

DEPARTMENT OF TECHNOLOGY, MANAGEMENT & BUDGET
AGENCY: DEPARTMENT OF HEALTH & HUMAN SERVICES

CADILLAC PLACE 4TH FLOOR ANNEX TRAINING SUITE BUILD-OUT
491_24304_MNB

3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

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CODE INFORMATION

APPLICABLE BUILDING CODES:	
1. BUILDING CODES	USE GROUP CLASSIFICATIONS: NO CHANGES BUSINESS GROUP B
	CONSTRUCTION CLASSIFICATION: NO CHANGES TYPE 2B
	FLOOR AREA: NO CHANGES 4TH FLOOR RENOVATED AREA 13,570 S.F. 4TH FLOOR TOTAL AREA 95,180 S.F.
2. MECHANICAL CODES	
	MICHIGAN MECHANICAL CODE 2021 MICHIGAN PLUMBING CODE 2021
3. ELECTRICAL CODES	OCCUPANCY: NO CHANGES
	2023 EDITION OF THE MICHIGAN ELECTRICAL CODE, PART B OF THE STATE CONSTRUCTION CODE
4. 2012 LIFE SAFETY CODE	FULLY SPRINKLERED NFPA13

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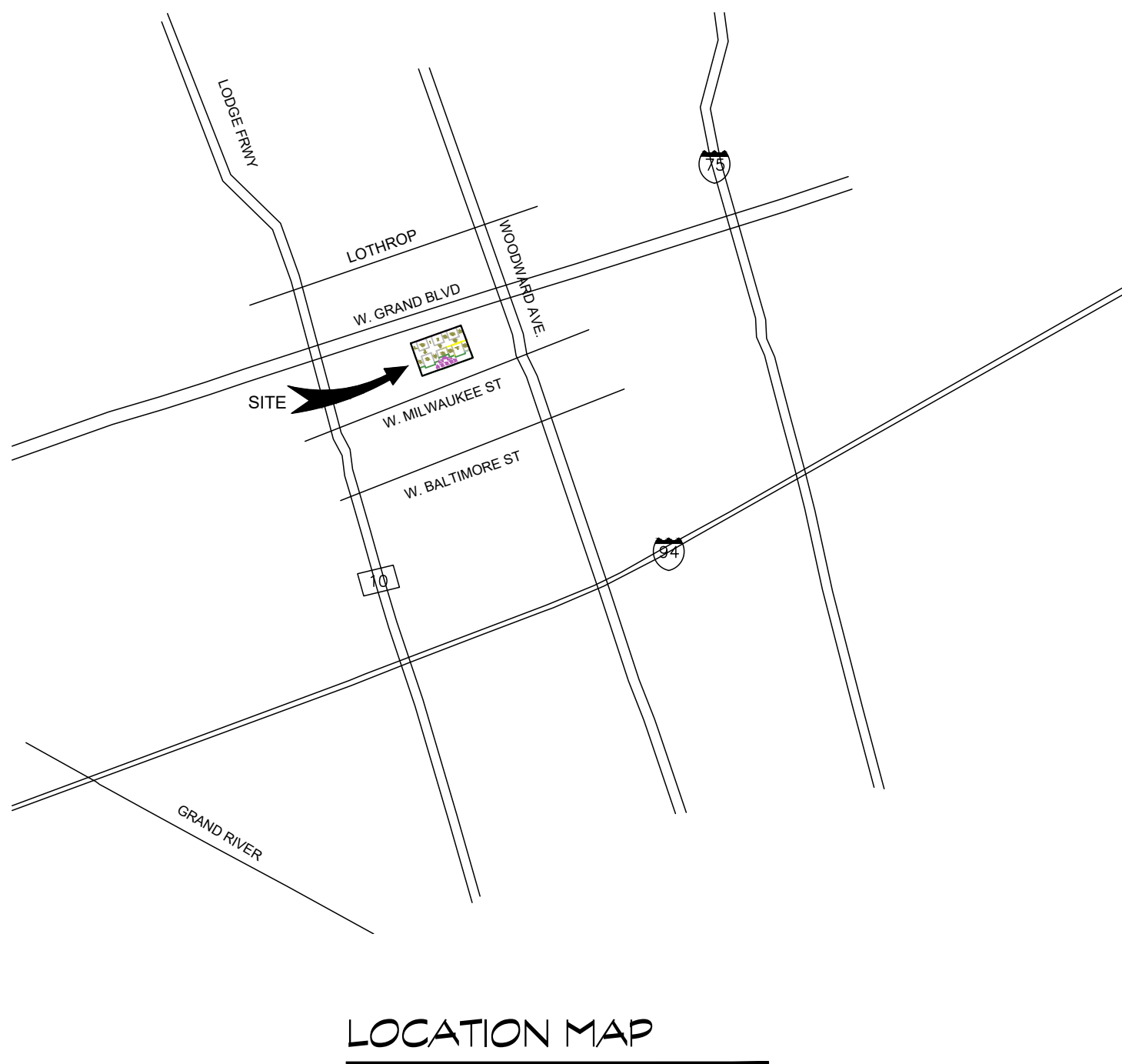
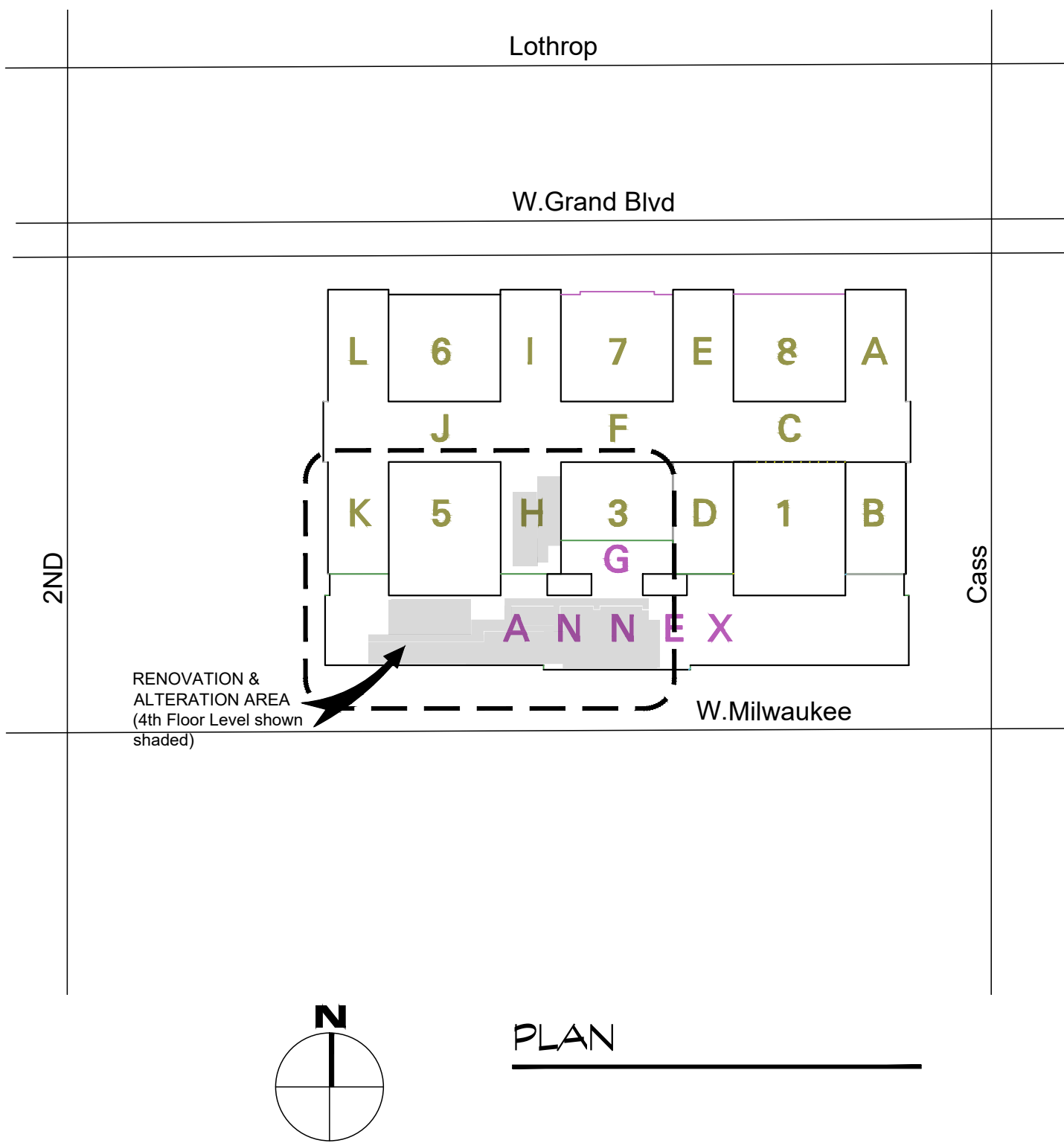
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DEPT. OF HEALTH & HUMAN SERVICES
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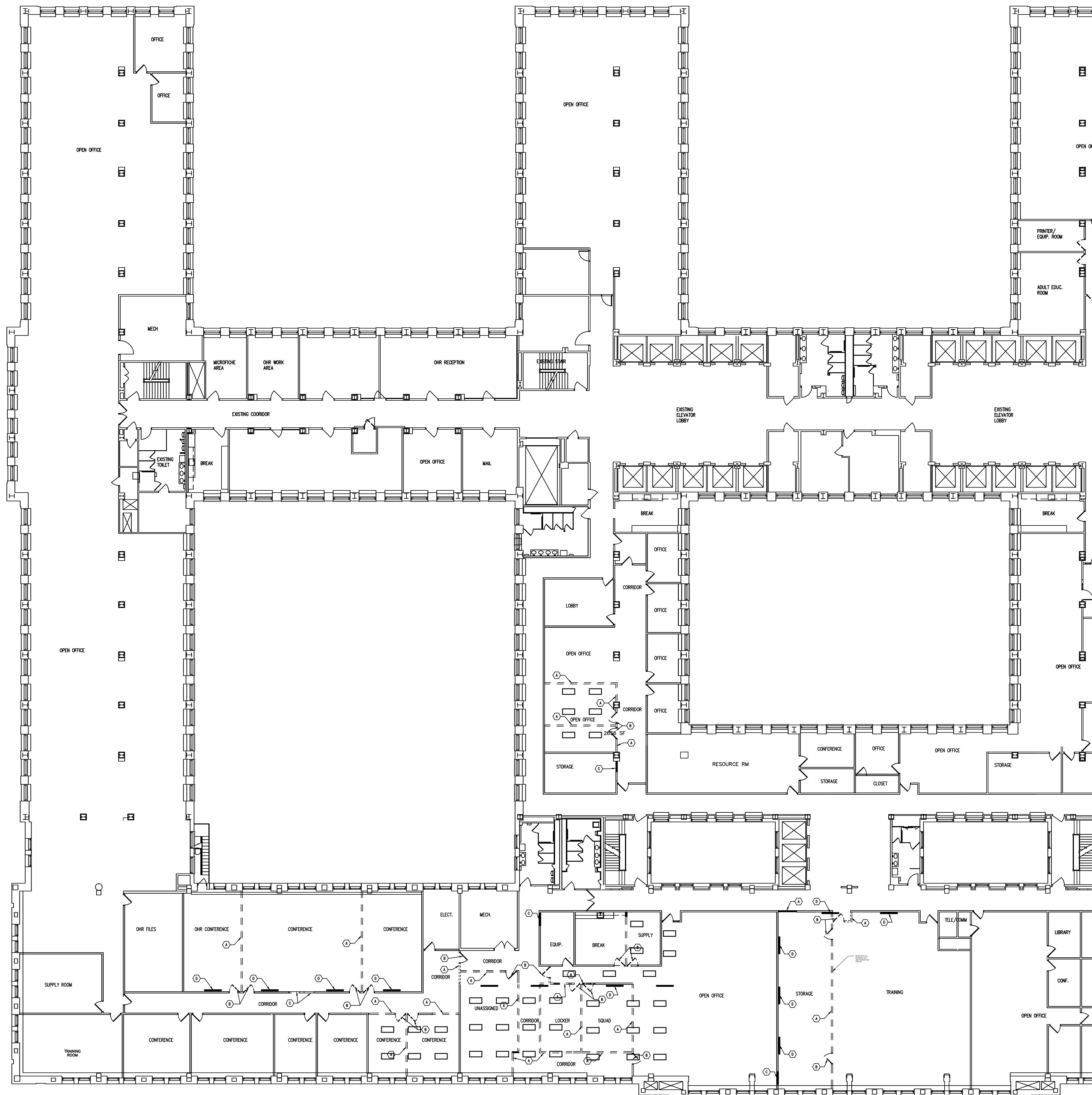
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STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

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KEY NOTES - DEMOLITION :

- (A) REMOVE EXISTING WALLS & ALL ASSOCIATED COMPONENTS INCLUDING HEADERS, FLOOR & WALL ANCHORS, ETC TO ALLOW FOR PROPER INSTALLATION OF NEW FINISHES, DOOR OPENINGS W/ HEADERS, ETC. REMOVE & GRIND DOWN ALL CHANNEL ANCHORS IN FASTENERS.
- (B) REMOVE EXISTING DOOR & FRAME REMOVE ALL EXISTING DOOR & FRAME COMPONENTS
- (C) CUT NEW OPENING IN EXISTING WALL FOR NEW DOOR & FRAME.
- (D) CUT OPENING IN WALL AS NEEDED FOR INSTALLATION OF NEW FIRE-TREATED WOOD BLOCKING IN WALL FOR NEW MONITOR HANGER. PATCH EXISTING DRYWALL TO MATCH WITHOUT A NOTICEABLE PATCHED APPEARANCE.

GENERAL NOTES :

- 1. VERIFY ALL EXISTING CONDITIONS REPORT ANY DISCREPANCIES IN WRITING TO ARCHITECT & OWNER REPRESENTATIVE.
- 2. PROVIDE ALL NECESSARY TEMPORARY SHORING & SUPPORTS AS REQUIRED TO COMPLETE THE INDICATED WORK'S INTENT.
- 3. PROVIDE ALL NECESSARY TEMPORARY PARTITIONS & BARRIERS TO CONTAIN & MINIMIZE DUST.
- 4. REMOVE ALL DIAGONAL BRACINGS ABOVE CEILING AT DEMOLISHED WALLS AS REQUIRED.
- 5. MAINTAIN FIRE EGRESS TO EXITS DURING WORK.
- 6. SEE MECHANICAL, PLUMBING, & ELECTRICAL PLANS (MEP) FOR ADDITIONAL DEMOLITION WORK

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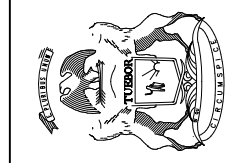
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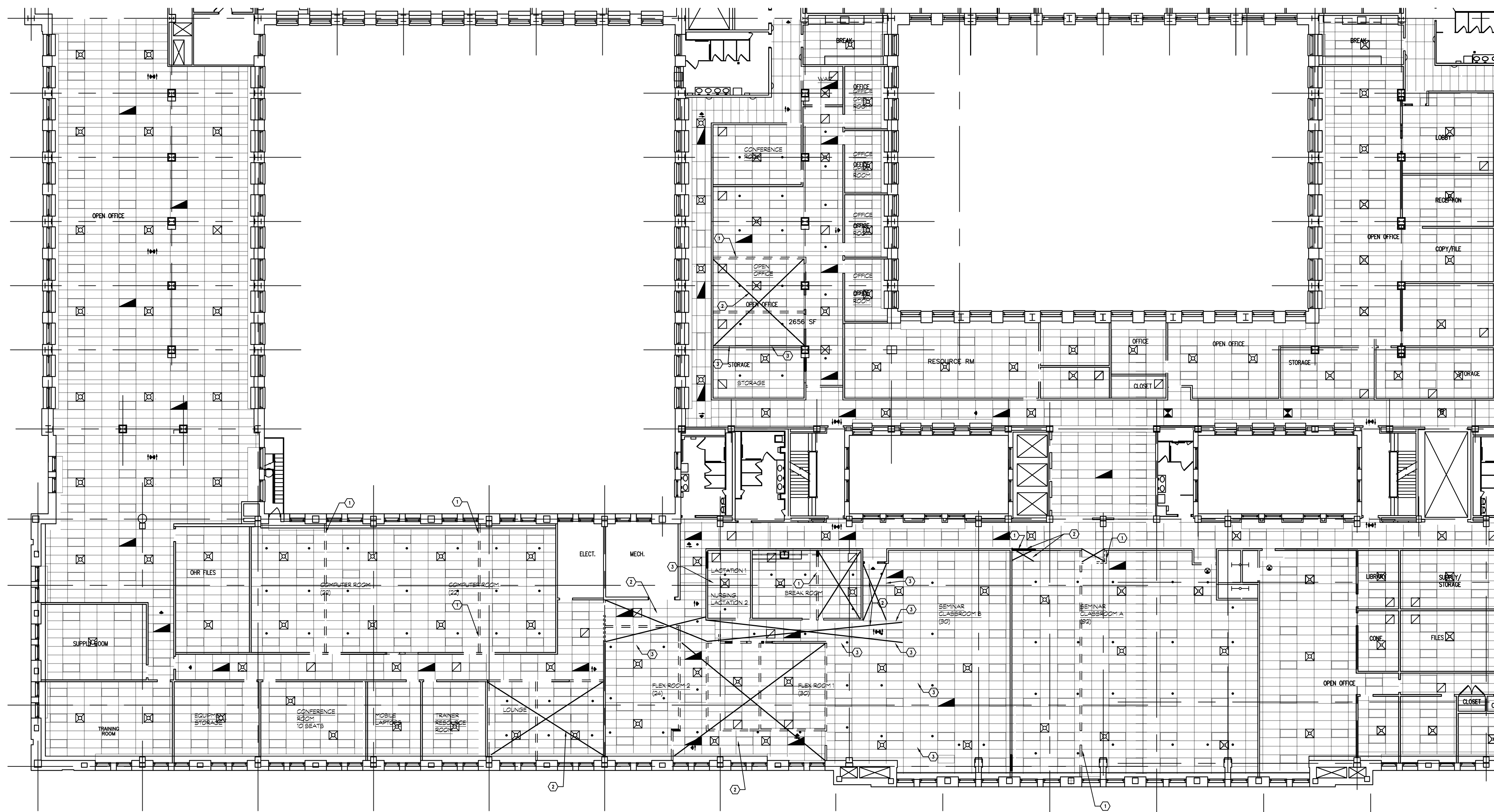
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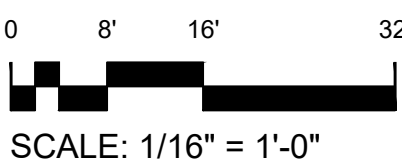
PARTIAL 4TH FLOOR PLAN- DEMOLITION
SCALE 1/16" = 1'-0"

0 8' 16' 32'
SCALE: 1/16" = 1'-0"

DEMO PLAN



PARTIAL 4TH FLOOR REFLECTED CEILING PLAN DEMO
SCALE 1/16" = 1'-0"



GENERAL NOTE:

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LEGEND :

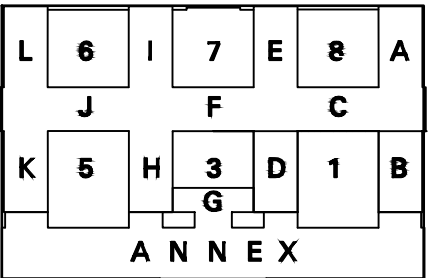
- 2 X 4' LIGHT FIXTURE, SEE ELECTRICAL
- 2 X 4' ACOUSTIC LAY-IN CEILING IN 2 X 4' SUSPENDED METAL CEILING GRID SYSTEM, NEW ACOUSTICAL CEILING PANELS TO MATCH EXISTING.
- RETURN AIR GRILLE
- SUPPLY AIR DIFFUSER
- FIRE SPRINKLER HEAD

KEY NOTES - DEMOLITION :

- ① REMOVE EXISTING CEILING PANELS & GRID ONLY AS NEEDED TO REMOVE EXISTING WALL, PATCH AND REINSTALL GRID SYSTEM, INSTALL CEILING PANELS.
- ② REMOVE EXISTING CEILING PANELS & GRID, REINSTALL / INSTALL GRID SYSTEM TO ALIGN WITH CEILING GRID IN NEIGHBORING ROOM.
- ③ REMOVE PORTION OF EXISTING CEILING GRID AND PANELS FOR INSTALLATION OF NEW WALL, PATCH AND REINSTALL GRID SYSTEM, INSTALL CEILING PANELS. SEE SHEET A1 FOR NEW WALLS.

GENERAL NOTES :

1. VERIFY ALL EXISTING CONDITIONS REPORT ANY DISCREPANCIES IN WRITING TO ARCHITECT & OWNER REPRESENTATIVE.
2. PROVIDE ALL NECESSARY TEMPORARY SHORING & SUPPORTS AS REQUIRED TO COMPLETE THE INDICATED WORK'S INTENT.
3. PROVIDE ALL NECESSARY TEMPORARY PARTITIONS & BARRIERS TO CONTAIN & MINIMIZE DUST.
4. REMOVE ALL DIAGONAL BRACING ABOVE CEILING AT DEMOLISHED WALLS AS REQUIRED.
5. MAINTAIN FIRE EGRESS TO EXITS DURING WORK.
6. SEE MECHANICAL PLUMBING & ELECTRICAL FOR MEP WORK.



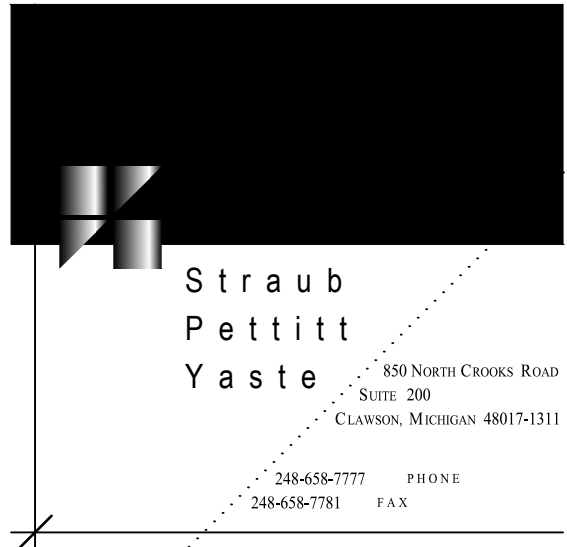
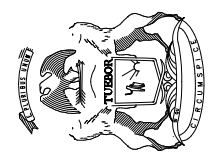
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REFLECTED CEILING
PLAN DEMOLITION

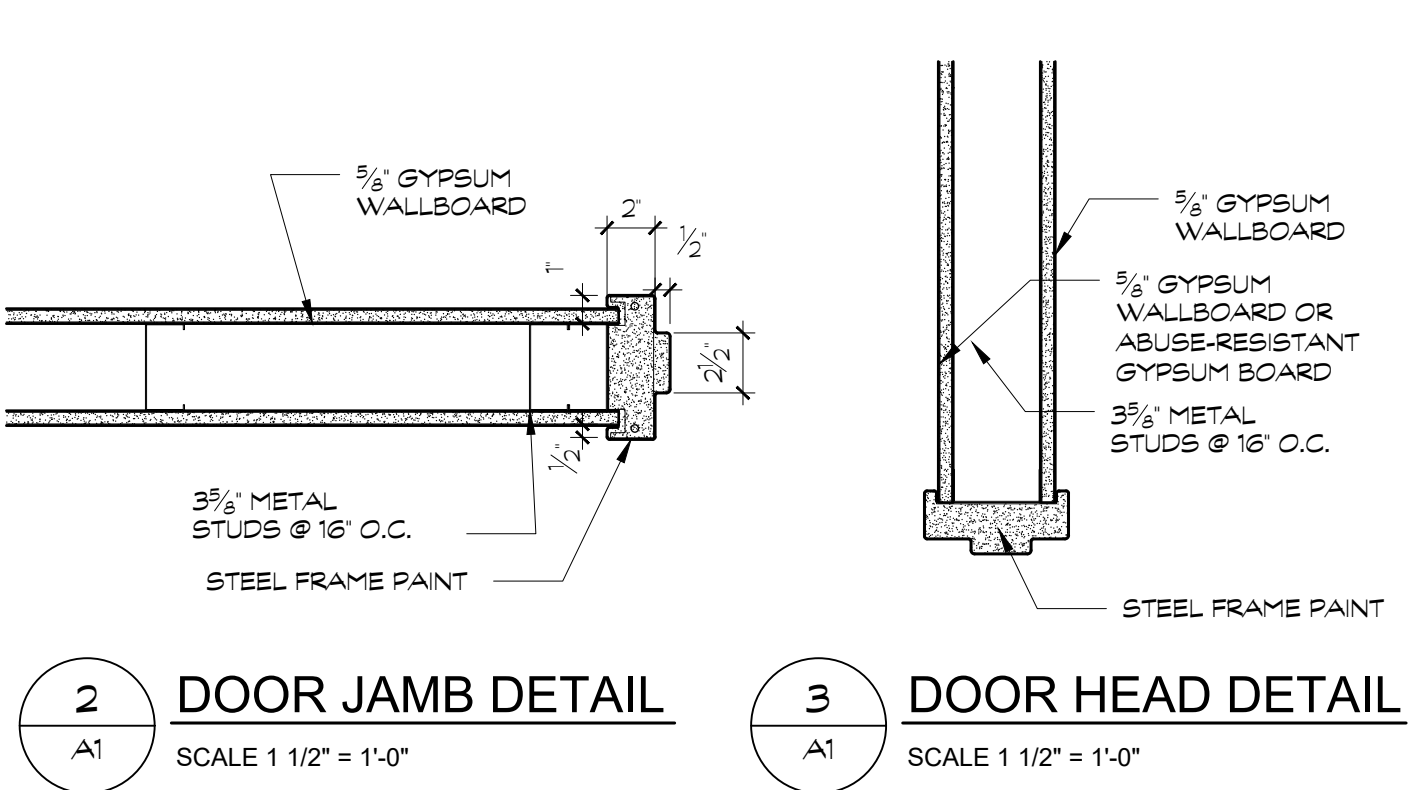


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Room Finish Schedule					
Rm.Name	Floor	Base	Walls	Ceiling (8'-0" CLG HT +/-)	Remarks
SEMINAR CLASSROOM A	CARPET	4" VINYL			
SEMINAR CLASSROOM B	UNDER SEPARATE CONTRACT	UNDER SEPARATE CONTRACT	PAINTED GYP. BRD	ACOUSTIC PANEL CLG 2 X 4	
FLEX ROOM 1					
FLEX ROOM 2					
BREAK ROOM					
LACTATION 1					
NURSING LACTATION 2					
COMPUTER ROOM 1					
COMPUTER ROOM 2					
EQUIPMENT STORAGE					
CONFERENCE ROOM					
MOBILE LAPTOPS					
TRAINER RESOURCE ROOM					
LOUNGE					
WAIT					
DWDT DIRECTORS CONF. RM					
OPEN OFFICE					
STORAGE					
OFFICE 1					
OFFICE 2					
OFFICE 3					
OFFICE 4					
CORRIDORS					

Door Schedule													
Door		Frame				Details			Label	Hdw. Group	Remarks		
No.	Size (W x H)	Thk	Material	Core	Type	Finish	Material	Finish	Type	Head	Jamb	Sill/Thr.	
1	3'-0" x 7'-0"	1 3/4"	HOLLOW METAL	HONEY-COMB	2	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 1 MATCH EXISTING
2	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	2	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 2
3	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	1	PAINT	HOLLOW METAL	PAINTED	A1	3/A1	2/A1		Set 2
4	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	1	PAINT	HOLLOW METAL	PAINTED	A1	3/A1	2/A1		Set 2
5	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	1	PAINT	HOLLOW METAL	PAINTED	A1	3/A1	2/A1		Set 2
6	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	1	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 2
7	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	2	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 2
8	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	2	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 2
9	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	2	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 2
10	3'-0" x 7'-0"	1 3/4"	H.M.	HONEY-COMB	1	PAINT	HOLLOW METAL	PAINTED	A	3/A1	2/A1		Set 2 MATCH EXISTING



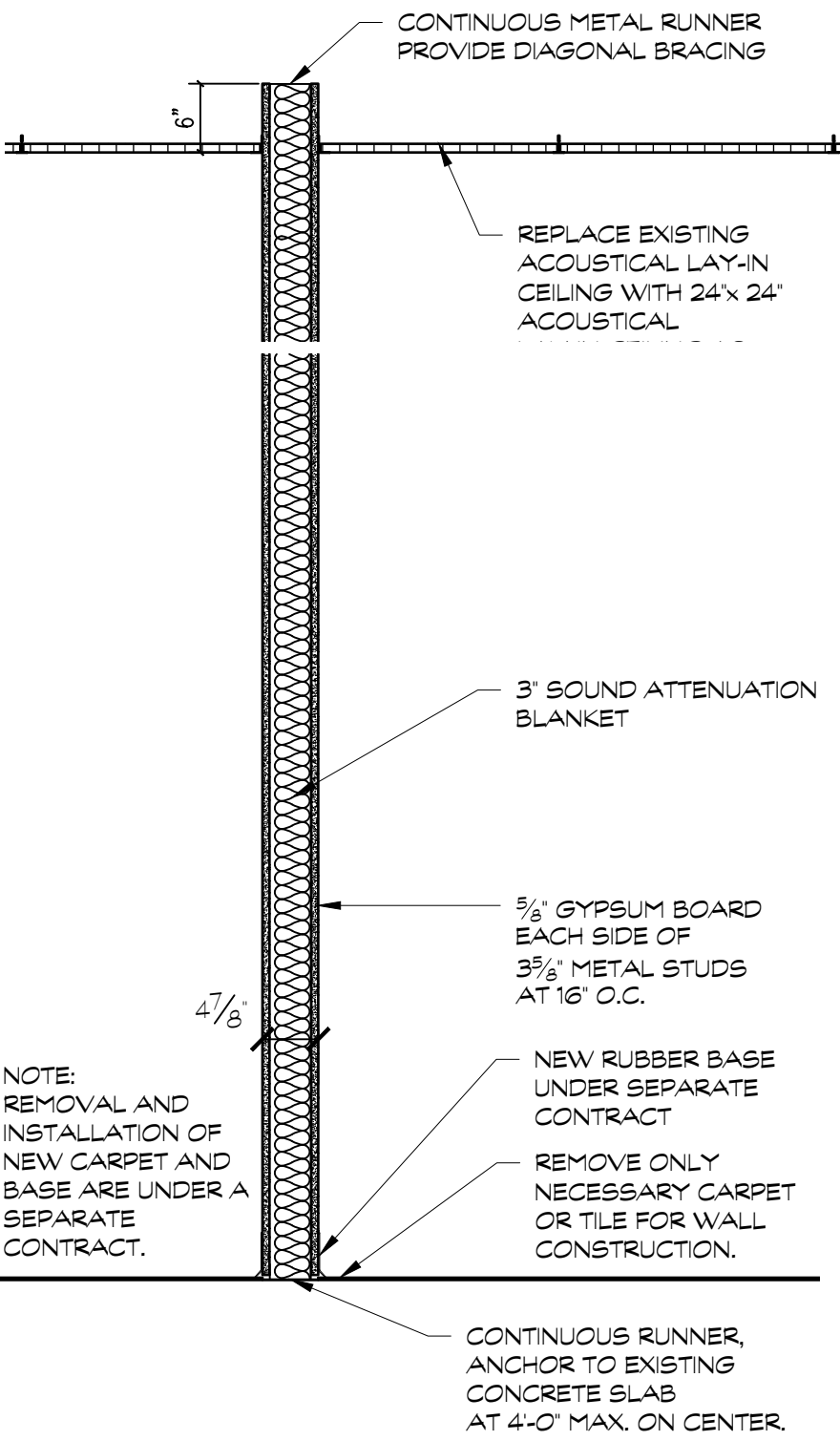
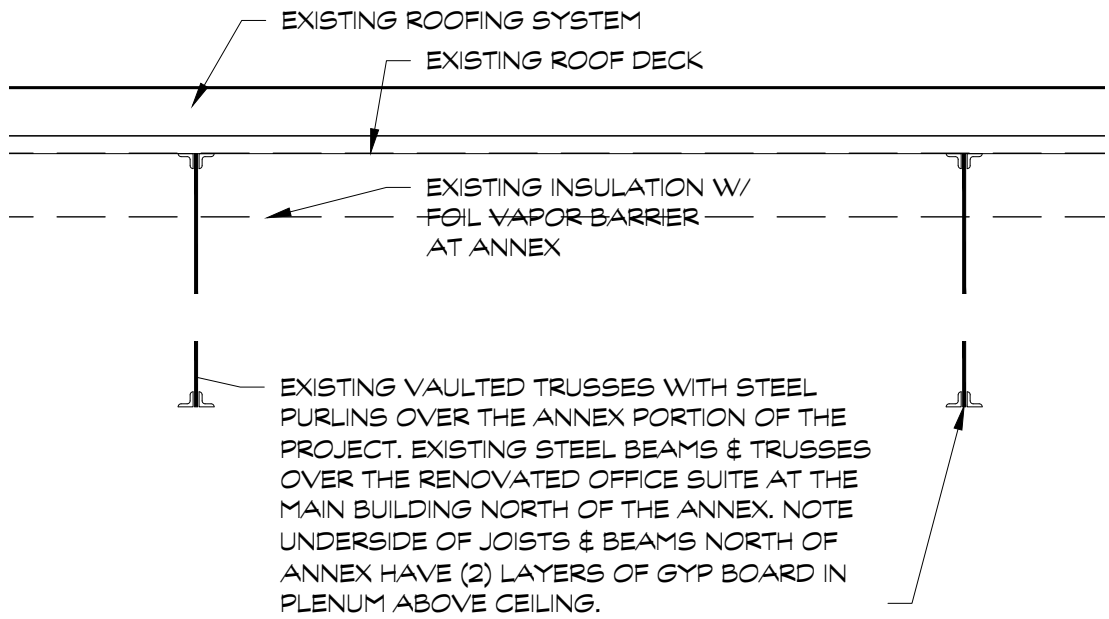
2 DOOR JAMB DETAIL
SCALE 1 1/2" = 1'-0"

3 DOOR HEAD DETAIL
SCALE 1 1/2" = 1'-0"

GENERAL NOTES :

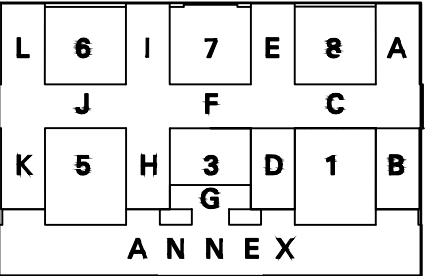
KEY NOTES - NEW WORK :

- NEW WALL SEE WALL DETAIL NO 1 THIS SHEET
- NEW SOLID WOOD DOOR IN HOLLOW METAL FRAME. SEE DOOR SCHEDULE
- SIDELITE IN HOLLOW METAL FRAME
- PATCH WALL & PAINT
- DELETE SOUND ATTENUATION BLANKET IN NEW WALL
- LOCATION OF NEW WALL MOUNTED MONITOR, OPEN WALL AS NEEDED AND INSTALL SOLID FIRE-TREATED WOOD BLOCKING BETWEEN STUDS.
- VERIFY ALL EXISTING CONDITIONS REPORT ANY DISCREPANCIES IN WRITING TO ARCHITECT & OWNER REPRESENTATIVE.
- PROVIDE ALL NECESSARY TEMPORARY SHORING & SUPPORTS AS REQUIRED TO COMPLETE THE INDICATED WORK'S INTENT.
- PATCH FLOORS, WALLS, & CEILINGS TO MATCH ADJACENT SURFACES AFFECTED BY DEMOLISHED CEILINGS, WALLS, DOORS & FRAMES. ALSO SEE DEMO PLAN.
- PROVIDE ALL NECESSARY TEMPORARY PARTITIONS & BARRIERS TO CONTAIN & MINIMIZE DUST.
- MAINTAIN FIRE EGRESS TO EXITS DURING WORK.
- PAINT ALL CORRIDOR WALLS IN COMMON WITH THE SHADED ROOM SPACES OF THE RENOVATED AREAS
- SEE MECHANICAL, PLUMBING, & ELECTRICAL PLANS (MEP) FOR ADDITIONAL NEW WORK.

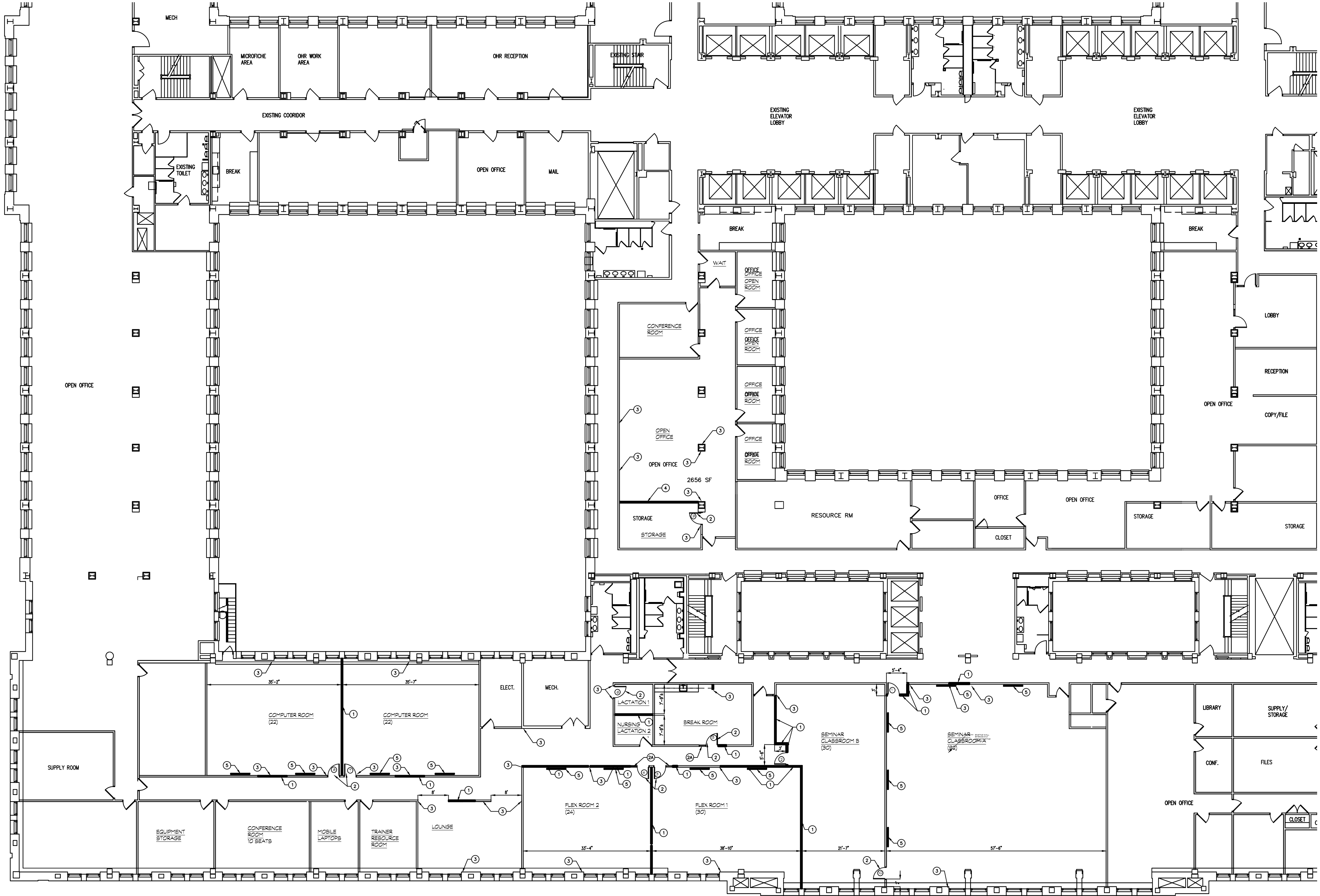


NOTE: REMOVAL AND INSTALLATION OF NEW CARPET AND BASE ARE UNDER A SEPARATE CONTRACT.

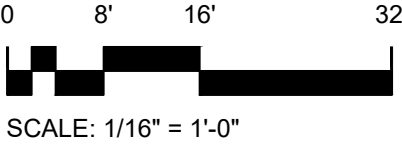
WALL TYPE 1
NEW GYPSUM BOARD
WALL SECTION
SCALE 3/4" = 1'-0"



KEY PLAN



PARTIAL 4TH FLOOR PLAN
SCALE 1/16" = 1'-0"



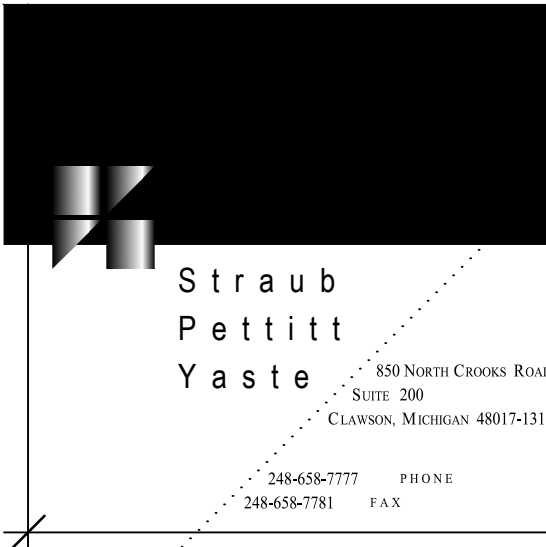
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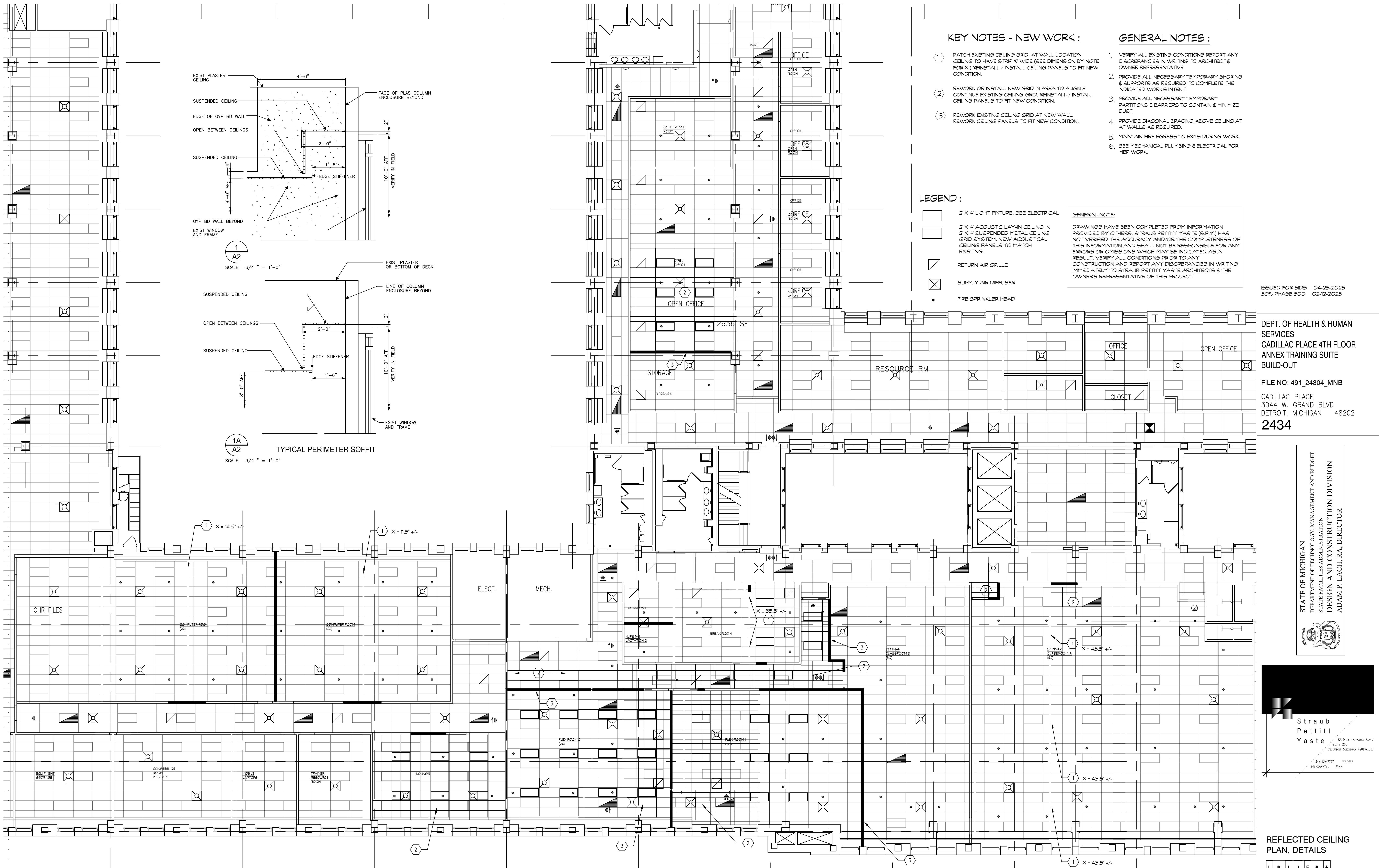
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FLOOR PLAN
WALL SECTION
SCHEDULES



KEY NOTES - NEW WORK :

- 1. PATCH EXISTING CEILING GRID, AT WALL LOCATION CEILING TO HAVE STRIP X" WIDE (SEE DIMENSION BY NOTE FOR X) REINSTALL / INSTALL CEILING PANELS TO FIT NEW CONDITION.
- 2. REWORK OR INSTALL NEW GRID IN AREA TO ALIGN & CONTINUE EXISTING CEILING GRID, REINSTALL / INSTALL CEILING PANELS TO FIT NEW CONDITION.
- 3. REWORK EXISTING CEILING GRID AT NEW WALL. REWORK CEILING PANELS TO FIT NEW CONDITION.

GENERAL NOTES :

- 1. VERIFY ALL EXISTING CONDITIONS REPORT ANY DISCREPANCIES IN WRITING TO ARCHITECT & OWNER REPRESENTATIVE.
- 2. PROVIDE ALL NECESSARY TEMPORARY SHORING & SUPPORTS AS REQUIRED TO COMPLETE THE INDICATED WORKS INTENT.
- 3. PROVIDE ALL NECESSARY TEMPORARY PARTITIONS & BARRIERS TO CONTAIN & MINIMIZE DUST.
- 4. PROVIDE DIAGONAL BRACING ABOVE CEILING AT AT WALLS AS REQUIRED.
- 5. MAINTAIN FIRE EGRESS TO EXITS DURING WORK.
- 6. SEE MECHANICAL PLUMBING & ELECTRICAL FOR MEP WORK.

LEGEND :

- 2 X 4' LIGHT FIXTURE, SEE ELECTRICAL
- 2 X 4' ACUSTIC LAY-IN CEILING IN 2 X 4' SUSPENDED METAL CEILING GRID SYSTEM, NEW ACUSTICAL CEILING PANELS TO MATCH EXISTING.
- RETURN AIR GRILLE
- SUPPLY AIR DIFFUSER
- FIRE SPRINKLER HEAD

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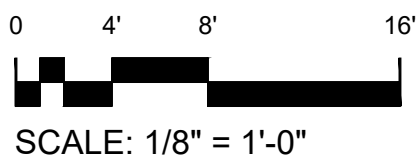
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REFLECTED CEILING
PLAN, DETAILS

L	6	I	7	E	8	A
J				F		C
K	5	H	3	D	1	B
ANNEX						

A2

PARTIAL 4TH FLOOR REFLECTED CEILING PLAN
SCALE 1/8" = 1'-0"



FIRE PROTECTION NOTES

- THE FIRE PROTECTION CONTRACTOR (FPC) SHALL MODIFY THE EXISTING SPRINKLER SYSTEM TO FACILITATE THE NEW FLOOR PLAN AND AS REQUIRED PER THE LOCAL AUTHORITY HAVING JURISDICTION. ALL EXISTING SPRINKLERS IN THE AREA IDENTIFIED SHALL BE REMOVED. NEW SPRINKLERS SHALL BE INSTALLED AND CONNECTED TO EXISTING BRANCH PIPING.
- ALL AREAS OF THE FACILITY SHALL BE FULLY SPRINKLERED.
- FPC SHALL FIELD VERIFY EXISTING CONDITIONS AT THE SITE INCLUDING SPRINKLER HEAD LOCATIONS, PIPE SIZES, AND PIPE LOCATIONS. SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST NFPA 13, MICHIGAN BUILDING & INTERNATIONAL FIRE CODES. FPC SHALL OBTAIN ALL REQUIRED PERMITS FROM ALL AUTHORITIES HAVING JURISDICTION. FPC SHALL BE RESPONSIBLE FOR ALL FEES ASSOCIATED WITH OBTAINING APPROVALS.
- FPC SHALL COORDINATE SPRINKLER HEAD LOCATIONS & PIPE ROUTING WITH OTHER TRADES TO AVOID INTERFERENCES. THE FPC SHALL COORDINATE FINAL LOCATIONS AND ELEVATIONS OF PIPING AND SPRINKLER HEADS WITH ARCHITECT FOR APPROVAL.
- REFER TO ARCHITECTURAL, MECHANICAL AND ELECTRICAL PLANS FOR LOCATIONS OF CEILING DIFFUSERS, GRILLES, LIGHTS, AND OTHER CEILING ORNAMENTATION.
- ALL NEW FIRE PROTECTION PIPING SHALL BE INSTALLED TO ALLOW DRAINAGE BACK TO SYSTEM RISERS WHEN POSSIBLE. WHERE THIS IS IMPRACTICAL, AUXILIARY DRAINS SHALL BE INSTALLED AND DRAINED TO AN ACCEPTABLE LOCATION AS DETERMINED BY THE GENERAL CONTRACTOR OR OWNER'S REPRESENTATIVE.
- PROVIDE ESCUTCHEON PLATES FOR ALL PIPING AND HEAD PENETRATIONS THROUGH WALLS, FLOORS, AND CEILINGS.
- SYSTEM SHALL BE DESIGNED TO PROVIDE A DENSITY OF 0.15 GPM/SQ.FT. OVER THE MOST REMOTE 1500 SQ.FT. FOR ORDINARY HAZARD GROUP 1 OCCUPANCIES FOR ALL AREAS SPRINKLER HEAD SPACING AND COVERAGE AREA SHALL BE IN ACCORDANCE WITH NFPA REQUIREMENTS. HYDRAULIC CALCULATIONS SHALL INCLUDE 100 GPM FOR THE OUTSIDE HOSE DEMAND.
- FPC IS RESPONSIBLE FOR CORE DRILLING ALL PENETRATIONS REQUIRED TO COMPLETE THEIR WORK. PROVIDE SLEEVES AND FIRESTOP SEALANTS WHERE PIPES PENETRATE FIRE RATED WALLS. COMPLY WITH ASTM E-814 AND UL 1479. PROVIDE SLEEVES IN ALL WALL PENETRATIONS; SCHEDULE 40 IN MASONRY AND CONCRETE WALLS, SHEET METAL IN DRYWALL PARTITIONS. PENETRATIONS THROUGH EXTERIOR WALLS SHALL BE WEATHER TIGHT.
- ALL HANGER CONNECTIONS FOR PIPING 3" & LARGER SHALL BE FROM PANEL POINT ON TOP CHORD OF JOISTS. ALL HANGER CONNECTIONS FOR PIPE 2 1/2" & LESS SHALL BE WITHIN SIX INCHES FROM PANEL POINT ON TOP CHORD OF JOISTS. ALL PIPING SHALL BE SUPPORTED IN ACCORDANCE WITH NFPA 13.
- INSTALL ALL PIPING TIGHT TO BOTTOM CHORD OF JOIST WHENEVER POSSIBLE.
- IN AREAS WITH LAY-IN CEILINGS, SPRINKLERS SHALL BE PIPED WITH A SWING JOINT TO ALLOW CENTERING OF SPRINKLERS IN CEILING TILE WITH A ONE INCH VARIANCE IN EITHER DIRECTION.
- FPC MUST BE LICENSED BY THE STATE OF MICHIGAN TO PERFORM FIRE PROTECTION WORK.
- FPC SHALL FIELD VERIFY LOCATION OF MECHANICAL EQUIPMENT PER MECHANICAL DRAWINGS FOR EQUIPMENT LOCATIONS, DUCTWORK, ROOF OPENINGS & FRAMING THAT WILL IMPACT SPRINKLER INSTALLATION.
- ALL PIPING AND HEAD LOCATIONS SHALL BE COORDINATED WITH OTHER TRADES TO AVOID INTERFERENCE AND CONFLICTS.
- FPC SHALL PROVIDE PIPE SUPPORTS AS REQUIRED PER NFPA 13-1996 (RE: NOTE 10 ABOVE).
- ALL SPRINKLERS TO BE INSTALLED IN BULKHEADS, SOFFITS, OR GYPSUM BOARD CEILINGS SHALL BE CONCEALED TYPE WITH COVER PLATE. COLOR OF COVER PLATE SHALL MATCH AREA AND BE COORDINATED WITH ARCHITECT AT INSTALLATION.
- ALL UPRIGHT SPRINKLER HEADS SHALL BE INSTALLED WITH A MAX. 12" DEFLECTOR DISTANCE.
- PROVIDE HIGH TEMPERATURE HEADS AS REQUIRED NEAR HIGH HEAT GENERATING EQUIPMENT AND APPLIANCES.
- TWO (2) LEVELS OF PROTECTION SHALL BE REQUIRED OVER AREAS WITH CEILINGS IF CONSTRUCTION OF PERIMETER BULKHEADS AND WALLS ARE NOT INSTALLED TO THE ROOF DECK.
- ALL PIPING AND HEAD LOCATIONS SHALL BE COORDINATED WITH OTHER TRADES TO AVOID INTERFERENCES AND CONFLICTS.
- ALL PIPING 1 1/4" DIAMETER AND SMALLER SHALL BE SCHEDULE 40 BLACK STEEL PIPE WITH CLASS 125 - 175 PSI THREADED FITTINGS OR UL LISTED AND ASTM F442 APPROVED CHLORINATED POLYVINYL CHLORIDE (CPVC) PIPING EQUIVALENT TO BLAZEMASTER (INSTALLED PER MANUFACTURERS INSTALLATION REQUIREMENTS). ALL PIPING 1 1/2" DIAMETER AND LARGER SHALL BE SCHEDULE 10 BLACK STEEL PIPE WITH GROOVED TYPE FITTINGS.
- PROVIDE TAGS ON ALL VALVES AND LABELS ON CONCEALED PIPING.
- PROVIDE AUXILIARY DRAINS WITH VALVES, THREADED CAPS, AND TAGS FOR EACH TRAPPED SECTION OF SPRINKLER PIPING. PROVIDE ACCESS DOORS AT EACH DRAIN LOCATION IF REQUIRED. COORDINATE DRAIN & ACCESS DOOR LOCATION WITH THE CONSTRUCTION MANAGER AND ALL OTHER TRADES PRIOR TO INSTALLATION.
- FPC SHALL LAYOUT SPRINKLER SYSTEM & PERFORM HYDRAULIC CALCULATIONS. FPC SHALL OBTAIN A FLOW TEST TO DETERMINE THAT THERE IS ADEQUATE PRESSURE & FLOW AVAILABLE FOR TO SERVE THE REVISED FIRE PROTECTION SYSTEM. FPC SHALL NOTIFY THE ENGINEER OF RECORD IMMEDIATELY IF THE NEW SYSTEM FLOW OR PRESSURE EXCEEDS WHAT IS AVAILABLE AT EXISTING RISER. PROVIDE SUBMITTALS OF THE SPRINKLER SYSTEM LAYOUT, HYDRAULIC CALCULATIONS & FIRE PROTECTION EQUIPMENT TO THE AUTHORITY HAVING JURISDICTION & THE ENGINEER OF RECORD FOR REVIEW BEFORE PROCEEDING WITH ANY WORK.
- PROVIDE SPRINKLER HEAD CABINET NEAR RISERS WITH SPRINKLER WRENCH AND QUANTITY OF HEADS PER NFPA 13 FOR ALL SPRINKLER HEAD TYPES.
- FPC SHALL INSTALL NEW SPRINKLERS AS REQUIRED PER THE NEW LAYOUT & SHALL PROVIDE SPRINKLERS OF THE SAME TYPE, TEMPERATURE RATING, K-FACTOR, AND MANUFACTURER OF THE EXISTING SPRINKLER HEADS IF POSSIBLE.
- FPC SHALL INSTALL FIRE EXTINGUISHERS AS REQ'D, COORDINATE WITH ARCHITECT FOR LOCATIONS.
- ADDITIONAL SPRINKLERS SHALL BE REQUIRED UNDER OBSTRUCTIONS, LARGE DUCTS, ETC. AS REQUIRED FOR NFPA 13, REFER TO MECHANICAL & ARCHITECTURAL PLANS FOR OBSTRUCTIONS AND DUCT SIZES.
- ALL SPRINKLER PIPING SHALL BE HYDROSTATICALLY PRESSURE TESTED AT 200 PSI FOR TWO HOURS WITH NO LEAKAGE. ALL LEAKS SHALL BE REPAIRED AT CONTRACTOR'S EXPENSE. REPAIRS SHALL BE MADE BY TIGHTENING OR REPLACEMENT OF FITTINGS, CAULKING OR WRAPPING OF JOINTS SHALL NOT BE ALLOWED.
- FPC SHALL PROVIDE FINAL SYSTEM LAYOUT OF SPRINKLER PIPING, HEAD LOCATIONS, HEAD TYPES, PIPE SIZES, PIPE ELEVATIONS, AND HYDRAULIC CALCULATIONS TO THE ENGINEER OF RECORD AND TO THE AUTHORITY HAVING JURISDICTION FOR REVIEW BEFORE PROCEEDING WITH ANY WORK.
- FPC SHALL SUBMIT ALL REQUIRED PLANS AND CALCULATIONS TO LOCAL AUTHORITY HAVING JURISDICTION AS WELL AS ARCHITECT OF RECORD FOR APPROVAL OF PIPE ROUTING AND SPRINKLER HEAD LOCATIONS.
- ACCEPTABLE MANUFACTURERS FOR FIRE PROTECTION EQUIP., VALVES, SPRINKLER HEAD & ACCESSORIES TO BE INSTALLED SHALL INCLUDE: VIKING, TYCO, CENTRAL, RELIABLE, GUARDIAN, AES CO., ELKHART BRASS, VICTAULIC, HERSEY, ORION, AKRON BRASS, HYDRO FLOW, POTTER-ROEMER, FIRE PROTECTION PRODUCTS, FLEX-ARM, 3M, AMES, WATTS, APOLLO, FIREMATIC, ASCO, FLEXHEAD, SYSTEM SENSOR AND HARRINGTON SIGNAL. MANUFACTURER SHALL BE APPROVED BY BUILDING OWNER.
- FPC SHALL COORDINATE TYPE OF HEAD REQUIRED (IE: CONCEALED, PENDANT) AND COLOR / FINISH WITH ARCHITECT PRIOR TO FINALIZING BID.

HEATING, VENTILATING AND AIR CONDITIONING SPECIFICATIONS

SCOPE

THE WORK TO BE PERFORMED UNDER THE HVAC SPECIFICATIONS CONSISTS OF PROVIDING ALL LABOR AND MATERIALS FOR THE COMPLETE INSTALLATION FOR ALL HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS. THE WORK SHALL INCLUDE BUT IS NOT LIMITED TO THE FOLLOWING:

- DUCTWORK AND ACCESSORIES
- AIR DEVICES

GENERAL

THIS SPECIFICATION IS INCLUSIVE FOR EACH ITEM REQUIRING ALL LABOR, EQUIP. AND MATERIALS NECESSARY TO PROPERLY INSTALL, ALTER, ADJUST AND PUT IN OPERATION, THE COMPLETE HVAC SYSTEMS.

THIS CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER LAYOUT AND CONSTRUCTION OF THE WORK INCLUDED IN THIS CONTRACT.

THE CONTRACTOR SHALL VISIT THE PROJECT SITE TO COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED.

ALL DEMOLITION, CUTTING AND PATCHING AS REQUIRED FOR THE WORK UNDER THIS CONTRACT SHALL BE PROVIDED BY THIS CONTRACTOR.

THIS CONTRACTOR SHALL COORDINATE THIS WORK WITH THAT OF ALL OTHER TRADES ON THIS PROJECT.

GUIDE LINES, REGARDLESS OF DETAILS INDICATED ON THE DRAWINGS, ALL EQUIP. SHALL BE INSTALLED IN ACCORDANCE WITH ALL MANUFACTURERS' REQUIREMENTS.

REGULATIONS

SYSTEMS IN ALL AND / OR IN PART SHALL CONFORM TO ALL PERTINENT LAWS, CODES, ORDINANCES AND REGULATIONS OF ALL BODIES HAVING JURISDICTION, AT ALL GOVERNING LEVELS, NOTWITHSTANDING ANYTHING IN THESE PLANS AND SPECIFICATIONS TO THE CONTRARY. IN CASE OF CONFLICT BETWEEN GOVERNING LEVELS, THE MORE STRINGENT REGULATIONS SHALL APPLY.

THIS CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY ANY AUTHORITY HAVING JURISDICTION IN CONNECTION WITH THIS WORK.

WORKMANSHIP

THE WORK UNDER THIS CONTRACT SHALL BE INSTALLED BY SKILLED CRAFTSMEN. ALL HEATING, VENTILATING AND AIR CONDITIONING SYSTEMS SHALL BE INSTALLED IN A WORKMANLIKE MANNER IN ACCORDANCE WITH ACCEPTED HVAC INDUSTRY STANDARDS.

DUCTWORK

ALL NEW SUPPLY AIR DUCTWORK SHALL BE GALVANIZED STEEL, CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH ALL ASHRAE AND SMACNA STANDARDS. FLEXIBLE DUCTWORK TO RELOCATED AND NEW CEILING DIFFUSERS SHALL BE ALLOWED, HOWEVER THE LENGTH OF FLEXIBLE DUCT SHALL NOT EXCEED 5'-0". INSULATE ALL NEW AND EXISTING DUCTWORK AFFECTED BY NEW WORK WITH BLANKET TYPE DUCT INSULATION THAT MATCHES THE EXISTING INSULATION CURRENTLY INSTALLED ON EXISTING DUCTWORK THROUGHOUT THE CEILING SPACE. FIELD VERIFY AND COORDINATE ALL REQUIRED WORK.

TESTING AND BALANCING

THIS CONTRACTOR SHALL HAVE THE AIR DISTRIBUTION SYSTEMS TESTED AND BALANCED BY A CERTIFIED INDEPENDENT AIR BALANCE CONTRACTOR TO WITHIN 5% OF CFM QUANTITIES INDICATED ON THE DRAWINGS. BALANCING SHALL BE PERFORMED IN ACCORDANCE WITH NEBB OR AABC STANDARDS. PROVIDE FINAL AIR BALANCE REPORTS FOR A.H.J. REVIEW.

TEMPERATURE CONTROLS

THIS CONTRACTOR SHALL PROVIDE CONTROL SYSTEMS COMPATIBLE WITH ALL OF THE HVAC EQUIPMENT PROVIDED BY THE OWNER AND BY THIS CONTRACTOR. ALL CONTROL WIRING SHALL BE BY THIS CONTRACTOR & INSTALLED IN ACCORDANCE WITH NEC CODE REQUIREMENTS & THE ELECTRICAL SPECIFICATIONS.

ALL THERMOSTATS SHALL BE MOUNTED 48" ABOVE FINISHED FLOOR. (PER A.D.A.)

SHOP DRAWINGS

THIS CONTRACTOR SHALL PROVIDE SHOP DRAWINGS FOR REVIEW IF REQUESTED BY THE ARCHITECT FOR EQUIPMENT LISTED BELOW, AND / OR SCHEDULED ON THE DRAWINGS, FOR THE ARCHITECT / ENGINEER REVIEW. ALL SHOP DRAWINGS MUST INDICATE EQUIPMENT MANUFACTURER AND CAPACITIES.

- HEATING AND VENTILATION EQUIPMENT & DEVICES
- FINAL AIR BALANCE REPORT

OPERATING AND MAINTENANCE

THIS CONTRACTOR SHALL PROVIDE THE OWNER WITH ALL WRITTEN AND VERBAL OPERATING & MAINTENANCE INSTRUCTIONS FOR ALL HVAC SYSTEMS INSTALLED UNDER THIS PROJECT.

GUARANTEE

THIS CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE, IN WRITING, ALL MATERIALS, EQUIPMENT AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER AND SHALL PROVIDE FREE SERVICE FOR REPAIR OF ALL EQUIPMENT INVOLVED IN THIS CONTRACT DURING THE GUARANTEE PERIOD. ALL EQUIPMENT WARRANTIES SHALL ALSO BE PROVIDED TO THE OWNER.

FIRE PROTECTION SPECIFICATIONS

SCOPE

THE ENTIRE INSTALLATION SHALL CONFORM TO THE RULES AND REGULATIONS OF THE STATE OF MICHIGAN, NFPA, UL, FM, IRI, BUILDING OWNER'S INSURANCE UNDERWRITER AND ANY OTHER CODES HAVING JURISDICTION. IN THE EVENT OF A CONFLICT BETWEEN APPLICABLE CODES THE MORE STRINGENT OF THE REQUIREMENTS SHALL GOVERN.

ARRANGE AND PAY FOR ALL FEES, COSTS, INSPECTIONS AND PERMITS RELATED TO THE FIRE PROTECTION WORK.

PIPE MATERIALS AND FITTINGS

FIELD VERIFY AND MATCH EXISTING OR SCHEDULE 40 BLACK STEEL ASTM A53. PROVIDE WITH STANDARD WEIGHT CAST IRON SCREWED FITTINGS, CLASS 125 CONFORMING TO ANSI STANDARD B16.4. (PAINT TO MATCH EXIST. IF REQ'D)

SPRINKLER HEADS

FIELD VERIFY AND MATCH EXISTING SIDEWALL AND CEILING MOUNTED HEADS COORDINATE ANY CHANGE OF HEAD OR ESCUTCHEON WITH ARCHITECT.

GENERAL NOTES

- THIS DRAWING IS DIAGRAMTIC & SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE P.C. SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCH. IMMEDIATELY OF ANY DISCREPANCIES IN THE DOCUMENTS BEFORE PROCEEDING. FAILURE TO DO SO WILL RESULT IN THE PLUMBING CONTR. TAKING FULL RESPONSIBILITY & LIABILITY FOR ANY SAID DISCREPANCIES.
- ALL NEW WORK SHALL BE DONE IN ACCORDANCE WITH ALL LOCAL, STATE & COUNTY CODE REGULATIONS. MIOSHA & A.D.A.
- DUE TO LIMITED SPACE IT IS CRITICAL THAT THE LOCATION OF ALL PIPING & ACCESSORIES IN CEILING SPACE BE COORDINATED WITH ALL EXISTING CONDITIONS AND ALL OTHER TRADES IN FIELD.

FIRE PROTECTION DEMOLITION KEY NOTE

- D1** IF REQUIRED, REMOVE EXISTING SPRINKLER HEADS IN THIS AREA TO FACILITATE REMOVED AND REWORKED CEILING AREAS. FIELD VERIFY AND COORDINATE ALL REQUIRED WORK.

FIRE PROTECTION ALTERATION KEY NOTE

- F1** IF REQUIRED, INSTALL NEW SPRINKLERS IN THIS AREA. FPC SHALL COORDINATE LOCATIONS WITH THE NEW OR REWORKED LAY-IN CEILING GRID AND LIGHTS WITH DIFFUSER LAYOUT. FPC SHALL UTILIZE EXISTING BRANCH PIPING FOR CONNECTION TO NEW SPRINKLERS AND SHALL INSTALL NEW PIPING AS REQUIRED TO FACILITATE THE REQUIRED SPRINKLER LAYOUT. FIELD VERIFY AND COORDINATE ALL REQUIRED WORK.

MECHANICAL NOTES

THESE KEY NOTES APPLY TO ALL MECHANICAL PLANS (M1 & M2)

CONTRACTOR'S PRE-BID NOTIFICATION:

ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS & CERTAIN FIELD OBSERVATIONS. THE CONTRACTORS AND ALL THEIR SUB CONTRACTORS SHALL VISIT THE JOB SITE & COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A CHANGE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED, DUE TO ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCH. IN WRITING FOR RESOLUTION BEFORE SUBMITTING A FINAL BID OR ENTERING INTO A CONSTRUCTION CONTRACT. FAILURE TO PROVIDE THE WRITTEN NOTIFICATION TO THE ARCHITECT SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDED COST BEING INCURRED BY THE BUILDING OWNER.

INSTALLATION COORDINATION

WHEN A CONFLICT BETWEEN INSTALLATION DETAILS, SUCH AS, BUT NOT LIMITED TO PIPING DIAGRAMS, EQUIPMENT DETAILS & CONNECTIONS, ETC., INDICATED ON THE DRAWINGS AND THE MANUFACTURERS INSTALLATION INSTRUCTIONS PROVIDED WITH REVIEWED SHOP DRAWINGS, THE MANUF. INSTALLATION INSTRUCTIONS SHALL TAKE PRECEDENT. NO ADDITIONAL COST WILL BE ALLOWED IF THE MANUF. INSTALLATION INSTRUCTIONS ARE NOT FOLLOWED.

SEALING OF DUCTWORK JOINTS:

ALL SUPPLY, RETURN AND EXHAUST DUCT JOINTS SHALL BE SEALED WITH HIGH VELOCITY DUCT SEALANT. DUCT TAPE OF ANY KIND SHALL NOT BE USED FOR SEALING DUCT JOINTS.

MECHANICAL DRAWING SCHEDULE

SHEET	SHEET TITLE
M1	MECHANICAL GENERAL INFORMATION, COMPOSITE FLOOR PLAN - FIRE PROTECTION DEMOLITION & ALTERATIONS
M2	PARTIAL 4TH FLOOR PLAN - MECHANICAL DEMOLITION
M3	PARTIAL 4TH FLOOR PLAN - MECHANICAL ALTERATIONS

MECHANICAL SYMBOL LEGEND

SYMBOL	DESCRIPTION
E-, EX or EXIST	EXISTING ITEM FIELD VERIFY EXACT LOCATION & SIZE
N -	NEW ITEM - FIELD COORDINATE
R + R	REMOVE & RELOCATE EXISTING ITEM FIELD VERIFY EXACT LOCATION & SIZE
R -	RELOCATED ITEM - FIELD COORDINATE
	NEW CONNECTION TO EXISTING ITEM - FIELD VERIFY EXACT LOCATION & SIZE OF EXISTING
(V.I.F.)	VERIFY IN FIELD
AHU	AIR HANDLING UNIT
FP	FAN POWERED TERMINAL UNIT WITH OUTDOOR AIR
CD	CEILING DIFFUSER (SUPPLY AIR)
RG	RETURN AIR GRILLE
	THERMOSTAT (INCLUDED WITH CONTROL UNIT)
SA / RA	SUPPLY AIR / RETURN AIR
O.E.RA	OPEN END RETURN AIR DUCT
OA	OUTDOOR AIR
SPKLR	SPRINKLER
N.F.P.A	NATIONAL FIRE PROTECTION ASSOCIATION
U.L	UNDERWRITERS LABORATORIES
F.M.	FACTORY MUTUAL
M.M.C.	MICHIGAN MECHANICAL CODE
I.E.C.C.	INTERNATIONAL ENERGY CONSERVATION CODE
M.C.	MECHANICAL CONTRACTOR
F.P.C.	FIRE PROTECTION CONTRACTOR
E.C.	ELECTRICAL CONTRACTOR
A.H.J.	AUTHORITY HAVING JURISDICTION



ISSUED FOR BIDS

04/25/2025

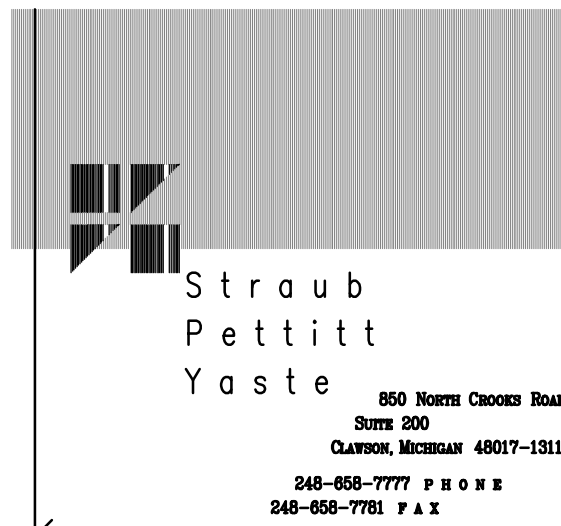
DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

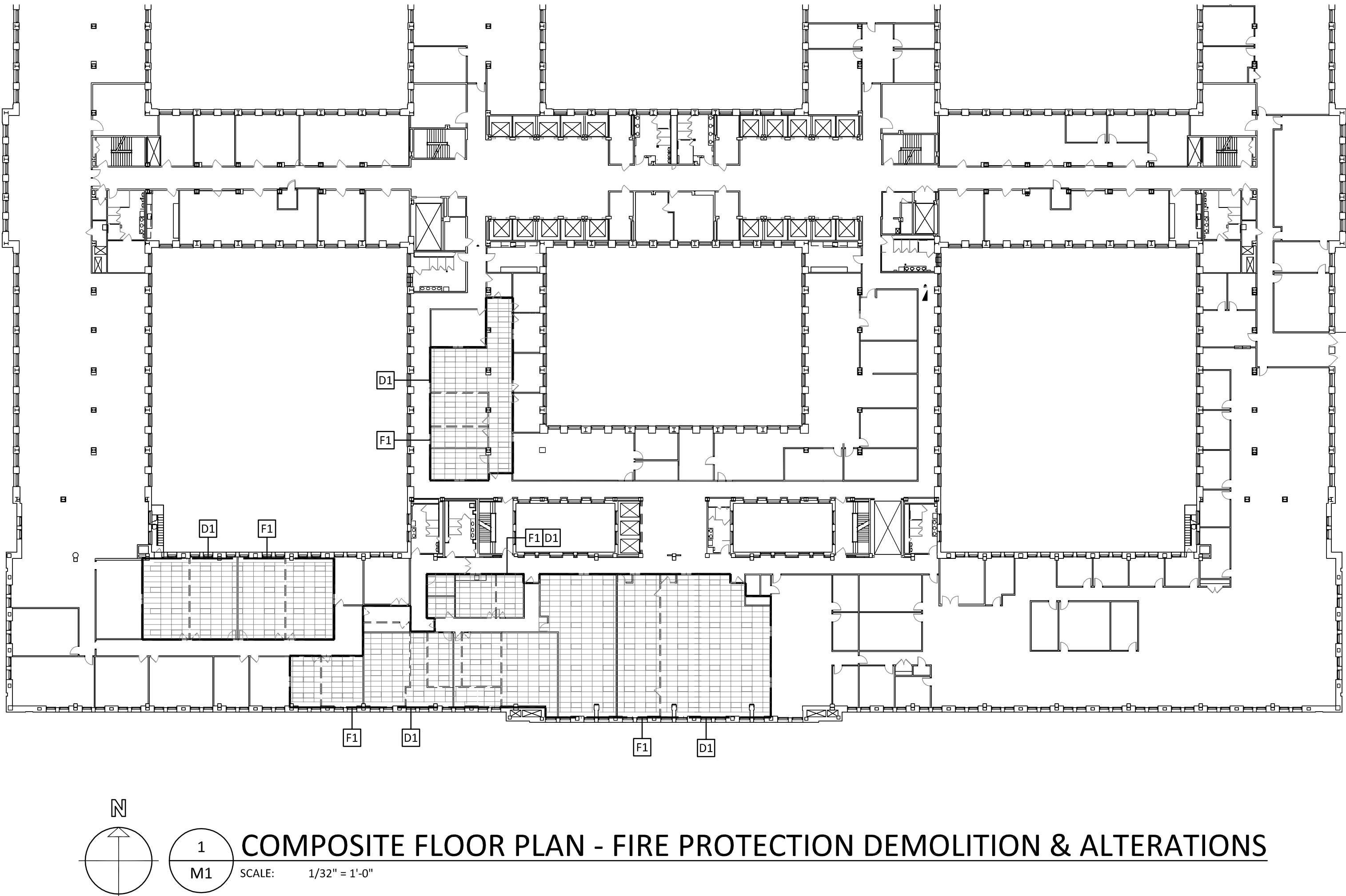
STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR

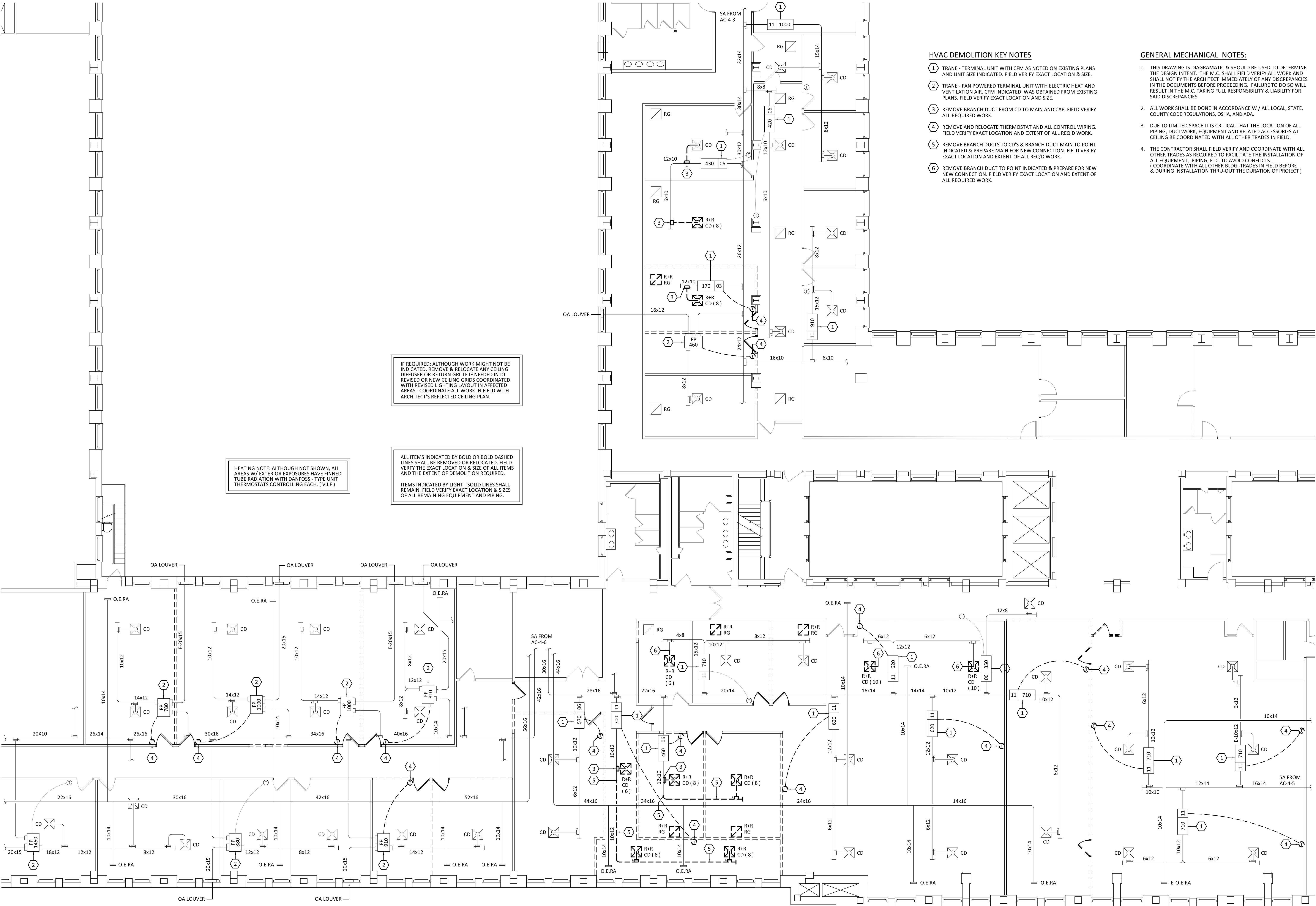


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MECH. GENERAL INFO.,
COMPOSITE FLOOR PLAN -
FIRE PROTECTION

M1





IF REQUIRED: ALTHOUGH WORK MIGHT NOT BE INDICATED, REMOVE & RELOCATE ANY CEILING DIFFUSER OR RETURN GRILLE IF NEEDED INTO REVISED OR NEW CEILING GRIDS COORDINATED WITH REVISED LIGHTING LAYOUT IN AFFECTED AREAS. COORDINATE ALL WORK IN FIELD WITH ARCHITECT'S REFLECTED CEILING PLAN.

HEATING NOTE: ALTHOUGH NOT SHOWN, ALL AREAS W/ EXTERIOR EXPOSURES HAVE FINNED TUBE RADIATION WITH DANFOSS - TYPE UNIT THERMOSTATS CONTROLLING EACH. (V.I.F.)

ALL ITEMS INDICATED BY BOLD OR BOLD DASHED LINES SHALL BE REMOVED OR RELOCATED. FIELD VERIFY THE EXACT LOCATION & SIZE OF ALL ITEMS AND THE EXTENT OF DEMOLITION REQUIRED.

ITEMS INDICATED BY LIGHT - SOLID LINES SHALL REMAIN. FIELD VERIFY EXACT LOCATION & SIZES OF ALL REMAINING EQUIPMENT AND PIPING.

HVAC DEMOLITION KEY NOTES

1. TRANE - TERMINAL UNIT WITH CFM AS NOTED ON EXISTING PLANS AND UNIT SIZE INDICATED. FIELD VERIFY EXACT LOCATION & SIZE.
2. TRANE - FAN POWERED TERMINAL UNIT WITH ELECTRIC HEAT AND VENTILATION AIR. CFM INDICATED WAS OBTAINED FROM EXISTING PLANS. FIELD VERIFY EXACT LOCATION AND SIZE.
3. REMOVE BRANCH DUCT FROM CD TO MAIN AND CAP. FIELD VERIFY ALL REQUIRED WORK.
4. REMOVE AND RELOCATE THERMOSTAT AND ALL CONTROL WIRING. FIELD VERIFY EXACT LOCATION AND EXTENT OF ALL REQ'D WORK.
5. REMOVE BRANCH DUCTS TO CD'S & BRANCH DUCT MAIN TO POINT INDICATED & PREPARE MAIN FOR NEW CONNECTION. FIELD VERIFY EXACT LOCATION AND EXTENT OF ALL REQ'D WORK.
6. REMOVE BRANCH DUCT TO POINT INDICATED & PREPARE FOR NEW NEW CONNECTION. FIELD VERIFY EXACT LOCATION AND EXTENT OF ALL REQUIRED WORK.

GENERAL MECHANICAL NOTES:

1. THIS DRAWING IS DIAGRAMATIC & SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE M.C. SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES IN THE DOCUMENTS BEFORE PROCEEDING. FAILURE TO DO SO WILL RESULT IN THE M.C. TAKING FULL RESPONSIBILITY & LIABILITY FOR SAID DISCREPANCIES.
2. ALL WORK SHALL BE DONE IN ACCORDANCE W / ALL LOCAL, STATE, COUNTY CODE REGULATIONS, OSHA, AND ADA.
3. DUE TO LIMITED SPACE IT IS CRITICAL THAT THE LOCATION OF ALL PIPING, DUCTWORK, EQUIPMENT AND RELATED ACCESSORIES AT CEILING BE COORDINATED WITH ALL OTHER TRADES IN FIELD.
4. THE CONTRACTOR SHALL FIELD VERIFY AND COORDINATE WITH ALL OTHER TRADES AS REQUIRED TO FACILITATE THE INSTALLATION OF ALL EQUIPMENT, PIPING, ETC. TO AVOID CONFLICTS (COORDINATE WITH ALL OTHER BLDG. TRADES IN FIELD BEFORE & DURING INSTALLATION THRU-OUT THE DURATION OF PROJECT)



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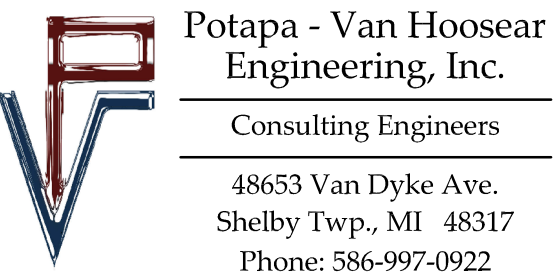
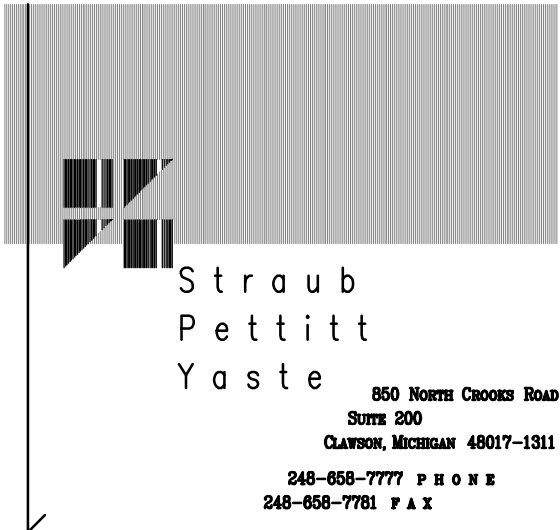
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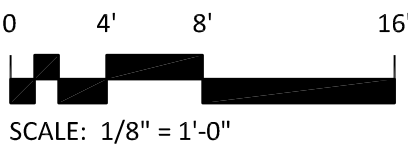
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PARTIAL 4TH FLOOR
PLAN - MECHANICAL
DEMOLITION

PARTIAL 4TH FLOOR PLAN - MECHANICAL DEMOLITION

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



OUTDOOR AIR VENTILATION SCHEDULE (ALTERED AREAS ONLY)											
HVAC SYSTEMS	OUTDOOR AIR REQUIRED TO BE PROVIDED BY EXISTING HVAC EQUIPMENT										
% OA LISTED WAS OBTAINED FROM OWNER'S EX. BLDG. PLANS - EQUIPMENT SCHEDULES (VIF)	OCCUPANCY CATEGORY	ZONE FLOOR AREA A _Z	OCCUPANT DENSITY No. / 1000 S.F. (M.M.C. 403.3) OR ACTUAL CHAIR COUNT	ZONE POPULATION P _Z	PEOPLE OUTDOOR AIR RATE R _P	AREA OUTDOOR AIR RATE R _A	BREATHING ZONE OUTDOOR AIRFLOW V _{BZ}	ZONE AIR DISTRIBUTION EFFECTIVENESS E _Z	(MIN) DESIGN ZONE OUTDOOR AIRFLOW V _{OZ}	CONTINUOUS OUTDOOR AIR REQUIRED	CONTINUOUS OUTDOOR AIR PROVIDED
PART OF E-AC-4-3 3,390 CFM W/ 32% OA (1,085 CFM) FP BOX OA (230 CFM)	EQUIPMENT STORAGE	370	-	-	-	0.12	44	0.8	55		
	CONFERENCE RM - 1	444	10 (ACTUAL)	10	5	0.06	77	0.8	96		
	MOBILE LAPTOPS	245	5	2	5	0.06	25	0.8	31		
	TRAINER RESOURCE	278	5	2	5	0.06	27	0.8	34		
	LOUNGE	507	30	15	5	0.06	105	0.8	131		
PART OF E-AC-4-5 2,400 CFM W/ 37% OA (888 CFM)	COMPUTER RM - 1	1058	22 (ACTUAL)	22	10	0.12	347	0.8	433		
	COMPUTER RM - 2	1073	22 (ACTUAL)	22	10	0.12	349	0.8	436		
	LACTATION - 1	77	5	1	5	0.06	10	0.8	12		
	LACTATION - 2	77	5	1	5	0.06	10	0.8	12		
	BREAK ROOM	402	30	12	5	0.06	84	0.8	105	4,839	8,983
PART OF E-AC-4-6 12,190 CFM W/ 32% OA (3,900 CFM) FP BOXES OA (2,880 CFM)	FLEX ROOM - 1	1076	30 (ACTUAL)	30	10	0.12	429	0.8	536		
	FLEX ROOM - 2	931	24 (ACTUAL)	24	10	0.12	352	0.8	440		
	SEMINAR CLASSRM - A	3033	92 (ACTUAL)	92	10	0.12	1284	0.8	1,605		
	SEMINAR CLASSRM - B	1154	30 (ACTUAL)	30	10	0.12	438	0.8	547		
	STORAGE	248	-	-	-	0.12	30	0.8	37		
	OPEN OFFICE	1392	5	7	5	0.06	118	0.8	148		
	CONFERENCE RM - 2	288	10 (ACTUAL)	10	5	0.06	67	0.8	84		
	WAITING	79	3 (ACTUAL)	3	5	0.06	20	0.8	25		
	OPEN ROOM - 1	157	5	1	5	0.06	14	0.8	18		
	OPEN ROOM - 2	157	5	1	5	0.06	14	0.8	18		
	OPEN ROOM - 3	157	5	1	5	0.06	14	0.8	18		
	OPEN ROOM - 4	157	5	1	5	0.06	14	0.8	18		

TOTAL OUTDOOR AIR PROVIDED IS IN COMPLIANCE WITH THE REQUIRED OUTDOOR VENTILATION AIR PER: 2021 MICHIGAN MECHANICAL CODE SECTION 403.

IF REQUIRED: ALTHOUGH WORK MIGHT NOT BE INDICATED, REMOVE & RELOCATE ANY EXISTING CEIL. DIFFUSER OR RET. GRILLE IF NEEDED INTO REVISED OR NEW CEILING GRIDS COORDINATED WITH REVISED LIGHTING LAYOUT IN AFFECTED AREAS. COORDINATE ALL WORK IN FIELD WITH ARCHITECT'S REFLECTED CEILING PLAN.

HEATING NOTE: ALTHOUGH NOT SHOWN, ALL AREAS W/ EXTERIOR EXPOSURES HAVE EXISTING FINNED TUBE RADIATION WITH DANFOSS UNIT THERMOSTATS CONTROLLING EACH. (V.I.F)

RE-BALANCE ALL EXISTING, RELOCATED & NEW CEILING DIFFUSERS SHOWN TO AIR QUANTITIES INDICATED. FIELD VERIFY ALL EXISTING & NEW LOCATIONS & COORDINATE ACCORDINGLY.

HVAC ALTERATION KEY NOTES

- EXISTING TRANE - TERMINAL UNIT REBALANCE TO CFM AS NOTED WITH UNIT SIZE INDICATED. FIELD VERIFY EXACT LOCATION & SIZE.
- EXISTING TRANE - FAN POWERED TERMINAL UNIT WITH ELECTRIC HEAT AND VENTILATION AIR. REBALANCE TO CFM AS NOTED WITH UNIT. FIELD VERIFY EXACT LOCATION AND SIZE. (OA SUPPLIED TO UNIT WAS OBTAINED FROM OWNER'S EXISTING PLANS - V.I.F)
- NEW CEILING DIFFUSER WITH 8"Ø NECK. M.C. SHALL FIELD VERIFY THE MANUFACTURER & MODEL OF THE EX. CD'S IN THE AREA AND MATCH. FIELD VERIFY AND COORDINATE NEW WORK.
- NEW CEILING DIFFUSER WITH 10"Ø NECK. M.C. SHALL FIELD VERIFY THE MANUFACTURER & MODEL OF THE EX. CD'S IN THE AREA AND MATCH. FIELD VERIFY AND COORDINATE NEW WORK.
- RELOCATED THERMOSTAT. PROVIDE NEW CONTROL WIRING TO UNIT IF REQUIRED. FIELD VERIFY AND COORDINATE ALL WORK.
- FIELD VERIFY & REBALANCE EXISTING UPSTREAM TERMINAL UNITS OR BRANCH DUCT MAIN TO PROVIDE THE ADDITIONAL 270 CFM (MINIMUM) REQUIRED FOR THE RENOVATED AREAS.

GENERAL MECHANICAL NOTES:

- THIS DRAWING IS DIAGRAMATIC & SHOULD BE USED TO DETERMINE THE DESIGN INTENT. THE M.C. SHALL FIELD VERIFY ALL WORK AND SHALL NOTIFY THE ARCHITECT IMMEDIATELY OF ANY DISCREPANCIES IN THE DOCUMENTS BEFORE PROCEEDING. FAILURE TO DO SO WILL RESULT IN THE M.C. TAKING FULL RESPONSIBILITY & LIABILITY FOR SAID DISCREPANCIES.
- ALL WORK SHALL BE DONE IN ACCORDANCE W / ALL LOCAL, STATE, COUNTY CODE REGULATIONS, OSHA, AND ADA.
- DUE TO LIMITED SPACE IT IS CRITICAL THAT THE LOCATION OF ALL PIPING, DUCTWORK, EQUIPMENT AND RELATED ACCESSORIES AT CEILING BE COORDINATED WITH ALL OTHER TRADES IN FIELD.
- PROVIDE HIGH IMPACT - LOCKABLE GAURDS ON ALL THERMOSTATS LOCATED IN ALL COMMON PUBLIC - COMMON AREAS. MOUNT ALL NEW OR RELOCATED THERMOSTATS @ 48" A.F.F. (V.I.F)
- COORDINATE THE EXACT LOCATION OF ALL NEW OR RELOCATED CEILING MOUNTED GRILLES & DIFFUSERS WITH THE ARCHITECT'S REFLECTED CEILING PLAN, SECTIONS, ELEVATIONS AND ELECTRICAL PLANS TO AVOID INTERFERENCES WITH LIGHTS AND OTHER CEILING ORNAMENTATION. (COORDINATE WITH SPRINKLER HEADS)
- THE CONTRACTOR SHALL FIELD VERIFY AND COORDINATE WITH ALL OTHER TRADES AS REQUIRED TO FACILITATE THE INSTALLATION OF ALL EQUIPMENT, PIPING, ETC. TO AVOID CONFLICTS (COORDINATE WITH ALL OTHER BLDG. TRADES IN FIELD BEFORE & DURING INSTALLATION THRU-OUT THE DURATION OF PROJECT)



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DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
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2434

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR





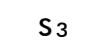
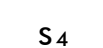
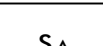
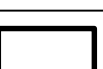




















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PARTIAL 4TH FLOOR
PLAN - MECHANICAL
ALTERATIONS

M3

LIGHTING FIXTURE SCHEDULE	
TYPE	DESCRIPTION
"LA1"	EXISTING 3-32 WATT T8 LAMP 2'X4' LAY-IN LIGHTING FIXTURE WITH ¾" X ¾" X ½" PLASTIC CUBE LOUVER, SILVER FINISH, 277 VOLT, TO BE RETROFITTED WITH NEW LED RETROFIT KIT. ELECTRICAL CONTRACTOR SHALL REMOVE EXISTING T8 LAMPS, BALLAST AND PLASTIC CUBE LOUVER TO FACILITATE INSTALLATION OF NEW RETROFIT KIT. NEW LED RETROFIT KIT TO BE AS FOLLOWS: 3,500 DEGREE K, 80 CRI MINIMUM WITH A DELIVERED LUMEN OUTPUT OF 4,066 LUMENS (MINIMUM), STEEL HOUSING, FIELD REPLACEABLE LIGHT ENGINE WITH INTEGRATED LED'S, DRIVER, POWER SUPPLY, ONE-PIECE LOWER REFLECTOR FINISHED WITH A TEXTURED HIGH REFLECTANCE WHITE POLYESTER POWDER COATING. STANDARD RIBBED FROSTED ACRYLIC LENS. MATTE WHITE FINISH. FIXTURE TO INCLUDE "WAVELINX LITE" WIRELESS INTEGRATED SENSOR FOR WIRELESS DAYLIGHT HARVESTING AND OCCUPANCY SENSOR CONTROL. 60,000 HOURS RATED TM21 LIFE AT 85% LUMEN OUTPUT (L85). 28.3 WATT INPUT POWER, EFFICACY OF 143.7 LUMENS/WATT, WITH CONSTANT INPUT POWER OVER THE LIFE OF THE FIXTURE. FIVE YEAR WARRANTY. STANDARD 0-10V DIMMING DRIVER, WITH A DIMMING RANGE OF 10% TO 100%. UNIVERSAL 120/277 VOLT OPERATION. METALUX "CBRK" 24CBRK-42-UNV-L835-CD1-WLS SERIES OR EQUAL COLUMBIA (WITH NX WIRELESS CONTROLS) OR LITHONIA (WITH NLIGHT AIR WIRELESS CONTROLS).
"LA1-EM"	SIMILAR TO TYPE "LA1" EXCEPT WITH FIELD INSTALLED UL924 "ETRD" EMERGENCY TRANSFER RELAY WITH DIMMING CONTROL TO ALLOW FOR BYPASSING IN-FIXTURE DIMMING AND RELAY CONTROLS AND OPERATION OF THE FIXTURE AS AN EMERGENCY LIGHT FIXTURE UPON LOSS OF NORMAL UTILITY POWER IN THE AREA SERVED BY THE FIXTURE. REFER TO THE MANUFACTURES WIRING DIAGRAMS FOR EXACT SYSTEM WIRING. METALUX "CBRK" 24CBRK-42-UNV-L835-CD1-WLS -CBRK-ETRD SERIES OR EQUAL COLUMBIA (WITH NX WIRELESS CONTROLS) OR LITHONIA (WITH NLIGHT AIR WIRELESS CONTROLS).
"LA2"	EXISTING 3-32 WATT T8 LAMP 2'X4' LAY-IN LIGHTING FIXTURE WITH ¾" X ¾" X ½" PLASTIC CUBE LOUVER, SILVER FINISH, 277 VOLT, TO BE RETROFITTED WITH NEW LED RETROFIT KIT. ELECTRICAL CONTRACTOR SHALL REMOVE EXISTING T8 LAMPS, BALLAST AND PLASTIC CUBE LOUVER TO FACILITATE INSTALLATION OF NEW RETROFIT KIT. NEW LED RETROFIT KIT TO BE AS FOLLOWS: 3,500 DEGREE K, 80 CRI MINIMUM WITH A DELIVERED LUMEN OUTPUT OF 4,066 LUMENS (MINIMUM), STEEL HOUSING, FIELD REPLACEABLE LIGHT ENGINE WITH INTEGRATED LED'S, DRIVER, POWER SUPPLY, ONE-PIECE LOWER REFLECTOR FINISHED WITH A TEXTURED HIGH REFLECTANCE WHITE POLYESTER POWDER COATING. STANDARD RIBBED FROSTED ACRYLIC LENS. MATTE WHITE FINISH. 60,000 HOURS RATED TM21 LIFE AT 85% LUMEN OUTPUT (L85). 28.3 WATT INPUT POWER, EFFICACY OF 143.7 LUMENS/WATT, WITH CONSTANT INPUT POWER OVER THE LIFE OF THE FIXTURE. FIVE YEAR WARRANTY. STANDARD 0-10V DIMMING DRIVER, WITH A DIMMING RANGE OF 10% TO 100%. UNIVERSAL 120/277 VOLT OPERATION. METALUX "CBRK" 24CBRK-42-UNV-L835-CD1 SERIES OR EQUAL COLUMBIA OR LITHONIA.
"FA"	EXISTING TO REMAIN OR RELOCATED 3-32 WATT T8 LAMP 2'X4' LAY-IN LIGHTING FIXTURE WITH ¾" X ¾" X ½" PLASTIC CUBE LOUVER, SILVER FINISH, 277 VOLT, MADE AVAILABLE BY RENOVATION WORK IN AREA. ELECTRICAL CONTRACTOR SHALL CLEAN FIXTURE AND REPLACE ANY LAMPS THAT ARE BURNED OUT OR SHOWING SIGNS OF EXCESSIVE USE PRIOR TO COMPLETION OF WORK.
"XA"	UNIVERSAL MOUNTING EDGE-LIT "EXIT" LIGHT FIXTURE, HIGH BRIGHTNESS LED'S, 25 YEAR LIFE, INJECTION-MOLDED ACRYLIC PANELS, SINGLE FACE, ARROWS AS INDICATED ON PLAN, 6" RED LETTERS, CLEAR PANEL TO MATCH EXISTING BUILDING STANDARD EDGE-LIT EXIT LIGHT FIXTURE. LED POWER SUPPLY CIRCUIT, 277 VOLT. LITHONIA LRP-KC-120/277 SERIES OR EQUAL SURE-LITES.
"XB"	SIMILAR TO TYPE "XA" EXCEPT DOUBLE FACE.

ELECTRICAL SYMBOL LIST	
SYMBOL	DESCRIPTION
	SITE LIGHTING FIXTURE - BUILDING MOUNTED. SEE FIXTURE SCHEDULE
	SINGLE POLE SWITCH
	THREE WAY SWITCH
	FOUR WAY SWITCH
	WALL MOUNTED OCCUPANCY SENSOR LIGHT SWITCH ("AUTOMATIC SWITCH")
	LIGHT FIXTURE, TYPE AS INDICATED ON FLOOR PLANS
	ROUND LIGHT FIXTURE, TYPE AS INDICATED ON FLOOR PLANS
	SQUARE LIGHT FIXTURE, TYPE AS INDICATED ON FLOOR PLANS
	WALL MOUNTED LIGHTING FIXTURE, TYPE AS INDICATED ON PLANS.
	DUPLEX RECEPTACLE
	DOUBLE DUPLEX RECEPTACLE
	DUPLEX RECEPTACLE MOUNTED 6" ABOVE COUNTER TOP (OR AT 42" A.F.F.)
	SPECIAL PURPOSE OUTLET
	LOW VOLTAGE / DATA OUTLET
	PANELBOARD
	JUNCTION BOX
	SINGLE PHASE MOTOR
	THREE PHASE MOTOR
	MANUAL MOTOR STARTER WITH OVERLOADS (P= WITH PILOT LIGHT)
	COMBINATION MAGNETIC MOTOR STARTER
	DISCONNECT SWITCH
	NIGHT LIGHT
	EMERGENCY
	ABOVE FINISHED FLOOR
	WEATHERPROOF
	GROUND FAULT INTERRUPTER

ELECTRICAL DRAWING INDEX	
SHEET NUMBER	SHEET TITLE
E001	ELECTRICAL SYMBOL LIST, GENERAL NOTES, DRAWING INDEX & FIXTURE SCHEDULE
ED100	PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION
ED101	PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION
ED102	PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION
ED103	PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION
E100	PARTIAL FOURTH FLOOR PLAN - LIGHTING NEW WORK
E101	PARTIAL FOURTH FLOOR PLAN - LIGHTING NEW WORK
E102	PARTIAL FOURTH FLOOR PLAN - LIGHTING NEW WORK
E103	PARTIAL FOURTH FLOOR PLAN - LIGHTING NEW WORK
E200	PARTIAL FOURTH FLOOR PLAN - POWER & SYSTEMS NEW WORK
E201	PARTIAL FOURTH FLOOR PLAN - POWER & SYSTEMS NEW WORK
E202	PARTIAL FOURTH FLOOR PLAN - POWER & SYSTEMS NEW WORK
E203	PARTIAL FOURTH FLOOR PLAN - POWER & SYSTEMS NEW WORK
E300	PARTIAL POWER ONE-LINE DIAGRAM - NEW WORK
E310	ELECTRICAL SCHEDULES
E311	ELECTRICAL SCHEDULES
E312	ELECTRICAL SCHEDULES
E400	MISCELLANEOUS DIAGRAMS AND DETAILS
E401	MISCELLANEOUS DIAGRAMS AND DETAILS
E500	ELECTRICAL SPECIFICATIONS
E501	ELECTRICAL SPECIFICATIONS
E502	ELECTRICAL SPECIFICATIONS
E503	ELECTRICAL SPECIFICATIONS
E504	ELECTRICAL SPECIFICATIONS
E505	ELECTRICAL SPECIFICATIONS
EX100	PARTIAL FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY
EX101	PARTIAL FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY
EX102	PARTIAL FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY
EX103	PARTIAL FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY

ELECTRICAL GENERAL NOTES	
1.	EXTENT OF DEMOLITION IS NOT INTENDED TO BE SHOWN IN FULL ON THESE DRAWINGS. FINAL DESIGNED CONDITIONS ARE SHOWN. EACH TRADE/CONTRACTOR IS RESPONSIBLE FOR REMOVAL AS REQUIRED TO ACHIEVE FINAL DESIGN CONDITIONS. REFERENCES TO EXISTING AS IDENTIFIED ARE TO CLARIFY SCOPE OF NEW CONSTRUCTION.
2.	ALL WORK CONDITIONS ARE TO BE FIELD VERIFIED AND DETAILS ADJUSTED AS REQUIRED TO MAINTAIN FIRE RESISTIVE RATINGS. INTEGRITY OF INSTALLED SYSTEMS (EXISTING AND NEW) AND THE MATCHING OF WORK WITH EXISTING CONDITIONS AND FINISHES.
3.	REMOVAL WORK SHALL BE EXECUTED WITH DUE CARE, INCLUDING PROTECTION OF EXISTING MATERIALS/SYSTEMS TO REMAIN SHORING, BRACING, ETC. EACH TRADE/SUBCONTRACTORS WILL BE RESPONSIBLE FOR ANY DAMAGE THEY CAUSE TO OTHER'S WORK.
4.	THE FULL EXTENT OF THE WORK FOR EACH TRADE IS IDENTIFIED THROUGHOUT ALL THE DRAWINGS. DO NOT ASSUME OR OMIT INDIVIDUAL TRADE WORK NOT SHOWN IN THE INDIVIDUAL TRADE DRAWINGS. FAILURE TO REVIEW ALL DRAWINGS FOR AN INDIVIDUAL TRADE'S COMPLETE SCOPE OF WORK WILL RESULT IN DENIAL FOR ANY CHANGE ORDER REQUESTS FOR MISSED ITEMS DURING BIDDING.
5.	SUBCONTRACTORS AND ALL TRADES MUST EXAMINE AREAS, DIMENSIONS CONDITIONS AND SUBSTRATES AFFECTING THE WORK AND THE CONDITIONS UNDER WHICH THE WORK IS TO BE INSTALLED, APPLIED AND COMPLETED. NOTIFY THE ARCHITECT IN WRITING OF UNSATISFACTORY CONDITIONS AND OTHER CONDITIONS DETRIMENTAL TO THE PROPER AND TIMELY COMPLETION OF THE WORK. <div><div>A. DO NOT PROCEED WITH THE WORK UNTIL THE UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED IN THE MANNER ACCEPTABLE TO THE CONTRACTOR OR TRADE PERFORMING THE WORK. PROCEED WITH INSTALLATION ONLY AFTER UNSAFE OR UNSATISFACTORY CONDITIONS HAVE BEEN CORRECTED.</div><div>B. BEGINNING WORK MEANS ACCEPTANCE OF THE CONDITIONS.</div><div>C. NO CHANGE ORDERS FOR ADDITIONAL WORK WILL BE ACCEPTED FOR CONDITIONS NOT IDENTIFIED DURING THE EXAMINATION PERIOD PRIOR TO THE COMMENCING OF WORK.</div></div>
6.	CONTRACTOR(S) WARRANTS THEY HAVE EXAMINED THOROUGHLY ALL DRAWINGS AND SPECIFICATIONS DIRECTLY AND INDIRECTLY RELATED TO THEIR WORK. BY BEGINNING THE WORK, CONTRACTOR CERTIFIES THAT ALL NECESSARY ITEMS REQUIRED TO PERFORM HIS WORK HAVE BEEN IDENTIFIED AND DOCUMENTED IN THE DRAWINGS AND/OR SPECIFICATIONS. <div><div>A. NOTIFY THE ARCHITECT IN WRITING OF ANY DISCREPANCIES, MISSING INFORMATION OR ANY UNCLEAR ITEMS WHICH WILL AFFECT THE WORK TO BE PERFORMED. DO NOT PROCEED WITH THE WORK UNTIL THE DISCREPANCIES, MISSING INFORMATION OR ANY UNCLEAR ITEMS HAVE BEEN CLARIFIED OR CORRECTED TO THE CONTRACTOR OR TRADE PERFORMING THE WORK.</div><div>B. BEGINNING THE WORK INDICATES FULL ACCEPTANCE AND CORRECTNESS OF THE INFORMATION PROVIDED.</div><div>C. NO CHANGE ORDERS FOR ADDITIONAL WORK WILL BE ACCEPTED FOR ANY DISCREPANCIES, MISSING INFORMATION OR UNCLEAR ITEMS OR INFORMATION NOT IDENTIFIED DURING THE EXAMINATION PERIOD PRIOR TO THE COMMENCING OF WORK.</div></div>
7.	THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY FIRESTOPPING AROUND ALL PENETRATIONS OF FIRE RATED WALLS, CEILINGS AND FLOORS. REFER TO ARCHITECTURAL AND ELECTRICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION REGARDING THE SPECIFIC FIRESTOPPING REQUIREMENTS AND PRODUCT SPECIFICATIONS.
8.	ALL ANCHORS FOR ELECTRICAL SYSTEMS SHALL BE STEEL. REFER TO SPECIFICATIONS FOR SPECIFIC APPROVED PRODUCTS. <u>UNDER NO CIRCUMSTANCES SHALL PLASTIC ANCHORS BE USED.</u>



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DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT


FILE NO: 491_24304_MNB

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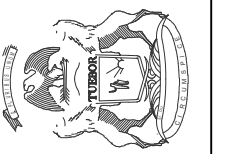
SYMBOL LIST, ELECTRICAL
GENERAL NOTES AND
DRAWING INDEX

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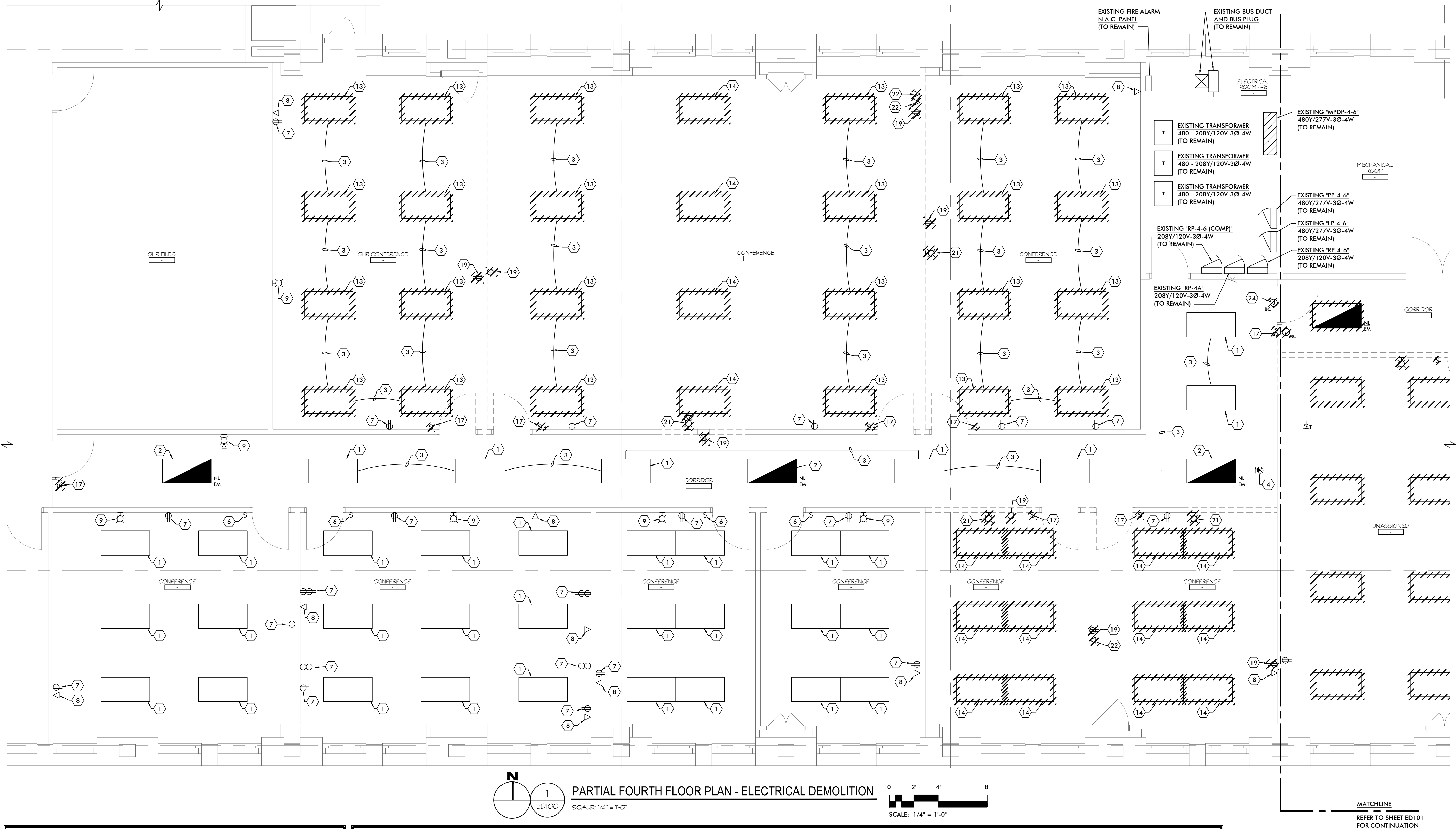
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**PARTIAL FOURTH FLOOR
PLAN - ELECTRICAL
DEMOLITION**

ED100



CONTRACTORS PRE-BID NOTIFICATION:

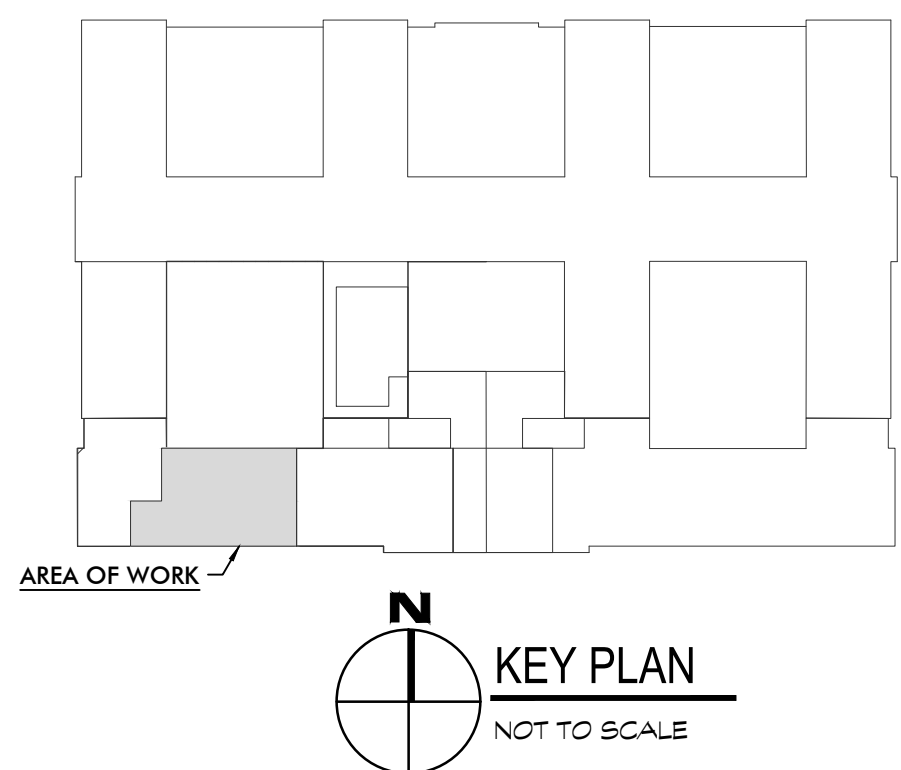
ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS AND SUBSTANTIAL FIELD OBSERVATIONS AND VERIFICATION. THIS CONTRACTOR AND ALL RELATED SUB-CONTRACTORS SHALL VISIT THE SITE AND COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A DEPARTURE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED DUE TO THE ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING FOR RESOLUTION PRIOR TO SUBMITTING FINAL BID OR ENTERING INTO A CONTRACT FOR CONSTRUCTION. FAILURE TO PROVIDE THE ARCHITECT WITH NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDITIONAL COST BEING INCURRED BY THE OWNER.

ELECTRICAL GENERAL NOTES:

- ALL DEVICES INDICATED WITH SOLID LIGHT LINES ARE EXISTING DEVICES TO REMAIN.
- ALL DEVICES AND FIXTURES INDICATED WITH SOLID DARK CROSS-HATCHED LINES ARE EXISTING TO BE REMOVED OR RELOCATED BY THIS ELECTRICAL CONTRACTOR.
- ALL DEVICES INDICATED WITH SOLID DARK LINES ARE NEW DEVICES TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR AS PART OF THIS SCOPE OF WORK.
- ELECTRICAL CONTRACTOR SHALL PROVIDE DEMOLITION OF ELECTRICAL DEVICES, CONDUIT, WIRING, FIXTURES, LIGHTING CONTROLS, EQUIPMENT, ETC. AS REQUIRED TO ACCOMMODATE ARCHITECTURAL, MECHANICAL AND ELECTRICAL REVISIONS. ELECTRICAL DEMOLITION SHEET PROVIDES A GENERAL GUIDELINE AS TO THE SCOPE OF THE WORK; HOWEVER, ALL DEMOLITION REQUIREMENTS MAY NOT BE INDICATED. PROVIDE DEMOLITION AS REQUIRED TO ACCOMMODATE PROJECT REVISIONS.
- COORDINATE DEMOLITION REQUIREMENTS WITH THE WORK OF OTHER TRADES.
- PRIOR TO START OF CONSTRUCTION, AND PRIOR TO ANY DEMOLITION WORK THE ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING TO IDENTIFY ALL EXISTING BRANCH CIRCUITS SERVING THE RENOVATION AREA, AND TO IDENTIFY THE AVAILABLE BRANCH CIRCUITS THAT MAY BE RE-USED AS PART OF THE PROPOSED RENOVATION, AS WELL AS CIRCUITS THAT SERVE EXISTING LIGHTING FIXTURES OR DEVICES THAT ARE TO REMAIN AND BE MAINTAINED.

DEMOLITION KEY NOTES

- EXISTING CEILING MOUNTED RECESSED 2X4 FLUORESCENT LIGHT FIXTURE TO REMAIN.
- EXISTING CEILING MOUNTED RECESSED 2X4 FLUORESCENT NIGHT LIGHT / EMERGENCY LIGHT FIXTURE TO REMAIN.
- EXISTING BRANCH CIRCUIT CONDUIT AND WIRING BETWEEN FIXTURES TO REMAIN.
- EXISTING EDGE-LIT EXIT LIGHT FIXTURE TO REMAIN.
- EXISTING CEILING MOUNTED OCCUPANCY SENSOR TO REMAIN.
- EXISTING SWITCHING CONTROL TO REMAIN.
- EXISTING DUPLEX RECEPTACLE (OR DOUBLE DUPLEX RECEPTACLE, AS INDICATED) TO REMAIN.
- EXISTING LOW VOLTAGE OUTLET (TELEPHONE, DATA OR CABLE TELEVISION, AS INDICATED) TO REMAIN.
- EXISTING FIRE ALARM NOTIFICATION APPLIANCE (TYPE AS INDICATED) TO REMAIN.
- EXISTING FIRE ALARM SYSTEM DUCT SMOKE DETECTOR CEILING MOUNTED REMOTE TEST SWITCH WITH INDICATING LAMP TO REMAIN.
- EXISTING ACCESS CONTROL SYSTEM CARD READER TO REMAIN.
- EXISTING ACCESS CONTROL SYSTEM "REQUEST TO EXIT" (aka "REX") TO REMAIN.
- ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING FLUORESCENT LAMPS, BALLAST AND DIFFUSER IN EXISTING FIXTURE TO REMAIN AND INSTALL NEW LED RETROFIT KIT AS INDICATED ON THE NEW WORK LIGHTING PLAN. RETROFIT FIXTURE TYPE AS INDICATED ON THE NEW WORK PLAN. NOTE THAT THE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING ARE TO BE RE-USED TO ALLOW FOR NEW LIGHTING CONTROLS AS INDICATED ON THE NEW WORK LIGHTING PLAN.
- ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING MOUNTED 2X4 LIGHT FIXTURES. PRIOR TO REINSTALLATION OF THE FIXTURE THE ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING FLUORESCENT LAMPS, BALLAST AND DIFFUSER IN THE RELOCATED FIXTURE AND INSTALL NEW LED RETROFIT KIT AS INDICATED ON THE NEW WORK LIGHTING PLAN. RETROFIT FIXTURE TYPE AS INDICATED ON THE NEW WORK PLAN. NOTE THAT THE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING IS TO BE REMOVED BACK TO NEAREST EXISTING LIGHT FIXTURE TO REMAIN OR NEAREST EXISTING JUNCTION BOX TO ALLOW FOR RE-USE OF THE EXISTING BRANCH CIRCUIT TO SERVE FIXTURE IN NEW LOCATION. THE EXISTING SWITCH LEG WIRING IS TO BE REVISED TO ALLOW FOR NEW LIGHTING CONTROLS AS INDICATED ON THE NEW WORK LIGHTING PLAN.
- ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING RECESSED CEILING MOUNTED 2X4 LIGHT FIXTURES. PRIOR TO REINSTALLATION OF THE FIXTURE THE ELECTRICAL CONTRACTOR SHALL CLEAN AND RELAMP THE FIXTURE. REFER TO NEW WORK LIGHTING PLAN FOR ADDITIONAL INFORMATION REGARDING BRANCH CIRCUITING.
- ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING EDGE-LIT EXIT LIGHT FIXTURE. DISCONNECT AND REMOVE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING TO NEAREST JUNCTION BOX TO ALLOW FOR THE EXISTING CIRCUIT TO BE RE-USED AND EXTENDED TO THE NEW LOCATION OF THE RELOCATED EXIT LIGHT FIXTURE AS INDICATED ON THE NEW WORK PLAN. REFER TO NEW WORK LIGHTING PLAN FOR NEW LOCATION OF RELOCATED EXIT LIGHT FIXTURE AND ADDITIONAL INFORMATION.
- ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING SWITCHING CONTROL COMPLETE. REFER TO NEW WORK LIGHTING PLAN FOR LOCATIONS WHERE NEW SWITCHING CONTROL IS TO BE INSTALLED.
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- ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING DUPLEX RECEPTACLE (OR DOUBLE DUPLEX RECEPTACLE WHERE INDICATED). DISCONNECT AND REMOVE EXISTING CONDUIT AND WIRING COMPLETE TO NEAREST JUNCTION BOX FOR RE-USE TO SERVE NEW POWER DEVICES IN THE RENOVATION AREA. PROVIDE NEW BRANCH CIRCUIT CONDUIT AND WIRING AS REQUIRED TO MAINTAIN SERVICE TO EXISTING DEVICES SERVED BY THE CIRCUIT THAT ARE EXISTING TO REMAIN. REFER TO GENERAL NOTE #6 FOR ADDITIONAL REQUIREMENTS ASSOCIATED WITH CIRCUIT TRACING REQUIRED TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK.
- ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING JUNCTION BOX AND WHIP CONNECTION TO EXISTING FURNITURE PARTITION TO BE REMOVED. DISCONNECT AND REMOVE EXISTING CONDUIT AND WIRING COMPLETE TO NEAREST JUNCTION BOX FOR RE-USE TO SERVE NEW POWER DEVICES IN THE RENOVATION AREA. REFER TO GENERAL NOTE #6 FOR ADDITIONAL REQUIREMENTS ASSOCIATED WITH CIRCUIT TRACING REQUIRED TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK.
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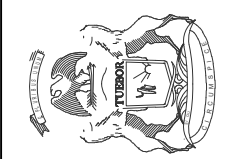
DEPT. OF HEALTH & HUMAN
SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

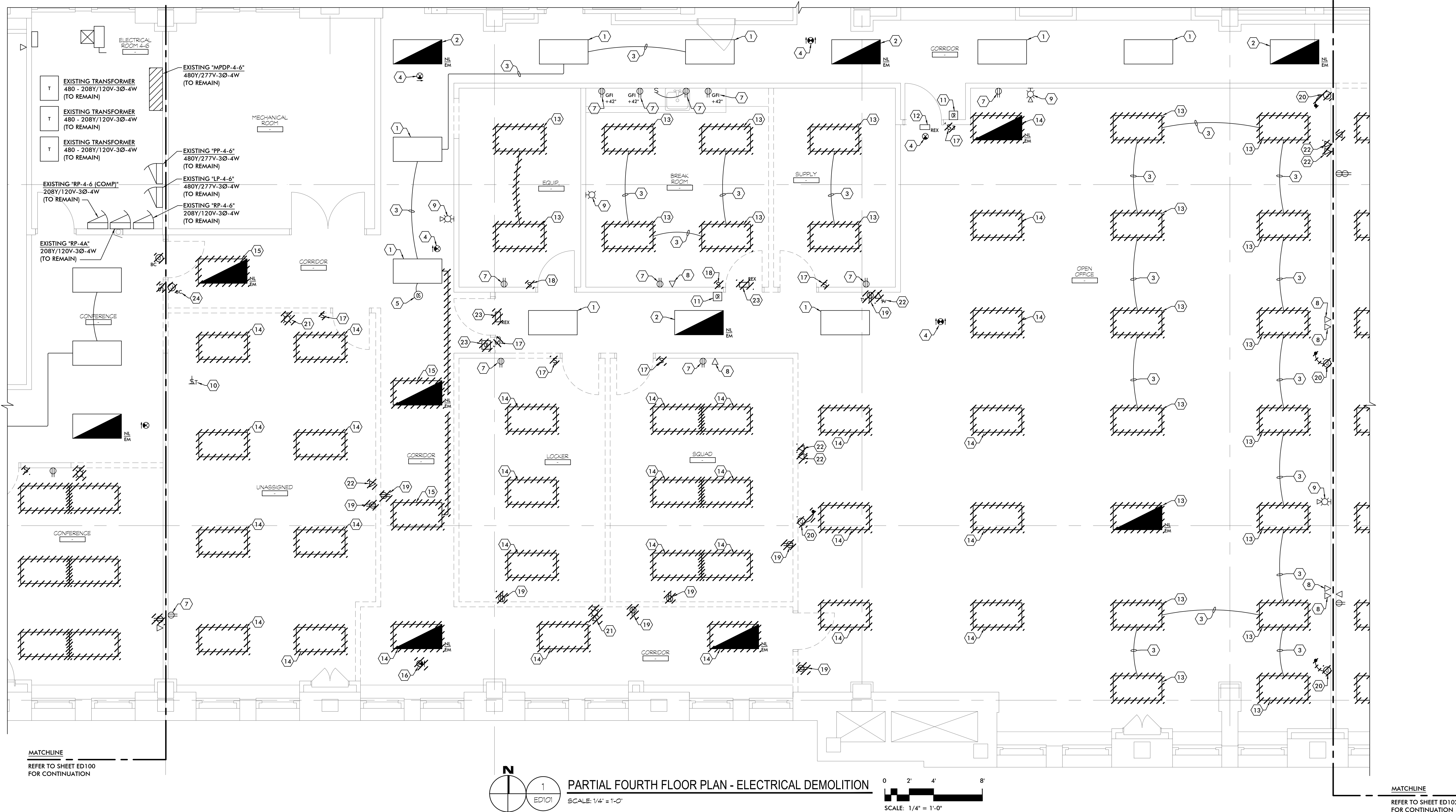
STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR



**Straub
Pettitt
Yaste**
850 North Cross Road
Suite 200
Canton, Michigan 48017-1311
248-658-7777 PHONE
248-658-7781 FAX

**PARTIAL FOURTH FLOOR
PLAN - ELECTRICAL
DEMOLITION**

ED101



CONTRACTORS PRE-BID NOTIFICATION:

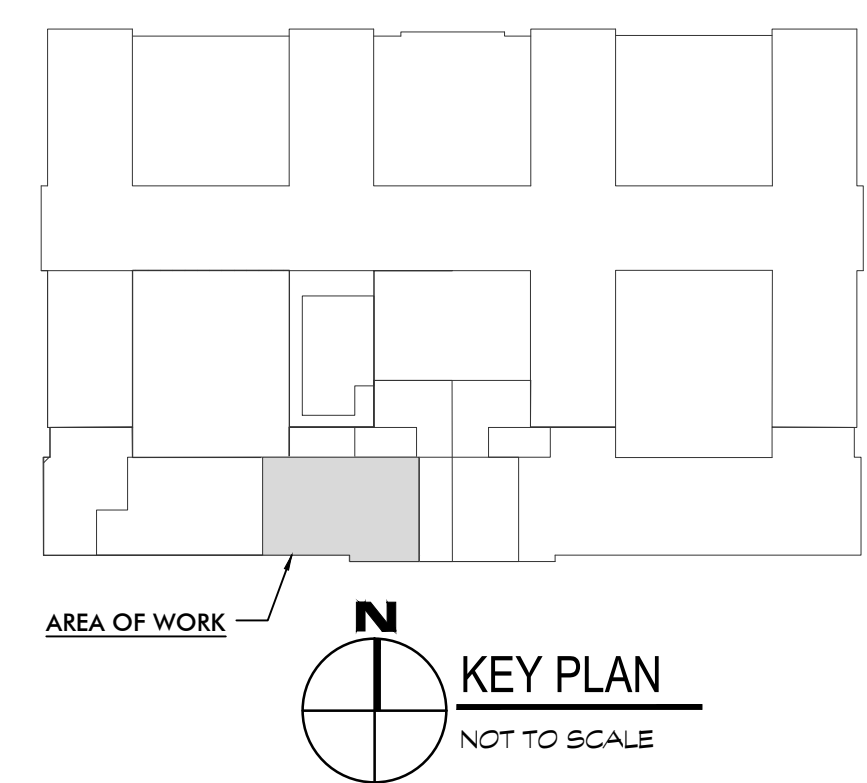
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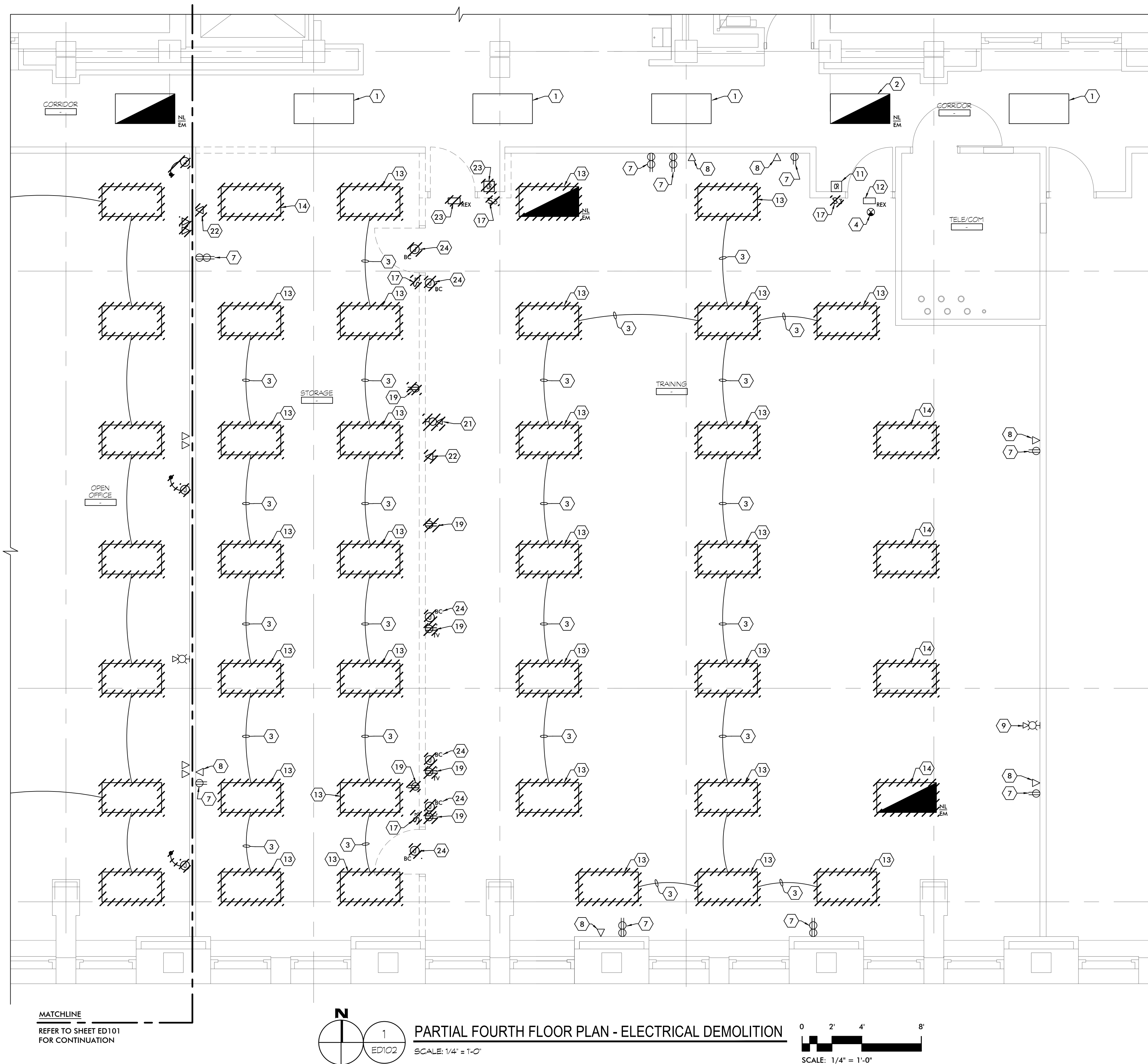
ELECTRICAL GENERAL NOTES:

- ALL DEVICES INDICATED WITH SOLID LIGHT LINES ARE EXISTING DEVICES TO REMAIN.
- ALL DEVICES AND FIXTURES INDICATED WITH SOLID DARK CROSS-HATCHED LINES ARE EXISTING TO BE REMOVED OR RELOCATED BY THIS ELECTRICAL CONTRACTOR.
- ALL DEVICES INDICATED WITH SOLID DARK LINES ARE NEW DEVICES TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR AS PART OF THIS SCOPE OF WORK.
- ELECTRICAL CONTRACTOR SHALL PROVIDE DEMOLITION OF ELECTRICAL DEVICES, CONDUIT, WIRING, FIXTURES, LIGHTING CONTROLS, EQUIPMENT, ETC. AS REQUIRED TO ACCOMMODATE ARCHITECTURAL, MECHANICAL AND ELECTRICAL REVISIONS. ELECTRICAL DEMOLITION SHEET PROVIDES A GENERAL GUIDELINE AS TO THE SCOPE OF THE WORK. HOWEVER, ALL DEMOLITION REQUIREMENTS MAY NOT BE INDICATED. PROVIDE DEMOLITION AS REQUIRED TO ACCOMMODATE PROJECT REVISIONS.
- COORDINATE DEMOLITION REQUIREMENTS WITH THE WORK OF OTHER TRADES.
- PRIOR TO START OF CONSTRUCTION, AND PRIOR TO ANY DEMOLITION WORK THE ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING TO IDENTIFY ALL EXISTING BRANCH CIRCUITS SERVING THE RENOVATION AREA, AND TO IDENTIFY THE AVAILABLE BRANCH CIRCUITS THAT MAY BE RE-USED AS PART OF THE PROPOSED RENOVATION, AS WELL AS CIRCUITS THAT SERVE EXISTING LIGHTING FIXTURES OR DEVICES THAT ARE TO REMAIN AND BE MAINTAINED.

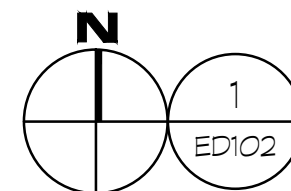
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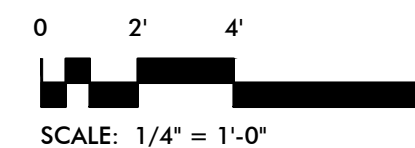


MATCHLINE
REFER TO SHEET ED101
FOR CONTINUATION



PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION

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



CONTRACTORS PRE-BID NOTIFICATION:

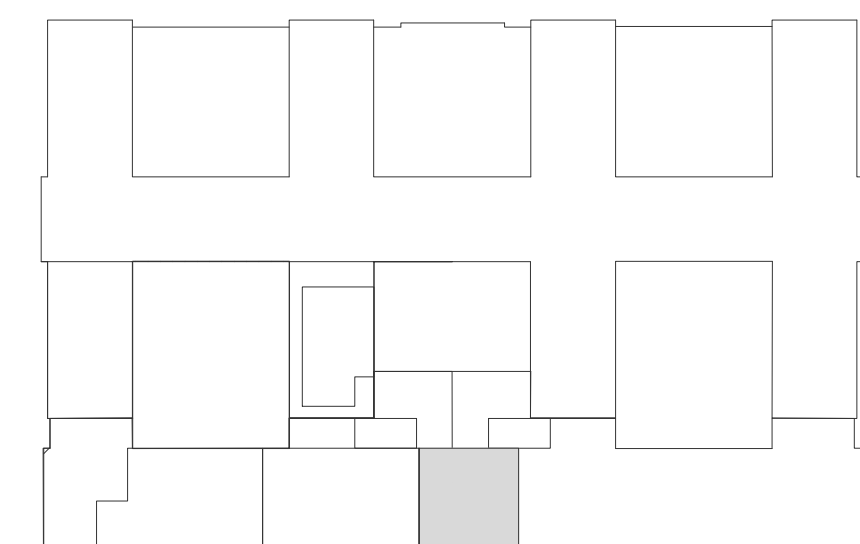
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ELECTRICAL GENERAL NOTES:

1. ALL DEVICES INDICATED WITH SOLID LIGHT LINES ARE EXISTING DEVICES TO REMAIN.
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DEMOLITION KEY NOTES

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KEY PLAN
NOT TO SCALE



ISSUED FOR BIDS 04/25/2025

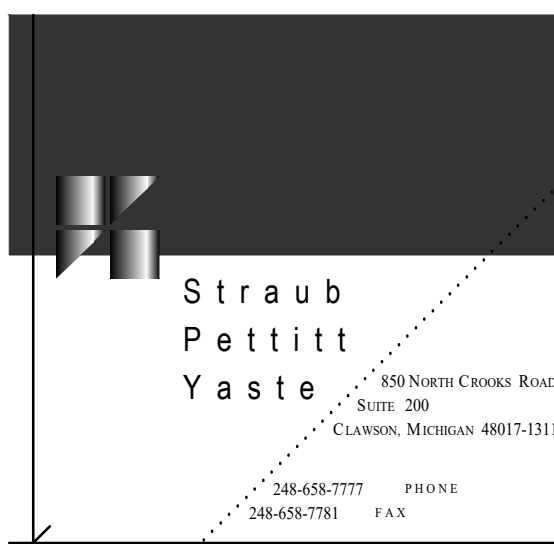
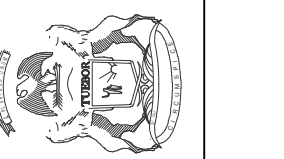
DEPT. OF HEALTH & HUMAN
SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

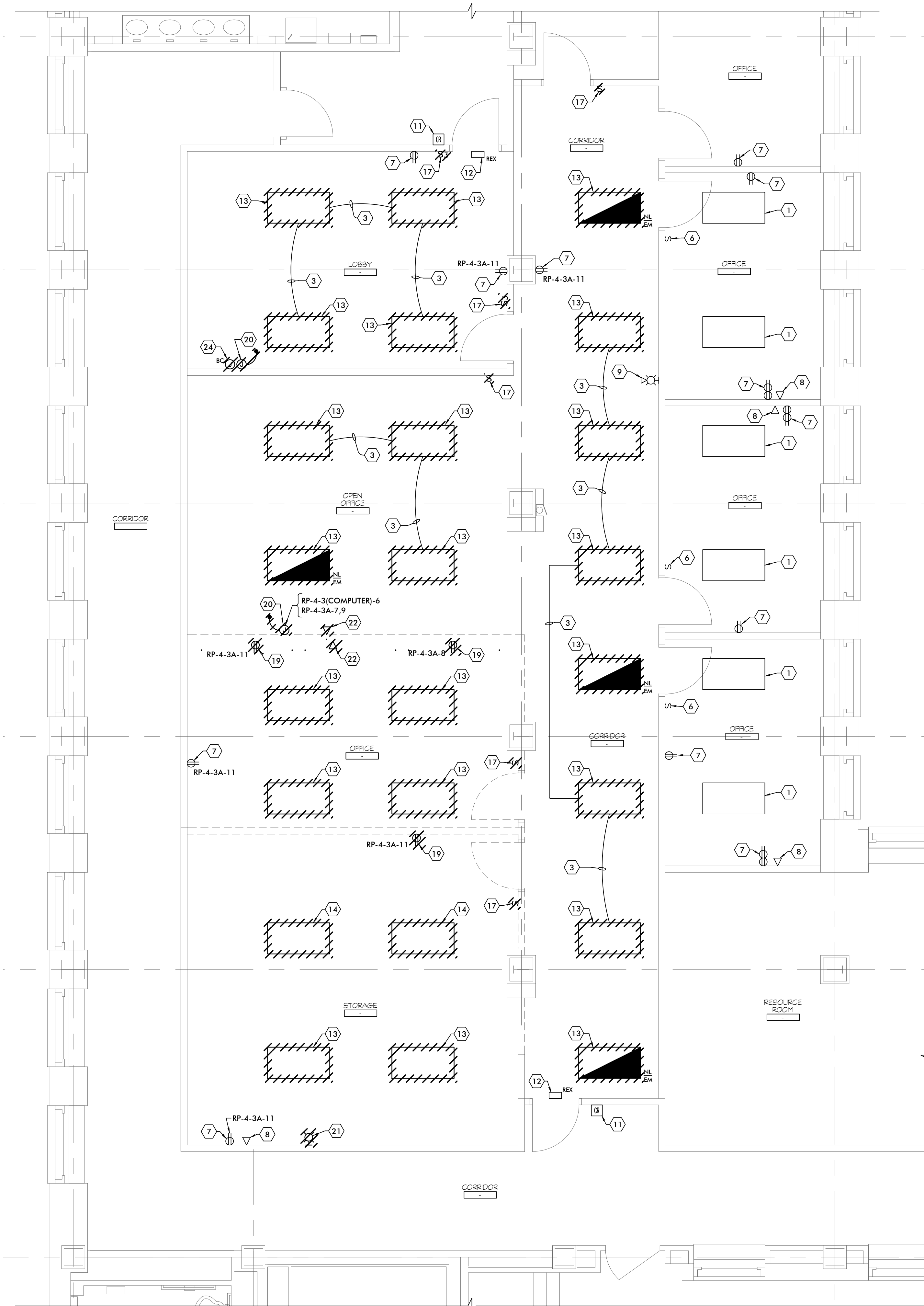
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STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR



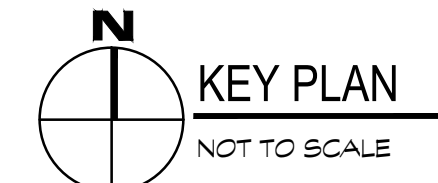
PARTIAL FOURTH FLOOR
PLAN - ELECTRICAL
DEMOLITION

ED102



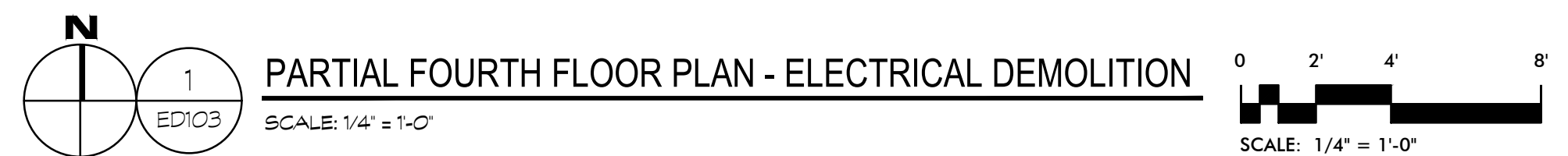
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 - 3 EXISTING BRANCH CIRCUIT CONDUIT AND WIRING BETWEEN FIXTURES TO REMAIN.
 - 4 EXISTING EDGE-LIT EXIT LIGHT FIXTURE TO REMAIN.
 - 5 EXISTING CEILING MOUNTED OCCUPANCY SENSOR TO REMAIN.
 - 6 EXISTING SWITCHING CONTROL TO REMAIN.
 - 7 EXISTING DUPLEX RECEPTACLE (OR DOUBLE DUPLEX RECEPTACLE, AS INDICATED) TO REMAIN.
 - 8 EXISTING LOW VOLTAGE OUTLET (TELEPHONE, DATA OR CABLE TELEVISION, AS INDICATED) TO REMAIN.
 - 9 EXISTING FIRE ALARM NOTIFICATION APPLIANCE (TYPE AS INDICATED) TO REMAIN.
 - 10 EXISTING FIRE ALARM SYSTEM DUCT SMOKE DETECTOR CEILING MOUNTED REMOTE TEST SWITCH WITH INDICATING LAMP TO REMAIN.
 - 11 EXISTING ACCESS CONTROL SYSTEM CARD READER TO REMAIN.
 - 12 EXISTING ACCESS CONTROL SYSTEM "REQUEST TO EXIT" (aka "REX") TO REMAIN.
 - 13 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING FLUORESCENT LAMPS, BALLAST AND DIFFUSER IN EXISTING FIXTURE TO REMAIN AND INSTALL NEW LED RETROFIT KIT AS INDICATED ON THE NEW WORK LIGHTING PLAN. RETROFIT KIT TYPE AS INDICATED ON THE NEW WORK LIGHTING PLAN. NOTE THAT THE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING IS TO BE REMOVED BACK TO NEAREST EXISTING LIGHT FIXTURE TO REMAIN OR NEAREST EXISTING JUNCTION BOX TO ALLOW FOR RE-USE OF THE EXISTING BRANCH CIRCUIT TO SERVE FIXTURE IN NEW LOCATION. THE EXISTING SWITCH LEG WIRING IS TO BE REVISED TO ALLOW FOR NEW LIGHTING CONTROLS AS INDICATED ON THE NEW WORK LIGHTING PLAN.
 - 14 ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING RECESSED CEILING MOUNTED 2X4 LIGHT FIXTURES. PRIOR TO REINSTALLATION OF THE FIXTURE THE ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING FLUORESCENT LAMPS, BALLAST AND DIFFUSER IN THE RELOCATED FIXTURE AND INSTALL NEW LED RETROFIT KIT AS INDICATED ON THE NEW WORK LIGHTING PLAN. RETROFIT KIT TYPE AS INDICATED ON THE NEW WORK LIGHTING PLAN. NOTE THAT THE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING IS TO BE REMOVED BACK TO NEAREST EXISTING LIGHT FIXTURE TO REMAIN OR NEAREST EXISTING JUNCTION BOX TO ALLOW FOR RE-USE OF THE EXISTING BRANCH CIRCUIT TO SERVE FIXTURE IN NEW LOCATION. THE EXISTING SWITCH LEG WIRING IS TO BE REVISED TO ALLOW FOR NEW LIGHTING CONTROLS AS INDICATED ON THE NEW WORK LIGHTING PLAN.
 - 15 ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING RECESSED CEILING MOUNTED 2X4 LIGHT FIXTURES. PRIOR TO REINSTALLATION OF THE FIXTURE THE ELECTRICAL CONTRACTOR SHALL CLEAN AND RELAMP THE FIXTURE. REFER TO NEW WORK LIGHTING PLAN FOR ADDITIONAL INFORMATION REGARDING BRANCH CIRCUITING.
 - 16 ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING EDGE-LIT EXIT LIGHT FIXTURE. DISCONNECT AND REMOVE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING TO NEAREST JUNCTION BOX TO ALLOW FOR THE EXISTING CIRCUIT TO BE RE-USED AND EXTENDED TO THE NEW LOCATION OF THE RELOCATED EXIT LIGHT FIXTURE AS INDICATED ON THE NEW WORK PLAN. REFER TO NEW WORK LIGHTING PLAN FOR NEW LOCATION OF RELOCATED EXIT LIGHT FIXTURE AND ADDITIONAL INFORMATION.
 - 17 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING SWITCHING CONTROL COMPLETE. REFER TO NEW WORK LIGHTING PLAN FOR LOCATIONS WHERE NEW SWITCHING CONTROL IS TO BE INSTALLED.
 - 18 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING TOGGLE SWITCH SERVING LIGHTING IN ROOM; EXISTING SWITCH LEG WIRING TO REMAIN FOR RE-USE TO CONNECT TO NEW WALL BOX OCCUPANCY SENSOR SWITCH TO BE INSTALLED IN THE SAME LOCATION AS INDICATED ON THE NEW WORK LIGHTING PLAN.
 - 19 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING DUPLEX RECEPTACLE (OR DOUBLE DUPLEX RECEPTACLE WHERE INDICATED). DISCONNECT AND REMOVE EXISTING CONDUIT AND WIRING COMPLETE TO NEAREST JUNCTION BOX FOR RE-USE TO SERVE NEW POWER DEVICES IN THE RENOVATION AREA. PROVIDE NEW BRANCH CIRCUIT CONDUIT AND WIRING AS REQUIRED TO MAINTAIN SERVICE TO EXISTING DEVICES SERVED BY THE CIRCUIT THAT ARE EXISTING TO REMAIN. REFER TO GENERAL NOTE #6 FOR ADDITIONAL REQUIREMENTS ASSOCIATED WITH CIRCUIT TRACING REQUIRED TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK.
 - 20 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING JUNCTION BOX AND WHIP CONNECTION TO EXISTING FURNITURE PARTITION TO BE REMOVED. DISCONNECT AND REMOVE EXISTING CONDUIT AND WIRING COMPLETE TO NEAREST JUNCTION BOX FOR RE-USE TO SERVE NEW POWER DEVICES IN THE RENOVATION AREA. REFER TO GENERAL NOTE #6 FOR ADDITIONAL REQUIREMENTS ASSOCIATED WITH CIRCUIT TRACING REQUIRED TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK.
 - 21 ELECTRICAL CONTRACTOR SHALL DISCONNECT, REMOVE AND RELOCATE EXISTING FIRE ALARM SYSTEM NOTIFICATION APPLIANCE (TYPE AS INDICATED). COORDINATE DEMOLITION WORK AND RELOCATION OF EXISTING DEVICE WITH THE EXISTING FIRE ALARM SYSTEM MANUFACTURE, AND AS DIRECTED ON DRAWINGS PREPARED BY THE EXISTING FIRE ALARM SYSTEM MANUFACTURE, ACTING AS A SUB-CONTRACTOR TO THIS ELECTRICAL CONTRACTOR. REFER TO NEW WORK PLANS FOR NEW LOCATION OF RELOCATED DEVICE.
 - 22 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING LOW VOLTAGE OUTLET (TELEPHONE, DATA OR CABLE TELEVISION). DISCONNECT AND REMOVE EXISTING BOX AND CONDUIT COMPLETE. COORDINATE DEMOLITION OF EXISTING LOW VOLTAGE CABLING WITH THE OWNERS COMMUNICATION CONTRACTOR IN THE FIELD.
 - 23 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING ACCESS CONTROL CARD READER AND/OR REQUEST TO EXIT DEVICE (AS INDICATED). COORDINATE REMOVAL, AND RELOCATION IF REQUIRED WITH THE OWNER'S ACCESS CONTROL SYSTEM CONTRACTOR IN FIELD PRIOR TO START OF CONSTRUCTION AND PRIOR TO START OF ANY DEMOLITION WORK. REFER TO NEW WORK POWER PLANS FOR ADDITIONAL INFORMATION.
 - 24 ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE EXISTING JUNCTION BOX WITH BLANK COVER. DISCONNECT AND REMOVE ASSOCIATED CONDUIT AND ANY ABANDONED WIRING COMPLETE TO SOURCE.



CONTRACTORS PRE-BID NOTIFICATION:

ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS AND SUBSTANTIAL FIELD OBSERVATIONS AND VERIFICATION. THIS CONTRACTOR AND ALL RELATED SUB-CONTRACTORS SHALL VISIT THE SITE AND COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A DEPARTURE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED DUE TO THE ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING FOR RESOLUTION PRIOR TO SUBMITTING FINAL BID OR ENTERING INTO A CONTRACT FOR CONSTRUCTION. FAILURE TO PROVIDE THE ARCHITECT WITH NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDITIONAL COST BEING INCURRED BY THE OWNER.



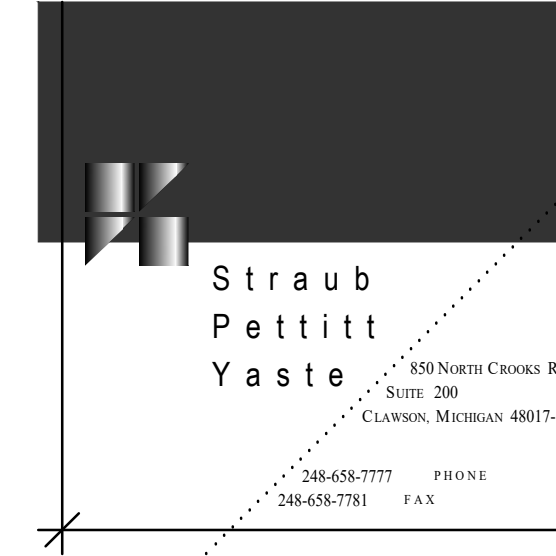
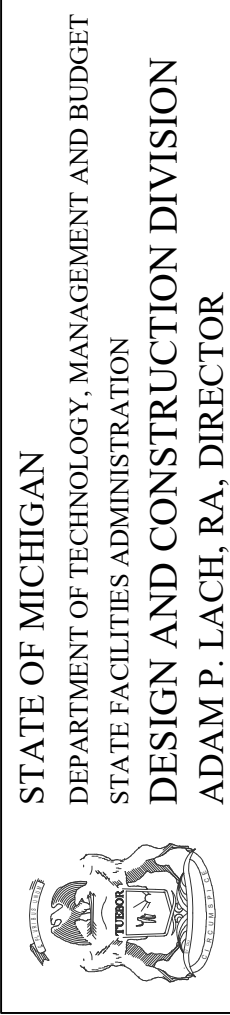
PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION



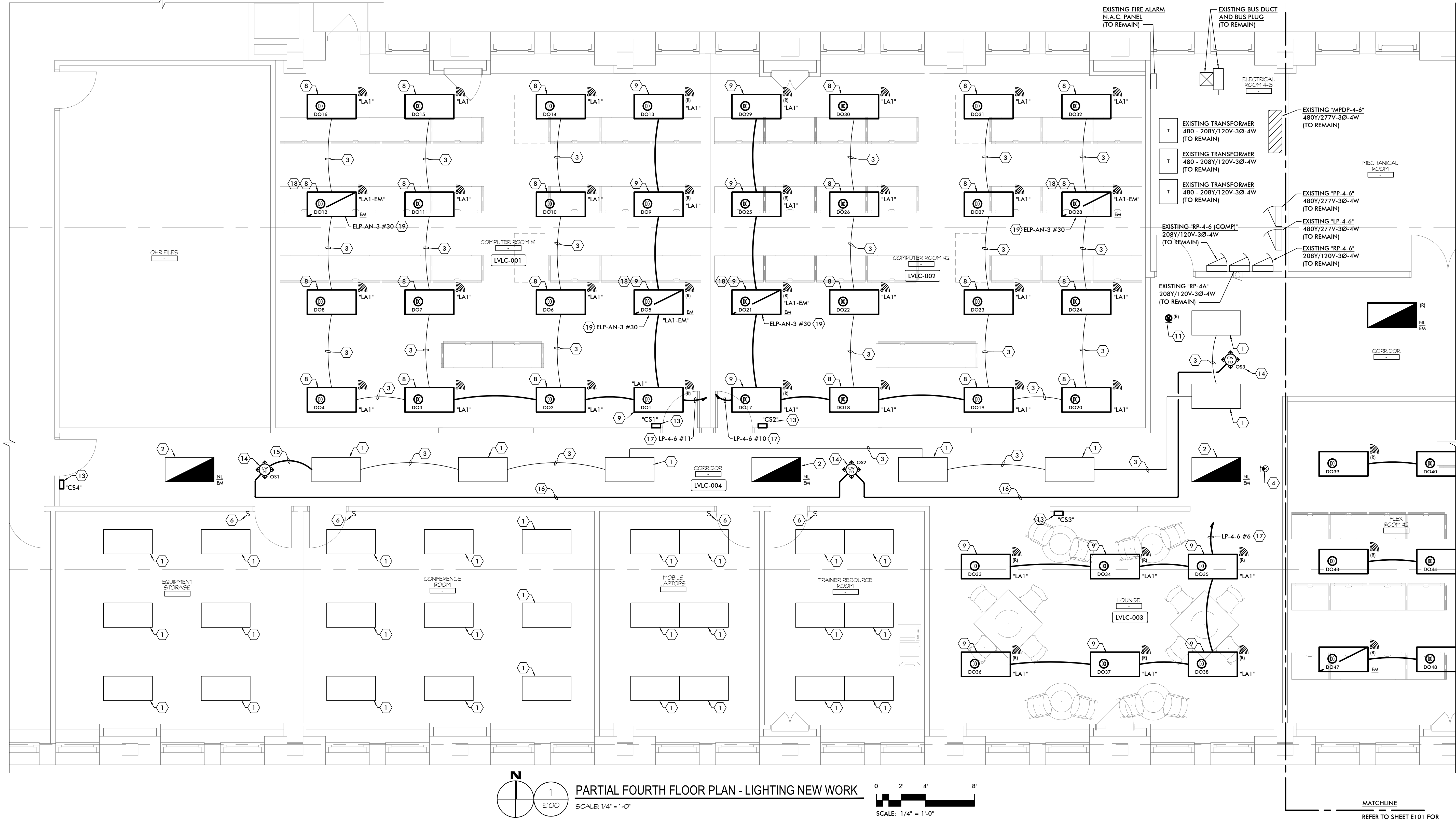
ISSUED FOR BIDS 04/25/2025

DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB
CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202
2434



PARTIAL FOURTH FLOOR PLAN - ELECTRICAL DEMOLITION



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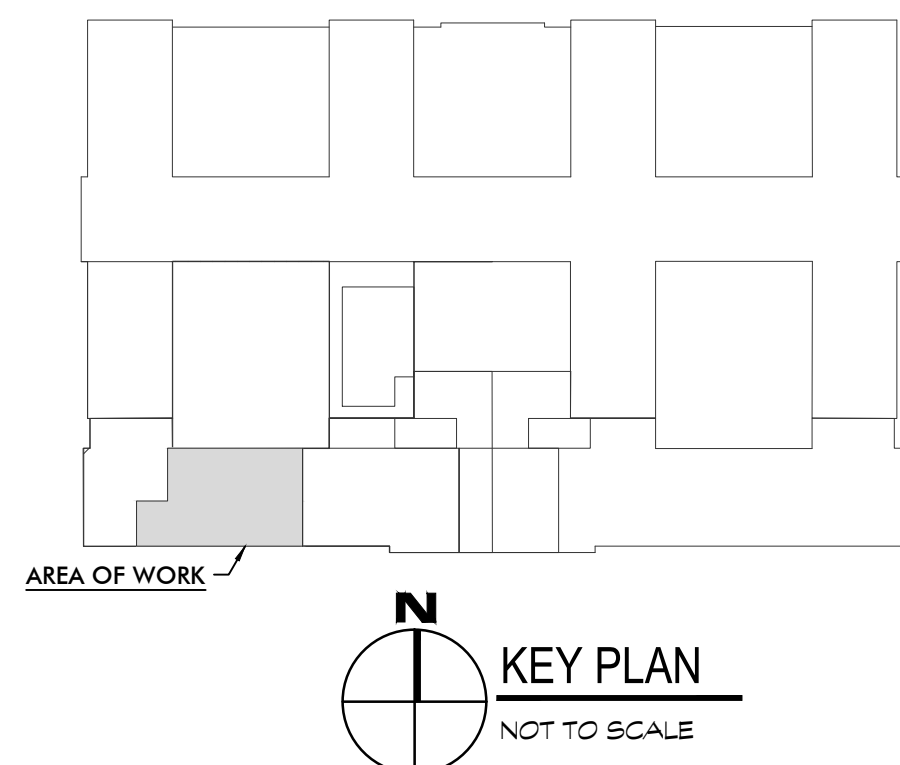
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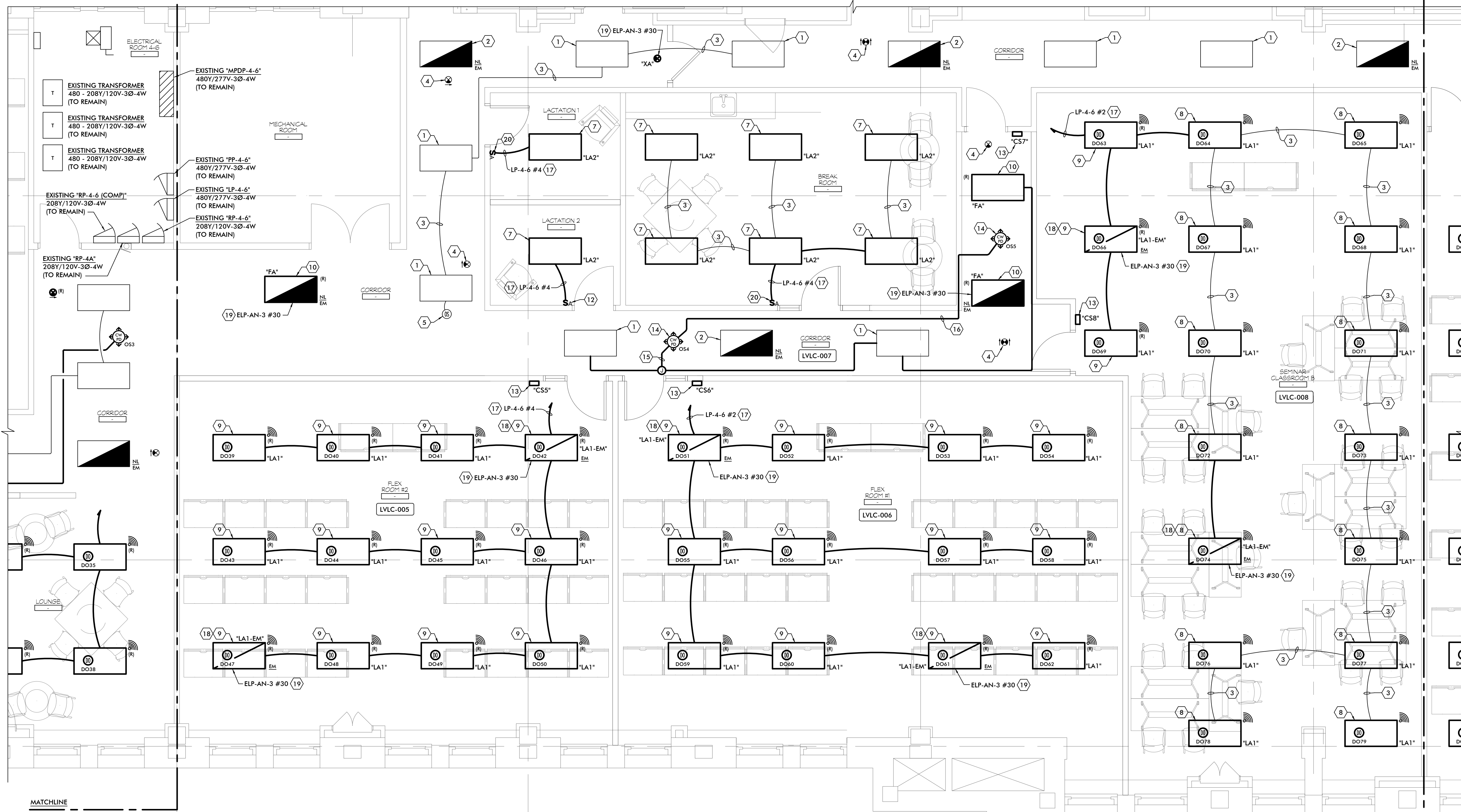
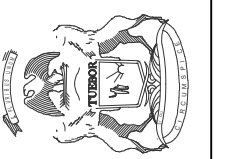
ELECTRICAL GENERAL NOTES:

- ALL JUNCTION BOXES SERVING BRANCH CIRCUIT WIRING SHALL BE LABELED WITH CIRCUITS SERVED. USE BROTHER P-TOUCH LABEL OR EQUAL ON BOX COVER.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES.
- ALL DEVICES INDICATED WITH SOLID DARK LINES ARE NEW DEVICES TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR AS PART OF THIS SCOPE OF WORK.
- PRIOR TO START OF CONSTRUCTION, AND PRIOR TO ANY DEMOLITION WORK THE ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING TO IDENTIFY ALL EXISTING BRANCH CIRCUITS SERVING THE RENOVATION AREA, AND TO IDENTIFY THE AVAILABLE BRANCH CIRCUITS THAT MAY BE RE-USED AS PART OF THE PROPOSED RENOVATION, AS WELL AS CIRCUITS THAT SERVE EXISTING LIGHTING FIXTURES OR DEVICES OUTSIDE OF THE WORK AREA THAT ARE TO REMAIN AND BE MAINTAINED.
- ALL CIRCUIT NUMBERS DO NOT INDICATE ACTUAL POLE POSITIONS USED BUT RATHER LOADS INTENDED TO BE GROUPED TOGETHER. ELECTRICAL CONTRACTOR SHALL CIRCUIT LOADS INTENDED TO BE GROUPED TOGETHER TO AN EXISTING SPARE 20A-1P CIRCUIT BREAKER MADE AVAILABLE BY DEMOLITION WORK IN THE AREA, OR A NEW 20A-1P CIRCUIT BREAKER INSTALLED IN EXISTING SPACE, IN THE PANEL NOTED. ELECTRICAL CONTRACTOR SHALL REFLECT ANY MODIFICATIONS FROM THE CIRCUIT NUMBER INDICATED WHERE A DIFFERENT CIRCUIT IS SELECTED IN THE FIELD ON THE AS-BUILT RECORD DRAWINGS. ELECTRICAL CONTRACTOR SHALL UPDATE THE PANEL TYPED CIRCUIT DIRECTORY TO REFLECT NEW LOAD ADDED TO THE EXISTING PANEL.

LIGHTING KEY NOTES

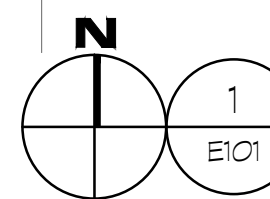
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- EXISTING RECESSED 2X4 LIGHT FIXTURE WITH NEW LED RETROFIT KIT, TYPE AS INDICATED. NOTE THAT THE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING AND ASSOCIATED 277-VOLT BRANCH CIRCUIT SERVING FIXTURE ARE TO REMAIN. EXISTING SWITCH LEG WIRING TO BE REVISED AS REQUIRED TO ALLOW FOR NEW WALL BOX OCCUPANCY SENSOR CONTROL AS INDICATED. REFER TO DEMOLITION PLANS FOR ADDITIONAL INFORMATION.
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- NEW LOCATION OF RELOCATED RECESS 2X4 LIGHT FIXTURE. PRIOR TO RELOCATION THE ELECTRICAL CONTRACTOR SHALL INSTALL THE NEW LED RETROFIT KIT, TYPE AS INDICATED. NOTE THAT THE EXISTING BRANCH CIRCUIT CONDUIT AND WIRING AND ASSOCIATED 277-VOLT BRANCH CIRCUIT SERVING FIXTURE ARE TO REMAIN. SEE KEY NOTE #8 ABOVE FOR ADDITIONAL INFORMATION REGARDING THE LED RETROFIT KIT.
- NEW LOCATION OF RELOCATED RECESSED CEILING MOUNTED 2X4 LIGHT FIXTURES. PRIOR TO REINSTALLATION OF THE FIXTURE THE ELECTRICAL CONTRACTOR SHALL CLEAN AND RELAMP THE FIXTURE WITH NEW T8, 32-WATT, 3500 DEGREE K LAMPS.
- NEW LOCATION OF RELOCATED EDGE-LIT EXIT LIGHT FIXTURE. EXTEND EXISTING 277-VOLT EMERGENCY BRANCH CIRCUIT CONDUIT AND WIRING PREVIOUSLY SERVING EXIT LIGHT FIXTURE TO NEW LOCATION INDICATED. REFER TO DEMOLITION PLANS FOR ADDITIONAL INFORMATION.
- NEW WALL BOX OCCUPANCY SENSOR INSTALLED IN EXISTING SWITCH BOX MADE AVAILABLE BY DEMOLITION WORK. REFER TO DEMOLITION PLAN FOR ADDITIONAL INFORMATION. NEW WALL BOX OCCUPANCY SENSOR TO BE DUAL-TECHNOLOGY TYPE, GREENGATE CONTROLS ONW-D-1001-MV-XX, WHERE "XX" DENOTES THE FINISH, TO BE SELECTED BY ARCHITECT, OR APPROVED EQUAL BY WATSTOPPER OR SENSOR SWITCH OR CURRENT LIGHTING NX CONTROLS.
- NEW WIRELESS LIGHTING CONTROL SYSTEM WALL MOUNTED CONTROL STATION. CONTROL STATION TO CONNECT WIRELESSLY TO THE ASSOCIATED "WAVELINK LITE" INTEGRATED LIGHT FIXTURES AS INDICATED. CONTROL STATION TO BE COOPER "WAVELINK LITE WALLSTATION", CATALOG NUMBER AS INDICATED IN THE WIRELESS LIGHTING CONTROL STATION SCHEDULE ON SHEET E401. NOTE THAT THE WALLSTATION REQUIRES 277-VOLT FOR OPERATION AND SHALL BE CIRCUITED TO THE SAME 120-VOLT BRANCH CIRCUIT THAT SERVES THE ASSOCIATED LIGHT FIXTURES. REFER TO WIRELESS LIGHTING CONTROL STATION SCHEDULE ON SHEET E402 FOR CONTROL STATION PROGRAMMING, FUNCTIONALITY TO BE INCLUDED IN STATION (i.e. SWITCHED ONLY, DIMMING, ETC), AND THE STYLE OF CONTROL STATION TO BE PROVIDED. NOTE THAT THE "WAVELINK LITE" SYSTEM IS AN IEEE 802.15.1 (BLUETOOTH 4.2 LOW ENERGY) MESH TECHNOLOGY THAT IS PROGRAMMED BY THE ELECTRICAL CONTRACTOR USING THE "WAVELINK LITE" MOBILE APPLICATION.
- NEW "WAVELINK LITE" WIRELESS LOW-VOLTAGE CEILING MOUNTED DAYLIGHT SENSOR AND DUAL-TECHNOLOGY OCCUPANCY SENSOR WITH POWER PACK FOR CONTROL OF LIGHTING LOAD. SENSOR TO BE WAVELINK LITE OCS-L-D-20 SERIES WITH WAVELINK LITE RSP-V-SW POWER PACK. DAYLIGHT / DUAL-TECHNOLOGY OCCUPANCY SENSOR OPERATES ON A BLUETOOTH 4.2 LOW ENERGY RADIO SYSTEM FOR WIRELESS CONNECTIVITY BETWEEN THE CEILING SENSOR (WITH INTEGRAL RELAY FOR CONTROL OF LIGHTING LOAD), WALL MOUNTED CONTROL STATION AND ASSOCIATED WIRELESS SWITCHPACKS THAT ARE SERVING OTHER LOADS THAT ARE PART OF THE "WAVELINK LITE" SYSTEM. REFER TO "WAVELINK LITE" WIRELESS LIGHTING CONTROL SYSTEM SCHEDULE ON SHEET E401 FOR ZONING, GROUPING OF CONTROLS AND ADDITIONAL INFORMATION. PROVIDE MULTIPLE "SLAVE" LOW-VOLTAGE SENSORS AS INDICATED TO PROVIDE MULTI-SENSOR CONTROL FOR THE CORRIDOR FROM A SINGLE POWER PACK.
- LINE-VOLTAGE CONTROL WIRING BETWEEN SENSOR POWER PACK AND GROUP OF FIXTURES INDICATED FOR ON/OFF CONTROL.
- LOW-VOLTAGE CONTROL WIRING BETWEEN SENSORS AND POWER PACK FOR MULTI-SENSOR CONTROL OF POWER PACK.
- CIRCUIT TO EXISTING 277-VOLT CIRCUIT PREVIOUSLY SERVING LIGHTING IN AREA. PERFORM CIRCUIT TRACING TO IDENTIFY EXACT CIRCUIT NUMBER. NOTE THAT CIRCUIT NUMBER INDICATED IS BASED ON FIELD SURVEY INFORMATION AND MAY NOT BE ACCURATE. UPDATE DRAWINGS TO REFLECT ACTUAL CIRCUIT NUMBER BASED ON CIRCUIT TRACING AND REFLECT ON "AS-BUILT" DRAWINGS. NOTE THAT THE NEW LIGHTING FIXTURES UTILIZE LED TECHNOLOGY RESULTING IN A REDUCTION OF THE CONNECTED LOAD ON THE CIRCUIT BY ROUGHLY 67% OF THE PRE-RENOVATION LOAD.
- EMERGENCY FIXTURE WITH UL924 BYPASS DEVICE AS SPECIFIED IN LIGHTING FIXTURE SCHEDULE TO SERVE FIXTURE FROM EMERGENCY POWER CIRCUIT INDICATED. FIXTURE SHALL OPERATE IN THE NORMAL CONDITION AS A SWITCHED FIXTURE. UPON LOSS OF NORMAL POWER IN THE AREA, THE FIXTURE SHALL ENERGIZE THE LAMPS SERVED FROM EMERGENCY POWER (VIA THE SWITCH-BYPASS DEVICE) TO FULL LUMEN OUTPUT, REGARDLESS OF THE POSITION OF THE LIGHTING CONTROLS SERVING THE FIXTURE.
- CIRCUIT TO EXISTING 277-VOLT EMERGENCY BRANCH CIRCUIT SERVING EMERGENCY LIGHTING IN THE AREA. PERFORM CIRCUIT TRACING TO IDENTIFY EXACT CIRCUIT NUMBER. NOTE THAT CIRCUIT NUMBER INDICATED IS BASED ON FIELD SURVEY INFORMATION AND MAY NOT BE ACCURATE. UPDATE DRAWINGS TO REFLECT ACTUAL CIRCUIT NUMBER BASED ON CIRCUIT TRACING AND REFLECT ON "AS-BUILT" DRAWINGS.
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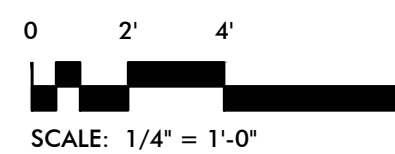


MATCHLINE
REFER TO SHEET E100 FOR
CONTINUATION

MATCHLINE
REFER TO SHEET E102 FOR
CONTINUATION



PARTIAL FOURTH FLOOR PLAN - LIGHTING NEW WORK
SCALE: 1/4" = 1'-0"



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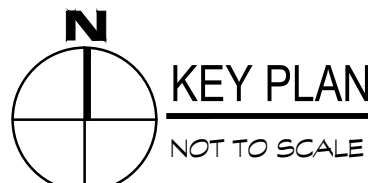
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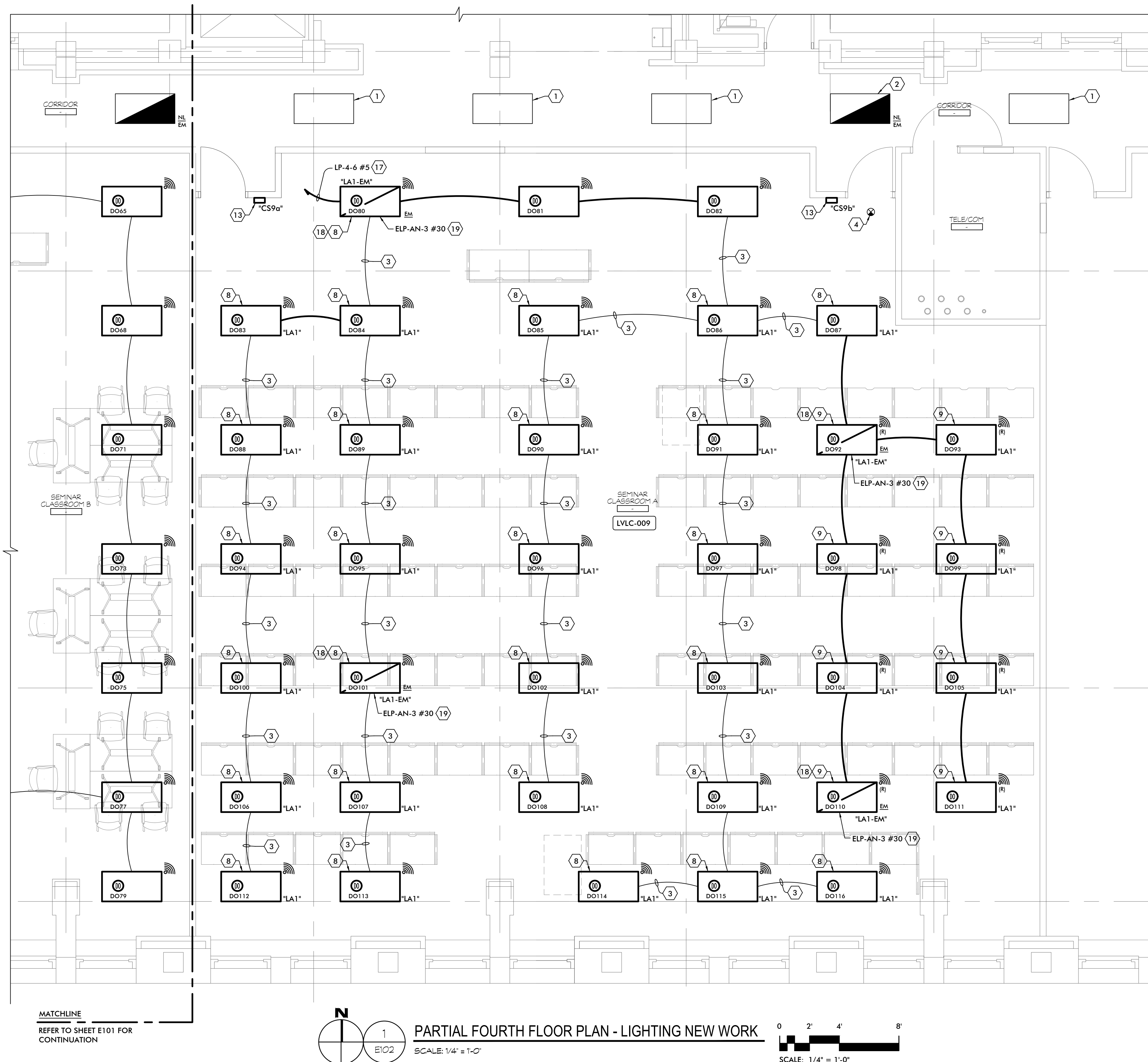
LIGHTING KEY NOTES

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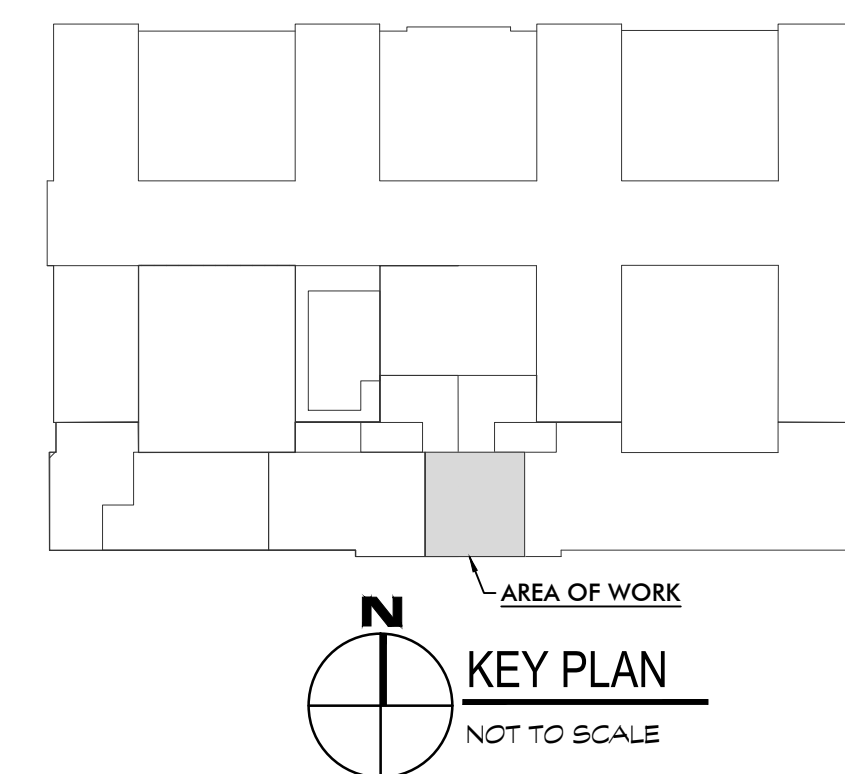
AREA OF WORK



KEY PLAN
NOT TO SCALE

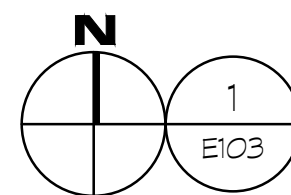


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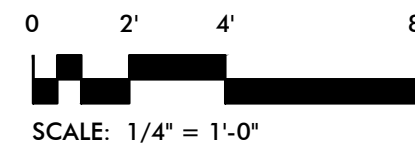
CONTRACTORS PRE-BID NOTIFICATION:

ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS AND SUBSTANTIAL FIELD OBSERVATIONS AND VERIFICATION. THIS CONTRACTOR AND ALL RELATED SUB-CONTRACTORS SHALL VISIT THE SITE AND COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A DEPARTURE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED DUE TO THE ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING FOR RESOLUTION PRIOR TO SUBMITTING FINAL BID OR ENTERING INTO A CONTRACT FOR CONSTRUCTION. FAILURE TO PROVIDE THE ARCHITECT WITH NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDITIONAL COST BEING INCURRED BY THE OWNER.



PARTIAL FOURTH FLOOR PLAN - LIGHTING NEW WORK

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



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

AREA OF WORK



KEY PLAN

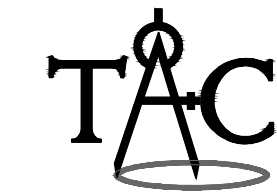
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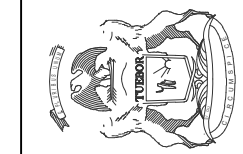
DEPT. OF HEALTH & HUMAN
SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

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3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

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DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
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PARTIAL FOURTH FLOOR
PLAN - LIGHTING
NEW WORK

E103

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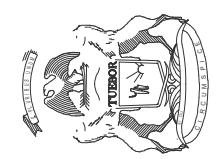
DEPT. OF HEALTH & HUMAN
SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

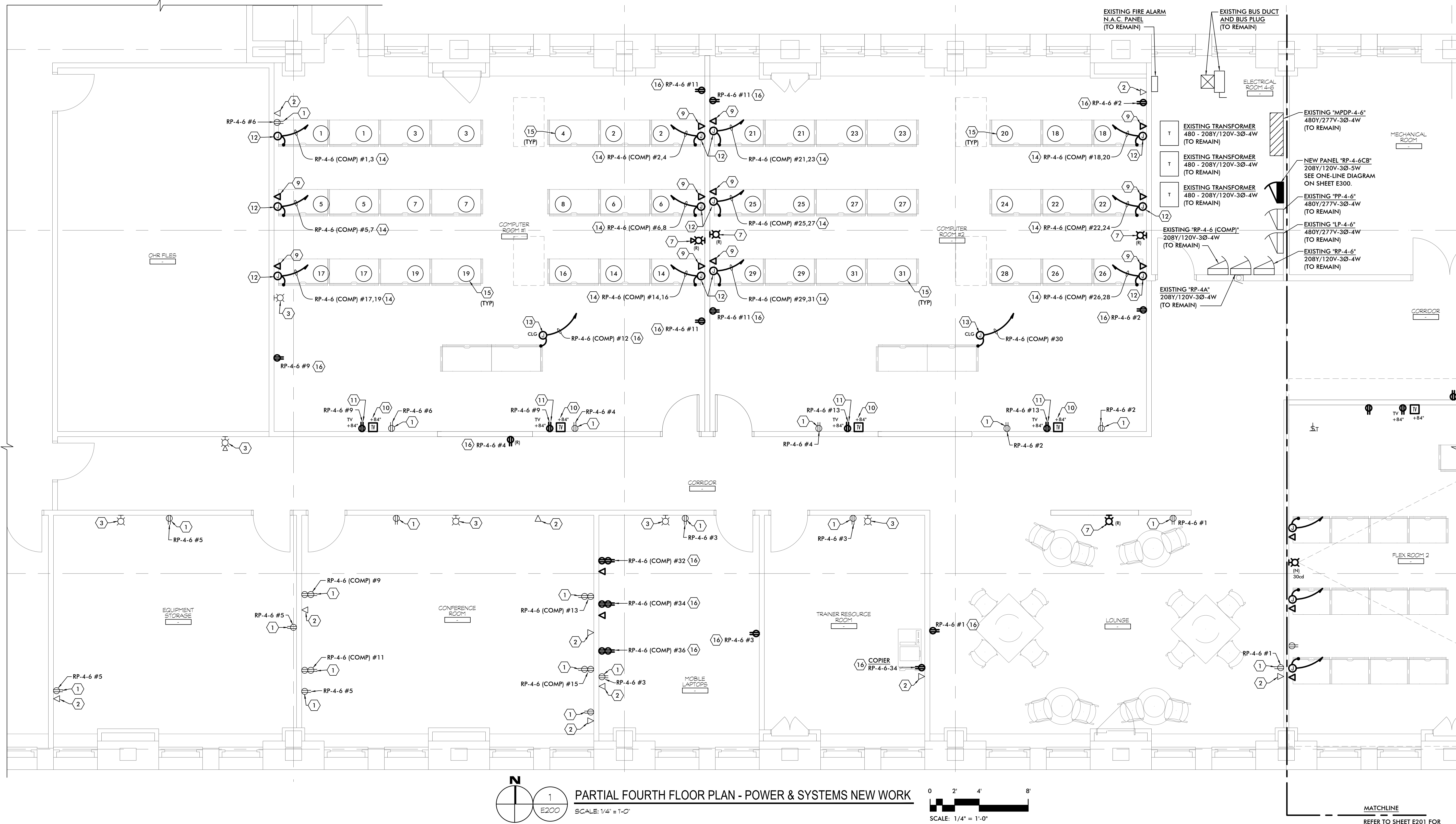
STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR



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248-458-7777 PHONE
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**PARTIAL FOURTH FLOOR
PLAN - POWER & SYSTEMS
NEW WORK**

E200



CONTRACTORS PRE-BID NOTIFICATION:

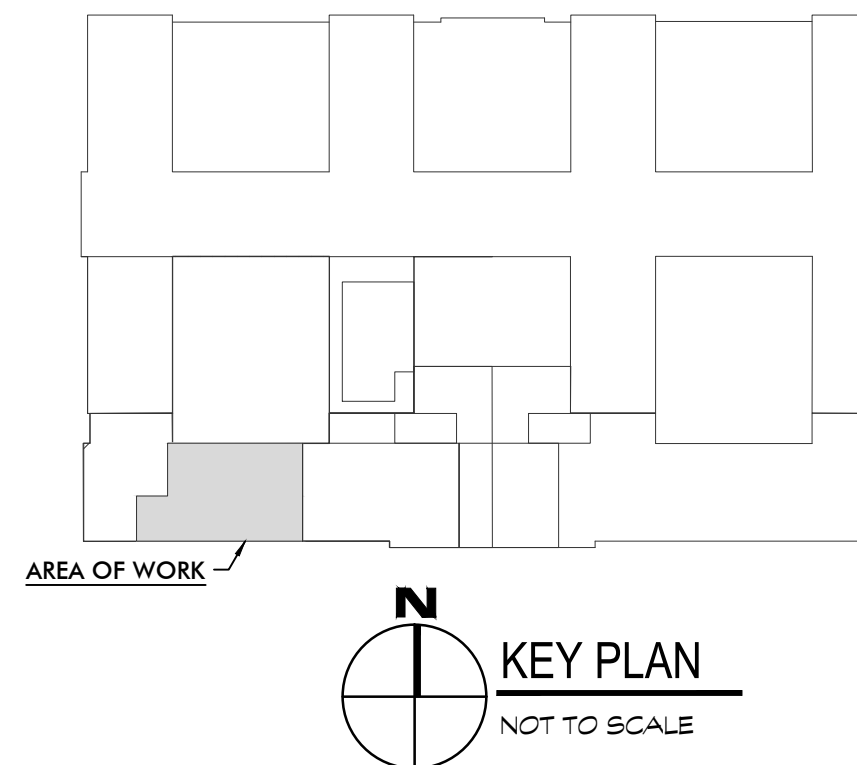
ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS AND SUBSTANTIAL FIELD OBSERVATIONS AND VERIFICATION. THIS CONTRACTOR AND ALL RELATED SUB-CONTRACTORS SHALL VISIT THE SITE AND COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A DEPARTURE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED DUE TO THE ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING FOR RESOLUTION PRIOR TO SUBMITTING FINAL BID OR ENTERING INTO A CONTRACT FOR CONSTRUCTION. FAILURE TO PROVIDE THE ARCHITECT WITH NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDITIONAL COST BEING INCURRED BY THE OWNER.

ELECTRICAL GENERAL NOTES:

- ALL JUNCTION BOXES SERVING BRANCH CIRCUIT WIRING SHALL BE LABELED WITH CIRCUITS SERVED. USE BROTHER P-TOUCH LABEL OR EQUAL ON BOX COVER.
- REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES.
- ALL DEVICES INDICATED WITH SOLID DARK LINES ARE NEW DEVICES TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR AS PART OF THIS SCOPE OF WORK.
- PRIOR TO START OF CONSTRUCTION, AND PRIOR TO ANY DEMOLITION WORK THE ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING TO IDENTIFY ALL EXISTING 120 VOLT AND 277 VOLT BRANCH CIRCUITS SERVING THE RENOVATION AREA, AND TO IDENTIFY THE AVAILABLE BRANCH CIRCUITS THAT MAY BE RE-USED AS PART OF THE PROPOSED RENOVATION, AS WELL AS CIRCUITS THAT SERVE EXISTING LIGHTING FIXTURES OR DEVICES OUTSIDE OF THE WORK AREA THAT ARE TO REMAIN AND BE MAINTAINED.
- CIRCUIT NUMBER DOES NOT INDICATE ACTUAL POLE POSITION USED BUT RATHER LOADS INTENDED TO BE GROUPED TOGETHER TO AN EXISTING SPARE 20A BRANCH CIRCUIT IN THE PANEL NOTED, OR EXISTING CIRCUIT MADE AVAILABLE BY DEMOLITION WORK IN THE RENOVATION AREA. UPDATE PANEL TYPED CIRCUIT DIRECTORY TO REFLECT REVISED LOAD SERVED BY THE BRANCH CIRCUIT. SEE NOTE #4 ABOVE FOR CIRCUIT TRACING REQUIREMENTS.

POWER & SYSTEMS KEY NOTES

- EXISTING DUPLEX RECEPTACLE (OR DOUBLE DUPLEX RECEPTACLE, AS INDICATED) TO REMAIN.
- EXISTING LOW VOLTAGE OUTLET (TELEPHONE, DATA OR CABLE TELEVISION, AS INDICATED) TO REMAIN.
- EXISTING FIRE ALARM NOTIFICATION APPLIANCE (TYPE AS INDICATED) TO REMAIN.
- EXISTING FIRE ALARM SYSTEM DUCT SMOKE DETECTOR CEILING MOUNTED REMOTE TEST SWITCH WITH INDICATING LAMP TO REMAIN.
- EXISTING ACCESS CONTROL SYSTEM CARD READER TO REMAIN.
- EXISTING ACCESS CONTROL SYSTEM "REQUEST TO EXIT" (aka "REX") TO REMAIN.
- RELOCATED OR NEW FIRE ALARM SYSTEM SYNCHRONIZED NOTIFICATION APPLIANCE, TYPE (i.e. "SPEAKER / STROBE" OR "STROBE ONLY" DEVICE) AND CANDELA RATING (i.e. 30cd) AS INDICATED. NOTIFICATION APPLIANCE TO BE CIRCUITED TO THE EXISTING SIGNAL CIRCUIT SERVING THE EXISTING NOTIFICATION APPLIANCES IN THE RENOVATION AREA, OR A NEW SIGNAL CIRCUIT IN A NEW NOTIFICATION APPLIANCE CIRCUIT (N.A.C.) PANEL AS DETERMINED BY THE EXISTING FIRE ALARM SYSTEM MANUFACTURER, ACTING AS A SUB-CONTRACTOR TO THIS ELECTRICAL CONTRACTOR. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE ELECTRICAL CONTRACTOR AND THE FIRE ALARM SYSTEM MANUFACTURER SHALL BE RESPONSIBLE FOR DETERMINING THE INVENTORY OF EXISTING NOTIFICATION APPLIANCES THAT ARE AVAILABLE FOR RE-USE BASED ON THE COORDINATE EXACT WIRING OF THE FURNITURE WITH THE MANUFACTURER'S APPROVED WIRING DIAGRAMS AND INSTALLATION DETAILS. NOTE THAT EXISTING SINGLE POLE CIRCUIT BREAKERS WILL NEED TO BE REMOVED AND REPLACED WITH MULTI-POLE CIRCUIT BREAKERS AS NOTED IN THE EXISTING RECEPTACLE PANEL. REFER TO PANEL SCHEDULES ON THE E310 SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
- NEW LOCATION OF RELOCATED ACCESS CONTROL CARD READER AND/OR REQUEST TO EXIT DEVICE (AS INDICATED). COORDINATE ALL REQUIREMENTS ASSOCIATED WITH THE RELOCATION OF THE ACCESS CONTROL SYSTEM COMPONENTS (CARD READER, REQUEST TO EXIT DEVICE, ETC.) WITH THE OWNER'S ACCESS CONTROL SYSTEM CONTRACTOR IN FIELD PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. REFER TO DEMOLITION PLANS FOR ADDITIONAL INFORMATION.
- NEW TELEPHONE / DATA OR DATA ONLY OUTLET. REFER TO TYPICAL TELEPHONE / DATA OUTLET DETAIL ON SHEET E400 FOR ADDITIONAL INFORMATION. NOTE THAT ALL TELEPHONE AND DATA SYSTEM OUTLETS, JACKS, CABLING, TERMINATIONS, ETC ARE BY THE OWNER'S COMMUNICATION CONTRACTOR.
- NEW CABLE TELEVISION OUTLET. COORDINATE EXACT MOUNTING ELEVATION WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE IN FIELD PRIOR TO INSTALLATION. REFER TO TYPICAL CABLE TELEVISION OUTLET DETAIL ON SHEET E400. NOTE THAT THE CABLE TELEVISION OUTLET AND THE ASSOCIATED 120 VOLT, 20 AMPERE DUPLEX RECEPTACLE SERVING THE TELEVISION ARE TO BE MOUNTED IN A SPECIAL RECESSED TV BOX / FRAME, WITH INTERNAL BARRIER TO SEPARATE THE 120 VOLT POWER AND LOW VOLTAGE WIRING, AS INDICATED ON THE TYPICAL CABLE TELEVISION OUTLET DETAIL.
- NEW 120 VOLT DUPLEX RECEPTACLE SERVING TELEVISION. COORDINATE EXACT MOUNTING ELEVATION WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE AND ARCHITECT IN FIELD PRIOR TO INSTALLATION. NOTE THAT THE CABLE TELEVISION OUTLET AND THE ASSOCIATED 120 VOLT, 20 AMPERE DUPLEX RECEPTACLE SERVING THE TELEVISION ARE TO BE MOUNTED IN A SPECIAL RECESSED TV BOX / FRAME, WITH INTERNAL BARRIER TO SEPARATE THE 120 VOLT POWER AND LOW VOLTAGE WIRING, AS INDICATED ON THE TYPICAL CABLE TELEVISION OUTLET DETAIL ON SHEET E400.
- NEW JUNCTION BOX TO SERVE 120 VOLT POWER TO FURNITURE PARTITION BASE FEED. VERIFY IN FIELD EXACT QUANTITY OF WIRES IN SYSTEM FURNITURE WHIP WITH THE MANUFACTURER'S APPROVED WIRING DIAGRAMS. PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXISTING CONFIGURATION OF THE ELECTRIFIED FURNITURE PARTITIONS WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE BASED ON THE FURNITURE TO BE FURNISHED AND INSTALLED BY THE OWNER'S FURNITURE CONTRACTOR.
- NEW JUNCTION BOX MOUNTED IN ACCESSIBLE CEILING SPACE TO SERVE 120 VOLT POWER TO FURNITURE PARTITION TOP FEED POLE FROM THE FURNITURE PARTITION TO ABOVE ACCESSIBLE CEILING SPACE. VERIFY IN FIELD EXACT QUANTITY OF WIRES IN SYSTEM FURNITURE WHIP WITH THE MANUFACTURER'S APPROVED WIRING DIAGRAMS. PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXISTING CONFIGURATION OF THE ELECTRIFIED FURNITURE PARTITIONS WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE BASED ON THE FURNITURE TO BE FURNISHED AND INSTALLED BY THE OWNER'S FURNITURE CONTRACTOR.
- ELECTRICAL CONTRACTOR SHALL CIRCUIT THE MULTI-WIRE BRANCH CIRCUITS INDICATED TO SERVE THE SYSTEM FURNITURE PARTITIONS TO A MULTI-POLE CIRCUIT BREAKER IN THE PANEL INDICATED TO ALLOW FOR THE SIMULTANEOUS DISCONNECTION OF ALL UNGROUNDED CONDUCTORS AT THE PANELBOARD WHERE THE BRANCH CIRCUIT ORIGINATES IN ACCORDANCE WITH THE REQUIREMENTS OF N.E.C. ARTICLE 405.7. WHERE TWO (2) CIRCUITS ARE INDICATED TO SERVE THE GROUP OF FURNITURE, A 2 POLE CIRCUIT BREAKER SHALL BE PROVIDED; WHERE THREE (3) CIRCUITS ARE INDICATED, A 3-POLE CIRCUIT BREAKER SHALL BE PROVIDED. ALL BRANCH CIRCUITS TO THE SYSTEMS FURNITURE PARTITION SHALL UTILIZE SEPARATE NEUTRAL CONDUCTORS FOR EACH PHASE, ALONG WITH A SEPARATE INSULATED GREEN EQUIPMENT GROUND CONDUCTOR. COORDINATE EXACT WIRING OF THE FURNITURE WITH THE MANUFACTURER'S APPROVED WIRING DIAGRAMS AND INSTALLATION DETAILS. NOTE THAT EXISTING SINGLE POLE CIRCUIT BREAKERS WILL NEED TO BE REMOVED AND REPLACED WITH MULTI-POLE CIRCUIT BREAKERS AS NOTED IN THE EXISTING RECEPTACLE PANEL. REFER TO PANEL SCHEDULES ON THE E310 SERIES DRAWINGS FOR ADDITIONAL INFORMATION.
- TAG DENOTES THE BRANCH CIRCUIT SERVING THE WORKSTATION. COORDINATE ALL WORK ASSOCIATED WITH THE CONNECTION OF THE BRANCH CIRCUIT POWER TO THE SYSTEMS FURNITURE WITH THE FURNITURE CONTRACTOR IN THE FIELD.
- CIRCUIT NUMBER DOES NOT INDICATE ACTUAL POLE POSITION USED BUT RATHER LOADS INTENDED TO BE GROUPED TOGETHER. REFER TO GENERAL NOTE #5 FOR ADDITIONAL INFORMATION.
- NEW UNDER-CARPET WIREWAY SYSTEM, "CONNECTRAC EXPRESS KIT" SYSTEM, WITH MODULAR PRE-WIRED QUAD POWER DEVICE (aka DOUBLE-DUPLEX RECEPTACLE), AND PROVISIONS FOR FOUR (4) CAT-5e OR CAT-6 CABLES TO SERVE THE LOW VOLTAGE CABLING TO THE OUTLET LOCATION. LOW VOLTAGE CABLING TO BE INSTALLED BY THE OWNER'S COMMUNICATION CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE ROUGH-IN BOX AND TERMINATION FITTINGS FOR TERMINATION OF THE CONNECTRAC AT THE WALL TO CONCEAL THE RACEWAY AND CABLING FROM WITHIN THE WALL CONSTRUCTION TO THE CONNECTRAC SYSTEM. SYSTEM TO CONSIST OF WIREWAY SEGMENTS, CORNER KITS, PRE-WIRED DUPLEX POWER DEVICE AND POWER FEED AND ALL MISCELLANEOUS ACCESSORIES AND COMPONENTS FOR A COMPLETE SYSTEM. EXACT SYSTEM FINISH TO BE SELECTED BY ARCHITECT. COORDINATE ALL WORK WITH ARCHITECTURAL TRADES. SYSTEM TO BE CONNECTRAC CT XP 1-XX-25.1C SERIES, WHERE THE "XX" DENOTES THE LENGTH OF THE FLOOR KIT, TO BE DETERMINED BY THE CONTRACTOR IN THE FIELD PRIOR TO ORDERING SYSTEM. ROUTE POWER FEED SERVING CONNECTRAC CONCEALED IN WALL CONSTRUCTION. PROVIDE NEW 1" EMPTY CONDUIT (WITH PULLWIRE), ROUTED FROM THE CONNECTRAC LOCATION TO THE CEILING SPACE ABOVE. STUB CONDUIT OUT TO ACCESSIBLE CEILING SPACE.



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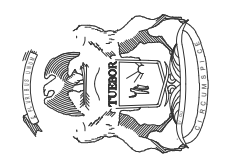
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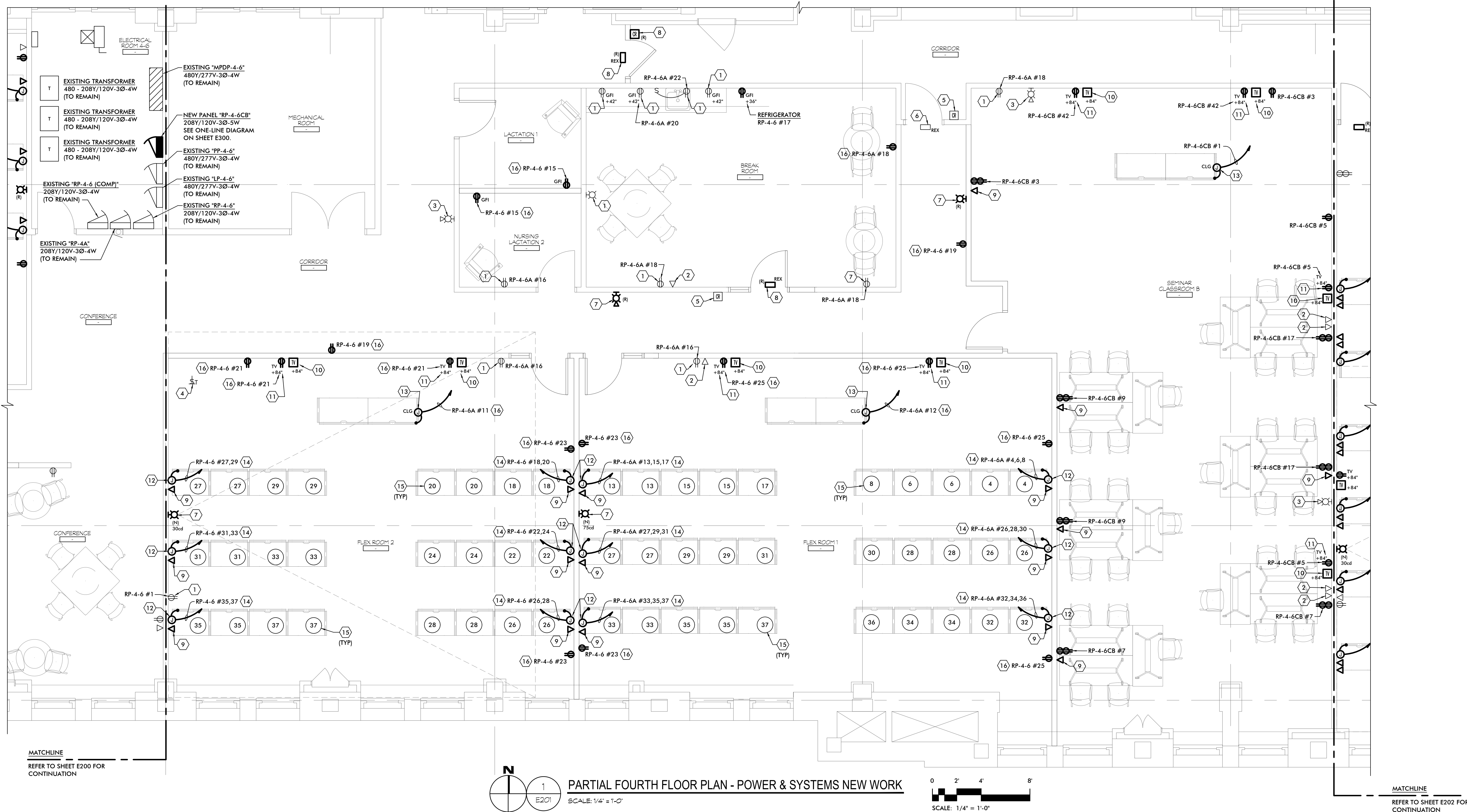
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PARTIAL FOURTH FLOOR
PLAN - POWER & SYSTEMS
NEW WORK

E201



CONTRACTORS PRE-BID NOTIFICATION:

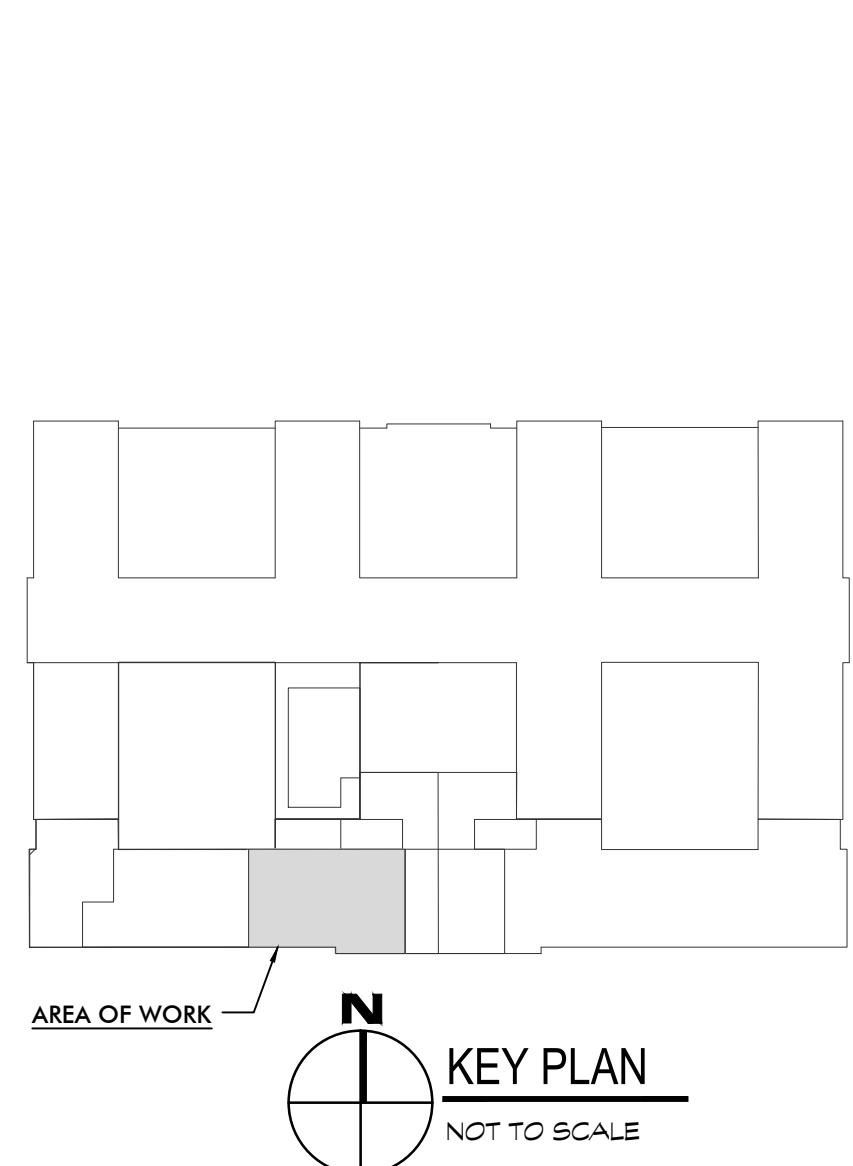
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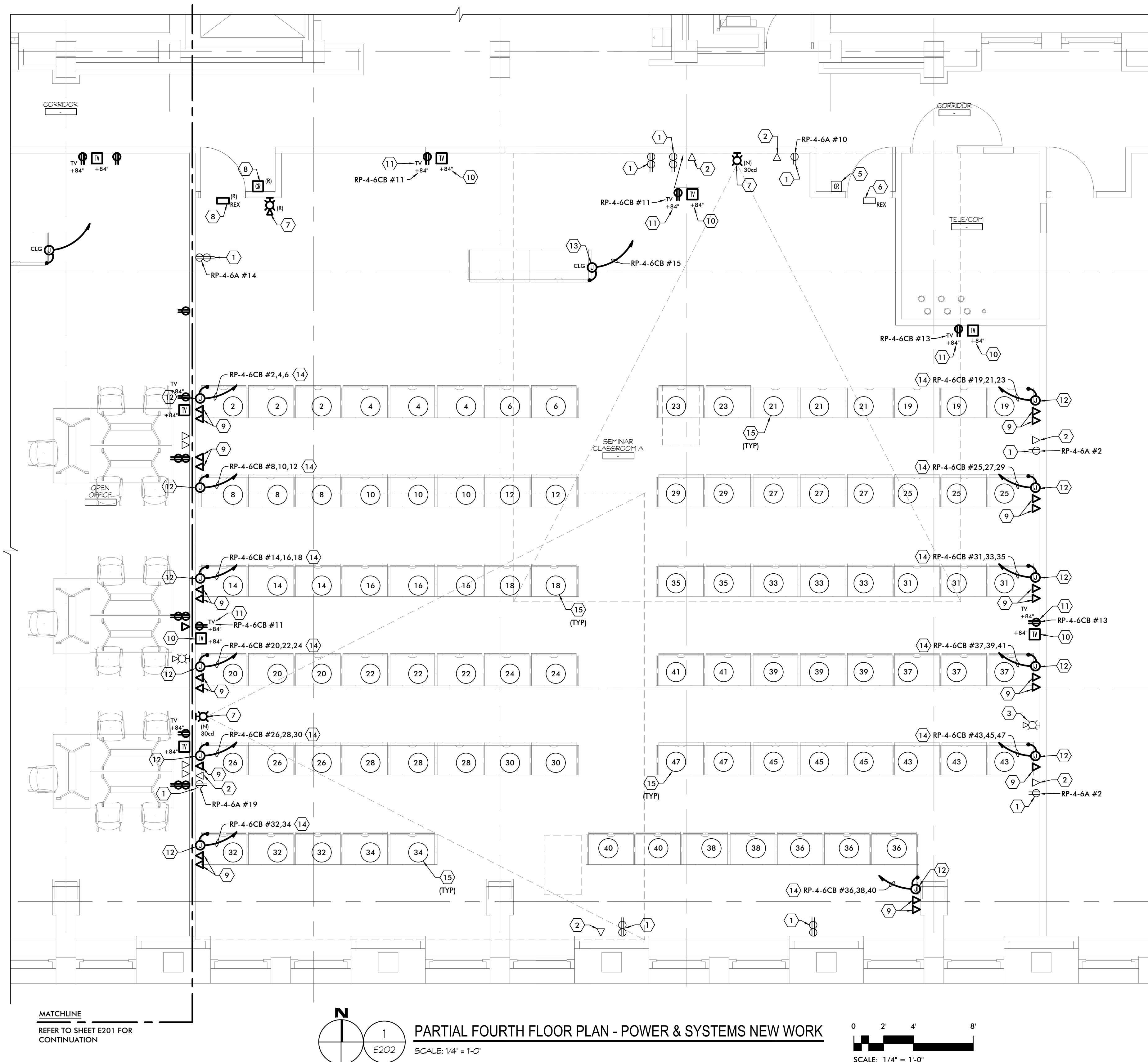
ELECTRICAL GENERAL NOTES:

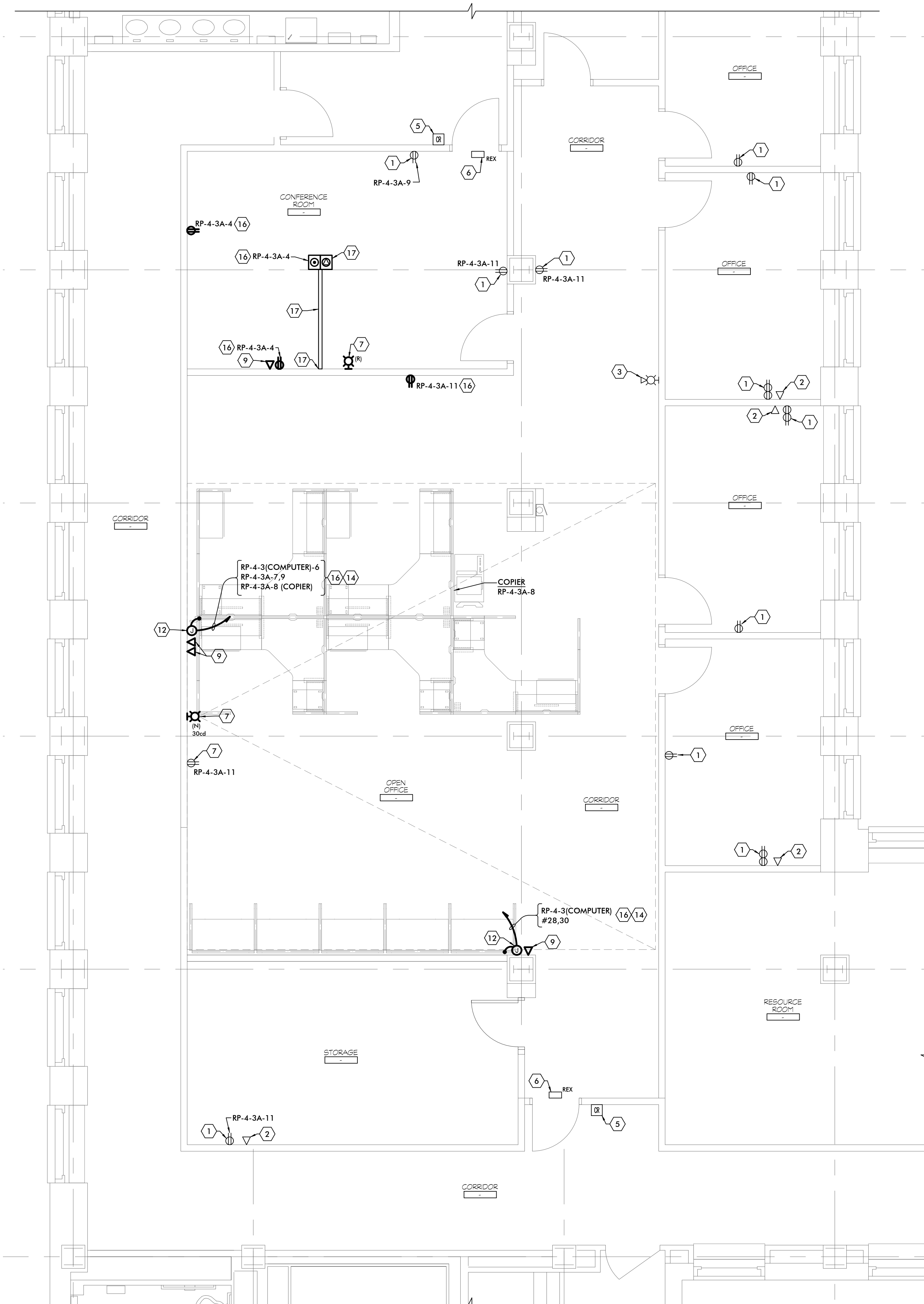
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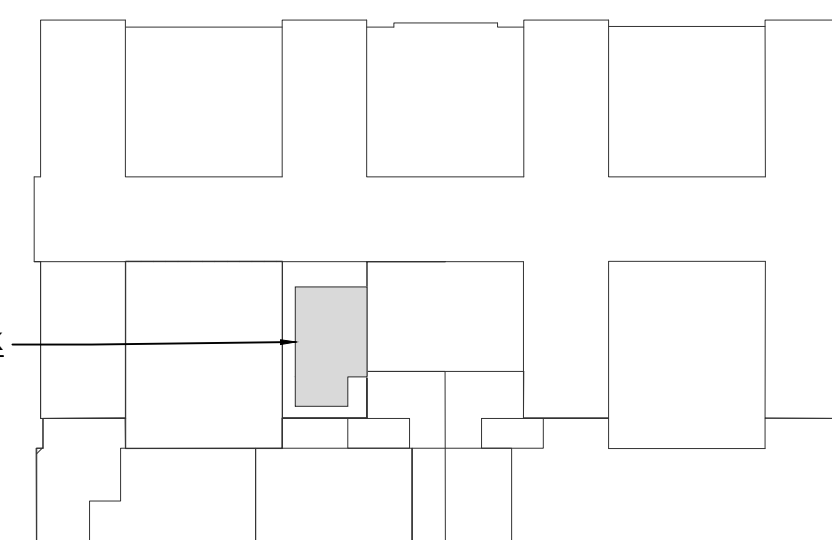
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2. REFER TO ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED LIGHT FIXTURES AND OTHER CEILING MOUNTED DEVICES.
3. ALL DEVICES INDICATED WITH SOLID DARK LINES ARE NEW DEVICES TO BE INSTALLED BY THE ELECTRICAL CONTRACTOR AS PART OF THIS SCOPE OF WORK.
4. PRIOR TO START OF CONSTRUCTION, AND PRIOR TO ANY DEMOLITION WORK THE ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING TO IDENTIFY ALL EXISTING 120 VOLT AND 277 VOLT BRANCH CIRCUITS SERVING THE RENOVATION AREA, AND TO IDENTIFY THE AVAILABLE BRANCH CIRCUITS THAT MAY BE RE-USED AS PART OF THE PROPOSED RENOVATION, AS WELL AS CIRCUITS THAT SERVE EXISTING LIGHTING FIXTURES OR DEVICES OUTSIDE OF THE WORK AREA THAT ARE TO REMAIN AND BE MAINTAINED.
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POWER & SYSTEMS KEY NOTES

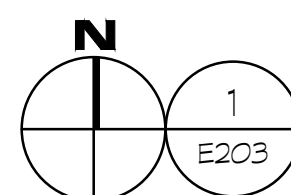
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- 5 EXISTING ACCESS CONTROL SYSTEM CARD READER TO REMAIN.
- 6 EXISTING ACCESS CONTROL SYSTEM "REQUEST TO EXIT" (aka "REX") TO REMAIN.
- 7 RELOCATED OR NEW FIRE ALARM SYSTEM SYNCHRONIZED NOTIFICATION APPLIANCE; TYPE (i.e. "SPEAKER / STROBE" OR "STROBE ONLY" DEVICE) AND CANDELA RATING (i.e. 30cd) AS INDICATED. NOTIFICATION APPLIANCE TO BE CIRCUITED TO THE EXISTING SIGNAL CIRCUIT SERVING THE EXISTING NOTIFICATION APPLIANCES IN THE RENOVATION AREA, OR A NEW SIGNAL CIRCUIT IN A NEW NOTIFICATION APPLIANCE CIRCUIT (N.A.C.) PANEL AS DETERMINED BY THE EXISTING FIRE ALARM SYSTEM MANUFACTURE, ACTING AS A SUB-CONTRACTOR TO THIS ELECTRICAL CONTRACTOR. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION. THE ELECTRICAL CONTRACTOR AND THE FIRE ALARM SYSTEM MANUFACTURE SHALL BE RESPONSIBLE FOR DETERMINING THE INVENTORY OF EXISTING NOTIFICATION APPLIANCES THAT ARE AVAILABLE FOR RE-USE BASED ON THE DEMOLITION WORK AND AN INVENTORY CREATED BY THE CONTRACTOR PRIOR TO START OF ANY DEMOLITION WORK IN THE RENOVATION AREA.
- 8 NEW LOCATION OF RELOCATED ACCESS CONTROL CARD READER AND/OR REQUEST TO EXIT DEVICE (AS INDICATED). COORDINATE ALL REQUIREMENTS ASSOCIATED WITH THE RELOCATION OF THE ACCESS CONTROL SYSTEM COMPONENTS (CARD READER, REQUEST TO EXIT DEVICE, ETC.) WITH THE OWNER'S ACCESS CONTROL SYSTEM CONTRACTOR IN FIELD PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. REFER TO DEMOLITION PLANS FOR ADDITIONAL INFORMATION.
- 9 NEW TELEPHONE / DATA OR DATA ONLY OUTLET. REFER TO TYPICAL TELEPHONE / DATA OUTLET DETAIL ON SHEET E400 FOR ADDITIONAL INFORMATION. NOTE THAT ALL TELEPHONE AND DATA SYSTEM OUTLETS, JACKS, CABLEING, TERMINATIONS, ETC ARE BY THE OWNER'S COMMUNICATION CONTRACTOR.
- 10 NEW CABLE TELEVISION OUTLET. COORDINATE EXACT MOUNTING ELEVATION WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE IN FIELD PRIOR TO INSTALLATION. REFER TO TYPICAL CABLE TELEVISION OUTLET DETAIL ON SHEET E400. NOTE THAT THE CABLE TELEVISION OUTLET AND THE ASSOCIATED 120 VOLT, 20 AMPERE DUPLEX RECEPTACLE SERVING THE TELEVISION ARE TO BE MOUNTED IN A SPECIAL RECESSED TV BOX / FRAME, WITH INTERNAL BARRIER TO SEPARATE THE 120 VOLT POWER AND LOW VOLTAGE WIRING, AS INDICATED ON THE TYPICAL CABLE TELEVISION OUTLET DETAIL.
- 11 NEW 120 VOLT DUPLEX RECEPTACLE SERVING TELEVISION. COORDINATE EXACT MOUNTING ELEVATION WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE AND ARCHITECT IN FIELD PRIOR TO INSTALLATION. NOTE THAT THE CABLE TELEVISION OUTLET AND THE ASSOCIATED 120 VOLT, 20 AMPERE DUPLEX RECEPTACLE SERVING THE TELEVISION ARE TO BE MOUNTED IN A SPECIAL RECESSED TV BOX / FRAME, WITH INTERNAL BARRIER TO SEPARATE THE 120 VOLT POWER AND LOW VOLTAGE WIRING, AS INDICATED ON THE TYPICAL CABLE TELEVISION OUTLET DETAIL ON SHEET E400.
- 12 NEW JUNCTION BOX TO SERVE 120 VOLT POWER TO FURNITURE PARTITION BASE FEED. VERIFY IN FIELD EXACT QUANTITY OF WIRES IN SYSTEM FURNITURE WHIP WITH THE MANUFACTURES APPROVED WIRING DIAGRAMS. PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXISTING CONFIGURATION OF THE ELECTRIFIED FURNITURE PARTITIONS WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE BASED ON THE FURNITURE TO BE FURNISHED AND INSTALLED BY THE OWNER'S FURNITURE CONTRACTOR.
- 13 NEW JUNCTION BOX MOUNTED IN ACCESSIBLE CEILING SPACE TO SERVE 120 VOLT POWER TO FURNITURE PARTITION TOP FEED POLE FROM THE FURNITURE PARTITION TO ABOVE ACCESSIBLE CEILING SPACE. VERIFY IN FIELD EXACT QUANTITY OF WIRES IN SYSTEM FURNITURE WHIP WITH THE MANUFACTURES APPROVED WIRING DIAGRAMS. PRIOR TO START OF CONSTRUCTION AND PRIOR TO ROUGH-IN OF ANY BOXES, RACEWAYS, ETC. THE ELECTRICAL CONTRACTOR SHALL VERIFY THE EXISTING CONFIGURATION OF THE ELECTRIFIED FURNITURE PARTITIONS WITH THE OWNER'S CONSTRUCTION REPRESENTATIVE BASED ON THE FURNITURE TO BE FURNISHED AND INSTALLED BY THE OWNER'S FURNITURE CONTRACTOR.
- 14 ELECTRICAL CONTRACTOR SHALL CIRCUIT THE MULTI-WIRE BRANCH CIRCUITS INDICATED TO SERVE THE SYSTEM FURNITURE PARTITIONS TO A MULTI-POLE CIRCUIT BREAKER IN THE PANEL INDICATED TO ALLOW FOR THE SIMULTANEOUS DISCONNECTION OF ALL UNGROUNDED CONDUCTORS AT THE PANELBOARD WHERE THE BRANCH CIRCUIT ORIGINATES IN ACCORDANCE WITH THE REQUIREMENTS OF N.E.C. ARTICLE 405.7. WHERE TWO (2) CIRCUITS ARE INDICATED TO SERVE THE GROUP OF FURNITURE, A 2 POLE CIRCUIT BREAKER SHALL BE PROVIDED; WHERE THREE (3) CIRCUITS ARE INDICATED, A 3-POLE CIRCUIT BREAKER SHALL BE PROVIDED. ALL BRANCH CIRCUITS TO THE SYSTEMS FURNITURE PARTITION SHALL UTILIZE SEPARATE NEUTRAL CONDUCTORS FOR EACH PHASE, ALONG WITH A SEPARATE INSULATED GREEN EQUIPMENT GROUND CONDUCTOR. COORDINATE EXACT WIRING OF THE FURNITURE WITH THE MANUFACTURES APPROVED WIRING DIAGRAMS AND INSTALLATION DETAILS. NOTE THAT EXISTING SINGLE POLE CIRCUIT BREAKERS WILL NEED TO BE REMOVED AND REPLACED WITH MULTI-POLE CIRCUIT BREAKERS AS NOTED IN THE EXISTING RECEPTACLE PANEL.
- 15 TAG DENOTES THE BRANCH CIRCUIT SERVING THE WORKSTATION. COORDINATE ALL WORK ASSOCIATED WITH THE CONNECTION OF THE BRANCH CIRCUIT POWER TO THE SYSTEMS FURNITURE WITH THE FURNITURE CONTRACTOR IN THE FIELD.
- 16 CIRCUIT NUMBER DOES NOT INDICATE ACTUAL POLE POSITION USED BUT RATHER LOADS INTENDED TO BE GROUPED TOGETHER. REFER TO GENERAL NOTE #5 FOR ADDITIONAL INFORMATION.
- 17 NEW UNDER-CARPET WIREWAY SYSTEM, "CONNECTRAC EXPRESS KIT" SYSTEM, WITH MODULAR PRE-WIRED QUAD POWER DEVICE (aka DOUBLE-DUPLEX RECEPTACLE), AND PROVISIONS FOR FOUR (4) CAT-5e OR CAT-6 CABLES TO SERVE THE LOW VOLTAGE CABLEING TO THE OUTLET LOCATION. LOW VOLTAGE CABLEING TO BE INSTALLED BY THE OWNER'S COMMUNICATION CONTRACTOR. ELECTRICAL CONTRACTOR SHALL PROVIDE ROUGH-IN BOX AND TERMINATION FITTINGS FOR TERMINATION OF THE CONNECTRAC AT THE WALL TO CONCEAL THE RACEWAY AND CABLEING FROM WITHIN THE WALL CONSTRUCTION TO THE CONNECTRAC SYSTEM. SYSTEM TO CONSIST OF WIREWAY SEGMENTS, CORNER KITS, PRE-WIRED DUPLEX POWER DEVICE AND POWER FEED AND ALL MISCELLANEOUS ACCESSORIES AND COMPONENTS FOR A COMPLETE SYSTEM. EXACT SYSTEM FINISH TO BE SELECTED BY ARCHITECT. COORDINATE ALL WORK WITH ARCHITECTURAL TRADES. SYSTEM TO BE CONNECTRAC CT-1P-1X-25-1-SERIES, WHERE THE "X" DENOTES THE LENGTH OF THE FLOOR KIT, TO BE DETERMINED BY THE CONTRACTOR IN THE FIELD PRIOR TO ORDERING SYSTEM. ROUTE POWER FEED SERVING CONNECTRAC CONCEALED IN WALL CONSTRUCTION. PROVIDE NEW 1" EMPTY CONDUIT (WITH PULLWIRE), ROUTED FROM THE CONNECTRAC LOCATION TO THE CEILING SPACE ABOVE. STUB CONDUIT OUT TO ACCESSIBLE CEILING SPACE.

AREA OF WORK



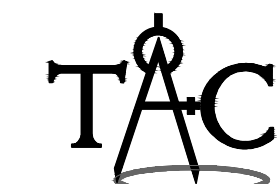
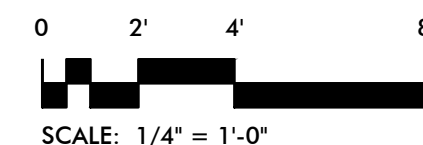
CONTRACTORS PRE-BID NOTIFICATION:

ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS AND SUBSTANTIAL FIELD OBSERVATIONS AND VERIFICATION. THIS CONTRACTOR AND ALL RELATED SUB-CONTRACTORS SHALL VISIT THE SITE AND COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A DEPARTURE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED DUE TO THE ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING FOR RESOLUTION PRIOR TO SUBMITTING FINAL BID OR ENTERING INTO A CONTRACT FOR CONSTRUCTION. FAILURE TO PROVIDE THE ARCHITECT WITH NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDITIONAL COST BEING INCURRED BY THE OWNER.



PARTIAL FOURTH FLOOR PLAN - POWER & SYSTEMS NEW WORK

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



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http://www.tac-associates.com
TAC Project No. 25-009

ISSUED FOR BIDS 04/25/2015

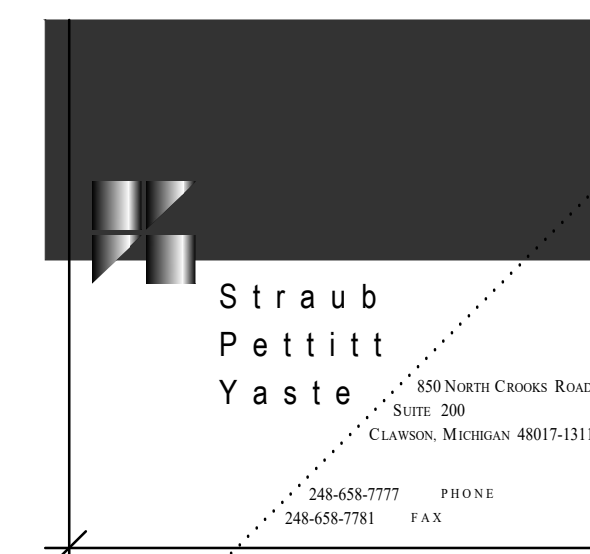
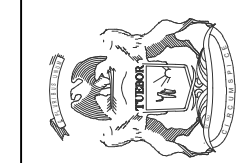
DEPT. OF HEALTH & HUMAN
SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

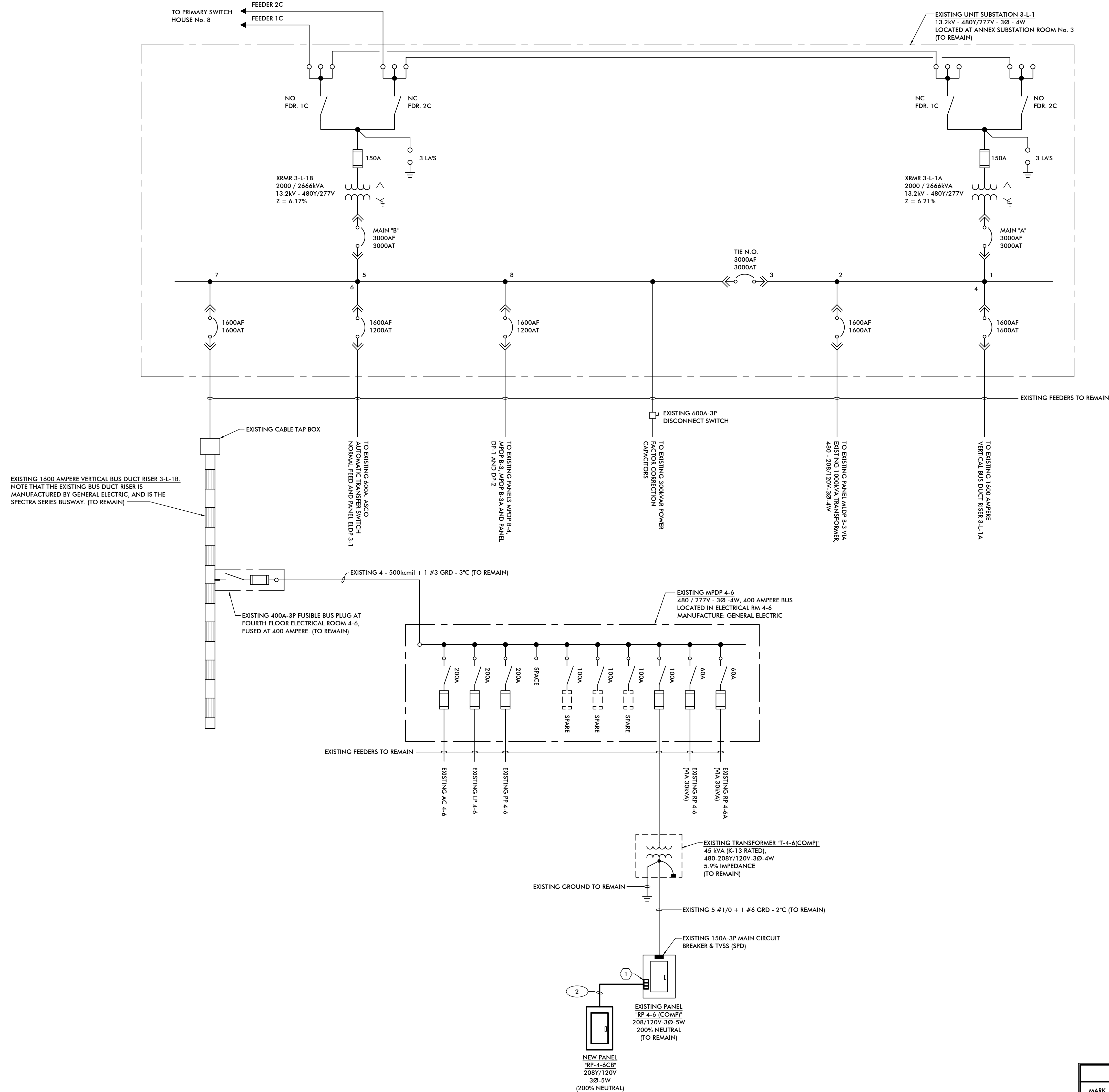
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STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR



PARTIAL FOURTH FLOOR
PLAN - POWER & SYSTEMS
NEW WORK

E203



CONTRACTORS PRE-BID NOTIFICATION:

ALL EXISTING ITEMS INDICATED IN THE CONTRACT DRAWINGS HAVE BEEN TAKEN FROM THE OWNER'S LIMITED RECORD DRAWINGS AND SUBSTANTIAL FIELD OBSERVATIONS AND VERIFICATION. THIS CONTRACTOR AND ALL RELATED SUB-CONTRACTORS SHALL VISIT THE SITE AND COMPLETELY UNDERSTAND THE CONDITIONS UNDER WHICH THE WORK MUST BE PERFORMED. IF A DEPARTURE FROM THE DESIGN INTENT OF THE DOCUMENTS IS REQUIRED DUE TO THE ACTUAL FIELD CONDITIONS OBSERVED BY THE CONTRACTOR, THE CONTRACTOR SHALL NOTIFY THE ARCHITECT IN WRITING FOR RESOLUTION PRIOR TO SUBMITTING FINAL BID OR ENTERING INTO A CONTRACT FOR CONSTRUCTION. FAILURE TO PROVIDE THE ARCHITECT WITH NOTIFICATION SHALL RESULT IN THE CONTRACTOR BEING HELD RESPONSIBLE TO COMPLETE ALL WORK TO MEET THE DESIGN INTENT WITH NO ADDITIONAL COST BEING INCURRED BY THE OWNER.

- ONE-LINE DIAGRAM GENERAL NOTES**
- REFER TO SHEETS E310 AND E311 FOR PANEL SCHEDULES FOR ALL EXISTING AND NEW PANELS TO BE MODIFIED OR INSTALLED AS PART OF THIS RENOVATION PROJECT.
 - REFER TO SHEET E312 FOR REQUIREMENTS REGARDING SHORT-CIRCUIT, TIME CURRENT AND ARC FLASH HAZARD ANALYSIS STUDY TO BE PERFORMED BY THIS ELECTRICAL CONTRACTOR AS PART OF HER/HIS SCOPE OF WORK.

- POWER ONE-LINE DIAGRAM KEY NOTES**
- ELECTRICAL CONTRACTOR SHALL REMOVE THREE (3) EXISTING SINGLE POLE CIRCUIT BREAKERS IN EXISTING PANEL TO ALLOW FOR THE INSTALLATION OF A NEW 100A-3P CIRCUIT BREAKER TO SERVE THE NEW SUB-PANEL INDICATED. NEW CIRCUIT BREAKER TO BE U.L. LISTED FOR USE IN THE EXISTING PANEL, SHALL BE MANUFACTURED BY THE SAME MANUFACTURE AS THE EXISTING PANEL (GENERAL ELECTRIC), SHALL BE LISTED BY THE MANUFACTURE FOR USE IN THE EXISTING PANEL AND SHALL HAVE AN A.I.C. RATING EQUAL TO THAT OF THE OTHER CIRCUIT BREAKERS IN THE PANEL.

ELECTRODE GROUNDING SCHEDULE	
MARK	GROUNDING
G1	1#6 COPPER ELECTRODE GROUND TO LOCAL BUILDING STEEL

CONDUIT AND WIRING SCHEDULE		
MARK	CONDUIT SIZE	WIRING
1	¾"	3 #6+1#10GRD
2	1 ½"	5 #3+1#8GRD

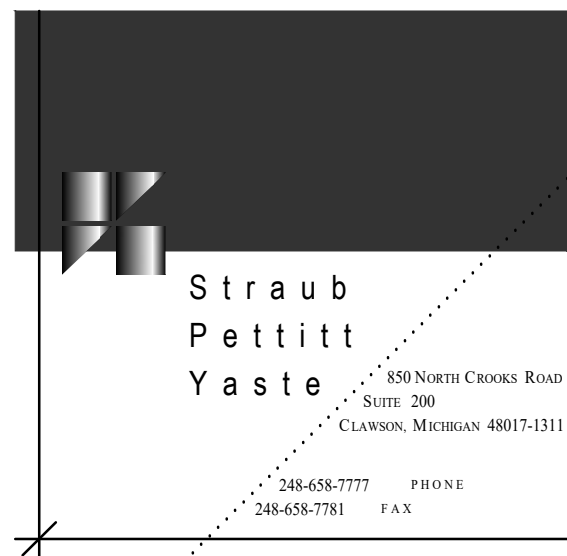


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DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
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FILE NO: 491_24304_MNB
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DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR



PARTIAL POWER ONE-LINE
DIAGRAM - NEW WORK

E300

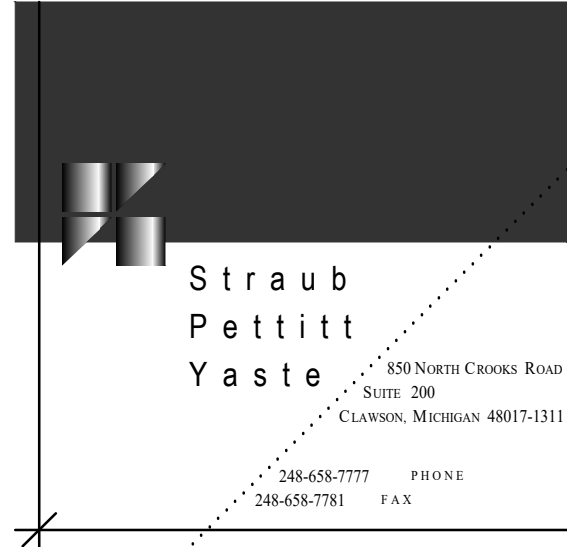
EXISTING PANEL SCHEDULE													
TYPE	DESCRIPTION	CB	VA	#	ØA	ØB	ØC	#	VA	CB	DESCRIPTION		TYPE
D	Existing Receptacles Conf. Room - SEE NOTE - 2	20/1	540	1	1080			2	540	20/1	Existing Receptacles Conference Room - SEE NOTE - 2		L
D	Existing Receptacles Conf. Room - SEE NOTE - 2	20/1	720	3		1260		4	540	20/1	Existing Receptacles Conference Room - SEE NOTE - 2		L
D	Existing Receptacles Conf. Room - SEE NOTE - 2	20/1	900	5			1800	6	900	20/1	Existing Receptacles OHR Files + Comp Rm #1 - SEE NOTE - 2		L
D	Existing Receptacles Training Room - SEE NOTE - 2	20/1	900	7	1200			8	300	20/1	Existing Annex Elev. Equipment Room Lights		L
D	New (3) Duplex - Comp. Room #1 - SEE NOTE - 3	20/1	540	9		720		10	180	20/1	Existing Annex Elev. Equipment Room Receptacles		D
D	New (4) Duplex - Comp. Room #1 & #2 - SEE NOTE - 3	20/1	720	11			1440	12	720	20/1	Existing Load - SEE NOTE - 2		D
D	New (2) Duplex - Comp. Room #2 - SEE NOTE - 3	20/1	360	13	1080			14	720	20/1	Existing Load - SEE NOTE - 2		D
D	New (2) GFI Duplex - Location #1 & #2 - SEE NOTE - 3	20/1	360	15		1080		16	720	20/1	Existing Load - SEE NOTE - 2		D
O	New REFRIGERATOR - Break Room - SEE NOTE - 3	20/1	1100	17			1940	18	840	20/2	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		D
D	New (2) Duplex - Corridor By Break Rm - SEE NOTE - 3	20/1	360	19	1200			20	840		Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		D
D	New (3) Duplex - Flex Room 2 - SEE NOTE - 3	20/1	540	21		1380		22	840	20/2	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		D
D	New (4) Duplex - Flex Room #2 & #1 - SEE NOTE - 3	20/1	720	23			1560	24	840		Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		D
D	New (4) Duplex - Flex Room #1 - SEE NOTE - 3	20/1	720	25	1560			26	840	20/2	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		D
D	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4	20/2	840	27		1680		28	840		Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		D
D	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		840	29			1140	30	300	20/1	Existing VAV Control		M
D	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4	20/2	840	31	1440			32	600	20/1	Existing BCU 4-6		M
D	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		840	33			2340		34	1500	20/1	COPIER - Trainer Resource Room - SEE NOTE 3	
D	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4	20/2	840	35			840	36		20/1	SPARE		C
D	Furniture Feed - 2 WS (4 Duplex) - Flex Rm 2 - SEE NOTE - 4		840	37	840			38		20/1	SPARE		C
C	SPARE	20/1		39				40		20/1	SPARE		C
C	SPARE	20/1		41			180	42	180	20/1	Existing Receptacle under Panel		D
					8400	8460	8900						
					ØA	ØB	ØC						
					69.95	70.45	74.11						
PANELBOARD INFORMATION					AMPS PER PHASE			NEC ARTICLE 220 DEMAND CALCULATIONS					
DESIGNATION: RP-4-6								CONTINUOUS LOAD (C):					
VOLTAGE: 208Y/120								KITCHEN LOAD (K):					
PHASE-WIRE: 3Ø-4W								RECEPT BASE LOAD (D): 10000					
BUS AMPACITY: 225A								RECEPT DEMAND LOAD (D): 4990					
MAIN TYPE: 100A MCB								LIGHTING LOAD (L): 2280					
MINIMUM A.I.C.:								ELECTRIC HEAT LOAD (H):					
NEUTRAL SIZE: 100%								MECHANICAL LOAD (M): 900					
MOUNTING: SURFACE								OTHER LOAD (O): 2600					
TOTAL POLES: 42								CONNECTED 3Ø LOAD (kVA): 25.76					
								CONNECTED 3Ø LOAD (AMPS): 71.50					
								DEMAND 3Ø LOAD (kVA): 20.77					
								DEMAND 3Ø LOAD (AMPS): 57.65					

NOTES:


1. EXACT SHORT CIRCUIT AND INTERRUPTING RATINGS OF THE PANEL AND OVER-CURRENT PROTECTIVE DEVICES TO BE DETERMINED BY STUDY TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. PROVIDE "HACR" MOTOR RATED CIRCUIT BREAKERS FOR ALL CIRCUITS SERVING MOTOR LOADS
3. ELECTRICAL CONTRACTOR SHALL PROVIDE A MULTI-POLE 20A CIRCUIT BREAKER AS INDICATED TO SERVE NEW FURNITURE PARTITION LOAD OR MULTI-WIRE CIRCUITS SERVING FLOOR BOXES. REFER TO NOTE ON POWER & SYSTEMS FLOOR PLAN FOR ADDITIONAL INFORMATION REGARDING THE NEED FOR MULTI-POLE CIRCUIT BREAKERS ON MULTI-WIRE BRANCH CIRCUITS FOR COMPLIANCE WITH NEC ARTICLE 210.4(B).

NOTES:

1. ALL EXISTING LOADS INDICATED IN THE ABOVE PANEL SCHEDULE ARE ESTIMATED BASED UPON THE LIMITED ACCURATE AS-BUILT INFORMATION, PANEL SCHEDULES AND CIRCUIT NUMBERS AT DEVICES.
2. ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING OF ALL EXISTING BRANCH CIRCUITS PRIOR TO START OF CONSTRUCTION TO VERIFY EXISTING LOAD SERVED. ELECTRICAL CONTRACTOR SHALL UPDATE THE PANEL TYPED CIRCUIT DIRECTORY BASED ON THE CIRCUIT TRACING. REFLECT CIRCUIT DIRECTORY CHANGES ON AS-BUILT RECORD DRAWINGS. NOTIFY ENGINEER IF EXISTING BRANCH CIRCUITS NOTED TO BE RE-USED, AND ANTICIPATED TO BE MADE AVAILABLE BY DEMOLITION WORK, ARE FOUND TO SERVE EXISTING LOADS THAT ARE TO REMAIN AS A RESULT OF THE CIRCUIT TRACING.
3. FOR SELECT EXISTING LOADS, THE POLE POSITION INDICATED MAY NOT REPRESENT THE ACTUAL POLE POSITION USED BUT RATHER THAT AN EXISTING BRANCH CIRCUIT IS TO BE REUSED. SEE NOTE-2.
4. ELECTRICAL CONTRACTOR SHALL REMOVE EXISTING SINGLE POLE CIRCUIT BREAKER AT THIS POSITION AND PROVIDE AND INSTALL A NEW MULTI-POLE CIRCUIT BREAKER, SIZE AS INDICATED, TO SERVE NEW SUB-PANEL NOTED. NEW CIRCUIT BREAKER TO BE U.L. LISTED FOR USE IN THE EXISTING PANEL, BE MANUFACTURED BY THE SAME MANUFACTURE AS THE EXISTING PANEL, (GENERAL ELECTRIC) AND SHALL HAVE AN A.I.C. RATING EQUAL TO THAT OF THE EXISTING CIRCUIT BREAKERS IN THE PANEL AND THE PANEL SHORT-CIRCUIT RATING.
5. ELECTRICAL CONTRACTOR SHALL REMOVE EXISTING SINGLE POLE CIRCUIT BREAKER AT THIS POSITION (EITHER EXISTING SPARE OR SPARE MADE AVAILABLE BY DEMOLITION WORK) AND PROVIDE AND INSTALL A NEW MULTI-POLE 20A CIRCUIT BREAKER AS INDICATED TO SERVE NEW FURNITURE PARTITION LOAD OR MULTI-WIRE CIRCUITS SERVING FLOOR BOXES. REFER TO NOTE ON POWER & SYSTEMS FLOOR PLAN FOR ADDITIONAL INFORMATION REGARDING THE NEED FOR MULTI-POLE CIRCUIT BREAKERS ON MULTI-WIRE BRANCH CIRCUITS FOR COMPLIANCE WITH NEC ARTICLE 210.4(B). SEE NOTE-2 ABOVE FOR CIRCUIT TRACING REQUIRED TO BE PERFORMED PRIOR TO START OF CONSTRUCTION TO CONFIRM AVAILABILITY FOR RE-USE OF EXISTING CIRCUIT POSITION BASED ON DEMOLITION WORK.



YELLOW BACKGROUND
WITH BLACK TEXT.



WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

31 Inches
2.9 cal/cm ^ 2

Flash Hazard Boundary
Flash Hazrad at 18 Inches

Category 1

Arc-rated FR Shirt & Pants

480 VAC
00
42 Inches
12 Inches
1 Inches

Shock Hazard when cover is removed
Glove Class
Limited Approach
Restricted Approach
Prohibited Approach

LOCATION:


"DP-A"

Warning: Changes in equipment settings or system configuration will
invalidate the calculated values and PPE requirements.

TYPICAL CATEGORY 1 AND 2 ARC
FLASH HAZARD LABEL DETAIL

NO SCALE

YELLOW BACKGROUND
WITH BLACK TEXT.



WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

123 Inches
28 cal/cm ^ 2

Flash Hazard Boundary
Flash Hazrad at 18 Inches

Category 4

Arc-rated FR Shirt & Pants & Arc Flash
Suit

480 VAC
00
42 Inches
12 Inches
1 Inches

Shock Hazard when cover is removed
Glove Class
Limited Approach
Restricted Approach
Prohibited Approach

LOCATION:


"MCC-1"

Warning: Changes in equipment settings or system configuration will
invalidate the calculated values and PPE requirements.

TYPICAL CATEGORY 3 AND 4 ARC
FLASH HAZARD LABEL DETAIL

NO SCALE

RED BACKGROUND WITH
WHITE TEXT.



DANGER

NO SAFE PPE EXISTS ENERGIZED WORK PROHIBITED

183 Inches
54 cal/cm ^ 2

Flash Hazard Boundary
Flash Hazrad at 18 Inches

Dangerous!

No FR Category Found

480 VAC
00
42 Inches
12 Inches
1 Inches

Shock Hazard when cover is removed
Glove Class
Limited Approach
Restricted Approach
Prohibited Approach

LOCATION:

MAIN DISTRIBUTION PANEL "MDP"

Warning: Changes in equipment settings or system configuration will
invalidate the calculated values and PPE requirements.

TYPICAL CATEGORY "DANGEROUS"
ARC FLASH HAZARD LABEL DETAIL

NO SCALE

NOTE: REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS REGARDING SHORT-CIRCUIT STUDY & ARC-FLASH HAZARD ANALYSIS TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THE PROJECT SCOPE OF WORK. LABEL SHOWN IS INTENDED TO CONVEY THE GENERAL CONFIGURATION OF THE ARC-FLASH WARNING LABEL. ALL LABELS SHALL COMPLY WITH THE REQUIREMENTS OF N.E.C. 110.16 AND NFPA 70E.

PRELIMINARY SHORT-CIRCUIT FAULT CURRENT STUDY AND ARC FLASH EVALUATION SCHEDULE														
BUS NAME	BUS KV	PROTECTIVE DEVICE NAME	BUS BOLTED FAULT (kA)	BUS ARCING FAULT (kA)	PROT BOLTED FAULT (kA)	PROT ARCING FAULT (kA)	TRIP / DELAY TIME (sec)	BREAKER OPENING TIME (sec)	EQUIP TYPE	GAP (mm)	ARC FLASH BOUNDARY (in)	WORKING DISTANCE (in)	INCIDENT ENERGY (cal/cm2)	REQUIRED PROTECTIVE FR CLOTHING CATEGORY
Existing Bus Duct 3-L-1B Riser	0.480	BRKR_3-L-1B #7	38.06	20.54	38.06	20.54	0.000	2.000	PNL	25	334.50	18.00	144.55	SEE NOTE - 1
Existing Distribution Panel "MPDP-4-6"	0.480	Bus_Plug_4-6	34.44	18.86	34.44	18.86	0.000	2.000	PNL	25	316.20	18.00	131.80	SEE NOTE - 1
Existing 45kVA Transformer Secondary	0.480	MPDP-4-6_SWB	2.04	1.42	2.04	1.42	0.000	2.000	PNL	25	57.68	18.00	8.08	SEE NOTE - 1
Existing Receptacle Panel "RP-4-6 (COMP)"	0.208	RP-4-6(Cmp)_Main	1.99	1.40	1.99	1.40	0.000	2.000	PNL	25	56.99	18.00	7.92	SEE NOTE - 1
New Receptacle Panel "RP-4-6CB"	0.208	RP-4-6(Cmp)_CB	1.90	1.35	1.90	1.35	0.000	2.000	PNL	25	55.76	18.00	7.64	SEE NOTE - 1
All short-circuit and Arc Flash analysis performed using SKM Systems Analysis, Inc. Power Tools for Windows software v8.0. Short-circuit fault current values are based upon an arbitrary maximum available primary fault current (750 MVA three phase and 250 MVA line to ground, both with an X/R of 15), with the existing 2,666kVA Substation "3-L-1B" transformer with a transformer impedance of 6.17% as the basis for this preliminary short-circuit current study and arc flash hazard analysis. Note that the transformer size is based on the Owner's record drawing information; however, the exact transformer size and impedance should be verified in the field by the Contractor prior to performing the final study. The preliminary study results documented in the above schedule are provided as support for the minimum AIC ratings indicated for the new distribution equipment, and is intended to provide an example to the Electrical Contractor for Arc Flash Hazard labeling requirements. This preliminary study is based on the primary fault current contribution noted above, and does not include any motor contribution. The final study to be performed by this Electrical Contractor shall utilize the actual available primary fault current contribution from the DTE Energy service, as well as the actual transformer impedance values and contributions for ALL MOTORS installed on the project. The final study and arc flash hazard analysis shall also be based upon the actual distribution equipment and over-current protective devices installed in the field on the project, and the actual installed feeder lengths, wiring types (i.e. THHN or THWN) and conduit type (i.e. metallic or non-metallic). The use of generic over-current protective devices or arbitrary feeder lengths in the study shall result in the study being REJECTED and the Electrical Contractor being forced to revise the study to reflect the actual installed conditions prior to final acceptance of the study and the required verification of equipment ratings. THE SHORT-CIRCUIT PORTION OF THE STUDY SHALL BE PERFORMED PRIOR TO ORDERING OF ANY EQUIPMENT TO VERIFY THAT THE AIC RATING OF THE EQUIPMENT ORDERED IS SUFFICIENT TO ACCOMMODATE THE MAXIMUM AVAILABLE FAULT CURRENT THAT WILL BE SEEN AT THE DISTRIBUTION EQUIPMENT. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS AND INFORMATION. The preliminary study looked at two scenarios: one using the actual clearing time expected for the specified circuit breakers used in the new distribution equipment; and a second scenario looks at a worst case approach to the Trip / Delay Time and the Breaker Opening Time, and the incident energy in this scenario has been calculated at the maximum 2 seconds discussed in the IEEE1584 Standard. The actual incident energy is expected to be lower once the final analysis is performed by the Electrical Contractor as part of their scope of work; however consideration should be given to the potential for circuit breaker mal-function or delay in operation of the device when determining the labeling requirements, and serious consideration given to using a longer clearing time in the study to ensure that maintenance workers are provided with the necessary protection in the event that the breaker or fuse takes longer to clear than would normally be expected. REFER TO SPECIFICATIONS FOR EXACT REQUIREMENTS ASSOCIATED WITH THE STUDY TO BE PERFORMED BY THE ELECTRICAL CONTRACTOR AS PART OF THEIR SCOPE OF WORK. NOTE THAT IN ADDITION TO THE SHORT-CIRCUIT CURRENT STUDY AND ARC FLASH HAZARD ANALYSIS DISCUSSED ABOVE, THE SPECIFICATION ALSO REQUIRES THE ELECTRICAL CONTRACTOR TO INCLUDE A TIME-CURRENT COORDINATION STUDY AS PART OF THE SCOPE OF WORK TO ENSURE THAT ALL CIRCUIT BREAKER TRIP SETTINGS AND FUSE SELECTIONS ARE COORDINATED TO AVOID A MIS-COORDINATION BETWEEN OVER-CURRENT PROTECTIVE DEVICES. NOTE THAT THE FINAL STUDY SHALL INCLUDE ALL DISTRIBUTION, LIGHTING, POWER AND RECEPTACLE PANELS AND MOTORS IN THE BUILDING AND THAT ARE CONNECTED TO THE ELECTRIC SERVICE, AND ASSOCIATED WITH THE NEW DISTRIBUTION EQUIPMENT, AS INDICATED ON THE NEW WORK ONE-LINE DIAGRAM ON SHEET E300, BUT THE STUDY DOES NOT HAVE TO INCLUDE THE ENTIRE BUILDINGS DISTRIBUTION SYSTEM, ONLY THOSE PARTS THAT ARE ASSOCIATED WITH THE NEW DISTRIBUTION EQUIPMENT. THE ABOVE PRELIMINARY STUDY ONLY LOOKED AT THE MAJOR PIECES OF DISTRIBUTION EQUIPMENT CLOSEST TO THE SERVICE ENTRANCE. THE ABOVE LIST OF EQUIPMENT IS NOT INTENDED TO BE THE TOTAL NUMBER OF PANELS OR EQUIPMENT TO BE INCLUDED IN THE STUDY.														

SHORT-CIRCUIT AND ARC FLASH HAZARD EVALUATION SCHEDULE NOTE:

1. PER NFPA 70E, THE EMPLOYER / BUILDING OWNER SHALL BE RESPONSIBLE FOR DEVELOPING AN OVERALL SAFETY PROGRAM THAT DIRECTS ACTIVITY APPROPRIATE TO THE RISK ASSOCIATED WITH THE ELECTRICAL HAZARD. THE DETERMINATION OF THE PROPER PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR THE ASSOCIATED RISK AT EACH PIECE OF ELECTRICAL DISTRIBUTION EQUIPMENT SHALL BE DETERMINED BASED ON THE CALCULATED INCIDENT ENERGY INDICATED IN THE SCHEDULE AND THE ASSOCIATED PPE LEVELS INDICATED IN THE NFPA 70E DOCUMENT. THE PPE LEVELS ARE NO LONGER PROVIDED AS PART OF THE ARC FLASH HAZARD EVALUATION AT THIS PRELIMINARY STAGE OF THE PROJECT DUE TO THE NEED FOR PERFORMING A DETAILED RISK ASSESSMENT AS PART OF THE OVERALL SAFETY PROGRAM THAT IS TO BE DEVELOPED BY THE BUILDING OWNER / EMPLOYER.



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TAC Project No. 25-009

ISSUED FOR BIDS

04/25/2025

DEPT. OF HEALTH & HUMAN
SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT


FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

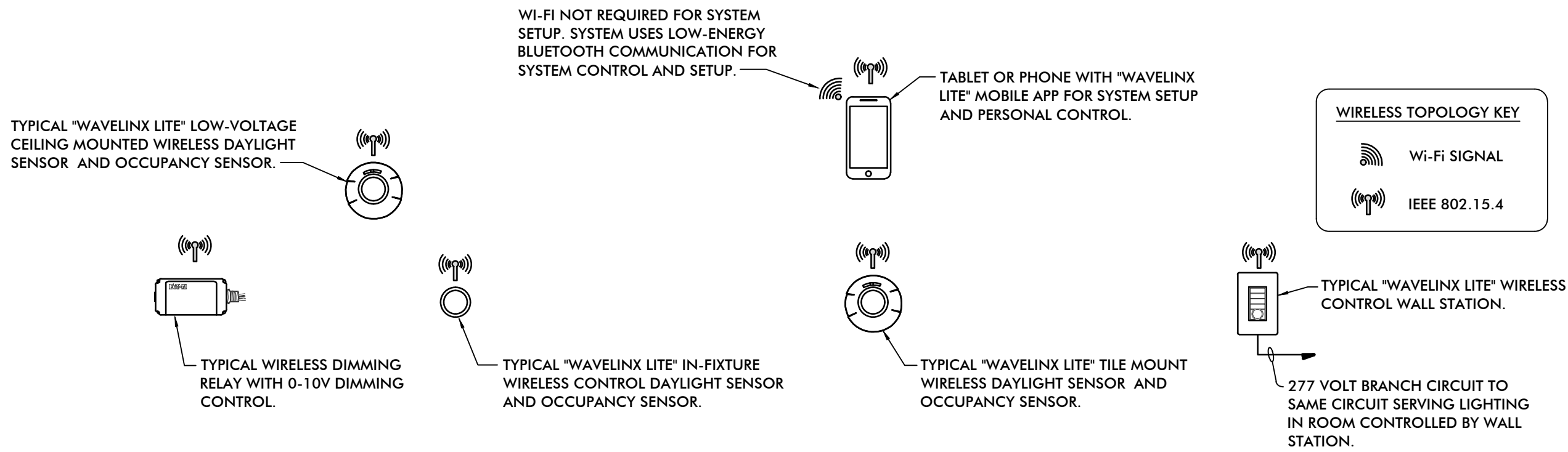
STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR





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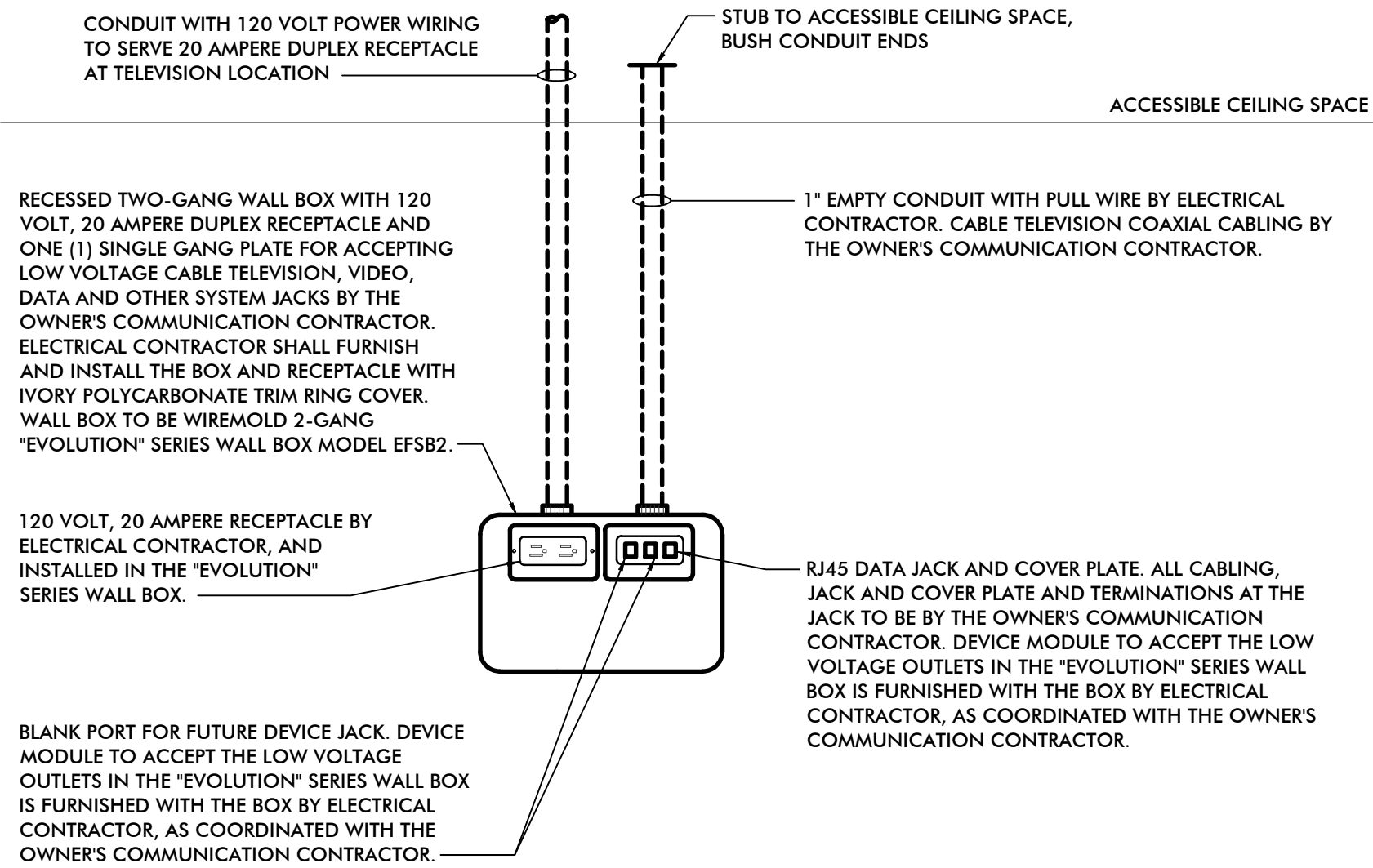
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"WAVELINX LITE" WIRELESS LIGHTING CONTROL SYSTEM - GENERAL SYSTEM TOPOLOGY DIAGRAM

NO SCALE

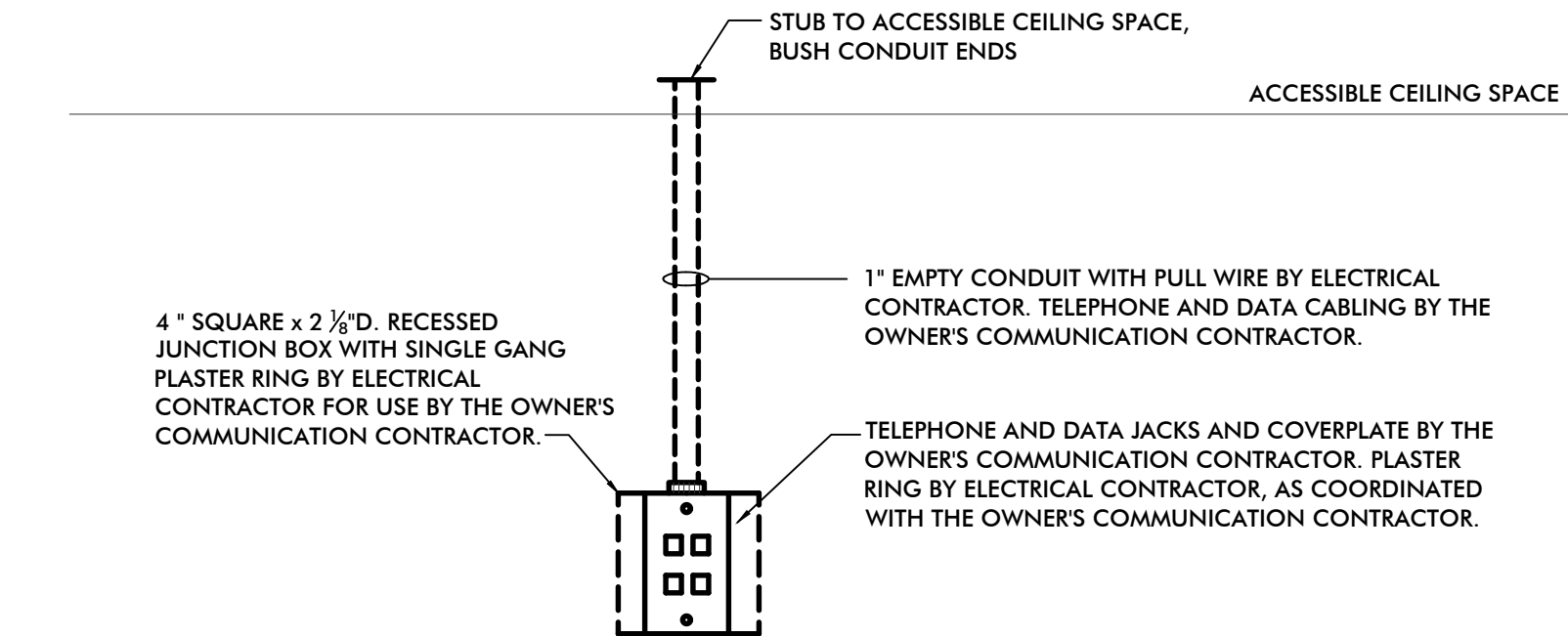
WIRING DIAGRAM SHOWN IS BASED ON A WIRELESS LIGHTING CONTROL SYSTEM MANUFACTURED BY COOPER, THE COOPER "WAVELINX LITE" SYSTEM. SYSTEMS FROM "EQUAL" MANUFACTURES SHALL BE THE SENSOR SWITCH "nLIGHTAIR" SYSTEM OR THE CURRENT LIGHTING "NX WIRELESS" SYSTEM.



TYPICAL CABLE TELEVISION OUTLET DETAIL

NO SCALE

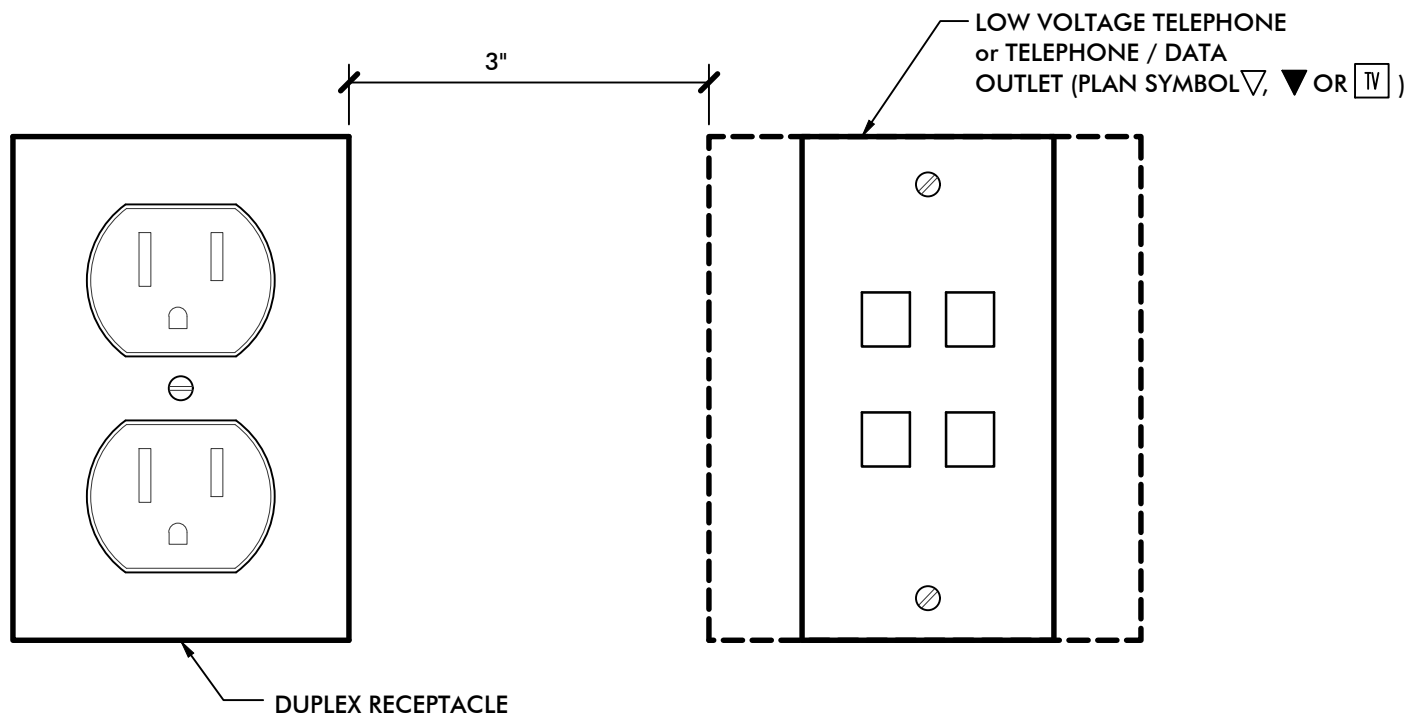
(PLAN SYMBOL = [TV])



TYPICAL TELEPHONE / DATA OUTLET DETAIL

NO SCALE

(PLAN SYMBOL = [V])



TYPICAL OUTLET SPACING DETAIL

NO SCALE

WIRELESS LIGHTING CONTROL SYSTEM GENERAL NOTES:

GENERAL REQUIREMENTS

- The general system topology diagram is diagrammatic only, and intended to convey the general configuration of the lighting control system components used on the project and the method in which the system is interconnected, programmed and operates. Refer to the manufacturer's approved shop / installation drawings for exact system installation and locations where interconnecting wiring may be required. Refer to wireless lighting control system schedule on this sheet for additional information.
- Electrical contractor shall provide and install 1" conduit sleeves between fire rated walls to accommodate routing of the low voltage cabling that may be required in order to support the system installation. The intent of the project is that the system is completely wireless; however, the lighting control system manufacturer shall be responsible for directing the contractor where interconnecting wiring and cabling may be required. Provide fire proofing at all penetrations of fire rated walls, floors and ceilings to maintain the fire rating of the surface penetrated.

COORDINATION REQUIREMENTS

- Prewire meeting: conducted on-site or during design meeting with lighting control system manufacturers or designated representative prior to commencing work as part of the manufacturer's standard practice and startup services. Manufacturer to review with the installer:
 - Installation of lighting area controller and supervisory controller and locations
 - Lighting control network wiring
 - Network IT requirements
 - Low voltage wiring requirements
 - Lighting control integration requirements
 - Lighting control system integration network wiring and connectivity
 - Installer responsibilities
 - Startup and training schedule and actions

CLOSEOUT SUBMITTALS

- Sustainable design closeout documentation.
- Wireless lighting control system manufacturer to provide an operation and maintenance manual that details the start-up procedure being performed including a process to follow, details on tests performed and an area that documents any test results.

APPROVALS

- 10-working days prior approval before bid date is required for alternate proposals.
- Complete catalog data, specifications and technical information on alternate equipment must be furnished to the architect and owner at least 30 business days in advance of the submission of approved construction documents.
- For wired alternatives, manufacturer shall provide wiring diagrams and architectural details of interconnecting wiring for power signal and control. Contractor shall provide a labor cost (add or deduction) to install the wired alternative to the lighting control system.

COMMISSIONING

- Provide factory-certified field service engineer to a site visit to ensure proper system installation and operation.
- Qualifications for factory-certified field service engineer:
 - Certified by the equipment manufacturer on the system installed.
- Conclude commissioning with or make a follow-up visit to:
 - Verify system control operation area by area.
 - Obtain sign-off on system functions.
 - User to be trained on system operation.

MAINTENANCE MATERIAL SUBMITTALS

- The manufacturer shall make available to the End-User a method of ordering new equipment for expansions, replacements and spare parts through established distributor channels.
- The manufacturer shall make new replacement parts available for minimum of 5 years from date of manufacture.
- The manufacturer shall make directly available to the owner additional software apps that may be desired for a minimum of 10 years from the system's date of purchase.

LIGHTING CONTROL APPLICATIONS

- Minimum lighting control performance required, unless local energy code is more stringent.
- Occupancy/vacancy requirements - provide an occupancy/vacancy sensor with manual on/ automatic off or automatic on/ automatic off functionality in all spaces. Manual on/vacancy sensors should be used for any enclosed space with a manual on switch that does not require hands free operation. Spaces with multiple occupants or where line of sight might be obscured ceiling or corner mount sensors and manual wallstations would be required. Automatic on of lighting via occupancy sensor cannot exceed 50% of lighting. Systems that do that allow the user to select occupancy or vacancy mode shall not be acceptable.

- Daylight zones - primary sidelit or toplit areas within an enclosed space shall be controlled separately and automatically by individual integrated daylight sensors. Adjustments to the daylight zones must be provided by a simple to use, intuitive mobile application.
- Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to dim electric light to the lowest light level and off.
- Provide the ability to adjust the high-end and low-end trim of the dimmers to ensure the lighting automatically provides energy saving even when daylighting calls for full illumination.
- Provide the ability for the dimmers and the relays to function separately. Systems where the 0-10v dimmers and relays are tied together reduce design capabilities and shall not be acceptable.

CYBERSECURITY

- The network connectable products within the Wireless Lighting Control system must be UL2900-1 listed to the Standard for Software Cybersecurity for Network-Connectable Products. Wireless Lighting Control Systems that fail to meet this requirement will not be accepted.

INSTALLATION

- The control system shall be installed and fully wired as shown on the plans by the installing contractor. The contractor shall complete all electrical connections to all control circuits.
- Install the work of this Section in accordance with manufacturer's printed instructions unless otherwise indicated.
- Provide written or computer-generated documentation on the commissioning of the system including room by room description including:
 - Sensor parameters, time delays, sensitivities and daylighting setpoints.
 - Sequence of operation, (e.g. manual ON, Auto OFF, Etc.).
 - Load parameters (e.g. blink warning, etc.).

PRODUCT SUPPORT AND SERVICE

- Factory telephone support shall be available at no cost to the owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment.

FACTORY COMMISSIONING

- Upon completion of the installation, the system shall be commissioned by the manufacturer's factory authorized representative who will verify a complete fully functional system.
- The electrical contractor shall provide both the manufacturer and the electrical engineer with twenty-one (21) working days written notice of the system startup and adjustment date.
- Upon completion of the system commissioning the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.
- Qualifications for factory certified field service engineer:
 - Certified by the equipment manufacturer on the system installed.
- Make first visit upon completion of installation of WaveLinx Connected Lighting system:
 - Verify locations of Wireless Area Controllers
 - Verify implementation of Construction Group process
- Identify connected devices and program using WaveLinx Mobile and Automatic Code Commissioning.
- Verify that system operation control based on defined Sequence of Operations (SOO).
- Obtain sign-off on system functions.

CLOSEOUT ACTIVITIES

- Training Visit
- Lighting control system manufacturer to provide one (1) day additional on-site system training to site personnel. This shall be a part of the second visit by field service to the site. A separate third visit will require an additional charge.
- During this visit, the manufacturer's Field Service Engineer will perform tasks, at the request of the facility representative or Commissioning Agent, such as to demonstrate wall control functions, explain or describe occupancy and/or daylight sensor functionality.



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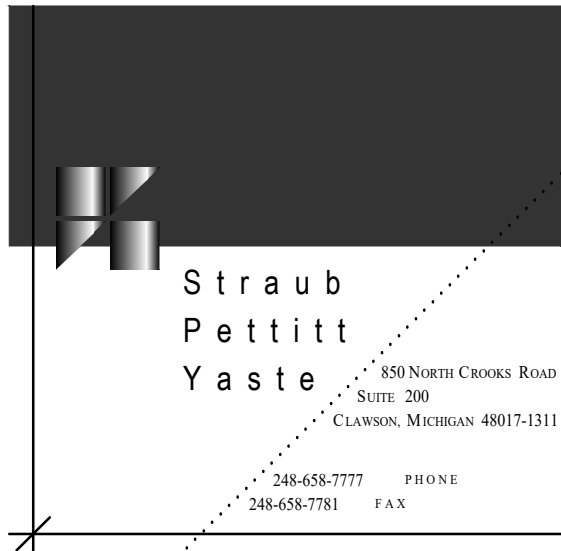
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MISCELLANEOUS WIRING
DIAGRAMS & DETAILS

E400

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WIRELESS "WAVELINX LITE" LIGHTING CONTROL SYSTEM SCHEDULE																		
CIRCUIT TAG	ROOM CONTROLLER TAG	SWITCHPACK CONTROL FUNCTION (COOPER RSP-L-010-347)	BRANCH CIRCUIT No. (See Note - 3)	LIGHTING LOAD DESCRIPTION	CONTROL STATION - SEE NOTE - 4			ASTRO TIME CLOCK CONTROL		OCCUPANCY SENSOR CONTROL / OUTDOOR CONTROL MODULE					DAYLIGHT HARVESTING CONTROL			REMARKS
					STATION No.	ZONE No.	DIMMER	YES / NO	ON / OFF SET POINT	"ON" CONTROL	"OFF" CONTROL	TIME DELAY	SENSOR No.	NODE No.	"ON" SETPOINT	"OFF" SETPOINT	SENSOR No.	
LVLC-001	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	COMPUTER LAB #1 LIGHTS	"CS1"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO1" thru "DO16"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-002	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	COMPUTER LAB #2 LIGHTS	"CS2"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO17" thru "DO32"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-003	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	LOUNGE LIGHTS	"CS3"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO33" thru "DO38"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-004	-	LOW-VOLTAGE WIRELESS OCCUPANCY SENSOR	SEE FLOOR PLAN	CORRIDOR LIGHTS (EXISTING FLUORESCENT)	"CS4"	1	NO	NO	-	AUTO-ON (FULL ON)	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"OS1" thru "OS3"	-	-	-	-	
LVLC-005	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	FLEX ROOM #2 LIGHTS	"CS5"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO39" thru "DO50"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-006	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	FLEX ROOM #1 LIGHTS	"CS6"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO51" thru "DO62"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-007	-	LOW-VOLTAGE WIRELESS OCCUPANCY SENSOR	SEE FLOOR PLAN	CORRIDOR LIGHTS (EXISTING & RELOCATED FLUORESCENT)	"CS7"	1	NO	NO	-	AUTO-ON (FULL ON)	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"OS4", "OS5"	-	-	-	-	
LVLC-008	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	SEMINAR CLASSROOM "B" LIGHTS	"CS8"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO63" thru "DO79"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-009	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	SEMINAR CLASSROOM "A" LIGHTS	"CS9a", "CS9b"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO80" thru "DO116"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-010	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	NORTH OFFICE AREA CORRIDOR LIGHTS	"CS10"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO117" thru "DO121"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-011	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	OPEN OFFICE AREA LIGHTS	"CS11"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO122" thru "DO131"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
LVLC-012	-	IN-FIXTURE SENSOR / RADIO WAVELINX LITE WLS	SEE FLOOR PLAN	CONFERENCE ROOM LIGHTS	"CS12"	1	YES	NO	-	AUTO-ON AT 50% DIMMED LEVEL	AUTO-OFF (SWITCHED OFF)	20-MINUTES	"DO132" thru "DO135"	-	-	-	-	EXACT DIM LEVEL AND SCENE PROGRAMMING TO BE VERIFIED WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.

- NOTES:**
1.

THE LIGHTING CONTROL SYSTEM MANUFACTURE SHALL BE RESPONSIBLE FOR THE SELECTION OF THE EXACT SWITCHPACK AND ADDITIONAL COMPONENTS REQUIRED FOR ALL "SWITCHPACKS" / RELAYS INDICATED IN THE ABOVE SCHEDULE. THE RELAY TYPE INDICATED IN THE SCHEDULE ABOVE PROVIDES ONLY THE GENERIC GENERAL TYPE OF RELAY, AND IS NOT INTENDED TO CONVEY THE EXACT SPECIFIC TYPE OR MODEL NUMBER REQUIRED.
2.

REFER TO WIRELESS LIGHTING CONTROL SYSTEM - GENERAL SYSTEM TOPOLOGY DIAGRAM ON SHEET E400 FOR ADDITIONAL INFORMATION REGARDING THE GENERAL CONFIGURATION OF THE SYSTEM AND THE ASSOCIATED COMPONENTS THAT COMPRISE THE SYSTEM. THE SYSTEM MANUFACTURE SHALL BE RESPONSIBLE FOR PREPARING SYSTEM WIRING DIAGRAMS SPECIFIC TO THIS PROJECT FOR THE ELECTRICAL CONTRACTOR'S USE FOR THE SYSTEM INSTALLATION. THE NOTED WIRING DIAGRAM SHALL BE SUBMITTED DURING THE SHOP DRAWING PHASE OF THE PROJECT FOR REVIEW. THE MANUFACTURES GENERIC WIRING DIAGRAMS ARE NOT INCLUDED SINCE THESE DIAGRAMS DO NOT PROVIDE ANY CLARIFICATION OF HOW THIS SPECIFIC SYSTEM WILL BE INSTALLED. THE BIDDING CONTRACTOR SHALL CONTACT THE LOCAL MANUFACTURES REPRESENTATIVES TO GAIN A COMPLETE UNDERSTANDING OF HOW THE SYSTEM OPERATES AND HOW THE SYSTEM IS INSTALLED PRIOR TO SUBMITTING HIS/HER BID.
3.

CIRCUIT NUMBER DOES NOT INDICATE ACTUAL POLE POSITION USED BUT RATHER LOADS INTENDED TO BE GROUPED TOGETHER. ELECTRICAL CONTRACTOR SHALL CIRCUIT LOADS INTENDED TO BE GROUPED TOGETHER TO AN EXISTING SPARE 20A-1P CIRCUIT BREAKER MADE AVAILABLE BY DEMOLITION WORK IN THE EXISTING PANEL INDICATED. ELECTRICAL CONTRACTOR SHALL PERFORM CIRCUIT TRACING PRIOR TO START OF CONSTRUCTION TO IDENTIFY THE EXACT PANEL AND BRANCH CIRCUIT NUMBER MADE AVAILABLE BY THE DEMOLITION WORK AND USED TO SERVE THE NEW LOADS INDICATED. THE ELECTRICAL CONTRACTOR SHALL REFLECT THE EXISTING BRANCH CIRCUIT NUMBER ON THE AS-BUILT RECORD DRAWINGS, AND SHALL UPDATE THE PANEL TYPED CIRCUIT DIRECTORY TO REFLECT THE NEW LOAD SERVED.
4.

REFER TO WIRELESS LIGHTING CONTROL STATION SCHEDULE ON THIS SHEET FOR PROGRAMMING AND ASSIGNING OF THE LIGHTING ZONES INDICATED TO THE RESPECTIVE CONTROL STATION SCENES AND/OR CONTROL BUTTONS.
5.

REFER TO LIGHTING FLOOR PLANS FOR BRANCH CIRCUIT SERVING LIGHTING FIXTURES WITH IN-FIXTURE SENSORS AND WIRELESS RADIO. CIRCUIT NUMBER INDICATED IS THE BRANCH CIRCUIT SHOWN ON THE FLOOR PLANS TO SERVE THE FIXTURES WITH IN-FIXTURE SENSORS, BUT WILL ALSO SERVE THE ROOM CONTROLLER POWER FOR ALTERNATE MANUFACTURES LIGHTING CONTROL SYSTEMS WHICH REQUIRE A ROOM CONTROLLER TO BE PART OF THE WIRELESS CONTROL SYSTEM. THE BASIS OF DESIGN SYSTEM DOESNT REQUIRE A ROOM CONTROLLER, BUT THIS DETAIL IS NOTED IN THE EVENT ONE OF THE ALTERNATE MANUFACTURE SYSTEMS IS UTILIZED.

WIRELESS LIGHTING CONTROL STATION SCHEDULE												
STATION No.	CONTROL STATION MODEL NUMBER - SEE NOTES 1 & 2 (COOPER WaveLinx Lite SERIES)	SCENE 1		SCENE 2		SCENE 3		SCENE 4		RAISE / LOWER BUTTON		REMARKS
		ZONES	DIM STATE	ZONES	DIM STATE	ZONES	DIM STATE	ZONES	DIM STATE	YES/NO	ZONES	
CS1	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS2	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS3	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS4	WWL3-X	1	ON	1	OFF	-	-	-	-	NO	-	
CS5	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS6	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS7	WWL3-X	1	ON	1	OFF	-	-	-	-	NO	-	
CS8	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS9a, CS9b	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS10	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS11	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.
CS12	WWL3-RL-X	1	"LIGHTS - 50%" 50%	1	"LIGHTS - 100%" 100%	-	-	-	-	YES	1	VERIFY EXACT PROGRAMMING OF SCENES WITH THE OWNERS CONSTRUCTION REPRESENTATIVE.

- NOTES:**
1.

CONTROL STATION FINISH TO BE SELECTED BY ARCHITECT. FINISH OPTION IS DENOTED BY THE "-X" IN THE SCHEDULE ABOVE.
2.

PROVIDE CUSTOM ENGRAVING OF PUSHBUTTONS TO REFLECT SCENE DESCRIPTION INDICATED IN THE SCHEDULE ABOVE.

ISSUED FOR BIDS

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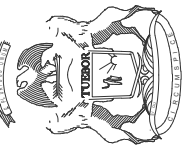
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ANNEX TRAINING SUITE
BUILD-OUT

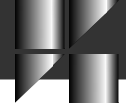
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CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
DESIGN AND CONSTRUCTION DIVISION
ADAM P. LACH, RA, DIRECTOR





Straub
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850 NORTH CROSS ROAD
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Electrical Specifications

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
- Copper building wire rated 600 V or less.
 - Aluminum building wire rated 600 V or less.
 - Metal-clad cable, Type MC, rated 600 V or less.
 - Connectors, splices, and terminations rated 600 V and less.

1.2 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Alpha Wire Company.
 - Belden Inc.
 - Cerro Wire LLC.
 - General Cable Technologies Corporation.
 - Service Wire Co.
 - Southwire Company.

- C. Standards:
- Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - RoHS compliant.
- D. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- E. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.
- F. Conductor Insulation:
- Type THHN and Type THWN-2: Comply with UL 83.
 - Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.
 - Type XHHW-2: Comply with UL 44.

2.2 ALUMINUM BUILDING WIRE

- A. Description: Flexible, insulated and uninsulated, drawn aluminum current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Alpha Wire Company.
 - Belden Inc.
 - Cerro Wire LLC.
 - General Cable Technologies Corporation.
 - Okonite Company (The).
 - Southwire Company.

2.3 METAL-CLAD CABLE, TYPE MC

- A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Alpha Wire Company.
 - Belden Inc.
 - General Cable Technologies Corporation.
 - Okonite Company (The).
 - Service Wire Co.
 - Southwire Company.

- C. Standards:
- Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
 - Comply with UL 1569.
 - RoHS compliant.
- D. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."
- E. Armor: Aluminum, interlocked.
- F. Jacket: PVC applied over armor.

2.4 CONNECTORS AND SPLICES

- A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- 3M Electrical Products.
 - AFC Cable Systems; a part of Aikore International.
 - Hubbell Power Systems, Inc.
 - Ideal Industries, Inc.
 - ILSCO.
 - NSI Industries LLC.

- O-Z/Gedney; a brand of Emerson Industrial Automation.

- Service Wire Co.

- C. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.
- D. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.
- Material: Copper.
 - Type: One hole with standard barrels.
 - Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

- A. Feeders: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger, unless noted otherwise on the drawings.
- B. Branch Circuits: Copper. Solid for No. 12 AWG and smaller; stranded for No. 10 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

- A. Service Entrance: Type XHHW-2, single conductors in raceway.
- B. Exposed Feeders: Type THHN/THWN-2, single conductors in raceway.
- C. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- D. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.
- E. Exposed Branch Circuits, Including in Crawlspace: Type THHN/THWN-2, single conductors in raceway.
- F. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN/THWN-2, single conductors in raceway or Metal-clad cable, Type MC. For Branch Circuits serving Patient Care Areas, Hospital Grade Armored Cable, Type AC shall be used in lieu of Type MC.
- G. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type XHHW-2, single conductors in raceway.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

- A. Conceal cables in finished walls, ceilings, and floors unless otherwise indicated.
- B. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.
- C. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
- D. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
- E. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
- F. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

- A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unsplined conductors.
- Use oxide inhibitor in each splice, termination, and tap for aluminum conductors.
- C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches (150 mm) of slack.

3.5 IDENTIFICATION

- A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."
- B. Identify each spare conductor at each end with identify number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Coordinate installation and requirements for sleeves with Architectural specifications.

3.7 FIRESTOPPING

- A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes grounding and bonding systems and equipment.

1.2 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article.
- B. Qualification Data: For testing agency and testing agency's field supervisor.
- C. Field quality-control reports.

1.3 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.
- Plans showing as-built, dimensioned locations of grounding features specified in "Field Quality Control" Article, including the following:
 - Test wells.
 - Ground rods.
 - Instructions for periodic testing and inspection of grounding features at test wells based on NFPA 70B.
 - Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - Include recommended testing intervals.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Burndy; Part of Hubbell Electrical Systems.
 - ERICO International Corporation.
 - Galvan Industries, Inc.; Electrical Products Division, LLC.
 - Harger Lightning & Grounding.
 - ILSCO.
 - O-Z/Gedney; a brand of Emerson Industrial Automation.
 - SIEMENS Industry, Inc.; Energy Management Division.

2.3 CONDUCTORS

- A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.
- B. Bare Copper Conductors:
- Solid Conductors: ASTM B 3.
 - Stranded Conductors: ASTM B 8.
 - Tinned Conductors: ASTM B 33.
 - Bonding Cable: 28 kmil, 14 strands of No. 17 AWG conductor, 1/4 inch (6 mm) in diameter.
 - Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
 - Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches (41 mm) wide and 1/16 inch (1.6 mm) thick.
- C. Grounding Bus: Predrilled rectangular bars of annealed copper, 1/4 by 4 inches (6.3 by 100 mm) in cross section, with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V and shall be Lexan or PVC, impulse tested at 5000 V.

2.4 CONNECTORS

- A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.
- B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
- C. Bus-Bar Connectors: Compression type, copper or copper alloy, with two wire terminals.
- D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.
- E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.
- F. Conduit Hubs: Mechanical type, terminal with threaded hub.
- G. Ground Rod Clamps: Mechanical type, copper or copper alloy, terminal with hex head bolt.
- H. Lay-in Lug Connector: Mechanical type, copper rated for direct burial terminal with set screw.
- I. Service Pail Connectors: Mechanical type, bronze alloy terminal, in short- and long-stud lengths, capable of single and double conductor connections.
- J. Signal Reference Grid Clamp: Mechanical type, stamped-steel terminal with hex head screw.
- K. Straps: Solid copper, copper lugs. Rated for 600 A.
- L. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.
- M. Water Pipe Clamps:
- Mechanical type, two pieces with stainless-steel bolts.
 - Material: Die-cast zinc alloy.
 - Listed for direct burial.
 - U-bolt type with malleable-iron clamp and copper ground connector.

2.5 GROUNDING ELECTRODES

- A. Ground Rods: Copper-clad steel; 3/4 inch by 10 feet (19 mm by 3 m).

PART 3 - EXECUTION

3.1 APPLICATIONS

- A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.
- B. Underground Grounding Conductors: Install bare copper conductor, No. 3/0 AWG minimum.
- Bury at least 24 inches (600 mm) below grade.
- C. Grounding Bus: Install in electrical equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
- Install bus horizontally, on insulated spacers 2 inches (50 mm) minimum from wall, 6 inches (150 mm) above finished floor unless otherwise indicated.
 - Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, and down; connect to horizontal bus.
- D. Conductor Terminations and Connections:
- Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - Underground Connections: Welded connectors except at test wells and as otherwise indicated.
 - Connections to Ground Rods at Test Walls: Bolted connectors.
 - Connections to Structural Steel: Welded connectors.

3.2 GROUNDING AT THE SERVICE

- A. Equipment grounding conductors and grounding electrode conductors shall be connected to the ground bus. Install a main bonding jumper between the neutral and ground buses.

3.3 GROUNDING SEPARATELY DERIVED SYSTEMS

- A. Generator: Install grounding electrode(s) at the generator location. The electrode shall be connected to the equipment grounding conductor and to the frame of the generator.

3.4 EQUIPMENT GROUNDING

- A. Install insulated equipment grounding conductors with all feeders and branch circuits.
- B. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
- C. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
- D. Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.5 FENCE GROUNDING

- A. Fence Grounding: Install at maximum intervals of 1500 feet (450 m) except as follows:
- Fences within 100 Feet (30 m) of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of 750 feet (225 m).
 - Gates and Other Fence Openings: Ground fence on each side of opening.
 - Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of 150 feet (45 m) on each side of crossing.
 - Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.

3.6 INSTALLATION

- A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
- B. Ground Bonding Common with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
- C. Ground Rods: Drive rods until tops are 2 inches (50 mm) below finished floor or final grade unless otherwise indicated.
- Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
- D. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.
- Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.

- Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.
- E. Grounding and Bonding for Piping:
- Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes; use a bolted clamp connector or bolt a lug-type connector to a pipe flange by using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.

3.7 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Tests and Inspections:
- After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
 - Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, at ground test wells. Make tests at ground rods before any conductors are connected.
 - Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - Perform tests by fall-of-potential method according to IEEE 81.
 - Prepare dimensioned Drawings locating each test well, ground rod and ground-rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
- C. Grounding system will be considered defective if it does not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Report measured ground resistances that exceed the following values:
- Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
 - Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohm(s).
- F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Architect promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
- Steel slotted support systems.
 - Conduit and cable support devices.
 - Support for conductors in vertical conduit.
 - Structural steel for fabricated supports and restraints.
 - Mounting, anchoring, and attachment components, including powder-actuated fasteners, mechanical expansion anchors, concrete inserts, clamps, through bolts, toggle bolts, and hanger rods.
 - Fabricated metal equipment support assemblies.

1.2 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, and coordinated with each other, using input from installers of the items involved.
- B. Welding certificates.

1.3 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
- AWS D1.1/D1.1M.
 - AWS D1.2/D1.2M.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design hanger and support system.
- B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- Flame Rating: Class 1.
 - Self-extinguishing according to ASTM D 635.

2.2 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Steel Slotted Support Systems: Preformed steel channels and angles with minimum 13/32-inch- (10-mm-) diameter holes at a maximum of 8 inches (200 mm) o.c. in at least one surface.
- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Allied Tube & Conduit; a part of Aikore International.
 - B-line, an Eaton business.
 - ERICO International Corporation.
 - G-Strut.
 - Thomas & Betts Corporation; A Member of the ABB Group.
 - Unistrut; Part of Aikore International.
 - Standard: Comply with MFMA-4 factory-fabricated components for field assembly.
 - Material for Channel, Fittings, and Accessories: Galvanized steel.
 - Channel Width: Selected for applicable load criteria.
 - Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
- C. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for nonarmored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be made of malleable iron.
- D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M steel plates, shapes, and bars; black and galvanized.
- E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

- Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Hilti, Inc.
 - ITW Rammed/Red Head; Illinois Tool Works, Inc.
 - MKT Fastening, LLC.
 - Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel, for use in hardened portland cement concrete, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - B-line, an Eaton business.
 - Empire Tool and Manufacturing Co., Inc.
 - Hilti, Inc.
 - ITW Rammed/Red Head; Illinois Tool Works, Inc.
 - Concrete Inserts: Steel or malleable-iron, slotted support system units are similar to MSS Type 18 units and comply with MFMA-4 or MSS SP-58.
 - Clamps for Attachment to Steel Structural Elements: MSS SP-58 units are suitable for attached structural element.
 - Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - Toggle Bolts: Stainless-steel springhead type.
 - Hanger Rods: Threaded steel.

2.3 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 055000 "Metal Fabrications" for steel shapes and plates.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with the following standards for application and installation requirements of hangers and supports, except where requirements on Drawings or in this Section are stricter:
- NECA 1.
 - NECA 101
 - NECA 102.
 - NECA 105.
 - NECA 111.
- B. Comply with requirements in Section 078413 "Penetration Firestopping" for firestopping materials and installation for penetrations through fire-rated walls, ceilings, and assemblies.
- C. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."
- D. Maximum Support Spacing and Minimum Hanger Rod Size for Raceways: Space supports for EMT, IMC, and RMC as required by NFPA 70. Minimum rod size shall be 1/4 inch (6 mm) in diameter.
- E. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slottedsupport system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
- Secure raceways and cables to these supports with single-bolt conduit clamps.
- F. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings, and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this article.
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT may be supported by openings through structure members, according to NFPA 70.
- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb (90 kg).
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
- To Wood: Fasten with lag screws or through bolts.
 - To New Concrete: Bolt to concrete inserts.
 - To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - To Existing Concrete: Expansion anchor fasteners.
 - Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.
 - To Steel: Beam clamps (MSS SP-58, Type 19, 21, 23, 25, or 27), complying with MSS SP-69.
 - To Light Steel: Sheet metal screws.
 - Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid the need for reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Comply with installation requirements in Section 055000 "Metal Fabrications" for site-fabricated metal supports.
- B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
- C. Field Welding: Comply with AWS D1.1/D1.1M.

END OF SECTION 260529



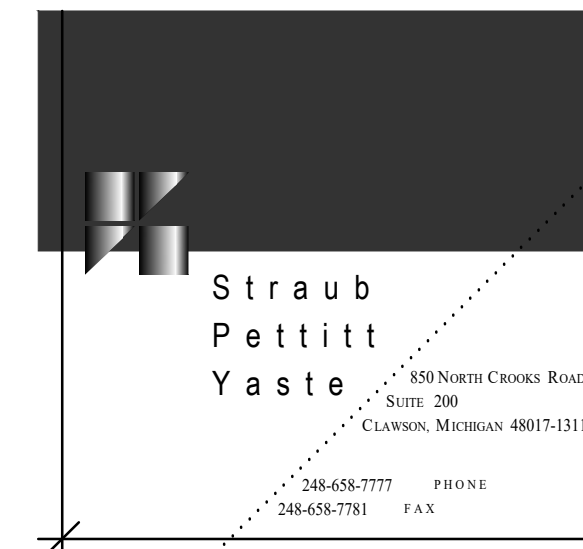
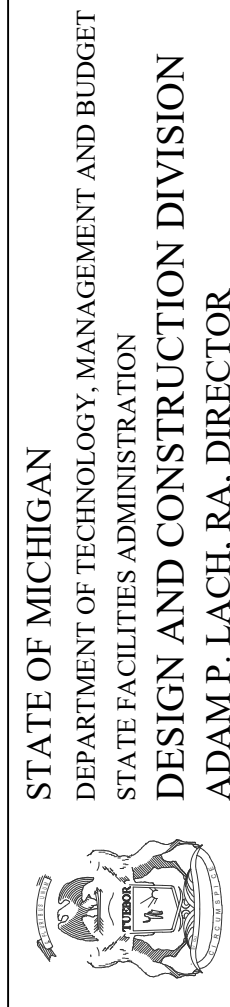
ISSUED FOR BIDS 04/25/2025

DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434



ELECTRICAL SPECIFICATIONS

E500

Electrical Specifications (Continued)

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

- PART 1 - GENERAL
- 1.1 SUMMARY
- A. Section Includes:
1. Metal conduits and fittings.
 2. Nonmetallic conduits and fittings.
 3. Metal wireways and auxiliary gutters.
 4. Surface raceways.
 5. Boxes, enclosures, and cabinets.
- B. Related Requirements:
1. Section 078413 "Penetration Firestopping" for firestopping at conduit and box entrances.
- 1.2 INFORMATIONAL SUBMITTALS
- A. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
1. Structural members in paths of conduit groups with common supports.
 2. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.
- PART 2 - PRODUCTS
- 2.1 METAL CONDUITS AND FITTINGS
- A. Metal Conduit:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Aikore International.
 - b. Allied Tube & Conduit; a part of Aikore International.
 - c. Electri-Flex Company.
 - d. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - e. Republic Conduit.
 - f. Southwire Company.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 - h. Western Tube and Conduit Corporation.
 2. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. GRC: Comply with ANSI C80.1 and UL 6.
 4. IMC: Comply with ANSI C80.6 and UL 1242.
 5. EMT: Comply with ANSI C80.3 and UL 797.
 6. FMC: Comply with UL 1; zinc-coated steel or aluminum.
 7. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.
- B. Metal Fittings: Comply with NEMA FB 1 and UL 5148.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. AFC Cable Systems; a part of Aikore International.
 - b. Allied Tube & Conduit; a part of Aikore International.
 - c. O-Z/Gedney; a brand of Emerson Industrial Automation.
 - d. Republic Conduit.
 - e. Southwire Company.
 - f. Thomas & Betts Corporation; A Member of the ABB Group.
 - g. Western Tube and Conduit Corporation.
2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Fittings, General: Listed and labeled for type of conduit, location, and use.
 4. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
5. Fittings for EMT:
- a. Material: Steel.
 - b. Type: Setscrew.
6. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
- C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.
- 2.2 NONMETALLIC CONDUITS AND FITTINGS
- A. Nonmetallic Conduit:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Aikore International.
 - b. CANTEX INC.
 - c. CertainTeed Corporation.
 - d. Electri-Flex Company.
 - e. Kraloy.
 - f. RACO; Hubbell.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 1. ENT: Comply with NEMA TC 13 and UL 1653.
 2. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.
- C. Nonmetallic Fittings:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. AFC Cable Systems; a part of Aikore International.
 - b. CANTEX INC.
 - c. CertainTeed Corporation.
 - d. Electri-Flex Company.
 - e. Kraloy.
 - f. RACO; Hubbell.
 - g. Thomas & Betts Corporation; A Member of the ABB Group.
 2. Fittings, General: Listed and labeled for type of conduit, location, and use.
 3. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.
 4. Solvents and Adhesives: As recommended by conduit manufacturer.
- 2.3 METAL WIREWAYS AND AUXILIARY GUTTERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. B-line, an Eaton business.
 2. Hoffman; a brand of Pentair Equipment Protection.
 3. MonoSystems, Inc.
- B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 12 unless otherwise indicated, and sized according to NFPA 70.
1. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

- 2.4 BOXES, ENCLOSURES, AND CABINETS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Crouse-Hinds, an Eaton business.
 2. Erickson Electrical Equipment Company.
 3. Hoffman; a brand of Pentair Equipment Protection.
 4. Hubbell Incorporated.
 5. Milbank Manufacturing Co.
 6. O-Z/Gedney; a brand of Emerson Industrial Automation.
 7. Thomas & Betts Corporation; A Member of the ABB Group.
- B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.
- C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
- D. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.
- E. Metal Floor Boxes:
1. Material: Cast metal.
 2. Type: Fully adjustable.
 3. Shape: Rectangular.
 4. Listing and Labeling: Metal floor boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- F. Luminaire Outlet Boxes: Nonadjustable, designed for attachment of luminaire weighing 50 lb (23 kg). Outlet boxes designed for attachment of luminaires weighing more than 50 lb (23 kg) shall be listed and marked for the maximum allowable weight.
- G. Paddle Fan Outlet Boxes: Nonadjustable, designed for attachment of paddle fan weighing 70 lb (32 kg).
1. Listing and labeling: Paddle fan outlet boxes shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
- I. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, galvanized, cast iron with gasketed cover.
- J. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
- K. Device Box Dimensions: 4 inches square by 2-1/8 inches deep (100 mm square by 60 mm deep).
- L. Gangable boxes are prohibited.
- M. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 12 with continuous-hinge cover with flush latch unless otherwise indicated.
1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
- N. Cabinets:
1. NEMA 250, Type 12 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 2. Hinged door in front cover with flush latch and concealed hinge.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

- A. Outdoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed Conduit: GRC.
 2. Concealed Conduit, Aboveground: GRC or EMT.
 3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried.
 4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
 5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.
- B. Indoors: Apply raceway products as specified below unless otherwise indicated.
1. Exposed, Not Subject to Physical Damage: EMT.
 2. Exposed, Not Subject to Severe Physical Damage: EMT.
 3. Exposed and Subject to Severe Physical Damage: GRC. Raceway locations include the following:
 - a. Mechanical rooms.
 4. Concealed in Ceilings and Interior Walls and Partitions: EMT.
 5. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
 6. Damp or Wet Locations: GRC.
- C. Minimum Raceway Size: 3/4-inch (21-mm) trade size.
- D. Raceway Fittings: Compatible with raceways and suitable for use and location.
1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
 2. EMT: Use setscrew, steel fittings. Comply with NEMA FB 2.10.
 3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.
- E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.
- F. Install surface raceways only where indicated on Drawings.
- G. Do not install nonmetallic conduit above grade, inside the building or on the roof. Nonmetallic conduit shall ONLY BE USED BELOW GRADE. UNDER NO CIRCUMSTANCES SHALL NONMETALLIC CONDUIT BE INSTALLED ABOVE GRADE, WITHIN THE BUILDING ENVELOPE OR EXPOSED ON THE ROOF. Any nonmetallic conduit found on the project to be installed in any of the locations described above will result in the Electrical Contractor having to remove and replace the raceway with a specified metallic raceway at the Contractor's expense.

3.2 INSTALLATION

- A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.
- C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.
- D. Do not fasten conduits onto the bottom side of a metal deck roof.
- E. Keep raceways at least 6 inches (150 mm) away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.
- F. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.
- G. Arrange stub-ups so curved portions of bends are not visible above finished slab.
- H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches (300 mm) of changes in direction.
- I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.
- J. Conceal conduit and EMT within finished walls, ceilings, and floors unless otherwise indicated. Install conduits parallel or perpendicular to building lines.
- K. Support conduit within 12 inches (300 mm) of enclosures to which attached.
- L. Raceways Embedded in Slabs:
1. Run conduit larger than 1-inch (27-mm) trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support. Secure raceways to reinforcement at maximum 10-foot (3-m) intervals.
 2. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 3. Arrange raceways to keep a minimum of 1 inch (25 mm) of concrete cover in all directions.
 4. Do not embed threadless fittings in concrete unless specifically approved by Architect for each specific location.
 5. Change from ENT to GRC before rising above floor.

- M. Stub-ups to Above Recessed Ceilings:
1. Use EMT for raceways.
 2. Use a conduit bushing or insulated fitting to terminate stub-ups not terminated in hubs or in an enclosure.
- N. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
- O. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.
- P. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.
- Q. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch (35-mm) trade size and insulated throat metal bushings on 1-1/2-inch (41-mm) trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.
- R. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb (90-kg) tensile strength. Leave at least 12 inches (300 mm) of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.
- S. Surface Raceways:
1. Install surface raceway with a minimum 2-inch (50-mm) radius control at bend points.
 2. Secure surface raceway with screws or other anchor-type devices at intervals not exceeding 48 inches (1200 mm) and with no less than two supports per straight raceway section. Support surface raceway according to manufacturer's written instructions. Tape and glue are not acceptable support methods.
- T. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces.
- U. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments: Seal the interior of all raceways at the following points:
1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 2. Where an underground service raceway enters a building or structure.
 3. Conduit extending from interior to exterior of building.
 4. Conduit extending into pressurized duct and equipment.
 5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
 6. Where otherwise required by NFPA 70.
- V. Expansion-Joint Fittings:
1. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:
 - a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F (70 deg C) temperature change.
 1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.
 2. Attics: 135 deg F (75 deg C) temperature change.
 3. Key latch to match panelboards.
 4. Metal barriers to separate wiring of different systems and voltage.
 5. Accessory feet where required for freestanding equipment.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

- A. Direct-Buried Conduit:
1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches (150 mm) in nominal diameter.
 2. Install backfill as specified in Section 312000 "Earth Moving."
 3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches (300 mm) of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
 4. Install manufactured duct elbows for stub-up at poles and equipment and at building entrances through floor unless otherwise indicated. Encase elbows for stub-up ducts throughout length of elbow.
 5. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through floor.
 - a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches (75 mm) of concrete for a minimum of 12 inches (300 mm) on each side of the coupling.
 - b. For stub-ups at equipment mounted on outdoor concrete bases and where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches (1500 mm) from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
 6. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

- A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies.

3.5 FIRESTOPPING

- A. Install firestopping at penetrations of fire-rated floor and wall assemblies. Comply with requirements in Section 078413 "Penetration Firestopping."

3.6 PROTECTION

- A. Protect coatings, finishes, and cabinets from damage and deterioration.
1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

END OF SECTION 260533

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Color and legend requirements for raceways, conductors, and warning labels and signs.
 2. Labels.
 3. Tapes and stencils.
 4. Tags.
 5. Signs.
 6. Cable ties.
 7. Paint for identification.
 8. Fasteners for labels and signs.

PART 2 - PRODUCTS

- 2.1 PERFORMANCE REQUIREMENTS
- A. Comply with ASME A13.1 and IEEE C2.
- B. Comply with NFPA 70.
- C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
- D. Comply with ANSI Z535.4 for safety signs and labels.
- E. Comply with NFPA 70E and Section 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.
- F. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.
- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

- A. Color-Coding for Phase- Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.
1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
 - 1) Phase A: Brown.
 - 2) Phase B: Orange.
 - 3) Phase C: Yellow.
 - b. For 208Y/120-V Circuits:
 - 1) Phase A: Black.
 - 2) Phase B: Red.
 - 3) Phase C: Blue.
 3. Color for Neutral: White or gray.
 4. Color for Equipment Grounds: Green.
 5. Colors for Isolated Grounds: Green with white stripe.
- B. Warning labels and signs shall include, but are not limited to, the following legends:
1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES (915 MM)."
 2. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 3. Arc Flash Hazard Warning: Refer to Section 260573.19 "Arc-Flash Hazard Analysis" requirements for arc-flash warning labels.
- C. Equipment Identification Labels:
1. Black letters on a white field.

2.3 LABELS

- A. Self-Adhesive Wraparound Labels: Preprinted, 3-mil- (0.08-mm-) thick, vinyl flexible label with acrylic pressure-sensitive adhesive.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Brady Corporation.
 - b. Brother International Corporation.
 - c. Ideal Industries, Inc.
 - d. Panduit Corp.
2. Self-Lamination: Clear; UV-, weather- and chemical-resistant; self-laminating, protective shield over the legend. Labels sized such that the clear shield overlaps the entire printed legend.
3. Marker for Labels: Machine-printed, permanent, waterproof, black ink recommended by printer manufacturer.

2.4 TAPES AND STENCILS

- A. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Carlton Industries, LP.
 - b. Ideal Industries, Inc.
 - c. Marking Services, Inc.
- B. Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; not less than 3 mils (0.08 mm) thick by 1 to 2 inches (25 to 50 mm) wide; compounded for outdoor use.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Carlton Industries, LP.
 - c. emeco.
- C. Floor Marking Tape: 2-inch- (50-mm-) wide, 5-mil (0.125-mm) pressure-sensitive vinyl tape, with yellow and black stripes and clear-vinyl overlay.
- D. Underground-Line Warning Tape:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Brady Corporation.
 - b. Ideal Industries, Inc.
 - c. LEM Products Inc.
 - d. Marking Services, Inc.
 - e. Reef Industries, Inc.
 2. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert and not subject to degradation when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 3. Color and Printing:
 - a. Comply with ANSI Z535.1, ANSI Z535.2, ANSI Z535.3, ANSI Z535.4, and ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: "ELECTRIC LINE, HIGH VOLTAGE".
 - c. Inscriptions for Orange-Colored Tapes: "TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE".

4. Tag:
- a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core; bright colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Width: 3 inches (75 mm).
 - c. Overall Thickness: 5 mils (0.125 mm).
 - d. Foil Core Thickness: 0.35 mil (0.0089 mm).
 - e. Weight: 28 lb/1000 sq. ft. (13.7 kg/100 sq. m).
 - f. Tensile according to ASTM D 882: 70 lbf (311.3 N) and 4600 psi (31.7 MPa).

2.5 SIGNS

- A. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved legend.
 2. Thickness:
 - a. For signs up to 20 sq. in. (129 sq. cm), minimum 1/16 inch (1.6 mm) thick.
 - b. For signs larger than 20 sq. in. (129 sq. cm), 1/8 inch (3.2 mm) thick.
 - c. Engraved legend with black letters on white face.
 - d. Self-adhesive.
 - e. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 CABLE TIES

- A. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.
1. Minimum Width: 3/16 inch (5 mm).
 2. Tensile Strength at 73 Deg F (23 Deg C) according to ASTM D 638: 12,000 psi (82.7 MPa).
 3. Temperature Range: Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C).
 4. Color: Black, except where used for color-coding.

2.7 MISCELLANEOUS IDENTIFICATION PRODUCTS

- A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).
- B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.
- B. Install identifying devices before installing acoustical ceilings and similar concealment.
- C. Verify identity of each item before installing identification products.
- D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.
- E. Apply identification devices to surfaces that require finish after completing finish work.
- F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.
- G. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.
- H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
1. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.
- I. Self-Adhesive Wraparound Labels: Secure tight to surface of raceway or cable at a location with high visibility and accessibility.
- K. Self-Adhesive Labels:
1. On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
- L. Self-Adhesive Vinyl Tape: Secure tight to surface at a location with high visibility and accessibility.
1. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding.
- M. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.
- N. Underground Line Warning Tapes:
1. During backfilling of trenches, install continuous underground-line warning tape directly above cable or raceway at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches (400 mm) overall.
 2. Install underground-line warning tape for direct-buried cables and cables in raceways.
- O. Laminated Acrylic or Melamine Plastic Signs:
1. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 2. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on minimum 1-1/2-inch- (38-mm-) high sign; where two lines of text are required, use signs minimum 2 inches (50 mm) high.
- P. Cable Ties: General purpose, for attaching tags.

3.2 IDENTIFICATION SCHEDULE

- A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.
- B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.
- C. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.
1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot (15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.
- D. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive wraparound labels with the conductor or cable designation, origin, and destination.
- E. Control-Circuit Conductor Termination Identification: For identification at terminations, provide self-adhesive wraparound labels with the conductor designation.
- F. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.
- G. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.
1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
- H. Locations of Underground Lines: Underground-line warning tape for power, lighting, communication, and control wiring and optical-fiber cable.
- I. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
- J. Instructional Signs: Self-adhesive labels, including the color code for grounded and ungrounded conductors.
- K. Arc Flash Warning Labeling: Self-adhesive labels.
- L. Equipment Identification Labels:
1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
 2. Outdoor Equipment: Laminated acrylic or melamine sign.

END OF SECTION 260553



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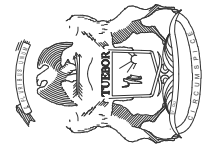
DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILT-OUT


FILE NO: 491_24304_MNB

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ELECTRICAL SPECIFICATIONS

E501

Electrical Specifications (Continued)

SECTION 260573.13 - SHORT-CIRCUIT STUDIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes a computer-based, fault-current study to determine the minimum interrupting capacity of circuit protective devices.

1.2 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
- Short-circuit study input data, including completed computer program input data sheets.
 - Short-circuit study and equipment evaluation report; signed, dated, and sealed by a qualified professional engineer.
 - Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.
 - Revised single-line diagram, reflecting field investigation results and results of short-circuit study.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Short-Circuit Study Specialist.
- B. Product Certificates: For short-circuit study software, certifying compliance with IEEE 399.

1.4 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Short-Circuit Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
- The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Short-Circuit Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Power Systems Analysis Companies: The Study shall be performed by one of the following companies, as a sub-contractor to the bidding Electrical Contractor. Companies other than those listed will be Rejected for non-compliance: a) Utilities Instrumentation Services (UIS); b) Power Factor Engineering, LLC; c) Northern Electrical Testing; d) Schneider Electric (Square-D) (as part of the new distribution equipment); e) Eaton Power Systems (as part of the new distribution equipment); f) Siemens Power Systems (as part of the new distribution equipment).
- E. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- EDSA Micro Corporation.
 - SKM System Analysis, Inc.
- B. Comply with IEEE 399 and IEEE 551.
- C. Analytical features of fault-current-study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.

2.2 SHORT-CIRCUIT STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
- Protective device designations and ampere ratings.
 - Cable size and lengths.
 - Transformer kilovolt ampere (kVA) and voltage ratings.
 - Motor and generator designations and kVA ratings.
 - Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Comments and recommendations for system improvements, where needed.
- E. Protective Device Evaluation:
- Evaluate equipment and protective devices and compare to short-circuit ratings.
 - Tabulations of circuit breaker, fuse, and other protective device ratings versus calculated short-circuit duties.
 - For 600-V overcurrent protective devices, ensure that interrupting ratings are equal to or higher than calculated 1/2-cycle symmetrical fault current.
 - For devices and equipment rated for asymmetrical fault current, apply multiplication factors listed in the standards to 1/2-cycle symmetrical fault current.
- F. Short-Circuit Study Input Data: As described in "Power System Data" Article in the Evaluations.
- G. Short-Circuit Study Output:
- Low-Voltage Fault Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - Voltage.
 - Calculated fault-current magnitude and angle.
 - Fault-point X/R ratio.
 - Equivalent impedance.
 - Momentary Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - Voltage.
 - Calculated symmetrical fault-current magnitude and angle.
 - Fault-point X/R ratio.
 - Equivalent impedance.
 - Calculated asymmetrical fault currents:
 - Based on fault-point X/R ratio.
 - Based on calculated symmetrical value multiplied by 1.6.
 - Based on calculated symmetrical value multiplied by 2.7.
 - Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - Voltage.
 - Calculated symmetrical fault-current magnitude and angle.
 - Fault-point X/R ratio.
 - No AC Decrement (NACD) ratio.
 - Equivalent impedance.
 - Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Obtain all data necessary for the conduct of the study.
- Verify completeness of data supplied on the one-line diagram. Call any discrepancies to the attention of Architect.
- B. For equipment provided that is Work of this Project, use characteristics submitted under the provisions of action submittals and information submittals for this Project.

B. Gather and tabulate the following input data to support the short-circuit study:

- Product Data for Project's overcurrent protective devices involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
- Obtain electrical power utility impedance at the service.
- Power sources and ties.
- For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
- For reactors, provide manufacturer and model designation, voltage rating, and impedance.
- For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip, SCCR, current rating, and breaker settings.
- Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
- Motor horsepower and NEMA MG 1 code letter designation.
- Cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).

3.2 SHORT-CIRCUIT STUDY

- A. Perform study following the general study procedures contained in IEEE 399.
- B. Calculate short-circuit currents according to IEEE 551.
- C. Base study on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied is indicated on Drawings.
- E. Begin short-circuit current analysis at the service, extending down to the system overcurrent protective devices as follows:
- To normal system low-voltage load buses where fault current is 10 kA or less.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. The calculations shall include the ac fault-current decay from induction motors. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.
- For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each of the following:
- Electric utility's supply termination point.
 - Incoming switchgear.
 - Low-voltage switchgear.
 - Control panels.
 - Branch circuit panelboards.
 - Disconnect switches.

3.3 ADJUSTING

- A. Make minor modifications to equipment as required to accomplish compliance with short-circuit study.

3.4 DEMONSTRATION

- A. Train Owner's operating and maintenance personnel in the use of study results.

END OF SECTION 260573.13

SECTION 260573.16 - COORDINATION STUDIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes computer-based, overcurrent protective device coordination studies to determine overcurrent protective devices and to determine overcurrent protective device settings for selective tripping.

1.2 ACTION SUBMITTALS

- A. Product Data: For computer software program to be used for studies.
- B. Other Action Submittals: Submit the following after the approval of system protective devices submittals. Submittals shall be in digital form.
- Coordination-study input data, including completed computer program input data sheets.
 - Study and equipment evaluation reports.
 - Overcurrent protective device coordination study report; signed, dated, and sealed by a qualified professional engineer.
 - Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Coordination Study Specialist.
- B. Product Certificates: For overcurrent protective device coordination study software, certifying compliance with IEEE 399.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For the overcurrent protective devices to include in emergency, operation, and maintenance manuals.
- In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
 - The following parts from the Protective Device Coordination Study Report:
 - One-line diagram.
 - Protective device coordination study.
 - Time-current coordination curves.
 - Power system data.

1.5 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Coordination Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
- The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Coordination Study Specialist Qualifications: Professional engineer in charge of performing the study and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Power Systems Analysis Companies: The Study shall be performed by one of the following companies, as a sub-contractor to the bidding Electrical Contractor. Companies other than those listed will be Rejected for non-compliance: a) Utilities Instrumentation Services (UIS); b) Power Factor Engineering, LLC; c) Northern Electrical Testing; d) Schneider Electric (Square-D) (as part of the new distribution equipment); e) Eaton Power Systems (as part of the new distribution equipment); f) Siemens Power Systems (as part of the new distribution equipment).
- E. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 COMPUTER SOFTWARE DEVELOPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- EDSA Micro Corporation.
 - SKM Systems Analysis, Inc.
- B. Comply with IEEE 242 and IEEE 399.
- C. Analytical features of device coordination study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.

- D. Computer software program shall be capable of plotting and diagramming time-current-characteristic curves as part of its output. Computer software program shall report device settings and ratings of all overcurrent protective devices and shall demonstrate selective coordination by computer-generated, time-current coordination plots.

2.2 PROTECTIVE DEVICE COORDINATION STUDY REPORT CONTENTS

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope. Include case descriptions, definition of terms and guide for interpretation of the computer printout.
- C. One-line diagram, showing the following:
- Protective device designations and ampere ratings.
 - Cable size and lengths.
 - Transformer kilovolt ampere (kVA) and voltage ratings.
 - Motor and generator designations and kVA ratings.
 - Switchgear, switchboard, motor-control center, and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
- F. Protective Device Coordination Study:
- Report recommended settings of protective devices, ready to be applied in the field. Use manufacturer's data sheets for recording the recommended setting of overcurrent protective devices when available.
 - Phase and Ground Relays:
 - Device tag.
 - Relay current transformer ratio and tap, time dial, and instantaneous pickup value.
 - Recommendations on improved relaying systems, if applicable.
 - Circuit Breakers:
 - Adjustable pickups and time delays (long time, short time, ground).
 - Adjustable time-current characteristic.
 - Adjustable instantaneous pickup.
 - Recommendations on improved trip systems, if applicable.
 - Fuses: Show current rating, voltage, and class.

- G. Time-Current Coordination Curves: Determine settings of overcurrent protective devices to achieve selective coordination. Graphically illustrate that adequate time separation exists between devices installed in series, including power utility company's upstream devices. Prepare separate sets of curves for the switching schemes and for emergency periods where the power source is local generation. Show the following information:

- Device tag and title, one-line diagram with legend identifying the portion of the system covered.
- Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.
- Identify the device associated with each curve by manufacturer type, function, and, if applicable, tap, time delay, and instantaneous settings recommended.
- Plot the following listed characteristic curves, as applicable:
 - Power utility's overcurrent protective device.
 - Low-voltage fuses including manufacturer's minimum melt, total clearing, tolerance, and damage bands.
 - Low-voltage equipment circuit-breaker trip devices, including manufacturer's tolerance bands.
 - Transformer full-load current, magnetizing inrush current.
 - Ground-fault protective devices.
 - The largest feeder circuit breaker in each motor-control center and panelboard.
- Provide adequate time margins between device characteristics such that selective operation is achieved.
- Comments and recommendations for system improvements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals for compliance with electrical distribution system coordination requirements and other conditions affecting performance. Devices to be coordinated are indicated on Drawings.
- Proceed with coordination study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to coordination study may not be used in study.

3.2 PROTECTIVE DEVICE COORDINATION STUDY

- A. Comply with IEEE 242 for calculating short-circuit currents and determining coordination time intervals.
- B. Comply with IEEE 399 for general study procedures.
- C. The study shall be based on the device characteristics supplied by device manufacturer.
- D. The extent of the electrical power system to be studied is indicated on Drawings.
- E. Begin analysis at the service, extending down to the system overcurrent protective devices as follows:
- To normal system low-voltage load buses where fault current is 10 kA or less.
- F. Study electrical distribution system from normal and alternate power sources throughout electrical distribution system for Project. Study all cases of system-switching configurations and alternate operations that could result in maximum fault conditions.
- G. The calculations shall include the ac fault-current decay from induction motors. The calculations shall also account for the fault-current dc decrement, to address the asymmetrical requirements of the interrupting equipment.

- For grounded systems, provide a bolted line-to-ground fault-current study for areas as defined for the three-phase bolted fault short-circuit study.
- H. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault and single line-to-ground fault at each of the following:
- Electric utility's supply termination point.
 - Switchgear.
 - Low-voltage switchgear.
 - Branch circuit panelboards.

I. Protective Device Evaluation:

- Evaluate equipment and protective devices and compare to short-circuit ratings.
 - Adequacy of switchgear, motor-control centers, and panelboard bus bars to withstand short-circuit stresses.
- 3.3 POWER SYSTEM DATA
- A. Obtain all data necessary for the conduct of the overcurrent protective device study.
- Verify completeness of data supplied in the one-line diagram on Drawings. Call discrepancies to the attention of Architect.
 - Use characteristics submitted under the provisions of action submittals and information submittals for this Project.

- B. Gather and tabulate the following input data to support coordination study. The list below is a guide.

- Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
- Electrical power utility impedance at the service.
- Power sources and ties.
- Short-circuit current at each system bus, three phase and line-to-ground.
- Full-load current of all loads.
- Voltage level at each bus.
- For transformers, include kVA, primary and secondary voltages, connection type, impedance, X/R ratio, taps measured in percent, and phase shift.
- For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
- Maximum demands from service meters.
- Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
- Motor horsepower and NEMA MG 1 code letter designation.

- Low-voltage cable sizes, lengths, number, conductor material, and conduit material (magnetic or nonmagnetic).
- Data sheets to supplement electrical distribution system diagram, cross-referenced with tag numbers on diagram, showing the following:
 - Special load considerations, including starting inrush currents and frequent starting and stopping.
 - Ratings, types, and settings of utility company's overcurrent protective devices.
 - Special overcurrent protective device settings or types stipulated by utility company.
 - Time-current-characteristic curves of devices indicated to be coordinated.
 - Manufacturer, frame size, interrupting rating in amperes rms symmetrical, ampere or current sensor rating, long-time adjustment range, short-time adjustment range, and instantaneous adjustment range for circuit breakers.
 - Manufacturer and type, ampere-tap adjustment range, time-delay adjustment range, instantaneous attachment adjustment range, and current transformer ratio for overcurrent relays.
 - Panelboards, switchboards, motor-control center ampacity, and SCCR in amperes rms symmetrical.

3.4 FIELD ADJUSTING

- A. Adjust relay and protective device settings according to the recommended settings provided by the coordination study. Field adjustments shall be completed by the engineering service division of the equipment manufacturer under the Startup and Acceptance Testing contract portion.
- B. Make minor modifications to equipment as required to accomplish compliance with short-circuit and protective device coordination studies.
- C. Testing and adjusting shall be by a full-time employee of the Field Adjusting Agency, who holds NETA ETT Level III certification or NICET Electrical Power Testing Level III certification.
- Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters. Perform NETA tests and inspections for all adjustable overcurrent protective devices.
- 3.5 DEMONSTRATION
- A. Engage the Coordination Study Specialist to train Owner's maintenance personnel in the following:
- Acquaint personnel in the fundamentals of operating the power system in normal and emergency modes.
 - Hand-out and explain the objectives of the coordination study, study descriptions, purpose, basis, and scope. Include case descriptions, definition of terms, and guide for interpreting the time-current coordination curves.
 - Adjust, operate, and maintain overcurrent protective device settings.

END OF SECTION 260573.16

SECTION 260573.19 - ARC-FLASH HAZARD ANALYSIS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes a computer-based, arc-flash study to determine the arc-flash hazard distance and the incident energy to which personnel could be exposed during work on or near electrical equipment.
- 1.2 ACTION SUBMITTALS
- A. Product Data: For computer software program to be used for studies.
- B. Study Submittals: Submit the following submittals after the approval of system protective devices submittals. Submittals shall be in digital form.
- Arc-flash study input data, including completed computer program input data sheets.
 - Arc-flash study report; signed, dated, and sealed by a qualified professional engineer.
 - Submit study report for action prior to receiving final approval of the distribution equipment submittals. If formal completion of studies will cause delay in equipment manufacturing, obtain approval from Architect for preliminary submittal of sufficient study data to ensure that the selection of devices and associated characteristics is satisfactory.

1.3 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Arc-Flash Study Specialist.
- B. Product Certificates: For arc-flash hazard analysis software, certifying compliance with IEEE 1584 and NFPA 70E.
- 1.4 CLOSEOUT SUBMITTALS
- A. Operation and Maintenance Data:
- Maintenance procedures according to requirements in NFPA 70E shall be provided in the equipment manuals.
 - Operation and Maintenance Procedures: In addition to items specified in Section 017823 "Operation and Maintenance Data," provide maintenance procedures for use by Owner's personnel that comply with requirements in NFPA 70E.

1.5 QUALITY ASSURANCE

- A. Studies shall use computer programs that are distributed nationally and are in wide use. Software algorithms shall comply with requirements of standards and guides specified in this Section. Manual calculations are unacceptable.
- B. Arc-Flash Study Software Developer Qualifications: An entity that owns and markets computer software used for studies, having performed successful studies of similar magnitude on electrical distribution systems using similar devices.
- The computer program shall be developed under the charge of a licensed professional engineer who holds IEEE Computer Society's Certified Software Development Professional certification.
- C. Arc-Flash Study Specialist Qualifications: Professional engineer in charge of performing the study, analyzing the arc flash, and documenting recommendations, licensed in the state where Project is located. All elements of the study shall be performed under the direct supervision and control of this professional engineer.
- D. Power Systems Analysis Companies: The Study shall be performed by one of the following companies, as a sub-contractor to the bidding Electrical Contractor. Companies other than those listed will be Rejected for non-compliance: a) Utilities Instrumentation Services (UIS); b) Power Factor Engineering, LLC; c) Northern Electrical Testing; d) Schneider Electric (Square-D) (as part of the new distribution equipment); e) Eaton Power Systems (as part of the new distribution equipment); f) Siemens Power Systems (as part of the new distribution equipment).
- E. Field Adjusting Agency Qualifications: An independent agency, with the experience and capability to adjust overcurrent devices and to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 SOFTWARE DEVELOPERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- EDSA Micro Corporation.
 - SKM Systems Analysis, Inc.
- B. Comply with IEEE 1584 and NFPA 70E.
- C. Analytical features of device coordination study computer software program shall have the capability to calculate mandatory features as listed in IEEE 399.

2.2 ARC-FLASH STUDY REPORT CONTENT

- A. Executive summary.
- B. Study descriptions, purpose, basis and scope.
- C. One-line diagram, showing the following:
- Protective device designations and ampere ratings.
 - Cable size and lengths.
 - Transformer kilovolt ampere (kVA) and voltage ratings.
 - Motor and generator designations and kVA ratings.
 - Switchgear, switchboard, motor-control center and panelboard designations.
- D. Study Input Data: As described in "Power System Data" Article.
- E. Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
- F. Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."

G. Arc-Flash Study Output:

- Interrupting Duty Report: Three-phase and unbalanced fault calculations, showing the following for each overcurrent device location:
 - Voltage.
 - Calculated symmetrical fault-current magnitude and angle.
 - Fault-point X/R ratio.
 - No AC Decrement (NACD) ratio.
 - Equivalent impedance.
 - Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a symmetrical basis.
 - Multiplying factors for 2-, 3-, 5-, and 8-cycle circuit breakers rated on a total basis.
- Incident Energy and Flash Protection Boundary Calculations:
 - Arcing fault magnitude.
 - Protective device clearing time.
 - Duration of arc.
 - Arc-flash boundary.
 - Working distance.
 - Incident energy.
 - Hazard risk category.
 - Recommendations for arc-flash energy reduction.
- Fault study input data, case descriptions, and fault-current calculations including a definition of terms and guide for interpretation of the computer printout.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine Project overcurrent protective device submittals. Proceed with arc-flash study only after relevant equipment submittals have been assembled. Overcurrent protective devices that have not been submitted and approved prior to arc-flash study may not be used in study.

3.2 ARC-FLASH HAZARD ANALYSIS

- A. Comply with NFPA 70E and its Annex D for hazard analysis study.
- Short-Circuit Study Output: As specified in "Short-Circuit Study Output" Paragraph in "Short-Circuit Study Report Contents" Article in Section 260572 "Overcurrent Protective Device Short-Circuit Study."
 - Protective Device Coordination Study Report Contents: As specified in "Protective Device Coordination Study Report Contents" Article in Section 260573 "Overcurrent Protective Device Coordination Study."
- C. Calculate maximum and minimum contributions of fault-current size.
- The minimum calculation shall assume that the utility contribution is at a minimum and shall assume no motor load.
 - The maximum calculation shall assume a maximum contribution from the utility and shall assume motors to be operating under full-load conditions.
- D. Calculate the arc-flash protection boundary and incident energy at locations in the electrical distribution system where personnel could perform work on energized parts.
- E. Include low-voltage equipment locations.
- F. Safe working distances shall be specified for calculated fault locations based on the calculated arc-flash contributions, as the sources are interrupted or decremented with time. Fault contribution from motors shall be decremented as follows:
- Fault contribution from induction motors should not be considered beyond three to five cycles.
- H. Arc-Flash computation shall include both line and load side of a circuit breaker as follows:
- When the circuit breaker is in a separate enclosure.
 - When the line terminals of the circuit breaker are separate from the work location.
- I. Base arc-flash calculations on actual overcurrent protective device clearing time. Cap maximum clearing time at two seconds based on IEEE 1584, Section 8.1.2.

3.3 POWER SYSTEM DATA

- A. Obtain all data necessary for the conduct of the arc-flash hazard analysis.
- Verify completeness of data supplied on the one-line diagram on Drawings and under "Preparatory Studies" Paragraph in "Arc-Flash Hazard Analysis" Article. Call discrepancies to the attention of Architect.
 - For new equipment, use characteristics submitted under the provisions of action submittals and information submittals for this Project.
- B. Electrical Survey Data: Gather and tabulate the following input data to support study.
- Product Data for overcurrent protective devices specified in other Sections and involved in overcurrent protective device coordination studies. Use equipment designation tags that are consistent with electrical distribution system diagrams, overcurrent protective device submittals, input and output data, and recommended device settings.
 - Obtain electrical power utility impedance at the service.
 - Power sources and ties.
 - For circuit breakers and fuses, provide manufacturer and model designation. List type of breaker, type of trip and available range of settings, SCCR, current rating, and breaker settings.
 - Busway manufacturer and model designation, current rating, impedance, lengths, and conductor material.
 - Motor horsepower and NEMA MG 1 code letter designation.
 - Low-voltage cable sizes, lengths, number, conductor material and conduit material (magnetic or nonmagnetic).
- 3.4 DEMONSTRATION
- A. Engage the Arc-Flash Study Specialist to train Owner's maintenance personnel in the potential arc-flash hazards associated with working on energized equipment and the significance of the arc-flash warning labels.

END OF SECTION 260573.19



ISSUED FOR BIDS

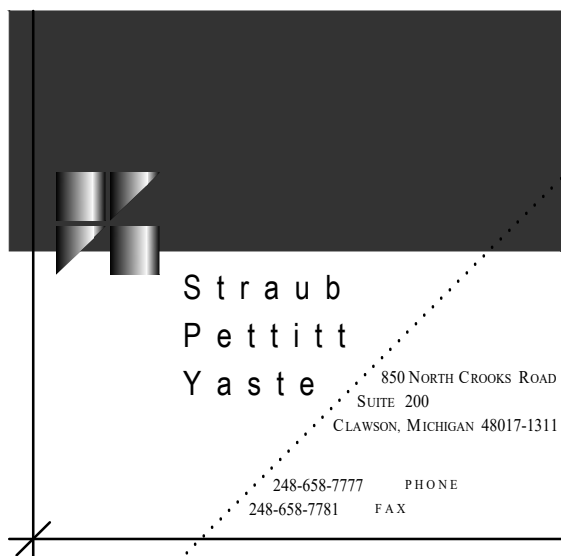
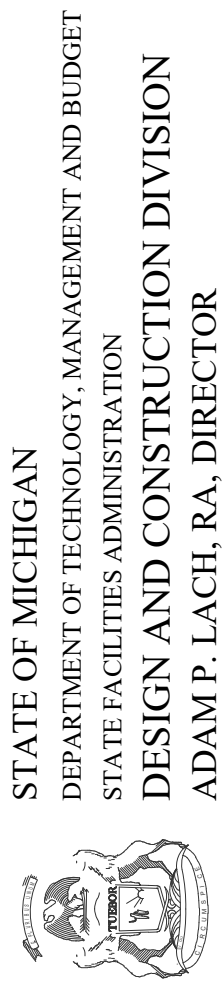
04/25/2025

DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT

FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434



ELECTRICAL SPECIFICATIONS

E502

Electrical Specifications (Continued)

SECTION 26 2213 - LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A Section includes distribution, dry-type transformers with a nominal primary and secondary rating of 600 V and less, with capacities up to 1500 kVA.

1.3 ACTION SUBMITTALS

- A Product Data: For each type of product.
 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type and size of transformer.
 2. Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, and performance for each type and size of transformer.
- B Shop Drawings:
 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
 3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

- A Qualification Data: For testing agency.
- B Source quality-control reports.
- C Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

- A Operation and Maintenance Data: For transformers to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

- A Testing Agency Qualifications: Accredited by NETA.
 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.7 DELIVERY, STORAGE, AND HANDLING

- A Inspection: On receipt, inspect for and note any shipping damage to packaging and transformer.
 1. If manufacturer packaging is removed for inspection, and transformer will be stored after inspection, re-package transformer using original or new packaging materials that provide protection equivalent to manufacturer's packaging.
- B Storage: Store in a warm, dry, and temperature-stable location in original shipping packaging.
- C Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.
- D Handling: Follow manufacturer's instructions for lifting and transporting transformers.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Acme Electric Corporation.
 2. Controlled Power Company; an Emerson company.
 3. Eaton.
 4. General Electric Company.
 5. Siemens Industry, Inc.; Energy Management Division.
 6. Sala/Hevi-Duty; a brand of Emerson Electric Co.
 7. Square D; by Schneider Electric.
- B Source Limitations: Obtain each transformer type from single source from single manufacturer.

2.2 GENERAL TRANSFORMER REQUIREMENTS

- A Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
- B Comply with NFPA 70.
 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- C Transformers Rated 15 kVA and Larger:
 1. Comply with 10 CFR 431 (DOE 2016) efficiency levels.
 2. Marked as compliant with DOE 2016 efficiency levels by an NRTL.
- D Shipping Restraints: Paint or otherwise color-code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside the transformer enclosure.

2.3 DISTRIBUTION TRANSFORMERS

- A Comply with NFPA 70, and list and label as complying with UL 1561.
- B Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses.
 1. One leg per phase.
 2. Core volume shall allow efficient transformer operation at 10 percent above the nominal tap voltage.
 3. Grounded to enclosure.
- C Coils: Continuous windings without splices except for taps.
 1. Coil Material: Aluminum.
 2. Internal Coil Connections: Brazed or pressure type.
 3. Terminal Connections: Welded.
- D Enclosure: Ventilated.
 1. NEMA 250, Type 2: Core and coil shall be encapsulated within resin compound to seal out moisture and air.
 2. KVA Ratings: Based on convection cooling only and not relying on auxiliary fans.
 3. Wiring Compartment: Sized for conduit entry and wiring installation.
 4. Finish: Comply with NEMA 250.
 - a. Finish Color: Gray weather-resistant enamel.
- E Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity.
- F Insulation Class, 30 kVA and Larger: 220 deg C UL-component-recognized insulation system with a maximum of 115 deg C rise above 40 deg C ambient temperature.
- G Grounding: Provide ground-bar kit or a ground bar installed on the inside of the transformer enclosure.
- H K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.
 1. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor, without exceeding the indicated insulation class in a 40 deg C maximum ambient and a 24-hour average ambient of 30 deg C.
 2. Indicate value of K-factor on transformer nameplate.
 3. Unit shall comply with requirements of DOE 2016 efficiency levels when tested according to NEMA TP 2 with a K-factor equal to one.
- I Neutral: Rated 200 percent of full load current for K-factor-rated transformers.
- J Wall Brackets: Manufacturer's standard brackets.
- K Low-Sound-Level Requirements: Maximum sound levels when factory tested according to IEEE C57.12.91, as follows:
 1. 9.00 kVA and Less: 40 dBA.
 2. 9.01 to 30.00 kVA: 45 dBA.
 3. 30.01 to 50.00 kVA: 45 dBA for K-factors of 1, 4, and 9.
 4. 50.01 to 150.00 kVA: 50 dBA for K-factors of 1, 4, and 9.
 5. 150.01 to 300.00 kVA: 55 dBA for K-factors of 1, 4, and 9.
 6. 300.01 to 500.00 kVA: 60 dBA for K-factors of 1, 4, and 9.

2.4 IDENTIFICATION

- A Nameplates: Engraved, laminated-acrylic or melamine plastic signs for each distribution transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Section 260553 "Identification for Electrical Systems."

2.5 SOURCE QUALITY CONTROL

- A Test and inspect transformers according to IEEE C57.12.01 and IEEE C57.12.91.
 1. Resistance measurements of all windings at rated voltage connections and of all tap connections.
 2. Ratio tests at rated voltage connections and of all tap connections.
 3. Phase relation and polarity tests at rated voltage connections.
 4. No load losses, and excitation current and rated voltage at rated voltage connections.
 5. Impedance and load losses at rated current and rated frequency at rated voltage connections.
 6. Applied and induced tensile tests.
 7. Regulation and efficiency at rated load and voltage.
 8. Insulation-Resistance Tests:
 - a. High-voltage to ground.
 - b. Low-voltage to ground.
 - c. High-voltage to low-voltage.
 9. Temperature tests.
- B Factory Sound-Level Tests: Conduct prototype sound-level tests on production-line products.

PART 3 - EXECUTION

3.1 EXAMINATION

- A Examine conditions for compliance with enclosure- and ambient-temperature requirements for each transformer.
- B Verify that field measurements are as needed to maintain working clearances required by NFPA 70 and manufacturer's written instructions.
- C Examine walls, floors, roofs, and concrete bases for suitable mounting conditions where transformers will be installed.
- D Verify that ground connections are in place and requirements in Section 260526 "Grounding and Bonding for Electrical Systems" have been met. Maximum ground resistance shall be 5 ohms at location of transformer.
- E Environment: Enclosures shall be rated for the environment in which they are located. Covers for NEMA 250, Type 4X enclosures shall not cause accessibility problems.
- F Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A Install wall-mounted transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 1. Coordinate installation of wall-mounted and structure-hanging supports with actual transformer provided.
- B Install transformers level and plumb on a concrete base with vibration-dampening supports. Locate transformers away from corners and not parallel to adjacent wall surface.
- C Construct concrete bases according to Section 033000 "Cast-in-Place Concrete" and anchor floor-mounted transformers according to manufacturer's written instructions and requirements in Section 260529 "Hangers and Supports for Electrical Systems."
 1. Coordinate size and location of concrete bases with actual transformer provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.
- D Secure transformer to concrete base according to manufacturer's written instructions.
- E Secure covers to enclosure and tighten all bolts to manufacturer-recommended torques to reduce noise generation.
- F Remove shipping bolts, blocking, and wedges.

3.3 CONNECTIONS

- A Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 1. Acme Electric Corporation.
 2. Controlled Power Company; an Emerson company.
 3. Eaton.
 4. General Electric Company.
 5. Siemens Industry, Inc.; Energy Management Division.
 6. Sala/Hevi-Duty; a brand of Emerson Electric Co.
 7. Square D; by Schneider Electric.
- C Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- D Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

3.4 FIELD QUALITY CONTROL

- A Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B Perform tests and inspections.
- C Small (Up to 167-kVA Single-Phase or 500-kVA Three-Phase) Dry-Type Transformer Field Tests:
 1. Visual and Mechanical Inspection.
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, and grounding.
 - c. Verify that resilient mounts are free and that any shipping brackets have been removed.
 2. Verify the unit is clean.
 3. Perform specific inspections and mechanical tests recommended by manufacturer.
 4. Verify that as-left tap connections are as specified.
 5. Verify the presence of surge arresters and that their ratings are as specified.
- D Electrical Tests:
 1. Measure resistance at each winding, tap, and bolted connection.
 2. Perform insulation-resistance tests winding-to-winding and each winding-to-ground. Apply voltage according to manufacturer's published data. In the absence of manufacturer's published data, comply with NETA ATS, Table 100.5. Calculate polarization index: the value of the index shall not be less than 1.0.
 3. Perform turns-ratio tests at all tap positions. Test results shall not deviate by more than one-half percent from either the adjacent coils or the calculated ratio. If test fails, replace the transformer.
 4. Verify correct secondary voltage, phase-to-phase and phase-to-neutral, after energization and prior to loading.
- D Remove and replace units that do not pass tests or inspections and retest as specified above.
- E Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.

3.5 ADJUSTING

- A Record transformer secondary voltage at each unit for at least 48 hours of typical occupancy period. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 5 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
- B Output Settings Report: Prepare a written report recording output voltages and tap settings.

3.6 CLEANING

- A Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 26 2213

SECTION 262416 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

- A Section Includes:
 1. Distribution panelboards.
 2. Lighting and appliance branch-circuit panelboards.
 - B Output Settings Report: Prepare a written report recording output voltages and tap settings.
1. DEFINITIONS
 2. MCCB: Molded-case circuit breaker.
 3. SPD: Surge protective device.

1.3 ACTION SUBMITTALS

- A Product Data: For each type of panelboard.
- B Shop Drawings: For each panelboard and related equipment.
 1. Include dimensioned plans, elevations, sections, and details.
 2. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
 3. Detail bus configuration, current, and voltage ratings.
 4. Short-circuit current rating of panelboards and overcurrent protective devices.
 5. Include evidence of NRTL listing for series rating of installed devices.
 6. Include evidence of NRTL listing for SPD as installed in panelboard.
 7. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.

1.4 CLOSEOUT SUBMITTALS

- A Operation and maintenance data.

1.5 FIELD CONDITIONS

- A Service Conditions: NEMA PB 1, usual service conditions, as follows:
 1. Ambient temperatures within limits specified.
 2. Altitude not exceeding 6600 feet (2000 m).

1.6 WARRANTY

- A Manufacturer's Warranty: Manufacturer agrees to repair or replace panelboards that fail in materials or workmanship within specified warranty period.
 1. Panelboard Warranty Period: 18 months from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANELBOARDS COMMON REQUIREMENTS

- A Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 1. Comply with NEMA PB 1.
 2. Comply with NFPA 70.
- D Enclosures: Flush and Surface-mounted, dead-front cabinets.
 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: NEMA 250, Type 1.
 - b. Outdoor Locations: NEMA 250, Type 3R.
 - c. Other Wet or Damp Indoor Locations: NEMA 250, Type 4.
 - d. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 2. Height: 84 inches (2.13 m) maximum.
 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
- E Incoming Mains Location: Convertible between top and bottom.
- F Phase, Neutral, and Ground Buses: Tin-plated aluminum.
- G Conductor Connectors: Suitable for use with conductor material and sizes.
 1. Material: Hard-drawn copper, 98 percent conductivity.
 2. Main and Neutral Buses: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
 3. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.
 4. Feed-Through Lugs: Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
 5. Subfeed (Double) Lugs: Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device.

- H NRTL Label: Panelboards shall be labeled by an NRTL acceptable to authority having jurisdiction for use as service equipment with one or more main service disconnecting and overcurrent protective devices.

- I Future Devices: Panelboards shall have mounting brackets, bus connections, filler plates, and necessary accessories required for future installation of devices.

- J Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by an NRTL for 100 percent interrupting capacity.

2.2 PERFORMANCE REQUIREMENTS

- A Surge Suppression: Factory installed as an integral part of indicated panelboards, complying with UL 1449 SPD Type 1.
1. POWER PANELBOARDS
 - A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. SIEMENS Industry, Inc.; Energy Management Division.
 4. Square-D Company.
 - B Panelboards: NEMA PB 1, distribution type.
 1. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 2. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
 - D Mains: As indicated on drawings.
 - E Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
 - F Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.3 CONNECTIONS

- A Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- B Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 1. Acme Electric Corporation.
 2. Controlled Power Company; an Emerson company.
 3. Eaton.
 4. General Electric Company.
 5. Siemens Industry, Inc.; Energy Management Division.
 6. Sala/Hevi-Duty; a brand of Emerson Electric Co.
 7. Square D; by Schneider Electric.
- C Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
- D Provide flexible connections at all conduit and conductor terminations and supports to eliminate sound and vibration transmission to the building structure.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. SIEMENS Industry, Inc.; Energy Management Division.
 4. Square-D Company.
- B Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
 1. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 2. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- D Mains: As indicated on drawings.
- E Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.5 ELECTRONIC-GRADE PANELBOARDS

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. SIEMENS Industry, Inc.; Energy Management Division.
 4. Square-D Company.
- B Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
 1. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 2. For doors more than 36 inches (914 mm) high, provide two latches, keyed alike.
- D Mains: As indicated on drawings.
- E Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
- F Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers.

2.6 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. SIEMENS Industry, Inc.; Energy Management Division.
 4. Square-D Company.
- B Panelboards: NEMA PB 1, with factory-installed, integral SPD; labeled by an NRTL for compliance with UL 67 and UL 1449 after installing SPD.
- C Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D Main Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- E Branch Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- F SPD.
 1. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
 2. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:
 - a. Line to Neutral: 700 V.
 - b. Line to Ground: 700 V.
 - c. Neutral to Ground: 700 V.
 - d. Line to Line: 1200 V.
 3. SCRC: Equal to the SCRC of the panelboard in which installed.
 4. Innominal Rating: 20 kA.

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. SIEMENS Industry, Inc.; Energy Management Division.
 4. Square-D Company.
- B Panelboards: NEMA PB 1, with factory-installed, integral SPD; labeled by an NRTL for compliance with UL 67 and UL 1449 after installing SPD.
- C Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- D Main Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- E Branch Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- F SPD.
 1. Peak Surge Current Rating: The minimum single-pulse surge current withstand rating per phase shall not be less than 100 kA. The peak surge current rating shall be the arithmetic sum of the ratings of the individual MOVs in a given mode.
 2. Protection modes and UL 1449 VPR for 240/120-V, single-phase, three-wire circuits shall not exceed the following:
 - a. Line to Neutral: 700 V.
 - b. Line to Ground: 700 V.
 - c. Neutral to Ground: 700 V.
 - d. Line to Line: 1200 V.
 3. SCRC: Equal to the SCRC of the panelboard in which installed.
 4. Innominal Rating: 20 kA.

- A Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Eaton.
 2. General Electric Company; GE Energy Management - Electrical Distribution.
 3. SIEMENS Industry, Inc.; Energy Management Division.
 4. Square-D Company.
- B MCCB: Comply with UL 489, with interrupting capacity to meet available fault currents.
 1. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

2. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
3. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
4. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
5. Subfeed Circuit Breakers: Vertically mounted.
6. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
 - f. Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - g. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 - h. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
 - i. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

2.7 IDENTIFICATION

- A Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
- B Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating.
- C Circuit Directory: Directory card inside panelboard door, mounted in metal frame with transparent protective cover.

PART 3 - EXECUTION

3.1 INSTALLATION

- A Comply with NECA 1.
- B Install panelboards and accessories according to NEMA PB 1.1.
- C Mount top of trim 90 inches (2286 mm) above finished floor unless otherwise indicated. Adjust top elevation to ensure that operating handle of the highest overcurrent protective device does not exceed the maximum elevation noted in the NEC.
- D Mount panelboard cabinet plumb and rigid without distortion of box.
- E Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
- F Install overcurrent protective devices and controllers not already factory installed.
- G Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
- H Install filler plates in unused spaces.
- I Stub four 1-inch (27-EMT) empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in the future. Stub four 1-inch (27-EMT) empty conduits into raised floor space or below slab not on grade.
- J Arrange conductors in gutters into groups and bundle and wrap with wire ties.

3.2 IDENTIFICATION

- A Identify field-installed connections, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B Create a directory to indicate installed circuit loads; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.
- C Panelboard Nameplates: Label each panelboard with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D Nameplates: Label each branch circuit device in power panelboards with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- E Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.

3.3 FIELD QUALITY CONTROL

- A Perform tests and inspections.
- B Acceptance Testing Preparation:
 1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
 2. Test continuity of each circuit.
- C Panelboards will be considered defective if they do not pass tests and inspections.
- D Prepare test and inspection reports. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

END OF SECTION 262416

SECTION 262726 - WIRING DEVICES

PART 1 - GENERAL

1.1 SUMMARY

- A Section Includes:
 1. General-use switches.
 2. General-grade duplex straight-blade receptacles.
 3. Receptacles with arc-fault and ground-fault protective devices.
 4. Locking receptacles.
 5. Pin-and-sleeve receptacles.

1.2 DEFINITIONS

- A Commercial/Industrial-Use Cord Reel: A cord reel subject to severe use in factories, commercial garages, construction sites, and hazardous locations requiring a harder service-type cord.
- B UL 1472 Type 1 Dimmer: Dimmer in which air-gap switch is used to energize preset lighting levels.

1.3 ACTION SUBMITTALS

- A Product Data:
 1. Toggle switches.
 2. Single straight-blade receptacles.
 3. Duplex straight-blade receptacles.
 4. Receptacles with GFCI device.
 5. Locking receptacles.
 6. Pin-and-sleeve receptacles.
 7. Spring-driven commercial/industrial-use cord reels.
 8. Cord reels for use in hazardous locations.
 9. Cord connectors.
- B Shop Drawings:
 1. Wiring diagrams for duplex straight-blade receptacles with integral switching means.
- C Field Quality-Control Submittals:
 1. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

- A Manufacturers' Instructions: Record copy of official installation and testing instructions issued to installer by manufacturer for the following:
 1. Single straight-blade receptacles.
 2. Duplex straight-blade receptacles.
 3. Receptacles with GFCI device.
 4. Locking receptacles.
 5. Pin-and-sleeve receptacles.
 6. Spring-driven commercial/industrial-use cord reels.
 7. Cord reels for use in hazardous locations.
- B Sample warranties.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A Special Tools:
 1. Proprietary equipment and software required to maintain, repair, adjust, or implement future changes to controlled receptacles.

2. Proprietary equipment required to maintain, repair, adjust, or implement future changes to cord connectors.

1.6 WARRANTY FOR DEVICES

- A Special Manufacturer Extended Warranty: Manufacturer warrants that devices perform in accordance with specified requirements and agrees to provide repair or replacement of devices that fail to perform as specified within extended warranty period.
 1. Initial Extended Warranty Period: Five years from date of Substantial Completion; full coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 GENERAL-USE SWITCHES

- A Toggle Switch:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - c. Leviton Manufacturing Co., Inc.
 - d. Legrand / Pass & Seymour.
2. Regulatory Requirements:
 - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 GENERAL-USE SWITCHES

- A General Characteristics:
 - a. Reference Standards: UL CCN WMUZ and UL 20.
4. Options:
 - a. Device Color: As selected by Architect.
 - b. Configuration:
 - 1) Extra-heavy-duty, 120-277 V, 20 A, single pole or three way, as indicated on drawings.
5. Accessories:
 - a. Cover Plate: 0.060 inch (1.5 mm) thick, high-impact thermoplastic (nylon) with smooth finish and color matching wiring device; from same manufacturer as wiring device.
 - b. Securing Screws for Cover Plate: Metal with head color matching wallplate finish.

2.3 GENERAL-USE SWITCHES

- A Duplex Straight-Blade Receptacle:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - b. Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - c. Leviton Manufacturing Co., Inc.
 - d. Legrand / Pass & Seymour.
2. Regulatory Requirements:
 - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.4 GENERAL-USE SWITCHES

Electrical Specifications (Continued)

SECTION 262726 - WIRING DEVICES (Continued)

2.4 LOCKING RECEPTACLES

- A. NEMA 250 V, Locking Receptacle:
- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - Leviton Manufacturing Co., Inc.
 - Legrand / Pass & Seymour.
 - Regulatory Requirements:
 - Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
 - General Characteristics:
 - Reference Standards: UL CCN RTRT and UL 498.
 - Options:
 - Device Color: Black with blue voltage indication on face.
 - Configuration:
 - 2 pole, 3 wire, grounding, NEMA L6-30R, or as noted on drawings.
 - 3 pole, 4 wire, grounding, NEMA L15-30R, or as noted on drawings.

2.5 PIN-AND-SLEEVE RECEPTACLES

- A. C2 Series, 125/250 V, Pin-and-Sleeve Receptacles:
- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - ABB, Electrification Business.
 - Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - Crouse-Hinds; brand of Eaton, Electrical Sector.
 - Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - Leviton Manufacturing Co., Inc.
 - Russellstoll.
 - Appleton.
 - Regulatory Requirements:
 - Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
 - General Characteristics:
 - Reference Standards: UL CCN QLIW, UL 1682, and UL 1686.
 - Series: UL 1686 C2 and IEC 60309-2 Series II.
 - Voltage Rating: 125/250 V.
 - Options:
 - Configuration:
 - 3 pole, 4 wire, 30 A, IP67 or 100 A, IP67, as indicated on drawings.
- B. C2 Series, 480 V, Pin-and-Sleeve Receptacles:
- Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - ABB, Electrification Business.
 - Arrow Hart, Wiring Devices; Eaton, Electrical Sector.
 - Crouse-Hinds; brand of Eaton, Electrical Sector.
 - Hubbell Wiring Device-Kellems; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - Killark; brand of Hubbell Electrical Solutions; Hubbell Incorporated.
 - Leviton Manufacturing Co., Inc.
 - Russellstoll.
 - Appleton.
 - Regulatory Requirements:
 - Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
 - General Characteristics:
 - Reference Standards: UL CCN QLIW, UL 1682, and UL 1686.
 - Series: UL 1686 C2 and IEC 60309-2 Series II.
 - Voltage Rating: 480 V.
 - Options:
 - Configuration:
 - 3 pole, 4 wire, Ampere rating as indicated on drawings.

2.6 WALL PLATES

- A. Single and combination types shall match corresponding wiring devices.
- Plate-Securing Screws: Metal with head color to match plate finish.
 - Material for Finished Spaces: Smooth, high-impact thermoplastic.
 - Material for Unfinished Spaces: Galvanized steel.
 - Material for Drop Locations: Cast aluminum with spring-loaded lip cover, and listed and labeled for use in wet and damp locations.

- B. Wet-Location, Weather-Proof Cover Plates: NEMA 250, complying with Type 3R, weather-resistant, die-cast aluminum with lockable cover.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receptacles:
- Verify that receptacles to be procured and installed for Owner-furnished equipment are compatible with mating attachment plugs on equipment.

3.2 INSTALLATION OF SWITCHES

- A. Comply with manufacturer's instructions.
- B. Reference Standards:
- Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
 - Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
 - Consult Architect for resolution of conflicting requirements.

3.3 IDENTIFICATION

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."
- Mark cover or cover plate using hot, stamped, or engraved machine printing with black-filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.4 INSTALLATION OF STRAIGHT-BLADE RECEPTACLES

- A. Comply with manufacturer's instructions.
- B. Reference Standards:
- Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
 - Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
 - Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacles to match configuration diagram in NEMA WD 6.
 - Consult Architect for resolution of conflicting requirements.

3.5 IDENTIFICATION

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."
- Mark cover or cover plate using hot, stamped, or engraved machine printing with black-filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.6 INSTALLATION OF LOCKING RECEPTACLES

- A. Comply with manufacturer's instructions.
- B. Reference Standards:
- Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
 - Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
 - Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacles to match configuration diagram in UL 1686.
 - Consult Architect for resolution of conflicting requirements.

3.7 IDENTIFICATION

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."
- Mark cover or cover plate using hot, stamped, or engraved machine printing with black-filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.8 INSTALLATION OF PIN-AND-SLEEVE RECEPTACLES

- A. Comply with manufacturer's instructions.
- B. Reference Standards:
- Unless more stringent requirements are specified in Contract Documents or manufacturers' instructions, comply with installation instructions in NECA NEIS 130.
 - Mounting Heights: Unless otherwise indicated in Contract Documents, comply with mounting heights recommended in NECA NEIS 1.
 - Receptacle Orientation: Unless otherwise indicated in Contract Documents, orient receptacles to match configuration diagram in UL 1686.
 - Consult Architect for resolution of conflicting requirements.

3.9 IDENTIFICATION

1. Identify cover or cover plate for device with panelboard identification and circuit number in accordance with Section 260553 "Identification for Electrical Systems."
- Mark cover or cover plate using hot, stamped, or engraved machine printing with black-filled lettering, and provide durable wire markers or tags inside device box or outlet box.

3.10 FIELD QUALITY CONTROL OF STRAIGHT-BLADE RECEPTACLES

- A. Tests and Inspections:
- Insert and remove test plug to verify that device is securely mounted.
 - Verify polarity of hot and neutral pins.
 - Measure line voltage.
 - Measure percent voltage drop under 15 Ampere Load. A value of 5 percent or higher is unacceptable.
 - Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
 - Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.
- B. Nonconforming Work:
- Device will be considered defective if it does not pass tests and inspections.
 - Remove and replace defective units and retest.
- C. Assemble and submit test and inspection reports.

3.11 FIELD QUALITY CONTROL OF LOCKING RECEPTACLES

- A. Tests and Inspections:
- Insert and remove test plug to verify that device is securely mounted.
 - Verify polarity of hot and neutral pins.
 - Measure line voltage.
 - Measure percent voltage drop.
 - Measure grounding circuit continuity; impedance must be not greater than 2 ohms.
 - Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.
- B. Nonconforming Work:
- Device will be considered defective if it does not pass tests and inspections.
 - Remove and replace defective units and retest.
- C. Assemble and submit test and inspection reports.

3.12 FIELD QUALITY CONTROL OF PIN-AND-SLEEVE RECEPTACLES

- A. Tests and Inspections:
- Insert and remove test plug to verify that device is securely mounted.
 - Measure line voltage.
 - Measure percent voltage drop.
 - Measure ground impedance, which must be not greater than 2 ohms.
 - Perform additional installation and maintenance inspections and diagnostic tests in accordance with NECA NEIS 130 and manufacturers' instructions.
- B. Nonconforming Work:
- Device will be considered defective if it does not pass tests and inspections.
 - Remove and replace defective units and retest.
- C. Assemble and submit test and inspection reports.

3.0 PROTECTION

- A. Devices:
- Schedule and sequence installation to minimize risk of contamination of wires and cables, devices, device boxes, outlet boxes, covers, and cover plates by plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other materials.
 - After installation, protect wires and cables, devices, device boxes, outlet boxes, covers, and cover plates from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

END OF SECTION 262726

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
- Fusible switches.
 - Nonfusible switches.
 - Receptacle switches.
 - Molded-case circuit breakers (MCB's).
 - Enclosures.

1.3 DEFINITIONS

- A. NC: Normally closed.
- B. NO: Normally open.
- C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).

- B. Shop Drawings: For enclosed switches and circuit breakers.
- Include plans, elevations, sections, details, and attachments to other work.
 - Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Field quality-control reports.
- 1.6 CLOSEOUT SUBMITTALS
- Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals.
 - In addition to items specified in Section 017822 "Operation and Maintenance Data," include the following:
 - Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.

1.7 MAINTENANCE/MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 - Fuse Pullers: Two for each size and type.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Accredited by NETA.
- Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
- Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
 - Altitude: Not exceeding 6600 feet (2010 m).

1.10 WARRANTY

- A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.
1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- D. Comply with NFPA 70.

2.2 FUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- ABB, Electrification Business.
 - Eaton.

3. Siemens Industry, Inc., Energy Management Division.

4. Square-D Company.

B. Type HD, Heavy Duty:

- Single throw.
 - Three pole.
 - 600-V ac.
 - 1200 A and smaller.
 - UL 98 and NEMA KS 1, horsepower rated, with clips or ball pods to accommodate specified fuses.
 - Lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
- Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - Auxiliary Contact Kit: Where indicated on drawings, One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 240-V, ac.
 - Hookstick Handle: Allows use of a hookstick to operate the handle.
 - Logs: Mechanical type, suitable for number, size, and conductor material.
 - Service-Rated Switches: Labeled for use as service equipment.

2.3 NONFUSIBLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- ABB, Electrification Business.
 - Eaton.
 - Siemens Industry, Inc., Energy Management Division.
 - Square-D Company.
- B. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- C. Accessories:
- Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - Auxiliary Contact Kit: Where indicated on drawings, One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - 240-V, ac.
 - Hookstick Handle: Allows use of a hookstick to operate the handle.
 - Logs: Mechanical type, suitable for number, size, and conductor material.
 - Service-Rated Switches: Labeled for use as service equipment.

2.4 RECEPTACLE SWITCHES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- ABB, Electrification Business.
 - Eaton.
 - Siemens Industry, Inc., Energy Management Division.
 - Russellstoll.
 - Appleton.
 - Hubbell.
- B. Type HD, Heavy Duty, Three Pole, Single-Throw Fusible Switch: Voltage and Amperage as indicated on drawings; UL 98 and NEMA KS 1; horsepower rated, with clips or ball pods to accommodate specified fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- C. Interlocking Linkage: Provided between the receptacle and switch mechanisms to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.
- D. Receptacles: Polycasted, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).
- E. Accessories:
- Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - Neutral Kit: If required to serve the receptacle / load, internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - Logs: Mechanical type, suitable for number, size, and conductor material.

2.5 MOLDED-CASE CIRCUIT BREAKERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- ABB, Electrification Business.
 - Eaton.
 - Siemens Industry, Inc., Energy Management Division.
 - Square-D Company.
- B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting areas.
- C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, by trip free, and reside in a tripped position between an on and off to provide local trip indication. Circuit-breaker enclosures shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.
- D. The maximum ampere rating and UL, IEC, or other certification standards, with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breaker/circuit breaker or Fuse/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end-use equipment along with the statement "Cautions - Series Rated System - _____ Amps Available. Identical Replacement Component Required."

- E. MCCB's shall be equipped with a device for locking in the isolated position.
- F. Logs shall be suitable for 194 deg F (90 deg C) rated wire, sized according to the 167 deg F (75 deg C) temperature rating in NFPA 70.
- G. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- H. Thermal-Magnetic: Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuit. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

- I. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (8-mA trip).

1. Features and Accessories:

- Standard frame sizes, trip ratings, and number of poles.
- Logs: Mechanical type, suitable for number, size, trip ratings, and conductor material.
- Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
- Ground-Fault Protection: Comply with UL 1053, remote-mounted and powered type with mechanical ground-fault-pole-selector current transformer/sensor.

2.6 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: The enclosure shall be gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1).
- C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both ends.
- D. Operating Mechanism: The circuit-breaker operating handle shall be externally operable with the operating mechanism being an integral part of the box, not the cover. The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The toggle used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- E. Enclosures designed as NEMA 250 Type 4, 4X, stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

- A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.
- Indoor, Dry and Clean Locations: NEMA 250, Type 1.
 - Outdoor Locations: NEMA 250, Type 3R.
 - Kitchens and Wash-Down Areas: NEMA 250, Type 4X, stainless steel.
 - Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
 - Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.
 - Hazardous Areas Indicated on Drawings: NEMA 250, Type 7 with cover attached by Type 316 stainless steel bolts.

3.3 INSTALLATION

- A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Install individual wall-mounted switches and circuit breakers with tops of uniform height unless otherwise indicated.
- C. Temporary Lifting Procedures: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- D. Install fuses in fusible devices.

E. Comply with NFPA 70 and NECA 1.

3.4 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
- Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - Label each enclosure with engraved metal or laminated-plastic nameplate.
- 3.5 FIELD QUALITY CONTROL
- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Perform tests and inspections.
- C. Tests and Inspections for Switches:
- Visual and Mechanical Inspection:
 - Inspect physical and mechanical condition.
 - Inspect onchorage, alignment, grounding, and clearances.
 - Verify that the unit is clean.
 - Verify blade alignment, blade penetration, travel stops, and mechanical operation.
 - Verify that fuse sizes and types match the Specifications and Drawings.
 - Verify that each fuse has adequate mechanical support and contact integrity.
 - Inspect bolted electrical connections for high resistance using one of the two following methods:
 - Use a low-resistance ohmmeter.
 - Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
 - Verify correct phase barrier installation.
 - Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

- Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."
- D. Tests and Inspections for Molded Case Circuit Breakers:
- Visual and Mechanical Inspection:
 - Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.
 - Inspect physical and mechanical condition.
 - Inspect onchorage, alignment, grounding, and clearances.
 - Verify that the unit is clean.
 - Operate the circuit breaker to ensure smooth operation.
 - Inspect bolted electrical connections for high resistance using one of the two following methods:
 - Use a low-resistance ohmmeter.
 - Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.
 - Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.
 - Inspect operating mechanism, contacts, and chutes in unloaded units.
 - Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

- Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
 - Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.
 - Correct malfunctioning units on-site, where possible, and related to demonstrate compliance; otherwise, replace with new units and retest.
 - Test and adjustment controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.
- Test procedures used.
 - Include identification of each enclosed switch and circuit breaker tested and describe test results.
 - List deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

- Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- Set field-adjustable circuit-breaker trip ranges as specified in Section 260573.16 "Coordination Studies."

END OF SECTION 262816

SECTION 262913.03 - MANUAL AND MAGNETIC MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
- Manual motor controllers.
 - Enclosures.
 - Accessories.
 - Identification.
- 1.2 ACTION SUBMITTALS
- A. Product Data: For each type of product.
- 1.3 INFORMATIONAL SUBMITTALS
- A. Field quality-control reports.
- 1.4 CLOSEOUT SUBMITTALS
- A. Testing and maintenance data.
- 1.5 QUALITY ASSURANCE
- A. Testing Agency Qualifications: Accredited by NETA.
- Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
- B. UL Compliance: Fabricate and label magnetic motor controllers to comply with UL 508 and UL 60947-4.1.
- C. NEMA Compliance: Fabricate motor controllers to comply with ICS 2.

2.2 MANUAL MOTOR CONTROLLERS

- A. Fractional Horsepower Manual Controllers (FHPMC): "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is on, off, or tripped.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Eaton.
 - General Electric Company.
 - Rockwell Automation, Inc.
 - SIEMENS Industry, Inc.; Energy Management Division.

2. Configuration: Nonreversing.

- Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type.
- Pilot Light: Red.

2.3 COMBINATION FULL-VOLTAGE MAGNETIC MOTOR CONTROLLER

- A. Description: Factory-assembled, combination full-voltage magnetic motor controller consisting of the controller described in this article, indicated disconnecting means, SCFD and OCFD, in a single enclosure.

- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- Eaton.
 - General Electric Company.
 - Rockwell Automation, Inc.
 - Siemens Industry, Inc., Energy Management Division.

- C. Standard: Comply with NEMA ICS 2, general-purpose, Class A.
- D. Configuration: Nonreversing.

- E. Contactor Calls: Pressure-encapsulated type.
1. Operating Voltage: Manufacturer's standard, unless indicated.

- F. Control Power:
-

Electrical Specifications (Continued)

SECTION 283111 - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fire-alarm control unit.
 - 2. System smoke detectors.
 - 3. Notification appliances.

1.3 DEFINITIONS

- A. EMT: Electrical Metallic Tubing.
- B. FACP: Fire Alarm Control Panel.
- C. HLI: High Level Interface.
- D. NICET: National Institute for Certification in Engineering Technologies.
- E. PC: Personal computer.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: For fire-alarm system.
 - 1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
 - 2. Include plans, elevations, sections, details, and attachments to other work.
 - 3. Include voltage drop calculations for notification-appliance circuits.
 - 4. Include battery-size calculations.
 - 5. Include input/output matrix.
 - 6. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
 - 7. Include performance parameters and installation details for each detector.
 - 8. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - 9. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.
- B. General Submittal Requirements:
 - 1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
 - 2. Shop Drawings shall be prepared by persons with the following qualifications:
 - a. Trained and certified by manufacturer in fire-alarm system design.
 - b. NICET-certified, fire-alarm technician; Level III minimum.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- 1.6 QUALITY ASSURANCE
 - A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
 - B. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

1.7 PROJECT CONDITIONS

- A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.
- B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - 1. Notify Owner no fewer than seven days in advance of proposed interruption of fire-alarm service.
 - 2. Do not proceed with interruption of fire-alarm service without Owner's written permission.
- C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.8 SEQUENCING AND SCHEDULING

- A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
- B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Source Limitations for Fire-Alarm System and Components: The renovation work indicated on the drawings and herein specified is an extension of the existing fire alarm system installed in the Facility. All new devices and equipment shall be manufactured by the existing fire alarm system manufacturer, and listed for operation on the existing system. Coordinate exact product numbers and system details with the existing fire alarm system manufacturer. The existing fire alarm system manufacturer shall act as a sub-contractor to this Electrical Contractor for the fire alarm system renovation work indicated on the construction document drawings, and herein specified.
- B. Automatic sensitivity control of certain smoke detectors.
- C. All components provided shall be listed for use with the selected system.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

- A. Fire-alarm signal initiation shall be by one or more of the following devices:
 - 1. Manual stations.
 - 2. Heat detectors.
 - 3. Smoke detectors.
 - 4. Duct smoke detectors.
 - 5. Automatic sprinkler system water flow.
- B. Fire-alarm signal shall initiate the following actions:
 - 1. Continuously operate alarm notification appliances.
 - 2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
 - 3. Transmit an alarm signal to the remote alarm receiving station.
 - 4. Unlock electric door locks in designated egress paths.
 - 5. Release fire and smoke doors held open by magnetic door holders.
 - 6. Close smoke dampers in air ducts of designated air-conditioning duct systems.
 - 7. Record events in the system memory.

- C. Supervisory signal initiation shall be by one or more of the following devices and actions:

- 1. Valve supervisory switch.
- 2. User disabling of zones or individual devices.

- D. System trouble signal initiation shall be by one or more of the following devices and actions:

- 1. Open circuits, shorts, and grounds in designated circuits.
- 2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
- 3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
- 4. Loss of primary power at fire-alarm control unit.
- 5. Ground or a single break in internal circuits of fire-alarm control unit.
- 6. Abnormal ac voltage at fire-alarm control unit.
- 7. Break in standby battery circuitry.
- 8. Failure of battery charging.
- 9. Abnormal position of any switch at fire-alarm control unit or annunciator.
- E. System Supervisory Signal Actions:
 - 1. Initiate notification appliances.
 - 2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
 - 3. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.

2.3 FIRE-ALARM CONTROL UNIT

- A. The fire alarm system control unit is existing to remain, and is to be expanded to facilitate the renovation work indicated on the drawings. It shall be the responsibility of the Electrical Contractor, working with the existing fire alarm system manufacturer to identify all modifications and revisions to the existing fire alarm control panel, as well as all wiring methods for connecting new initiating and notification appliances to the control panel. The existing fire alarm system manufacturer shall act as a sub-contractor to this Electrical Contractor for all work associated with the renovation and expansion of the existing fire alarm system to serve the renovation area.

2.4 SYSTEM SMOKE DETECTORS

- A. General Requirements for System Smoke Detectors:
 - 1. Comply with UL 268; operating at 24-V dc, nominal.
 - 2. Detectors shall match the existing wire type used in the existing facility as directed by the existing fire alarm system manufacturer.
 - 3. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - 4. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - 5. Integral Visual-Indicating Light: LED type, indicating detector has operated and power-on status.
 - 6. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
- B. Photoelectric Smoke Detectors:
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
- C. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 - 1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - 2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - a. Primary status.
 - b. Device type.
 - c. Present average value.
 - d. Present sensitivity selected.
 - e. Sensor range (normal, dirty, etc.).
 - 3. Each sensor shall have multiple levels of detection sensitivity.
 - 4. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - 5. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.5 NOTIFICATION APPLIANCES

- A. Notification appliances shall be manufactured by the same manufacture as the existing appliances used in the facility and listed for use on the existing fire alarm system and associated Notification Appliance Circuit Panels installed in the facility.
- B. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.
 - 1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.
- C. Speakers: Match existing speaker type and specification used in facility.
- D. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch (25-mm) high letters on the lens.
 - 1. Rated Light Output:
 - a. 15/30/75/110 cd, selectable in the field.
 - 2. Mounting: Wall mounted unless otherwise indicated.
 - 3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - 4. Flashing shall be in a temporal pattern, synchronized with other units.
 - 5. Strobe Leads: Factory connected to screw terminals.
 - 6. Mounting Faceplate: Factory finished, red.

2.6 ADDRESSABLE INTERFACE DEVICE

- A. General:
 - 1. Include address-setting means on the module.
 - 2. Store an internal identifying code for control panel use to identify the module type.
 - 3. Listed for controlling HVAC fan motor controllers.
- B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.
- C. Integral Relay: Capable of providing a direct signal to the equipment controlled.
 - 1. Allow the control panel to switch the relay contacts on command.
 - 2. Have a minimum of two normally open and two normally closed contacts available for field wiring.
- D. Control Module:
 - 1. Operate notification devices.
 - 2. Operate solenoids for use in sprinkler service.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment and wiring are installed, before installation begins.
- B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

- A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."
 - 1. Devices placed in service before all other trades have completed cleanup shall be replaced.
 - 2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.
- B. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - 1. Connect new equipment to existing control panel in existing part of the building.
 - 2. Expand, modify, and supplement existing control equipment as necessary to extend existing control functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
- C. Smoke- or Heat-Detector Spacing:
 - 1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
 - 2. Smooth ceiling spacing shall not exceed 28 feet.
 - 3. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
 - 4. HVAC: Locate detectors not closer than 36 inches (910 mm) from air-supply diffuser or return-air opening.
 - 5. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.
- D. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.
- E. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.
 - 1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.
- F. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.
- G. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.
- H. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.
- I. Device Location-Indicating Lights: Locate in public space near the device they monitor.

3.3 PATHWAYS

- Retain one of first two paragraphs below.
 - A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.
 - 1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.
 - B. Pathways shall be installed in EMT.
 - C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

- A. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - 1. Smoke dampers in air ducts of designated HVAC duct systems.

3.5 IDENTIFICATION

- A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.6 GROUNDING

- A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

- A. Field tests shall be witnessed by authorities having jurisdiction.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
 - 1. Visual Inspection: Conduct visual inspection prior to testing.
 - 2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
 - 3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - 4. Test visible appliances for the public operating mode according to manufacturer's written instructions.
- E. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
- F. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
- G. Fire-alarm system will be considered defective if it does not pass tests and inspections.
- H. Prepare test and inspection reports.

END OF SECTION 283111



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TAC Project No. 25-009

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DEPT. OF HEALTH & HUMAN SERVICES
CADILLAC PLACE 4TH FLOOR
ANNEX TRAINING SUITE
BUILD-OUT


FILE NO: 491_24304_MNB

CADILLAC PLACE
3044 W. GRAND BLVD
DETROIT, MICHIGAN 48202

2434

STATE OF MICHIGAN
DEPARTMENT OF TECHNOLOGY, MANAGEMENT AND BUDGET
STATE FACILITIES ADMINISTRATION
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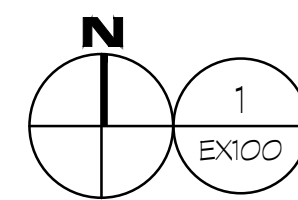
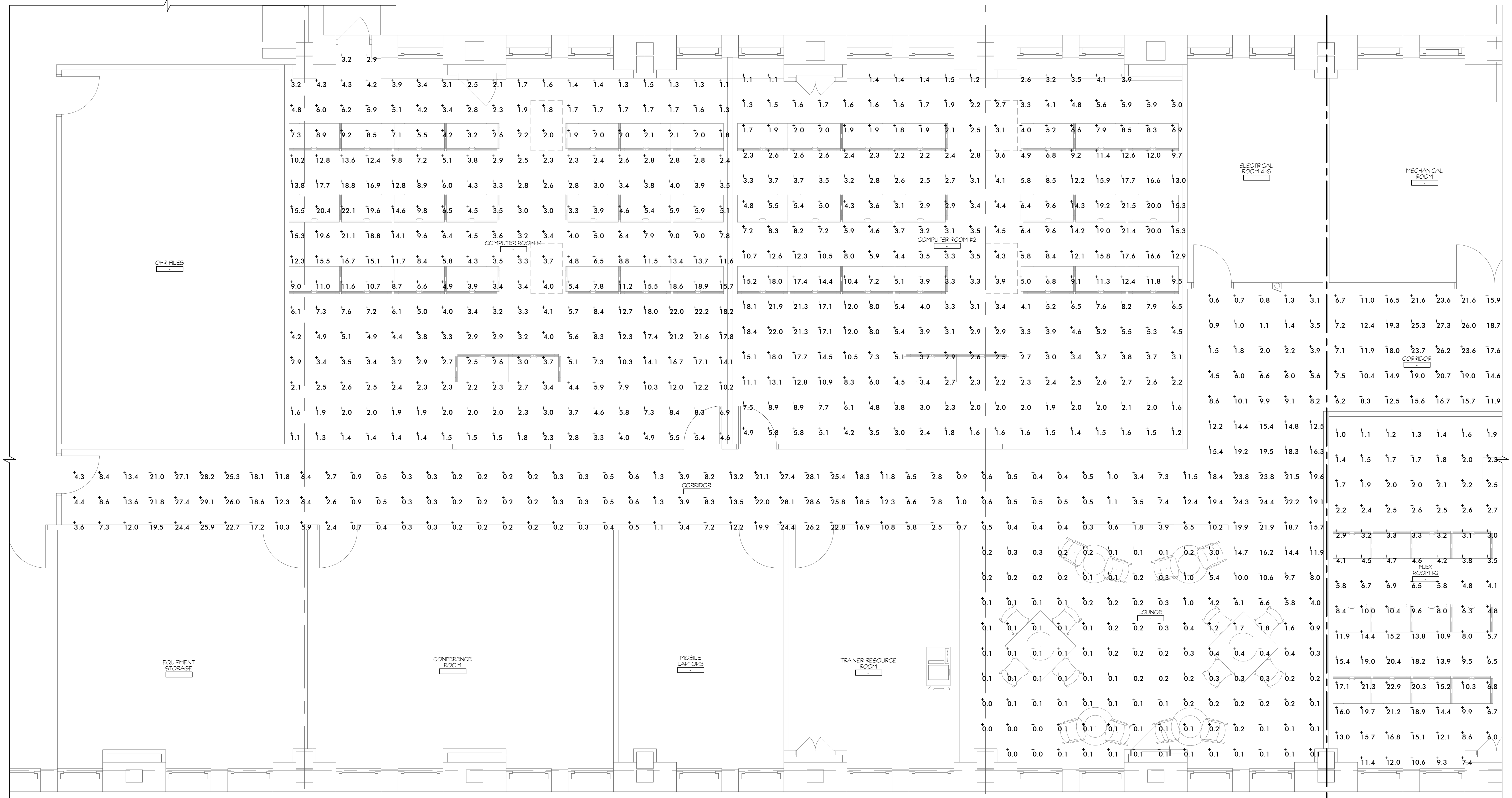


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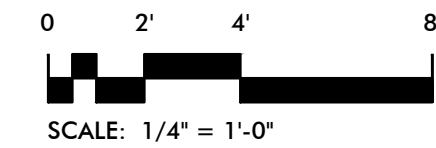
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ELECTRICAL SPECIFICATIONS

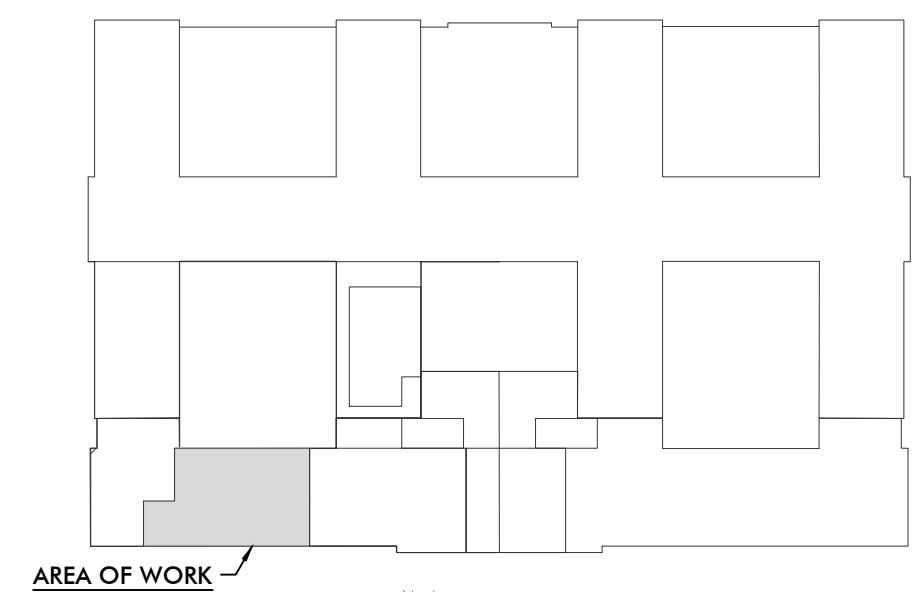


PARTIAL FOURTH FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY
SCALE: 1/4" = 1'-0"



MATCHLINE
REFER TO SHEET EX101
FOR CONTINUATION

Emergency Egress Lighting Photometry Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Min
Computer Room 1_Floor	Illuminance	Fc	6.31	22.2	1.1	5.74
Computer Room 2_Floor	Illuminance	Fc	6.34	22.0	1.1	5.76
Flex Room 1_Floor	Illuminance	Fc	6.42	22.7	0.8	8.03
Flex Room 2_Floor	Illuminance	Fc	6.85	23.5	0.8	8.56
Open Office and Corridor_Floor	Illuminance	Fc	8.54	26.2	0.7	12.20
Seminar Classroom A_Floor	Illuminance	Fc	5.48	23.5	0.6	9.13
Seminar Classroom B_Floor	Illuminance	Fc	5.26	21.0	0.6	8.77
Corridor - North	Illuminance	Fc	12.35	26.2	3.6	3.43
Open Office	Illuminance	Fc	5.95	20.4	0.7	8.50



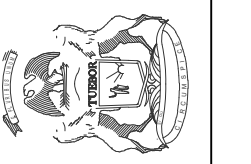
KEY PLAN
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BUILD-OUT

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PARTIAL FOURTH FLOOR
PLAN - EMERGENCY EGRESS
LIGHTING PHOTOMETRY

EX100

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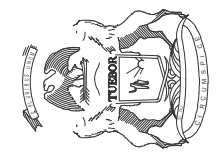
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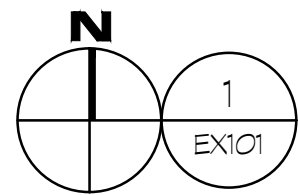
PARTIAL FOURTH FLOOR
PLAN - EMERGENCY EGRESS
LIGHTING PHOTOMETRY

EX101



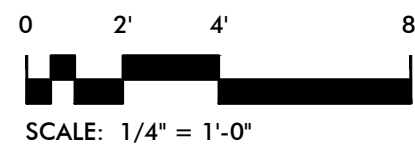
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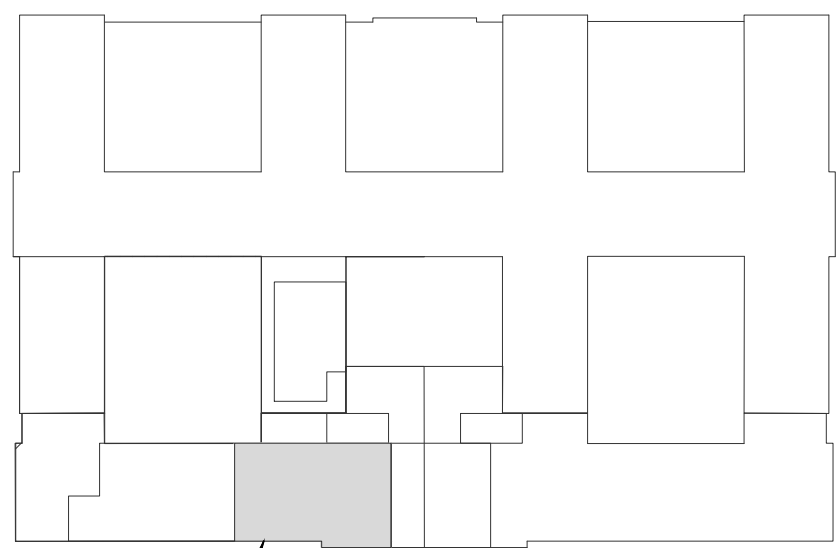
PARTIAL FOURTH FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY

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



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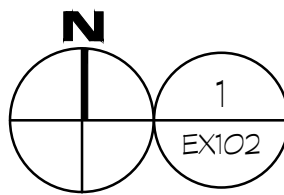
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Computer Room 2_Floor	Illuminance	Fc	6.34	22.0	1.1	5.76	20.00
Flex Room 1_Floor	Illuminance	Fc	6.42	22.7	0.8	8.03	28.38
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Open Office and Corridor_Floor	Illuminance	Fc	8.54	26.2	0.7	12.20	37.43
Seminar Classroom A_Floor	Illuminance	Fc	5.48	23.5	0.6	9.13	39.17
Seminar Classroom B_Floor	Illuminance	Fc	5.26	21.0	0.6	8.77	35.00
Corridor - North	Illuminance	Fc	12.35	26.2	3.6	3.43	7.28
Open Office	Illuminance	Fc	5.95	20.4	0.7	8.50	29.14



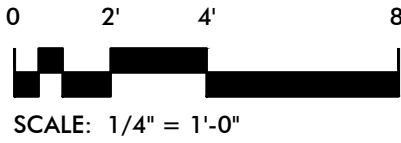
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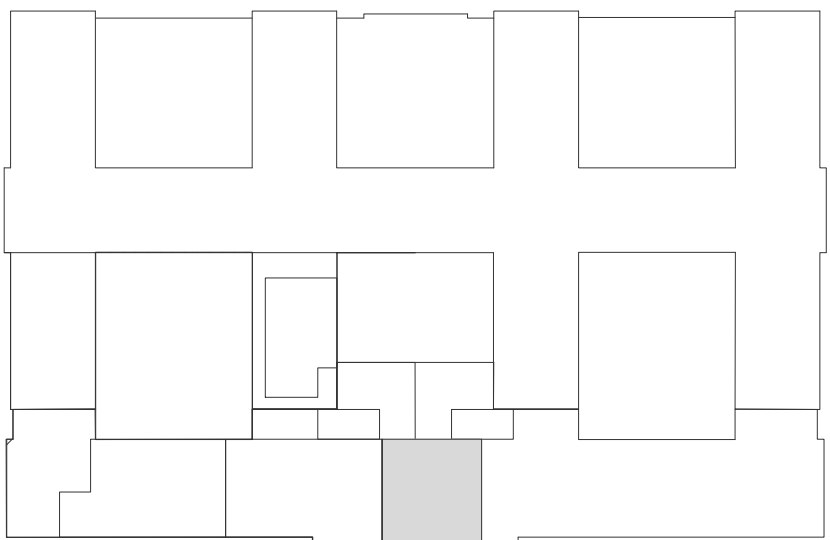
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PARTIAL FOURTH FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY
SCALE: 1/4" = 1'-0"



Emergency Egress Lighting Photometry Calculation Summary							
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KEY PLAN
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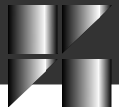
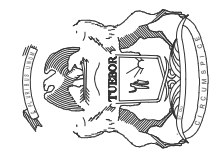
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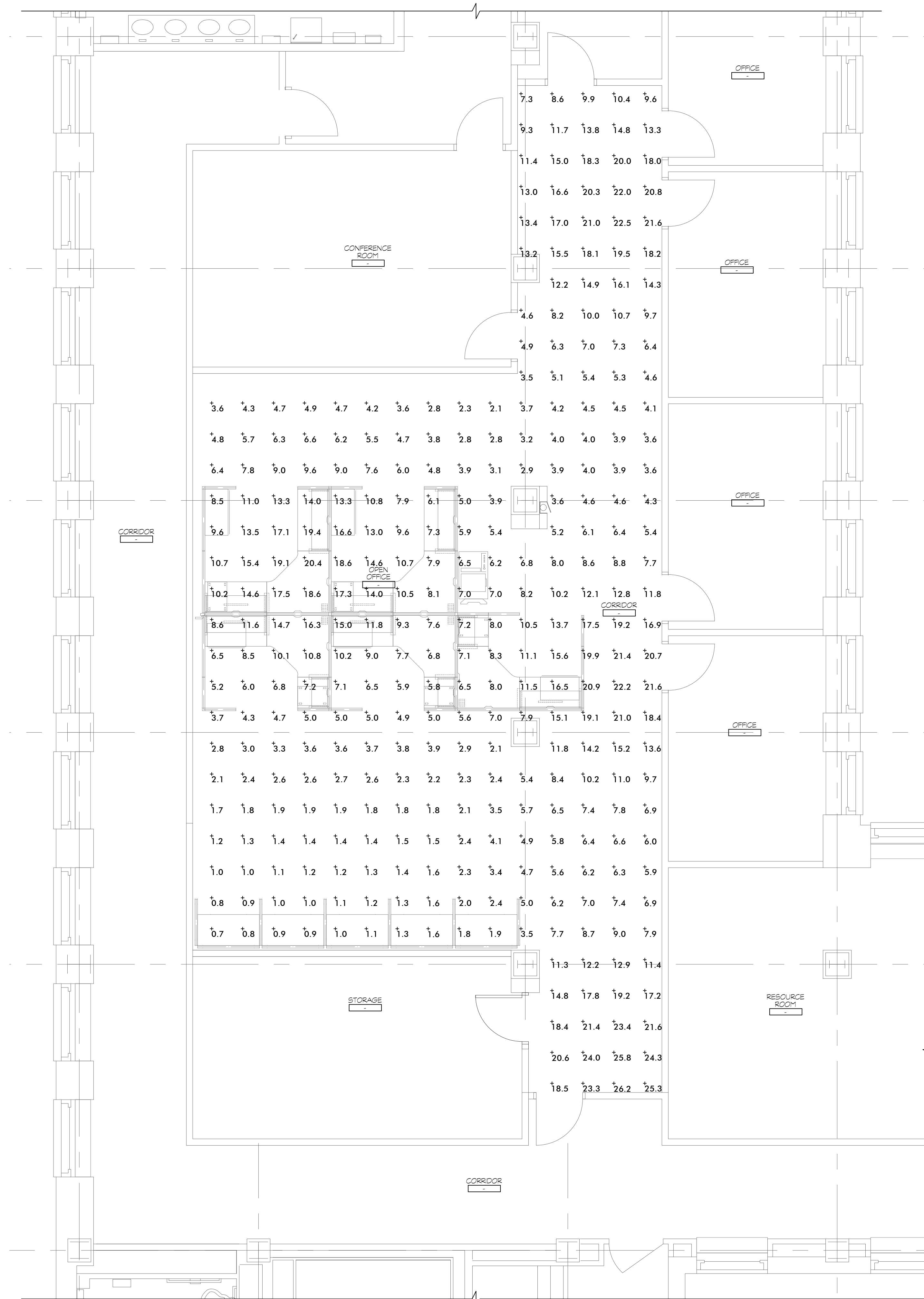


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**PARTIAL FOURTH FLOOR
PLAN - EMERGENCY EGRESS
LIGHTING PHOTOMETRY**



Emergency Egress Lighting Photometry Calculation Summary							
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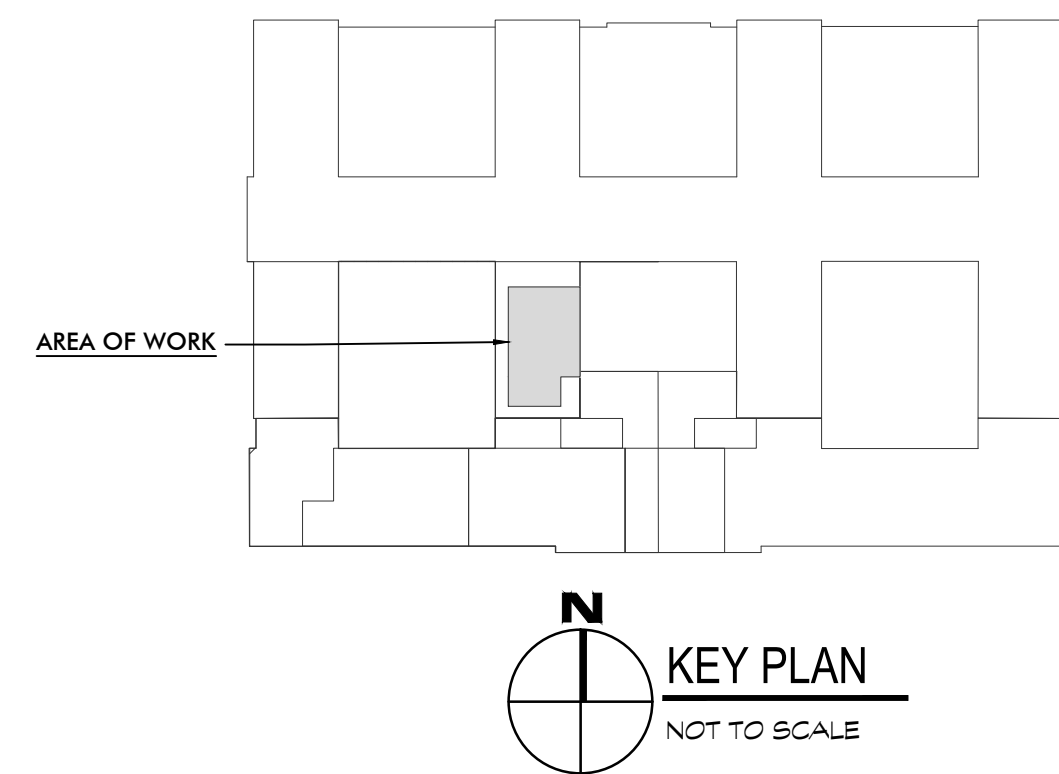
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PARTIAL FOURTH FLOOR
PLAN - EMERGENCY EGRESS
LIGHTING PHOTOMETRY



1
EX103

PARTIAL FOURTH FLOOR PLAN - EMERGENCY EGRESS LIGHTING PHOTOMETRY

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



0 2' 4' 8'

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