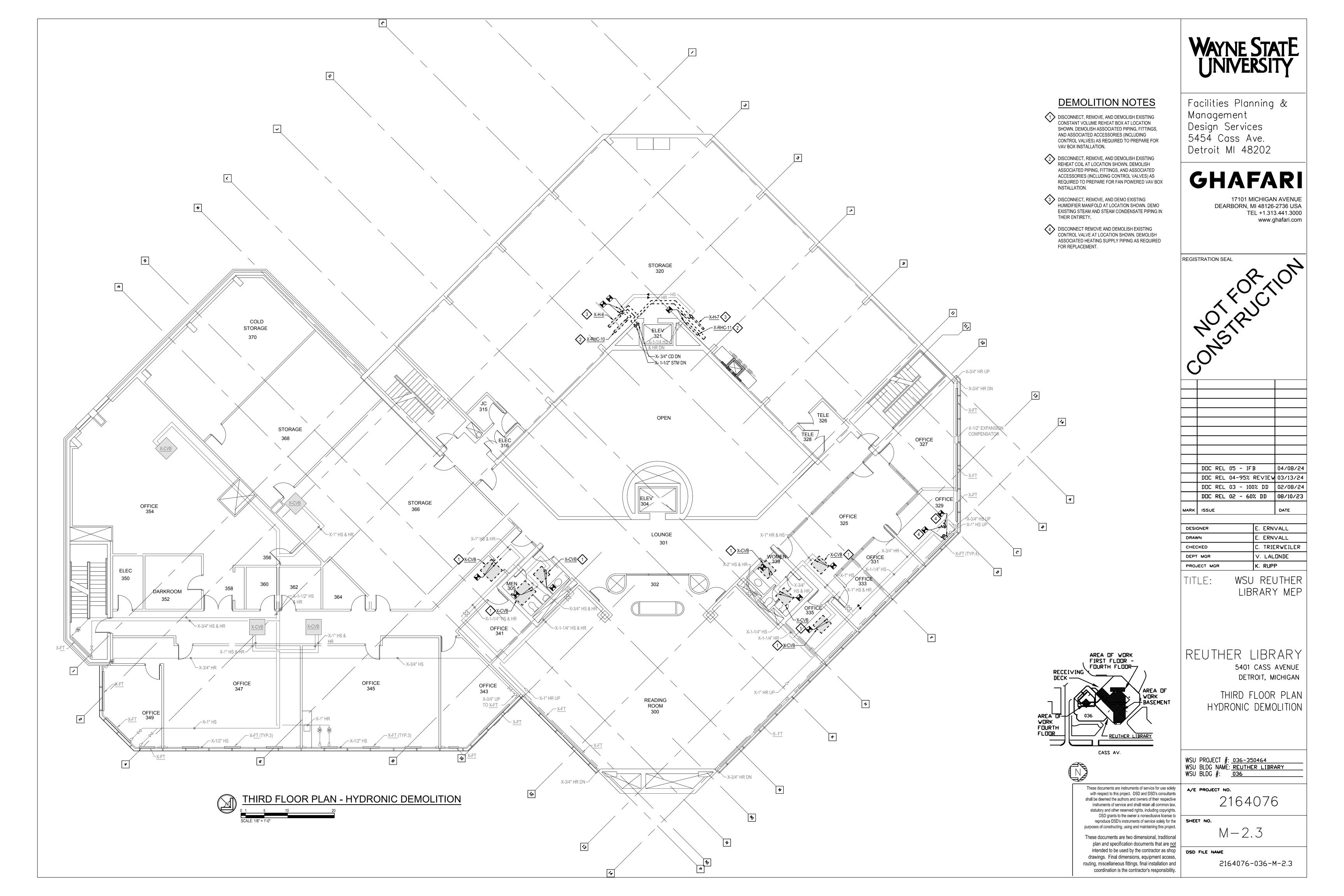


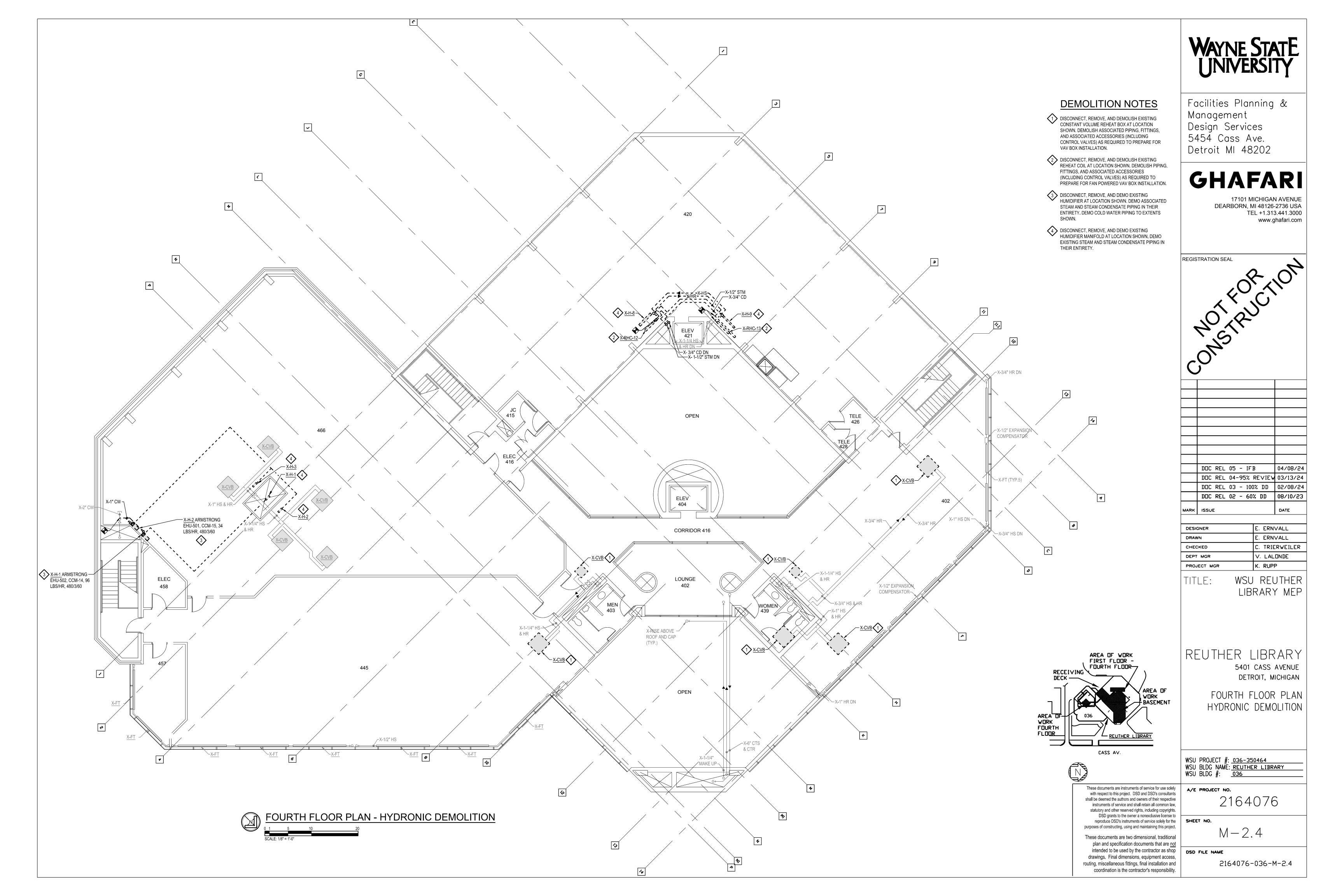


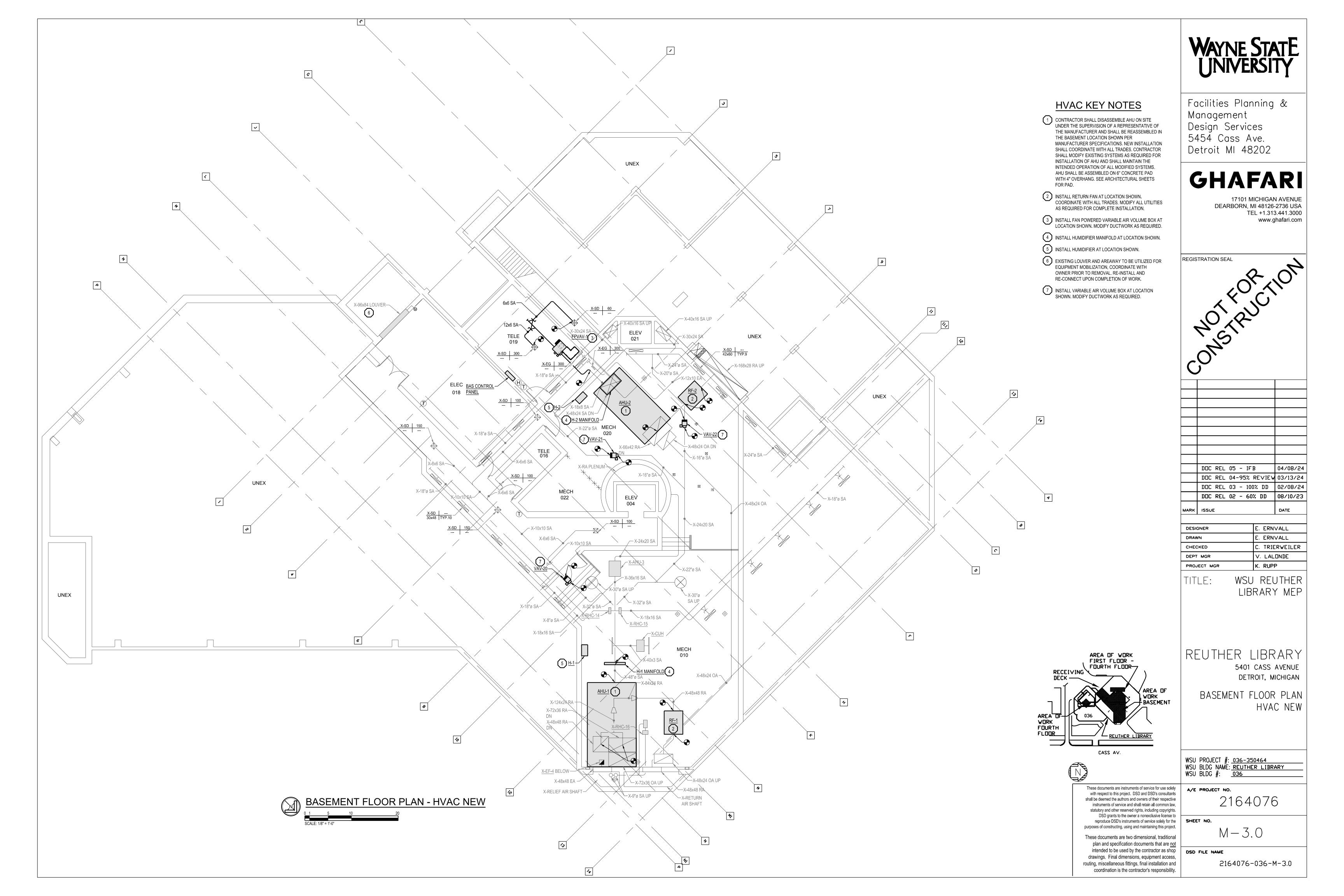


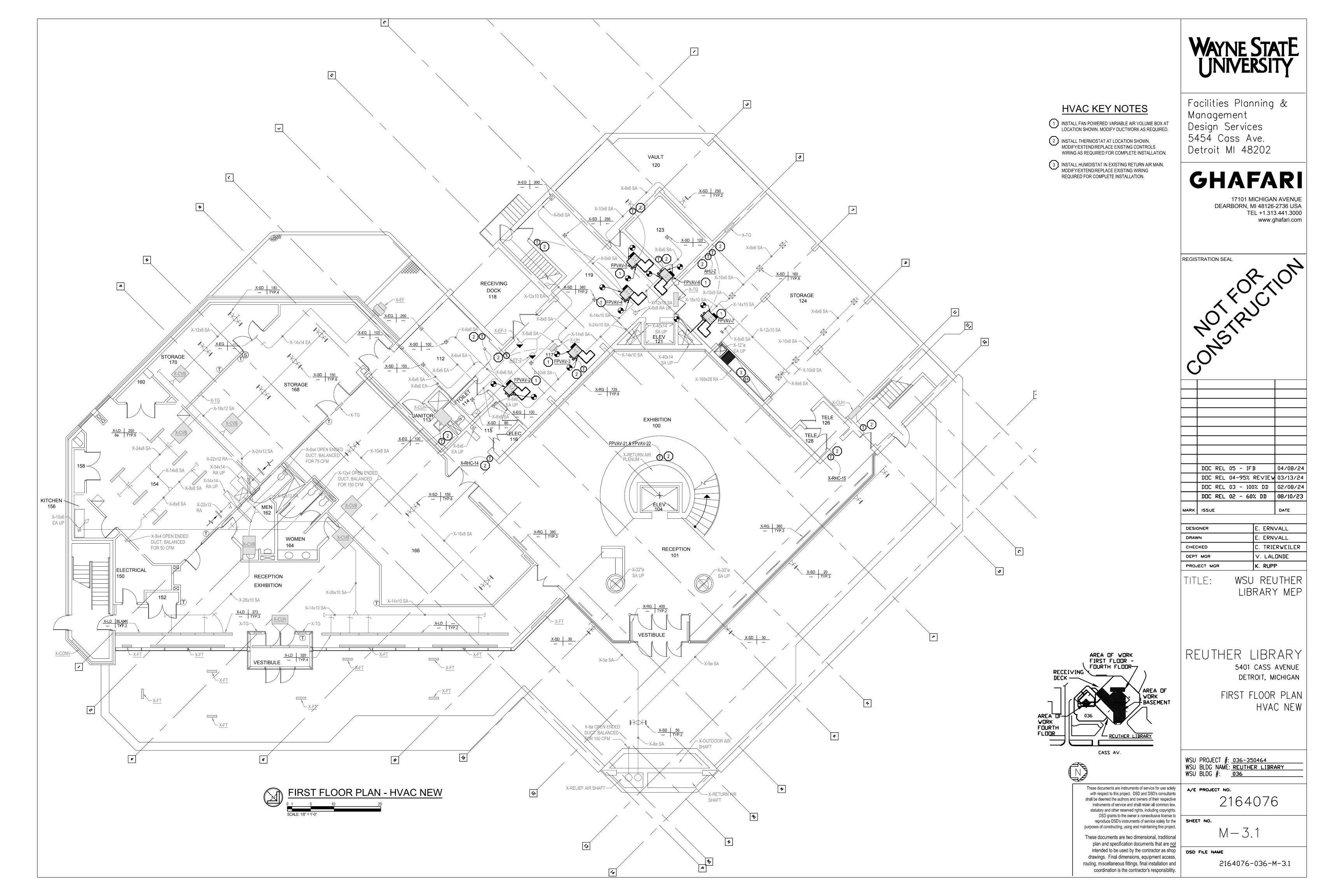


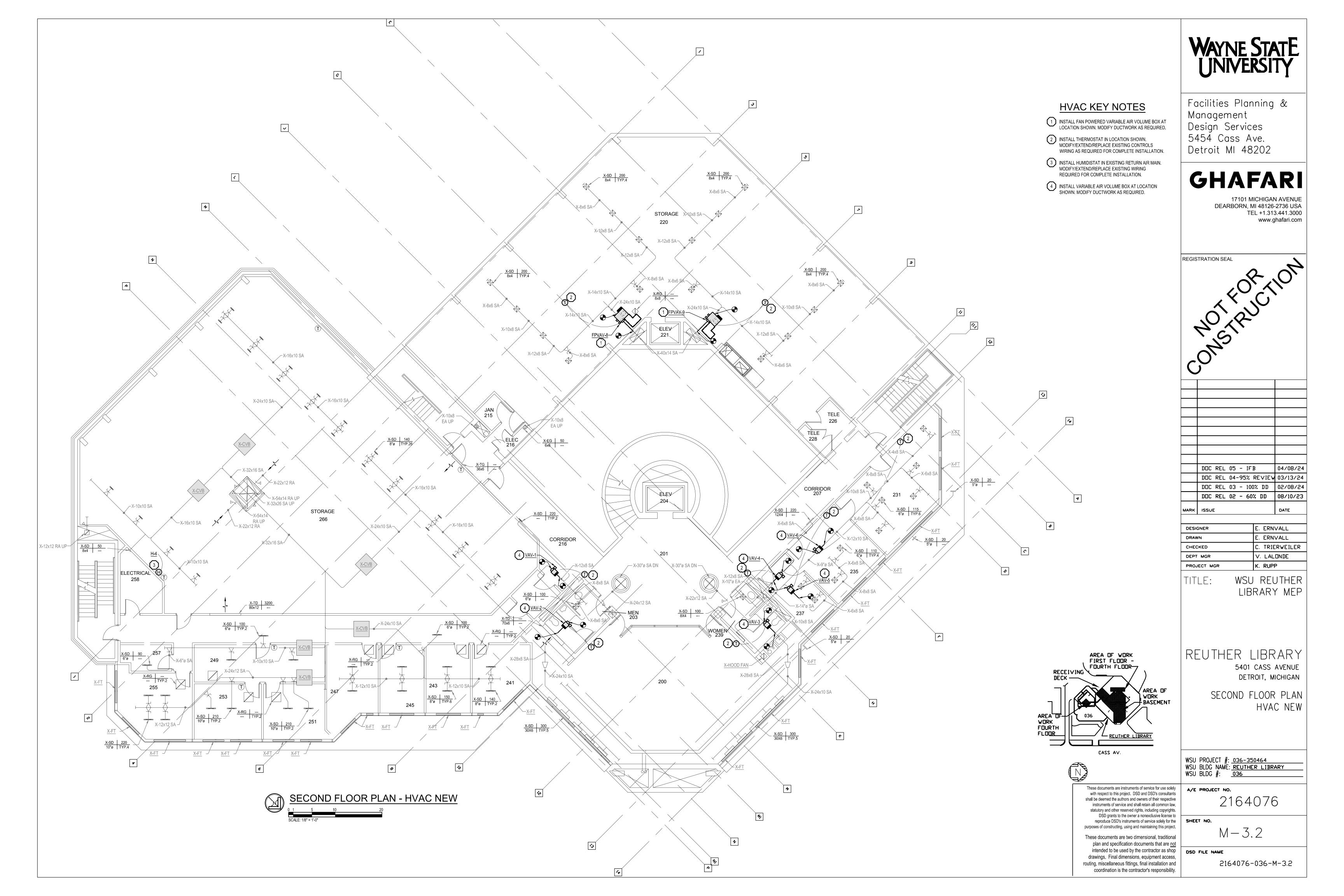


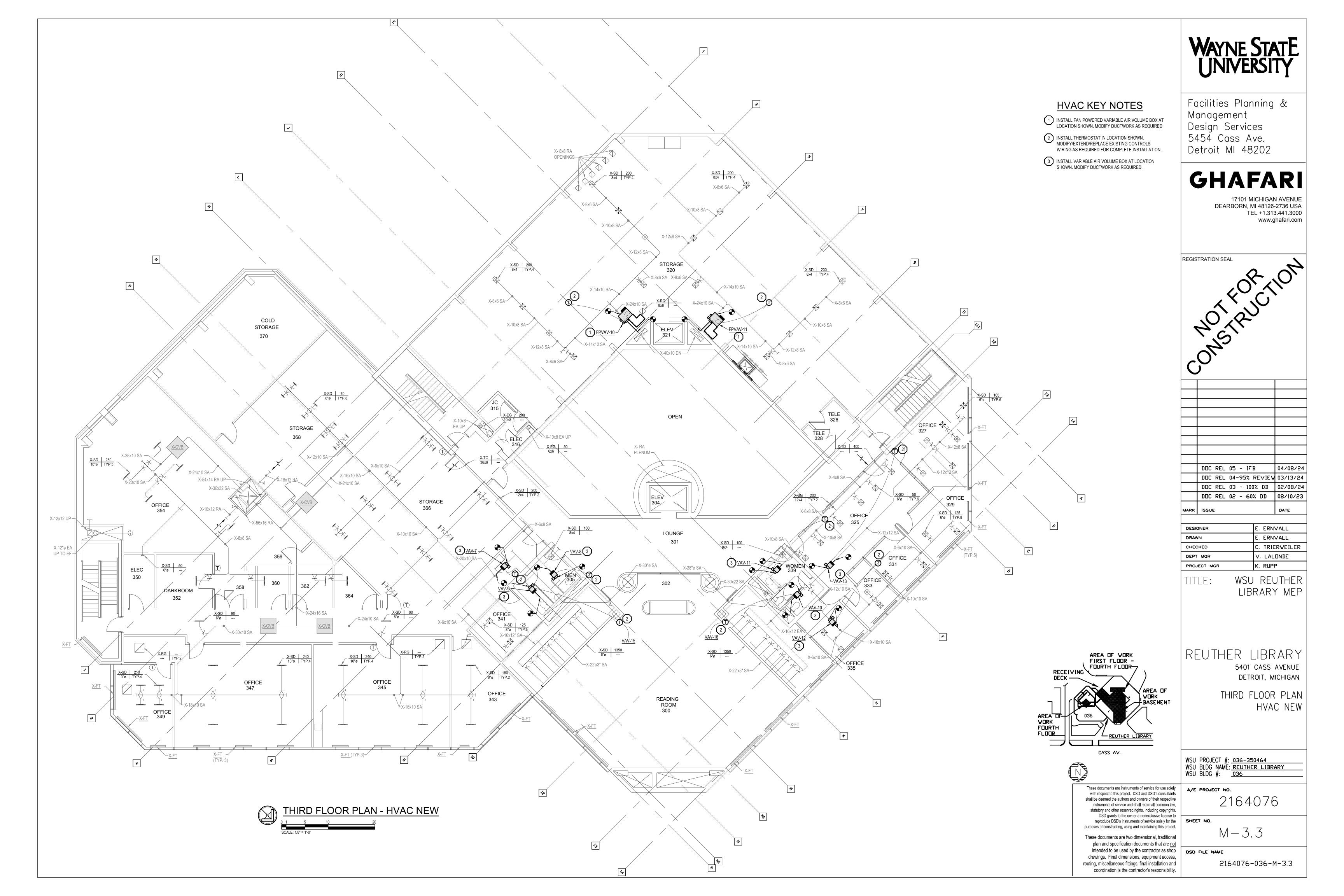


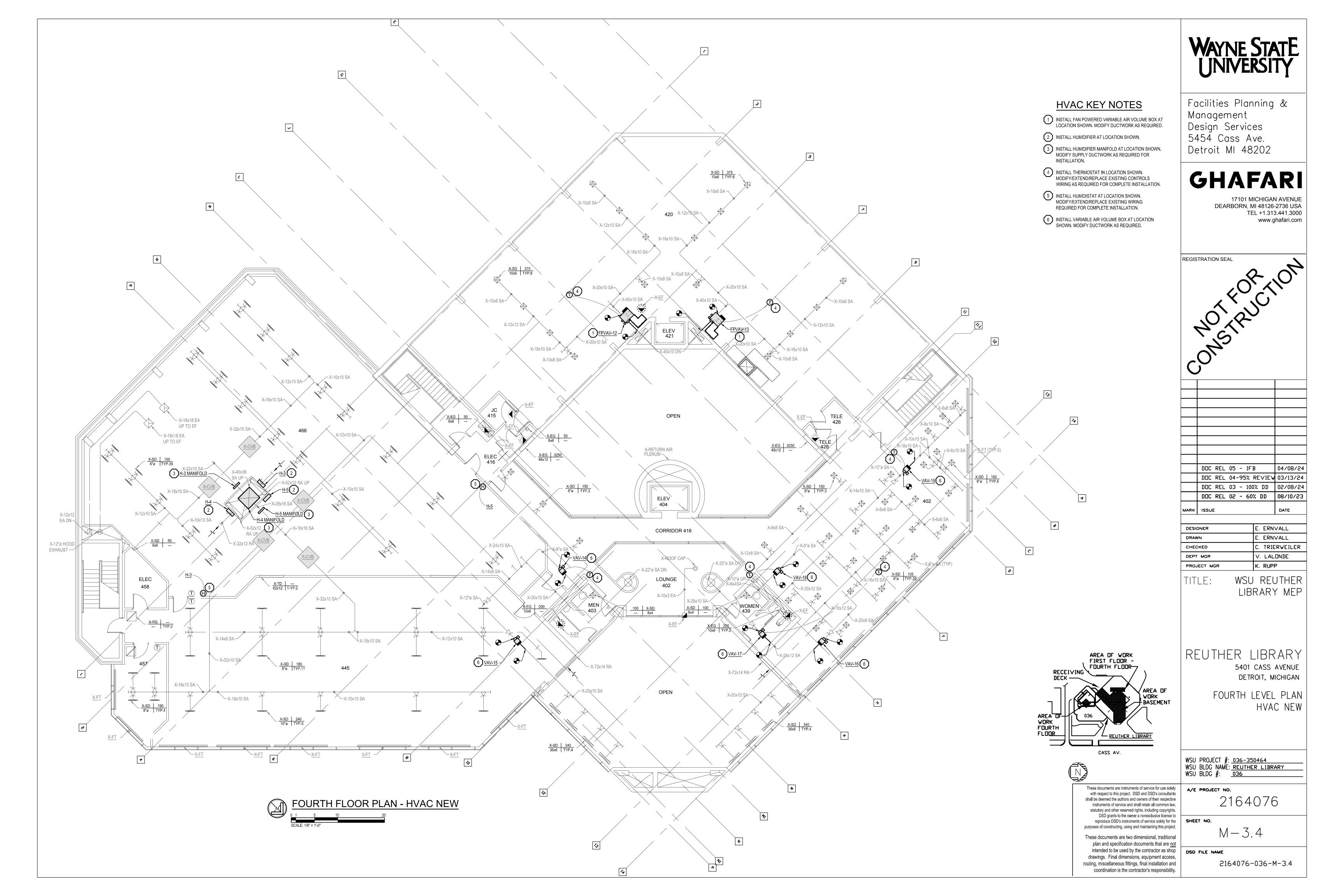


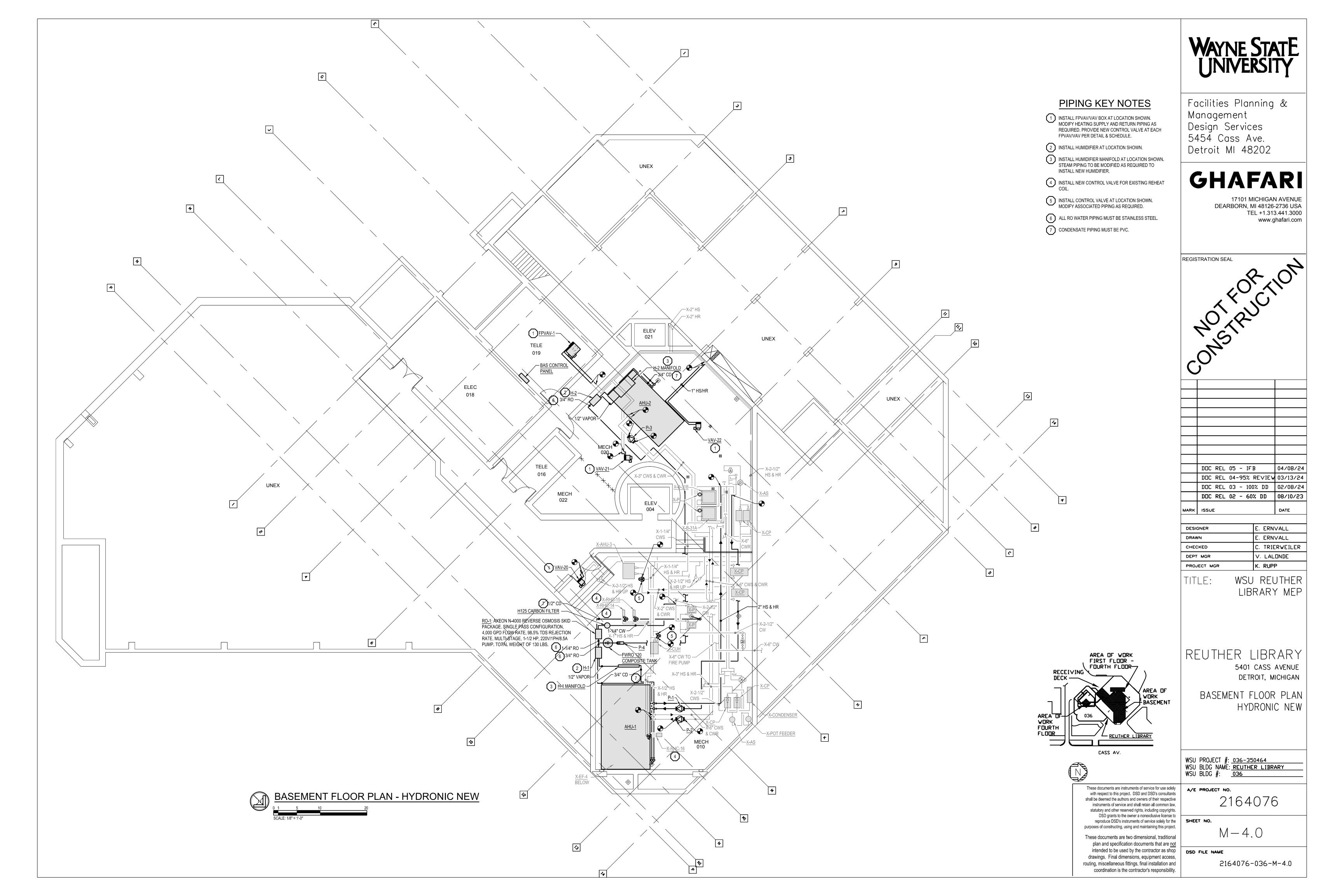


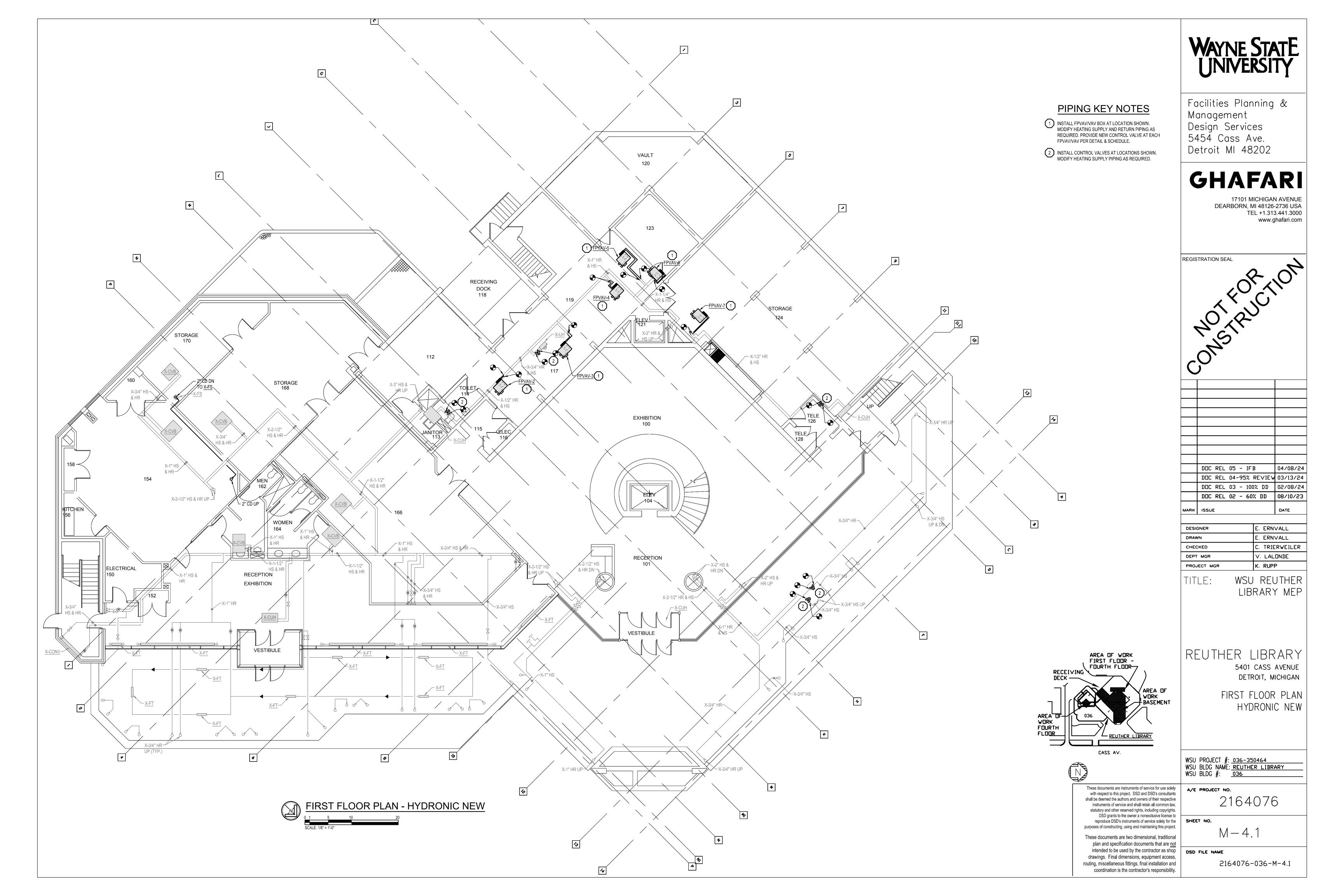


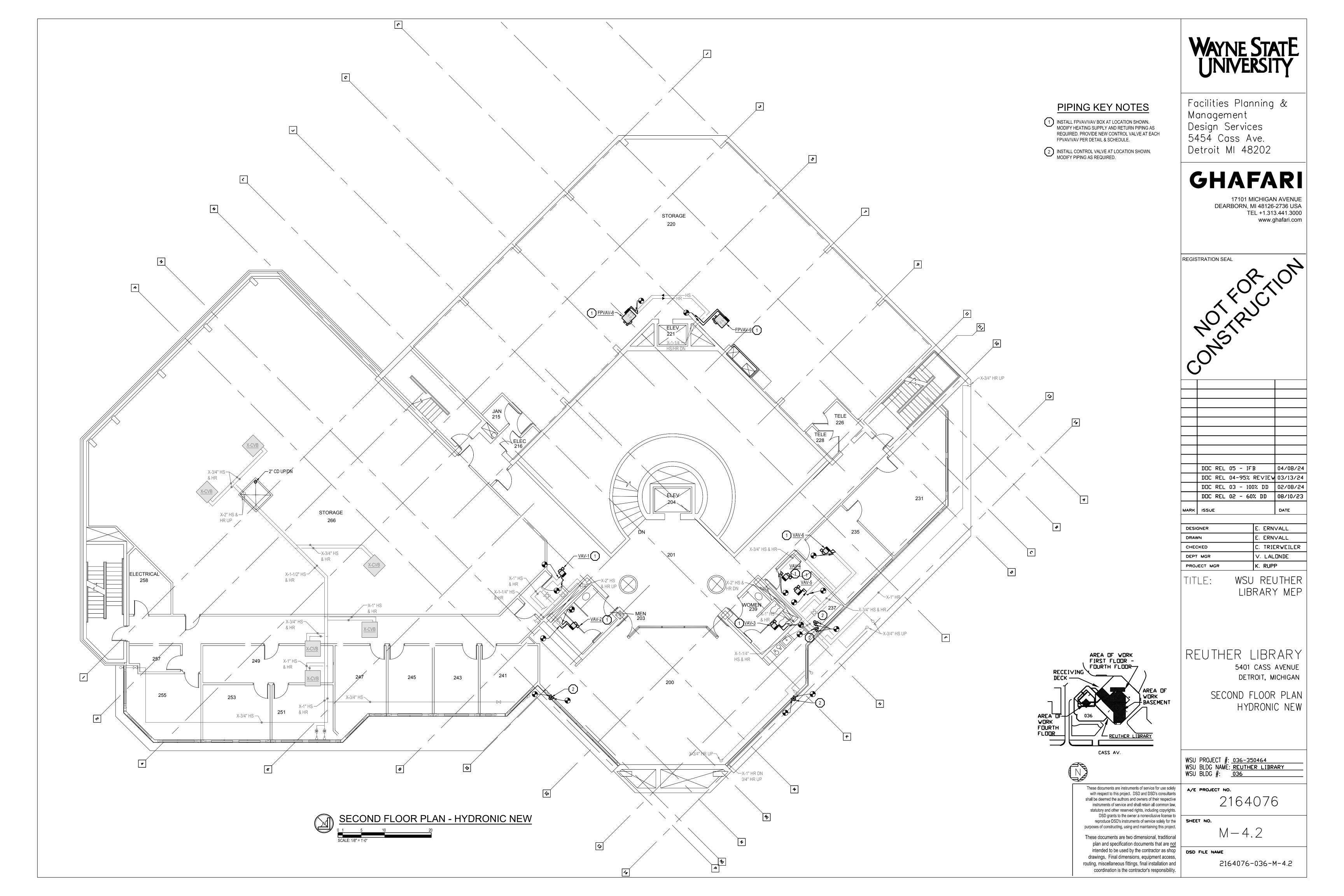


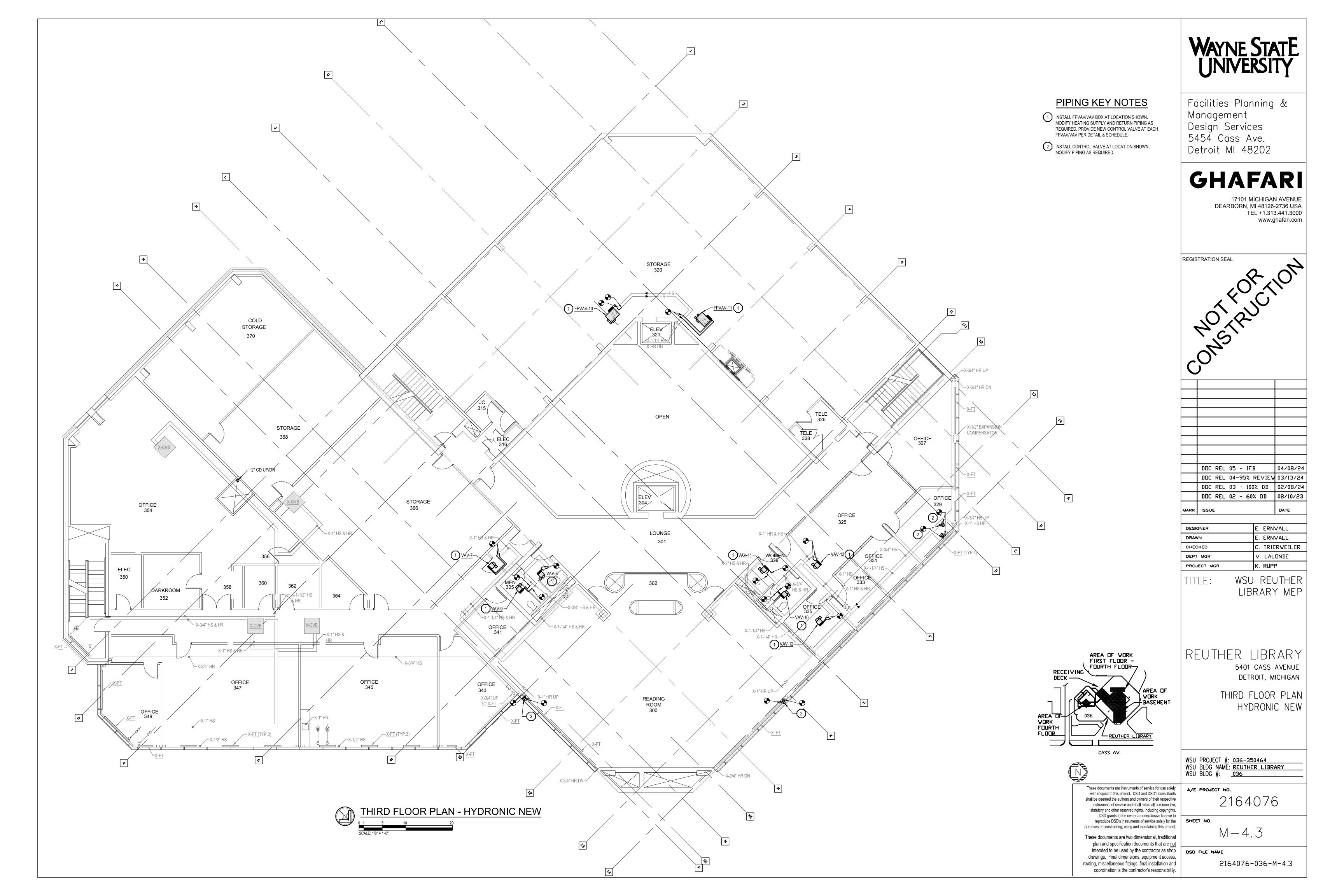


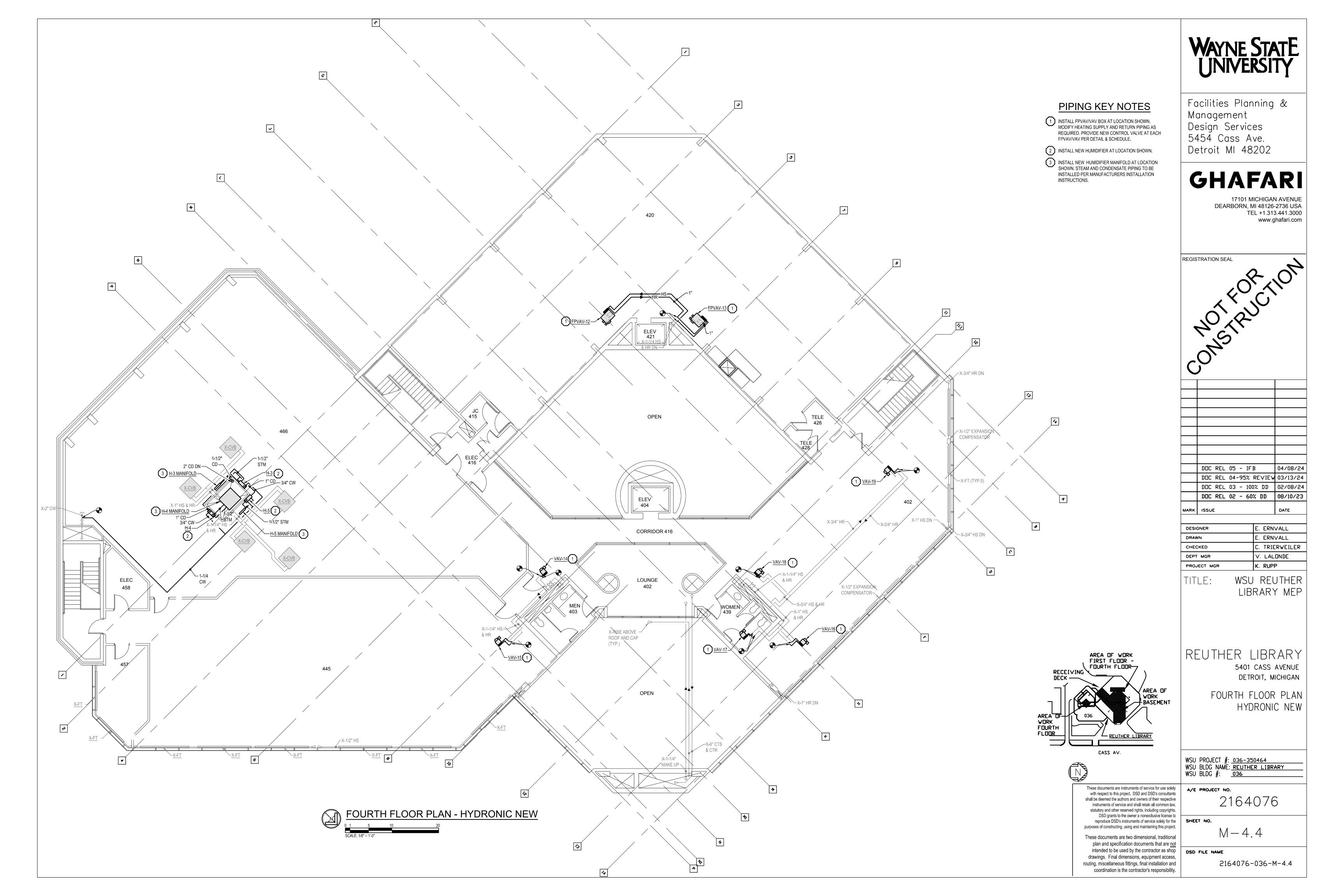


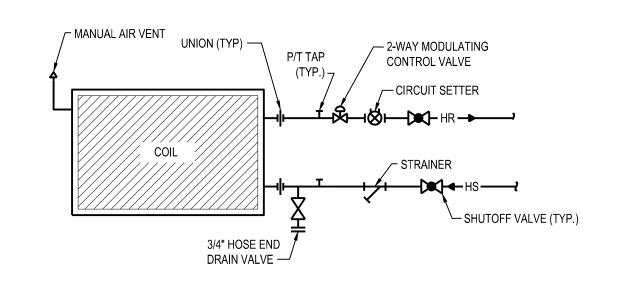








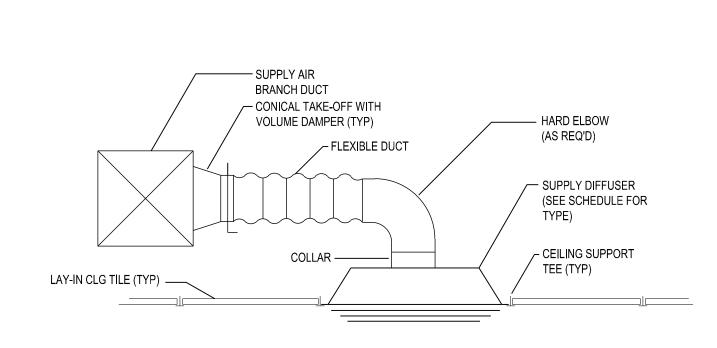


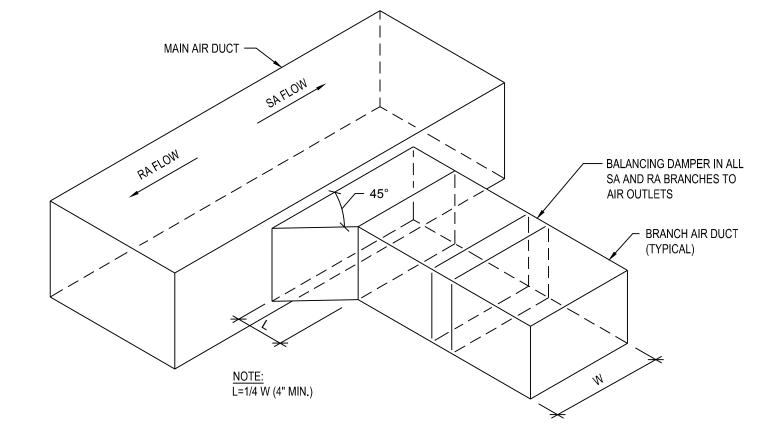


BELT DRIVE MOTOR PROVIDE MOTOR GUARD — HANGER RODS — SPRING VIBRATION ISOLATOR BRACKET -ISOLATORS — 6" FLEX CONNECTOR (TYP.)

TYPICAL VAV TERMINAL UNIT HYDRONIC PIPING DIAGRAM (2-WAY CONTROL VALVE)

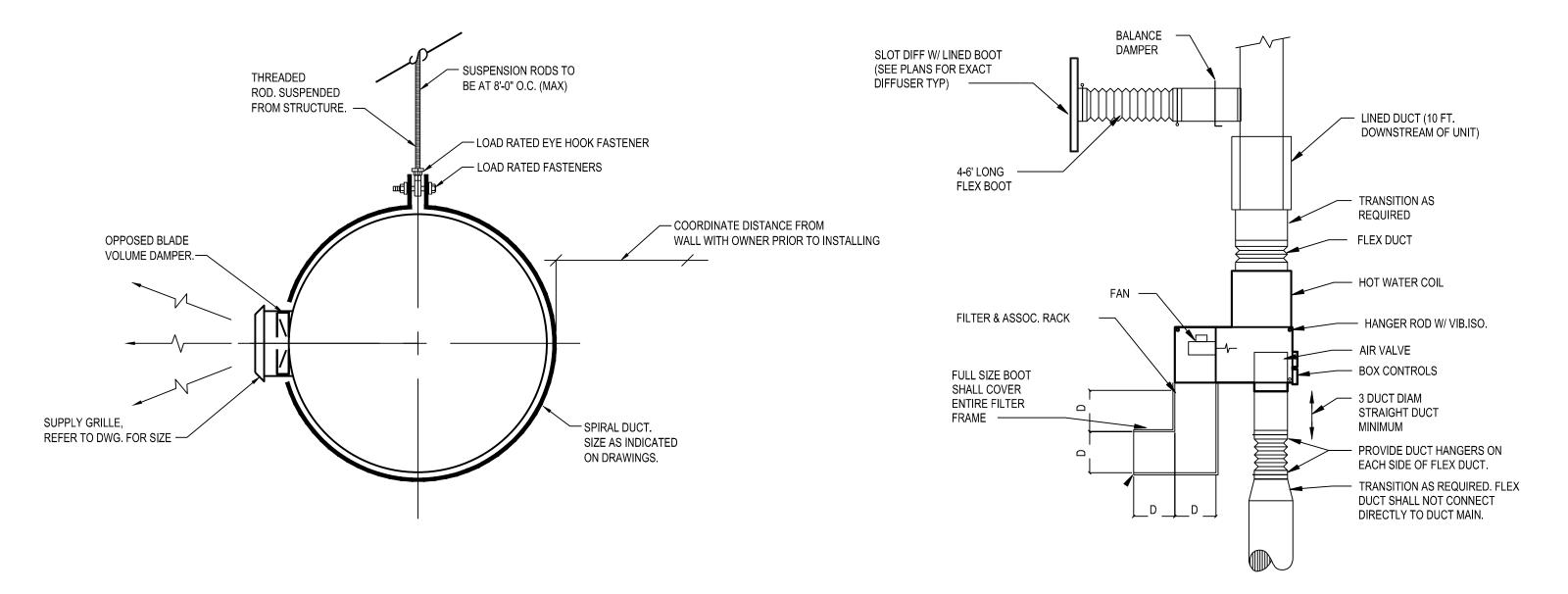
) RETURN FAN DETAIL SCALE: NTS





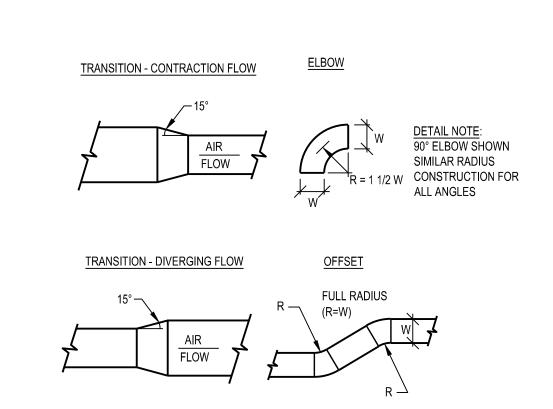
3 SUPPLY AIR DIFFUSER DETAIL SCALE: NTS

4 DUCT TRANSITION DETAIL SCALE: NTS

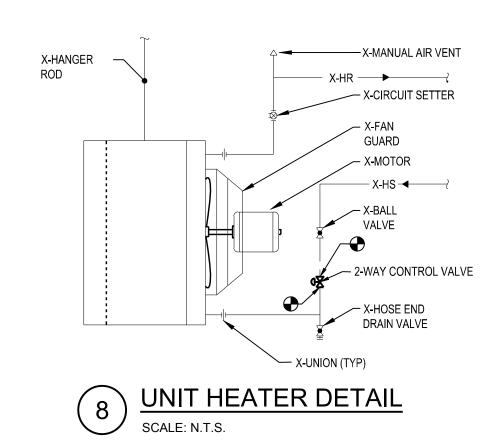


EXPOSED SUPPLY SPIRAL DUCT DETAIL

PARALLEL FAN POWERED VAV BOX DETAIL



OFFSETS, ELBOWS, & TRANSITIONS FOR RECTANGULAR DUCTWORK



WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

	DOC REL 05 - IFB	04/08/2
	D□C REL 04-95% REVIEW	03/13/2
	DOC REL 03 - 100% DD	02/08/2
	DOC REL 02 - 60% DD	08/10/2
MARK	ISSUE	DATE

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANCAL DETAILS

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

A/E PROJECT NO. 2164076

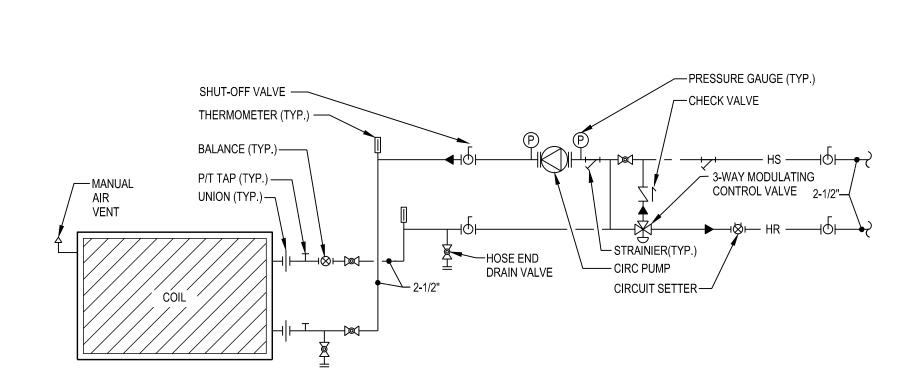
M - 5.1

2164076-036-M-5.1

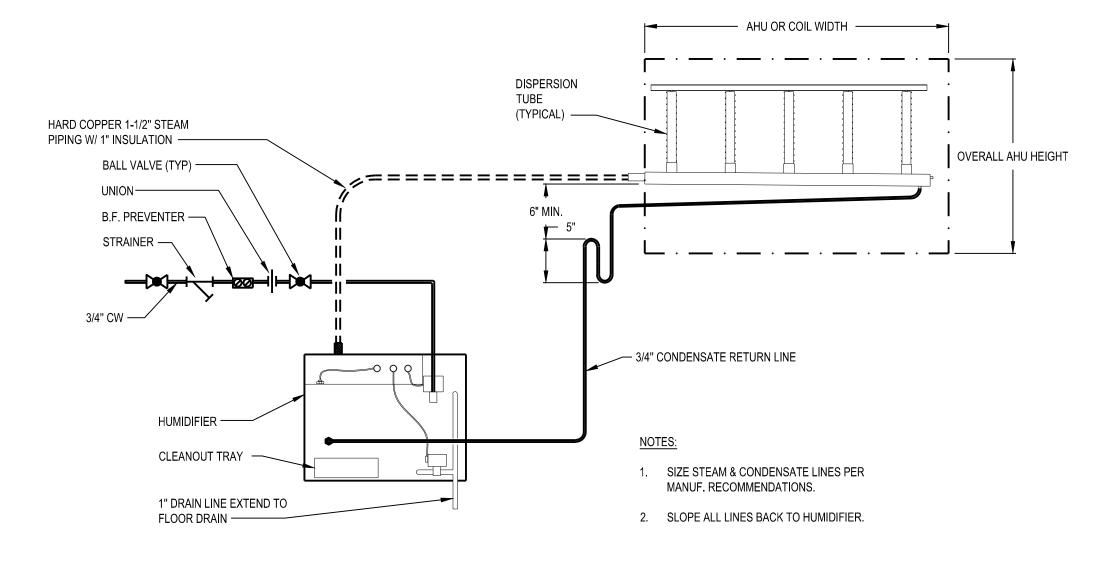
These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights.

These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

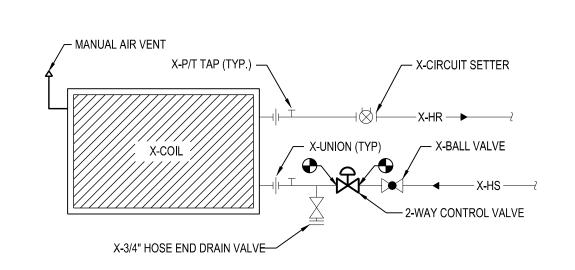
coordination is the contractor's responsibility.



AHU-1 HEATING COIL DETAIL



ELECTRIC HUMIDIFIER PIPING DIAGRAM



CABINET UNIT HEATER HYDRONIC PIPING DIAGRAM

FIN TUBE RADIATION DETAIL

SCALE: NTS

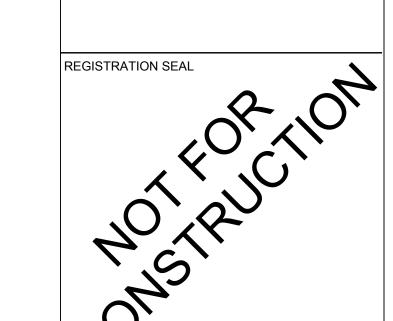
2-WAY CONTROL VALVE -

MODULES:

ACCESS/TURNING SECTION

3. ACCESS/TURNING SECTION

4. COOLING COIL SECTION



WAYNE STATE UNIVERSITY

Facilities Planning &

Management

Design Services

5454 Cass Ave.

Detroit MI 48202

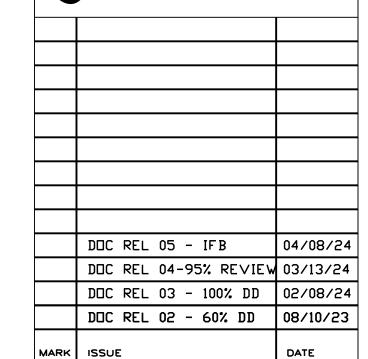
GHAFARI

17101 MICHIGAN AVENUE

TEL +1.313.441.3000

www.ghafari.com

DEARBORN, MI 48126-2736 USA



DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LAL□NDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANCAL DETAILS

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: 036

These documents are instruments of service for use solely A/E PROJECT NO. with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

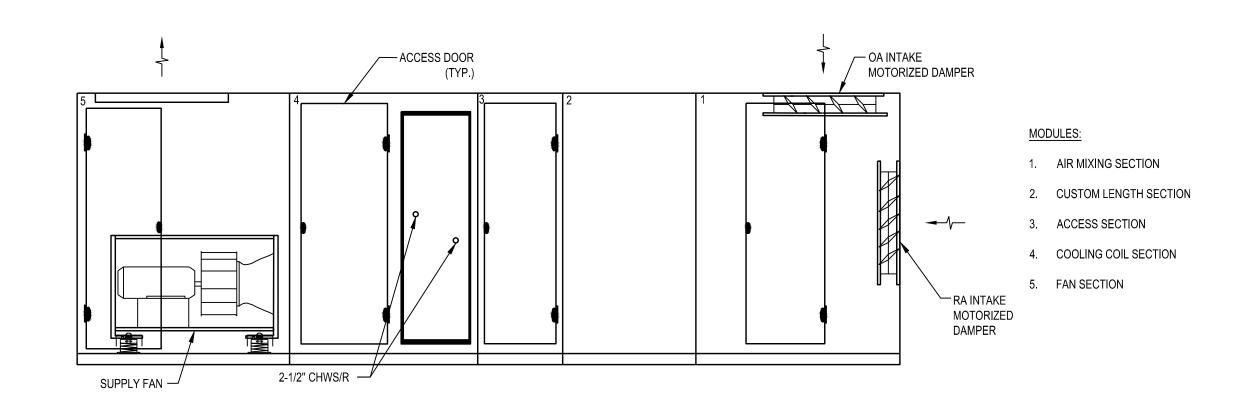
— MANUAL AIR VENT

X-UNION

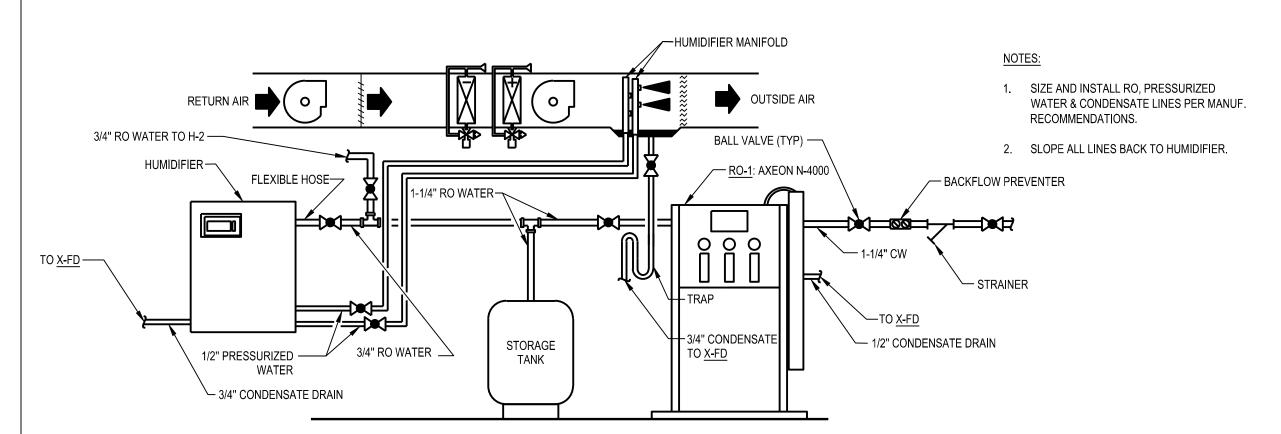
These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access,

2164076 M - 5.2

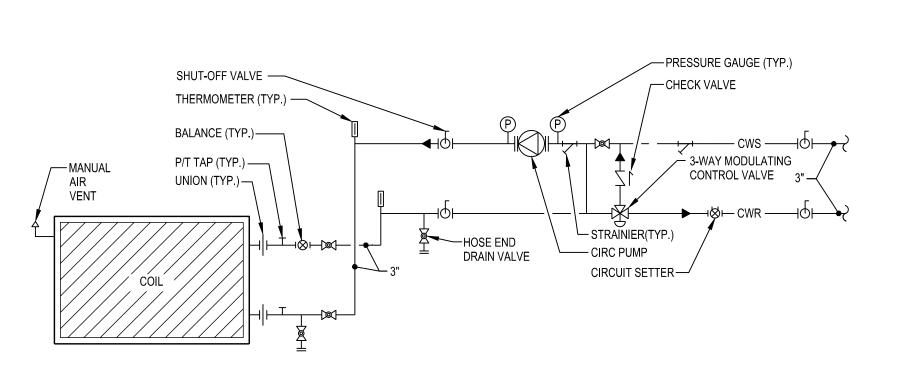
2164076-036-M-5.2 routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.



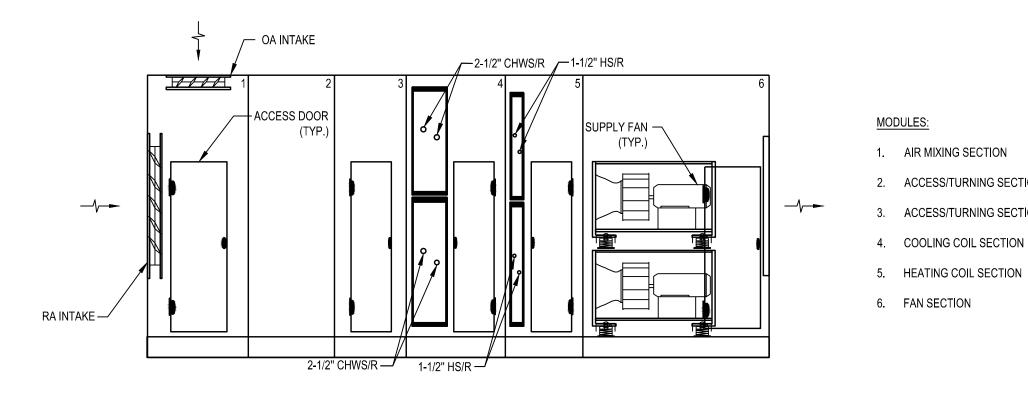
AHU-2 ELEVATION VIEW



ADIBATIC HUMIDIFIER PIPING DIAGRAM



TYPICAL AHU COOLING COIL DETAIL



AHU-1 ELEVATION VIEW

				VA	V BOX	SCHE	DULE					
				CFM				HEATING	COIL (°F)		
TAG	MODEL	SERVES	MAXIMUM	HEATING	MINIMUM	EAT	LAT	мвн	EWT	DELTA T	GPM	COMMENTS
VAV-1	DESV	MEN 203	540	270	110	55	90	10.2	200	40	0.75	1,2,3,4,5
VAV-2	DESV	200	1550	775	310	55	90	29.3	200	40	1.5	1,2,3,4,5
VAV-3	DESV	200	1550	775	310	55	90	29.3	200	40	1.5	1,2,3,4,5
VAV-4	DESV	CORRIDOR 207	540	270	110	55	90	10.2	200	40	0.75	1,2,3,4,5
VAV-5	DESV	237	550	275	110	55	90	10.4	200	40	0.75	1,2,3,4,5
VAV-6	DESV	231	700	350	140	55	90	13.2	200	40	0.75	1,2,3,4,5
VAV-7	DESV	OFFICE 341	250	125	50	55	90	4.7	200	40	0.5	1,2,3,4,5
VAV-8	DESV	LOUNGE 301	500	250	100	55	90	9.5	200	40	0.5	1,2,3,4,5
VAV-9	DESV	READING ROOM 300	1350	675	270	55	90	25.5	200	40	1.25	1,2,3,4,5
VAV-10	DESV	READING ROOM 300	1350	675	270	55	90	25.5	200	40	1.25	1,2,3,4,5
VAV-11	DESV	OFFICE 325	800	400	160	55	90	15.1	200	40	0.75	1,2,3,4,5
VAV-12	DESV	OFFICE 335	1000	500	200	55	90	18.9	200	40	1	1,2,3,4,5
VAV-13	DESV	OFFICE 327	1000	500	200	55	90	18.9	200	40	1	1,2,3,4,5
VAV-14	DESV	MEN 403	550	275	110	55	90	10.4	200	40	0.75	1,2,3,4,5
VAV-15	DESV	OPEN 400	1360	680	272	55	90	25.7	200	40	1.25	1,2,3,4,5
VAV-16	DESV	OPEN 400	1360	680	272	55	90	25.7	200	40	1.25	1,2,3,4,5
VAV-17	DESV	402	2100	1050	420	55	90	39.7	200	40	2	1,2,3,4,5
VAV-18	DESV	CORRIDOR 416	550	275	110	55	90	10.4	200	40	0.75	1,2,3,4,5
VAV-19	DESV	402	1500	750	300	55	90	28.4	200	40	1.5	1,2,3,4,5
VAV-20	DESV	MECH 010	600	300	120	55	90	11.3	200	40	0.75	1,2,3,4,5
VAV-21	DESV	MECH 020	2900	1450	580	55	90	54.8	200	40	2.75	1,2,3,4,6
VAV-22	DESV	MECH 020	3625	1810	725	55	90	68.4	200	40	3.5	1,2,3,4,6

5. 2-WAY CONTROL VALVE

6. 3-WAY CONTROL VALVE

1. BASED ON TRANE

4. CONNECT TO BAS

3. DIRECT DRIVE PLENUM FAN WITH VFD

NOTES:

1. BASED ON TITUS

3. MAX AIR PRESSURE DROP = 0.3 IN-WC

4. MAX WATER PRESSURE DROP = 3 FT-HD

2. MAX. NC = 35

	RETURN FAN SCHEDULE													
		SERVICE/				ESP				ELECTI	RICAL			
TAG	MODEL	LOCATION	CFM	TYPE	DRIVE	(IN WC)	FAN RPM	SONES	FAN HP	VOLTAGE	PHASE	DISC. BY	COMMENTS	
RF-1	QEI-40	AHU-1	29,000	INLINE	BELT	2.5	879	15.5	20	480	3	EC	1,2	
RF-2	QEI-30	AHU-2	16,000	INLINE	BELT	1.5	1,043	10.2	7 1/2	480	3	EC	1,2	
NOTES:														

1. BASED ON GREENHECK

2. PROVIDE WITH VFD. CONTROL TO TRACK ASSOCIATED SUPPLY FAN

ABBREVIATIONS: EC - ELECTRICAL CONTRACTOR

MC - MECHANICAL CONTRACTOR

NR - NOT REQUIRED

	FPVAV BOX SCHEDULE																		
					AIRFLOW	(CFM)				HEATI	NG COIL				E	LECTRICA	\L		
TAG	MANUFACTURER	MODEL	SERVES	MAX CFM	HEATING AIRFLOW	MIN CFM	FAN (CFM)	EAT	LAT	МВН	DELTA T	GPM	EWT	HP	VOLTAGE	PHASE	DISC. BY	STARTER BY	COMMENTS
FPVAV-1	TITUS	DTQP	TELE 019	360	288	72	216	55	90	10.9	40	0.75	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-2	TITUS	DTQP	112	330	264	66	198	55	90	10.0	40	0.75	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-3	TITUS	DTQP	119	720	576	144	432	55	90	21.8	40	1.25	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-4	TITUS	DTQP	119	250	200	50	150	55	90	7.6	40	0.75	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-5	TITUS	DTQP	VAULT 120	500	400	100	300	55	90	15.1	40	0.75	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-6	TITUS	DTQP	123	120	96	24	72	55	90	3.6	40	0.75	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-7	TITUS	DTQP	STORAGE 124	1380	1104	276	828	55	90	41.7	40	2.25	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-8	TITUS	DTQP	STORAGE 220	1600	1280	320	960	55	90	48.4	40	2.50	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-9	TITUS	DTQP	STORAGE 220	1600	1280	320	960	55	90	48.4	40	2.50	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-10	TITUS	DTQP	STORAGE 320	1600	1280	320	960	55	90	48.4	40	2.50	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-11	TITUS	DTQP	STORAGE 320	1600	1280	320	960	55	90	48.4	40	2.50	200	0.50	120	1	EC	EC	1,2,3,4,5
FPVAV-12	TITUS	DTQP	STORAGE 420	3000	2400	600	1800	55	90	90.7	40	4.50	200	1.00	120	1	EC	EC	1,2,3,4,6
FPVAV-13	TITUS	DTQP	STORAGE 420	3000	2400	600	1800	55	90	90.7	40	4.50	200	1.00	120	1	EC	EC	1,2,3,4,6
NOTES:	•		1					<u> </u>		1	1			ı		l		1	1

ABBREVIATIONS:

MFR - MANUFACTURER

NOTES:

1. BASED ON TITUS

2. MAX NC = 35

5. 2-WAY CONTROL VALVE

6. 3-WAY CONTROL VALVE

14. AIR HANDLING UNIT TO CONSIST OF THE FOLLOWING MODULES:

AIR MIXING SECTION, COOLING COIL

15. 2" DYNAMIC AIR CLEANER, MERV-13

SECTION, SUPPLY FAN SECTION

3. MAX AIR PRESSURE DROP = 0.3 IN-WC 4. MAX WATER PRESSURE DROP = 3 FT-HD ABBREVIATIONS: EC - ELECTRICAL CONTRACTOR

															AIR HA	NDLIN	IG L	JNIT	SCI	ΗE	DUL	E												
	AIR CAPACITY SUPPLY FAN MOTOR HOT WATER HEATING COIL CHILLED WATER COOLING COIL ELECTRICAL																																	
TAG	MODEL	TOTAL	O.A.	OTV	ESD	HP/FAN	VED	EVI.	I AT °E	MBH	EWT	LWT	GPM	MAX.	FACE	APD	EA	T°F	LAT °	F	MB	Н	EWT	LWT	GPM	MAX.	FACE	APD	VOLTAGE	DHVCE		CTADTED	DISCONNECT	COMMENTS
		CFM	CFM	QII.	E.S.F.	HE/FAIN	VFD	EAI F	LAIF	IVIDITI	°F	°F	GFIVI	P.D.	VELOCITY	(IN-WC)	DB	WB	DB W	B T	OTAL	SENS	°F	°F	GFIVI	P.D.	VELOCITY	(IN-WC)	VOLTAGE	FHASE	FLA	SIARIER		
AHU-1	PSCA	35,500	6,390	4	2.70	15	MFR	40	82.32	815	200	160	41	1.35	290	0.025	81	64	54.6 53	3.3	1,119	1,029	45	52	319	15.04	565	0.685	480	3	18.1	N/A	IVIFIX	1,2,3,4,5,6,7,8,9,10, 11,12,13,15
AHU-2	CSAA	16,000	800	2	2.43	7.5	MFR	-	1	-	-	ı	-	-	-	-	80	67	57.8 56	3.5	532	393	45	52	152	6.04	558	0.619	480	3	9.8	N/A		1,2,3,4,6,7,8,9,10,11 ,12,14,15
NOTE	<u>S:</u>																																	

13. AIR HANDLING UNIT TO CONSIST OF THE FOLLOWING MODULES:

AIR MIXING SECTION, HEATING COIL SECTION, COOLING COIL

SECTION, SUPPLY FAN SECTION

	FLUID PUMP SCHEDULE																		
							FLUID			PU	MP				IMC	OTOR			
TAG	SERVES	LOCATION	SERIES	MODEL	TYPE	TYPE	% CONC.	TEMP. °F	GPM	HEAD (FT)	IMP. DIA.	% EFF	RPM	HP	VOLT	PHASE	DISC BY	STARTER BY	COMMENTS
P-1	AHU-1 HC	BASEMENT	ecocirc XL	20-140	CIRCULATOR	WATER	100	200	41	10	-	54.4	2330	0.5	230	1	EC	EC	1
P-2	AHU-1 CC	BASEMENT	e-80	5x5x9.5B	IN-LINE	WATER	100	48	319	20	7.875	73.7	1200	3	230	1	EC	EC	1
P-3	AHU-2 CC	BASEMENT	ecocirc XL	40-275	IN-LINE	WATER	100	48	152	15	-	62.1	2283	2	230	1	EC	EC	1
P-4	H-2	BASEMENT	СМ	CM 1-7 A-S-I-E-AQQE B-A-A-N	END-SUCTION	WATER	100	68	9	208	-	68	3480	1.48	120	1	EC	EC	2

NOTES:

1. BASED ON: BELL GOSSETT

ABBREVIATIONS

NR - NOT REQUIRED

5. THREE-WAY CONTROL VALVE AT HEATING COIL

7. COOLING BASED ON 80°F DB / 67°F WB

8. DIRTY FILTER SWITCH

2. BASED ON: GRUNDFOS

2. UC600 CONTROLS PACKAGE, FIELD PROGRAMMABLE 6. THREE-WAY CONTROL VALVE AT COOLING COIL

EC - ELECTRICAL CONTRACTOR ETHL - ETHL. - ETHELEYNE GLYCOL PROP. - PROPYLENE GLYCOL

9. FREEZESTAT

12. 6" BASE RAIL

10. FAN STATUS CONTROL

11. STAINLESS STEEL DRAIN PAN

	HUMIDIFIER SCHEDULE														
TAG	SERVES	MODEL	CFM	O.A	. CONDITION	ONS	ROOM CC	NDITIONS	HUMIDIFIER	DISPERSION	ABSORPTION		ELECTRICAL	-	COMMENTS
IAG	SERVES	MODEL	CFIVI	CFM	EAT	% R.H.	DB	% R.H.	LOAD LBS/HR	METHOD	DISTANCE (IN.)	AMPS	VOLTAGE	PHASE	COMMENTS
H-1	AHU-1	EC020	35,500	35,500	74	21	65	30-50	440	MIST	48	3.2	230	1	1,3,4
H-2	AHU-2	EC005	16,000	16,000	74	21	65	30-50	110	MIST	48	2	230	1	1,3,4
H-3	RTU-1	RX-24-1	3,050	3,050	54.5	60	65	30-50	17.36	MIST	11	10.8	480	3	2,3
H-4	RTU-1	RX-75-1	10,360	10,360	54.5	60	65	30-50	58.96	MIST	12	32.5	480	3	2,3
H-5	RTU-1	RX-36-1	4,840	4,840	54.4	60	65	30-50	27.55	MIST	6	14.4	480	3	2,3
NOTEC.					•	•	•	•		•					-

NOTES:

1. BASED ON CAREL

4. PROVIDE WITH N-SERIES REVERSE . BASED ON DRI-STEAM OSMOSIS SYSTEM BY AXEON. SEE B. PROGRAMMABLE HUMIDISTAT DRAWINGS FOR DETAILS.

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23
MARK	ISSUE	DATE

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANICAL SCHEDULE

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

A/E PROJECT NO.

2164076

M - 6.1

2164076-036-M-6.1

SEQUENCE OF OPERATION: AHU-1

SUPPLY FAN CONTROL:

THE VARIABLE SPEED SUPPLY FANS (SFX-C) WILL BE STARTED BASED ON OCCUPANCY SCHEDULE (OCC-SCHEDULE). WHEN THE ANALOG FAN STATUS (SFA-R) INDICATES SUFFICIENT FANS HAVE STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FANS (SFX-O) WILL MODULATE IN UNISON TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-P) AT SETPOINT (DAP-SP). UPON A LOSS OF AIRFLOW (SFA-R) OF ENOUGH FANS TO DROP BELOW THE MINIMUM REQUIRED (MINIMUM RUNNING DEVICES), THE FANS WILL STOP UNTIL THE UNIT IS MANUALLY RESET (SYS-RESET).

RETURN FAN CONTROL:

AFTER THE SUPPLY FAN HAS BEEN STARTED, THE VARIABLE SPEED RETURN FAN WILL BE STARTED. THE RETURN FAN (RF-O) WILL MODULATE TO MAINTAIN THE BUILDING STATIC PRESSURE AT SETPOINT (BLDGP-SP). EXHAUST AIR DAMPERS (EAD-O) WILL BE ENABLED WHEN BOTH THEIR SUPPLY AND RETURN FANS ARE PROVEN ON, AND THE RETURN FANS ARE CONTROLLING TO BUILDING PRESSURE. THEY WILL BE CLOSED OTHERWISE, EXHAUST DAMPERS WILL BE MODULATED OPEN TO MAINTAIN BUILDING STATIC PRESSURE SETPOINT. ONCE FULLY OPEN. THE BUILDING PRESSURE CONTROL LOOP WILL RESET THE RETURN FAN DISCHARGE STATIC SETPOINT (EFF-RF SP) FROM (RF-DSP-MIN) TO (RF-DSP-MAX) TO MAINTAIN BUILDING STATIC PRESSURE SETPOINT. UPON A LOSS OF RETURN AIRFLOW (RF-S), THE SYSTEM WILL STOP UNTIL THE UNIT IS MANUALLY RESET (SYS-RESET).

ECONOMIZER CONTROL:

WHEN THE ENTHALPY OF THE OUTDOOR AIR IS LESS THAN THE RETURN AIR (ECON-AVAILABLE), THE ECONOMIZER WILL ACT AS THE INITIAL STAGE OF COOLING, WORKING IN SEQUENCE WITH THE COOLING COIL. THE RETURN AIR CO2 SENSOR (RA-Q) WILL BE USED TO RESET THE DAMPER MINIMUM POSITION.

MINIMUM OA CONTROL:

THE FRESH AIR INTAKE OF THE UNIT WILL BE LIMITED TO PREVENT THE PREHEAT TEMPERATURE (PH-T) FROM FALLING BELOW THE LOW LIMIT SETPOINT (OALT-SP).

TEMPERATURE CONTROL:

THE OUTDOOR AIR TEMPERATURE (OA-T) WILL RESET THE ZONE TEMPERATURE TARGET, WHICH WILL RESET THE DISCHARGE AIR TEMPERATURE SETPOINT (DAT-SP). THE TEMPERATURE SETPOINT (XX-SP) WILL ADDITIONALLY BE SHIFTED BASED ON OUTDOOR AIR TEMPERATURE TO COMPENSATE FOR EXTREME OUTDOOR AIR TEMPERATURES (OA-T)

WARMUP/COOLDOWN MODE:

THE WARMUP/COOLDOWN MODE WILL BE INITIATED BY THE NETWORK INPUT (WC-C). THE UNIT WILL CONTROL TO OCCUPIED SETPOINTS (CLGOCC-SP & AMP; HTGOCC-SP) DURING WARMUP AND COOLDOWN CYCLES.

OCCUPIED MODE:

THE OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT (OCC-SCHEDULE). THE OCCUPANCY MODE CAN ALSO BE OVERRIDDEN BY A NETWORK INPUT (OCC-OVERRIDE).

UNOCCUPIED MODE:

THE UNIT WILL CYCLE TO MAINTAIN UNOCCUPIED ZONE SETPOINTS (CLGUNOCC-SP & AMP; HTGUNOCC-SP) DURING UNOCCUPIED PERIODS.

FREEZE PROTECTION GENERAL:

THIS SEQUENCE CONSISTS OF THREE STAGES USED TO PREVENT THE COILS FROM FREEZING WHEN THE DISCHARGE AIR TEMPERATURE (DA-T) FALLS TOO LOW. THE FIRST STAGE SENDS HEATING HOT-WATER PLANT REQUESTS, SETS THE ECONOMIZER DAMPER(S) TO THE MINIMUM POSITION, AND MODULATES ANY APPLICABLE HEATING COILS AND ENABLES THE COIL PUMP ON THE HEATING COIL (SEE INDIVIDUAL COIL SECTIONS FOR DETAILS) TO MAINTAIN A STAGE ONE LOW TEMPERATURE SETPOINT (STG1-LT-SP). THE SECOND STAGE FULLY CLOSES ANY ASSOCIATED OUTDOOR AIR DAMPERS FOR ONE HOUR AND SETS A LEVEL 3 ALARM (L3-MIN-VENT-INTR). THE THIRD STAGE SHUTS DOWN THE SUPPLY FAN (SF-C) AND ANY RETURN/RELIEF FAN, CLOSES THE ECONOMIZER DAMPER(S), FULLY OPENS ANY APPLICABLE COOLING COIL, AND SENDS TWO HEATING HOT-WATER REQUESTS. THE THIRD STAGE ALSO MODULATES APPLICABLE HEATING COILS (SEE INDIVIDUAL COIL SECTIONS FOR DETAILS) AND SENDS A LEVEL 2 ALARM (L2-LOW-TEMP).

PREHEAT COIL:

THE PREHEAT (PH-O) WILL MODULATE TO MAINTAIN THE TEMPERATURE SETPOINT. ON A CALL FOR PREHEAT OR A DROP IN THE OUTDOOR AIR TEMPERATURE (OA-T) BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT (OALT-SP), THE COIL PUMP (PHP-C) WILL BE STARTED. UPON A LOSS OF PREHEAT COIL PUMP STATUS (PHP-S), THE PUMP WILL ATTEMPT TO AUTOMATICALLY RESTART UNTIL POSITIVE STATUS IS RECEIVED. WHEN THE UNIT IS SHUTDOWN, THE PREHEAT COIL WILL BE COMMANDED TO A PRESET POSITION SHOULD THE OUTDOOR AIR FREEZE PROTECTION THE COIL WILL MODULATE TO MAINTAIN THE STAGE ONE LOW TEMPERATURE SETPOINT (STG1-LT-SP). DURING STAGE 3 FREEZE PROTECTION THE COIL WILL MODULATE TO MAINTAIN THE STAGE THREE

RHP-C RHP-S

RETURN-

SUPPLY

(OALT-SP), THE LEAD COIL PUMP (CPX-C) WILL BE STARTED. WHEN THE UNIT IS SHUTDOWN, THE COOLING COIL WILL BE COMMANDED TO A PRESET POSITION SHOULD THE OUTDOOR AIR TEMPERATURE (OA-T) FALL BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT (OALT-SP). WHEN THE CONDENSATE FLOAT SWITCH IS IN "ALARM" (COND-A), THE COOLING CONTROL SEQUENCE WILL BE DISABLED. THEN THE FAN(S) WILL BE DISABLED VIA A HARD WIRED SHUTDOWN CIRCUIT.

HUMIDIFICATION:

THE HUMIDIFIER WILL BE ENABLED (HUM-C) AND MODULATE (HUM-O) TO MAINTAIN THE ZONE RELATIVE HUMIDITY SETPOINT (HUM-SP) AS SENSED BY THE ZONE RELATIVE HUMIDITY SENSOR (ZN-H). THE HUMIDITY HIGH LIMIT WILL OVERRIDE THE OUTPUT IF NECESSARY TO PREVENT THE DISCHARGE AIR HUMIDITY FROM EXCEEDING DISCHARGE HUMIDITY HIGH LIMIT SETPOINT. SEE HUMIDIFIER SEQUENCE ON SHEET M-7.4.

DEHUMIDIFICATION:

ON A RISE IN THE RETURN AIR HUMIDITY (RA-H), THE COOLING COIL OUTPUT WILL BE OVERRIDDEN TO MAINTAIN THE RETURN AIR HUMIDITY BELOW THE RETURN AIR DEHUMIDIFICATION SETPOINT (DEHUM-SP). THE REHEAT CONTROL WILL MAINTAIN THE TEMPERATURE AT SETPOINT.

UNIT PROTECTION:

- DISCHARGE A WILL STOP RU RETURN AIR H RUNNING AND
- DISCHARGE A CIRCUIT.
- RETURN AIR S

OF 4 FANS

DAPHI-A

FFILT-DP

ADDITIONAL POINTS MO

			*		
	DA-VP	DISCHARGE AIR VELOCITY PRESSURE	0-10VDC	INPUT	ANALOG
E AIR HIGH DUCT PRESSURE ALARM (DAPHI-A) - WHEN IN "ALARM", THE CONTROL SEQUENCE RUNNING AND THE FAN(S) WILL BE DISABLED VIA A HARD WIRED SHUTDOWN CIRCUIT.	EAD-O	EXHAUST AIR DAMPER OUTPUT	0-10VDC	OUTPUT	ANALOG
R HIGH DUCT PRESSURE (RAPHI-A) - WHEN IN "ALARM", THE CONTROL SEQUENCE WILL STOP	FFILT-DP	FINAL FILTER DIFFERENTIAL PRESSURE	0-10VDC	INPUT	ANALOG
ND THE FAN(S) WILL BE DISABLED VIA A HARD WIRED SHUTDOWN CIRCUIT.	FRZ-S	FREEZE STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
E AIR SMOKE DETECTOR (DA-SD) - DISABLES THE FAN(S) VIA A HARD WIRED SHUTDOWN	HUMHI-A	HUMIDITY HIGH LIMIT	DRY CONTACT MAINTAINED	INPUT	BINARY
R SMOKE DETECTOR (RA-SD) - DISABLES THE FAN(S) VIA A HARD WIRED SHUTDOWN CIRCUIT.	HUM-O	HUMIDIFIER OUTPUT	0-10VDC	OUTPUT	ANALOG
	HUM-S	HUMIDIFIER STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
S MONITORED BY THE FMS:	HUM-C	HUMIDIFIER COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
AIR TEMPERATURE (OA-T)	MA-T	MIXED AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
AIR HUMIDITY (OA-H)	OA-H	OUTDOOR AIR HUMIDITY	0-10VDC	INPUT	ANALOG
AIR VELOCITY PRESSURE (OA-VP) TEMPERATURE (MA-T)	OA-T	OUTDOOR AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
OIL DISCHARGE TEMPERATURE (CC-T)	OAD-O	OUTDOOR AIR DAMPER OUTPUT	0-10VDC	OUTPUT	ANALOG
E AIR VELOCITY PRESSURE (DA-VP)	OA-VP	OUTDOOR AIR VELOCITY PRESSURE	0-10VDC	INPUT	ANALOG
VELOCITY PRESSURE (RLF-VP)	PFILT-DP	PREFILTER DIFFERENTIAL PRESSURE	0-10VDC	INPUT	ANALOG
DIFF PRESSURE (PFILT-DP) ER DIFFERENTIAL PRESSURE (FFILT-DP)	PH-O	PREHEAT OUTPUT	0-10VDC	OUTPUT	ANALOG
DITY LIMIT (HUMHI-A)	PH-T	PREHEAT TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
R STATUS (HUM-S)	PHP-C	PREHEAT PUMP COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
	PHP-S	PREHEAT PUMP STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
	RLF-VP	RELIEF AIR VELOCITY PRESSURE	0-10VDC	INPUT	ANALOG
	RA-H	RETURN AIR HUMIDITY	0-10VDC	INPUT	ANALOG
	RA-Q	RETURN AIR QUALITY	0-10VDC	INPUT	ANALOG
	RA-T	RETURN AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
	RAD-0	RETURN AIR DAMPER OUTPUT	0-10VDC	OUTPUT	ANALOG
	RAPHI-A	RETURN AIR HIGH DUCT PRESSURE	DRY CONTACT MAINTAINED	INPUT	BINARY
	RA-P	RETURN AIR STATIC PRESSURE	0-10VDC	INPUT	ANALOG
	RF-0	RETURN FAN OUTPUT	0-10VDC	OUTPUT	ANALOG
	RF-C	RETURN FAN COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
RF VFD	RF-S	RETURN FAN STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
RF-C RF-O	SFA-R	SUPPLY FAN ARRAY STATUS RESISTANCE	RESISTIVE	INPUT	ANALOG
RF-S	SF-O	SUPPLY FAN OUTPUT	0-10VDC	OUTPUT	ANALOG
SDR-2	SF-C	SUPPLY FAN COMMAND	24VAC MAINTAINED	OUTPUT	BINARY

By Others

LOCATE MINIMUM 10'

FROM HUMIDIFIER

ZN-T ZN-H

POINTS LIST: AHU-1

Signal

0-10VDC

DRY CONTACT MAINTAINED

0-10VDC

NICKEL 1K RTD

24VAC MAINTAINED

DRY CONTACT MAINTAINED

0-10VDC

NICKEL 1K RTD

DRY CONTACT MAINTAINED

0-10VDC

PointType

INPUT

INPUT

OUTPUT

INPUT

OUTPUT

INPUT

INPUT

INPUT

INPUT

DataType

ANALOG

BINARY

ANALOG

ANALOG

BINARY

BINARY

ANALOG

ANALOG

BINARY

ANALOG

ANALOG

Description

BUILDING STATIC PRESSURE

CONDENSATE ALARM

COOLING OUTPUT

COOLING PUMP COMMAND

COOLING PUMP STATUS

DISCHARGE AIR HUMIDITY

DISCHARGE AIR TEMPERATURE

DISCHARGE AIR HIGH DUCT PRESSURE

DISCHARGE AIR STATIC PRESSURE 1

LONGEST DUCT RUN

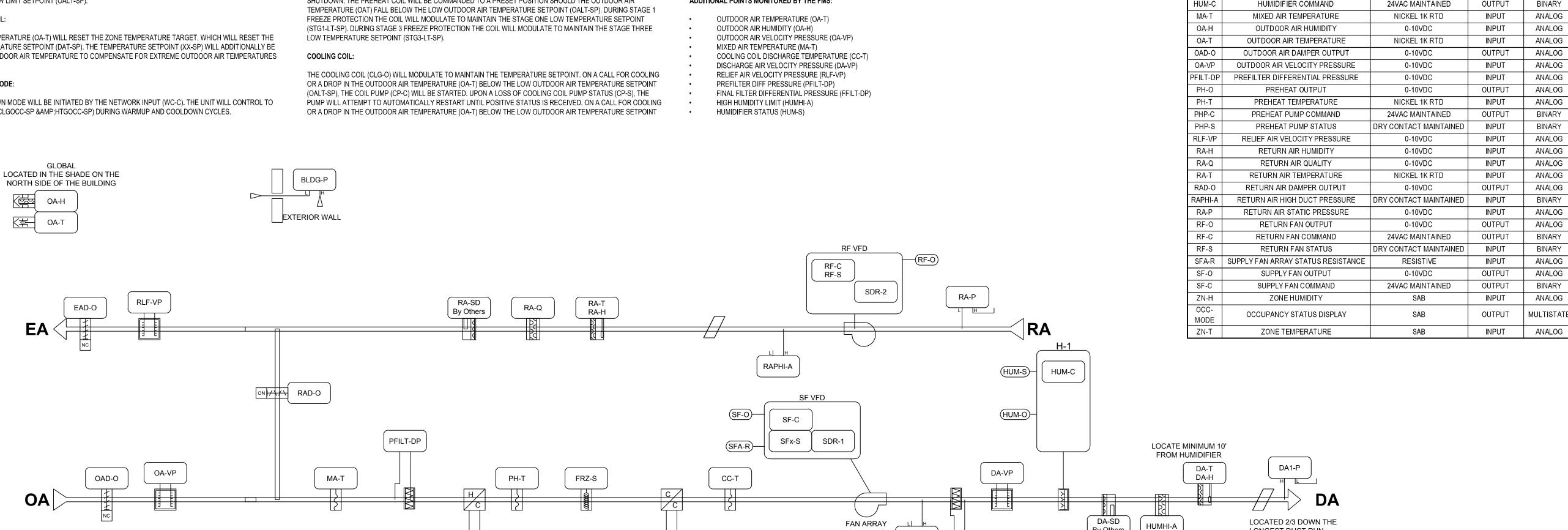
CC-T COOLING COIL DISCHARGE TEMPERATURE

COND-A

CP-C

CP-S

DA-H

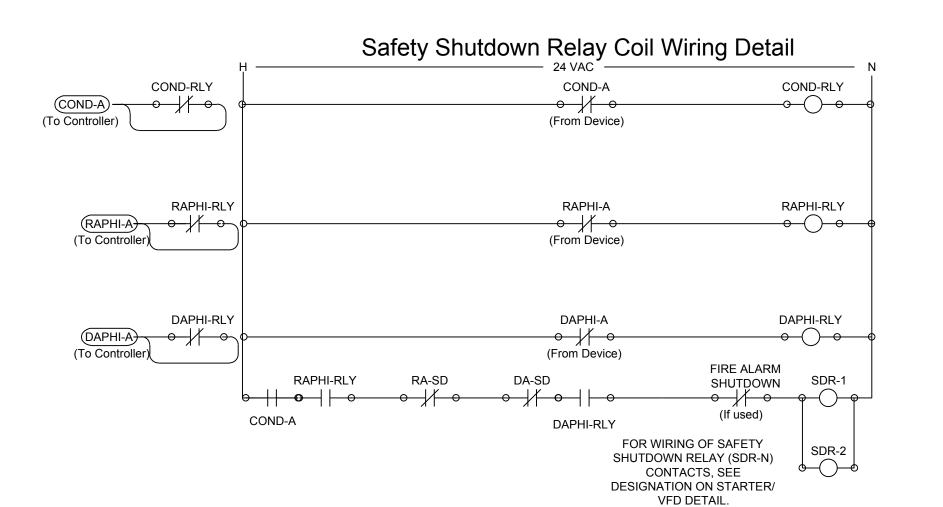


CP-C CP-S

CLG-O

COND-A

CONDENSATE



PH-O

RETURN-

SUPPLY-

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFAR

17101 MICHIGAN AVENUE **DEARBORN, MI 48126-2736 USA** TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

DDC REL 04-95% REVIEW 03/13/8 DDC REL 03 - 100% DD 02/08/8			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DOC REL 04-95% REVIEW 03/13/3 DOC REL 03 - 100% DD 02/08/3 DOC REL 02 - 60% DD 08/10/3			
DDC REL 03 - 100% DD 02/08/0 DDC REL 02 - 60% DD 08/10/2		DOC REL 05 - IFB	04/08/2
DOC REL 02 - 60% DD 08/10/2		DOC REL 04-95% REVIEW	03/13/2
		DOC REL 03 - 100% DD	02/08/2
MARK ISSUE DATE		DOC REL 02 - 60% DD	08/10/2
	MARK	ISSUE	DATE

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANICAL CONTROLS

WSU PROJECT #: 036-350464 WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: <u>036</u>

A/E PROJECT NO. 2164076

M - 7.1

SHEET NO.

2164076-036-M-7.1

AHU-1 CONTROL DIAGRAM

SEQUENCE OF OPERATION: AHU-2

SUPPLY FAN CONTROL:

THE VARIABLE SPEED SUPPLY FANS (SFX-C) WILL BE STARTED BASED ON OCCUPANCY SCHEDULE (OCC-SCHEDULE). WHEN THE ANALOG FAN STATUS (SFA-R) INDICATES SUFFICIENT FANS HAVE STARTED, THE CONTROL SEQUENCE WILL BE ENABLED. THE SUPPLY FANS (SFX-O) WILL MODULATE IN UNISON TO MAINTAIN THE DISCHARGE STATIC PRESSURE (DA-P) AT SETPOINT (DAP-SP). UPON A LOSS OF AIRFLOW (SFA-R) OF ENOUGH FANS TO DROP BELOW THE MINIMUM REQUIRED (MINIMUM RUNNING DEVICES), THE FANS WILL STOP UNTIL THE UNIT IS MANUALLY RESET (SYS-RESET).

RETURN FAN CONTROL:

AFTER THE SUPPLY FAN HAS BEEN STARTED, THE VARIABLE SPEED RETURN FAN WILL BE STARTED. THE RETURN FAN (RF-O) WILL MODULATE TO MAINTAIN THE BUILDING STATIC PRESSURE AT SETPOINT (BLDGP-SP). EXHAUST AIR DAMPERS (EAD-O) WILL BE ENABLED WHEN BOTH THEIR SUPPLY AND RETURN FANS ARE PROVEN ON, AND THE RETURN FANS ARE CONTROLLING TO BUILDING PRESSURE. THEY WILL BE CLOSED OTHERWISE EXHAUST DAMPERS WILL BE MODULATED OPEN TO MAINTAIN BUILDING STATIC PRESSURE SETPOINT. ONCE FULLY OPEN, THE BUILDING PRESSURE CONTROL LOOP WILL RESET THE RETURN FAN DISCHARGE STATIC SETPOINT (EFF-RF-DSP) FROM (RF-DSP-MIN) TO (RF-DSP-MAX) TO MAINTAIN BUILDING STATIC PRESSURE SETPOINT. UPON A LOSS OF RETURN AIRFLOW (RF-S), THE SYSTEM WILL STOP UNTIL THE UNIT IS MANUALLY RESET (SYS-RESET).

ECONOMIZER CONTROL:

WHEN THE ENTHALPY OF THE OUTDOOR AIR IS LESS THAN THE RETURN AIR (ECON-AVAILABLE), THE ECONOMIZER WILL ACT AS THE INITIAL STAGE OF COOLING, WORKING IN SEQUENCE WITH THE COOLING COIL. THE RETURN AIR CO2 SENSOR (RA-Q) WILL BE USED TO RESET THE DAMPER MINIMUM POSITION.

MINIMUM OA CONTROL:

THE FRESH AIR INTAKE OF THE UNIT WILL BE LIMITED TO PREVENT THE MIXED AIR TEMPERATURE (MA-T) FROM FALLING BELOW THE LOW LIMIT SETPOINT (OALT-SP).

TEMPERATURE CONTROL:

LOCATED IN THE SHADE ON THE NORTH SIDE OF THE BUILDING

THE OUTDOOR AIR TEMPERATURE (OA-T) WILL RESET THE ZONE TEMPERATURE TARGET, WHICH WILL RESET THE DISCHARGE AIR TEMPERATURE SETPOINT (DAT-SP). THE TEMPERATURE SETPOINT (XX-SP) WILL ADDITIONALLY BE SHIFTED BASED ON OUTDOOR AIR TEMPERATURE TO COMPENSATE FOR EXTREME OUTDOOR AIR TEMPERATURES

EXTERIOR WAL

ON // RAD-O

COND-RLY

RAPHI-RLY

DAPHI-RLY

COND-A

(To Controller)

(To Controller)

(To Controller)

MA-T

OCCUPIED MODE:

THE OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT (OCC-SCHEDULE). THE OCCUPANCY MODE CAN ALSO BE OVERRIDDEN BY A NETWORK INPUT (OCC-OVERRIDE).

FREEZE PROTECTION GENERAL:

THIS SEQUENCE CONSISTS OF THREE STAGES USED TO PREVENT THE COILS FROM FREEZING WHEN THE DISCHARGE AIR TEMPERATURE (DA-T) FALLS TOO LOW. THE FIRST STAGE SENDS HEATING HOT-WATER PLANT REQUESTS, SETS THE ECONOMIZER DAMPER(S) TO THE MINIMUM POSITION, AND MODULATES ANY APPLICABLE HEATING COILS (SEE INDIVIDUAL COIL SECTIONS FOR DETAILS) TO MAINTAIN A STAGE ONE LOW TEMPERATURE SETPOINT (STG1-LT-SP). THE SECOND STAGE FULLY CLOSES ANY ASSOCIATED OUTDOOR AIR DAMPERS FOR ONE HOUR AND SETS A LEVEL 3 ALARM (L3-MIN-VENT-INTR). THE THIRD STAGE SHUTS DOWN THE SUPPLY FAN (SF-C) AND ANY RETURN/RELIEF FAN, CLOSES THE ECONOMIZER DAMPER(S), FULLY OPENS ANY APPLICABLE COOLING COIL. AND SENDS TWO HEATING HOT-WATER REQUESTS. THE THIRD STAGE ALSO MODULATES APPLICABLE HEATING COILS (SEE INDIVIDUAL COIL SECTIONS FOR DETAILS) AND SENDS A LEVEL 2 ALARM (L2-LOW-TEMP).

COOLING COIL:

THE COOLING COIL (CLG-O) WILL MODULATE TO MAINTAIN THE TEMPERATURE SETPOINT. ON A CALL FOR COOLING OR A DROP IN THE OUTDOOR AIR TEMPERATURE (OA-T) BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT (OALT-SP), THE COIL PUMP (CP-C) WILL BE STARTED. UPON A LOSS OF COOLING COIL PUMP STATUS (CP-S), THE PUMP WILL ATTEMPT TO AUTOMATICALLY RESTART UNTIL POSITIVE STATUS IS RECEIVED. ON A CALL FOR COOLING OR A DROP IN THE OUTDOOR AIR TEMPERATURE (OA-T) BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT (OALT-SP), THE LEAD COIL PUMP (CPX-C) WILL BE STARTED. WHEN THE UNIT IS SHUTDOWN, THE COOLING COIL WILL BE COMMANDED TO A PRESET POSITION SHOULD THE OUTDOOR AIR TEMPERATURE (OA-T) FALL BELOW THE LOW OUTDOOR AIR TEMPERATURE SETPOINT (OALT-SP). WHEN THE CONDENSATE FLOAT SWITCH IS IN "ALARM" (COND-A), THE COOLING CONTROL SEQUENCE WILL BE DISABLED. THEN THE FAN(S) WILL BE DISABLED VIA A HARD WIRED SHUTDOWN CIRCUIT. DURING STAGE 3 FREEZE PROTECTION THE COIL WILL MODULATE TO A FULLY OPEN POSITION AND ENERGIZE THE CHILLED WATER PUMP (CP=C).

HUMIDIFICATION:

By Others

SUPPLY

Safety Shutdown Relay Coil Wiring Detail

COND-A

(From Device)

RAPHI-A

(From Device)

DAPHI-A

 \bullet

(From Device)

DAPHI-RLY

DA-SD

PFILT-DP

THE HUMIDIFIER WILL BE ENABLED (HUM-C) AND MODULATE (HUM-O) TO MAINTAIN THE ZONE RELATIVE HUMIDITY SETPOINT (HUM-SP) AS SENSED BY THE ZONE RELATIVE HUMIDITY SENSOR (ZN-H). THE HUMIDITY HIGH LIMIT WILL OVERRIDE THE OUTPUT IF NECESSARY TO PREVENT THE DISCHARGE AIR HUMIDITY FROM EXCEEDING DISCHARGE HUMIDITY HIGH LIMIT SETPOINT.

SFx-S

SFA-R)—

CC-T

CP-C CP-S

COND-RLY

RAPHI-RLY

DAPHI-RLY

FIRE ALARM

(If used)

SHUTDOWN

 $\textcolor{red}{\bullet} \bigcirc \textcolor{red}{\bullet}$

 $\textcolor{red}{\bullet}\bigcirc\textcolor{red}{\bullet}$

CLG-O

PAN COND-A

CONDENSATE

SDR-1

FAN ARRAY

OF 4 FANS

DAPHI-A

FFILT-DP

DEHUMIDIFICATION:

ON A RISE IN THE RETURN AIR HUMIDITY (RA-H), THE COOLING COIL OUTPUT WILL BE OVERRIDDEN TO MAINTAIN THE RETURN AIR HUMIDITY BELOW THE RETURN AIR DEHUMIDIFICATION SETPOINT (DEHUM-SP). THE REHEAT CONTROL WILL MAINTAIN THE TEMPERATURE AT SETPOINT. SEE HUMIDIFIER SEQUENCE ON SHEET M-7.4.

- DISCHARGE AIR HIGH DUCT PRESSURE ALARM (DAPHI-A) -WHEN IN "ALARM", THE CONTROL SEQUENCE WILL
- STOP RUNNING AND THE FAN(S) WILL BE DISABLED VIA A HARD WIRED SHUTDOWN CIRCUIT. RETURN AIR HIGH DUCT PRESSURE (RAPHI-A) -WHEN IN "ALARM", THE CONTROL SEQUENCE WILL STOP
- RUNNING AND THE FAN(S) WILL BE DISABLED VIA A HARD WIRED SHUTDOWN CIRCUIT.
- DISCHARGE AIR SMOKE DETECTOR (DA-SD) -DISABLES THE FAN(S) VIA A HARD WIRED SHUTDOWN CIRCUIT. • RETURN AIR SMOKE DETECTOR (RA-SD) -DISABLES THE FAN(S) VIA A HARD WIRED SHUTDOWN CIRCUIT.

ADDITIONAL POINTS MONITORED BY THE FMS:

- OUTDOOR AIR TEMPERATURE (OA-T)
- OUTDOOR AIR HUMIDITY (OA-H)*OUTDOOR AIR VELOCITY PRESSURE (OA-VP)
- COOLING COIL DISCHARGE TEMPERATURE (CC-T)•DISCHARGE AIR VELOCITY PRESSURE (DA-VP)

HUM-C

DA-SD By Others

DA-VP

LOCATE MINIMUM 10' FROM HUMIDIFIER

ZN-T ZN-H

HUMHI-A

LOCATE MINIMUM 10'

FROM HUMIDIFIER

LOCATED 2/3 DOWN THE

LONGEST DUCT RUN

- RELIEF AIR VELOCITY PRESSURE (RLF-VP) PREFILTER DIFF PRESSURE (PFILT-DP)
- FINAL FILTER DIFFERENTIAL PRESSURE (FFILT-DP)
- HIGH HUMIDITY LIMIT (HUMHI-A)•HUMIDIFIER STATUS (HUM-S)

NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPI
BLDG-P	BUILDING STATIC PRESSURE	0-10VDC	INPUT	ANALOG
COND-A	CONDENSATE ALARM	DRY CONTACT MAINTAINED	INPUT	BINARY
CLG-O	COOLING OUTPUT	0-10VDC	OUTPUT	ANALOG
CC-T	COOLING COIL DISCHARGE TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
CP-C	COOLING PUMP COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
CP-S	COOLING PUMP STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
DA-H	DISCHARGE AIR HUMIDITY	0-10VDC	INPUT	ANALOG
DA-T	DISCHARGE AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
DAPHI-A	DISCHARGE AIR HIGH DUCT PRESSURE	DRY CONTACT MAINTAINED	INPUT	BINARY
DA1-P	DISCHARGE AIR STATIC PRESSURE 1	0-10VDC	INPUT	ANALOG
DA-VP	DISCHARGE AIR VELOCITY PRESSURE	0-10VDC	INPUT	ANALOG
EAD-O	EXHAUST AIR DAMPER OUTPUT	0-10VDC	OUTPUT	ANALOG
FFILT-DP	FINAL FILTER DIFFERENTIAL PRESSURE	0-10VDC	INPUT	ANALOG
FRZ-S	FREEZE STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
HUMHI-A	HUMIDITY HIGH LIMIT	DRY CONTACT MAINTAINED	INPUT	BINARY
HUM-O	HUMIDIFIER OUTPUT	0-10VDC	OUTPUT	ANALOG
HUM-S	HUMIDIFIER STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
HUM-C	HUMIDIFIER COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
MA-T	MIXED AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
OA-H	OUTDOOR AIR HUMIDITY	0-10VDC	INPUT	ANALOG
OA-T	OUTDOOR AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
OAD-O	OUTDOOR AIR DAMPER OUTPUT	0-10VDC	OUTPUT	ANALOG
OA-VP	OUTDOOR AIR VELOCITY PRESSURE	0-10VDC	INPUT	ANALOG
PFILT-DP	PREFILTER DIFFERENTIAL PRESSURE	0-10VDC	INPUT	ANALOG
RLF-VP	RELIEF AIR VELOCITY PRESSURE	0-10VDC	INPUT	ANALOG
RA-H	RETURN AIR HUMIDITY	0-10VDC	INPUT	ANALOG
RA-Q	RETURN AIR QUALITY	0-10VDC	INPUT	ANALOG
RA-T	RETURN AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
RAD-O	RETURN AIR DAMPER OUTPUT	0-10VDC	ОИТРИТ	ANALOG
RAPHI-A	RETURN AIR HIGH DUCT PRESSURE	DRY CONTACT MAINTAINED	INPUT	BINARY
RA-P	RETURN AIR STATIC PRESSURE	0-10VDC	INPUT	ANALOG
RF-O	RETURN FAN OUTPUT	0-10VDC	OUTPUT	ANALOG
RF-C	RETURN FAN COMMAND	24VAC MAINTAINED	ОИТРИТ	BINARY
RF-S	RETURN FAN STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
SFA-R	SUPPLY FAN ARRAY STATUS RESISTANCE	RESISTIVE	INPUT	ANALOG
SF-O	SUPPLY FAN OUTPUT	0-10VDC	ОИТРИТ	ANALOG
SF-C	SUPPLY FAN COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
ZN-H	ZONE HUMIDITY	SAB	INPUT	ANALOG
	OCCUPANCY STATUS DISPLAY	SAB	OUTPUT	MULTISTATE
ZN-T	ZONE TEMPERATURE	SAB	INPUT	ANALOG

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

DOC REL 05 - IFB	04/08/24
DOC REL 04-95% REVIEW	03/13/24
DOC REL 03 - 100% DD	02/08/24
DOC REL 02 - 60% DD	08/10/23

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

DATE

MARK ISSUE

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANICAL CONTROLS

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: <u>036</u>

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO.

purposes of constructing, using and maintaining this project. These documents are two dimensional, traditional plan and specification documents that are not drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

M - 7.2

2164076-036-M-7.2

AHU-2 CONTROL DIAGRAM

FOR WIRING OF SAFETY

SHUTDOWN RELAY (SDR-N)

CONTACTS, SEE

DESIGNATION ON STARTER/

VFD DETAIL.

SEQUENCE OF OPERATION: AHU-3

UNIT ENABLE:

WHEN THE NETWORK INPUT (UNITEN-MODE) UNIT ENABLE SWITCH IS SET TO OCCUPIED, THE CONTROL SEQUENCE

OCCUPIED MODE:

WILL BE ENABLED.

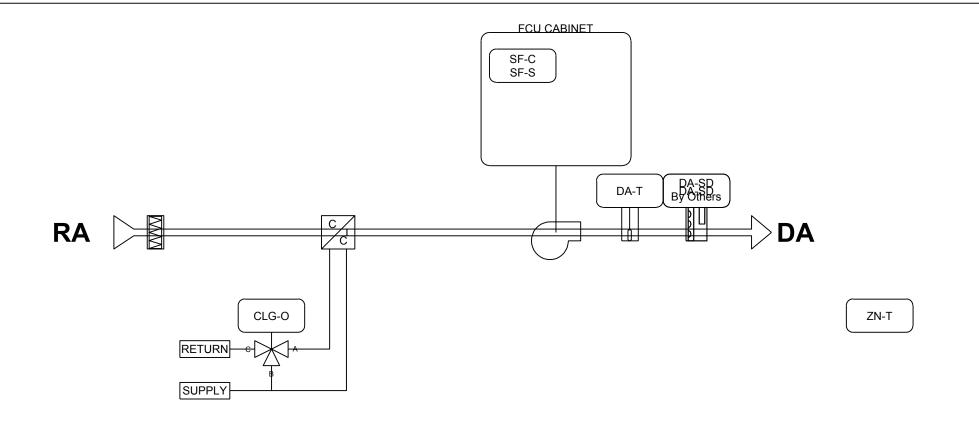
OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT (OCC-SCHEDULE). DURING OCCUPIED MODE, THE CONSTANT SPEED SUPPLY FAN (SF-C) WILL BE STARTED AND WILL RUN CONTINUOUSLY. THE COOLING COIL (CLG-O) WILL MODULATE TO MAINTAIN THE ZONE TEMPERATURE SETPOINT (ZN-SP).

UNOCCUPIED MODE:

THE UNIT WILL CYCLE ON TO MAINTAIN UNOCCUPIED ZONE SETPOINTS (CLGUNOCC-SP & AMP; HTGUNOCC-SP) DURING UNOCCUPIED PERIODS.

ADDITIONAL POINTS MONITORED BY THE FMS:

- SUPPLY FAN STATUS (SF-S)
- DISCHARGE AIR SMOKE DETECTOR (DA-SD) DISCHARGE AIR TEMPERATURE (DA-T)



	POINTS LIST: X-AHU-3						
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE			
CLG-O	COOLING OUTPUT	24VAC INCREMENTAL	OUTPUT	POSITIONADJUST			
DA-SD	DISCHARGE AIR SMOKE ALARM	DRY CONTACT MAINTAINED	INPUT	BINARY			
DA-T	DISCHARGE AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG			
SF-C	SUPPLY FAN COMMAND	24VAC MAINTAINED	OUTPUT	BINARY			
SF-S	SUPPLY FAN STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			
OCC-MODE	OCCUPANCY STATUS DISPLAY	SAB	OUTPUT	MULTISTATE			
ZN-T	ZONE TEMPERATURE	SAB	INPUT	ANALOG			
WC-ADJ	WARMER/COOLER ADJUST	SAB	INPUT	ANALOG			

ZN-T

X-AHU-3 CONTROL DIAGRAM

SEQUENCE OF OPERATION: FPVAV-1 - FPVAV-13

OCCUPIED:

NORMAL OPERATING MODE FOR OCCUPIED SPACES OR DAYTIME OPERATION. WHEN THE UNIT IS IN THE OCCUPIED MODE THE VAV SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE OCCUPIED HEATING OR COOLING SETPOINT. APPLICABLE VENTILATION AND AIRFLOW SETPOINTS SHALL BE ENFORCED. THE OCCUPIED MODE SHALL BE THE DEFAULT MODE OF THE VAV.

HEAT/COOL MODE:

THE HEAT/COOL MODE SHALL BE SET BY A COMMUNICATED VALUE OR AUTOMATICALLY BY THE VAV. IN STANDALONE OR AUTO MODE THE VAV SHALL COMPARE THE PRIMARY AIR TEMPERATURE WITH THE CONFIGURED AUTO CHANGEOVER SETPOINT TO DETERMINE IF THE AIR IS "HOT"" OR ""COLD"". HEATING MODE IMPLIES THE PRIMARY AIR TEMPERATURE IS HOT. COOLING MODE IMPLIES THE PRIMARY AIR TEMPERATURE IS COLD."

HEAT/COOL SETPOINT:

THE SPACE TEMPERATURE SETPOINT SHALL BE DETERMINED EITHER BY A LOCAL (E.G., THUMBWHEEL) SETPOINT, THE VAV DEFAULT SETPOINT OR A COMMUNICATED VALUE. THE VAV SHALL USE THE LOCALLY STORED DEFAULT SETPOINTS WHEN NEITHER A LOCAL SETPOINT NOR COMMUNICATED SETPOINT IS PRESENT. IF BOTH A LOCAL SETPOINT AND COMMUNICATED SETPOINT EXIST, THE VAV SHALL USE THE COMMUNICATED VALUE.

COOLING MODE:

WHEN THE UNIT IS IN COOLING MODE, THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE COOLING SETPOINT BY MODULATING THE AIRFLOW BETWEEN THE ACTIVE COOLING MINIMUM AIRFLOW SETPOINT TO THE MAXIMUM COOLING AIRFLOW SETPOINT. THE VAV SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE COOLING SETPOINT TO DETERMINE THE REQUESTED COOLING CAPACITY OF THE UNIT. THE OUTPUTS WILL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED COOLING CAPACITY. WHEN IN THE OCCUPIED MODE, THE CONTROLLER SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE COOLING SETPOINT TO DETERMINE THE REQUESTED COOLING CAPACITY OF THE UNIT. THE OUTPUTS SHALL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED COOLING CAPACITY.

HEATING MODE:

WHEN THE UNIT IS IN HEATING MODE, THE VAV CONTROLLER SHALL MAINTAIN THE SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT BY MODULATING THE AIRFLOW BETWEEN THE ACTIVE HEATING MINIMUM AIRFLOW SETPOINT TO THE MAXIMUM HEATING AIRFLOW SETPOINT. THE VAV CONTROLLER SHALL USE THE MEASURED SPACE TEMPERATURE AND THE ACTIVE HEATING SETPOINT TO DETERMINE THE REQUESTED HEATING CAPACITY

OF THE UNIT. THE OUTPUTS WILL BE CONTROLLED BASED ON THE UNIT CONFIGURATION AND THE REQUESTED HEATING CAPACITY.

INTERMITTENT FAN CONTROL:

DURING ALL OCCUPIED MODES, WHEN THE UNIT IS IN COOLING MODE, AS THE SPACE TEMPERATURE FALLS BELOW THE ACTIVE COOLING SETPOINT, THE FAN WILL WORK IN CONJUNCTION WITH REHEAT SEQUENCE, AND THE VAV DAMPER SHALL MODULATE TO ITS MINIMUM COOLING AIRFLOW SETPOINT. UPON A CONTINUED DROP IN TEMPERATURE, THE TERMINAL FAN SHALL BE ENERGIZED AND MODULATES BETWEEN THE MINIMUM AND MAXIMUM FAN AIRFLOW SETPOINTS TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT. IF THE FAN REACHES ITS MAXIMUM FAN AIRFLOW SETPOINT, THE VAV CONTROLLER SHALL INITIATE REHEAT (AS DESCRIBED BELOW) TO MAINTAIN SPACE TEMPERATURE AT THE ACTIVE HEATING SETPOINT, WHILE THE FAN CONTINUES TO OPERATE AT THE MAXIMUM FAN AIRFLOW SETPOINT. DURING THE UNOCCUPIED MODE, THE VAV DAMPER SHALL MODULATE FULLY CLOSED. THE TERMINAL FAN AND HEAT (AS DESCRIBED BELOW) SHALL CYCLE AS NEEDED TO MAINTAIN SPACE TEMPERATURE ABOVE THE UNOCCUPIED HEATING SETPOINT.

DISCHARGE AIR TEMP SENSOR:

A DISCHARGE AIR TEMP (DA-T) SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

UNIT ENABLE:

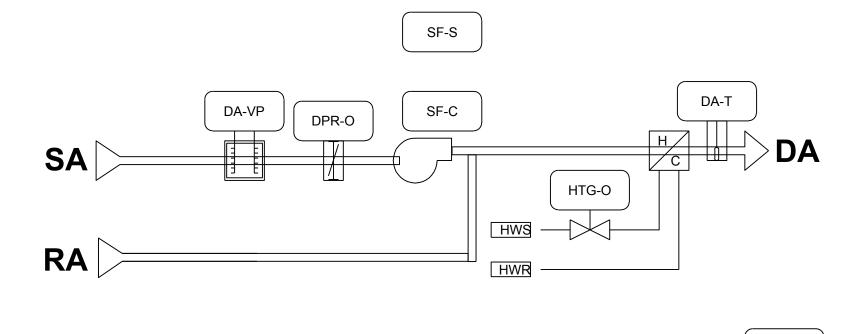
A NETWORK UNIT ENABLE (UNITEN-MODE) SIGNAL WILL CONTROL THE MODE OF THE BOX.

NETWORK WARMUP-COOLDOWN:

WARM-UP AND COOLDOWN MODES WILL BE ACTIVATED BY A NETWORK COMMAND (WC-C). WHEN THE ZONE TEMPERATURE (ZN-T) IS BELOW THE EFFECTIVE HEATING SETPOINT (EFFHTG-SP), THE BOX DAMPER WILL BE MODULATED TO ALLOW WARM AIR FLOW. THEN REHEAT COIL TO MAINTAIN THE ZONE TEMPERATURE (ZN-T), WHEN THE BOX EFFECTIVE HEATING SETPOINT IS SATISFIED THE FLOW WILL REMAIN AT THE WARM-UP MINIMUM POSITION UNTIL THE WARM COMMAND HAS BEEN REMOVED.

ADDITIONAL POINTS MONITORED BY THE FMS:

SUPPLY FAN STATUS (SF-S)



$\widehat{}$	FPVAV-1 -	FPVAV-13	CONTROL	DIAGRAM
		·	·	

	POINTS LIST: FPVAV-1 - FPVAV-13							
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE				
HTGO	HEATINGOUTPUT	0-10VDC	OUTPUT	ANALOG				
DA-T	DISCHARGEAIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG				
SF-S	SUPPLY FAN STATUS	DRYCONTACTMAINTAINED	INPUT	BINARY				
SF-C	SUPPLY FAN COMMAND	24VACMAINTAINED	OUTPUT	BINARY				
DPR-O	SUPPLYAIRDAMPEROUTPUT	INTEGRATED	OUTPUT	POSITIONADJUST				
DA-VP	DISCHARGEAIR VELOCITY PRESSURE	INTEGRATED DIGITAL VELOCITY PRESSURE	INPUT	ANALOG				
OCC-MODE	OCCUPANCY STATUS DISPLAY	SAB	OUTPUT	MULTISTATE				
ZN-T	ZONETEMPERATURE	SAB	INPUT	ANALOG				
WC-ADJ	WARMER/COOLER ADJUST	SAB	INPUT	ANALOG				

X-B31A CONTROL CABINET X-B31A-A X-B31A-EN X-B31A	GLOBAL LOCATED IN THE SHADE ON THE NORTH SIDE OF THE BUILDING	EMER-STOP	MIX1-O	HWP1-C HWP1-S HWP2-C HWP2-S HWP2	SHWS1-T	TO BUILDING HEATING COILS
X-B31B CONTROL CABINET X-B-31B-S X-B31B-EN X-B31B-EN X-B31B	BP2	HWS-T	MIX2-O	P-2-C P-2-S P-3-C P-3-S P-2 O P-3	SHWS2-T	——————————————————————————————————————

	POINTS LIST: X-B-31A & X-B-31B						
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE			
X-B31A-EN	X-B31A ENABLE	24VAC MAINTAINED	OUTPUT	BINARY			
X-B31A-A	X-B31A ALARM	DRY CONTACT MAINTAINED	INPUT	BINARY			
X-B31A-S	X-B31A STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			
X-B31B-EN	X-B31B ENABLE	24VAC MAINTAINED	ОИТРИТ	BINARY			
X-B31B-A	X-B31B ALARM	DRY CONTACT MAINTAINED	INPUT	BINARY			
X-B31B-S	X-B31B STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			
EMER-STOP	EMERGENCY SHUTDOWN	DRY CONTACT MAINTAINED	INPUT	BINARY			
MIX1-O	MIXING VALVE OUTPUT	0-10VDC	OUTPUT	ANALOG			
MIX2-O	MIXING VALVE OUTPUT	0-10VDC	ОИТРИТ	ANALOG			
HWS-T	HW SUPPLY TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG			
SHWS1-T	SECONDARY HW SUPPLY TEMPERATURE 1	NICKEL 1K RTD	INPUT	ANALOG			
SHWS2-T	SECONDARY HW SUPPLY TEMPERATURE 2	NICKEL 1K RTD	INPUT	ANALOG			
HWR-T	HW RETURN TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG			
SHWR1-T	SECONDARY HW RETURN TEMPERATURE 1	NICKEL 1K RTD	INPUT	ANALOG			
SHWR2-T	SECONDARY HW RETURN TEMPERATURE 2	NICKEL 1K RTD	INPUT	ANALOG			
HWP1-C	HW PUMP 1 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY			
HWP1-O	HW PUMP 1 OUTPUT	0-10VDC	OUTPUT	ANALOG			
HWP1-S	HW PUMP 1 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			
HWP2-C	HW PUMP 2 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY			
HWP2-O	HW PUMP 2 OUTPUT	0-10VDC	ОИТРИТ	ANALOG			
HWP2-S	HW PUMP 2 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			
P2-C	PUMP 2 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY			
P2-O	PUMP 2 OUTPUT	0-10VDC	ОИТРИТ	ANALOG			
P2-S	PUMP 2 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			
P3-C	PUMP 3 COMMAND	24VAC MAINTAINED	ОИТРИТ	BINARY			
P3-O	PUMP 3 OUTPUT	0-10VDC	ОИТРИТ	ANALOG			
P3-S	PUMP 3 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY			

	POINTS LIST: X	X-B-31A & X-B-31B		
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE
-B31A-EN	X-B31A ENABLE	24VAC MAINTAINED	ОИТРИТ	BINARY
-B31A-A	X-B31A ALARM	DRY CONTACT MAINTAINED	INPUT	BINARY
-B31A-S	X-B31A STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
-B31B-EN	X-B31B ENABLE	24VAC MAINTAINED	ОИТРИТ	BINARY
-B31B-A	X-B31B ALARM	DRY CONTACT MAINTAINED	INPUT	BINARY
-B31B-S	X-B31B STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
MER-STOP	EMERGENCY SHUTDOWN	DRY CONTACT MAINTAINED	INPUT	BINARY
IIX1-O	MIXING VALVE OUTPUT	0-10VDC	ОИТРИТ	ANALOG
IIX2-O	MIXING VALVE OUTPUT	0-10VDC	ОИТРИТ	ANALOG
WS-T	HW SUPPLY TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
HWS1-T	SECONDARY HW SUPPLY TEMPERATURE 1	NICKEL 1K RTD	INPUT	ANALOG
HWS2-T	SECONDARY HW SUPPLY TEMPERATURE 2	NICKEL 1K RTD	INPUT	ANALOG
WR-T	HW RETURN TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
HWR1-T	SECONDARY HW RETURN TEMPERATURE 1	NICKEL 1K RTD	INPUT	ANALOG
HWR2-T	SECONDARY HW RETURN TEMPERATURE 2	NICKEL 1K RTD	INPUT	ANALOG
WP1-C	HW PUMP 1 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
WP1-O	HW PUMP 1 OUTPUT	0-10VDC	ОИТРИТ	ANALOG
WP1-S	HW PUMP 1 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
WP2-C	HW PUMP 2 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
WP2-O	HW PUMP 2 OUTPUT	0-10VDC	OUTPUT	ANALOG
WP2-S	HW PUMP 2 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
2-C	PUMP 2 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
2-0	PUMP 2 OUTPUT	0-10VDC	OUTPUT	ANALOG
2-S	PUMP 2 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
3-C	PUMP 3 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
3-0	PUMP 3 OUTPUT	0-10VDC	OUTPUT	ANALOG

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036 These documents are instruments of service for use solely A/E PROJECT NO. with respect to this project. DSD and DSD's consultants 2164076 shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to

purposes of constructing, using and maintaining this project. These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access,

routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

reproduce DSD's instruments of service solely for the SHEET NO. M - 7.3

2164076-036-M-7.3

Facilities Planning &

Management

REGISTRATION SEAL

DOC REL 05 - IFB

MARK ISSUE

DESIGNER

DEPT MGR

TITLE:

PROJECT MGR

DRAWN CHECKED

DOC REL 04-95% REVIEW 03/13/24

DOC REL 03 - 100% DD 02/08/24

DOC REL 02 - 60% DD 08/10/23

04/08/24

DATE

E. ERNVALL E. ERNVALL

V. LALONDE

K. RUPP

WSU REUTHER

LIBRARY MEP

5401 CASS AVENUE DETROIT, MICHIGAN

REUTHER LIBRARY

MECHANICAL CONTROLS

X-AHU-3, FPVAV,

C. TRIERWEILER

Design Services

5454 Cass Ave.

Detroit MI 48202

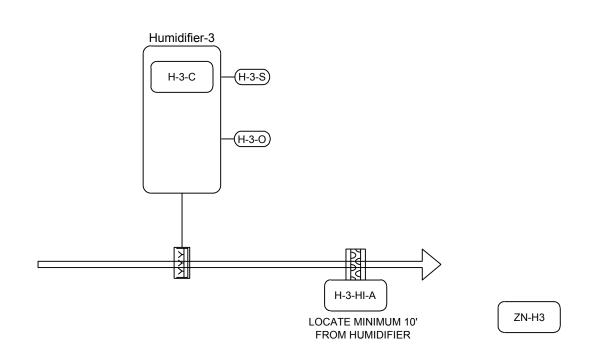
GHAFARI

17101 MICHIGAN AVENUE

TEL +1.313.441.3000 www.ghafari.com

DEARBORN, MI 48126-2736 USA

(3) X-B-31A & X-B-31B CONTROL DIAGRAM

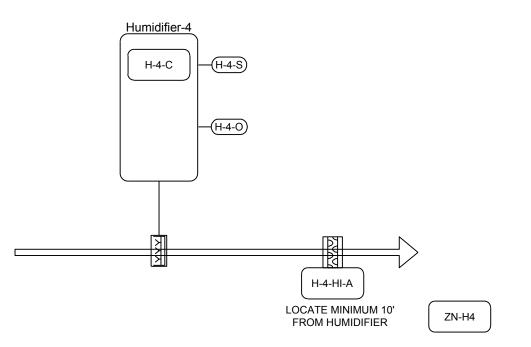


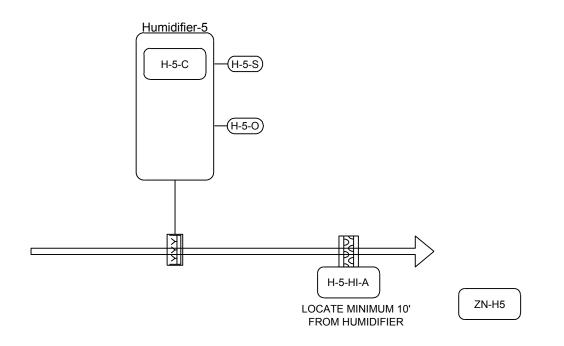
SEQUENCE OF OPERATION: H-3 - H-5

HUMIDIFICATION:

THE HUMIDIFIER WILL BE ENABLED (H-X-C) AND MODULATE (H-X-O) TO MAINTAIN THE ZONE RELATIVE HUMIDITY SETPOINT AS SENSED BY THE ZONE RELATIVE HUMIDITY SENSOR (ZN-HX). THE HUMIDITY HIGH LIMIT WILL OVERRIDE THE OUTPUT IF NECESSARY TO PREVENT THE DISCHARGE AIR HUMIDITY FROM EXCEEDING DISCHARGE HUMIDITY HIGH LIMIT SETPOINT..

ADDITIONAL POINTS MONITORED BY THE FMS:





H-3 - H-5 CONTROL DIAGRAM

POINTS LIST: H-3 - H-5 POINTTYPE DATATYPE NAME DESCRIPTION

ZN-H5 ZONE HUMIDITY H-5 SAB

H-3-HI-A	H-3 HIGH LIMIT	DRY CONTACT MAINTAINED	INPUT	BINARY
H-3-O	H-3 OUTPUT	0-10VDC	OUTPUT	ANALOG
H-3-S	H-3 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
H-3-C	H-3 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
ZN-H3	ZONE HUMIDITY H-3	SAB	INPUT	ANALOG
H-4-HI-A	H-4 HIGH LIMIT	DRY CONTACT MAINTAINED	INPUT	BINARY
H-4-0	H-4 OUTPUT	0-10VDC	OUTPUT	ANALOG
H-4-S	H-4 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
H-4-C	H-4 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY
ZN-H4	ZONE HUMIDITY H-4	SAB	INPUT	ANALOG
H-5-HI-A	H-5 HIGH LIMIT	DRY CONTACT MAINTAINED	INPUT	BINARY
H-5-O	H-5 OUTPUT	0-10VDC	OUTPUT	ANALOG
H-5-S	H-5 STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY
H-5-C	H-5 COMMAND	24VAC MAINTAINED	OUTPUT	BINARY

INPUT

ANALOG

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

DDC REL 05 - IFB 04/08/24 DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23 MARK ISSUE DATE			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 04-95% REVIEW 03/13/24 DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23			
DDC REL 03 - 100% DD 02/08/24 DDC REL 02 - 60% DD 08/10/23		DOC REL 05 - IFB	04/08/24
DDC REL 02 - 60% DD 08/10/23		DOC REL 04-95% REVIEW	03/13/24
		DOC REL 03 - 100% DD	02/08/24
MARK ISSUE DATE		DOC REL 02 - 60% DD	08/10/23
	MARK	ISSUE	DATE

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> MECHANICAL CONTROLS HUMIDIFIERS

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

M - 7.4

2164076-036-M-7.4

SEQUENCE OF OPERATION: VAV-1, VAV-14, VAV-20 - VAV-22

OCCUPIED MODE:

WHEN THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE OCCUPIED HEATING (EFFHTG-SP) AND COOLING (EFFCLG-SP) SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-F) AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE (ZN-T) ABOVE THE COOLING SETPOINT (EFFCLG-SP), THE PRIMARY AIR DAMPER (DPR-O) WILL INCREASE THE CFM (SA-F) AND THERE WILL BE NO MECHANICAL HEATING. ON A DROP IN ZONE TEMPERATURE (ZN-T) BELOW THE HEATING SETPOINT (EFFHTG-SP), THE REHEAT COIL WILL BE USED TO MAINTAIN THE ZONE TEMPERATURE (ZN-T) AND THE DAMPER (DPR-O) IS CONTROLLED TO PROVIDE A MINIMUM CFM (SA-F).

UNOCCUPIED MODE:

WHEN IN THIS MODE, WHILE THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE UNOCCUPIED HEATING (EFFHTG-SP) AND COOLING (EFFCLG-SP) SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-F) AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE (ZN-T) ABOVE THE UNOCCUPIED COOLING SETPOINT (EFFCLG-SP), THE PRIMARY AIR DAMPER (DPR-O) WILL INCREASE THE CFM (SA-F) (IF AVAILABLE) AND THERE WILL BE NO MECHANICAL HEATING. ON A DROP IN ZONE TEMPERATURE (ZN-T) BELOW THE UNOCCUPIED HEATING SETPOINT (EFFHTG-SP), THE REHEAT COIL WILL BE USED TO MAINTAIN THE ZONE TEMPERATURE (ZN-T) AND THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-F).

DISCHARGE AIR TEMP SENSOR:

A DISCHARGE AIR TEMP (DA-T) SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

UNIT ENABLE:

A NETWORK UNIT ENABLE (UNITEN-MODE) SIGNAL WILL CONTROL THE MODE OF THE BOX. ADD "LOCAL REHEAT CONTROL" FROM TRANE 500.

NETWORK WARMUP-COOLDOWN:

WARM-UP AND COOLDOWN MODES WILL BE ACTIVATED BY A NETWORK COMMAND (WC-C). WHEN THE ZONE TEMPERATURE (ZN-T) IS BELOW THE EFFECTIVE HEATING SETPOINT (EFFHTG-SP), THE BOX DAMPER WILL BE MODULATED TO ALLOW WARM AIR FLOW, THEN REHEAT COIL TO MAINTAIN THE ZONE TEMPERATURE (ZN-T). WHEN THE BOX EFFECTIVE HEATING SETPOINT IS SATISFIED THE FLOW WILL REMAIN AT THE WARM-UP MINIMUM POSITION UNTIL THE WARM COMMAND HAS BEEN REMOVED.

SEQUENCE OF OPERATION: VAV-2 - VAV-13 & VAV-15 - VAV-19

OCCUPIED MODE:

WHEN THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE OCCUPIED HEATING (EFFHTG-SP) AND COOLING (EFFCLG-SP) SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-F) AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE (ZN-T) ABOVE THE COOLING SETPOINT (EFFCLG-SP), THE PRIMARY AIR DAMPER (DPR-O) WILL INCREASE THE CFM (SA-F) AND THERE WILL BE NO MECHANICAL HEATING. ON A DROP IN ZONE TEMPERATURE (ZN-T) BELOW THE HEATING SETPOINT (EFFHTG-SP), THE SUPPLEMENTARY HEAT COIL WILL BE FULLY UTILIZED BEFORE THE REHEAT COIL IS ENABLED AND THE DAMPER (DPR-O) IS CONTROLLED TO PROVIDE A MINIMUM CFM (SA-F).

UNOCCUPIED MODE:

WHEN IN THIS MODE, WHILE THE ZONE TEMPERATURE (ZN-T) IS BETWEEN THE UNOCCUPIED HEATING (EFFHTG-SP) AND COOLING (EFFCLG-SP) SETPOINTS (INSIDE OF THE BIAS), THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE MINIMUM CFM (SA-F) AND THERE WILL BE NO MECHANICAL HEATING. ON A RISE IN ZONE TEMPERATURE (ZN-T) ABOVE THE UNOCCUPIED COOLING SETPOINT (EFFCLG-SP), THE PRIMARY AIR DAMPER (DPR-O) WILL INCREASE THE CFM (SA-F) (IF AVAILABLE) AND THERE WILL BE NO MECHANICAL HEATING. ON A DROP IN ZONE TEMPERATURE (ZN-T) BELOW THE UNOCCUPIED HEATING SETPOINT (EFFHTG-SP), THE REHEAT COIL WILL BE FULLY UTILIZED BEFORE THE SUPPLEMENTARY HEAT IS ENABLED AND THE PRIMARY AIR DAMPER (DPR-O) WILL BE AT THE

DISCHARGE AIR TEMP SENSOR:

A DISCHARGE AIR TEMP (DA-T) SENSOR IS PROVIDED ON EACH BOX FOR MONITORING PURPOSES.

UNIT ENABLE:

A NETWORK UNIT ENABLE (UNITEN-MODE) SIGNAL WILL CONTROL THE MODE OF THE BOX.

NETWORK WARMUP-COOLDOWN:

WARM-UP AND COOLDOWN MODES WILL BE ACTIVATED BY A NETWORK COMMAND (WC-C). WHEN THE ZONE TEMPERATURE (ZN-T) IS BELOW THE EFFECTIVE HEATING SETPOINT (EFFHTG-SP), THE BOX DAMPER WILL BE MODULATED TO ALLOW WARM AIR FLOW, THEN REHEAT COIL, THEN SUPPLEMENTAL HEATING COIL TO MAINTAIN THE ZONE TEMPERATURE (ZN-T). WHEN THE BOX EFFECTIVE HEATING SETPOINT IS SATISFIED THE FLOW WILL REMAIN AT THE WARM-UP MINIMUM POSITION UNTIL THE WARM COMMAND HAS BEEN REMOVED.

SEQUENCE OF OPERATION: X-CUH-1 - X-CUH-3 & X-UH-1

SUPPLY FAN CONTROL:

THIS FAN IS SINGLE SPEED THAT WILL RUN CONTINUOUSLY WHEN HEATING.

TEMPERATURE CONTROL:

THE UNIT WILL CONTROL TO MAINTAIN THE ZONE TEMPERATURE SET POINT AS SENSED BY THE ZONE TEMPERATURE SENSOR.

OCCUPIED MODE:

THE OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT.

UNOCCUPIED MODE:

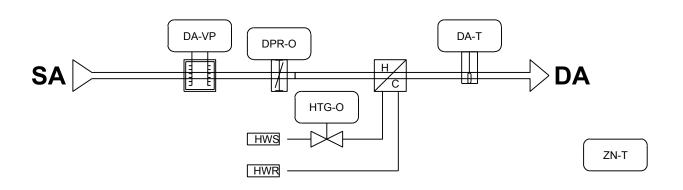
THE ZONE TEMPERATURE SET POINT WILL BE SETBACK IN UNOCCUPIED MODE.

HEATING COIL:

THE HEATING COIL WILL CYCLE OPEN AND CLOSED TO MAINTAIN THE TEMPERATURE SET POINT.

ADDITIONAL POINTS MONITORED BY THE FMS:

SUPPLY FAN STATUS (SF-S)

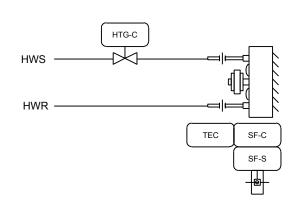


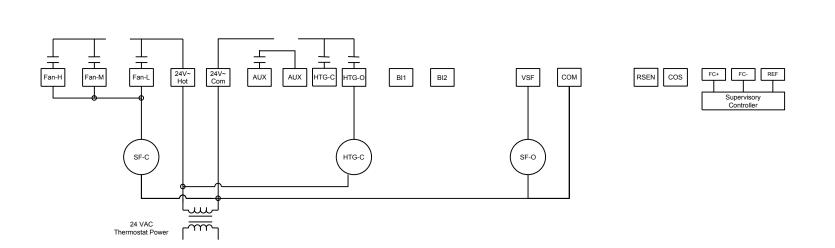
VAV-1, VAV-14, VAV-20 - VAV-22 CONTROL DIAGRAM

A HTG-O HWS HWR



VAV-2 - VAV-13 & VAV-15 - VAV-19 CONTROL DIAGRAM





X-CUH-1 -	X-CUH-3 &	X-UH-1	CONTROL	DIAGRAM

POINTS LIST: VAV-1, VAV-14, VAV-20 - VAV-22					
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE	
HTG-O	HEATING OUTPUT	0-10VDC	OUTPUT	ANALOG	
DA-T	DISCHARGE AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG	
DPR-O	SUPPLY AIR DAMPER OUTPUT	INTEGRATED	OUTPUT	POSITIONADJUST	
DA-VP	DISCHARGE AIR VELOCITY PRESSURE	INTEGRATED DIGITAL VELOCITY PRESSURE	INPUT	ANALOG	
OCC-MODE	OCCUPANCY STATUS DISPLAY	SAB	OUTPUT	MULTISTATE	
ZN-T	ZONE TEMPERATURE	SAB	INPUT	ANALOG	
WC-ADJ	WARMER/COOLER ADJUST	SAB INPUT ANALOG		ANALOG	

POINTS LIST: VAV-2 - VAV-13, VAV-15 - VAV-19				
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE
HTG-O	HEATING OUTPUT	0-10VDC	ОИТРИТ	ANALOG
DA-T	DISCHARGE AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG
SUPHTG-C	SUPPLEMENTAL HEATING COMMAND	24VAC MAINTAINED	ОИТРИТ	BINARY
DPR-O	SUPPLY AIR DAMPER OUTPUT	INTEGRATED	ОИТРИТ	POSITIONADJUST
DA-VP	DISCHARGE AIR VELOCITY PRESSURE	INTEGRATED DIGITAL VELOCITY PRESSURE	INPUT	ANALOG
OCC-MODE	OCCUPANCY STATUS DISPLAY	SAB	ОИТРИТ	MULTISTATE
ZN-T	ZONE TEMPERATURE	SAB	INPUT	ANALOG
WC-ADJ	WARMER/COOLER ADJUST	SAB	INPUT	ANALOG

POINTS LIST: VAV-2 - VAV-13, VAV-15 - VAV-19					
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYPE	
HTG-O	HEATING OUTPUT	0-10VDC	ОИТРИТ	ANALOG	
DA-T	DISCHARGE AIR TEMPERATURE	NICKEL 1K RTD	INPUT	ANALOG	
SUPHTG-C	SUPPLEMENTAL HEATING COMMAND	24VAC MAINTAINED	ОИТРИТ	BINARY	
DPR-O	SUPPLY AIR DAMPER OUTPUT	INTEGRATED	ОИТРИТ	POSITIONADJUST	
DA-VP	DISCHARGE AIR VELOCITY PRESSURE	INTEGRATED DIGITAL VELOCITY PRESSURE	INPUT	ANALOG	
OCC-MODE	OCCUPANCY STATUS DISPLAY	SAB	ОИТРИТ	MULTISTATE	
ZN-T	ZONE TEMPERATURE	SAB	INPUT	ANALOG	
WC-ADJ	WARMER/COOLER ADJUST	SAB	INPUT	ANALOG	

POINTS LIST: X-CUH-1 - X-CUH-3 & X-UH-1

24VAC MAINTAINED

SIGNAL

DRY CONTACT MAINTAINED | INPUT

DESCRIPTION

SUPPLY FAN STATUS

ZONE TEMPERATURE

SUPPLY FAN COMMAND 24VAC MAINTAINED

HTG-C HEATING OUTPUT

POINTTYPE DATATYPE

OUTPUT

OUTPUT

INPUT

BINARY

BINARY

BINARY

ANALOG

WAYNE STATE

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
701
\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
4

	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23
MARK	ISSUE	DATE

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

MECHANICAL CONTROLS

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: <u>036</u>

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop | DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

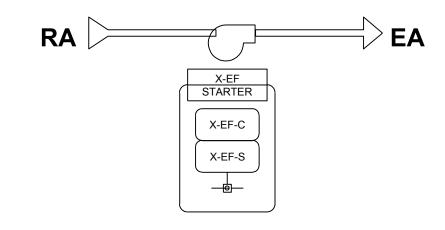
M - 7.5

2164076-036-M-7.5

SEQUENCE OF OPERATION: X-EF

ADDITIONAL POINTS MONITORED/CONTROLLED BY THE FMS:

- X-EF STATUS (X-EF-S)
- X-EF COMMAND (X-EF-C)



X-EF CONTROL DIAGRAM

POINTS LIST: X-EF				
NAME	DESCRIPTION	SIGNAL	POINTTYPE	DATATYF
X-EF-C	X-EF COMMAND	24VAC MAINTAINED	ОИТРИТ	BINARY
X-EF-S	X-EF STATUS	DRY CONTACT MAINTAINED	INPUT	BINARY

POINTS LIST: X-FT

SIGNAL

| HEATING OUTPUT | 24VAC MAINTAINED | OUTPUT

|POINTTYPE|DATATYPE

INPUT

POINTS LIST: X-RHC-14 - X-RHC-16

SIGNAL

INPUT

0-10VDC

SAB

DESCRIPTION

HTG-O HEATING OUTPUT

ZN-T ZONE TEMPERATURE

DA-T DISCHARGE AIR TEMPERATURE NICKEL 1K RTD INPUT

BINARY

ANALOG

POINTTYPE DATATYPE

ANALOG

ANALOG

ANALOG

purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not

drawings. Final dimensions, equipment access,

routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

NAME DESCRIPTION

ZONE TEMPERATURE SAB

GHAFARI

WAYNE STATE UNIVERSITY

Facilities Planning &

Management

Design Services

5454 Cass Ave.

Detroit MI 48202

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23

DESIGNER	E. ERNVALL
DRAWN	E. ERNVALL
CHECKED	C. TRIERWEILER
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

DATE

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> MECHANICAL CONTROLS X-EF, X-FT, X-RHC

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: 036

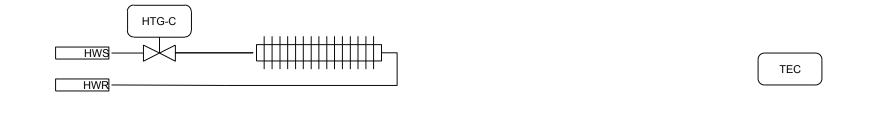
These documents are instruments of service for use solely A/E PROJECT NO. with respect to this project. DSD and DSD's consultants 2164076 shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to

reproduce DSD's instruments of service solely for the SHEET NO.

M - 7.6

intended to be used by the contractor as shop | DSD FILE NAME

2164076-036-M-7.6



SEQUENCE OF OPERATION: X-FT

TEMPERATURE CONTROL:

THE UNIT WILL CONTROL TO MAINTAIN THE ZONE TEMPERATURE SET POINT AS SENSED BY THE ZONE

TEMPERATURE SENSOR. OCCUPIED MODE:

THE OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT.

SEQUENCE OF OPERATION: X-CUH-1 - X-CUH-3 & X-UH-1

ADDITIONAL POINTS MONITORED BY THE FMS:

DISCHARGE AIR TEMPERATURE (DA-T)

THE UNIT WILL CONTROL TO MAINTAIN THE ZONE TEMPERATURE SETPOINT.

THE OCCUPANCY MODE WILL BE CONTROLLED VIA A NETWORK INPUT.

THE HEATING COIL WILL MODULATE OPEN AND CLOSE IN SEQUENCE TO MAINTAIN THE TEMPERATURE SETPOINT.

TEMPERATURE CONTROL:

OCCUPIED MODE:

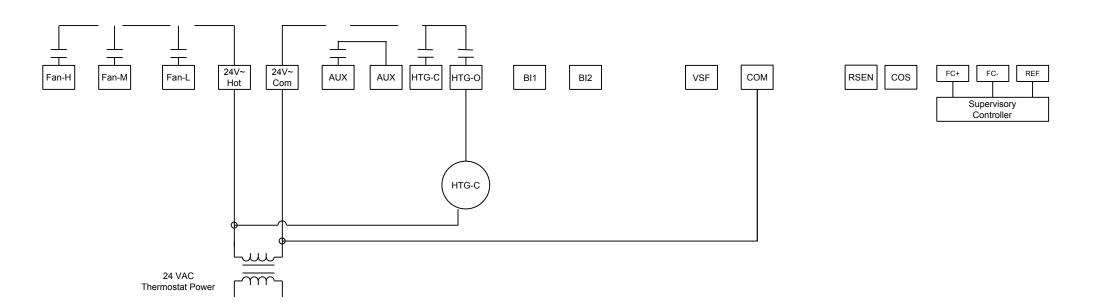
HEATING COIL:

UNOCCUPIED MODE:

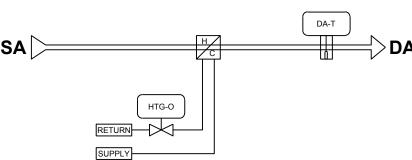
THE ZONE TEMPERATURE SET POINT WILL BE SETBACK IN UNOCCUPIED MODE.

HEATING COIL:

THE HEATING COIL WILL CYCLE OPEN AND CLOSED TO MAINTAIN THE TEMPERATURE SET POINT.



X-FT CONTROL DIAGRAM



TEC

AUX-C

X-RHC-14 - X-RHC-16 CONTROL DIAGRAM

ELECTRICAL SYMBOLS LEGEND

		ELECI	RICAL SYMBOLS LEG	PENL) -
	OUTLETS		FIXTURES		SERVICE and EQUIPMENT
	SINGLE RECEPTACLE (120 VOLT)		LIGHT FIXTURE	TVSS	
	DUPLEX RECEPTACLE	<u>∪</u>	STRIP FIXTURE	VFD	TRANSIENT VOLTAGE SURGE SUPPRESSION
	EMERGENCY RECEPTACLE		EMERGENCY LIGHT FIXTURE	<u> </u>	VARIABLE FREQUENCY DRIVE
	DOUBLE DUPLEX RECEPTACLE	-	IN-GRADE LIGHT FIXTURE		TRANSFORMER
F	FLUSH FLOOR BOX	O ₄	SPOTLIGHT (number of heads shown)		DISCONNECT SWITCH
s	SURFACE FLOOR BOX	⊗	EXIT SIGN (face & direction as shown)	⊼ ⊠	MAGNETIC STARTER
	SPECIAL EQUIPMENT RECEPTACLE	igoplus	WALL MOUNT LIGHT FIXTURE	\boxtimes	COMB. STARTER
	TELEPHONE OUTLET	\oplus	CEILING LIGHT FIXTURE		PANELBOARD, SURFACE MOUNTED
		<u> </u>	TRACK & FIXTURE		PANELBOARD, FLUSH MOUNTED
	DATA OUTLET	$\stackrel{-}{\smile}$	STREET TYPE POLE FIXTURE		WEATHERHEAD
	TELEPHONE / DATA OUTLET	⊶ □	POLE MOUNTED LIGHT FIXTURE	<u>D</u>	UTILITY METER, AS REQUIRED
PP	POWER POLE	+□	EXTERIOR WALL MOUNT LIGHT FIXTURE	@	DIGITAL EQUIPMENT METER, AS REQUIRED
)	JUNCTION BOX		WALLPACK LIGHT FIXTURE	CT	CURRENT TRANSFORMERS
)	WALL JUNCTION BOX	•	SPECIAL PURPOSE LIGHT FIXTURE	©	GENERATOR, KW SHOWN
]	PULL (JUNCTION) BOX		HIGH BAY LIGHT FIXTURE	<u></u>	TELEPHONE TERMINAL BOARD
	UNDERFLOOR JUNCTION BOX	п4	EMERGENCY EGRESS LIGHT FIXTURE	Ţ.	GROUND CONNECTION PER N.E.C.
)	CEILING MOUNTED WIFI	D ₃	(number of heads shown)	WW	WIREWAY
	SWITCHES	\nearrow	DOCK LIGHT FIXTURE	TS1	TRANSFER SWITCH
			CIRCUITRY and RACEWAYS	\Box	ENCLOSED CIRCUIT BREAKER
	SINGLE-POLE SWITCH THREE-WAY SWITCH		CONDUIT INSTALLED (by E.C.)	HE	CAPACITOR
	FOUR-WAY SWITCH		CONDUIT INSTALLED (by e.c.) CONDUIT INSTALLED (by others)		CONTROL
	SWITCH WITH PILOT LIGHT		CONDUIT STUB UP	Ū	THERMOSTAT
0	THERMAL OVERLOAD SWITCH			_	HUMIDISTAT
	MANUAL MOTOR SWITCH		CONDUIT STUB DOWN	\oplus	
1	KEY SWITCH	1,3	HOME RUN (with circuit numbers)	⊖ PC	PHOTOCELL (voltage as required)
	TIME SWITCH		END OF CONDUIT RUN	TC	TIME CLOCK (24 hour U.O.N.)
1	DIMMER SWITCH	 3	END OF CONDUIT RUN, CAP AND STAKE	3 3	PUSHBUTTON STATION (number of buttons indicated)
_		\longrightarrow	"CONDUIT RUN CONTINUES" INDICATION		CONTROL TRANSFORMER
	MECHANICAL		FLEXIBLE PIGTAILS/CONNECTIONS		LIGHTING CONTACTOR
/	SINGLE PHASE MOTOR		WIREMOLD AS SPECIFIED		IRRIGATION CONTROLLER (120 volt
/	THREE PHASE MOTOR		PLUGMOLD AS SPECIFIED		xxVA connection by x/C)
	RESISTANCE HEATER, KW SHOWN		BUS DUCT	1	
w	PIPE TRACE HEATER	—UFD—	UNDERFLOOR DUCT	(OS1)	WALL MOUNT DUAL TECHNOLOGY SENSOR
₹	ELECTRIC UNIT HEATER		SOUND and SIGNAL	\triangle	
1)	ELECTRIC WATER HEATER	S	SPEAKER	(0\$2)	OCCUPANCY SENSOR / PHOTOCELL
	NURSE CALL	(S)+	WALL MOUNTED SPEAKER	V ∧	
	NURSE CALL CONTROLLER	₩.	WALL MOUNTED SPEAKER / CLOCK COMB	3O (0S3)	ULTRASONIC SENSOR - 360° - 2 CIRCUIT
<u>u</u>]	MASTER STATION		SINGLE FACE CLOCK	\bigvee	
J 	EMERGENCY PULL STATION	Ф Ф	DUAL FACE CLOCK	\triangle	DUAL TECHNOLOGY CENCOD 200° 4000 CO ET
]	EMERGENCY PUSH STATION	VI	VIDEO INPUT	(OS4)	DUAL TECHNOLOGY SENSOR - 360° - 1000 SQ FT
		AV	AUDIO / VIDEO INPUT	<u>^</u>	
3	CODE BLUE STATION PENDENT INTERFACE	BO	BELL	(OS5)	DUAL TECHNOLOGY SENSOR - 360° - 500 SQ FT
	BED / LIGHT INTERFACE	⊗	VOLUME CONTROL	Ψ	
 ก	SINGLE BED STATION	B	BUZZER	oc	SWITCH STYLE OCCUPANCY SENSOR
<u>u</u> 2]	DUAL BED STATION	©	CHIME		
	DOME LIGHT	▼	TELEVISION OUTLET	PP	POWER PACK
<u>~</u>	STAFF REGISTER STATION	M	MICROPHONE OUTLET		
<u>S</u>	STAFF STATION	(1)	INTERCOM OUTLET	\$⊤	DIGITAL TIME SWITCH
]		•	CAMERA	Фτ	DIGITAL TIME SWITCH
<u> 기</u>	DUTY STATION		DOOR CONTACT		FIRE ALARM
	<u>DESIGNATIONS</u>		MOTION DETECTOR	(3)	SMOKE DETECTOR
>	DEMOLITION NOTE		BEAM DETECTOR	$\stackrel{\sim}{\Theta}$	HEAT DETECTOR
)	PLAN NOTE	KP KP	KEY PAD	Ě	DUCT SMOKE DETECTOR
7	ADDENDUM NOTE	SSCP		F/S	DUCT SMOKE DETECTOR
		SSCP CCTV	CCTV CONTROL PANEL		HORN
					HORN & LIGHT
		CR	CARD READER		SPEAKER
		SS	STUDENT STATION	▭	SPEAKER & LIGHT
		AS	ADMINISTRATION STATION	E	PULL STATION
		TS	TEACHER STATION		FIRE ALARM CONTROL PANEL
		G≺	GLASS BREAK	ANN	ANNUNCIATOR PANEL
				EOL_	END OF LINE DEVICE
\ ⊏	NERAL ELECTRICA		=9	_ EOL_ } €	REMOTE INDICATING LIGHT, WALL MTD.
<i>_</i>	TALINAL LLLO INIOA		<u></u>	1	REMOTE INDICATING LIGHT, WALL WITD. REMOTE INDICATING LIGHT, CLG. MTD.
				*	MACNETIC DOOD HOLDED

MAGNETIC DOOR HOLDER

F FLOW SWITCH (furnished by FP/C)

FCPS FIRE CONTROL POWER SUPPLY

MONITOR MODULE CONTROL MODULE

∇ VISUAL ONLY UNIT

TAMPER SWITCH (furnished by FP/C)

CARBON MONOXIDE DETECTOR

FIREFIGHTER COMMUNICATION JACK

GE

- 1. ALL WALL AND FLOOR PENETRATIONS ARE TO BE SEALED TO MAINTAIN ORIGINAL
- 2. ALL CONDUITS TO BE FIELD ROUTED ALONG EXISTING PIPING AND STRUCTURAL
- 3. THE DIVISION 26 CONTRACTORS SHALL VISIT THE PROJECT AND DETERMINE THE EXACT EXTENT OF THE DEMOLITION WORK REQUIRED BEFORE BIDDING THE PROJECT.
- 4. REMOVE ALL EXISTING OBSOLETE EXPOSED CONDUIT, WIRE AND UNUSED EQUIPMENT WHERE WORK IS BEING DONE EXCEPT ITEMS NOTED OTHERWISE.
- 5. WHERE BUILDING SURFACES ARE DAMAGED BY THE REMOVAL OF OLD WORK, SURFACES SHALL BE PATCHED TO MATCH ADJACENT.
- 6. EXISTING WORK WHICH IS PRESENTLY CONCEALED AND WHICH WILL REMAIN CONCEALED AND DOES NOT INTERFERE WITH ANY NEW WORK OF ANY TRADE NEED NOT BE REMOVED. HOWEVER, ALL CONDUIT SHALL BE CAPPED BELOW FINISH SURFACE AND THEN PATCHED TO MATCH, OR AS NOTED.
- 7. EXISTING OPENINGS, WHICH ARE TO BE REUSED, SHALL BE MODIFIED OR ENLARGED TO SUIT THE NEW SYSTEMS AS REQUIRED. PROVIDE ALL REQUIRED CUTTING AND PATCHING.
- 8. IF ASBESTOS IS PRESENT, IT WILL BE REMOVED OR RENDERED HARMLESS UNDER SEPARATE CONTRACT BY THE OWNER.
- 9. THE DIVISION 26 CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING THE EXISTING WALLS TO MATCH THE ADJACENT SURFACES BEHIND ALL SURFACE MOUNTED
- 10. CONTRACTOR SHALL FIELD VERIFY ALL EQUIPMENT VOLTAGES AND LOADS PRIOR TO INSTALLING SERVICE TO EQUIPMENT.
- 11. DRAWINGS ARE BASED ON EXISTING RECORD DOCUMENT AND CASUAL FIELD OBSERVATION. REPORT ANY DISCREPANCIES TO ENGINEER FOR CLARIFICATION.

ABBREVIATIONS LEGEND

A AC ACU-	AMPS ABOVE COUNTER AIR CONDITIONING UNIT	GC GFI GND	GENERAL CONTRACTOR GROUND FAULT INTERUPTER GROUND	P P- PB	POLE PUMP PULL BOX
AFF	ABOVE FINISHED FLOOR	GND	GROUND	PNL	PANEL
AHJ AHU-	AUTHORITY HAVING JURISDICTION AIR HANDLING UNIT	H-	HUMIDIFIER	PRV- PVC	POWER ROOF VENTILATOR POLY VINYL CLORIDE
AIC	AMPS INTERUPTING CAPACITY	HID HOA	HIGH INTENSITY DISCHARGE HAND-OFF-AUTO SELECTOR SWITCH	PWR	POWER
AS ATS	ABOVE SHELF AUTOMATIC TRANSFER SWITCH	HP	HORSEPOWER	RECEPT	RECEPTACLE
		HR HVAC	HOUR HEATING/VENTILATING/AIR CONDITIONING	RGC RTU-	RIGID GALVANIZED STEEL CONDUIT ROOF TOP UNIT
B- BC	BOILER BELOW COUNTER	IG	ISOLATED GROUND		
BLDG	BUILDING	IMC	INTERMEDIATE METAL CONDUIT	SF- SPEC	SUPPLY FAN SPECIFICATIONS
CHLR- CND (C)	CHILLER CONDUIT	JB	JUNCTION BOX	SW SWBD	SWITCH SWITCHBOARD
CKT CKT BKR	CIRCUIT CIRCUIT BREAKER	LC	LIGHT CONTROL	TCC	TEMPERATURE CONTROL CONTRACTOR
CT-	COOLING TOWER	LT LTG	LIGHT LIGHTING	TR TS	TAMPER PROOF RECEPTACLE TAMPER PROOF SWITCH
CU- CUH-	CONDENSING UNIT CABINET UNIT HEATER	LT FLEX	LIQUID TIGHT FLEXIBLE METAL CONDUIT	TYP	TYPICAL
DFU-	DUCT FURNACE	MAX	MAXIMUM	UF	UNDER FLOOR
DISC	DISCONNECT	MC MCC	MECHANICAL CONTRACTOR MOTOR CONTROL CENTER	UH-	UNIT HEATER
DWG DWH-	DRAWING DOMESTIC WATER HEATER	MIN MLO	MINIMUM MAIN LUG ONLY	UL UNO	UNDERWRITERS' LABORATORIES, INC. UNLESS NOTED OTHERWISE
		MT	MOUNT	V	VOLTS
EBB- EC	ELECTRIC BASEBOARD ELECTRICAL CONTRACTOR	MTD MTG	MOUNTED MOUNTING	VL	VERIFY LOCATION WITH OWNER
EF- EM	EXHAUST FAN EMERGENCY	MUAU-	MAKE-UP AIR UNIT	W	WATTS
EMT	ELECTRICAL METALLIC TUBING	NC	NORMALLY CLOSED	W/	WITH
EWC EXIST (E)	ELECTRIC WATER COOLER EXISTING	NIC	NOT IN CONTRACT	W/O WP	WITHOUT WEATHER PROOF
. ,		NL NO	NIGHT LIGHT NORMALLY OPEN	XFMR	TRANSFORMER
FLA FLEX	FULL LOAD AMPS FLEXIBLE CONDUIT	NTS	NOT TO SCALE	VLINIL	INANGI URWER

FLR

FSES F/S FU-

FLUOR

FLOOR

FLUORESCENT

FIRE/SMOKE **FURNACE**

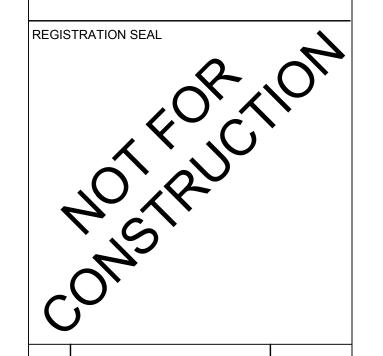
FOOD SERVICE EQUIP. SUPPLIER



Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
·	DOC REL 02 - 60% DD	08/10/23

DESIGNER	B. THELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS

DATE

V. LAL□NDE

K. RUPP PROJECT MGR WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

ELECTRICAL SYMBOLS, ABBREVIATIONS, NOTES, AND SCHEDULES

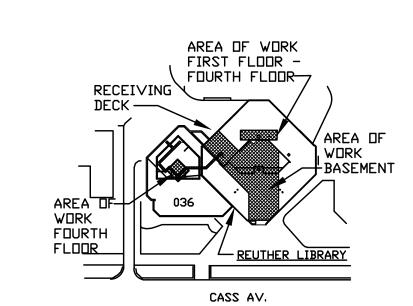
SCALE: N.T.S.

WSU PROJECT #: 036-350464 WSU BLDG NAME: REUTHER LIBRARY WSU BLDG #: <u>036</u>

> A/E PROJECT NO. 2164076

DEPT MGR

2164076-036-E-0.1



These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to

reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not drawings. Final dimensions, equipment access,

routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.



- NO WORK DONE IN THIS AREA, UNLESS NOTED OTHERWISE.
- 2 EXISTING DEVICE TO REMAIN.
- 3 EXISTING EQUIPMENT TO REMAIN.
- DISCONNECT & REMOVE EXISTING DEVICE. REMOVE ASSOCIATED CONDUIT & WIRE.
- DISCONNECT & REMOVE EXISTING EQUIPMENT. REMOVE ASSOCIATED CONDUIT & WIRE.
- DISCONNECT & REMOVE EXISTING EQUIPMENT.
 ASSOCIATED CONDUIT & WIRE TO REMAIN FOR NEW EQUIPMENT.

GHAFARI

Facilities Planning &

Management

Design Services

5454 Cass Ave.

Detroit MI 48202

WAYNE STATE UNIVERSITY

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

	DOC REL 05 - IFB	04/08/2
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/2
Ü	DOC REL 02 - 60% DD	08/10/23

		 00, 20,
/ARK	ISSUE	DATE

DESIGNER	B. THELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> ELECTRICAL BASEMENT FLOOR PLAN DEMOLITION

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

CASS AV. WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036



RECEIVING DECK —

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

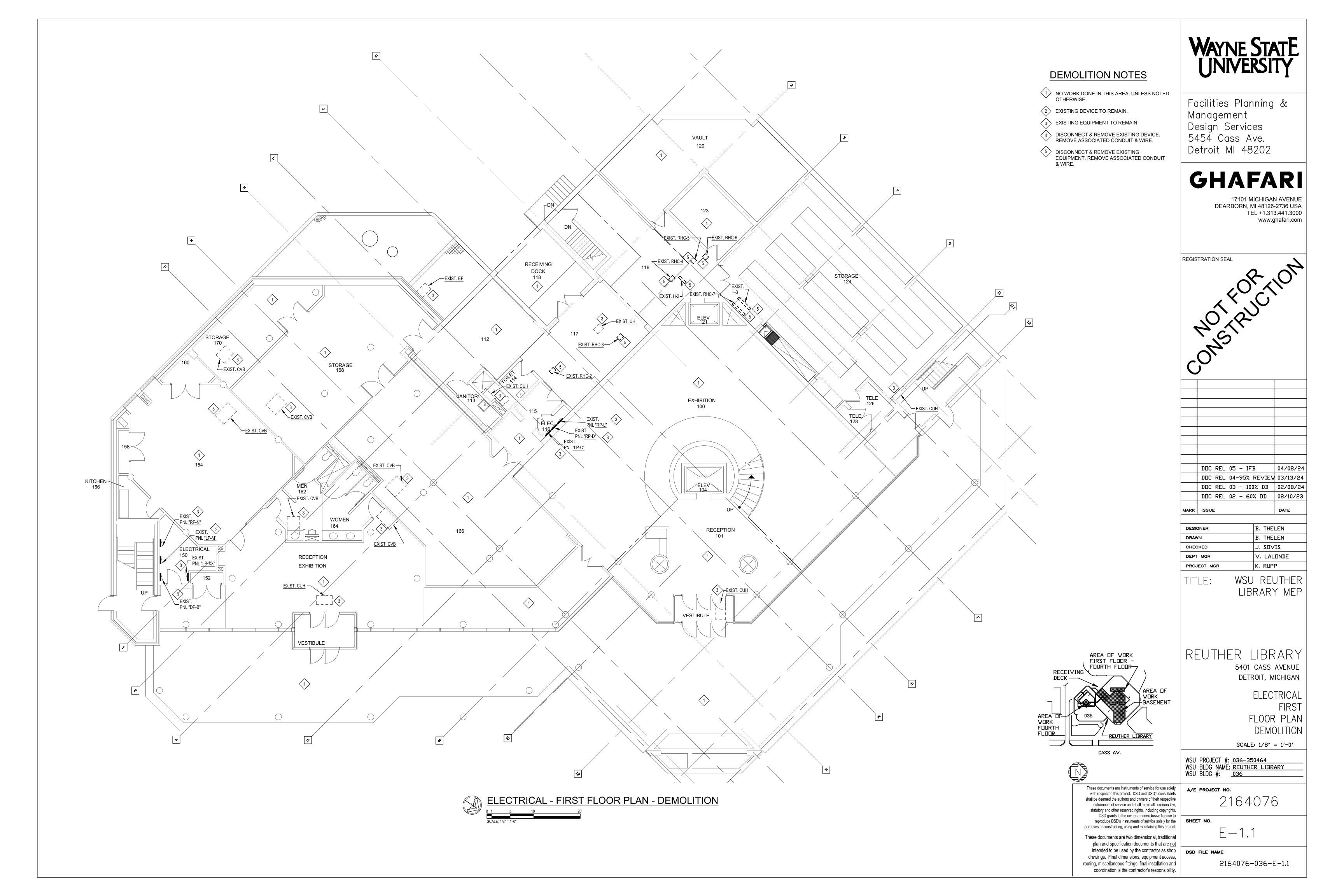
AREA OF WORK FIRST FLOOR – FOURTH FLOOR

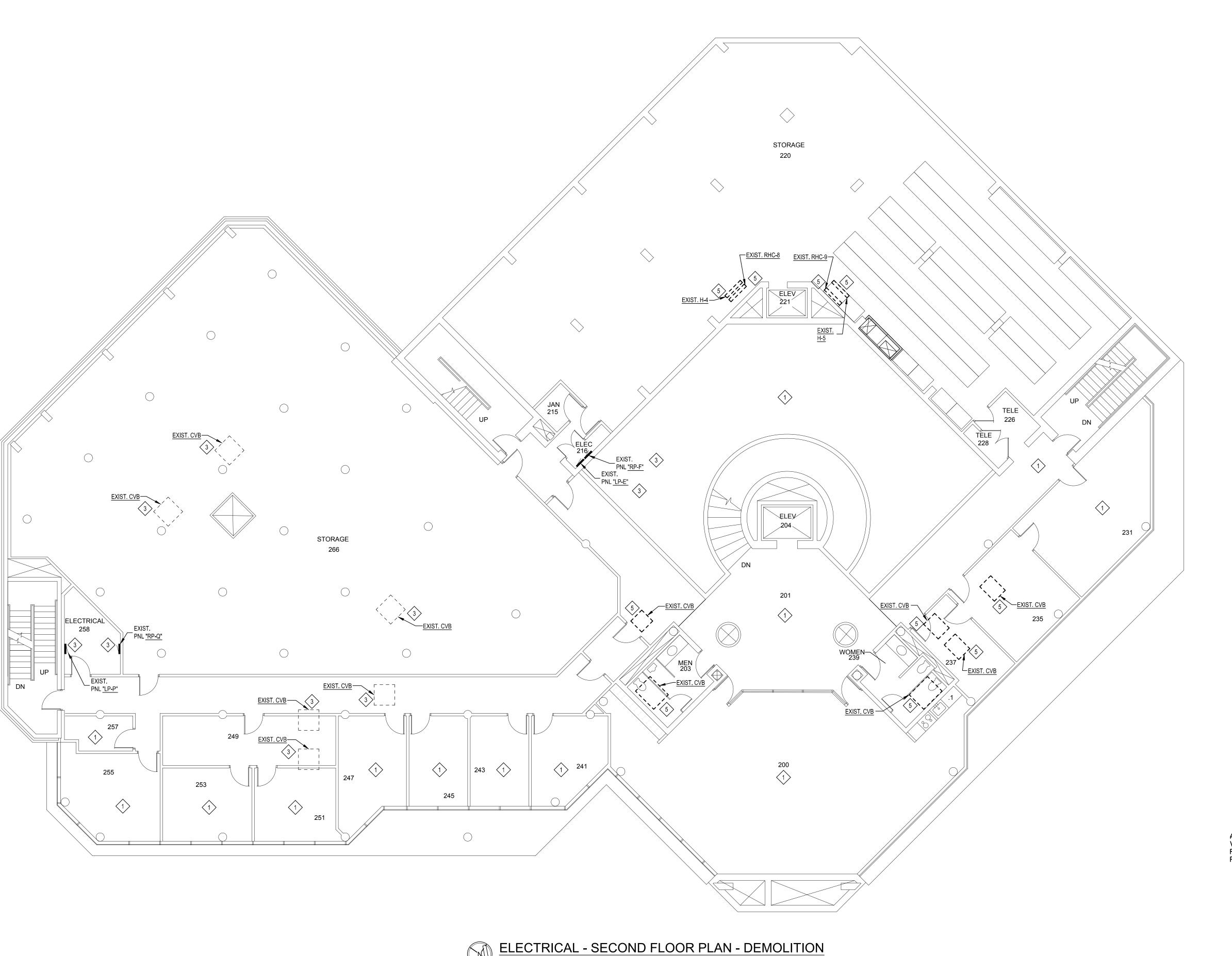
These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

E-1.0





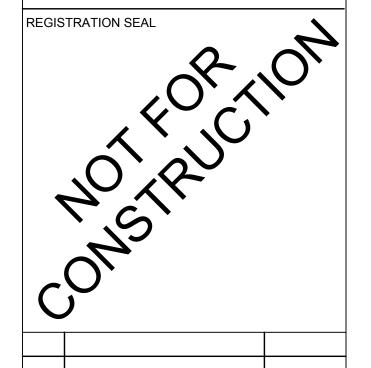
- NO WORK DONE IN THIS AREA, UNLESS NOTED OTHERWISE.
- 2 EXISTING DEVICE TO REMAIN.
- 3 EXISTING EQUIPMENT TO REMAIN.
- DISCONNECT & REMOVE EXISTING DEVICE.
 REMOVE ASSOCIATED CONDUIT & WIRE.
- DISCONNECT & REMOVE EXISTING EQUIPMENT. REMOVE ASSOCIATED CONDUIT & WIRE.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



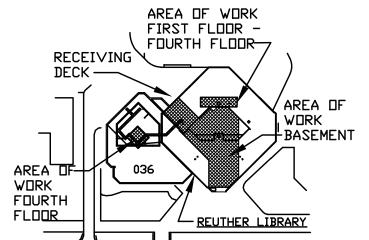
	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23

DATE

B. THELEN DESIGNER

DESIGNER	D. INELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP



CASS AV.

with respect to this project. DSD and DSD's consultants

shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to

purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not

drawings. Final dimensions, equipment access,

routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> ELECTRICAL SECOND FLOOR PLAN DEMOLITION

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

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036 These documents are instruments of service for use solely

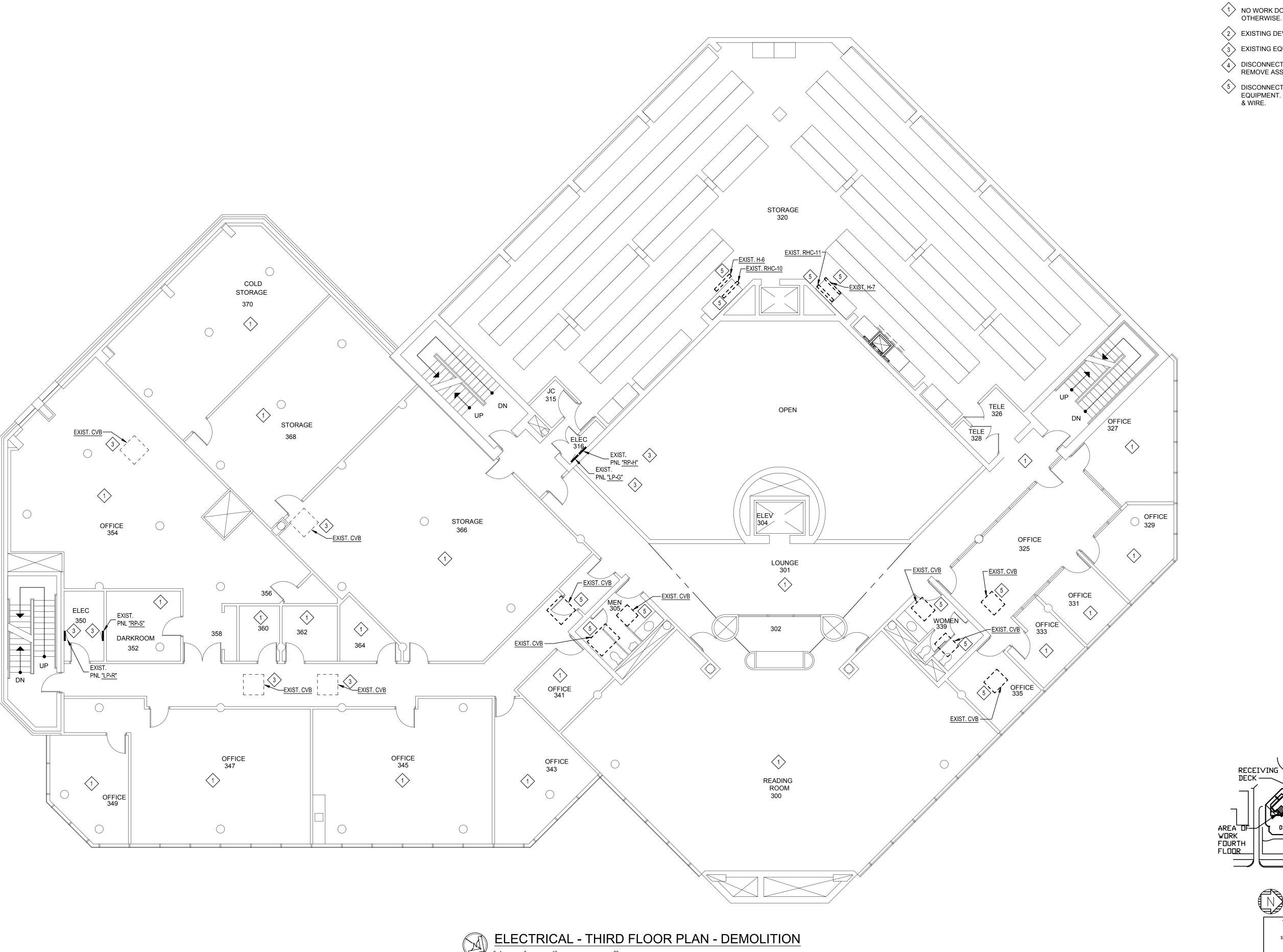
A/E PROJECT NO.

2164076

reproduce DSD's instruments of service solely for the SHEET NO.

E-1.2

intended to be used by the contractor as shop DSD FILE NAME



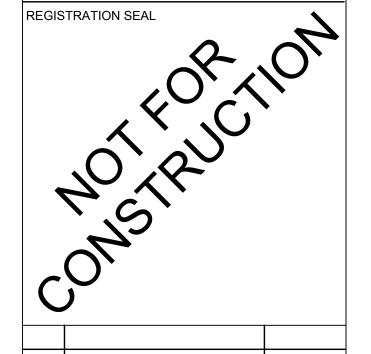
- NO WORK DONE IN THIS AREA, UNLESS NOTED OTHERWISE.
- 2 EXISTING DEVICE TO REMAIN.
- 3 EXISTING EQUIPMENT TO REMAIN.
- DISCONNECT & REMOVE EXISTING DEVICE.
 REMOVE ASSOCIATED CONDUIT & WIRE.
- DISCONNECT & REMOVE EXISTING EQUIPMENT. REMOVE ASSOCIATED CONDUIT & WIRE.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23

DESIGNER	B. THELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS
DEPT MGR	V. LAL□NDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

DATE

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> ELECTRICAL THIRD FLOOR PLAN DEMOLITION

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

CASS AV.

AREA OF WORK FIRST FLOOR – FOURTH FLOOR

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

- REUTHER LIBRARY

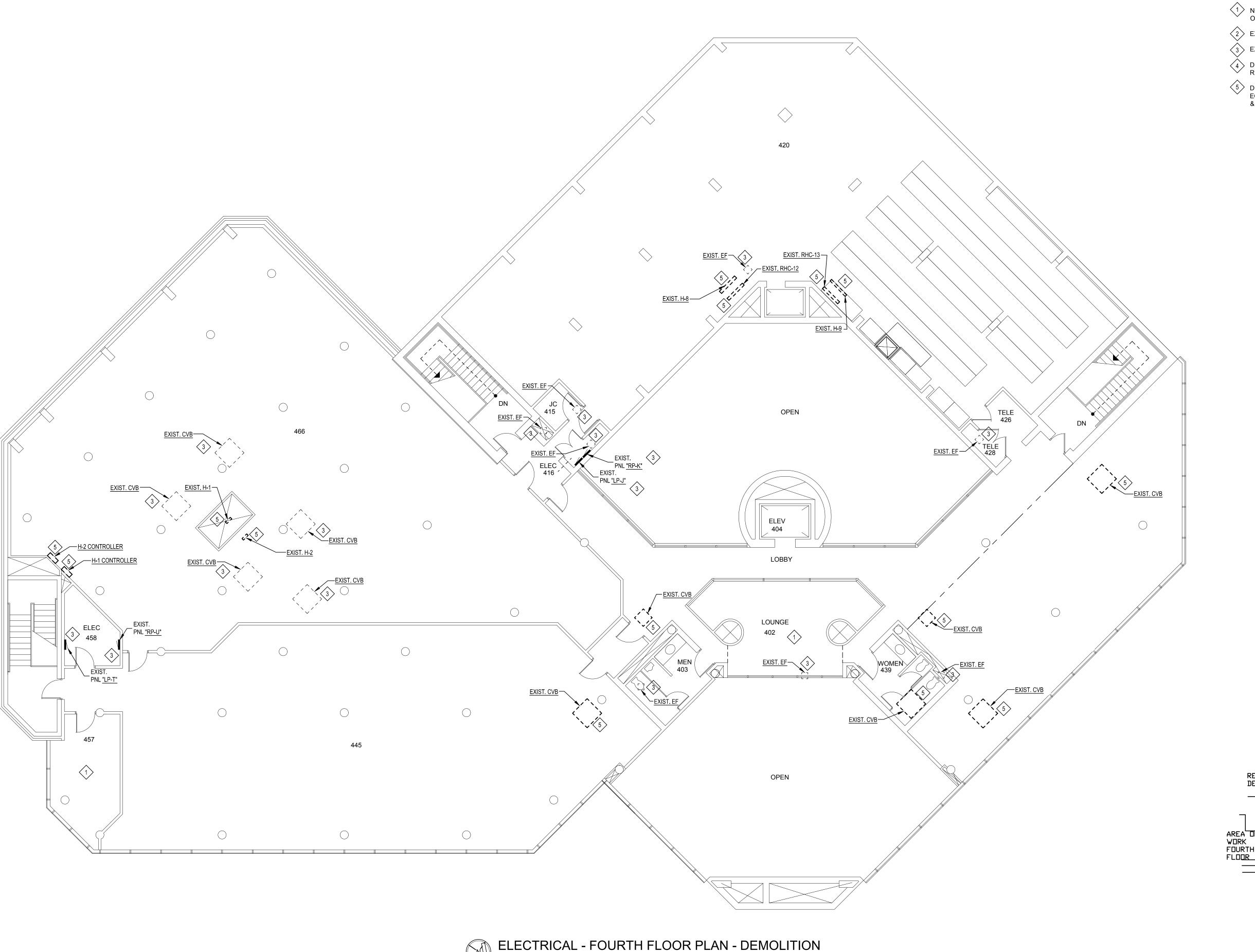
These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

E-1.3



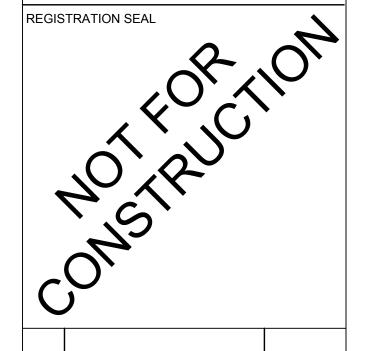
- NO WORK DONE IN THIS AREA, UNLESS NOTED OTHERWISE.
- 2 EXISTING DEVICE TO REMAIN.
- 3 EXISTING EQUIPMENT TO REMAIN.
- DISCONNECT & REMOVE EXISTING DEVICE.
 REMOVE ASSOCIATED CONDUIT & WIRE.
- DISCONNECT & REMOVE EXISTING EQUIPMENT. REMOVE ASSOCIATED CONDUIT & WIRE.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	DOC REL 02 - 60% DD	08/10/23

MARK ISSUE

DESIGNER DRAWN B. THELEN CHECKED J. SDVIS
CHECKED J. SOVIS
DEPT MGR V. LALONDE
PROJECT MGR K. RUPP

WSU REUTHER LIBRARY MEP

DATE

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> ELECTRICAL FOURTH FLOOR PLAN DEMOLITION

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

RECEIVING DECK —

AREA OF WORK FIRST FLOOR – FOURTH FLOOR

CASS AV.

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO.

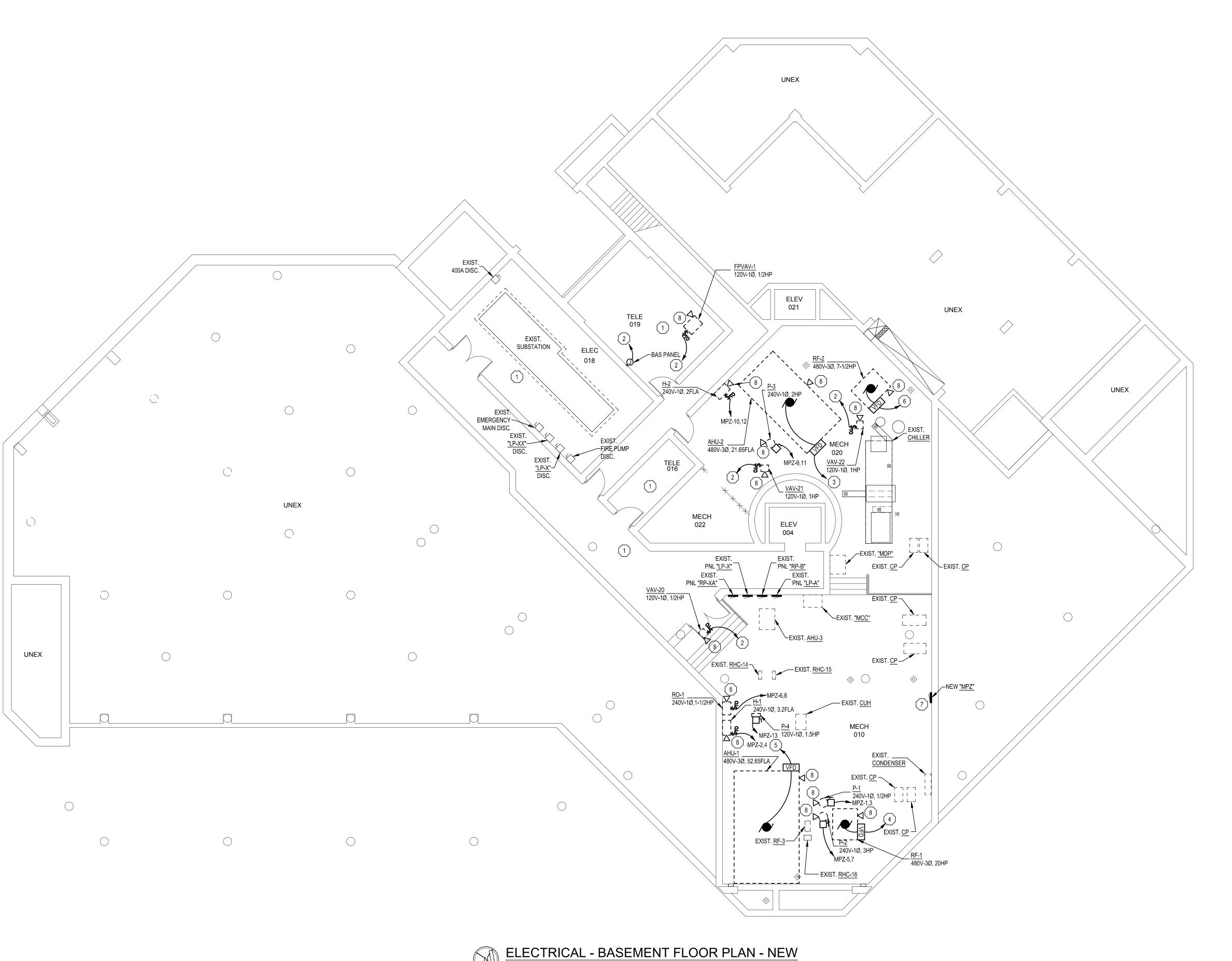
purposes of constructing, using and maintaining this project. These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

E - 1.4



ELECTRICAL KEY NOTES

- 1) NO WORK IN THIS AREA, UNLESS NOTED OTHERWISE.
- 2 CONTRACTOR SHALL CIRCUIT TO NEAREST AVAILABLE 20A CIRCUIT.
- 3 CONTRACTOR SHALL REPLACE EXISTING 60A FUSES IN MCC WITH NEW 30A FUSES. NEW FUSES SHALL MATCH EXISTING TYPE.
- 4 CONTRACTOR SHALL REPLACE EXISTING 20A FUSES IN MCC WITH NEW 35A FUSES. NEW FUSES SHALL MATCH EXISTING
- 5 CONTRACTOR SHALL REPLACE EXISTING 125A FUSES IN MCC WITH NEW 70A FUSES. NEW FUSES SHALL MATCH EXISTING TYPE.
- 6 CONTRACTOR SHALL REUSE EXISTING CIRCUIT FOR NEW EQUIPMENT.
- 7 CONTRACTOR SHALL PROVIDE AND INSTALL NEW 20KVA MINI POWER ZONE WITH 480V INPUT AND 120/240V OUTPUT. MINI POWER ZONE SHALL BE SQUARE D, OR APPROVED EQUAL. COORDINATE LOCATION IN FIELD. CONTRACTOR SHALL PROVIDE AND INSTALL NEW 50A-2P BREAKER IN EXISTING PANEL "LP-A" TO FEED NEW POWER ZONE.
- 8 CONTRACTOR SHALL INSTALL NEW DATA DEVICE FOR MECHANICAL UNIT. DATA SHALL TERMINATE TO NEAREST I.T. CLOSET.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
·	DOC REL 02 - 60% DD	08/10/23

DESIGNER	B. THELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

DATE

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> ELECTRICAL BASEMENT FLOOR PLAN

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

CASS AV. WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036



RECEIVING DECK —

AREA DI WORK FOURTH FLOOR

These documents are instruments of service for use solely with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to reproduce DSD's instruments of service solely for the SHEET NO. purposes of constructing, using and maintaining this project.

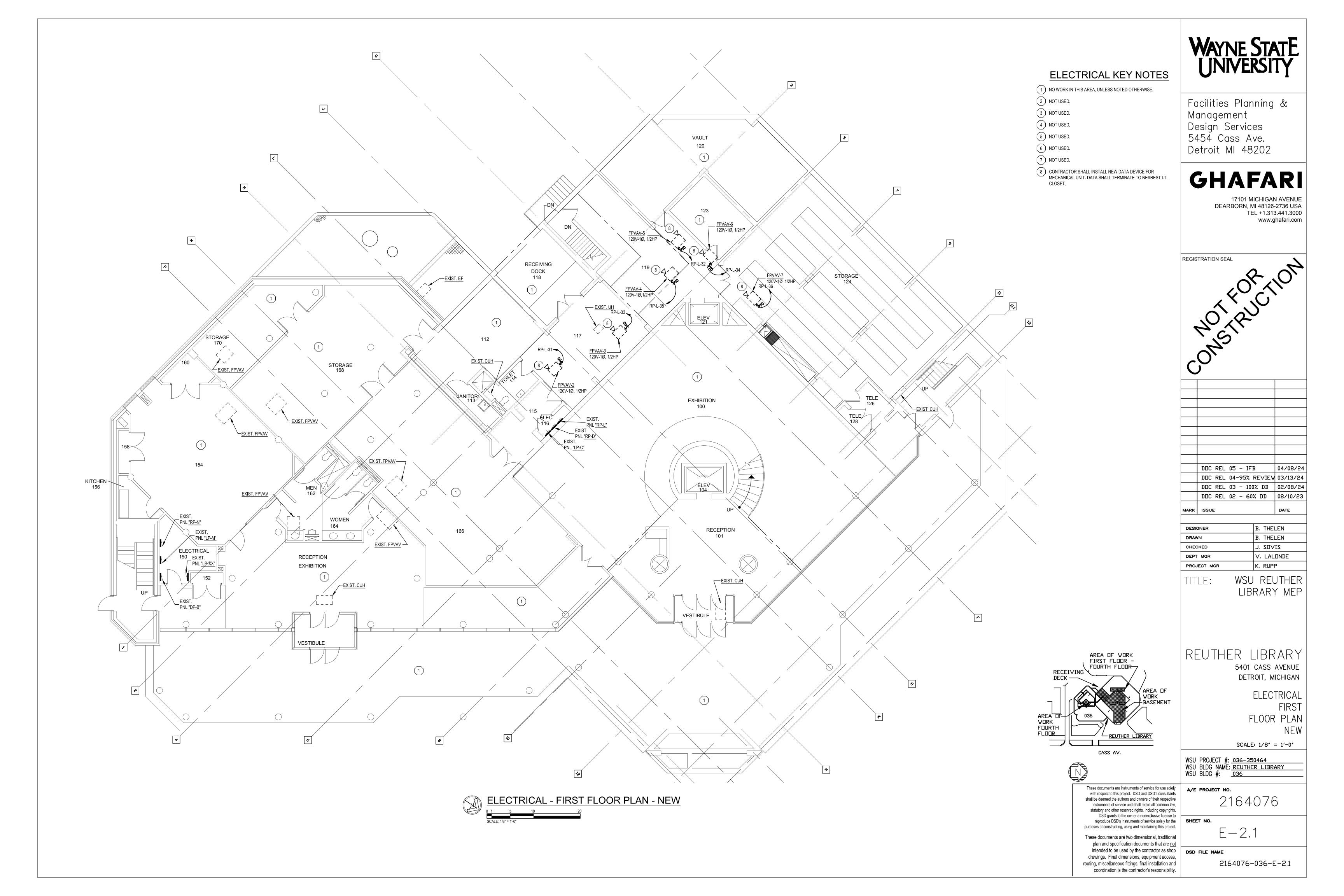
AREA OF WORK FIRST FLOOR – FOURTH FLOOR

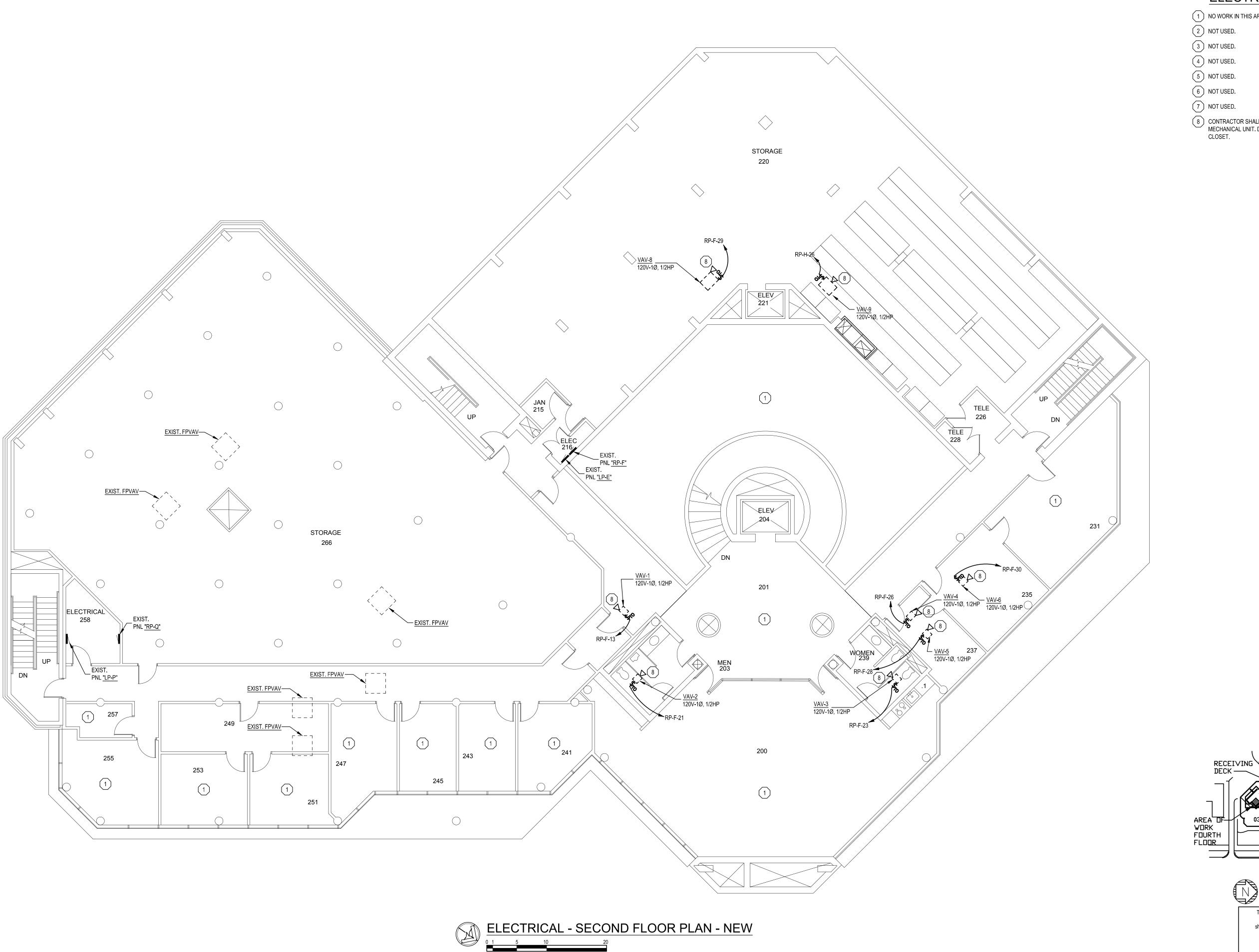
These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

A/E PROJECT NO. 2164076

E - 2.0





ELECTRICAL KEY NOTES

- 1) NO WORK IN THIS AREA, UNLESS NOTED OTHERWISE.

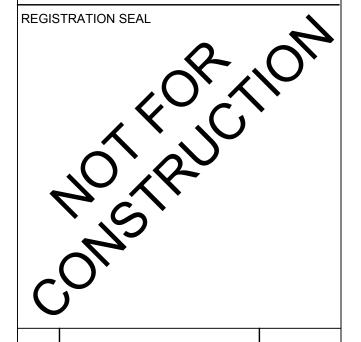
- 5 NOT USED.
- 6 NOT USED.
- 8 CONTRACTOR SHALL INSTALL NEW DATA DEVICE FOR MECHANICAL UNIT. DATA SHALL TERMINATE TO NEAREST I.T. CLOSET.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



DOC REL 05 - IFB	04/08/24
DOC REL 04-95% REVIEW	03/13/24
DOC REL 03 - 100% DD	02/08/24
DOC REL 02 - 60% DD	08/10/23

	DESIGNER	B. THELEN
	DRAWN	B. THELEN
·	CHECKED	J. SOVIS
	DEPT MGR	V. LAL□NDE
Ţ	PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

DATE



ELECTRICAL SECOND FLOOR PLAN

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

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

These documents are instruments of service for use solely A/E PROJECT NO. with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights.

AREA OF WORK FIRST FLOOR – FOURTH FLOOR

CASS AV.

DSD grants to the owner a nonexclusive license to

purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not

drawings. Final dimensions, equipment access,

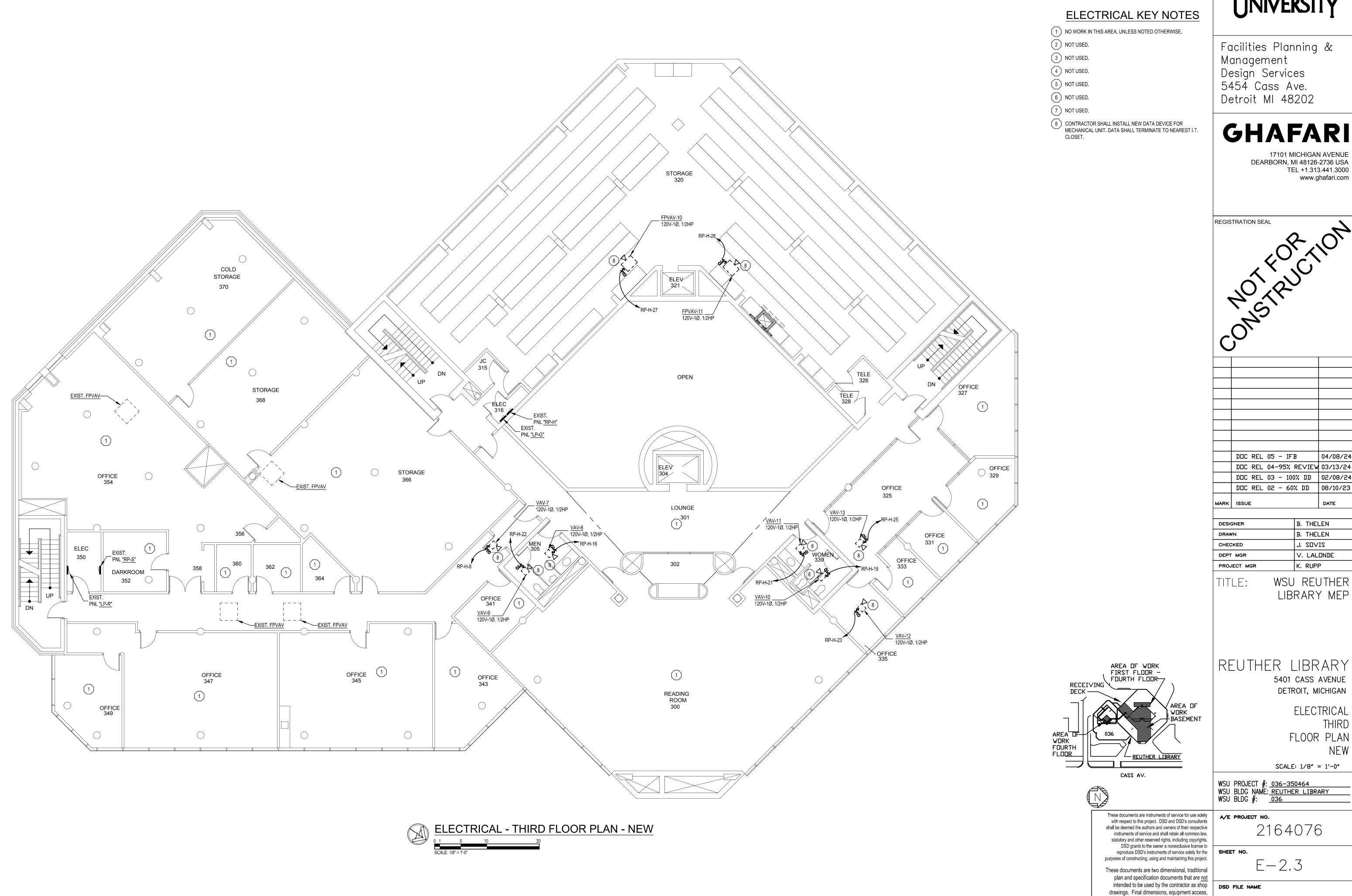
routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

2164076

reproduce DSD's instruments of service solely for the SHEET NO.

E - 2.2

intended to be used by the contractor as shop DSD FILE NAME



WAYNE STATE UNIVERSITY

Facilities Planning & Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	חחר פבו מס <u>- 40</u> % חח	09/10/23

	DUC KEE OE	00% DD	007
MARK	ISSUE		DAT

	DESIGNER	B. THELEN
	DRAWN	B. THELEN
	CHECKED	J. SOVIS
	DEPT MGR	V. LALONDE
	PROJECT MGR	K. RUPP
i i		

REUTHER LIBRARY

ELECTRICAL THIRD FLOOR PLAN

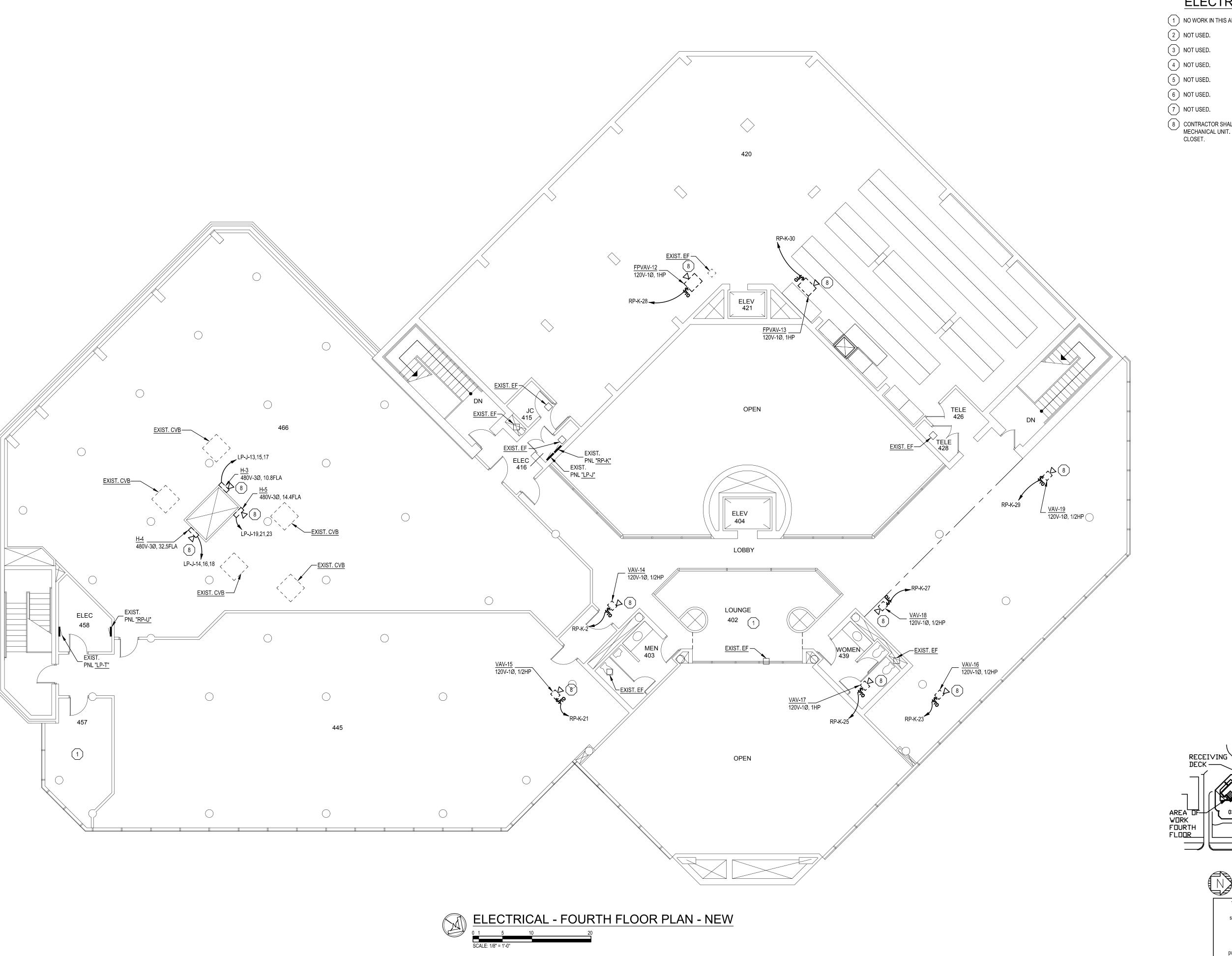
SCALE: 1/8" = 1'-0"

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

2164076

E - 2.3

routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.



ELECTRICAL KEY NOTES

- 1) NO WORK IN THIS AREA, UNLESS NOTED OTHERWISE.
- 8 CONTRACTOR SHALL INSTALL NEW DATA DEVICE FOR MECHANICAL UNIT. DATA SHALL TERMINATE TO NEAREST I.T. CLOSET.

AREA OF WORK FIRST FLOOR – FOURTH FLOOR

CASS AV.

These documents are instruments of service for use solely

with respect to this project. DSD and DSD's consultants

shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to

purposes of constructing, using and maintaining this project.

These documents are two dimensional, traditional plan and specification documents that are not

drawings. Final dimensions, equipment access,

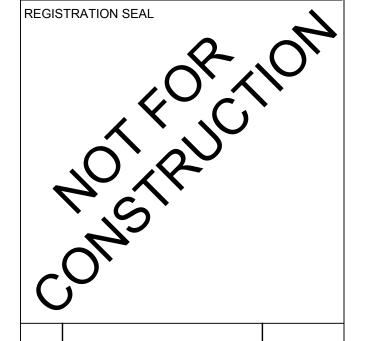
routing, miscellaneous fittings, final installation and coordination is the contractor's responsibility.

WAYNE STATE UNIVERSITY

Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com



	DOC REL 05 - IFB	04/08/24
	DOC REL 04-95% REVIEW	03/13/24
	DOC REL 03 - 100% DD	02/08/24
	מת 12 – 20% אחר ביו	08/10/23

DESIGNER	B. THELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

DATE

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY 5401 CASS AVENUE DETROIT, MICHIGAN

> ELECTRICAL FOURTH FLOOR PLAN

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

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

A/E PROJECT NO.

2164076

reproduce DSD's instruments of service solely for the SHEET NO.

E - 2.4

intended to be used by the contractor as shop DSD FILE NAME

	_											
		LOCATION: ELECTRICAL RM 416 PLY FROM: MDP				NTING: SURFACE A.I.C. RATING: OSURE: NEMA 1 NOTES:						
VOLTS: 480 /277 PHASE: 3 WIRE:				4	AMPS:_	100	MAIN: MLO					
BRKR		DESCRIPTION	CIRCI	лт Т	PH	HASE LOADS		CIRCUIT		DESCRIPTION	BRKR	
Α	P	- DESCRIPTION	VA		Α	В	С		VA	DESCRIPTION	Α	P
20	1	ARCHIVES LIGHTS		1	0			2		ROOM 411 LIGHTS	20	1
20	1	ARCHIVES LIGHTS		3		0		4		ROOM 411 LIGHTS	20	1
20	1	CORRIDOR/LUNCH/KITCH. LTS	9 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 · 0 ·	5		10 + 2 + 10 + 10 + 10 + 10 + 10 + 10 + 1	0	6		SPARE	20	1
20	1	ROOM 402 LIGHTS		7	o			8		SPARE	20	1
20	1	ROOM 402 LIGHTS		9		0		10		SPARE	20	1
20	1	SPARE		11			0	12		ELEC. CLOS./JAN. CLOS. LTS.	20	1
20	3	(NEW) H-3	2993	13	12000			14	9007	(NEW) H-4	45	3
-	-	-	2993	15		12000		16	9007	-	-	-
-	-	-	2993	17			12000	18	9007	-	_	-
20	3	(NEW) H-5	3991	19	3991			20		SPACE	-	-
-	-	-	3991	21		3991		22		SPACE	_	-
-	•	-	3991	23			3991	24		SPACE	_	-
-	-	SPACE		25	o			26		SPACE	-	-
<u>-</u>	-	SPACE		27		0		28		SPACE	_	-
-	-	SPACE		29			0	30		SPACE	-	-

	_	LOCATION: ELECTRICAL RM 216 PLY FROM: PANEL "LP-E"		MOUNTING: SURFACE A.I.C. RATING: ENCLOSURE: NEMA 1 NOTES:								
VOLTS:		208 /120 PHASE:_	3	WIRE:_	4	4 AMPS:		_ MAIN: MLO		_		
BRKR		DESCRIPTION	CIRCUIT		PHASE LOADS		CIRCUIT		DESCRIPTION.	BRKR		
Α	P	DESCRIPTION	VA		Α	В	С		VA	DESCRIPTION	Α	F
20	1	ARCHIVES/ELEC. CLOS. RCPT.		1	o			2		ROOMS 211, 209 RCPT.	20	1
20	1	WATER COOLER SOUTH		3		0		4		ROOMS 209, 207 RCPT.	20	1
20	1	WATER COOLER NORTH		5			0	6		ROOM 205 RCPT.	20	1
20	1	ARCHIVES/N. CORRIDOR RCPT.		7	0			8		ROOMS 237, 7, 235 RCPT.	20	1
20	1	ROOM 231 RCPT.		9		0		10		KITCHEN EXHAUST FAN	20	1
20	1	ROOM 231 RCPT.		11			0	12		WOMEN'S LAV. EXHAUST FAN	20	1
20	1	(NEW) FPVAV-1-1	1176	13	1176			14		LOBBY/CORR/WOM LAV RCPT.	20	1
20	11	REFRIGERATOR RCPT.		15		O		16		CORR/MEN LAV/CONF RCPT.	20	1
20	1	KITCHEN RCPT.		17			0	18		WATER HEATER MEN'S LAV.	20	1
20	1	CONFERENCE ROOM RCPT.		19	0			20		CONF RM LIGHTS	20	1
20	1	(NEW) FPVAV-1-2	1176	21		1176		22		LAVATORIES LIGHTS	20	1
20	1	(NEW) FPVAV-1-3	1176	23			1176	24		CONF RM LIGHTS	20	1
20	1	RANGE		25	1176			26	1176	(NEW) FPVAV-1-4	20	1
20	1	RANGE	· · · · · · · · · · · · · · · · · · ·	27		1176		28	1176	(NEW) FPVAV-1-5	20	1
20	1	(NEW) FPVAV-2-8	1176	29			2352	30	1176	(NEW) FPVAV-1-6	20	1

		LOCATION: ELECTRICAL RM 316 PLY FROM: PANEL "LP-G"		DUNTING: SURFACE CLOSURE: NEMA 1				A.I.C. RATING: NOTES:					
V	OLTS	: 208 /120 PHASE:	3	WIRE:_	4	AMPS:_	100	MAIN:_	MLO	-			
BRKR		- DESCRIPTION -	CIRCUIT		PHASE LOADS		CIR	CUIT	DESCRIPTION	BRKR			
Α	P	DESCRITTION	VA		Α	В	С		VA	DESCRI ITON		A P	
20	1	ELECTRIC CLOSET RCPT.		1	0			2		RCPT. NEAR S. ENTRANCE	20	1	
20	1_	ROOMS 311, 307 RCPT.		3		0		4		ROOMS 311, 307 RCPT.	20		
20	1	ROOMS 307, 307-1 RCPT.		5			0	6		WATER COOL. N./CORR. RCPT.	20		
20	1_	WOM LAV, 335, FLOOR RCPT.		7	1176			8	1176	(NEW) FPVAV-1-7	20		
20	1	RM 335, 333, 331, 329 RCPT.		9		0		10		ROOMS 331, 329	20	1	
20	1	SPARE CIRCUIT IN ROOM 331		11			0	12		RM 329 AND ARCHIVES RCPT.	20	1	
20	1	ROOM 300 RCPT.		13	0			14		LAVATORIES LIGHTS	20		
20	1	300 S. LISTEN CARRELS RCPT.		15		1176		16	1176	(NEW) FPVAV-1-8	20		
20	1	300 S. LISTEN CARRELS RCPT.		17			0	18		WATER COOLER SOUTH	20	1	
20	1	(NEW) FPVAV-1-10	1176	19	1176			20		300 N. LISTEN CARRELS RCPT.	20		
20	1	(NEW) FPVAV-1-11	1176	21		2352		22	1176	(NEW) FPVAV-1-9	20		
20	1	(NEW) FPVAV-1-12	1176	23			1176	24		300 N. LISTEN CARRELS RCPT.	20		
20	1	(NEW) FPVAV-1-13	1176	25	2352			26	1176	(NEW) FPVAV-2-9	20		
20	1	(NEW) FPVAV-2-10	1176	27	50-10-00 00-00-00 00 00 00 00 00 00 00 00 00	2352		28	1176	(NEW) FPVAV-2-11	20		
20	1	SPARE		29			0	30		SPARE	20		

LOCATION: ELECTRICAL RM 416 SUPPLY FROM: PANEL "LP-J"					UNTING: S CLOSURE: 1				A.I.	C. RATING: NOTES:					
١	OLTS	: 208 /120 PHASE:	3	WIRE:_	4	AMPS:_	100	MAIN:	MLO	-					
BRKR		- DESCRIPTION	CIRCL	CIRCUIT PHASE LOADS CIRCUIT		CUIT	DECEMBER	BRKR							
Α	P	DESCRIPTION	VA		Α	В	С		VA	DESCRIPTION	Α	P			
20	1	RANGE		1	1176			2	1176	(NEW) FPVAV-1-14	20	1			
20	1	RANGE		3		0		4		ROOM 411 RCPT.	20	1			
20	1	WOM LAV/CLCK RM 411 RCPT.		5			0	6		ROOM 402 RCPT.	20	1			
20	1	MEN LAV/CLCK RM 411 RCPT.		7	0	0 10 10 10 10 10 10 10 10 10 10 10 10 10	50-115-115-13-13-13-13-13-13-13-13-13-13-13-13-13-	8		WATER COOLER NORTH	20	1			
20	1	KITCH. COUNT. RCPT./FRIDGE		9		0		10		ELECTRIC ROOM RCPT.	20	1			
20	1	WATER HEATER IN LUNCH RM		11			0	12		VENDING MACHINE RCPT.	20	1			
20	1	LAVATORIES LIGHTS		13	0			14		EXHAUST FAN IN KITCHEN	20	1			
20	1	ARCHIVES/RM 402 RCPT.		15		0		16		3RD FLOOR READING RM LTS.	20	1			
20	1	3RD FLOOR READING RM LTS.		17			0	18		FEED TO DESKS RM 402	20	1			
20	1	3RD FLOOR READING RM LTS.		19	0			20		FEED TO DESKS RM 402	20	1			
20	1	(NEW) FPVAV-1-15	1176	21		1176		22		COPY MACHINE	20	1			
20	1	(NEW) FPVAV-1-16	1176	23			1176	24		FEED TO DESKS RM 411	20	1			
20	1	(NEW) FPVAV-1-17	1920	25	3096			26	1176	(NEW) FPVAV-1-19	20	1			
20	1	(NEW) FPVAV-1-18	1176	27		3096		28	1920	(NEW) FPVAV-2-12	20	1			
20	1	SPARE		29			1920	30	1920	(NEW) FPVAV-2-13	20	1			
			CONN	ECTED	4272	4272	3096	TOTAL	CONNEC	CTED LOAD 11640	VOLT-	\MPS			

		OCATION: ELECTRICAL RM 116 PLY FROM: MDP			OUNTING: SURFACE A.I ICLOSURE: NEMA 1					I.C. RATING: NOTES:		
VOLTS:		208 /120 PHASE:	3	WIRE:	4	AMPS:	100	MAIN:	MAIN: MCB			
BRI	(R	D.F.C.CDIDGION	CIRCL	ит Т	PHASE LOADS			CIRCUIT			BRKR	
Α	P	DESCRIPTION	VA		Α	В	С		VA	DESCRIPTION	A P	
20	1	1ST FLOOR SOUTH		1	0			2		1ST FLOOR SOUTH	20	1
20	1	1ST FLOOR SOUTH		3		o		4		1ST FLOOR NORTH	20	1
20	1	1ST FLOOR NORTH	0+0H0H0H0H0+0H0H0+0H0H0H0H0H	5			0	6		1ST FLOOR NORTH	20	1
20	1	2ND FLOOR SOUTH		7	0			8		2ND FLOOR NORTH	20	1
20	1	2ND FLOOR SOUTH		9		0		10		2ND FLOOR NORTH	20	
20	1	2ND FLOOR SOUTH		11			0	12		2ND FLOOR NORTH	20	
20	1	2ND FLOOR SOUTH		13	0			14		2ND FLOOR NORTH	20	
20	11	3RD FLOOR SOUTH		15		0		16		3RD FLOOR NORTH	20	
20	1	3RD FLOOR SOUTH		17			0	18		3RD FLOOR NORTH	20	
20	1	3RD FLOOR SOUTH		19	0			20		3RD FLOOR NORTH	20	
20	11	3RD FLOOR SOUTH	***********	21		0		22		3RD FLOOR NORTH	20	
20	1	1ST FLOOR SOUTH (DIMMER)		23			0	24		1ST FLOOR NORTH (DIMMER)	20	
20	1	1ST FLOOR SOUTH (DIMMER)		25	0			26		1ST FLOOR NORTH (DIMMER)	20	
20	1	2ND FLOOR NORTH (DIMMER)		27		0		28		3RD FLOOR SOUTH (DIMMER)	20	
20	1	2ND FLOOR SOUTH (DIMMER)		29			0	30		3RD FLOOR NORTH (DIMMER)	20	
20	1	(NEW) FPVAV-2-2	1176	31	2352			32	1176	(NEW) FPVAV-2-5	20	
20	1	(NEW) FPVAV-2-3	1176	33		2352		34	1176	(NEW) FPVAV-2-6	20	
20	1	(NEW) FPVAV-2-4	1176	35			2352	36	1176	(NEW) FPVAV-2-7	20	
-	-	SPACE		37	0			38		SPACE	-	
-	-	SPACE		39	****	0		40		SPACE	-	
-	-	SPACE		41			0	42		SPACE	-	

					NEV	N PA	NEL	"M	PZ"	1				
							URFACE IEMA 1			C. RATING: 18 kA NOTES:				
,	VOLTS:	240 /	<mark>/120 P</mark> H	IASE:1	WIRE:_	3	AMPS:_	70	MAIN:	МСВ				
BR	KR	D.F.	(COURTION	CIRCU	ΙΙΤ	PH.A	ASE LOADS	;	CIR	CUIT	DECEMBER	BR	BRKR	
A	Р	ן טו	SCRIPTION	VA		Α		С		VA	DESCRIPTION	A	P	
20	2	P-1		588	1	972			2	384	H-1	20	2	
	-	_		588	3			972	4	384			-	
25		P-2		2040	5	3060			6		RO-1	20		
7.3		P-Z				3000		70/0			•		2	
				2040	7			3060	8	1020				
20	2	P-3		1440	9	1680			10	240		20	2	
-	-	-		1440	11			1680	12	240	-	-	-	
30	1	P-4		2400	13	2400			14		SPARE	20	1	
20	1	SPARE			15			0	16		SPARE	20	1	
20	1	SPARE			17			o	18		SPARE	20	1	
	CONNECTED					8112	100 B 1 80 40 00 88 48 10 10 10 10 10 10 10 10 10 10 10 10 10	5712	TOTAL	CONNEC	TED LOAD 138	24 VOLT-	AMPS	
TOTAL CONNECTED							13824					— 60 AMPS		
				<u>]</u>	LOA	D CA	LCUL	ATIC	ONS					
	4	LOAD TYPE	CONNECTED V	A DEMANI) VA	N.E.C. SEC	CTION							
	M	1ECHANICAL	13824	1382	4	215.2(A	3)(1)							
		LIGHTING [0	0		215.2(A	, , ,							
		RECEPTACLE	0	0		TABLE 22								
KIT	CHEN	EQUIPMENT	0	0	+	TABLE 22	20.56							
	OTHER 0 0				4									
	TOTAL VA 13824 13824													
TO	OTAL .	AMPERAGE	57.60	57.6	 									



Facilities Planning & Management Design Services 5454 Cass Ave. Detroit MI 48202

GHAFARI

17101 MICHIGAN AVENUE DEARBORN, MI 48126-2736 USA TEL +1.313.441.3000 www.ghafari.com

REGISTRATION SEAL

DOC REL 05 - IFB	04/08/24
DOC REL 04-95% REVIEW	03/13/24
DOC REL 03 - 100% DD	02/08/24
DOC REL 02 - 60% DD	08/10/23

DATE

DESIGNER	B. THELEN
DRAWN	B. THELEN
CHECKED	J. SOVIS
DEPT MGR	V. LALONDE
PROJECT MGR	K. RUPP

WSU REUTHER LIBRARY MEP

REUTHER LIBRARY AREA OF WORK FIRST FLOOR -FOURTH FLOOR 5401 CASS AVENUE DETROIT, MICHIGAN ELECTRICAL

MARK ISSUE

PANEL SCHEDULES

SCALE: N.T.S.

RECEIVING \\
DECK —

AREA DF WORK FOURTH FLOOR

These documents are instruments of service for use solely

A/E PROJECT NO. with respect to this project. DSD and DSD's consultants shall be deemed the authors and owners of their respective instruments of service and shall retain all common law, statutory and other reserved rights, including copyrights. DSD grants to the owner a nonexclusive license to

CASS AV.

purposes of constructing, using and maintaining this project. These documents are two dimensional, traditional plan and specification documents that are not intended to be used by the contractor as shop DSD FILE NAME drawings. Final dimensions, equipment access, routing, miscellaneous fittings, final installation and

coordination is the contractor's responsibility.

2164076

WSU PROJECT #: 036-350464
WSU BLDG NAME: REUTHER LIBRARY
WSU BLDG #: 036

reproduce DSD's instruments of service solely for the SHEET NO.

E - 6.1

2164076-036-E-6.1