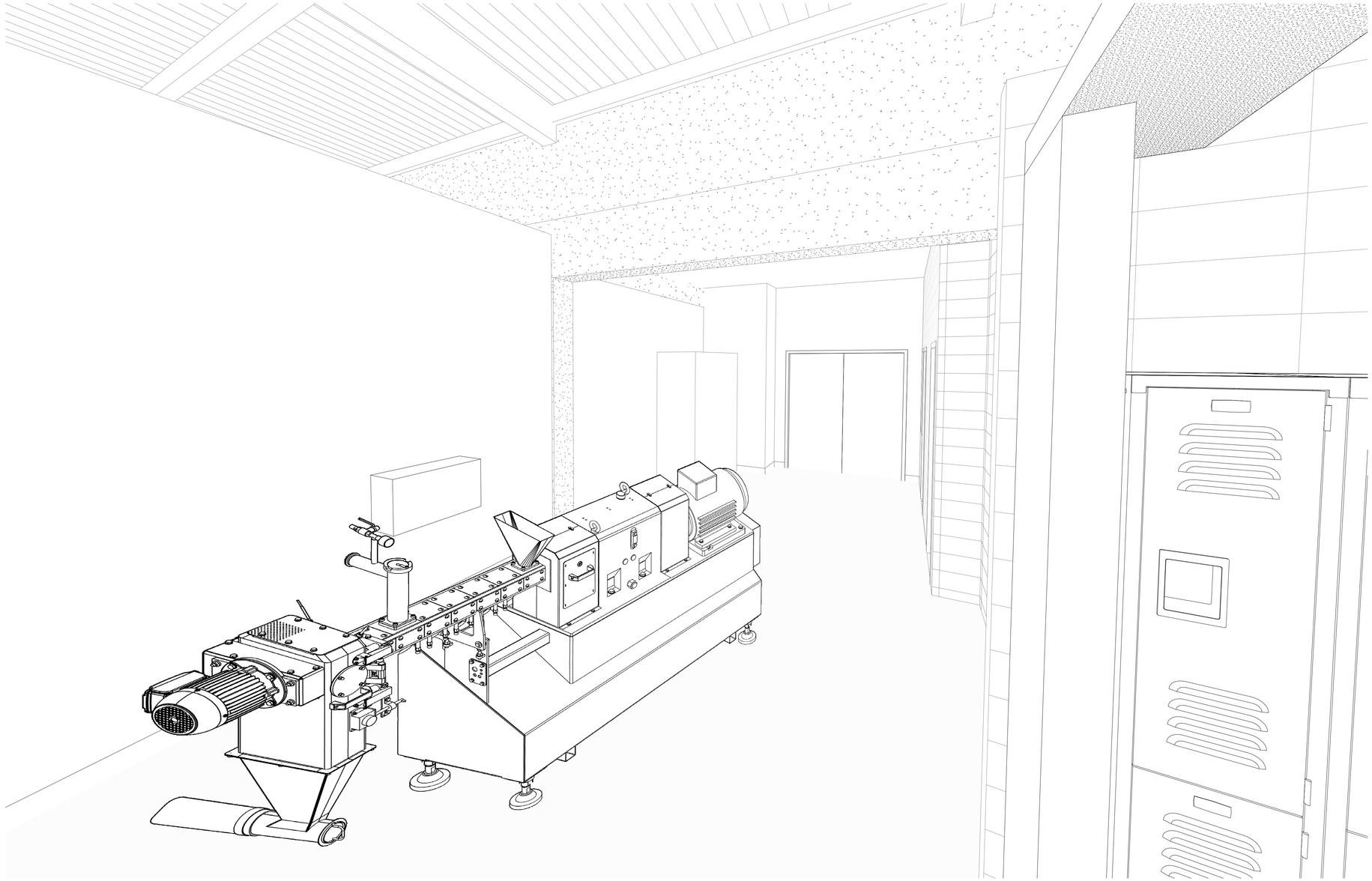

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PROJECT NO.: PPA#23-0871
AAI#25013.01

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2880 TECHNOLOGY BLVD.
BOZEMAN MT, 59718

ELECTRICAL ENGINEER
MORRISON-MAIERLE
2880 TECHNOLOGY BLVD.
BOZEMAN MT, 59718

CURRENT ADOPTED CODES:

- **2021 International Building Code (IBC)**
  - ARM Rule 24.301.146
- **2021 International Mechanical Code (IMC)**
  - ARM Rule 24.301.172
- **2021 International Fuel Gas Code (IFGC)**
  - ARM Rule 24.301.173
- **2021 International Energy Conservation Code (IECC)**
  - ARM Rule 24.301.161
- **ICC A117.1-2017 Standard for Accessible and Usable Buildings and Facilities**
  - ARM Subchapter 24.301.9
- **2021 International Existing Building Code (IEBC)**
  - ARM Rule 24.301.171
- **2020 National Electrical Code (NEC)**
  - ARM Rule 24.301.401
- **2021 Uniform Plumbing Code (UPC) (IAPMO)**
  - ARM Rule 24.301.301
- **2021 international Swimming Pool and Spa Code**
  - ARM Rule 24.301.175
- **2021 International Fire Code**
  - ARM Rule 23.12.601
  - Admin Order 2023-04 Adoption of 2021 Fire Code

https://www.bozeman.net/departments/community-development/building/adopted-codes

MONTANA STATE UNIVERSITY

HARRISON LAB 132 REMODEL

PERMIT & BID SET

ISSUE DATE: 10.23.2025

ARCHITECTURAL ABBREVIATIONS

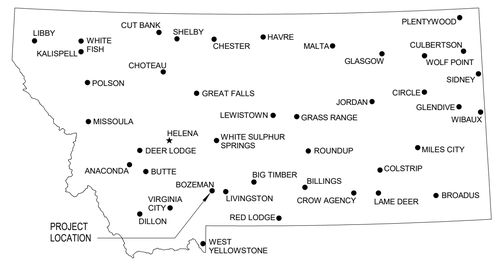
&	AND
∠	ANGLE
@	AT
CL	CENTERLINE
o	DEGREE
#	NUMBER
ABV	ABOVE
AC	ASPHALTIC CONCRETE
ACP	ACOUSTICAL CEILING PANEL
ACT	ACOUSTICAL CEILING TILE
ACOUS	ACOUSTICAL
ADD	ADDITION
AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
ALT	ALTERNATE
ALUM	ALUMINUM
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASPH	ASPHALT
AVG	AVERAGE
BD	BOARD
BLDG	BUILDING
BLKG	BLOCKING
BLW	BELOW
BM	BENCH MARK
B.O.	BOTTOM OF
B.S.	BOTH SIDES
BTU	BRITISH THERMAL UNIT
BUR	BUILT-UP ROOF
CAB	CABINET
C.B.	CATCH BASIN
CEM	CEMENT
C.I.	CAST IRON
CIRC	CIRCULAR
CLG	CEILING
CLR.	CLEAR
C.M.P.	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
COL	COLUMN
COMP	COMPOSITION
CONC	CONCRETE
CONSTR	CONSTRUCTION
CONT	CONTINUOUS
COOR	COORDINATE
CORR	CORRIDOR
C.R.	COLD ROLLED
C.R.C.	COLD ROLLED CHANNEL
C.T.	CERAMIC TILE
CTR	CENTER
DBL	DOUBLE
DEPT	DEPARTMENT
D.F.	DRINKING FOUNTAIN
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM.	DIMENSION
DISP	DISPENSER
DL	DEAD LOAD
DN.	DOWN
DS	DOWNSPOUT
DWG	DRAWINGS
E	EAST
(E)	EXISTING
EA	EACH
E.I.F.S.	EXTERIOR INSULATION & FINISH SYSTEM
ELEV	ELEVATION
ELEV	ELEVATOR
ELEC	ELECTRICAL
EMB	EMBOSSING
EQ	EQUAL
EQUIP	EQUIPMENT
E.G.	EACH SIDE
EXIST	EXISTING
EXP	EXPOSED
EXP.AGG.	EXPANSION EXPOSED AGGREGRATE
EXP.JT.	EXPANSION JOINT EXTERIOR
F.B.	FLAT BAR
F.D.	FLOOR DRAIN
FDN	FOUNDATION
F.E.	FIRE EXTINGUISHER
F.E.C.	FIRE EXTINGUISHER CABINET
FIN	FINISH
FF	FACTORY FINISH(ED)
FF	FINISH FLOOR
FLUOR	FLUORESCENT
F.O.B.	FACE OF BLOCK
F.O.F.	FACE OF FINISH
F.O.S.	FACE OF STUD
F.O.	FACE OF (Conc. etc.)
F.R.P.	FIBER REINFORCED PANEL
FRPF	FIREPROOFING
FRT	FIRE-RETARDENT TREATED
FT	FOOT OR FEET
FTG	FOOTING
FURR	FURRING
FUT	FUTURE
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
G.B.	GRAB BAR
G.I.	GALVANIZED IRON
GL	GLASS
GT	GLASS TYPE
GWB	GYPSUM WALL BOARD
GYM	GYMNASIUM
GYP.	GYPSUM
H.B.	HOSE BIB
H.C.	HOLLOW CORE
HDWD	HARDWOOD
HDWR	HARDWARE
H.M.	HOLLOW METAL
H.M.F.	HOLLOW METAL FRAME
HORIZ	HORIZONTAL
H.P.	HIGH POINT
HR	HOUR
HT	HEIGHT
HW	HOT WATER
HWY	HIGHWAY
I.D.	INSIDE DIAMETER
(") OR IN	INCHES
IHM	INSULATED HOLLOW METAL
INSUL	INSULATION
INT	INTERIOR
JAN	JANITOR
JT	JOINT
KIT	KITCHEN
LAB	LABORATORY
LAM	LAMINATE OR LAMINATED
LAV	LAVATORY
LB	POUND
LH	LEFT HAND
LL	LIVE LOAD
L.O.W.	LIMITS OF WORK
L.P.	LOW POINT
MAT'L	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MET OR MTL	METAL
MFR	MANUFACTURER
MH	MANHOLE
MIN	MINIMUM OR MINUTE
MISC	MISCELLANEOUS
M.O.	MASONRY OPENING
MULL	MULLION
N	NORTH
NE	NORTHEAST
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
NW	NORTHWEST
O	OVER
O.C.	ON CENTER
O.D.	OUTSIDE DIAMETER
OFD	OVERFLOW DRAIN
OFF	OFFICE
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OH	OVERHEAD
OPNG	OPENING
OPP	OPPOSITE
PARA	PARALLEL
PART	PARTITION
PERF	PERFORATED
PERM	PERMANENT
PERP	PERPENDICULAR
P.I.C.	PRECAST INSULATED CONCRETE
PL	PLATE
P.LAM	PLASTIC LAMINATE
PLAST	PLASTER
PLYWD	PLYWOOD
PR	PAIR
PREFAB	PREFABRICATED
PRMA	PROTECTED MEMBRANE ROOF ASSEMBLY
PROJ	PROJECT
PT	POINT AND PAINT
P.T.	PRESERVATIVE TREATED
PTD	PAPER TOWEL DISPENSER
PVC	POLYVINYL CHLORIDE
R	RISER OR RADIUS
R.D.	ROOF DRAIN
REF	REFERENCE
REFR	REFRIGERATOR
REINF	REINFORCING
REQ	REQUIRED
R.H.	RIGHT HAND
RL	RELOCATE
R.L.	RAIN LEADER
RM	ROOM
R.O.	ROUGH OPENING
R.O.W.	RIGHT OF WAY
RTU	ROOF TOP UNIT
S	SOUTH
SAN	SANITARY
S.C.	SOLID CORE
SCHED	SCHEDULE
SE	SOUTHEAST
SECT	SECTION
SHEATH	SHEATHING
SHT	SHEET
SIM	SIMILAR
SND	SANITARY NAPKIN DISPENSER
SPEC	SPECIFICATIONS
SQ	SQUARE
S.S.	SANITARY SEWER
S.ST.	STAINLESS STEEL
STD	STANDARD
STL	STEEL
STOR	STORAGE
STRUCT	STRUCTURAL
ST.S	STORM SEWER
SUSP	SUSPENDED
SV	SHEET VINYL
SW	SOUTHWEST
SYM	SYMMETRICAL
TB	TACKBOARD
TBHM	THERMALLY- BROKEN HOLLOW METAL
TEL	TELEPHONE
TEMP	TEMPORARY
TERR	TERRAZZO
T&G	TONGUE AND GROOVE
THRU	THROUGH
T.O.	TOP OF (eg CONCRETE)
T.O.S.	TOP OF STEEL
TV	TELEVISION
TYP	TYPICAL
UAA	UNIVERSITY OF ALASKA ANCHORAGE
UL	UNDERWRITERS LABORATORY
UNFIN	UNFINISHED
UNO	UNLESS NOTED OTHERWISE
VCT	VINYL COMPOSITION TILE
VERT	VERTICAL
VEST	VESTIBULE
VR	VAPOR RETARDER
VTR	VENT THROUGH ROOF
W	WEST
W/	WITH
WC	WATER CLOSET
WD	WOOD
W/O	WITHOUT
WP	WATERPROOF
WT	WEIGHT

PROJECT DESCRIPTION

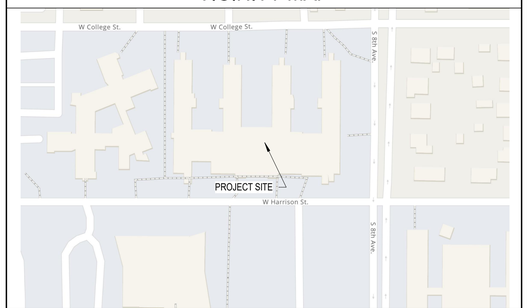
THE RENOVATION OF THE EXTRUDER LAB IS AIMED AT IMPROVING OPERATIONAL EFFICIENCY AND ENSURING A SAFER WORKING ENVIRONMENT. KEY UPDATES INCLUDE THE RECONFIGURATION OF EXTRUDING PROCESS EQUIPMENT TO ESTABLISH A MORE EFFICIENT LAYOUT WITHIN THE LAB SPACE. ADDITIONALLY, A DEDICATED WET ROOM HAS BEEN DESIGNATED TO HOUSE CLEANING AND SANITARY FUNCTIONS, EFFECTIVELY SEPARATING THEM FROM THE MAIN LAB ACTIVITIES.

FURTHER ENHANCEMENTS INCLUDE THE CREATION OF A MORE CONTAINED AND UNIFORM PREPARATION AREA, WHICH WILL FEATURE INDIVIDUAL LOCKERS TO SUPPORT BETTER ORGANIZATION AND HYGIENE.

STATE MAP

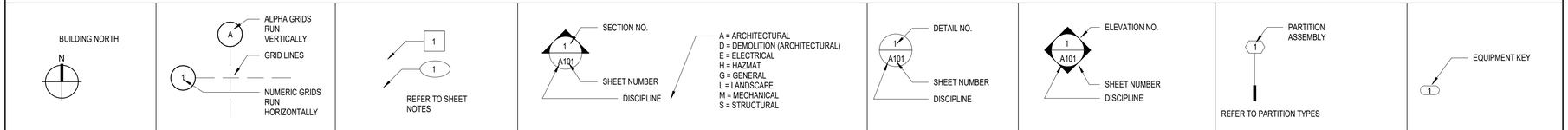


VICINITY MAP



DRAWING INDEX

ARCHITECTURAL DRAWING CONVENTIONS



GENERAL PROJECT NOTES

1. ALL WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE PROVISIONS OF THE BUILDING CODES OUTLINED ON THE LIFE SAFETY PLAN, AND ALL OTHER STATE AND LOCAL CODES, INCLUDING ALL AMENDMENTS.
2. ALL WORK SHALL CONFORM TO THE AMERICAN DISABILITIES ACT (A.D.A.) ACCESSIBILITY GUIDELINES FOR BUILDING AND FACILITIES (A.D.D.A.G.) AND A.N.S.I. 117.1 UNLESS NOTED OTHERWISE.
3. ALL DIMENSIONS ARE TO FACE OF STUD, FACE OF CONCRETE, FACE OF C.M.U., TO CENTERLINE OF STRUCTURAL COLUMN, OR TO STRUCTURAL GRID-LINE UNLESS NOTED OTHERWISE.
4. DIMENSIONS NOTED AS 'CLEAR' (OR CLR.) SHALL BE TO FINISHED FACE.
5. DO NOT SCALE THE DRAWINGS TO OBTAIN CONSTRUCTION DIMENSIONS.

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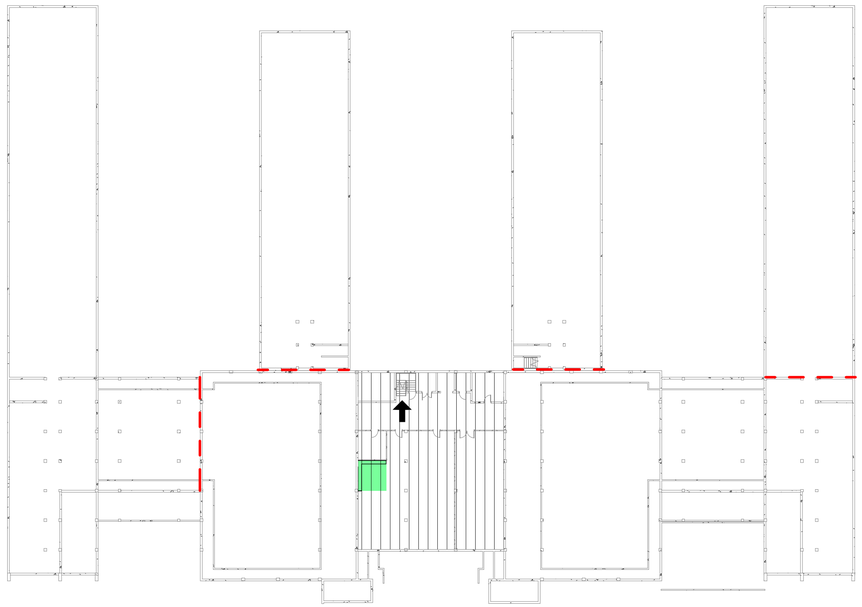
HARRISON LAB 132
REMODEL
STREET ADDRESS

Revisions		
No.	Description	Date

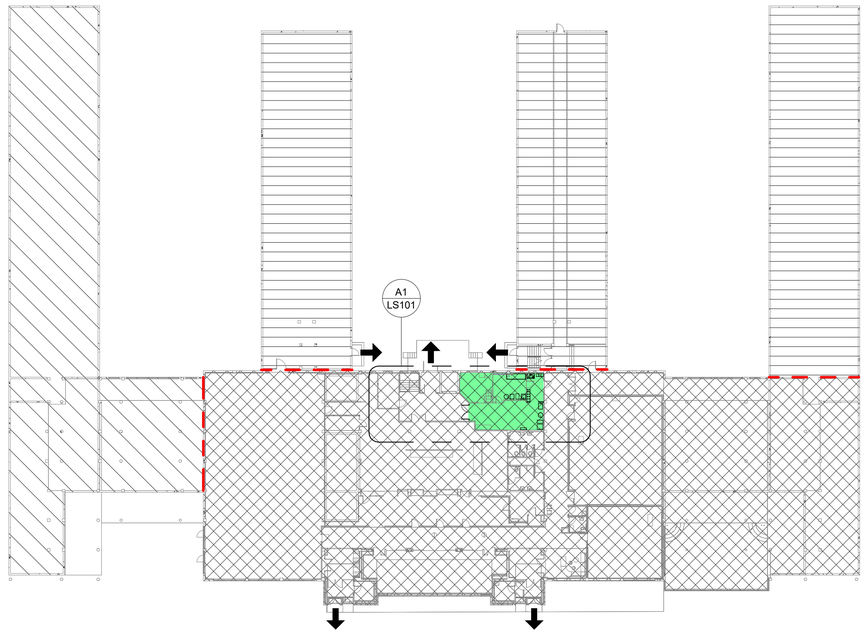
Drawn by TB	Date 10.23.2025
Checked MM	Job No. PPA#23-0871 AA#25013.01

Sheet Contents
GENERAL NOTES, ABBREVIATIONS, LOCATION MAP AND SHEET INDEX

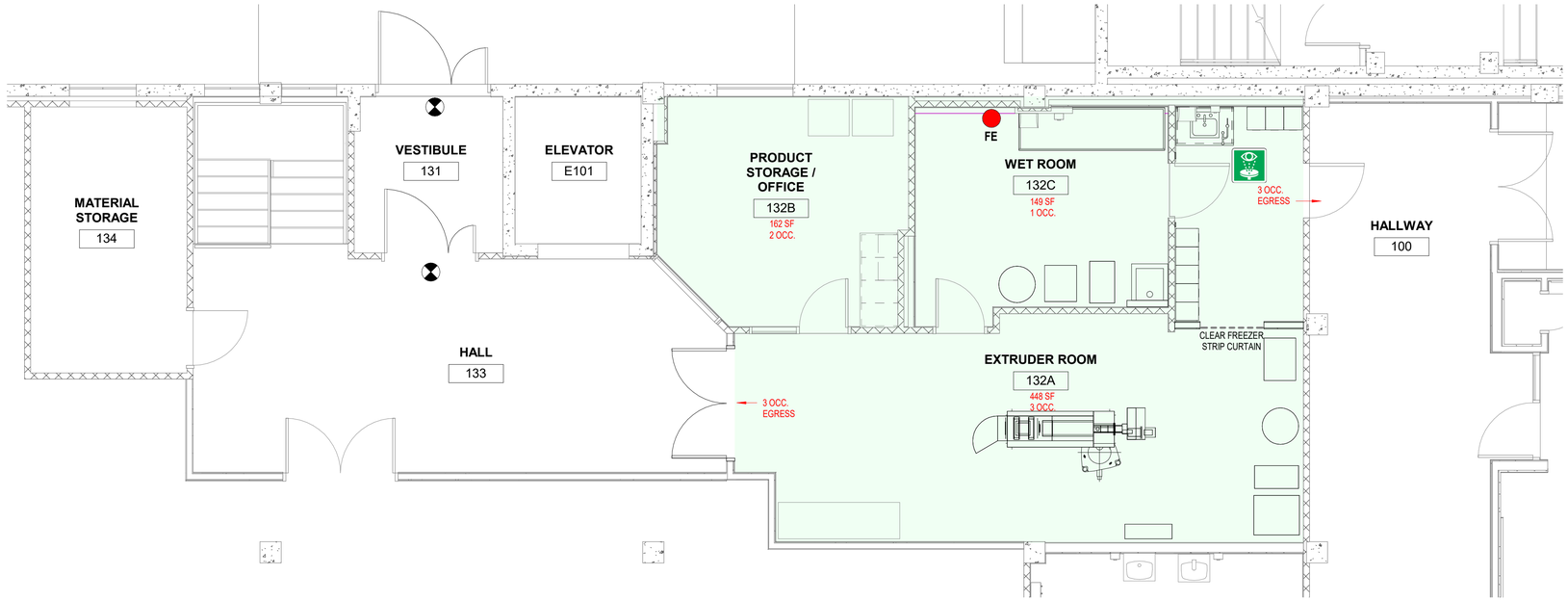
Sheet No.
G100



C1 LS101 LEVEL B LIFE SAFETY OVERALL PLAN
1/32" = 1'-0"



C2 LS101 LEVEL 1 LIFE SAFETY OVERALL PLAN
1/32" = 1'-0"



A1 LS101 LEVEL 1 LIFE SAFETY PARTIAL PLAN
1/4" = 1'-0"

LIFE SAFETY PLAN LEGEND

- AREA OF WORK
- EXISTING B OCCUPANCY
- EXISTING R2 OCCUPANCY
- EXISTING A3 OCCUPANCY
- EXISTING S-2 OCCUPANCY
- EXISTING 1-HOUR FIRE RATED WALL
- EXISTING EXIT SIGN LOCATION
- FE — EXISTING FIRE EXTINGUISHER UL-RATED: 2A-10B:C
- EMERGENCY EYEWASH
- EXISTING EXIT DISCHARGE

BUILDING CODE INFORMATION

LEVEL 1 ALTERATION PER IEBC 2021
LEVEL 1 ALTERATIONS INCLUDE THE REMOVAL AND REPLACEMENT OR THE COVERING OF EXISTING MATERIALS, ELEMENTS, EQUIPMENT OR FIXTURES USING NEW MATERIALS, ELEMENTS, EQUIPMENT, OR FIXTURES THAT SERVE THE SAME PURPOSE.

EXISTING BUILDING CONSTRUCTION TYPE 3B W/ SPRINKLER SYSTEM (NO CHANGE)

EXISTING OCCUPANCY CLASSIFICATIONS: (LEVEL 1) (NO CHANGE)
A3 - ASSEMBLY 25,227 SF
B - BUSINESS 10,840 SF
R2 - RESIDENTIAL 17,010 SF

AREA OF WORK:

800 SF MAIN LEVEL & 155 SF LOWER LEVEL

EXISTING OCCUPANT LOAD: (NO CHANGE)

OCCUPANCY OF SPACES PER IBC 2021, TABLE 1004.5
BUSINESS = 150 SF GROSS

EXISTING AREA OF WORK = 6 OCCUPANTS (NO CHANGE)

FIRE SUPPRESSION:

EXISTING AREA OF WORK = ORDINARY HAZARD GROUP 1 CLASSIFICATION (NO CHANGE)

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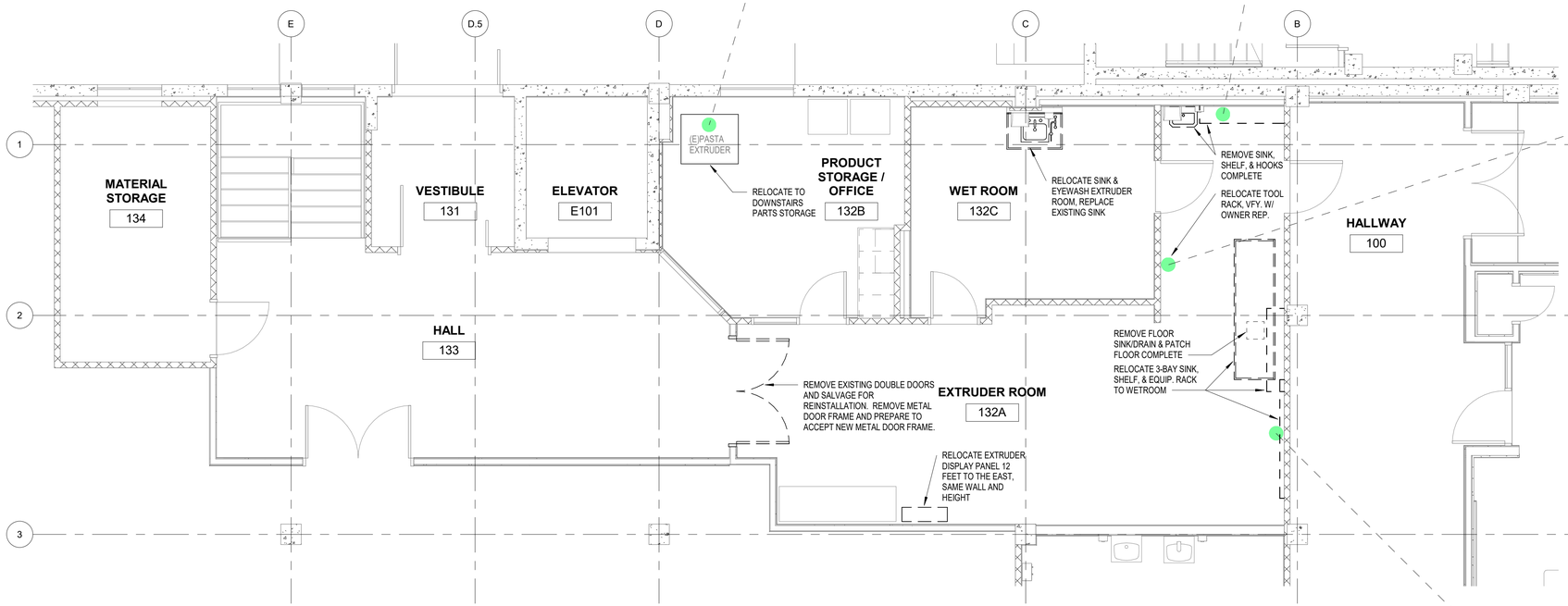
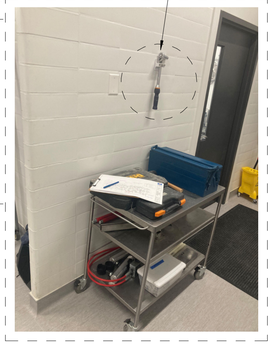
Sheet Contents
LIFE SAFETY PLANS

Sheet No.
LS101



1 D101 MAIN LEVEL DEMOLITION PLAN
1/4" = 1'-0"



PATCH ATTACHMENT HOLES W/ SILICONE KITCHEN & BATH SEALANT, COLOR TO MATCH EXISTING WALL FINISH

(RC) SHELF TO WET ROOM NORTH WALL, PATCH ATTACHMENT HOLES W/ SILICONE KITCHEN & BATH SEALANT, COLOR TO MATCH

(RC) EQUIPMENT RACK TO WET ROOM SOUTH WALL, PATCH ATTACHMENT HOLES W/ SILICONE KITCHEN & BATH SEALANT, COLOR TO MATCH

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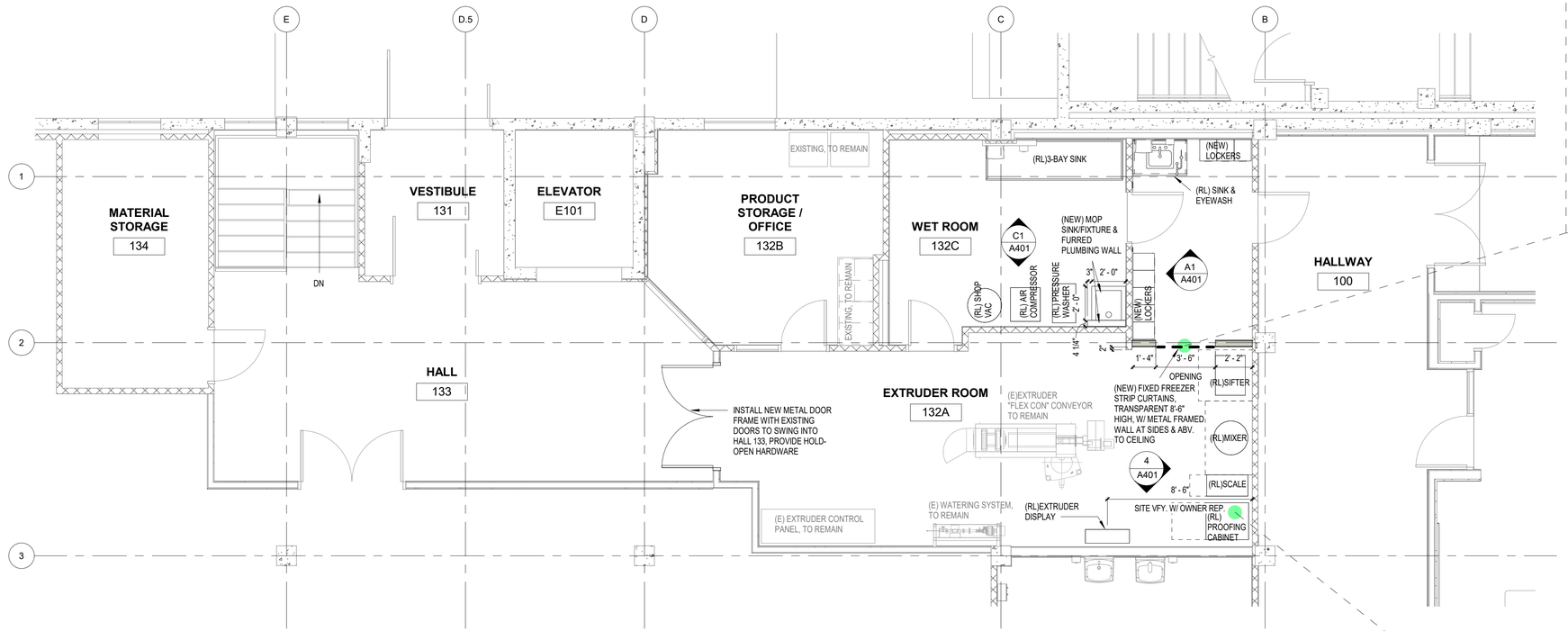
Sheet Contents
DEMOLITION PLAN

Sheet No.
D101



1 A102 MAIN LEVEL PARTIAL PLAN

1/4" = 1'-0"

BASIS OF DESIGN OR APPROVED EQUAL

Home / Strip Curtains / General Use / PVC Strip Curtains

PVC Strip Curtains

Stocked PVC Strip Curtain Doors are clear and transparent strips that are widely used at dock doors and other doorways to reduce heat loss or cooled air through doorways, protects workers, and reduce noise. Vinyl strips allow natural light in dark areas and ease of access. Heavy duty PVC strips have excellent optical clarity. Build your strip curtain kit in 5 easy steps below.

- Quick Ship - Ships in 2-3 work days!
- Lifetime Warranty on Hardware
- Ultra Clear Strips
- Flame retardant; meets California Fire Marshal requirements
- Reduces energy cost
- Barrier for dust, smoke, and flying debris
- Reduces noise
- Available in these widths/thicknesses: 6"/.060" | 8"/.080"| 12"/.120" | 16"/.160"

General Use Strip Curtains

HEADER MOUNT

- 6" - Light Duty - .060" Thick
- Header Mount - Galvanized Steel

Width Min: 36" 84 Height Min: 36" 102 Width Height

- 100%
- 67%

Tip! 100% 67%

Description

- Clear - Stays clear 20% longer
- Temperature Range - Between 0°F and +150°F.
- UV Absorber - Strips will not discolor
- Crystal Clear - Extrusion Clear Processing for maximum line of sight
- CFM and NFPA-701 flame retardant certifications
- 2 Year warranty on manufacturing defects - Strips
- **Need other colors, click here?**

Lead Time

- Ships in 2-3 work days
- Ships UPS or FedEx. You can also specify your shipping account

Warranty

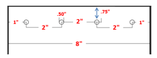
- Strips - 5 year warranty on manufacturing defects
- Hardware - Lifetime warranty on manufacturing defects

Ratings and Certifications

- CFM and NFPA-701 flame retardant certifications
- Exceeds OSHA requirements
- 5 Year warranty on manufacturing defects

Hole Spacing

The PVC strip curtains have holes punched every 2" (see example of 8" wide strip below). This allows the strips to fit most of the strip curtain hardware on the market. Please note that you can also purchase the strips without any mounting holes. Some customers choose to use their hardware and punch their mounting holes onsite. Loop style is also available for mounting to bars and tubes. If you want just the strips, then on this form, select "no hardware."



PROOFING CABINET SURFACE TEMPERATURE VS. MATERIAL IGNITION

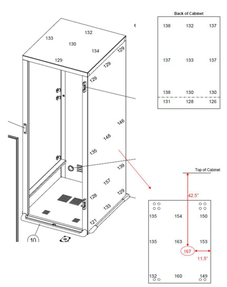
(RL) PROOFING CABINET MODEL # C517-PFC-U OUTSIDE SURFACE TEMPERATURE AT HIGHEST TEMPERATURE SETTING: 167 DEGREES F

IGNITION CHARACTERISTICS OF FOOD PRODUCTS USED IN PROOFING CABINET # C517-PFC-U

75% starch - 770°F
10% protein - 968°F
5% fiber - 752°F
<1% ash (minerals) - NA
1% fat - NA
8% water - NA

FIRE SAFETY CODE:
PROOFING CABINET OUTSIDE SURFACE TEMP NEEDS TO 80% MAX IGNITION TEMP. OF ANY FOOD PRODUCT.

FIBER HAS THE LOWEST IGNITION TEMP. OF 752 DEGREES, CABINET HOTTEST SURFACE TEMP. 167 DEGREES = 22%, <80% OK



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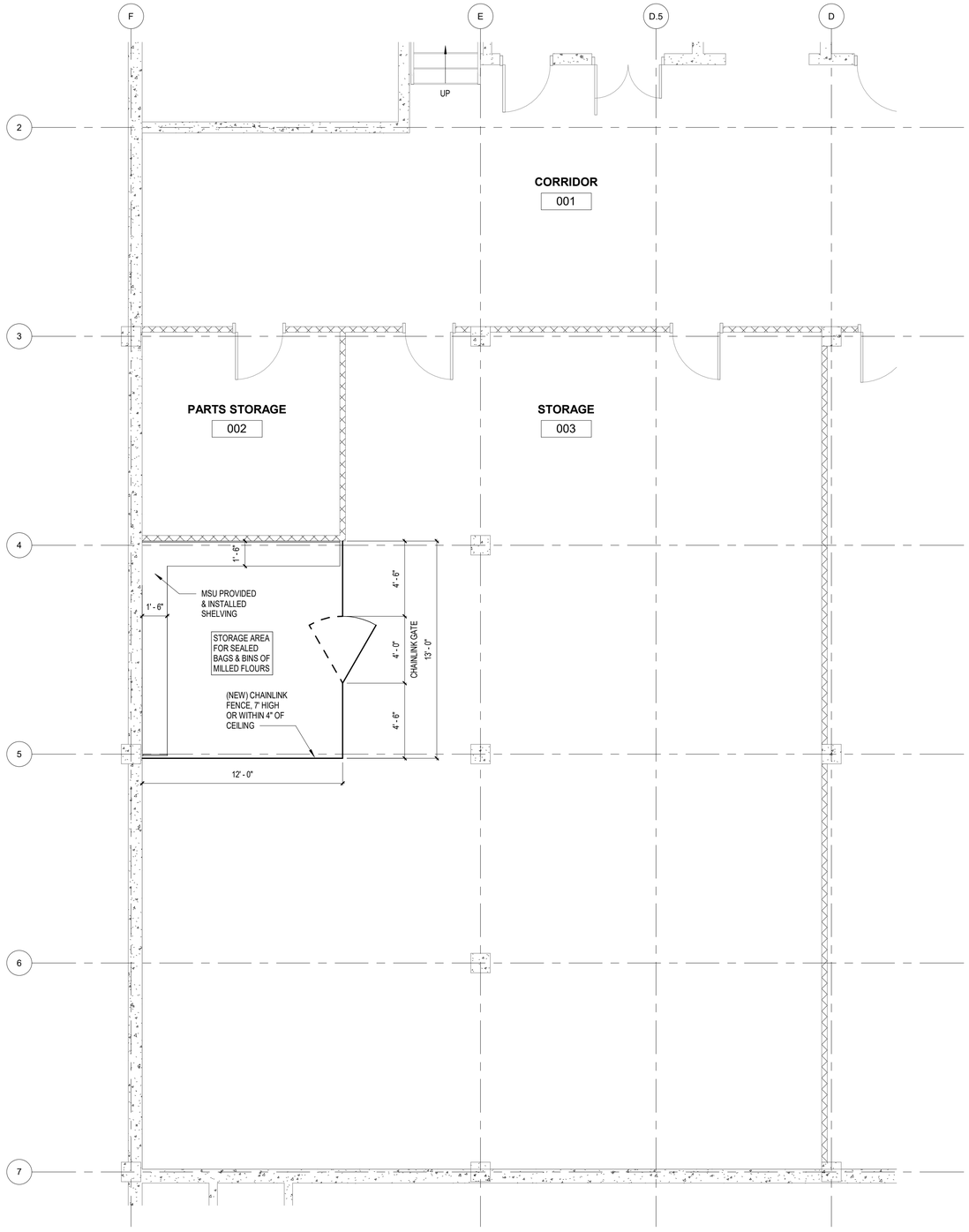
Sheet Contents
FLOOR PLAN MAIN LEVEL

Sheet No.
A102



1 A103 LOWER LEVEL PARTIAL PLAN

1/4" = 1'-0"

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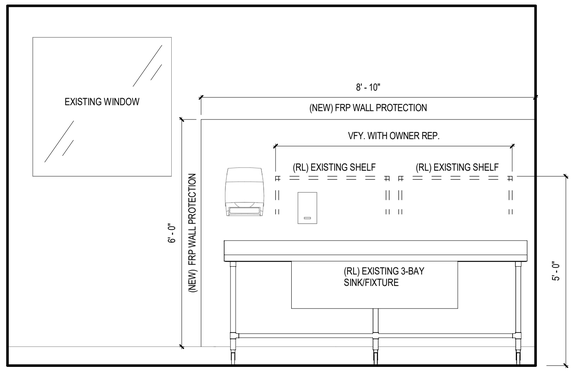
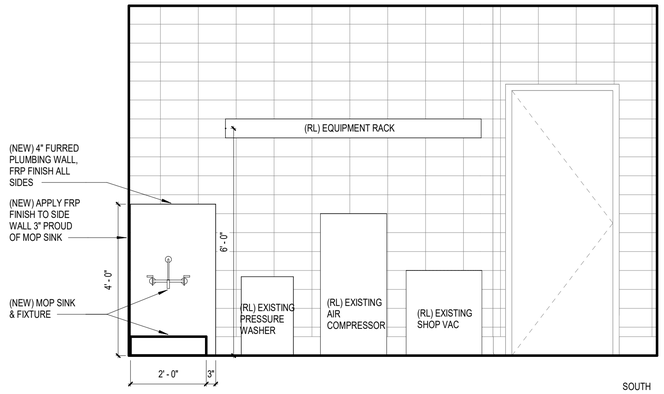
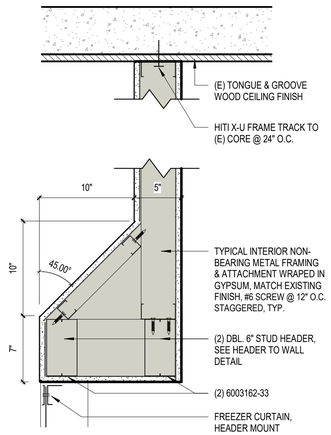
Sheet Contents
FLOOR PLAN LOWER LEVEL

Sheet No.
A103

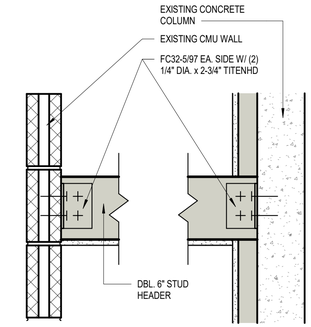




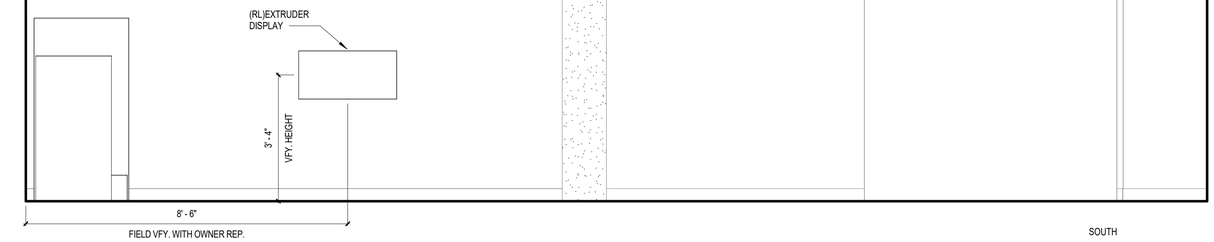
C1 / A401 WET ROOM
1/2" = 1'-0"

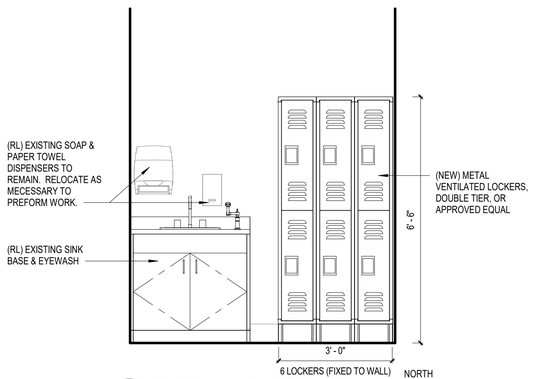


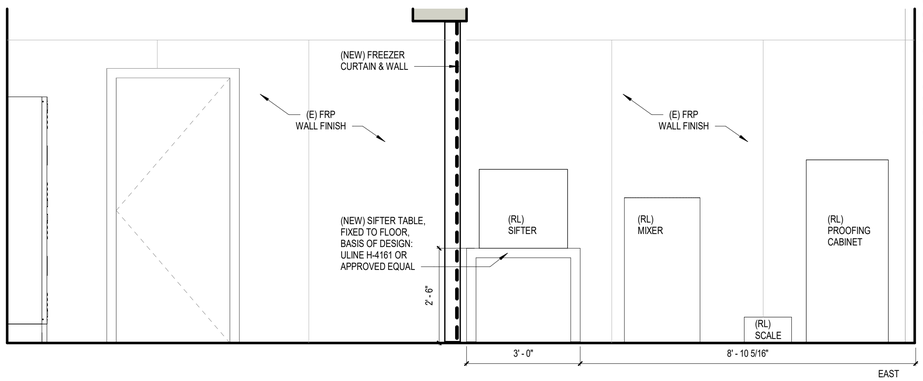
C3 / A401 HEADER DETAIL
1 1/2" = 1'-0"

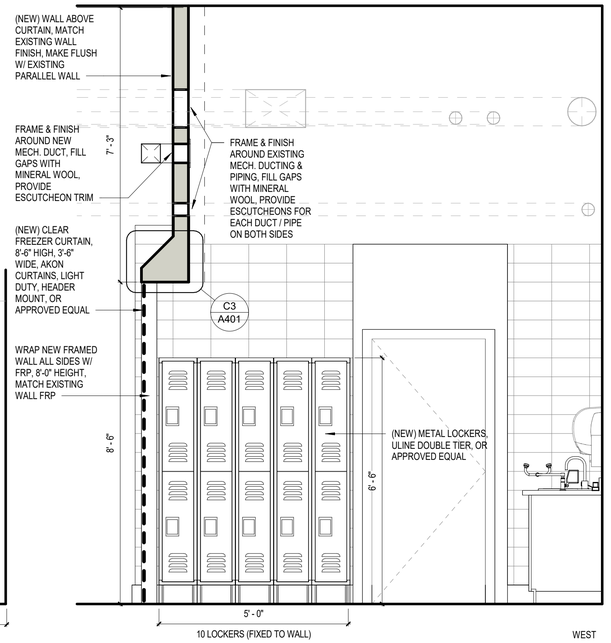


C4 / A401 HEADER TO WALL DETAIL
1 1/2" = 1'-0"









A1 / A401 EXTRUDER ROOM
1/2" = 1'-0"

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STREET ADDRESS

Revisions

No.	Description	Date

Drawn by TB	Date 10.23.2025
Checked MM	Job No. PPA#23-0871 AAI#25013.01

Sheet Contents
INTERIOR ELEVATIONS & DETAILS

Sheet No.
A401

HVAC LEGEND

DUCTWORK SYMBOLS

DOUBLE LINE / SINGLE LINE

- 20x12 — DUCT WIDTH x DEPTH — 20x12
- ACOUSTICAL DUCT LINING
- 10" — ROUND DUCT — 10"
- 10" — FLEXIBLE DUCT — 10"
- R — INCLINED RISE, IN DIRECTION OF AIR FLOW — R
- D — INCLINED DROP, IN DIRECTION OF AIR FLOW — D
- FLEXIBLE DUCT CONNECTION
- ELBOW WITH TURNING VANES
- STANDARD RADIUS ELBOW
- DAMPER IN WALL OR FLOOR (X; F FIRE, S SMOKE, FS FIRE/SMOKE)
- S — SMOKE DETECTOR — S
- VD — MANUAL VOLUME DAMPER — VD
- M — MOTOR OPERATED DAMPER — M
- ELECTRIC DUCT HEATING COIL WITH CONTROL BOX
- DUCT HEATING COIL
- BDD — BACKDRAFT DAMPER — BDD
- RUNOUT TO CEILING DIFFUSER: CONCEALED DUCTWORK
- RUNOUT TO ROUND DIFFUSER: EXPOSED DUCTWORK
- RUNOUT TO RETURN/EXHAUST CEILING GRILLE: CONCEALED DUCTWORK
- RUNOUT TO RETURN/EXHAUST CEILING GRILLE: EXPOSED DUCTWORK

DUCTWORK SYMBOLS

MISCELLANEOUS

- CEILING SUPPLY DIFFUSER
- CEILING RETURN GRILLE
- CEILING EXHAUST GRILLE
- SIDEWALL SUPPLY GRILLE
- SIDEWALL RETURN GRILLE
- SIDEWALL EXHAUST GRILLE
- SUPPLY DUCT (SECTION)
- RETURN, EXHAUST, OR TRANSFER DUCT (SECTION)
- EXHAUST DUCT (SECTION)

DRAWING SYMBOLS

- X / X — DETAIL DESIGNATION OR ENLARGED PLAN / HVAC DRAWING NUMBER WHERE DETAIL IS SHOWN
- X / X — SECTION DESIGNATION / DRAWING NUMBER WHERE SECTION IS SHOWN
- VAV-X — EQUIPMENT TAG / TAG NUMBER
- POINT OF NEW CONNECTION
- POINT OF DISCONNECTION
- T — THERMOSTAT
- T — ROOM TEMPERATURE SENSOR
- H — ROOM HUMIDITY SENSOR
- C — ROOOM CO2 SENSOR
- VAV-X — VAV BOX W/ REHEAT COIL
- VAV-X — VAV BOX
- VAV-X — VAV BOX W/ INTEGRAL SOUND ATENUATOR AND REHEAT
- VAV-X — VENTURI FLOW CONTROL VALVE
- HVAC-X — HVAC EQUIPMENT
- UH-X — UNIT HEATER

MECHANICAL SPECIFICATIONS

GENERAL

1. THE MECHANICAL CONTRACTOR SHALL INCLUDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS AND METHODS LISTED, MENTIONED, OR SCHEDULED IN THESE SPECIFICATIONS AND THE ACCOMPANYING DRAWINGS. ALL MATERIAL, EQUIPMENT, AND LABOR SHALL BE FURNISHED TOGETHER WITH ALL INCIDENTAL ITEMS REQUIRED BY GOOD PRACTICE TO PROVIDE THE COMPLETE SYSTEMS DESCRIBED.
2. EXAMINE AND REFER TO ALL ARCHITECTURAL, CIVIL, STRUCTURAL, ELECTRICAL, UTILITY, LANDSCAPE AND MECHANICAL DRAWINGS AND SPECIFICATIONS FOR CONSTRUCTION CONDITIONS WHICH MAY AFFECT THE MECHANICAL WORK. INSPECT THE BUILDING SITE AND EXISTING FACILITIES FOR VERIFICATION OF PRESENT CONDITIONS. MAKE PROPER PROVISIONS FOR THESE CONDITIONS IN PERFORMANCE OF THE WORK AND COST THEREOF.
3. ALL WORK ON THE PROJECT SHALL CONFORM TO ALL LOCAL CITY, STATE AND NATIONAL CODES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO THE N.F.P.A., N.E.C., I.B.C., I.E.C.C., I.M.C., U.P.C., THE LOCAL UTILITY SERVING COMPANIES AND THE AUTHORITY HAVING JURDISCTION.
4. THE MECHANICAL AND ELECTRICAL CONTRACTORS SHALL BE RESPONSIBLE FOR AND PAY FOR ALL FEES AND PERMITS REQUIRED FOR WORK UNDER THEIR CONTRACT AND UNDER THEIR SUPERVISION BY SUBCONTRACT.
5. ALL USAGE CONTRACTS BETWEEN THE OWNER AND THE SERVING UTILITIES COMPANY, SUCH AS MEMBERSHIP AND USAGE CHARGES OR FEES, ETC., FOR THE PURPOSE OF OBTAINING THE SERVICES FOR THE UTILITY COMPANY SHALL BE APPLIED FOR AND PAID FOR BY THE OWNER.
6. SMOKING SHALL NOT BE PERMITTED ANYWHERE IN THIS FACILITY.
7. DIVISION 1 SPECIFICATIONS SHALL SUPERSEDED THESE SPECIFICATIONS.
8. EXISTING BUILDING AUTOMATION SYSTEM SHALL BE MODIFIED AS NECESSARY BY ELECTRO CONTROLS.

MATERIALS AND EQUIPMENT

1. MANUFACTURER'S TRADE NAMES AND CATALOG NUMBERS ARE LISTED TO INDICATE SPECIAL CONDITIONS AND QUALITY OF MATERIALS OR EQUIPMENT TO BE SUPPLIED AND INSTALLED. ALTERNATIVE EQUIPMENT OR MATERIALS MAY BE SUBMITTED FOR REVIEW FOR APPROVAL PRIOR TO ANY BIDDING. NO SUBSTITUTIONS SHALL BE ALLOWED AFTER BIDDING.
2. WRITTEN PRIOR APPROVAL FOR SUBSTITUTIONS MUST BE SUBMITTED TO AND RECEIVED BY THE ARCHITECT/ENGINEER TEN (10) DAYS PRIOR TO BID OPENING. REQUESTS FOR SUBSTITUTION ARE TO BE SUBMITTED SUFFICIENTLY AHEAD OF THE DEADLINE TO GIVE AMPLE TIME FOR EXAMINATION. PRIOR APPROVAL REQUEST FOR SUBSTITUTION MUST INDICATE THE SPECIFIC ITEM OR ITEMS TO BE FURNISHED IN LIEU OF THOSE SCHEDULED, TOGETHER WITH COMPLETE TECHNICAL AND COMPARATIVE DATA ON SCHEDULED ITEMS AND ITEMS PROPOSED FOR SUBSTITUTION.
3. HIGH ALTITUDE OPERATION: CAPACITY OF ALL EQUIPMENT IS TO BE SIZED AND MANUFACTURED TO PERFORM AT THE ELEVATION OF THE PROJECT SITE. IF NOT SPECIFICALLY INDICATED IN THE EQUIPMENT SCHEDULE OR IN THE SPECIFICATIONS PROVIDE ALL REQUIRED ACCESSORIES AND EQUIPMENT FOR PROPER OPERATION AT ELEVATION OF THE PROJECT SITE.
4. STORE MATERIALS AND EQUIPMENT INDOORS AT THE JOB SITE OR, IF THIS IS NOT POSSIBLE, STORE ON RAISED PLATFORMS AND PROTECT FROM THE WEATHER BY MEANS OF WATERPROOF COVERS. COVERINGS SHALL PERMIT CIRCULATION OF AIR AROUND THE MATERIALS TO PREVENT CONDENSATION OF MOISTURE. SCREEN OR CAP OPENINGS IN EQUIPMENT TO PREVENT THE ENTRY OF VERMIN.
5. ALL PIPING INSULATION SHALL HAVE A SPREAD NOT EXCEEDING 25 AND A SMOKE DEVELOPMENT RATING NOT EXCEEDING 50. REFRIGERANT PIPING SHALL BE 1/2" THICK CLOSED CELL ELASTOMERIC - ARMACELL BY ARMAFLEX OR EQUAL.
6. ALL NEW PIPING SHALL BE IDENTIFIED WITH SETON SET MARK PIPE MARKERS, LETTERED TO MATCH EXISTING AND MARKED AT A MAXIMUM OF EVERY 25 FT. ALSO, ALL NEW VALVES SHALL BE IDENTIFIED WITH BRASS OR ALUMINUM VALVE TAGS.
7. SEE THE MECHANCIAL PIPING SCHEDULE AND THE DOMESTIC PIPING SCHEDULE ON THE DRAWINGS FOR MATERIAL AND INSULATION REQUIREMENTS.
8. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIRE-CAULKING ALL FIRE-RATED OR SMOKE-RATED WALL PENETRATIONS OF PIPING, DUCT WORK, ETC.
9. THE BUILDING AUTOMATION CONTROL SYSTEM SHALL BE AN EXTENSION OF THE EXISTING DELTA CONTROL SYSTEM IN HARRISON HALL.

INTENT OF DRAWINGS

1. THE DRAWINGS ARE PARTLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW EXACT LOCATION OF PIPING AND DUCTWORK UNLESS SPECIFICALLY DIMENSIONED. RISER AND OTHER DIAGRAMS ARE SCHEMATIC AND DO NOT NECESSARILY SHOW THE PHYSICAL ARRANGEMENT OF THE EQUIPMENT. THEY SHALL NOT BE USED FOR OBTAINING LINEAL RUNS OF PIPING OR DUCTWORK, NOR SHALL THEY BE USED FOR SHOP DRAWINGS FOR PIPING AND DUCTWORK FABRICATION OR ORDERING. DISCREPANCIES SHOWN ON DIFFERENT PLANS, OR BETWEEN PLANS AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT/ENGINEER FOR RESOLUTION.

REVIEW & SITE INSPECTIONS

1. ALL WORK AND MATERIAL IS SUBJECT TO REVIEW AT ANY TIME BY THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE. IF THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE FINDS MATERIAL THAT DOES NOT CONFORM TO THESE SPECIFICATIONS OR THAT IS NOT PROPERLY INSTALLED OR FINISHED, CORRECT THE DEFICIENCIES IN A MANNER SATISFACTORY TO THE ARCHITECT/ENGINEER AT THE CONTRACTOR'S EXPENSE.

RESPONSIBILITY

1. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF A SATISFACTORY AND COMPLETE SYSTEM IN ACCORDANCE WITH THE INTENT OF THE DRAWING AND SPECIFICATIONS. PROVIDE, AT NO EXTRA COST, ALL INCIDENTAL ITEMS, MATERIALS, ACCESSORIES AND LABOR REQUIRED FOR COMPLETION OF THE WORK EVEN THOUGH THEY ARE NOT SPECIFICALLY MENTIONED OR INDICATED ON THE DRAWINGS OR IN THE SPECIFICATIONS.
2. THE DRAWINGS DO NOT ATTEMPT TO SHOW COMPLETE DETAILS OF THE BUILDING CONSTRUCTION WHICH AFFECT THE MECHANICAL INSTALLATION. AND REFERENCE IS THEREFORE REQUIRED TO THE ARCHITECTURAL, CIVIL, STRUCTURAL, LANDSCAPE AND ELECTRICAL DRAWINGS AND SPECIFICATIONS AND TO SHOP DRAWINGS OF ALL TRADES FOR ADDITIONAL DETAILS WHICH AFFECT THE INSTALLATION OF THE WORK COVERED UNDER THIS DIVISION OF THE CONTRACT.
3. LOCATION OF MECHANICAL SYSTEM COMPONENTS SHALL BE CHECKED FOR CONFLICTS WITH OPENINGS, STRUCTURAL MEMBERS AND COMPONENTS OF OTHER SYSTEMS HAVING FIXED LOCATIONS. IN THE EVENT OF ANY CONFLICTS, THE ARCHITECT/ENGINEER SHALL BE CONSULTED AND HIS DECISION SHALL GOVERN. NECESSARY CHANGES SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.
4. TAKE EXTREME CAUTION NOT TO INSTALL WORK THAT CONNECTS TO EQUIPMENT UNTIL SUCH TIME AS COMPLETE SHOP DRAWINGS OF SUCH EQUIPMENT HAVE BEEN APPROVED BY THE ARCHITECT/ENGINEER. ANY WORK INSTALLED BY THE CONTRACTOR, PRIOR TO APPROVAL OF SHOP DRAWINGS, WILL BE AT THE CONTRACTOR'S RISK.
5. MODIFICATIONS AND CHANGES REQUIRED DUE TO INSTALLATION OF EQUIPMENT OTHER THAN THE EQUIPMENT SCHEDULES AND SPECIFIED SHALL BE MADE AT THE CONTRACTOR'S EXPENSE, THIS INCUDEDS WORK BY OTHER TRADES. IF THE INSTALLTION OF EQUIPMENT OTHER THAN THE SCHEDULED AND SPECIFIED EQUIPMENT REQUIRES MODIFICATIONS TO STRUCTURE, ELECTRICAL SYSTEMS, PLUMBING SYSTEMS, FIRE PROTECTION OR FIRE ALARM SYSTEMS, ANY AND ALL CHANGES SHALL BE MADE AT THE MECHANICAL CONTRACTORS EXPENSE.
6. ALL WORK TO BE PERFORMED SHALL FIRST BE SCHEDULED AND SUBMITTED TO THE OWNER'S REPRESENTATIVE FOR ACCEPTANCE.
7. THE CONTRACTOR SHALL BE CAREFUL NOT TO BLOCK ANY PATHS OF EGRESS WHILE PERFORMING THE WORK SPECIFIED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP OF ALL MATERIALS RESULTING FROM HIS/HER WORK. CLEANUP SHALL BE PERFORMED TO THE LEVEL OF ACCEPTANCE OF THE OWNER'S REPRESENTATIVE & THE ENGINEER.
9. THE CONTRACTOR SHALL AND HEREBY DOES WARRANT AND GUARANTEE THAT ALL WORK EXECUTED UNDER HIS/HER CONTRACT SHALL BE FREE OF DEFECTS OF MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE(1) YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION.

SHOP DRAWINGS AND SUBMITTALS

1. WITHIN 30 DAYS AFTER AWARDING OF THE MECHANICAL CONTRACT, THE MECHANICAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND SUBMITTALS FOR THE FOLLOWING PRODUCTS:
   a. GRILLES, REGISTERS, & DIFFUSERS
   b. PLUMBING FIXTURES AND TRIM
   c. DOMESTIC WATER PIPING, SANITARY WASTE AND VENT PIPING
   d. FILTRATION UNIT, DEHUMIDIFIER
2. SHOP DRAWINGS AND SUBMITTALS SHALL BE IN THE FORM OF ELECTRONICALLY TRANSMITTED PDFS. SHOP DRAWINGS AND SUBMITTALS SHALL INCLUDE SHOP DRAWINGS AND LITERATURE SHOWING ITEM TO BE USED, SIZE, DIMENSIONS, CAPACITY, ROUGH IN, ETC., AS REQUIRED FOR COMPLETE CHECK AND INSTALLATION. MANUFACTURER'S LITERATURE SHOWING MORE THAN ONE ITEM SHALL BE CLEARLY MARKED AS TO WHICH ITEM IS BEING FURNISHED OR IT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
3. EACH ITEM SUBMITTED MUST BE CLEARLY MARKED AS FOLLOWS FOR PURPOSES OF IDENTIFICATION AND RECORD. SUBMITTALS NOT MARKED (TYPEWRITTEN ONLY) AS DESCRIBED BELOW WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
   DATE, NAME OF PROJECT, BRANCH OF WORK, SUBMITTED BY, SPECIFICATION OR PLAN REFERENCE:
4. PRIOR TO THEIR SUBMISSION, EACH SUBMITTAL SHALL BE THOROUGHLY CHECKED BY THE CONTRACTOR FOR COMPLIANCE WITH THE CONTRACT DOCUMENT REQUIREMENTS. EACH SUBMITTAL SHALL THEN BEAR A STAMP EVIDENCING SUCH CHECKING AND SHALL SHOW CORRECTIONS MADE, IF ANY. SUBMITTALS REQUIRING EXTENSIVE CORRECTIONS SHALL BE REVISED BEFORE SUBMISSION TO THE ENGINEER. EACH SUBMITTAL NOT STAMPED AND SIGNED BY THE CONTRACTOR EVIDENCING SUCH CHECKING WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
5. REVIEW OF THE SHOP DRAWINGS AND LITERATURE BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR FOR RESPONSIBILITY FOR DEVIATIONS FOR THE DRAWINGS OR SPECIFICATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN THE SHOP DRAWINGS OR LITERATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE MATERIALS AND EQUIPMENT WHICH MEET THE SPECIFICATIONS AND JOB REQUIREMENTS.

STARTUP, TESTING AND OWNER TRAINING

1. ENTIRE NEW AIR AND WATER SYSTEMS SHALL BE COMPLETELY BALANCED TO THE SATISFACTION OF THE ENGINEER IN ACCORDANCE WITH THE STANDARDS OF NEBB. APPROVED TEST AND BALANCE CONTRACTORS ARE: RGO INC. (406) 390-3344, PRECISION AIR & WATER BALANCING (406)-257-3013, & HIGHLANDS BALANCING (406)-723-4021.
2. REFER TO MSU DIVISION 1 SPECIFICATIONS FOR REQUIREMENTS FOR OWNER TRAINING AND STARTUP.

PROJECT CLOSEOUT

1. THE MECHANICAL CONTRACTOR SHALL MAINTAIN AT THE PROJECT SITE, A "RECORD SET OF DRAWINGS" SHOWING FIELD CHANGES, AS-BUILT ELEVATIONS, UNUSUAL CONDITIONS ENCOUNTERED DURING CONSTRUCTION, AND SUCH OTHER DATA AS REQUIRED TO PROVIDE THE OWNER WITH AN ACCURATE "AS CONSTRUCTED" SET OF RECORD DRAWINGS. THE CONTRACTOR SHALL FURNISH THIS "RECORD SET" TO THE ENGINEER FOLLOWING THE FINAL INSPECTION OF THE PROJECT.
2. THE MECHANICAL CONTRACTOR SHALL PROVIDE AN "OPERATION AND MAINTENANCE MANUAL" (O&M MANUAL) PRIOR TO THE COMMENCEMENT OF OWNER TRAINING. THE O&M MANUAL SHALL BE PROVIDED IN DIGITAL OR THREE PAPER COPIES (BOUND & LABELED) FORMAT AS REQUESTED BY THE ENGINEER OR OWNER. THE O&M MANUAL SHALL CONSIST OF A TITLE PAGE, TABLE OF CONTENTS, AND MANUAL CONTENTS. THE MANUAL CONTENTS SHALL CONSIST OF PRODUCT DATA INFORMATION, PRODUCT SERVICE/MAINTENANCE MANUAL, AND EXECUTED WARRANTY FOR EACH AND ALL EQUIPMENT AND PRODUCTS INSTALLED UNDER THE SCOPE OF THIS PROJECT.

DUCT MATERIAL SCHEDULE

SYSTEM	SHAPE	MATERIAL	INSALLAION LOCATION	PRESSURE CLASS	INSULATION TYPE	INSULATION R-VALUE	ACOUSTIC LINER	LINER R-VALUE	REMARKS
SUPPLY AIR	RECTANGULAR	GALVANIZED	INDOOR - CONDITIONED	LOW <2" WC	EXTERIOR WRAP W/ FSK JACKET	R-6	SEE PLANS	4	SEE NOTES
SUPPLY AIR	ROUND	GALVANIZED SPIRAL	INDOOR - CONDITIONED	LOW <2" WC	EXTERIOR WRAP W/ FSK JACKET	R-6	NONE	-	SEE NOTES
RETURN	RECTANGULAR	GALVANIZED	INDOORS - CONDITIONED	LOW <2" WC	NONE	-	NONE	-	SEE NOTES
EXHAUST	RECTANGULAR	GALVANIZED	INDOORS - CONDITIONED	LOW <2" WC	EXTERIOR WRAP W/ FSK JACKET	R-8	NONE	-	SEE NOTES

NOTES: ALL DUCTWORK SHALL BE CONSTRUCTED IN COMPLIANCE WITH SMACNA STANDARDS. ALL DUCTWORK SHALL BE SEALED IN ACCORDANCE WITH SMACNA AND CURRENT EDITION OF THE INTERNATIONAL ENERGY CONSERVATION CODE. ALL DUCT INSULATION MUST HAVE FLAME SPREAD LESS THAN 25 AND SMOKE-DEVELOPED INDEX OF NOT MORE HAN 50 WHEN TESTED IN ACCORDANCE WITH ASTM E84 OR UL 723. EXHAUST DUCTWORK LOCATED IN AIR PLENUMS AND INSIDE THE BUILDING ENVELOPE MAY BE UN-INSULATED FROM INLET TO TERMINATION AT THE BUILDING ENVELOPE IF A BACKDRAFT DAMPER IS INSTALLED WHERE THE DUCTWORK PENETRATES BUILDING ENVELOPE. PROVIDE AEROFLEX OR EQUAL ACOUSTIC LINING DOWNSTREAM OF VAV BOX IN VAV BOX PLENUM.

M - SHEET INDEX

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HARRISON LAB 132
REMODEL

Revisions

No.	Description	Date

Drawn by CMS	Date 10.23.2025
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Sheet Contents
MECHANICAL LEGEND & SPECIFICATIONS

Sheet No.
M001

EXISTING VARIABLE AIR VOLUME TERMINAL UNIT SCHEDULE - EXTRUDER LAB

MARK	MFGR.	MODEL #	SIZE	SERVES ROOM #	SIZE		AIR FLOW (CFM)		RE-HEAT COIL PERFORMANCE									REMARKS
					INLET (IN)	OUTLET (IN)	MIN	MAX	HEATING AIR FLOW (CFM)	CAPACITY (MBH)	ROWS	EAT (F)	LAT (F)	WATER FLOW (GPM)	EWT (F)	LWT (F)	WPD (FT)	APD (in WC) (BOX & COIL)	
(E) VAV-105	PRICE	SDV5	8	OFFICE, WORK ROOM	8	12x10	470	470	470	EXISTING									SEE NOTES
(E) VAV-106	PRICE	SDV5	6	EXTRUDER LAB	6	12x8	100	350	100	EXISTING									SEE NOTES

NOTES: EQUIPMENT TO BE REBALANCED TO NOTED AIRFLOWS.

EXHAUST FAN SCHEDULE - EXTRUDER LAB

MARK	MANUFACTURER	MODEL #	TYPE	SERVES	DRIVE	CFM	STATIC PRESSURE (inWC)	DAMPER	ELECTRIC DATA			REMARKS
									VOLTAGE	PHASE	HP / WATTS	
(E) EF- 4	COOK	90SQ17DEC	INLINE	ANALYTICAL LAB 02	DIRECT	330	0.2	BACKDRAFT	SEE MEP COORDINATION SCHEDULE			SEE NOTES

NOTES:
1.) REBALANCE EXISTING FAN TO UPDATED AIRFLOW.

DEHUMIDIFICATION UNIT SCHEDULE - EXTRUDER LAB

MARK	MANUFACTURER	MODEL #	TOTAL AIRFLOW (CFM)	MOISTURE REMOVAL CAPACITY (LB/HR)	CONTROL TOLERANCE	REFRIGERANT	FILTER	OPERATING WEIGHT (LB)	ELECTRIC DATA			REMARKS
									VOLTAGE	PHASE	HP / WATTS	
DU-1	EVAIR	RL-3	200	3.0	+/- 5% RH	R-32	MERV-11	56	SEE MEP COORDINATION SCHEDULE			SEE NOTES

NOTES:
1.) PROVIDE COMPLETE WITH MANUFACTURER'S POWER CORD, D77 CONTROLLER, AND DRY CONTACTS FOR FUTURE BMS MONITORING.

FILTRATION UNIT SCHEDULE - EXTRUDER LAB

MARK	MANUFACTURER	MODEL #	AIRFLOW (CFM)	OUTER FILTER PRODUCT NUMBER	INNER FILTER PRODUCT NUMBER	SOUND RATING (DB)	OPERATING WEIGHT (LB)	ELECTRIC DATA			REMARKS
								VOLTAGE	PHASE	HP / WATTS	
FU-1	JET	AFS-1000C	450 - 1000	708731	708733	51 - 67	42	SEE MEP COORDINATION SCHEDULE			SEE NOTES

NOTES:
1.) PROVIDE COMPLETE WITH (2) SETS OF SPARE FILTERS, MANUFACTURER'S POWER CORD, AND MANUFACTURER'S REMOTE CONTROL.

GRILLE, REGISTER AND DIFFUSER SCHEDULE - EXTRUDER LAB

MARK	MFGR	MODEL	DESCRIPTION	FUNCTION	MAX CFM	NC AT MAX CFM	THROW AT MAX CFM (FT)	PRESSURE DROP AT MAX CFM (in. W.C.)	NECK SIZE (W"xH")	DAMPER TYPE	MATERIAL	FINISH	REMARKS
S-3	PRICE	520	6"x6" SURFACE MOUNT LOUVERED GRILLE	SUPPLY	80	-	16	0.05	6"x6"	MANUAL	STEEL	BY ARCH	SEE NOTES
R-3	PRICE	530	8"x6" DUCT MOUNT LOUVERED GRILLE	RETURN	80	-	-	0.05	8"x6"	MANUAL	STEEL	BY ARCH	SEE NOTES

NOTES: PROVIDE MANUAL BALANCING DAMPER AT LOCATIONS WHERE A SPECIFIED AIR VOLUME IS REQUIRED I.E. FOR SUPPLY AND RETURN ONLY. COORDINATE FRAME AND MOUNTING TYPE WITH CEILING TYPES. SEE ARCHITECTURAL PLANS FOR CEILING TYPES. THE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE ALL FITTINGS AND ACCESSORIES REQUIRED FOR A COMPLETE INSTALLATION. SCHEDULES N.C. VALUES ARE VALID FOR SCHEDULE AIR FLOW ONLY AND REPRESENT A MAXIMUM ACCEPTABLE N.C. VALUE. SUBSTITUTED EQUIPTMENT SHALL HAVE N.C. VALUE EQUAL TO OR BELOW THE SCHEDULES N.C. AT THE AIR FLOW LISTED ON THE PLANS.

MEP COORDINATION SCHEDULE - EXTRUDER LAB

MARK	DESCRIPTION	ELECTRICAL DATA		CONTROL		NOTES	STARTER / DISCONNECT		DISCONNECT				FEEDER	
		LOAD	VOLT-PHASE	TYPE	DIV		TYPE	DIV	SIZE (NEMA)	SWITCH (AMPS)	FUSE (AMPS)	ENCLOSURE (NEMA)	COPPER WIRE (AWG)	CONDUIT (INCHES)
MECHANICAL EQUIPMENT														
DU-1	DEHUMIDIFICATION UNIT	5.8 A	120 - 1	INT	23 / 23		RCPT	26/26	--	--	--	--	#12	3/4"
FU-1	FILTRATION UNIT	1/3 HP	120 - 1	INT	23 / 23		RCPT	26/26	--	--	--	--	#12	3/4"

CONTROL TYPE:
- BAS BUILDING AUTOMATION SYSTEM
- MS MANUAL SWITCH
- T THERMOSTAT
- N/A NOT APPLICABLE

DISCONNECT/STARTER TYPE:
- MSS MANUAL STARTER SWITCH WITH THERMAL OVERLOADS
- N/A NOT APPLICABLE
- NFD NON-FUSED DISCONNECT
- RCPT RECEPTACLE

DIVISION OF RESPONSIBILITIES:
- 22/22 FURNISHED AND INSTALLED BY DIV. 22, WIRED BY DIV. 22
- 22/26 FURNISHED AND INSTALLED BY DIV. 22, WIRED BY DIV. 26
- 23/23 FURNISHED AND INSTALLED BY DIV. 23, WIRED BY DIV. 23
- 23/26 FURNISHED AND INSTALLED BY DIV. 23, WIRED BY DIV. 26
- 26/26 FURNISHED AND INSTALLED BY DIV. 26, WIRED BY DIV. 26

NOTES:
1. SIZE THERMAL OVERLOADS IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES FOR INSTALLED EQUIPMENT

GENERAL NOTES:
- A. CONTROL WIRING SHALL BE CONCEALED WITHIN WALL CONSTRUCTION, ABOVE CEILING, OR RUN IN CONDUIT. EXPOSED CONTROL WIRING IS UNACCEPTABLE.
- B. UNLESS SPECIFICALLY NOTED, ALL FEEDERS SHALL INCLUDE A FULL-SIZED NEUTRAL. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY WITH THE MANUFACTURER OF THE ACTUAL EQUIPMENT BEING SUPPLIED WETHER A NEUTRAL IS REQUIRED PRIOR TO ROUGH-IN.

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LICENSED PROFESSIONAL ENGINEER

MONTANA STATE UNIVERSITY
HARRISON LAB 132
REMODEL

Revisions

No.	Description	Date

Drawn by	Date
CMS	10.23.2025
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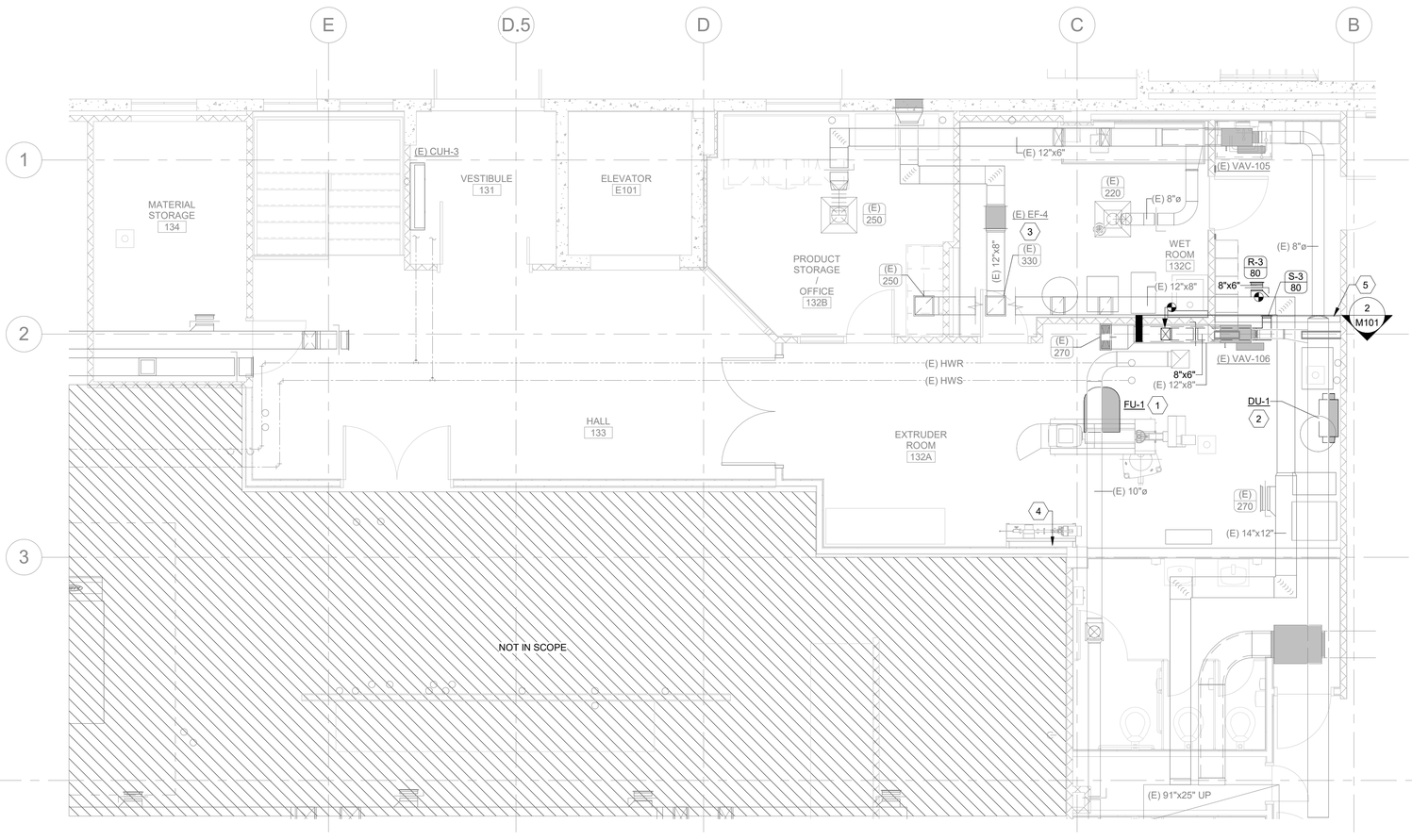
Sheet Contents
MECHANICAL SCHEDULES & DETAILS

Sheet No.
M002



1 M101 LEVEL 1 - HVAC PLAN
1/4" = 1'-0"

GENERAL MECHANICAL NOTES

A.) IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO FIELD COORDINATE THE LOCATION OF EQUIPMENT ROUTING OF ALL DUCTWORK AND PIPING WITH ALL OTHER TRADES.

B.) IT SHALL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR TO REVIEW THE DRAWINGS FOR ALL DISCIPLINES AND PROVIDE ALL LABOR AND MATERIALS REQUIRED FOR A COMPLETE INSTALLATION.

C.) COORDINATE THE INSTALLATION OF GRILLES, REGISTERS AND DIFFUSERS WITH THE ELECTRICAL LIGHTING PLANS.

D.) VERIFY THE LOCATION OF THERMOSTATS AND SENSORS WITH THE ARCHITECT AND ENGINEER PRIOR TO INSTALLATION. INSTALL THERMOSTATS 48" ABOVE FINISHED FLOOR PER ADA REQUIREMENTS.

E.) PROVIDE AND INSTALL SEISMIC BRACING FOR ALL EQUIPMENT, DUCTWORK AND PIPING PER THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE.

F.) FLEXIBLE DUCTWORK BETWEEN BRANCH DUCTS AND GRILLES, REGISTERS OR DIFFUSERS SHALL BE LIMITED TO 5FT.

G.) PROVIDE AND INSTALL FIRE, SMOKE AND/OR COMBINATION SMOKE/FIRE DAMPERS WHERE DUCTWORK PASSES THROUGH FIRE RATED ASSEMBLIES. ASSOCIATED DUCT DETECTORS SHALL BE ADDRESSABLE. SMOKE DAMPERS AND COMBINATION SMOKE/FIRE DAMPERS SHALL INCLUDE A KEYED REMOTE TEST SWITCH LOCATED IN AN ACCESSIBLE LOCATION. FIELD COORDINATE THE LOCATION OF TEST SWITCHES WITH THE ARCHITECT AND ENGINEER PRIOR INSTALLATION.

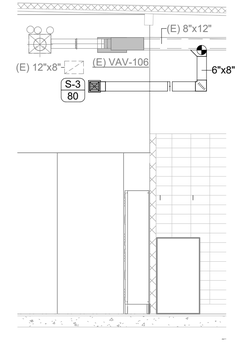
H.) SEAL ALL DUCT AND PIPE PENETRATIONS THROUGH FIRE RATED ASSEMBLIES WITH A UL-APPROVED FIRE STOP SYSTEM.

I.) PROVIDE ACCESS DOORS TO ALLOW SERVICE AND INSPECTION OF EQUIPMENT, VALVES, DAMPERS AND DEVICES INSTALLED ABOVE NON-REMOVABLE CEILINGS.

J.) PROVIDE REMOTE CONTROLLED DAMPER ACTUATORS FOR BALANCING DAMPERS INSTALLED IN INACCESSIBLE LOCATION. PROVIDE RUSKIN ZPD25 OR APPROVED EQUAL.

(#) KEY NOTES:

1. HANG FROM CEILING PER MANUFACTURER'S INSTRUCTIONS AT 10' AFF. MAINTAIN MANUFACTURER'S REQUIRED CLEARANCES.
2. WALL MOUNT WITH DIVERSITECH QUICK SLING OR EQUAL AT 9' AFF.
3. REBALANCE EXISTING FAN AND GRILLE AT NEW AIRFLOW.
4. MAINTAIN ACCESS TO HVAC CONTROLS HATCH. FIELD COORDINATE EXACT LOCATION.
5. COORDINATE WALL INSTALLATION WITH EXISTING DUCTWORK AND PIPING IN THIS AREA. PROVIDE ESCUTCHEONS AT PIPE PENETRATIONS.



2 M101 SECTION AT NEW DUCTWORK
1/4" = 1'-0"

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Sheet Contents
LEVEL 1 - MECHANICAL FLOOR PLAN

Sheet No.
M101

PLUMBING LEGEND

PIPING SYMBOLS

GENERAL

(E) NAME	EXISTING PIPE
(D) NAME	EXISTING PIPE TO BE REMOVED
NAME	NEW PIPING
	DIRECTION OF FLOW

HEATING

A	COMPRESSED AIR
ATV	ATMOSPHERIC VENT
HWS	HEATING WATER SUPPLY
HWR	HEATING WATER RETURN
HPS	HIGH PRESSURE STEAM
MPS	MEDIUM PRESSURE STEAM
LPS	LOW PRESSURE STEAM
HPC	HIGH PRESSURE CONDENSATE
MPC	MEDIUM PRESSURE CONDENSATE
LPC	LOW PRESSURE CONDENSATE
PCR	PUMPED CONDENSATE

AIR CONDITIONING & REFRIGERATION

CS	CONDENSER WATER SUPPLY
CR	CONDENSER WATER RETURN
CWS	CHILLED WATER SUPPLY
CWR	CHILLED WATER RETURN
D	DRAIN LINE
HPWS	HEAT PUMP WATER SUPPLY
HPWR	HEAT PUMP WATER RETURN
RL	REFRIGERANT LIQUID
RS	REFRIGERANT SUCTION

PLUMBING

DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RECIRCULATION
SAN	SANITARY WASTE
GW	GREASE WASTE
V	SANITARY VENT
G	NATURAL GAS
LPG	LIQUIFIED PETROLEUM GAS

PIPING SYMBOLS

PIPING SPECIALTIES & FITTINGS

- ANCHOR
- PIPE GUIDES
- FLEXIBLE CONNECTION
- AUTOMATIC AIR VENT
- MANUAL AIR VENT - BALL VALVE WITH 12" OF SOFT COPPER
- TOP CONNECTION, 45 DEG OR 90 DEG
- BOTTOM CONNECTION, 45 DEG OR 90 DEG
- SIDE CONNECTION OR TEE FITTING
- CAPPED OUTLET
- CHANGE IN ELEVATION OF PIPE
- PIPE RISE OR ELBOW TURNED UP
- PIPE DROP OR ELBOW TUNED DOWN
- UNION OR FLANGE
- STRAINER
- STEAM TRAP - SEE TRAP SCHEDULE FOR TYPE
- LIQUID IN GLASS THERMOMETER
- BI-METAL TEMPERATURE GAUGE
- PRESSURE GAUGE
- THERMOMETER WELL
- DDC TEMP SENSOR
- FLOW SWITCH
- PRESSURE SWITCH
- PRESSURE SWITCH
- BLIND FLANGE
- HOSE END CONNECTION
- SCHEMATIC PUMP

VALVES

- ISOLATION VALVE - SEE SPECIFICATIONS FOR TYPE
- CHECK VALVE - ARROW INDICATES DIRECTION OF FLOW
- 3-WAY TEMPERATURE CONTROL VALVE
- 2-WAY TEMPERATURE CONTROL VALVE
- TEMPERATURE & PRESSURE RELIEF VALVE
- COMBINATION Y-STRAINER & SHUTOFF VALVE
- COMBINATION AUTOMATIC FLOW CONTROL & SHUTOFF VALVE
- AUTOMATIC FLOW CONTROL VALVE
- MANUAL FLOW CONTROL VALVE
- DRAIN VALVE WITH HOSE THREAD END CONNECTION

PLUMBING SPECIFICATIONS

GENERAL

1. THE PLUMBING CONTRACTOR SHALL INCLUDE ALL ITEMS, ARTICLES, MATERIALS, OPERATIONS AND METHODS LISTED, MENTIONED, OR SCHEDULED IN THESE SPECIFICATIONS AND THE ACCOMPANYING DRAWINGS. ALL MATERIAL, EQUIPMENT, AND LABOR SHALL BE FURNISHEDTOGETHER WITH ALL INCIDENTAL ITEMS REQUIRED BY GOOD PRACTICE TO PROVIDE THE COMPLETE SYSTEMS DESCRIBED.
2. EXAMINE AND REFER TO ALL ARCHITECTURAL, CIVIL, STRUCTURAL, ELECTRICAL, UTILITY, LANDSCAPE AND PLUMBING DRAWINGS AND SPECIFICATIONS FOR CONSTRUCTION CONDITIONS WHICH MAY AFFECT THE PLUMBING WORK. INSPECT THE BUILDING SITE AND EXISTING FACILITIES FOR VERIFICATION OF PRESENT CONDITIONS. MAKE PROPER PROVISIONS FOR THESE CONDITIONS IN PERFORMANCE OF THE WORK AND COST THEREOF.
3. ALL WORK ON THE PROJECT SHALL CONFORM TO ALL LOCAL CITY, STATE AND NATIONAL CODES AND REGULATIONS, INCLUDING BUT NOT LIMITED TO THE N.F.P.A., N.E.C., i.B.C., I.E.C.C., I.M.C., U.P.C., THE LOCAL UTILITY SERVING COMPANIES AND THE AUTHORITY HAVING JURDISCTION.
4. THE PLUMBING AND ELECTRICAL CONTRACTORS SHALL BE RESPONSIBLE FOR AND PAY FOR ALL FEES AND PERMITS REQUIRED FOR WORK UNDER THEIR CONTRACT AND UNDER THEIR SUPERVISION BY SUBCONTRACT.
5. ALL USAGE CONTRACTS BETWEEN THE OWNER AND THE SERVING UTILITIES COMPANY, SUCH AS MEMBERSHIP AND USAGE CHARGES OR FEES, ETC., FOR THE PURPOSE OF OBTAINING THE SERVICES FOR THE UTILITY COMPANY SHALL BE APPLIED FOR AND PAID FOR BY THE OWNER.
6. SMOKING SHALL NOT BE PERMITTED ANYWHERE IN THIS FACILITY.
7. DIVISION 1 SPECIFICATIONS SHALL SUPERSEDED THESE SPECIFICATIONS.

MATERIALS AND EQUIPMENT

1. MANUFACTURER'S TRADE NAMES AND CATALOG NUMBERS ARE LISTED TO INDICATE SPECIAL CONDITIONS AND QUALITY OF MATERIALS OR EQUIPMENT TO BE SUPPLIED AND INSTALLED. ALTERNATIVE EQUIPMENT OR MATERIALS MAY BE SUBMITTED FOR REVIEW FOR APPROVAL PRIOR TO ANY BIDDING. NO SUBSTITUTIONS SHALL BE ALLOWED AFTER BIDDING.
2. WRITTEN PRIOR APPROVAL FOR SUBSTITUTIONS MUST BE SUBMITTED TO AND RECEIVED BY THE ARCHITECT/ENGINEER TEN (10) DAYS PRIOR TO BID OPENING. REQUESTS FOR SUBSTITUTION ARE TO BE SUBMITTED SUFFICIENTLY AHEAD OF THE DEADLINE TO GIVE AMPLE TIME FOR EXAMINATION. PRIOR APPROVAL REQUEST FOR SUBSTITUTION MUST INDICATE THE SPECIFIC ITEM OR ITEMS TO BE FURNISHED IN LIEU OF THOSE SCHEDULED, TOGETHER WITH COMPLETE TECHNICAL AND COMPARATIVE DATA ON SCHEDULED ITEMS AND ITEMS PROPOSED FOR SUBSTITUTION.
3. HIGH ALTITUDE OPERATION: CAPACITY OF ALL EQUIPMENT IS TO BE SIZED AND MANUFACTURED TO PERFORM AT THE ELEVATION OF THE PROJECT SITE. IF NOT SPECIFICALLY INDICATED IN THE EQUIPMENT SCHEDULE OR IN THE SPECIFICATIONS PROVIDE ALL REQUIRED ACCESSORIES AND EQUIPMENT FOR PROPER OPERATION AT ELEVATION OF THE PROJECT SITE.
4. STORE MATERIALS AND EQUIPMENT INDOORS AT THE JOB SITE OR, IF THIS IS NOT POSSIBLE, STORE ON RAISED PLATFORMS AND PROTECT FROM THE WEATHER BY MEANS OF WATERPROOF COVERS. COVERINGS SHALL PERMIT CIRCULATION OF AIR AROUND THE MATERIALS TO PREVENT CONDENSATION OF MOISTURE. SCREEN OR CAP OPENINGS IN EQUIPMENT TO PREVENT THE ENTRY OF VERMIN.
5. ALL PIPING INSULATION SHALL HAVE A SPREAD NOT EXCEEDING 25 AND A SMOKE DEVELOPMENT RATING NOT EXCEEDING 50. REFRIGERANT PIPING SHALL BE 1/2" THICK CLOSED CELL ELASTOMERIC - ARMACELL BY ARMAFLEX OR EQUAL.
6. ALL NEW PIPING SHALL BE IDENTIFIED WITH SETON SET MARK PIPE MARKERS, LETTERED TO MATCH EXISTING AND MARKED AT A MAXIMUM OF EVERY 25 FT. ALSO, ALL NEW VALVES SHALL BE IDENTIFIED WITH BRASS OR ALUMINUM VALVE TAGS.
7. SEE THE MECHANCIAL PIPING SCHEDULE AND THE DOMESTIC PIPING SCHEDULE ON THE DRAWINGS FOR MATERIAL AND INSULATION REQUIREMENTS.
8. THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR FIRE-CAULKING ALL FIRE-RATED OR SMOKE-RATED WALL PENETRATIONS OF PIPING, ETC.
9. INSTALL FLOOR DRAIN STRAINERS AND CLEANOUT COVERS FLUSH AND LEVEL WITH FINISHED FLOOR.

INTENT OF DRAWINGS

1. THE DRAWINGS ARE PARTLY DIAGRAMMATIC AND DO NOT NECESSARILY SHOW EXACT LOCATION OF PIPING AND DUCTWORK UNLESS SPECIFICALLY DIMENSIONED. RISER AND OTHER DIAGRAMS ARE SCHEMATIC AND DO NOT NECESSARILY SHOW THE PHYSICAL ARRANGEMENT OF THE EQUIPMENT. THEY SHALL NOT BE USED FOR OBTAINING LINEAL RUNS OF PIPING OR DUCTWORK, NOR SHALL THEY BE USED FOR SHOP DRAWINGS FOR PIPING AND DUCTWORK FABRICATION OR ORDERING. DISCREPANCIES SHOWN ON DIFFERENT PLANS, OR BETWEEN PLANS AND ACTUAL FIELD CONDITIONS SHALL BE BROUGHT TO T HE ATTENTION OF THE ARCHITECT/ENGINEER FOR RESOLUTION.

REVIEW & SITE INSPECTIONS

1. ALL WORK AND MATERIAL IS SUBJECT TO REVIEW AT ANY TIME BY THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE. IF THE ARCHITECT/ENGINEER OR THEIR REPRESENTATIVE FINDS MATERIAL THAT DOES NOT CONFORM TO THESE SPECIFICATIONS OR THAT IS NOT PROPERLY INSTALLED OR FINISHED, CORRECT THE DEFICIENCIES IN A MANNER SATISFACTORY TO THE ARCHITECT/ENGINEER AT THE CONTRACTOR'S EXPENSE.

RESPONSIBILITY

1. THE PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR THE INSTALLATION OF A SATISFACTORY AND COMPLETE SYSTEM IN ACCORDANCE WITH THE INTENT OF THE DRAWING AND SPECIFICATIONS. PROVIDE, AT NO EXTRA COST, ALL INCIDENTAL ITEMS, MATERIALS, ACCESSORIES AND LABOR REQUIRED FOR COMPLETION OF THE WORK EVEN THOUGH THEY ARE NOT SPECIFICALLY MENTIONED OR INDICATED ON THE DRAWINGS OR IN THE SPECIFICATIONS.
2. THE DRAWINGS DO NOT ATTEMPT TO SHOW COMPLETE DETAILS OF THE BUILDING CONSTRUCTION WHICH AFFECT THE PLUMBING INSTALLATION; AND REFERENCE IS THEREFORE REQUIRED TO THE ARCHITECTURAL, CIVIL, STRUCTURAL, LANDSCAPE AND ELECTRICAL DRAWINGS AND SPECIFICATIONS AND TO SHOP DRAWINGS OF ALL TRADES FOR ADDITIONAL DETAILS WHICH AFFECT THE INSTALLATION OF THE WORK COVERED UNDER THIS DIVISION OF THE CONTRACT.
3. LOCATION OF PLUMBING SYSTEM COMPONENTS SHALL BE CHECKED FOR CONFLICTS WITH OPENINGS, STRUCTURAL MEMBERS AND COMPONENTS OF OTHER SYSTEMS HAVING FIXED LOCATIONS. IN THE EVENT OF ANY CONFLICTS, THE ARCHITECT/ENGINEER SHALL BE CONSULTED AND HIS DECISION SHALL GOVERN. NECESSARY CHANGES SHALL BE MADE AT THE CONTRACTOR'S EXPENSE.
4. TAKE EXTREME CAUTION NOT TO INSTALL WORK THAT CONNECTS TO EQUIPMENT UNTIL SUCH TIME AS COMPLETE SHOP DRAWINGS OF SUCH EQUIPMENT HAVE BEEN APPROVED BY THE ARCHITECT/ENGINEER. ANY WORK INSTALLED BY THE CONTRACTOR, PRIOR TO APPROVAL OF SHOP DRAWINGS, WILL BE AT THE CONTRACTOR'S RISK.
5. MODIFICATIONS AND CHANGES REQUIRED DUE TO INSTALLATION OF EQUIPMENT OTHER THAN THE EQUIPMENT SCHEDULES AND SPECIFIED SHALL BE MADE AT THE CONTRACTOR'S EXPENSE, THIS INCUDEDS WORK BY OTHER TRADES. IF THE INSTALLATION OF EQUIPMENT OTHER THAN THE SCHEDULED AND SPECIFIED EQUIPMENT REQUIRES MODIFICATIONS TO STRUCTURE, ELECTRICAL SYSTEMS, PLUMBING SYSTEMS, FIRE PROTECTION OR FIRE ALARM SYSTEMS, ANY AND ALL CHANGES SHALL BE MADE AT THE MECHANICAL CONTRACTORS EXPENSE.
6. ALL WORK TO BE PERFORMED SHALL FIRST BE SCHEDULED AND SUBMITTED TO THE OWNER'S REPRESENTATIVE FOR ACCEPTANCE.
7. THE CONTRACTOR SHALL BE CAREFUL NOT TO BLOCK ANY PATHS OF EGRESS WHILE PERFORMING THE WORK SPECIFIED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP OF ALL MATERIALS RESULTING FROM HIS/HER WORK. CLEANUP SHALL BE PERFORMED TO THE LEVEL OF ACCEPTANCE OF THE OWNER'S REPRESENTATIVE & THE ENGINEER.
9. THE CONTRACTOR SHALL AND HEREBY DOES WARRANT AND GUARANTEE THAT ALL WORK EXECUTED UNDER HIS/HER CONTRACT SHALL BE FREE OF DEFECTS OF MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE(1) YEAR FROM THE DATE OF SUBSTANTIAL COMPLETION.

SHOP DRAWINGS AND SUBMITTALS

1. WITHIN 30 DAYS AFTER AWARDING OF THE MECHANICAL CONTRACT, THE MECHANICAL CONTRACTOR SHALL SUBMIT SHOP DRAWINGS AND SUBMITTALS FOR THE FOLLOWING PRODUCTS:
   a. GRILLES, REGISTERS, & DIFFUSERS
   b. PLUMBING FIXTURES AND TRIM
   c. DOMESTIC WATER PIPING, SANITARY WASTE AND VENT PIPING
   d. FILTRATION UNIT, DEHUMIDIFIER
2. SHOP DRAWINGS AND SUBMITTALS SHALL BE IN THE FORM OF ELECTRONICALLY TRANSMITTED PDFS. SHOP DRAWINGS AND SUBMITTALS SHALL INCLUDE SHOP DRAWINGS AND LITERATURE SHOWING ITEM TO BE USED, SIZE, DIMENSIONS, CAPACITY, ROUGH IN, ETC., AS REQUIRED FOR COMPLETE CHECK AND INSTALLATION. MANUFACTURER'S LITERATURE SHOWING MORE THAN ONE ITEM SHALL BE CLEARLY MARKED AS TO WHICH ITEM IS BEING FURNISHED OR IT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
3. EACH ITEM SUBMITTED MUST BE CLEARLY MARKED AS FOLLOWS FOR PURPOSES OF IDENTIFICATION AND RECORD. SUBMITTALS NOT MARKED (TYPEWRITTEN ONLY) AS DESCRIBED BELOW WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
   DATE, NAME OF PROJECT, BRANCH OF WORK, SUBMITTED BY, SPECIFICATION OR PLAN REFERENCE:
4. PRIOR TO THEIR SUBMISSION, EACH SUBMITTAL SHALL BE THOROUGHLY CHECKED BY THE CONTRACTOR FOR COMPLIANCE WITH THE CONTRACT DOCUMENT REQUIREMENTS. EACH SUBMITTAL SHALL THEN BEAR A STAMP EVIDENCING SUCH CHECKING AND SHALL SHOW CORRECTIONS MADE, IF ANY. SUBMITTALS REQUIRING EXTENSIVE CORRECTIONS SHALL BE REVISED BEFORE SUBMISSION TO THE ENGINEER. EACH SUBMITTAL NOT STAMPED AND SIGNED BY THE CONTRACTOR EVIDENCING SUCH CHECKING WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
5. REVIEW OF THE SHOP DRAWINGS AND LITERATURE BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR FOR RESPONSIBILITY FOR DEVIATIONS FOR THE DRAWINGS OR SPECIFICATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN THE SHOP DRAWINGS OR LITERATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE MATERIALS AND EQUIPMENT WHICH MEET THE SPECIFICATIONS AND JOB REQUIREMENTS.

STARTUP, TESTING AND OWNER TRAINING

1. ENTIRE NEW AIR AND WATER SYSTEMS SHALL BE COMPLETELY BALANCED TO THE SATISFACTION OF THE ENGINEER IN ACCORDANCE WITH THE STANDARDS OF NEBB. APPROVED TEST AND BALANCE CONTRACTORS ARE: RGO INC. (406) 390-3344, PRECISION AIR & WATER BALANCING (406)-257-3013, & HIGHLANDS BALANCING (406)-723-4021.

PROJECT CLOSEOUT

1. THE PLUMBING CONTRACTOR SHALL MAINTAIN AT THE PROJECT SITE, A "RECORD SET OF DRAWINGS" SHOWING FIELD CHANGES, AS-BUILT ELEVATIONS, UNUSUAL CONDITIONS ENCOUNTERED DURING CONSTRUCTION, AND SUCH OTHER DATA AS REQUIRED TO PROVIDE THE OWNER WITH AN ACCURATE "AS CONSTRUCTED" SET OF RECORD DRAWINGS. THE CONTRACTOR SHALL FURNISH THIS "RECORD SET" TO THE ENGINEER FOLLOWING THE FINAL INSPECTION OF THE PROJECT.
2. THE PLUMBING CONTRACTOR SHALL PROVIDE AN "OPERATION AND MAINTENANCE MANUAL" (O&M MANUAL) PRIOR TO THE COMMENCEMENT OF OWNER TRAINING. THE O&M MANUAL SHALL BE PROVIDED IN DIGITAL OR THREE PAPER COPIES (BOUND & LABELED) FORMAT AS REQUESTED BY THE ENGINEER OR OWNER. THE O&M MANUAL SHALL CONSIST OF A TITLE PAGE, TABLE OF CONTENTS, AND MANUAL CONTENTS. THE MANUAL CONTENTS SHALL CONSIST OF PRODUCT DATA INFORMATION, PRODUCT SERVICE/MAINTENANCE MANUAL, AND EXECUTED WARRANTY FOR EACH AND ALL EQUIPMENT AND PRODUCTS INSTALLED UNDER THE SCOPE OF THIS PROJECT.

PLUMBING PIPING MATERIAL SCHEDULE

SYSTEM NAME	INSTALLATION LOCATION	SIZE RANGE	MATERIAL	FITTING TYPE	INSULATION TYPE	INSULATION THICKNESS
DOMESTIC HOT WATER	INDOOR	ALL	TYPE 'L' COPPER	PRESS SEAL OR SOLDER	GLASS FIBER OR FLEXIBLE ELASTOMERIC	1"
DOMESTIC COLD WATER	INDOOR	ALL	TYPE 'L' COPPER	PRESS SEAL OR SOLDER	GLASS FIBER OR FLEXIBLE ELASTOMERIC	1"
SANITARY WASTE, VENT	ABOVE GRADE	ALL	CAST IRON	NO HUB	-	N/A
SANITARY WASTE, VENT	BELOW GRADE	ALL	PVC	DWV	-	N/A

NOTES: INSTALL AND SUPPORT ALL PIPING PER MANUFACTURERS INSTRUCTIONS. INSULATE ALL PIPING IN ACCORDANCE WITH THE INTERNATIONAL ENERGY CONSERVATION CODE. ALL PIPE INSULATION SHALL HAVE SMOKE DEVELOPMENT BELOW 50 AND FLAME SPREAD LESS THAN 25 WHEN TESTED IN ACCORDANCE WITH ASTM E 84 OR UL 723. SEISMIC BRACING OF ALL SYSTEMS...

P - SHEET INDEX

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Sheet Contents
PLUMBING LEGEND & SPECIFICATIONS

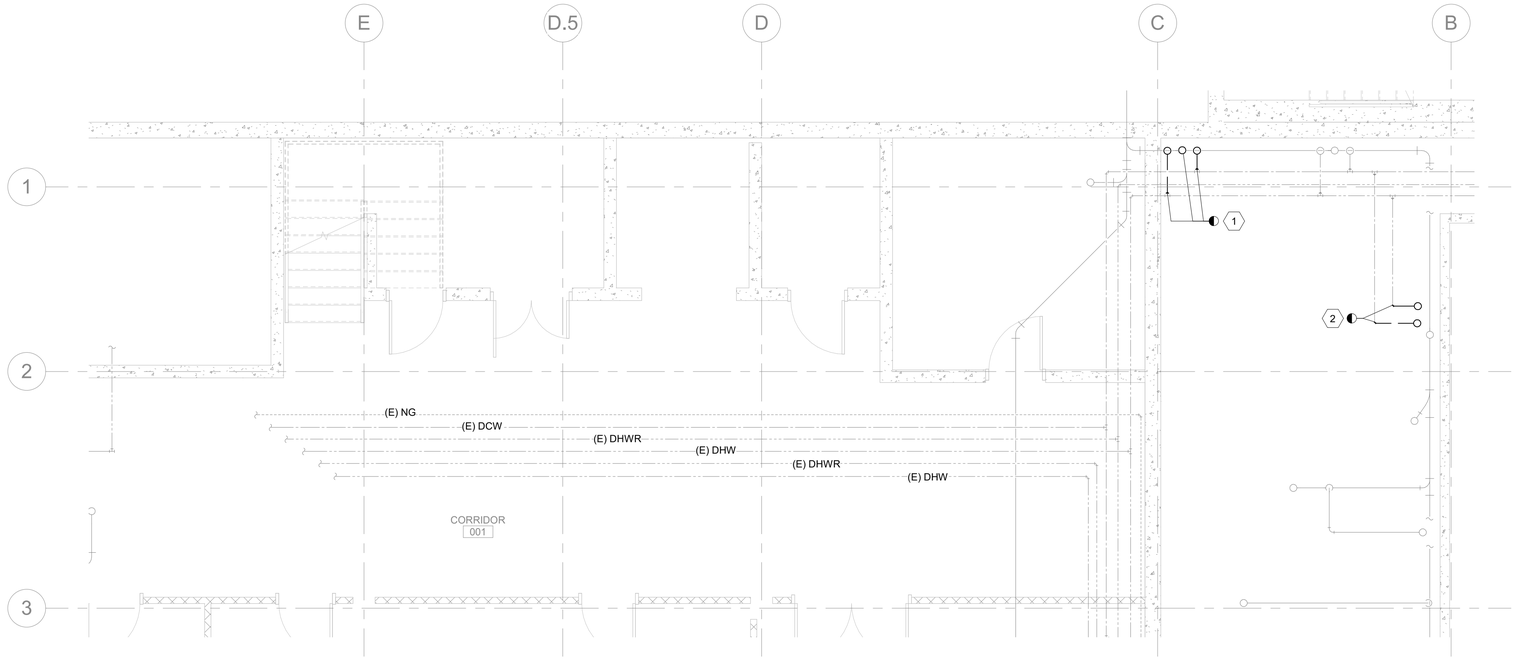
Sheet No.
P001

GENERAL PLUMBING DEMOLITION NOTES

A. LOCATIONS AND DIMENSIONS OF EXISTING FACILITIES IDENTIFIED ON THIS DRAWING ARE APPROXIMATE AND REPRESENT THE BEST AVAILABLE INFORMATION BASED ON A COMBINATION OF FIELD INVESTIGATIONS AND VARIOUS DESIGN AND RECORD DRAWINGS AVAILABLE AT THE TIME OF THE DESIGN. FIELD VERIFY LOCATIONS AND DIMENSIONS PRIOR TO AND DURING PERFORMANCE OF THE WORK AND NOTIFY THE ARCHITECT / ENGINEER OF ANY MAJOR DISCREPANCIES.
B. EXISTING PLUMBING EQUIPMENT AND PIPING SHOWN AS DARK AND DASHED SHALL BE DEMOLISHED. EXISTING MECHANICAL EQUIPMENT SHOWN LIGHT WITH SOLID LINES IS TO REMAIN UNCHANGED.
C. COORDINATE WITH THE GENERAL CONTRACTOR FOR ROOF, WALL, CEILING AND FLOOR PATCH AND REPAIR WORK ASSOCIATED WITH MECHANICAL DEMOLITION.
D. COORDINATE WORK WITH THE OWNER TO ENSURE SHUT DOWN OF UTILITIES AND FIXTURES IS IN ACCORDANCE WITH AN ACCEPTABLE OWNER SCHEDULE.

KEY NOTES:

1. DEMOLISH 1/2" DCW, 1/2" DHW, AND 2" SAN BACK TO MAINS. COORDINATE EXTENTS OF DEMOLITION WITH NEW WORK.
2. DEMOLISH 3/4" DCW AND 3/4" DHW. PRESERVE PIPE FOR RECONNECTION.



1 PD100 FLOOR PLAN - BASEMENT PLUMBING DEMO - EXTRUDER LAB 2025
1/4" = 1'-0"

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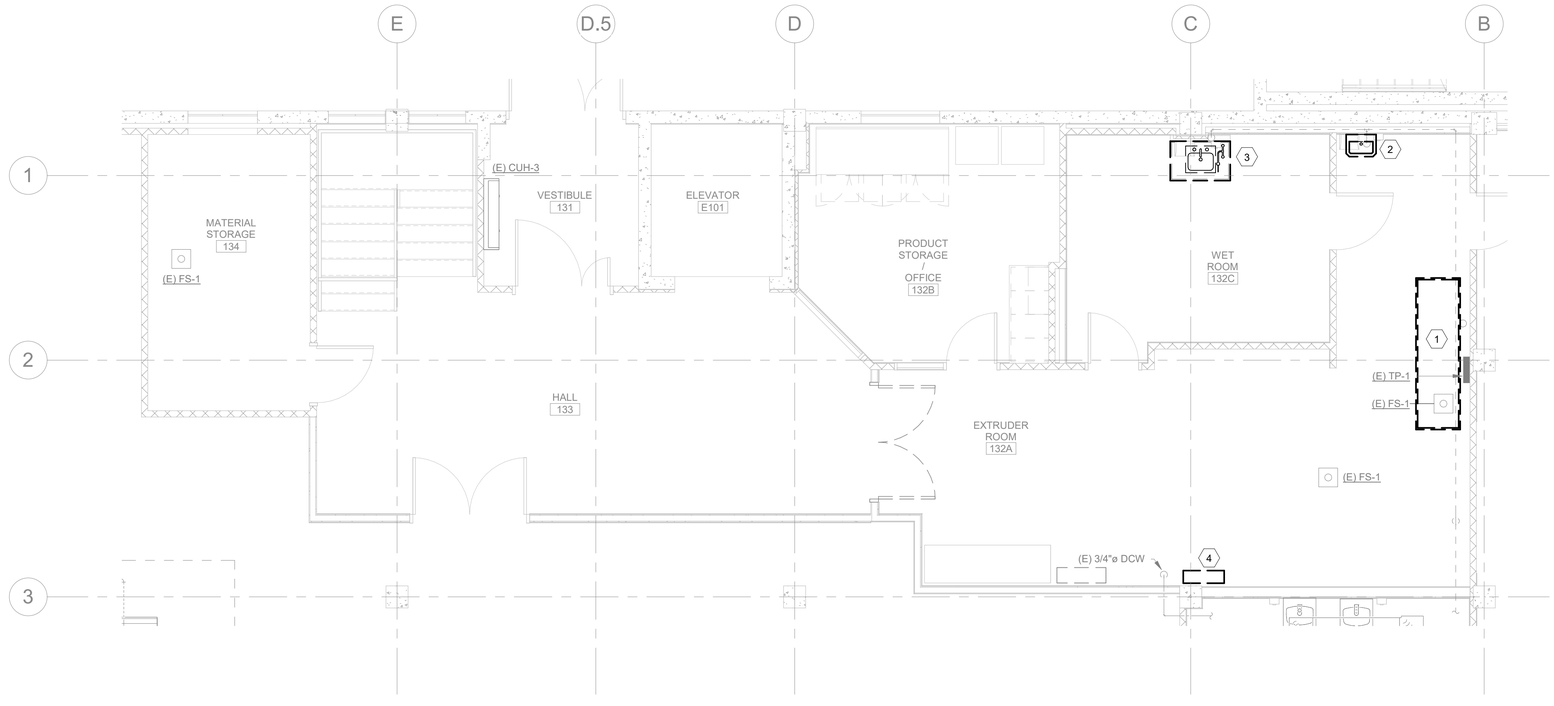
Sheet Contents
BASEMENT - PLUMBING DEMO PLAN

Sheet No.
PD100



1 PD101 FLOOR PLAN - MAIN FLOOR PLUMBING DEMO - EXTRUDER LAB 2025

1/4" = 1'-0"

GENERAL PLUMBING DEMOLITION NOTES

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B. EXISTING PLUMBING EQUIPMENT AND PIPING SHOWN AS DARK AND DASHED SHALL BE DEMOLISHED. EXISTING MECHANICAL EQUIPMENT SHOWN LIGHT WITH SOLID LINES IS TO REMAIN UNCHANGED.
C. COORDINATE WITH THE GENERAL CONTRACTOR FOR ROOF, WALL, CEILING AND FLOOR PATCH AND REPAIR WORK ASSOCIATED WITH MECHANICAL DEMOLITION.
D. COORDINATE WORK WITH THE OWNER TO ENSURE SHUT DOWN OF UTILITIES AND FIXTURES IS IN ACCORDANCE WITH AN ACCEPTABLE OWNER SCHEDULE.

KEY NOTES:

1. 3-COMPARTMENT SINK AND ASSOCIATED INDIRECT DRAINAGE PIPING TO BE REMOVED AND RELOCATED. DEMOLISH ASSOCIATED DCW AND DHW TO EXTENTS SHOWN ON PD100. ADJACENT TRAP PRIMER AND FLOOR SINK TO REMAIN.
2. HANDWASH SINK TO BE DEMOLISHED AND RETURNED TO OWNER. PRESERVE ASSOCIATED PIPING FOR RECONNECTION.
3. HANDWASH SINK AND EYEWASH STATION TO BE REMOVED AND RELOCATED. DEMOLISH ASSOCIATED PIPING BACK TO MAINS AND CAP. COORDINATE EXTENTS OF DEMOLITION WITH NEW WORK.
4. HOSE REEL TO BE REMOVED AND RETURNED TO OWNER.

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MONTANA STATE UNIVERSITY
HARRISON LAB 132
REMODEL

Revisions

No.	Description	Date

Drawn by CMS	Date 10.23.2025
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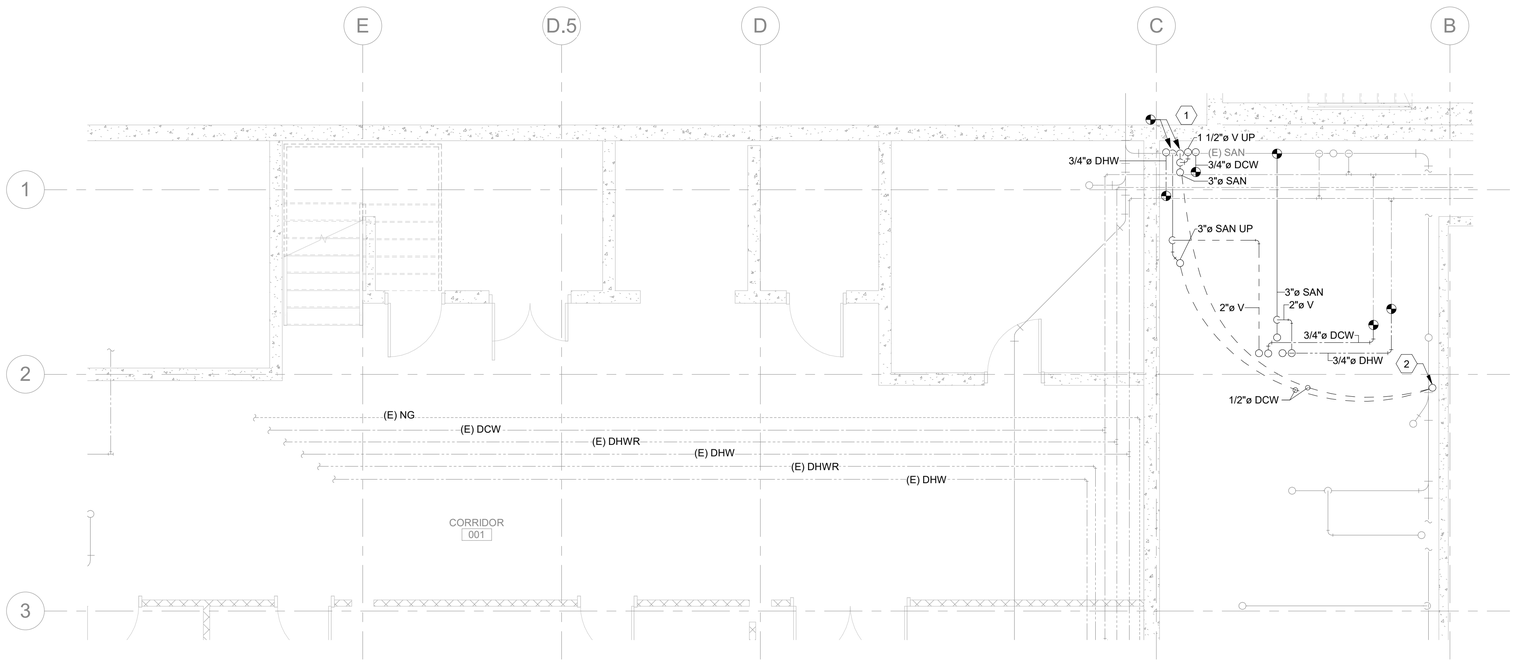
Sheet Contents
LEVEL 1 - PLUMBING DEMO PLAN

Sheet No.
PD101



1 P100 FLOOR PLAN - BASEMENT PLUMBING - EXTRUDER LAB 2025

1/4" = 1'-0"

GENERAL PLUMBING NOTES

A.) IT SHALL BE THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO FIELD COORDINATE THE LOCATION OF EQUIPMENT AND ROUTING OF PIPING WITH ALL OTHER TRADES.

B.) IT SHALL BE THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO REVIEW THE DRAWINGS FOR ALL DICIPLINES AND PROVIDE ALL LABOR AND MATERIALS REQUIRED FOR A COMPLETE INSTALLATION.

C.) PROVIDE AND INSTALL SEISMIC BRACING FOR ALL EQUIPMENT, DUCTWORK AND PIPING PER THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE.

D.) SEAL ALL PIPE PENETRATIONS THROUGH FIRE RATED ASSEMBLIES WITH A UL-APPROVED FIRE STOP SYSTEM.

E.) PROVIDE ACCESS DOORS TO ALLOW SERVICE AND INSPECTION OF EQUIPMENT, VALVES, DAMPERS AND DEVICES INSTALLED ABOVE NON-REMOVABLE CEILINGS.

F.) ALL BELOW SLAB VENT PIPING SHALL BE 2" MINIMUM.

G.) PROVIDE TRAP SEALS FOR ALL FLOOR DRAINS AND SINKS.

H.) PROVIDE TRAP PRIMERS FOR ALL FLOOR DRAINS AND SINKS. LOCATE TRAP PRIMERS IN A VALVE BOX IN AN ACCESSIBLE LOCATION.

I.) INSTALL ACCESSIBLE PLUMBING FIXTURES IN COMPLIANCE WITH ADA REQUIREMENTS. INSULATE ALL EXPOSED PIPING BELOW ADA ACCESSIBLE FIXTURES.

J.) INSTALL FLOOR DRAIN STRAINERS AND CLEANOUT COVERS FLUSH AND LEVEL WITH FINISHED FLOOR.

KEY NOTES:

1. 3/4" DHW, 1-1/2" V, AND 3/4" DCW UP TO SK-3 ABOVE. .
2. CONNECT 1/2" DCW TO (E) TRAP PRIMER ABOVE.

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BASEMENT - PLUMBING PLAN

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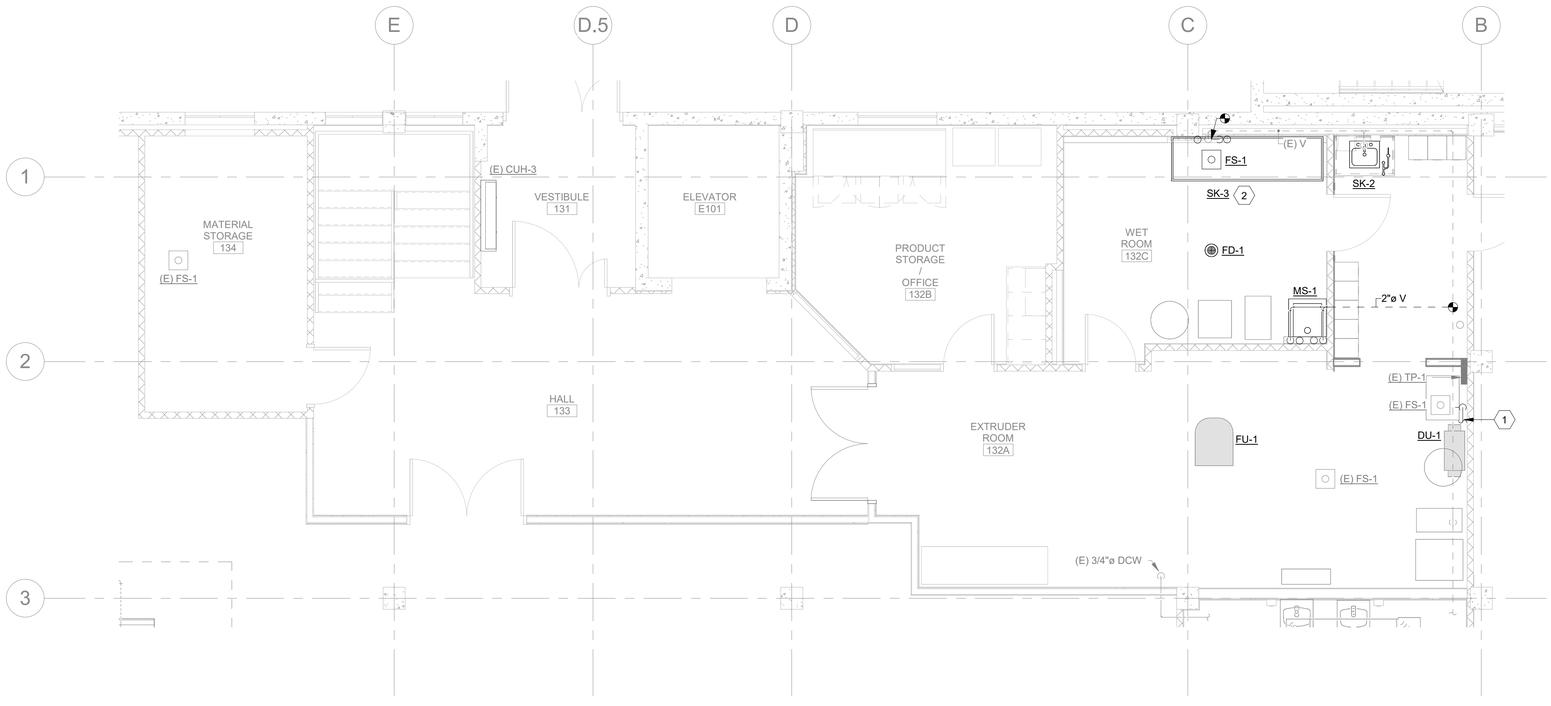
P100

PLUMBING FIXTURE SCHEDULE - EXTRUDER LAB

MARK	DESCRIPTION	MFGR	MODEL #	MATERIAL & FINISH	TRIM			ROUGH-IN SIZE					REMARKS
					ITEM	MFGR	MODEL	RL/ORL	WASTE	VENT	COLD	HOT	
FD-1	ROUND FLOOR DRAIN	JR SMITH	2005Y	CAST IRON BODY WITH NICKEL BRONZE GRATE	- -	- -	- -	- -	SEE PLANS	SEE PLANS	- -	- -	PROVIDE WITH NO-HUB OUTLET, TRAP PRIMER CONNECTION, AND JR SMITH QUAD CLOSE TRAP SEAL.
FS-1	FLOOR SINK	JR SMITH	3120Y	ENAMELED CAST IRON BODY WITH ALUMINUM STRAINER	N / A	N / A	N / A	- -	SEE PLANS	SEE PLANS	- -	- -	PROVIDE WITH NO-HUB OUTLET, DOME STRAINER. 3/4" GRATE, AND JR SMITH QUAD CLOSE TRAP SEAL.
MS-1	MOP SINK	FIAT	MSB2424	POLYMER	FAUCET	MOEN	8124	- -	3"	2"	3/4"	3/4"	PROVIDE COMPLETE WITH GRID DRAIN, CAST IRON P-TRAP, STAINLESS STEEL WALL GUARDS, MOEN 8199 RUBBER HOSE AND BRACKET, MOEN 8198 MOP/BROOM HOLDER. PROVIDE FAUCET WITH INTEGRAL CHECK VALVES.
(E) SK-2	HANDWASH SINK	EAGLE GROUP	HSA-10-1FK	STAINLESS STEEL	INTEGRAL TO SINK			- -	2"	1-1/2"	1/2"	1/2"	ROUGH-IN AND CONNECT.
(E) SK-3	3 COMPARTMENT SINK	OWNER PROVIDED			OWNER PROVIDED			- -	2"	- -	3/4"	3/4"	ROUGH-IN AND CONNECT.

NOTES: PROVIDE ALL FIXTURES WITH APPROPRIATE COMMERCIAL GRADE SUPPORTS/CARRIERS, P-TRAPS, STOP VALVES, BRAIDED FLEXIBLE SUPPLIES, UNDER FIXTURE PIPING INSULATION AND HAMMER ARRESTORS. PROVIDE AND INSTALL TRAP PRIMERS FOR ALL FLOOR DRAINS AND FLOOR SINKS UNLESS OTHERWISE INDICATED. INSTALL ALL TRAP PRIMERS IN RECESSED WALL MOUNTED BOXES IN AN ACCESSIBLE LOCATION. FIELD COORDINATE INSTALLATION LOCATION OF TRAP PRIMER WALL BOXES, WATER CLOSETS, LAVATORIES, AND URINALS FOR ADA...



1 P101 FLOOR PLAN - MAIN FLOOR PLUMBING - EXTRUDER LAB 2025

1/4" = 1'-0"

GENERAL PLUMBING NOTES

A.) IT SHALL BE THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO FIELD COORDINATE THE LOCATION OF EQUIPMENT AND ROUTING OF PIPING WITH ALL OTHER TRADES.

B.) IT SHALL BE THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO REVIEW THE DRAWINGS FOR ALL DICIPLINES AND PROVIDE ALL LABOR AND MATERIALS REQUIRED FOR A COMPLETE INSTALLATION.

C.) PROVIDE AND INSTALL SEISMIC BRACING FOR ALL EQUIPMENT, DUCTWORK AND PIPING PER THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE.

D.) SEAL ALL PIPE PENETRATIONS THROUGH FIRE RATED ASSEMBLIES WITH A UL-APPROVED FIRE STOP SYSTEM.

E.) PROVIDE ACCESS DOORS TO ALLOW SERVICE AND INSPECTION OF EQUIPMENT, VALVES, DAMPERS AND DEVICES INSTALLED ABOVE NON-REMOVABLE CEILINGS.

F.) ALL BELOW SLAB VENT PIPING SHALL BE 2" MINIMUM.

G.) PROVIDE TRAP SEALS FOR ALL FLOOR DRAINS AND SINKS.

H.) PROVIDE TRAP PRIMERS FOR ALL FLOOR DRAINS AND SINKS. LOCATE TRAP PRIMERS IN A VALVE BOX IN AN ACCESSIBLE LOCATION.

I.) INSTALL ACCESSIBLE PLUMBING FIXTURES IN COMPLIANCE WITH ADA REQUIREMENTS. INSULATE ALL EXPOSED PIPING BELOW ADA ACCESSIBLE FIXTURES.

J.) INSTALL FLOOR DRAIN STRAINERS AND CLEANOUT COVERS FLUSH AND LEVEL WITH FINISHED FLOOR.

KEY NOTES:

1. 3/4" DRAIN LINE FROM DU-1 TO INDIRECT DRAIN INTO FLOOR SINK.
2. MODIFY EXISTING INDIRECT SANITARY DRAINAGE PIPE TO ROUTE TO FLOOR SINK.

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LEVEL 1 - PLUMBING PLAN

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P101

ELECTRICAL ABBREVIATIONS LEGEND

A, AMP	AMPERES	MAN	MANUAL
AC	ALTERNATING CURRENT	MAX	MAXIMUM
A/C	AIR CONDITIONING	MCA	MINIMUM CIRCUIT AMPACITY
AF	AMP FUSE	MCC	MOTOR CONTROL CENTER
AFF	ABOVE FINISHED FLOOR	MDP	MAIN DISTRIBUTION PANEL
AFG	ABOVE FINISHED GRADE	MECH	MECHANICAL
AHU	AIR HANDLING UNIT	MH	METAL HALIDE
AL	ALUMINUM	MIN	MINIMUM
AS	AMP SWITCH	MSS	MOTOR STARTER SWITCH WITH THERMAL OVERLOADS
ATS	AUTOMATIC TRANSFER SWITCH	N	NEUTRAL
BAS	BUILDING AUTOMATION SYSTEM	NC	NORMALLY CLOSED
BKR	BREAKER	NEC	NATIONAL ELECTRIC CODE
C	RACEWAY/CONDUIT	NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
CB	CIRCUIT BREAKER	NFD	NON-FUSED DISCONNECT
CCTV	CLOSED CIRCUIT TELEVISION	NIC	NOT IN CONTRACT
CKT	CIRCUIT	NO	NORMALLY OPEN
CLG	CEILING	#	NUMBER
C.O.	RACEWAY/CONDUIT ONLY, WITH PULL STRING	OAE	OR APPROVED EQUAL
CNTRL	CONTROL	OC	ON CENTER
CU	COPPER	OCPD	OVERCURRENT PROTECTIVE DEVICE
D	EXISTING TO BE DEMOLISHED	OH	OVERHEAD
DF	DRINKING FOUNTAIN	P	POLE
DISC	DISCONNECT	PB	PUSHBUTTON
DIST	DISTRIBUTION	PNL	PANEL
DPDT	DOUBLE POLE DOUBLE THROW	PS	POWER SUPPLY
DWG	DRAWING	PVC	POLYVINYL CHLORIDE CONDUIT
EA	EACH	PWR	POWER
EF	EXHAUST FAN	R	EXISTING TO BE RELOCATED
ELEC	ELECTRIC	RCPT	RECEPTACLE
EMT	ELECTRICAL METALLIC TUBING	RECEPT	RECEPTACLE
EQUIP	EQUIPMENT	RGS	RIGID GALVANIZED STEEL
EX, EXIST	EXISTING	RM	ROOM
FA	FIRE ALARM	RVNR	REDUCED VOLTAGE NON-REVERSING
FACP	FIRE ALARM CONTROL PANEL	RVR	REDUCED VOLTAGE REVERSING
FATC	FIRE ALARM TERMINAL CABINET	SP	SINGLE POLE TOGGLE SWITCH
FD	FUSED DISCONNECT	SPD	SURGE PROTECTIVE DEVICE (TVSS)
FLR	FLOOR	SPEC	SPECIFICATION
FO	FIBER OPTIC	SPST	SINGLE POLE SINGLE THROW
FSD	FIRE SMOKE DAMPER RELAY, CONTROLLED BY ASSOCIATED SMOKE DETECTOR AND CIRCUITED BACK TO FACP	SSPB	START-STOP PUSHBUTTON
		SW	SWITCH
FVNR	FULL VOLTAGE NON-REVERSING	SWBD	SWITCHBOARD
FVR	FULL VOLTAGE REVERSING	SWGR	SWITCHGEAR
GEC	GROUNDED ELECTRODE CONDUCTOR	TB	TELEPHONE BOARD
GFCI	GROUND FAULT CIRCUIT INTERRUPER	TC	TIME CLOCK
GFI	GROUND FAULT INTERRUPTER	TD	TIME DELAY
GFP	GROUND FAULT PROTECTION	TEL	TELEPHONE
GND	GROUND	TSP	TWISTED SHIELDED PAIR
GRC	GALVANIZED RIGID CONDUIT	TTB	TELEPHONE TERMINAL BOARD
HD	HAND DRYER	TYP	TYPICAL
HID	HIGH INTENSITY DISCHARGE	UG	UNDERGROUND
HOA	HAND-OFF-AUTOMATIC	UH	UNIT HEATER
HP	HORSEPOWER	UNO	UNLESS NOTED OTHERWISE
HPS	HIGH PRESSURE SODIUM	V	VOLT
HTR	HEATER	VA	VOLT-AMPERES
HVAC	HEATING, VENTILATION & AIR CONDITIONING	VFD	VARIABLE FREQUENCY DRIVE
HZ	HERTZ	W	WATTS
J-BOX	JUNCTION BOX	WP	WEATHERPROOF
KVA	KILOVOLT-AMPERES	W/O	WITHOUT
KW	KILOWATTS	XFMR	TRANSFORMER
LCP	LIGHTING CONTROL PANEL	Y	WYE-CONNECTED
LPW	LUMENS PER WATT	Δ	DELTA-CONNECTED
LTG	LIGHTING	ø	PHASE
LV	LOW VOLTAGE		
MAG	MAGNETIC STARTER		

NOTE: THESE ABBREVIATIONS COMPRISE A STANDARD LIST; NOT ALL ABBREVIATIONS APPEAR IN THIS PROJECT.

ELECTRICAL LOW VOLTAGE LEGEND

FIRE ALARM SYSTEM

Symbol	Description
FACP	FIRE ALARM CONTROL PANEL
FAA	FIRE ALARM ANNUNCIATOR
PS	SPRINKLER PRESSURE SWITCH
FS	SPRINKLER FLOW SWITCH
TS	SPRINKLER TAMPER SWITCH
H	HEAT DETECTOR
SD	SMOKE DETECTOR - PHOTO-ELECTRIC
SD D	DUCT SMOKE DETECTOR
SS	SINGLE-STATION SMOKE DETECTOR. PROVIDE 120V AND MONITOR AT FACP VIA RELAY.
CO	CARBON MONOXIDE DETECTOR
D	DOOR HOLDER
F	MANUAL STATION (MOUNT AT +46" AFF, UNO)
F F	STROBE - WALL MOUNT (+82" AFF), CEILING MOUNT
	HORN/STROBE - WALL MOUNT (+82" AFF), CEILING MOUNT
S S	SPEAKER STROBE - WALL MOUNT (+82" AFF), CEILING MOUNT

TELEPHONE/DATA SYSTEM

Symbol	Description
	VOICE-DATA OUTLET (MOUNT AT +18" AFF, UNO). EC SHALL PROVIDE ROUGH-IN ONLY: 2-GANG J-BOX WITH MUD RING AND PATHWAY.
WA	WIRELESS ACCESS POINT, CEILING MOUNT. EC SHALL PROVIDE ROUGH-IN ONLY: 2-GANG J-BOX AND PATHWAY.

SECURITY SYSTEM

Symbol	Description
CR	CARD READER, +48"AFF (SEE PLANS/DETAIL FOR ROUGH-IN)
RE	REQUEST TO EXIT MOTION DETECTOR
DC	DOOR CONTACTS
ES	ELECTRIC STRIKE
EL	ELECTRIC LOCK
MD	MOTION DETECTOR
GB	GLASS BREAK DETECTOR
C	CCTV CAMERA

ELECTRICAL ONE-LINE LEGEND

Symbol	Description
M	CT AND CUSTOMER POWER METER
M	MOTOR SYMBOL
M	UTILITY ELECTRIC METER AND BASE (BASE BY CUSTOMER)
SPD	SURGE PROTECTION DEVICE
LA	LIGHTNING ARRESTOR
	STRESS RELIEF CONE
PFC	POWER FACTOR CORRECTION CAPACITOR
$M	MOTOR STARTER SWITCH WITH THERMAL OVERLOADS
	CONTACTOR NORMALLY OPEN, NORMALLY CLOSED
	TRANSFORMER, 3-PHASE, 3-WIRE DELTA CONNECTION
	TRANSFORMER, 3-PHASE, 4-WIRE GROUNDED WYE CONNECTION
	AUTOMATIC TRANSFER SWITCH
VFD	VARIABLE FREQUENCY DRIVE
	FIXED MOUNT LV BREAKER
	FUSED SWITCH ("XXAS/XXAF" - SW AND FUSE AMP RATING)
G	GENERATOR
CB	WALL MOUNTED BREAKER
	THERMAL OVERLOAD ELEMENT
	DISCONNECT SWITCH ("XXAS" = SWITCH AMP RATING)
	FUSED DISCONNECT SWITCH ("XXAS/XXAF" = SW AND FUSE AMP RATING)
	COMBINATION MOTOR STARTER (STR SIZE, TYP, AS, AF, SEE MEP COORDINATION SCHEDULE)
PNL A 208Y/120V 3ø, 4W	SWITCHBOARD OR PANELBOARD; NAME, VOLTAGE, PHASE, NUMBER OF WIRES WHEN INDICATED

ELECTRICAL POWER LEGEND

Symbol	Description
	BRANCH CIRCUIT PANELBOARD
X	PANEL AND CIRCUIT DESIGNATION ARE SHOWN NEXT TO EACH DEVICE (PANEL NAME - CIRCUIT NUMBER). BRANCH CIRCUIT WIRE SIZE IS #12 UNLESS NOTED OTHERWISE. A SINGLE INSULATED GREEN GROUND CONDUCTOR SHALL BE PROVIDED WITH EACH HOME RUN. PROVIDE A SEPARATE NEUTRAL FOR EACH CIRCUIT. HOME RUNS SHALL HAVE NO MORE THAN THREE CIRCUITS. LINE VOLTAGE AND LOW VOLTAGE WIRING IS NOT SHOWN ON PLANS. FOR EQUIPMENT CIRCUITING, SEE MEP COORDINATION SCHEDULE. X INDICATES TYPE: "GFI" - GROUND FAULT INTERRUPTER "WP" - WEATHERPROOF WHILE-IN-USE COVER "U" - PROVIDE WITH (2) USB PORTS
X	SIMPLEX RECEPTACLE (MOUNT AT +18" AFF, UNO)
X	DUPLEX RECEPTACLE (MOUNT AT +18" AFF, UNO)
X	QUADRUPLEX RECEPTACLE (MOUNT AT +18" AFF, UNO)
X	SIMPLEX ABOVE COUNTER RECEPTACLE (MOUNT AT + 4" ABOVE BACKSPLASH)
X	DUPLEX ABOVE COUNTER RECEPTACLE (MOUNT AT +4" ABOVE BACKSPLASH)
X	QUADRUPLEX ABOVE COUNTER RECEPTACLE (MOUNT AT +4" ABOVE BACKSPLASH)
	4-GANG FLOOR BOX WITH QUADRUPLEX RECEPTACLE & PROVISIONS FOR MSU AV CABLING & TELEPHONE/DATA OUTLETS. HUBBELL MODEL CFB4G30, COVER MODEL 24GCCVR SERIES, OR EQUAL.
X	SPECIAL PURPOSE RECEPTACLE (MOUNT AT +18" AFF, UNO) X INDICATES TYPE: TYPE A: NEMA 5-20R; TYPE B: NEMA 5-30R; TYPE C: NEMA 5-50R; TYPE D: NEMA 6-20R; TYPE E: NEMA 6-30R; TYPE F: NEMA 6-50R; TYPE G: NEMA 14-20R; TYPE H: NEMA 14-30R; TYPE I: NEMA 14-50R
X	PUSHBUTTON (MOUNT AT +54" AFF, UNO) X INDICATES TYPE: "EPO" - EMERGENCY POWER OFF "ADA" - HANDICAPPED ACCESSIBLE DOOR (DEVICE BY OTHERS) "ODO" - OVERHEAD DOOR OPERATOR (DEVICE BY OTHERS)
	FLATSCREEN TV BOX: 2-GANG, FLUSH IN WALL, HUBBELL RACO NSAV62M, WITH NSAV6C COVER. DUPLEX RECEPTACLE & SINGLE GANG DATA PORT. MOUNT AT +72" AFF, UNO. PROVIDE A 1" CONDUIT HOMERUN TO LOCATION SHOWN ON SHEET E2.1 FOR MSU IT WIRING.
J	JUNCTION BOX
J	DROP-DOWN RECEPTACLE
PS-X	SURFACE MOUNTED PLUGSTRIP X INDICATES TYPE AND STYLE: TYPE A: PLUGSTRIP, POWER ONLY, OUTLET EVERY 3' OC TYPE B: WIREMOLD SERIES 4000 POWER AND DATA TYPE C: WIREMOLD SERIES 5000 POWER AND DATA
	SURFACE MOUNTED RACEWAY
	RACEWAY CONCEALED IN WALL, FLOOR, OR CEILING IN FINISHED SPACES, EXPOSED IN UNFINISHED SPACES
	RACEWAY BELOW FLOOR OR BELOW GRADE
	RACEWAY STUB-OUT WITH CAPPED END
	RACEWAY STUB-OUT WITH BRUSHED END
	GROUNDING BUS

ELECTRICAL PROJECT NOTES

A. PRIOR TO BID CONTRACTOR SHALL VISIT THE SITE. NOT ALL WORK REQUIRED TO COMPLETE THE PROJECT IS SHOWN ON THE DRAWINGS. THE CONTRACTOR SHALL BECOME THOROUGHLY FAMILIAR WITH ALL THE WORK REQUIRED TO COMPLETE THE PROJECT IN ADDITION TO THE LOCAL CONDITIONS AND INCLUDE SAID WORK IN THE BID.

B. GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH NECA 1, "STANDARD PRACTICES FOR GOOD WORKMANSHIP IN ELECTRICAL CONTRACTING." THIS PUBLICATION IS AVAILABLE FROM NECA BY TELEPHONE AT 301-657-3110 OR ON-LINE AT WWW.NECANET.ORG.

C. DURING DEMOLITION, THE CONTRACTOR SHALL NOTE ALL EXISTING RACEWAY (BOTH SURFACE AND CONCEALED) TO THE EXTENT POSSIBLE. THESE RACEWAYS SHALL BE REUSED TO THE GREATEST EXTENT POSSIBLE TO INSURE A CLEAN FINISHED PRODUCT.

D. CONTRACTOR SHALL REMOVE, TRANSPORT, AND LEGALLY DISPOSE OF LAMPS AND BALLASTS OFF-SITE. IT IS ASSUMED THE BALLASTS DO NOT CONTAIN PCBs. THE CONTRACTOR SHALL NOTIFY THE OWNER IMMEDIATELY IF IT IS SUSPECTED THAT BALLASTS CONTAIN PCBs.

E. ALL POWER INTERRUPTIONS SHALL BE COORDINATED WITH OWNER AT LEAST 72 HOURS IN ADVANACE. ANY DISRUPTION OF WORKERS IN THE SPACE SHALL BE KEPT TO A MINIMUM AND BE COORDINATED WITH THE OWNER PRIOR TO WORK COMMENCING IN THAT SPACE.

F. CONTRACTOR SHALL EXTEND UNSWITCHED HOT LEG FROM EXISTING EMERGENCY FIXTURE LOCATION TO NEW EMERGENCY FIXTURES. AS NEEDED. SEE DEMO PLANS FOR AN APPROXIMATION OF EXISTING EMERGENCY FIXTURE LOCATIONS. FIELD VERIFY EXACT LOCATION PRIOR TO BID.

G. PROVIDE PLENUM RATED CABLES WHERE REQUIRED FOR LIGHTING CONTROL, DATA, AND OTHER L.V. SYSTEMS NOT INSTALLED IN CONDUIT. VERIFY CONDUIT REQUIREMENTS ON DRAWINGS AND SPECIFICATIONS.

H. FIRE-RESISTANCE: PROVIDE A MINIMUM HORIZONTAL DISTANCE OF 24" BETWEEN OUTLET BOXES LOCATED ON OPPOSITE SIDES OF FIRE-RESISTANCE RATED WALLS. WHERE THIS IS NOT POSSIBLE INSTALL UL LISTED PUTTY PADS ON ALL OUTLET BOXES NOT MEETING THE 24" SEPARATION. PROVIDE A UL LISTED THROUGH -PENETRATION FIRESTOP FOR PENETRATIONS OF FIRE-RESISTANCE RATED ASSEMBLIES.

I. CONDUCTORS ARE SIZED PER THE 75 DEGREE C RATING COLUMN OF NEC TABLE 310.16. IF THE TERMINAL USED FOR A TERMINATION OF A PARTICULAR CONDUCTOR IS NOT MARKED, OR THE TERMINAL IS MARKED FOR 60 DEGREE C CONDUCTORS, IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO EITHER ADJUST THE AMPACITY OF THE CONDUCTOR TO MATCH THE 60 DEGREE COLUMN OF TABLE 310.16, OR REPLACE THE TERMINAL WITH ONE RATED FOR AT LEAST 75 DEGREES C.

J. BASED ON ACTUAL HOMERUN LENGTHS REQUIRED IN THE FIELD, THE CONTRACTOR SHALL CALCULATE AND INCREASE THE WIRE SIZES AS REQUIRED TO LIMIT BRANCH CIRCUIT VOLTAGE DROP TO 3%. FOR 20A BRANCH CIRCUITS THE MINIMUM CONDUCTOR SIZES SHALL BE AS FOLLOWS: #10 AMG CU FOR RUNS BETWEEN 100 AND 200 LINEAR FEET, #8 AWG CU FOR RUNS BETWEEN 200 AND 325 LINEAR FEET, ANS AS CALCULATED BY THE CONTRACTOR FOR CIRCUITS EXTENDING BEYOND 325 LINEAR FEET. IN ALL CASES WHERE WIRE SIZES INCREASE, THE CONTRACTOR SHALL PROVIDE LARGER CONDUITS AS REQUIRED.

K. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH 120V BRANCH CIRCUIT.

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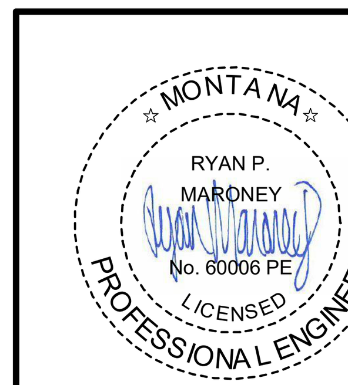

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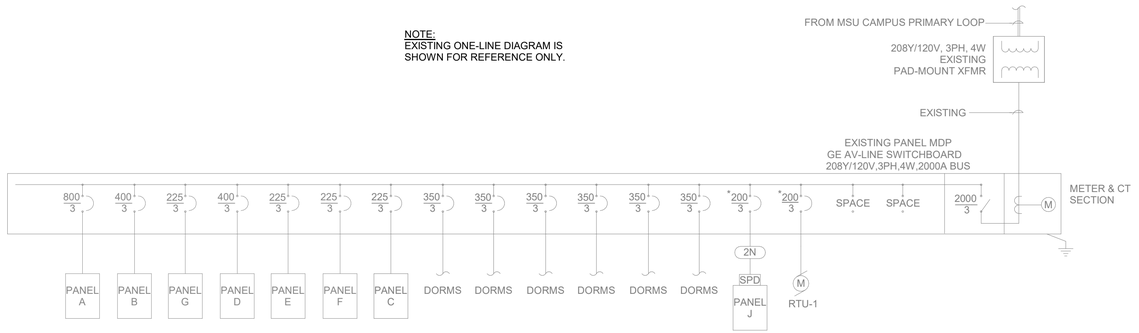
ELECTRICAL SYMBOLS AND ABBREVIATIONS

Sheet No.
E001

Autodesk Docs://25013.01 MSU Harrison Kitchen - Extruder Lab 132/MEP - MSU Harrison Kitchen - Extruder Lab 132 r23.rvt
Plot Date Time: 10/23/2025 3:19:43 PM

NOTE:
EXISTING ONE-LINE DIAGRAM IS SHOWN FOR REFERENCE ONLY.



1 ELECTRICAL ONE LINE DIAGRAM - EXISTING

NOTE: ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL FIELD WIRING BETWEEN SYSTEM COMPONENTS AS SHOWN. RUN ALL WIRING IN CONDUIT. REFER TO MANUFACTURER WIRING DIAGRAMS AND SHOP DRAWINGS FOR FULL REQUIREMENTS.

2 CONVEYOR / BAG DUMP BLOCK WIRING DIAGRAM

Branch Panel: D

Location: WET ROOM 132C
Supply From: EXISTING
Mounting: Recessed
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating: MATCH EXISTING
Mains Type: MCB
Mains Rating: 400 A
MCB Rating: 400 A

Notes:
THIS PANELBOARD IS EXISTING TO REMAIN. EXISTING PANEL IS A GE NLAB TYPE PANELBOARD. UPDATE PANEL SCHEDULE BASED ON AS-BUILT CONDITIONS UPON COMPLETION OF WORK.

CKT	Circuit Description	Load Classification	Trip	Poles	A		B		C		Poles	Trip	Load Classification	Circuit Description	CKT
1	** EXISTING LOAD	--	20 A	1	0 VA	0 VA					1	20 A	Power	** EXISTING LOAD	2
3	** EXISTING LOAD	--	20 A	1			0 VA	0 VA			1	20 A	--	** EXISTING LOAD	4
5	** EXISTING LOAD	--	20 A	1					0 VA	0 VA	1	20 A	Receptacle	** EXISTING LOAD	6
7	** EXISTING LOAD	--	20 A	1	0 VA	0 VA					1	20 A	Receptacle	** EXISTING LOAD	8
9	** EXISTING LOAD	--	20 A	1			0 VA	0 VA			1	20 A	Receptacle	** EXISTING LOAD	10
11									0 VA	0 VA	1	20 A	Power	** EXISTING LOAD	12
13	** EXISTING LOAD	--	30 A	3	0 VA	0 VA					1	20 A	Receptacle	** EXISTING LOAD	14
15							0 VA	0 VA			1	20 A	Receptacle	** EXISTING LOAD	16
17	** EXISTING LOAD	--	20 A	1					0 VA	0 VA	1	20 A	Receptacle	** EXISTING LOAD	18
19	* RCPT - SCALE	Receptacle	20 A	1	600 VA	0 VA					1	20 A	Receptacle	** EXISTING LOAD	20
21	* RCPT - OVEN	Heating	20 A	1			1440...	0 VA			1	20 A	Receptacle	** EXISTING LOAD	22
23	* RCPT - PRESSURE WASHER	Motor	20 A	1					1740...	0 VA	1	20 A	Receptacle	** EXISTING LOAD	24
25	# RCPT - AIR COMP.	Motor	20 A	1	1800...	0 VA					1	20 A	Power	** EXISTING LOAD	26
27	# RCPT - SHOP VAC.	Motor	20 A	1			1200...	696 VA			1	20 A	HVAC	# DU-1	28
29	EXISTING SPARE	--	30 A	1					0 VA	864 VA	1	20 A	HVAC	# FU-1	30
31					0 VA	0 VA					1	20 A	Power	** EXISTING LOAD	32
33	** EXISTING LOAD	--	40 A	3			0 VA	1250...			2	15 A	Motor	*** PLANETARY MIXER	34
35									0 VA	1250...					36
37	# HOPPER AGITATOR & CONVEYOR CONTROL PANEL	Motor	20 A	3	1607...	747 VA					3	20 A	Motor	# BAG DUMP / DUST COLLECTION CONTROL PANEL	38
39							1607...	747 VA							40
41									1607...	747 VA					42
			Total Load:		4753 VA		6939 VA		6207 VA						
			Total Amps:		40 A		60 A		54 A						

Legend:

* RE-USE AN EXISTING 20A-1P SPARE BREAKER WITHIN PANEL 'D' TO CIRCUIT THIS NEW LOAD.

** EXISTING PANEL 'D' BRANCH CIRCUIT TO REMAIN.

*** CIRCUIT IS MISLABELLED. CIRCUIT BREAKER TO BE REUSED AND BRANCH CIRCUIT TO BE RELOCATED TO REFEED PLANETARY MIXER. RELABEL CIRCUIT "PLANETARY MIXER."

PROVIDE A NEW BREAKER TO CIRCUIT THIS NEW LOAD.

Load Classification	Connected Load	Demand Factor	Estimated Demand	Panel Totals	
HVAC	1560 VA	100.00%	1560 VA		
Heating	1440 VA	100.00%	1440 VA	**Total Conn. Load:**	17900 VA
Motor	14300 VA	108.43%	15505 VA	**Total Est. Demand:**	19105 VA
Power	0 VA	0.00%	0 VA	**Total Conn.:**	50 A
Receptacle	600 VA	100.00%	600 VA	**Total Est. Demand:**	53 A

Notes:
LOAD CALCULATED ABOVE IS NEW LOAD. CALCULATED EXISTING LOAD ON PANEL IS APPROX. 116 AMPS, BASED ON NEC ARTICLE 220 LOAD CALCULATIONS PERFORMED UNDER THE ORIGINAL EXTRUDER LAB PROJECT, IN WHICH WE WERE ALSO ENGINEER-OF-RECORD ON THAT PROJECT. NEW LOAD (60A) + EXISTING (116A) = 176A TOTAL.

MEP COORDINATION SCHEDULE - EXTRUDER LAB

MARK	DESCRIPTION	ELECTRICAL DATA		CONTROL		NOTES	STARTER / DISCONNECT		DISCONNECT				FEEDER	
		LOAD	VOLT-PHASE	TYPE	DIV		TYPE	DIV	SIZE (NEMA)	SWITCH (AMPS)	FUSE (AMPS)	ENCLOSURE (NEMA)	COPPER WIRE (AWG)	CONDUIT (INCHES)
MECHANICAL EQUIPMENT														
DU-1	DEHUMIDIFICATION UNIT	5.8 A	120 - 1	INT	23 / 23		RCPT	26/26	--	--	--	--	#12	3/4"
FU-1	FILTRATION UNIT	1/3 HP	120 - 1	INT	23 / 23		RCPT	26/26	--	--	--	--	#12	3/4"

CONTROL TYPE:
- BAS BUILDING AUTOMATION SYSTEM
- MS MANUAL SWITCH
- T THERMOSTAT
- N/A NOT APPLICABLE

DISCONNECT/STARTER TYPE:
- MSS MANUAL STARTER SWITCH WITH THERMAL OVERLOADS
- N/A NOT APPLICABLE
- NFD NON-FUSED DISCONNECT
- RCPT RECEPTACLE

DIVISION OF RESPONSIBILITIES:
- 22/22 FURNISHED AND INSTALLED BY DIV. 22, WIRED BY DIV. 22
- 22/26 FURNISHED AND INSTALLED BY DIV. 22, WIRED BY DIV. 26
- 23/23 FURNISHED AND INSTALLED BY DIV. 23, WIRED BY DIV. 23
- 23/26 FURNISHED AND INSTALLED BY DIV. 23, WIRED BY DIV. 26
- 26/26 FURNISHED AND INSTALLED BY DIV. 26, WIRED BY DIV. 26

NOTES:
1. SIZE THERMAL OVERLOADS IN ACCORDANCE WITH MANUFACTURER'S GUIDELINES FOR INSTALLED EQUIPMENT

GENERAL NOTES:
A. CONTROL WIRING SHALL BE CONCEALED WITHIN WALL CONSTRUCTION, ABOVE CEILING, OR RUN IN CONDUIT. EXPOSED CONTROL WIRING IS UNACCEPTABLE.
B. UNLESS SPECIFICALLY NOTED, ALL FEEDERS SHALL INCLUDE A FULL-SIZED NEUTRAL. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY WITH THE MANUFACTURER OF THE ACTUAL EQUIPMENT BEING SUPPLIED WETHER A NEUTRAL IS REQUIRED PRIOR TO ROUGH-IN.

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HARRISON LAB 132
REMODEL

Revisions

No.	Description	Date

Drawn by PMH	Date 10.23.2025
Checked RPM	Job No. PPA#23-0871 AAI#25013.01

Sheet Contents
ELECTRICAL DETAILS AND SCHEDULES

Sheet No.
E002

Autodesk Docs://25013.01 MSU Harrison Kitchen - Extruder Lab 132/MEP - MSU Harrison Kitchen - Extruder Lab 132 r23.rvt

260010 - GENERAL REQUIREMENTS OF ELECTRICAL

A. SUMMARY

1. THE REQUIREMENTS LISTED IN THIS SECTION ARE SUPPLEMENTAL TO THE DIVISION 01 GENERAL REQUIREMENTS.
2. IT SHALL BE THE RESPONSIBILITY OF THE ELECTRICAL AND LOW-VOLTAGE CONTRACTORS TO EXAMINE AND REFER TO ALL ARCHITECTURAL, CIVIL, STRUCTURAL, MECHANICAL, PLUMBING AND LANDSCAPE DRAWINGS AND SPECIFICATIONS FOR CONSTRUCTION CONDITIONS WHICH MAY AFFECT THE SCOPE OF ELECTRICAL, COMMUNICATIONS, ELECTRONIC SAFETY AND SECURITY WORK. INSPECT THE BUILDING SITE AND EXISTING FACILITIES FOR VERIFICATION OF PRESENT CONDITIONS. MAKE PROPER PROVISIONS FOR THESE CONDITIONS IN PERFORMANCE OF THE WORK AND COST THEREOF.
3. ELECTRICAL, COMMUNICATIONS, ELECTRONIC SAFETY AND SECURITY WORK FOR THIS PROJECT SHALL INCLUDE ALL ITEMS, ARTICLES, MATERIALS AND THE ASSOCIATED LABOR MENTIONED, SCHEDULES OR SHOWN IN THESE SPECIFICATIONS AND IN THE ACCOMPANYING DRAWINGS.
4. FURNISH AND INSTALL ALL EQUIPMENT, MATERIALS AND ANY REQUIRED INCIDENTAL ITEMS REQUIRED BY GOOD PRACTICE TO COMPLETE THE SYSTEMS DESCRIBED HEREIN.
5. REFER TO DIVISION 01 FOR ALL LISTED ALTERNATES AND PROVIDE SEPARATE PRICING AND WORK AS INDICATED IN DIVISION 01 AND CONTRACT DOCUMENTS.

B. DEFINITIONS - THROUGHOUT CONTRACT DOCUMENTS THESE WORDS AND PHRASES ARE USED:

1. CONTRACT DOCUMENTS - ALL DRAWINGS, SPECIFICATIONS, ADDENDA AND CHANGE ORDERS THAT DOCUMENT WORK TO BE DONE.
2. DEMOLITION – CAREFULLY DISCONNECT AND REMOVE ITEMS. ALL REASONABLE CAUTION SHALL BE TAKEN TO AVOID DAMAGING REMOVED EQUIPMENT AND TO RETAIN ITS OPERABILITY.
3. REMOVE BACK TO SOURCE - REMOVE ALL CONDUIT AND WIRE BACK TO PANELBOARD OR LAST LIVE DEVICE.
4. EQUIVALENT OR EQUAL - PRODUCT OF LIKE TYPE AND FUNCTION THAT COMPLIES WITH ALL APPLICABLE PROVISIONS OF DRAWINGS AND SPECIFICATIONS AND WHICH HAS BEEN APPROVED AS SUBSTITUTE FOR SPECIFIED ITEM.
5. FURNISH - PURCHASE MATERIAL AS SHOWN AND SPECIFIED, AND PLACE MATERIAL TO APPROVED LOCATION ON SITE OR ELSEWHERE AS NOTED OR AGREED UPON.
6. INSTALL - SET IN PLACE AND CONNECT, READY FOR USE AND IN COMPLETE AND PROPERLY OPERATING FINISHED CONDITION.
7. PROVIDE - FURNISH AND INSTALL WITH ALL PRODUCTS, LABOR, SUB-CONTRACTS, AND APPURTENANCES REQUIRED FOR A COMPLETE AND PROPERLY OPERATING, FINISHED CONDITION.
8. ROUGH-IN - PROVIDE CONDUIT RACEWAY SYSTEM WITH JUNCTION BOXES, FITTINGS, STRAPS, BUSHINGS, ETC., FOR FUTURE INSTALLATION OF WIRING, DEVICES, DISCONNECTS AND BREAKERS. PROVISION SHALL BE MADE IN PANELBOARD (HARDWARE, ETC.) FOR FUTURE INSTALLATION OF BREAKERS.
9. SERVICEABLE - ARRANGED SO THAT COMPONENT OR PRODUCT IN QUESTION MAY BE PROPERLY REMOVED AND REPLACED WITHOUT DISASSEMBLY, DESTRUCTION OR DAMAGE TO SURROUNDING INSTALLATION.

C. CODES, STANDARDS AND REGULATIONS

1. CODES - PERFORM ALL WORK IN STRICT ACCORDANCE WITH ALL APPLICABLE NATIONAL, STATE AND LOCAL CODES; INCLUDING, BUT NOT LIMITED TO LATEST LEGALLY ENACTED EDITIONS OF FOLLOWING CODES:
   a. NFPA 70, NATIONAL ELECTRIC CODE – NEC
   b. NFPA 72, NATIONAL FIRE ALARM CODE
   c. ANSI-C2, NATIONAL ELECTRICAL SAFETY CODE – NESC
   d. INTERNATIONAL BUILDING CODE – IBC
   e. INTERNATIONAL FIRE CODE – IFC
   f. INTERNATIONAL ENERGY CONSERVATION CODE – IECC
2. STANDARDS - REFERENCE TO STANDARDS INFERS THAT INSTALLATION, EQUIPMENT AND MATERIAL SHALL BE WITHIN LIMITS FOR WHICH IT WAS DESIGNED, TESTED AND APPROVED, IN CONFORMANCE WITH CURRENT PUBLICATIONS AND STANDARDS OF FOLLOWING ORGANIZATIONS:
   a. AMERICAN NATIONAL STANDARDS INSTITUTE – ANSI
   b. AMERICAN SOCIETY FOR TESTING AND MATERIALS – ASTM
   c. AMERICAN SOCIETY OF HEATING REFRIGERATING AND AIR CONDITIONING ENGINEERS – ASHRAE (STANDARD 90-75)
   d. INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS – IEEE
   e. INSULATED CABLE ENGINEERS ASSOCIATION – ICEA
   f. NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION – NECA
   g. NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION – NEMA
   h. NATIONAL FIRE PROTECTION ASSOCIATION – NFPA
   i. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION – OSHA
   j. UNDERWRITERS' LABORATORIES, INC. – UL
   k. RULES AND REGULATIONS OF THE STATE/LOCAL FIRE MARSHAL
   l. STANDARDS AND REQUIREMENT OF THE SERVING UTILITIES
   m. STATE AND LOCAL ORDINANCES
3. REGULATIONS - DESIGN HAS BEEN PERFORMED IN ACCORDANCE WITH APPLICABLE REGULATIONS AND GUIDELINES NOTED BELOW. CONTRACTOR SHALL CAREFULLY APPLY THESE REGULATIONS AND BRING ANY DISCREPANCIES TO IMMEDIATE ATTENTION OF ARCHITECT/ENGINEER.
   a. AMERICANS WITH DISABILITIES ACT – ADA

D. FEES AND PERMITS

1. ELECTRICAL CONTRACTOR SHALL PAY FOR ALL PERMITS OR FEES IN CONNECTION WITH ELECTRICAL WORK. FEES SHALL INCLUDE ANY OR ALL USER FEES, GOVERNMENT FEES, SYSTEM DEVELOPMENT FEES, CONNECTION FEES OR OTHER FEES THAT ARE REQUIRED TO BE PAID BEFORE SYSTEMS CAN BE CONNECTED OR USED.
2. SCHEDULE ALL REQUIRED ELECTRICAL INSPECTIONS WITH LOCAL ELECTRICAL INSPECTOR. NOTIFY ENGINEER OF ALL ITEMS OF DISCREPANCY NOTED BY ELECTRICAL INSPECTOR IF THOSE ITEMS AFFECT COST OR FUNCTION OF SYSTEM, OR IF THEY CONFLICT WITH ELECTRICAL DRAWINGS AND SPECIFICATIONS.
3. DELIVER ALL INSPECTION CERTIFICATES TO ARCHITECT/ENGINEER PRIOR TO FINAL ACCEPTANCE OF WORK.

E. INTENT OF SPECIFICATIONS AND DRAWINGS

1. PLANS AND SPECIFICATIONS ARE INTENDED TO RESULT IN COMPLETE ELECTRICAL INSTALLATION IN FULL COMPLIANCE WITH ALL APPLICABLE CODES, STANDARDS AND ORDINANCES.
2. PLANS AND SPECIFICATIONS ARE TO SUPPLEMENT EACH OTHER AND ANY DETAILS CONTAINED IN ONE SHALL BE INCLUDED AS IF CONTAINED IN BOTH.
3. ELECTRICAL DRAWINGS SHALL SERVE AS WORKING DRAWINGS, BUT ARCHITECTURAL DRAWINGS SHALL TAKE PRECEDENCE IF ANY DIMENSIONAL DISCREPANCIES EXIST.
4. DRAWINGS ARE PARTLY DIAGRAMMATIC AND DO NOT SHOW ROUTING OF CONDUITS, EXACT LOCATION OF PRODUCTS, OR INSTALLATION FEATURES IN EXACT DETAIL. LOCATIONS OF DEVICES, FIXTURES AND EQUIPMENT ARE APPROXIMATE UNLESS DIMENSIONED.
5. RISER DIAGRAMS AND CONTROL SCHEMATICS ARE NOT TO SCALE AND DO NOT SHOW PHYSICAL ARRANGEMENT OF EQUIPMENT. DO NOT USE RISER DIAGRAMS OR SCHEMATICS TO OBTAIN LINEAL CONDUIT AND CABLING DISTANCES.
6. ITEMS ARE SHOWN ON DRAWINGS IN LOCATIONS TO MINIMIZE INTERFERENCE WITH OTHER EQUIPMENT, STRUCTURAL MEMBERS, ETC. EXACT FINISH LOCATIONS ARE NOT INDICATED, HOWEVER, AND ALL WORK SHALL BE DONE TO AVOID INTERFERENCE, PRESERVE HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR.
7. IN EVENT THAT DISCREPANCIES OF ANY KIND EXIST OR REQUIRED ITEMS/DETAILS HAVE BEEN OMITTED, CONTRACTOR SHALL NOTIFY ARCHITECT/ENGINEER IN WRITING OF SUCH DISCREPANCY OR OMISSION AT LEAST TEN DAYS PRIOR TO BID DATE. FAILURE TO DO SO SHALL BE CONSTRUED AS WILLINGNESS OF CONTRACTOR TO SUPPLY ALL NECESSARY MATERIALS AND LABOR REQUIRED FOR PROPER COMPLETION OF WORK.

F. CONTRACTOR'S RESPONSIBILITY - CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF COMPLETE AND FUNCTIONAL PIECE OF WORK IN ACCORDANCE WITH TRUE INTENT OF CONTRACT DOCUMENTS. PROVIDE ALL INCIDENTAL ITEMS REQUIRED FOR COMPLETE INSTALLATION AND SATISFACTORY OPERATION OF ALL EQUIPMENT, WHETHER OR NOT SPECIFICALLY NOTED IN CONTRACT DOCUMENTS.

1. QUALIFICATIONS
   a. CONTRACTOR SHALL EMPLOY ON THIS PROJECT, CAPABLE, EXPERIENCED AND RELIABLE FOREMAN AND SUCH SKILLED WORKMEN AS MAY BE REQUIRED FOR VARIOUS CLASSES OF WORK TO BE PERFORMED.
   b. WHERE SPECIAL SKILLS AND CERTIFICATION ARE REQUIRED, CONTRACTOR SHALL ENSURE THAT WORK IS PERFORMED BY INDIVIDUALS WITH REQUIRED EXPERIENCE, SKILL AND CERTIFICATION.
   c. IF, IN ENGINEER'S OPINION, CONTRACTOR'S EMPLOYEES DO NOT POSSESS NECESSARY QUALIFICATIONS TO PERFORM SPECIALTY WORK, CONTRACTOR WILL BE REQUIRED TO OBTAIN SERVICES OF WORKMEN WHO ARE APPROVED BY MANUFACTURER AND CERTIFIED BY APPLICABLE AGENCY OR GROUP. THESE WORKMEN, IF REQUIRED, SHALL BE PROVIDED AT NO ADDITIONAL EXPENSE.
   d. REFER TO OTHER SPECIFICATION SECTIONS FOR ADDITIONAL REQUIRED CONTRACTOR QUALIFICATIONS AND CERTIFICATION.
2. LICENSING AND CERTIFICATION - ALL DIVISION 26 WORK SHALL BE ACCOMPLISHED BY ELECTRICIANS, LICENSED BY STATE IN WHICH WORK IS BEING DONE, CERTIFIED AS REQUIRED, AND SKILLED IN THEIR CRAFT. ELECTRICIAN MAY ELECT TO HIRE SUBCONTRACTORS FOR PORTIONS OF WORK (SUCH AS SYSTEMS DESCRIBED IN DIVISIONS 27 AND 28) WHO ARE NOT LICENSED ELECTRICIANS, BUT HAVE REQUIRED CERTIFICATES AND ARE LICENSED IN THEIR DISCIPLINE BY STATE IN WHICH WORK IS BEING DONE.
3. COORDINATION
   a. CONTRACTOR SHALL CONSULT ALL CONTRACT DOCUMENTS, SHOP DRAWINGS OF OTHER TRADES, AND ACTUAL BUILDING DIMENSIONS TO PREDETERMINE THAT HIS WORK AND EQUIPMENT WILL FIT AS PLANNED. DO NOT SCALE DRAWINGS FOR FABRICATION. NO EXTRA PAYMENT WILL BE ISSUED FOR MATERIALS OR ITEMS WHICH DO NOT FIT BECAUSE OF CONTRACTOR'S FAILURE TO VERIFY AS-BUILT BUILDING DIMENSIONS.
   b. CONTRACTOR SHALL CHECK LOCATION OF FIXTURES, OUTLETS, EQUIPMENT, CONDUIT, ETC., TO DETERMINE THEY CLEAR ALL OPENINGS, STRUCTURAL MEMBERS, PIPING, DUCTS AND MISCELLANEOUS EQUIPMENT HAVING FIXED LOCATIONS.
   c. CHANGES IN LOCATION OF ELECTRICAL WORK, NECESSARY DUE TO OBSTACLES OR INSTALLATION OF OTHER TRADES SHOWN ON CONTRACT DOCUMENTS, SHALL BE MADE BY ELECTRICAL CONTRACTOR AT NO EXTRA COST.
   d. CONTRACTOR SHALL COORDINATE WITH PLUMBING AND MECHANICAL CONTRACTORS TO AVOID INSTALLATION OF PIPING AND DUCTWORK ABOVE OR BELOW PANELBOARDS IN VIOLATION OF NATIONAL ELECTRICAL CODE.
   e. LAY OUT ALL WORK IN ADVANCE AND AVOID CONFLICT WITH OTHER WORK IN PROGRESS. PHYSICAL DIMENSIONS SHALL BE DETERMINED FROM ARCHITECTURAL AND STRUCTURAL PLANS. VERIFY LOCATIONS FOR JUNCTION BOXES, DISCONNECT SWITCHES, STUB-UPS, ETC., FOR CONNECTION TO EQUIPMENT FURNISHED BY OTHERS, OR IN OTHER DIVISIONS OF THIS WORK.
   f. CONTRACTOR SHALL COORDINATE AND PLAN WORK TO PROCEED WITH WORK OF OTHER TRADES.
   g. CONTRACTOR SHALL INFORM GENERAL CONTRACTOR OF ALL REQUIRED OPENINGS IN BUILDING STRUCTURE FOR INSTALLATION OF ELECTRICAL EQUIPMENT.
   h. CONTRACTOR SHALL CHECK DIMENSIONS OF ALL ELECTRICAL EQUIPMENT INSTALLED, PROVIDED BY HIMSELF OR BY OTHERS, SO CORRECT CLEARANCES AND CONNECTIONS CAN BE MADE.
   i. CONSULTING ALL CONTRACT DOCUMENTS AND SHOP DRAWINGS OF OTHER TRADES, CONTRACTOR SHALL DETERMINE WHERE ELECTRICAL JUNCTION/PULL BOXES AND EQUIPMENT CAN BE INSTALLED TO MAINTAIN PROPER ACCESSIBILITY. WHERE ACCESSIBILITY CANNOT BE MAINTAINED BY JUDICIOUS PLACEMENT OF BOXES, ELECTRICAL CONTRACTOR SHALL COORDINATE WITH GENERAL CONTRACTOR TO PROVIDE, FABRICATE, INSTALL, ADJUST, PAINT, ETC. ACCESS DOORS THROUGH NON-ACCESSIBLE FLOOR, WALL, AND CEILING FINISHES TO ALLOW ACCESS TO ALL ELECTRICAL JUNCTION AND PULL BOXES, ELECTRICAL DEVICES, ELECTRICAL EQUIPMENT, ETC. AT ALL REQUIRED LOCATIONS WHETHER SHOWN OR NOT SHOWN ON PLANS. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR DETERMINING SIZE AND LOCATION OF THE ACCESS DOORS. REPORT ANY CONFLICTS TO ARCHITECT/ENGINEER.

G. REVIEW - ALL WORK AND MATERIAL IS SUBJECT TO REVIEW AT ANY TIME BY THE ARCHITECT/ENGINEER OR HIS REPRESENTATIVE. IF THE ARCHITECT/ENGINEER OR HIS REPRESENTATIVE FINDS MATERIAL THAT DOES NOT CONFORM TO THESE SPECIFICATIONS OR THAT IS NOT PROPERLY INSTALLED OR FINISHED, CORRECT THE DEFICIENCIES IN A MANNER SATISFACTORY TO THE ARCHITECT/ENGINEER AT THE CONTRACTOR'S EXPENSE.

H. TEMPORARY FACILITIES

1. LADDERS AND SCAFFOLDS - THE ELECTRICAL AND LOW-VOLTAGE CONTRACTORS SHALL PROVIDE THEIR OWN LADDERS, SCAFFOLDS, ETC. OF SUBSTANTIAL CONSTRUCTION FOR ACCESS TO THEIR WORK IN VARIOUS PORTIONS OF THE BUILDING AS MAY BE REQUIRED. WHEN NO LONGER NEEDED, THEY SHALL BE REMOVED BY THE CONTRACTOR.
2. PROTECTION DEVICES - THE ELECTRICAL AND LOW-VOLTAGE CONTRACTORS SHALL PROVIDE AND MAINTAIN THEIR OWN NECESSARY BARRICADES, FENCES, SIGNAL LIGHTS, ETC., REQUIRED BY ALL GOVERNING AUTHORITIES OR SHOWN ON THE DRAWINGS. WHEN NO LONGER NEEDED, THEY SHALL BE REMOVED BY THE CONTRACTOR.
3. TEMPORARY FIRE PROTECTION - THE ELECTRICAL AND LOW-VOLTAGE CONTRACTORS SHALL PROVIDE ALL NECESSARY FIRST AID HAND FIRE EXTINGUISHERS FOR CLASS A, B, C AND SPECIAL HAZARDS AS MAY EXIST IN HIS OWN WORK AREA ONLY IN ACCORDANCE WITH GOOD AND SAFE PRACTICE AND AS REQUIRED BY JURISDICTIONAL SAFETY AUTHORITY.

I. RECORD DOCUMENTS (AS-BUILT DRAWINGS)

1. SEE REQUIREMENTS REGARDING RECORD DOCUMENTS IN GENERAL DIVISION AND DIVISION 1.
2. AT BEGINNING OF WORK, CONTRACTOR SHALL SET ASIDE ONE COMPLETE SET OF DRAWINGS WHICH SHALL BE MAINTAINED AS COMPLETE "AS-BUILT" SET. DRAWINGS SHALL BE UPDATED DAILY IN NEAT AND LEGIBLE MANNER AND SHALL NOT BE USED FOR ANY OTHER PURPOSE. DRAWINGS, SPECIFICATION, ADDENDA, CHANGE ORDERS, ETC. SHALL BE MAINTAINED AT JOB SITE AND AVAILABLE FOR REVIEW AT ANY TIME.
3. SHOW DIMENSIONED LOCATION AND ROUTING OF ALL ELECTRICAL WORK THAT WILL BECOME PERMANENTLY CONCEALED, CAST IN CONCRETE OR BURIED UNDERGROUND.
4. SHOW COMPLETE ROUTING AND SIZING OF ANY SIGNIFICANT REVISIONS TO SYSTEMS SHOWN.
5. SHOW PROVISIONS FOR FUTURE CONNECTION, REFERENCED TO BUILDING LINES OR APPROVED BENCH MARKS.
6. PROVIDE WIRING DIAGRAMS FOR ALL INDIVIDUAL COMMUNICATIONS SYSTEMS AS INSTALLED. IDENTIFY ALL COMPONENTS AND SHOW ALL WIRE AND TERMINAL NUMBERS AND CONNECTIONS.
7. AT COMPLETION OF PROJECT, DELIVER DRAWINGS TO ENGINEER FOR REVIEW.

J. WARRANTY

1. THE CONTRACTOR SHALL GUARANTEE THAT ALL MATERIALS AND LABOR INSTALLED ARE NEW AND OF FIRST QUALITY AND THAT ANY MATERIAL OR LABOR FOUND DEFECTIVE SHALL BE REPLACED WITHOUT COST TO THE OWNER WITHIN ONE (1) YEAR AFTER SUBSTANTIAL COMPLETION OF THE CONTRACT OR ONE (1) FULL SEASON OF HEATING AND COOLING OPERATION, WHICHEVER IS THE GREATER. THE GUARANTEE SHALL LIST THE DATE OF THE BEGINNING OF THE ONE (1) YEAR PERIOD, WHICH SHALL BE THE DATE THAT THE SUBSTANTIAL COMPLETION CERTIFICATE IS ISSUED.
2. ANY DAMAGE TO THE BUILDING, CAUSED BY DEFECTIVE WORK OR MATERIAL OF THE CONTRACTOR WITHIN THE ABOVE-MENTIONED PERIOD, SHALL BE SATISFACTORILY REPAIRED WITHOUT COST TO THE OWNER.
3. THE GUARANTEE DOES NOT INCLUDE MAINTENANCE OF EQUIPMENT. THE OWNER SHALL ACCEPT FULL RESPONSIBILITY FOR PROPER OPERATION AND MAINTENANCE OF EQUIPMENT IMMEDIATELY UPON SUBSTANTIAL COMPLETION AND OCCUPANCY OF THE BUILDING.
4. FINAL ACCEPTANCE BY THE OWNER WILL NOT OCCUR UNTIL ALL OPERATING INSTRUCTIONS ARE MOUNTED IN EQUIPMENT ROOMS AND OPERATING PERSONNEL THOROUGHLY INDOCTRINATED IN THE OPERATION OF ALL ELECTRICAL EQUIPMENT BY THE CONTRACTOR.
5. NO EQUIPMENT INSTALLED AS PART OF THIS PROJECT SHALL BE USED FOR TEMPORARY HEAT DURING CONSTRUCTION.

K. MATERIALS AND EQUIPMENT

1. MANUFACTURER'S TRADE NAMES AND CATALOG NUMBERS LISTED ARE INTENDED TO INDICATE THE QUALITY OF EQUIPMENT OR MATERIALS DESIRED. MANUFACTURERS NOT LISTED IN THE SPECIFICATION WILL BE CONSIDERED SUBSTITUTIONS AND MUST HAVE PRIOR APPROVAL.
2. SEE DIVISION 01 FOR SUBSTITUTIONS PROCEDURES. REQUESTS FOR SUBSTITUTION ARE TO BE SUBMITTED SUFFICIENTLY AHEAD OF THE DEADLINE, TO GIVE AMPLE TIME FOR EXAMINATION. PRIOR APPROVAL REQUEST FOR SUBSTITUTION MUST INDICATE THE SPECIFIC ITEM OR ITEMS TO BE FURNISHED IN LIEU OF THOSE SCHEDULED, TOGETHER WITH COMPLETE TECHNICAL AND COMPARATIVE DATA ON SCHEDULED ITEMS AND ITEMS PROPOSED FOR SUBSTITUTION.
3. IF THE ENGINEER APPROVES ANY PROPOSED SUBSTITUTION, THE APPROVED PRODUCT WILL BE LISTED IN AN ADDENDUM. BIDDERS SHALL NOT RELY ON APPROVAL MADE IN ANY OTHER MANNER.
4. ELECTRICAL EQUIPMENT MAY BE INSTALLED WITH MANUFACTURER'S STANDARD FINISH AND COLOR EXCEPT WHERE SPECIFIC COLOR, FINISH OR CHOICE IS INDICATED. IF THE MANUFACTURER HAS NO STANDARD FINISH, EQUIPMENT SHALL HAVE A PRIME COAT AND TWO FINISH COATS OF GRAY ENAMEL.
5. HIGH ALTITUDE OPERATION: CAPACITY OF ALL EQUIPMENT IS TO BE SIZED AND MANUFACTURED TO PERFORM AT THE ELEVATION OF THE PROJECT SITE. IF NOT SPECIFICALLY INDICATED IN THE EQUIPMENT SCHEDULE OR IN THE SPECIFICATIONS PROVIDE ALL REQUIRED ACCESSORIES AND EQUIPMENT FOR PROPER OPERATION AT ELEVATION OF THE PROJECT SITE.
6. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR MATERIALS AND EQUIPMENT INSTALLED UNDER THIS CONTRACT. CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR THE PROTECTION OF MATERIALS AND EQUIPMENT OF OTHERS FROM DAMAGE AS A RESULT OF HIS WORK.
7. MANUFACTURED MATERIAL AND EQUIPMENT SHALL BE APPLIED, INSTALLED, CONNECTED, ERECTED, USED, CLEANED AND CONDITIONED AS DIRECTED BY MANUFACTURER UNLESS HEREIN SPECIFIED TO THE CONTRARY.
8. THIS CONTRACTOR SHALL MAKE THE REQUIRED ARRANGEMENT WITH GENERAL CONTRACTOR OR CONSTRUCTION MANAGER FOR THE INTRODUCTION INTO THE BUILDING OF EQUIPMENT TOO LARGE TO PASS THROUGH FINISHED OPENINGS.
9. STORE MATERIALS AND EQUIPMENT INDOORS AT THE JOB SITE OR, IF THIS IS NOT POSSIBLE, STORE ON RAISED PLATFORMS AND PROTECT FROM THE WEATHER BY MEANS OF WATERPROOF COVERS. COVERINGS SHALL PERMIT CIRCULATION OF AIR AROUND THE MATERIALS TO PREVENT CONDENSATION OF MOISTURE. SCREEN OR CAP OPENINGS IN EQUIPMENT TO PREVENT THE ENTRY OF VERMIN.

L. SUBSTITUTION OF MATERIALS - WHERE SUBSTITUTED EQUIPMENT REQUIRES STRUCTURAL, ARCHITECTURAL, MECHANICAL, PLUMBING OR ELECTRICAL WORK THAT DIFFERS FROM BASIC DESIGN, COST OF ALL CHANGES, INCLUDING RE-DESIGN, SHALL BE RESPONSIBILITY OF CONTRACTOR USING SUBSTITUTION.

1. APPROVED MANUFACTURERS
   a. IN GENERAL, ONE PARTICULAR MANUFACTURER AND PART NUMBER OR SERIES IS LISTED TO DESCRIBE EQUIPMENT. EQUIVALENT EQUIPMENT OF OTHER MANUFACTURERS LISTED FOR THAT ITEM MAY BE SUBSTITUTED WITHOUT PRIOR APPROVAL. IT SHALL BE CONTRACTOR'S RESPONSIBILITY TO ENSURE THAT ITEM USED FOR BIDDING PURPOSES IS TRULY EQUIVALENT TO THAT SPECIFIED. IF IT IS NOT EQUIVALENT, IT WILL BE REJECTED AT SHOP DRAWING REVIEW AND CONTRACTOR SHALL SUPPLY SPECIFIED ITEM AT HIS OWN COST.
   b. IT IS UNDERSTOOD THAT MANUFACTURERS LISTED MAY NOT ACTUALLY HAVE EQUIVALENT PRODUCT TO THAT SPECIFIED. IF CONTRACTOR/DISTRIBUTOR HAS ANY QUESTIONS REGARDING DESIRED PRODUCT CHARACTERISTICS AND SUITABILITY OF PROPOSED SUBSTITUTION, HE IS ENCOURAGED TO SUBMIT FOR PRIOR APPROVAL. ALSO, ANY MANUFACTURER NOT LISTED SHALL BE SUBMITTED FOR PRIOR APPROVAL.
2. PRIOR APPROVALS
   a. MANUFACTURERS NOT LISTED IN SPECIFICATION OR ON SCHEDULE FOR A PARTICULAR ITEM ARE OPEN FOR SUBSTITUTION PRIOR TO BID OPENING ONLY.
   b. MANUFACTURERS DESIRING APPROVAL SHALL SUBMIT CATALOG CUTS THAT DEFINE QUALITY OF PRODUCT AND ABILITY TO PERFORM AS SPECIFIED. IT IS UNDERSTOOD THAT NO TWO MANUFACTURES USE IDENTICAL METHODS OR MAKE IDENTICAL PRODUCTS. ANY AND ALL DEVIATIONS FROM THAT SPECIFIED SHALL BE CLEARLY NOTED.
   c. SUBMITTALS SHALL ARRIVE AT ENGINEER AT LEAST TEN (10) DAYS PRIOR TO BID OPENING. ALL APPROVALS WILL BE LISTED IN LAST ADDENDUM AS BEING APPROVED TO BID. ITEMS SUBSTITUTED, BUT NOT LISTED IN CONTRACT DOCUMENTS, WILL NOT BE CONSIDERED IF SUBMITTED ON SHOP DRAWINGS.
   d. APPROVAL OF SUBSTITUTE EQUIPMENT IS ON BASIS OF QUALITY ONLY. MATERIALS SUPPLIER SHALL BE RESPONSIBLE FOR HIS QUOTATION REFLECTING PROPER SELECTION OF HIS PARTICULAR EQUIPMENT WITH REGARD TO PROPER CAPACITIES, PHYSICAL DIMENSIONS, REQUIREMENTS, INTENDED FUNCTION, FINISH, COLOR, ETC. ENGINEER WILL NOT GIVE APPROVAL TO SPECIFIC MODEL NUMBERS OR CHECK CAPACITIES, DIMENSIONS, OR REQUIREMENTS. EVALUATION WILL BE ON BASIS OF QUALITY AND EQUALITY TO SPECIFIED ITEMS.
   e. PRIOR APPROVAL SHALL BE OBTAINED FROM ENGINEER AND NO OTHER ENTITY (ARCHITECT, OWNER, ETC.) IS AUTHORIZED TO GIVE SUCH APPROVAL.
3. SAMPLES
   a. WHERE, IN ENGINEER/ARCHITECT'S OPINION, PRODUCT SAMPLE IS REQUIRED IN ORDER TO DETERMINE APPEARANCE, QUALITY, WORKMANSHIP OR OPERATION, CONTRACTOR SHALL SUBMIT ACTUAL PRODUCTION SAMPLES OF ITEM IN QUESTION.
   b. SAMPLES WILL BE RETURNED TO CONTRACTOR. APPROVED SAMPLES MAY BE USED.
   c. ALL COSTS INCURRED IN PROVIDING AND RETURNING SAMPLES WILL BE CONTRACTOR'S RESPONSIBILITY.

M. PRODUCT AND SYSTEM SUBMITTALS

1. SUBMITTALS WILL BE REQUIRED FOR EACH PIECE OF EQUIPMENT, MATERIAL OR PRODUCT UTILIZED IN THE PROJECT. ALL SUBMITTAL SHALL BE SUBMITTED, REVIEWED AND ALL DISCREPANCIES ADDRESSED PRIOR TO ORDERING EQUIPMENT OR STARTING WORK. ANY EQUIPMENT ORDERED WITHOUT HAVING FIRST COMPLETED THE SUBMITTAL PROCESS IS DONE AT THE RISK OF THE CONTRACTOR. ANY WORK PERFORMED PRIOR TO COMPLETING THE SUBMITTAL PROCESS IS DONE AT THE RISK OF THE CONTRACTOR.
2. SUBMITTAL DEFINITIONS
   a. PRODUCT DATA: PROVIDE MANUFACTURERS CUT SHEETS THAT INCLUDE GENERAL PRODUCT INFORMATION INCLUDING BUT NOT LIMITED TO: MODEL NUMBER, PHYSICAL DATA, NOMINAL CAPACITIES, ROUGH-IN REQUIREMENTS.
   b. PERFORMANCE DATA: PROVIDE DETAILED PERFORMANCE AND CAPACITIES BASED ON PROJECT SPECIFIC REQUIREMENTS INCLUDING BUT NOT LIMITED TO: VOLTAGE, PHASE, AMPERAGE, OVERCURRENT PROTECTION, CONDUCTOR SIZE, CONDUCTOR MATERIAL, CONDUIT SIZE, COLOR TEMPERATURE, COLOR RENDERING INDEX, LIFE EXPECTANCE, EFFICACY, EFFICIENCY, IP RATINGS, LIGHT DISTRIBUTION TYPES AND LIGHTING CONTROL.
   c. SHOP DRAWINGS: PROVIDE DETAILED DRAWINGS OF THE EQUIPMENT SHOWING OVERALL DIMENSIONS, LOCATION OF ELECTRICAL CONNECTION, LOCATION OF ANCHORAGE POINTS, LOCATION OF ELECTRICAL AND CONTROL PANELS, AND ALL OPERATING, SERVICE AND MAINTENANCE CLEARANCES.
   d. DELEGATED DESIGN: PROVIDE DETAILED DRAWINGS PREPARED AND STAMPED BY A REGISTERED PROFESSIONAL ENGINEER THAT DETAIL PERTINENT DESIGN CRITERIA, THE MATERIALS AND PRODUCTS TO BE INSTALLED AND THE REQUIRED INSTALLATION LOCATIONS.
   e. WIRING DIAGRAM: PROVIDE DIAGRAMS THAT IDENTIFY AND DETAIL REQUIRED FIELD WIRING.
   f. COLOR CHART: PROVIDE A PHYSICAL COLOR CHART OF MATERIAL SAMPLES REQUIRED FOR SELECTION OF EQUIPMENT COLORS.
   g. SUSTAINABILITY COMPLIANCE: PROVIDE LITERATURE THAT INDICATED A PRODUCTS COMPLIANCE WITH LEED OR GREEN GLOBES. SEE DIVISION 01 FOR ADDITIONAL INFORMATION AND REQUIREMENTS.
3. SUBMITTAL FORMATS
   a. INCLUDE THE FOLLOWING INFORMATION WITH EACH SUBMITTAL:
      - PROJECT NAME
      - SUBMITTAL DATE
      - NAME OF ARCHITECT
      - NAME OF ENGINEER
      - NAME OF GENERAL CONTRACTOR OR CONSTRUCTION MANAGER
      - NAME OF SUB-CONTRACTOR
      - NAME OF FIRM OR ENTITY THAT PREPARED THE SUBMITTAL
      - UNIQUE SUBMITTAL NUMBER
      - TYPE OF SUBMITTAL
      - SPECIFICATION SECTION
      - NAME OR MARK OF EQUIPMENT OR MATERIAL AND DETAIL OR DRAWINGS REFERENCE.
   b. ALL SUBMITTAL WITH THE EXCEPTION OF COLOR CHARTS OR MATERIAL SAMPLES SHALL BE ELECTRONICALLY TRANSMITTED PDF'S. ALL SUBMITTALS OVER 8 MB SHALL BE SETUP ON A SHARE FILE SITE AND ACCESS GRANTED THROUGH EMAIL WITH FOLDER'S LINK FOR DOWNLOAD.
4. SUBMITTAL REQUIREMENTS
   a. SUBMITTALS SHALL BE SUBMITTED AS A COMPLETE SPECIFICATION SECTION. THE SUBMITTAL MUST INCLUDE ALL MATERIALS AND EQUIPMENT FOR THAT SPECIFICATION SECTION. SUBMITTALS FOR INDIVIDUAL MATERIALS OF EQUIPMENT WILL BE REJECTED WITHOUT REVIEW.
   b. SUBMITTALS SHALL BE COMPLETE, CLEARLY SHOW ITEM USED, SIZE, DIMENSIONS, CAPACITY, ROUGH IN, ETC., AS REQUIRED FOR COMPLETE CHECK AND INSTALLATION. MANUFACTURER'S LITERATURE SHOWING MORE THAN ONE ITEM SHALL BE CLEARLY MARKED AS TO WHICH ITEM IS BEING FURNISHED OR IT WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
   c. EACH SUBMITTAL SHALL BE THOROUGHLY CHECKED BY THE CONTRACTOR FOR COMPLIANCE WITH THE CONTRACT DOCUMENT REQUIREMENTS, ACCURACY OF DIMENSIONS, RELATIONSHIP TO THE WORK OF OTHER TRADES, AND CONFORMANCE WITH SOUND, SAFE PRACTICES AS TO ERECTION AND INSTALLATION. EACH SUBMITTAL SHALL THEN BEAR A STAMP EVIDENCING SUCH CHECKING AND SHALL SHOW CORRECTIONS MADE, IF ANY. SUBMITTALS REQUIRING EXTENSIVE CORRECTIONS SHALL BE REVISED BEFORE SUBMISSION. EACH SUBMITTAL NOT STAMPED AND SIGNED BY THE GENERAL AND ELECTRICAL CONTRACTORS EVIDENCING SUCH CHECKING WILL BE REJECTED AND RETURNED WITHOUT REVIEW.
   d. ON EACH SUBMITTAL, CLEARLY INDICATE DEVIATIONS FROM REQUIREMENTS IN THE CONTRACT DOCUMENTS, INCLUDING MINOR VARIATIONS AND LIMITATIONS; INCLUDE RELEVANT ADDITIONAL INFORMATION AND REVISIONS, OTHER THAN THOSE REQUESTED ON PREVIOUS SUBMITTALS. INDICATE BY HIGHLIGHTING ON EACH SUBMITTAL OR NOTING ON ATTACHED SEPARATE SHEET.
   e. REVIEW OF THE SHOP DRAWINGS AND LITERATURE BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR FOR RESPONSIBILITY FOR DEVIATIONS FOR THE DRAWINGS OR SPECIFICATIONS, NOR SHALL IT RELIEVE THE CONTRACTOR FROM RESPONSIBILITY FOR ERRORS IN THE SHOP DRAWINGS OR LITERATURE. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE MATERIALS AND EQUIPMENT WHICH MEET THE SPECIFICATIONS AND JOB REQUIREMENTS.
   f. LUMINAIRES SUBMITTALS SHALL INCLUDE DIMENSIONS, QUALITY, DISTRIBUTION, COLOR RENDERING INDEX, COLOR TEMPERATURE, OPTICS, PHOTOMETRICS, ALL LISTINGS (UL, DLC, ENERGY STAR, MADE IN AMERICA, ETC.), IP RATINGS, VOLTAGE, WATTAGE, WARRANTY, INSTALLATION METHODS, CONTROL METHODS, EFFICACY, EFFICIENCY, DIFFUSER OPTIONS, EMERGENCY OPERATION AND ANY REQUIRED ACCESSORIES. PROVIDE IES AND REVIT FILES UPON REQUEST.
5. ENGINEER'S REVIEW - SUBMITTAL REVIEW IS FOR GENERAL DESIGN AND ARRANGEMENT ONLY AND DOES NOT RELIEVE CONTRACTOR FROM ANY REQUIREMENTS OF CONTRACT DOCUMENTS. SUBMITTALS WILL NOT BE CHECKED FOR QUANTITY, DIMENSION, FIT OR PROPER TECHNICAL DESIGN OF MANUFACTURED EQUIPMENT. WHERE PRODUCT OR SYSTEM PERFORMANCE DEVIATIONS HAVE NOT BEEN SPECIFICALLY NOTED IN SUBMITTAL BY CONTRACTOR, ENGINEER'S REVIEW WILL NOT RELIEVE CONTRACTOR'S RESPONSIBILITY TO PROVIDE COMPLETE AND SATISFACTORY WORKING INSTALLATION OF EQUAL QUALITY AND PERFORMANCE TO SPECIFIED SYSTEM. ORDERING, MANUFACTURE, SHIPMENT OR INSTALLATION OF EQUIPMENT PRIOR TO RECEIPT OF ENGINEER'S WRITTEN REVIEW IS STRICTLY AT CONTRACTOR'S RISK AND ALL COSTS ASSOCIATED WITH SHIPPING, CHANGES, REPLACEMENT OR RESTOCKING SHALL BE CONTRACTOR'S RESPONSIBILITY.

N. SUB-CONTRACTORS - WITH SHOP DRAWING SUBMITTALS, CONTRACTOR SHALL SUBMIT LIST OF ALL SUB-CONTRACTORS TO BE USED FOR THE PROJECT.

O. OPERATION AND MAINTENANCE MANUALS

1. OPERATION AND MAINTENANCE MANUALS (O&M MANUALS) SHALL CONTAIN:
   a. NAMES AND CONTACT INFORMATION FOR THE PROJECT ARCHITECT, PROJECT ENGINEER.
   b. NAMES AND CONTACT INFORMATION FOR THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER.
   c. NAMES AND CONTACT INFORMATION FOR SUB-CONTRACTORS.
   d. INSTALLATION, MAINTENANCE AND OPERATING INSTRUCTIONS FOR EACH PIECE OF EQUIPMENT.
   e. PARTS LISTS
   f. WIRING DIAGRAMS
   g. EQUIPMENT START-UP AND INSPECTION CERTIFICATES
   h. TEST AND BALANCE REPORTS
   i. COMMISSIONING REPORTS
   j. COPIES OF EQUIPMENT WARRANTIES
   k. COPIES OF SUBMITTALS
   l. RECORD DRAWINGS.
   m. TRAINING DVD'S
2. PRIOR TO SUBSTANTIAL COMPLETION SUBMIT AN ELECTRONIC COPY OF THE O&M MANUAL IN PDF FORMAT TO THE ARCHITECT, ENGINEER AND OWNER FOR REVIEW AND APPROVAL. THE PDF SHALL BE ONE FILE WITH AN INDEX AND HYPERLINKS TO EACH SECTION. INDIVIDUAL BOUND PDFS WITHOUT AUTOMATED NAVIGATION WILL BE REJECTED. ALL O&M DATA SHALL BE GROUPED BY THE EQUIPMENT TYPE AND ORDERED BY THE SPECIFICATION NUMBERING.
3. PRIOR TO FINAL PAYMENT A FINAL ELECTRONIC COPY OF THE O&M MANUAL ON AN ARCHIVAL QUALITY DVD AS WELL AS TWO PRINTED COPIES SHALL BE FURNISHED TO THE OWNER. PRINTED COPIES SHALL HAVE COMMERCIAL QUALITY 8-1/2" X 11" 3-RING BINDERS WITH TABBED DIVIDERS FOR EACH SECTION.

P. SITE EXAMINATION

1. PRIOR TO SUBMITTING BID, CONTRACTOR SHALL VISIT SITE OF PROPOSED WORK AND FAMILIARIZE HIMSELF WITH CONDITIONS AFFECTING WORK. ALLOWANCE SHALL BE MADE IN BID FOR THESE CONDITIONS AND NO ADDITIONAL ALLOWANCE SHALL BE GRANTED BECAUSE OF LACK OF KNOWLEDGE OF SUCH CONDITIONS.
2. CONTRACTOR SHALL VERIFY ALL MEASUREMENTS AT BUILDING SITE.

Q. CUTTING AND PATCHING

1. OBTAIN WRITTEN PERMISSION OF ARCHITECT/ENGINEER BEFORE CUTTING OR PIERCING STRUCTURAL MEMBERS.
2. SLEEVES THROUGH FLOORS AND WALLS SHALL BE BLACK IRON PIPE, FLUSH WITH WALLS, CEILINGS OR FINISHED FLOORS, SIZED TO ACCOMMODATE RACEWAY. GROUT ALL PENETRATIONS THROUGH CONCRETE WALLS OR FLOORS. HOLES THROUGH EXISTING CONCRETE AND CONCRETE BLOCK (CMU) SHALL BE CORE DRILLED.

R. CLEAN-UP AND COMMISSIONING

1. DURING CONSTRUCTION - THROUGHOUT CONSTRUCTION, KEEP WORK AREA REASONABLY NEAT AND ORDERLY BY PERIODIC CLEAN-UPS.
2. COMMISSIONING - AS INDEPENDENT PARTS OF CONSTRUCTION ARE COMPLETED, THEY MAY BE COMMISSIONED AND UTILIZED DURING CONSTRUCTION. SEE VARIOUS SECTIONS FOR RESTRICTIONS.
3. AT COMPLETION OF WORK
   a. CLEAN EQUIPMENT OF DIRT AND DEBRIS, INCLUDING INTERIOR OF PANELS, OUTLET BOXES, ETC. REMOVE LABELS FROM AND CLEAN ALL FIXTURE LENSES.
   b. REMOVE MATERIALS, SCRAPS, ETC., RELATIVE TO THIS WORK AND LEAVE PREMISES IN CLEAN AND ORDERLY CONDITION. THIS INCLUDES ALL TUNNELS, ATTICS, CEILING AND CRAWL SPACES.
   c. REMOVE ALL TEMPORARY FACILITIES AND RESTORE TO CONDITIONS PRESENT PRIOR TO WORK.

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Revisions		
No.	Description	Date

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Sheet Contents
ELECTRICAL SPECIFICATIONS

Sheet No.
E003

S. PROJECT COMPLETION AND DEMONSTRATION
1. TESTING
   a. PRIOR TO FINAL TEST, ALL SWITCHES, PANELBOARDS, DEVICES, AND FIXTURES SHALL BE IN PLACE.
   b. AT COMPLETION OF WORK, OR UPON REQUEST FROM ARCHITECT/ENGINEER, PLACE ENTIRE ELECTRICAL INSTALLATION, AND/OR ANY PORTION THEREOF, IN OPERATION TO DEMONSTRATE SATISFACTORY OPERATION.
   c. ALL ELECTRICAL SYSTEMS SHALL BE FREE FROM SHORT CIRCUITS AND UNINTENTIONAL GROUNDS.
   d. FURNISH ONE (1) COPY OF CERTIFIED TEST RESULTS TO ARCHITECT/ENGINEER PRIOR TO FINAL INSPECTION AND INCLUDE ONE (1) COPY IN EACH BROCHURE OF EQUIPMENT.
2. ADJUSTMENTS
   a. MAKE ALL CHANGES NECESSARY TO BALANCE CONNECTED ELECTRICAL LOADS ON COMPLETE SYSTEM. ARRANGE FOR BALANCED CONDITIONS OF CIRCUITS UNDER CONNECTED LOAD DEMANDS, AS CONTEMPLATED BY NORMAL WORKING CONDITIONS. FINAL LOAD AND BALANCE TEST SHALL BE DEMONSTRATED IN PRESENCE OF ARCHITECT/ENGINEER.
   b. IMMEDIATELY CORRECT ALL DEFICIENCIES WHICH ARE EVIDENCED DURING TESTS AND REPEAT TESTS UNTIL SYSTEM IS APPROVED. DO NOT COVER OR CONCEAL ELECTRICAL INSTALLATIONS UNTIL SATISFACTORY TESTS ARE MADE AND APPROVED.
3. FINAL WALK-THRU
   a. CONDUCT OPERATING TESTS DURING FINAL INSPECTION. DEMONSTRATE INSTALLATION TO OPERATE SATISFACTORILY IN ACCORDANCE WITH REQUIREMENTS OF CONTRACT DOCUMENTS. SHOULD ANY PORTION OF INSTALLATION FAIL TO MEET REQUIREMENTS OF CONTRACT DOCUMENTS, REPAIR OR REPLACE ITEMS FAILING TO MEET REQUIREMENTS UNTIL ITEMS CAN BE DEMONSTRATED TO COMPLY.
   b. HAVE INSTRUMENTS AVAILABLE FOR MEASURING LIGHT INTENSITIES, VOLTAGE AND CURRENT VALUES AND FOR DEMONSTRATION OF CONTINUITY, GROUNDS, OR OPEN CIRCUIT CONDITIONS.
   c. FURNISH PERSONNEL TO ASSIST IN TAKING MEASUREMENTS AND MAKING TESTS. IN EVENT THAT SYSTEMS ARE NOT COMPLETE AND FULLY OPERATIONAL AT TIME OF FINAL INSPECTION, ALL COSTS OF ANY SUBSEQUENT INSPECTIONS SHALL BE BORNE BY CONTRACTOR AT NO ADDITIONAL COST TO OWNER.

T. OWNER ORIENTATION AND TRAINING
1. GENERAL
   a. THE SYSTEM TRAINING IS INTENDED TO FAMILIARIZE THE OWNER'S OPERATING AND MAINTENANCE STAFF WITH ALL SYSTEMS REQUIRING MAINTENANCE. TRAINING IS TO BE PROVIDED AFTER THE SYSTEMS ARE IN PLACE AND OPERATIONAL, AFTER ISSUES NOTED DURING COMMISSIONING HAVE BEEN RESOLVED, AND BEFORE FINAL ACCEPTANCE.
   b. PROVIDE SECOND SET OF TRAINING SESSIONS FOR AUTOMATIC CONTROL SYSTEMS ABOUT 6-9 MONTHS AFTER THE FIRST SESSIONS.
   c. ALL TRAINING SHALL BE VIDEO TAPED, REPRODUCED ON DVD'S AND GIVEN TO THE OWNER. PROVIDE A COPY FOR EACH O&M MANUAL PRODUCED.
   d. SEE INDIVIDUAL SPECIFICATION SECTIONS FOR ADDITIONAL TRAINING REQUIREMENTS.
2. ATTENDANCE - TRAINING IS TO BE PROVIDED BY CONTRACTOR'S REPRESENTATIVES THAT ARE FAMILIAR WITH THE SYSTEM'S OPERATION AND MAINTENANCE REQUIREMENTS. INDIVIDUAL TRAINING SESSIONS (MODULES) ARE TO PROVIDED FOR EACH TYPE OR GROUP OF SYSTEMS, SEPARATED ROUGHLY BY TRADE GROUP THAT WILL BE PERFORMING MAINTENANCE ON THE SYSTEM.
3. SCHEDULE - DUPLICATE TRAINING SESSIONS ARE TO BE PROVIDED FOR EACH TRAINING MODULE, SO THAT OWNER'S OPERATING PERSONNEL CAN BE SPLIT INTO TWO GROUPS DURING TRAINING. DUPLICATE TRAINING SESSIONS TO BE SCHEDULED ON DIFFERENT DAYS. LENGTH OF TRAINING SESSIONS WILL BE DETERMINED BY SCOPE OF TRAINING INDICATED BELOW, AND AS COORDINATED WITH OWNER AFTER DRAFT COPY OF TRAINING DOCUMENTS HAVE BEEN REVIEWED.
4. TRAINING DOCUMENTATION
   a. CONTRACTOR TO SUBMIT DRAFT COPY OF AGENDA AND TRAINING DOCUMENTS TO OWNER FOR REVIEW AT LEAST TWO WEEKS PRIOR TO TRAINING DATE.
   b. PROVIDE A COPY OF THE FOLLOWING ITEMS FOR EACH PERSON THAT WILL BE ATTENDING THE TRAINING SESSIONS. COORDINATE REQUIRED NUMBER WITH THE OWNER.
      - TRAINING AGENDA.
      - SUMMARY OF NEW SYSTEMS AND EXISTING SYSTEMS AFFECTED BY THIS PROJECT.
      - SUMMARY OF WORK PERFORMED UNDER THIS PROJECT.
      - CONTROL SYSTEM DRAWINGS AND SEQUENCES OF OPERATION.
      - LIST OF IMPORTANT MAINTENANCE AND TROUBLE-SHOOTING OPERATIONS FOR ALL SYSTEMS.
   c. PROVIDE MINIMUM OF 2 COPIES OF CONTRACT DOCUMENTS INCLUDING ALL DRAWINGS, SPECIFICATIONS, ADDENDUMS, AND CHANGE ORDERS.
5. TRAINING SESSIONS
   a. ASSEMBLE AT LOCATION TO BE DETERMINED BY THE OWNER.
   b. DISTRIBUTE TRAINING DOCUMENTATION AS INDICATED ABOVE.
   c. PROVIDE CLASSROOM STYLE TRAINING IF REQUIRED FOR ORIENTATION, DISCUSSION OF NEW SYSTEMS AND EXISTING SYSTEMS AFFECTED BY THIS PROJECT, AND OTHER ISSUES APPROPRIATE FOR A CLASSROOM FORMAT.
   d. VISIT SITE AND REVIEW LOCATIONS, AND PERFORM DETAILED REVIEW OF OPERATION AND MAINTENANCE REQUIREMENTS FOR CURRENT SYSTEMS.
   e. ALL TRAINING SESSION SHALL BE VIDEO RECORDED AND DISTRIBUTED TO THE OWNER UPON COMPLETION IN DVD FORMAT, OR OWNER DESIRED FORMAT. INCLUDE ALL TRAINING VIDEOS IN THE O&M MANUAL.

260519 - CONDUCTORS

A. FEEDERS: COPPER, TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
B. BRANCH CIRCUITS: COPPER, TYPE THHN/THWN-2, SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER. SINGLE CONDUCTORS IN RACEWAY.
C. CORD DROPS AND PORTABLE APPLIANCE CONNECTIONS: TYPE SO, CORD WITH STAINLESS-STEEL, WIRE-MESH, STRAIN RELIEF DEVICE AT TERMINATIONS.
D. PROVIDE A DEDICATED NEUTRAL CONDUCTOR FOR EACH 120 V BRANCH CIRCUIT.

260505 - SELECTIVE DEMOLITION OF ELECTRICAL SYSTEMS

A. NOT ALL REMOVAL AND REVISION WORK REQUIRED AS PART OF THE DEMOLITION WORK IS SHOWN ON THE PLANS. THE PLANS ARE INTENDED TO INDICATE AREAS WHERE DEMOLITION WILL OCCUR AND TO ESTABLISH THE INTENT OF THE DEMOLITION WORK. IT IS THE CONTRACTOR'S RESPONSIBILITY TO REMOVE ALL EXISTING ELECTRICAL RACEWAYS, WIRES, DEVICES AND EQUIPMENT THAT FALL WITHIN THE AREA AFFECTED BY DEMOLITION OF THE STRUCTURE.
B. THE CONTRACTOR SHALL BECOME THOROUGHLY FAMILIAR WITH WORK AND LOCAL CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED. USING ORIGINAL DESIGN DRAWINGS AND WALK-THROUGH INSPECTIONS, A CONCERTED EFFORT WAS MADE TO PLACE PERTINENT INFORMATION ON THE CONTRACT DRAWINGS. HOWEVER, DUE TO THE NATURE OF DEMO/REMODEL WORK, THE CONTRACTOR MUST BEAR IN MIND THAT UNFORESEEN CONDITIONS MAY EXIST, AND SHALL THOROUGHLY INSPECT THE WORK AREA PRIOR TO BIDDING. THE CONTRACTOR SHALL INCLUDE ANY/ALL INCIDENTAL ITEMS IN BID WHICH MAY BE REQUIRED TO PROVIDE COMPLETE DEMOLITION AND REWORK ASSOCIATED SYSTEMS IN ADJACENT AREAS WHERE NO DEMOLITION IS OCCURRING.
C. PROVIDE TEMPORARY WIRING AND CONNECTIONS TO MAINTAIN EXISTING SYSTEMS IN SERVICE DURING CONSTRUCTION. WHEN WORK MUST BE PERFORMED ON ENERGIZED EQUIPMENT OR CIRCUITS, USE PERSONNEL EXPERIENCED IN SUCH OPERATIONS AND FOLLOW THE SAFE WORKING PRACTICE REQUIREMENTS OF NFPA 70E.
D. INVENTORY AND RECORD, BY USE OF PRECONSTRUCTION PHOTOGRAPHS OR VIDEO, THE CONDITION OF ITEMS TO BE REMOVED AND SALVAGED. PROVIDE PHOTOGRAPHS OR VIDEO OF CONDITIONS THAT MIGHT BE MISCONSTRUED AS DAMAGE CAUSED BY SALVAGE OPERATIONS.
E. MAKE PROVISIONS TO MAINTAIN EXISTING ELECTRICAL SERVICE ENERGIZED UNTIL NEW SYSTEM IS COMPLETE AND READY FOR USE. OBTAIN PERMISSION FROM THE OWNER AND THE ARCHITECT/ENGINEER AT LEAST [48] HOURS PRIOR TO PARTIALLY OR COMPLETELY DISABLING THE SYSTEM. MINIMIZE THE DURATION OF ANY OUTAGES. IF REQUIRED, MAKE TEMPORARY CONNECTIONS TO MAINTAIN SERVICE IN AREAS ADJACENT TO THE DEMOLITION WORK AREA.
F. REMOVE ALL ELECTRICAL DEVICES FROM WALLS, FLOORS AND CEILINGS THAT ARE TO BE DEMOLISHED OR MOVED. REMOVE ABANDONED OUTLETS IF CONDUIT AND WIRING SERVICING THEM IS ABANDONED AND REMOVED. PROVIDE BLANK COVER FOR ANY ABANDONED BOXES WHICH ARE NOTED ON THE PLANS AS NOT REMOVED. REMOVE CONDUIT TO POINT WHERE IT NO LONGER INTERFERES WITH CONSTRUCTION AND IS CONCEALED. FOR CONDUIT BURIED IN CONCRETE OR CMU WALLS, CUT CONDUIT OFF FLUSH WITH FLOOR AND PLUG CONDUIT. REMOVE ALL CONDUCTORS BACK TO SOURCE (PANELBOARD OR LAST LIVE DEVICE).
G. MAINTAIN ACCESS TO EXISTING ELECTRICAL INSTALLATIONS THAT REMAIN ACTIVE. MODIFY INSTALLATION OR PROVIDE ACCESS PANEL AS REQUIRED.
H. PROVIDE REVISED TYPED CIRCUIT DIRECTORY IN PANELBOARDS THAT HAVE CIRCUITS REMOVED.
I. REPAIR ADJACENT CONSTRUCTION AND FINISHES DAMAGED DURING DEMOLITION AND EXTENSION WORK. REPAIR TO EXISTING CONDITION OR BETTER.
J. EQUIPMENT TO BE RELOCATED SHALL BE SERVICED, MODIFIED AND REPAIRED AS NECESSARY TO PLACE IT IN GOOD WORKING ORDER AND TO THE SATISFACTION OF ARCHITECT/ENGINEER. PROTECT ITEMS FROM DAMAGE DURING TRANSPORT AND STORAGE. ANY LOST, STOLEN OR DAMAGED ITEMS ARE THE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE REPLACED WITH NEW ITEMS THAT MATCH THE ORIGINAL. REINSTALL ITEMS IN LOCATIONS INDICATED. COMPLY WITH INSTALLATION REQUIREMENTS FOR NEW MATERIALS AND EQUIPMENT. PROVIDE CONNECTIONS, SUPPORTS, AND MISCELLANEOUS MATERIALS NECESSARY TO MAKE THE ITEM FUNCTIONAL FOR USE AT THE NEW LOCATION. EQUIPMENT SHALL BE TESTED IN THE NEW LOCATION AND PROPER FUNCTION DEMONSTRATED.
K. EXCEPT FOR ITEMS OR MATERIALS INDICATED TO BE RECYCLED, REUSED, SALVAGED, REINSTALLED, OR OTHERWISE INDICATED TO REMAIN OWNER'S PROPERTY, REMOVE DEMOLISHED MATERIALS FROM PROJECT SITE AND LEGALLY DISPOSE OF THEM IN AN EPA-APPROVED LANDFILL. DO NOT ALLOW DEMOLISHED MATERIALS TO ACCUMULATE ON-SITE. REMOVE AND TRANSPORT DEBRIS IN A MANNER THAT WILL PREVENT SPILLAGE ON ADJACENT SURFACES AND AREAS.

260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

A. RACEWAYS AND CABLES CARRYING CIRCUITS WITHIN BUILDINGS. IDENTIFY THE COVERS OF EACH JUNCTION AND PULL BOX OF THE FOLLOWING SYSTEMS WITH PAINT AS FOLLOWS:
   1. BATTERY OR GENERATOR BACKED UP EMERGENCY SYSTEM: ORANGE
   2. FIRE DETECTION AND ALARM SYSTEM: RED
   3. SYSTEMS WITH VOLTAGE GREATER THAN 600V: YELLOW
   4. DIRECT CURRENT SYSTEMS (SOLAR PV SYSTEM): GREEN
B. CONDUCTOR COLOR-CODING:
   1. 120/240V: PHASE A - BLACK, PHASE B - RED, NEUTRAL - WHITE.
   2. 208Y/120V: PHASE A - BLACK, PHASE B - RED, PHASE C - BLUE, NEUTRAL - WHITE.
   3. 480Y/277V: PHASE A - BROWN, PHASE B - ORANGE, PHASE C - YELLOW, NEUTRAL - GRAY.
   4. 240/120V (CENTER-TAPPED DELTA): PHASE A - BLACK, PHASE B - RED, WILD LEG - ORANGE, NEUTRAL - WHITE.
   5. GROUNDS: BARE COPPER OR GREEN.
C. ALL EQUIPMENT SHALL HAVE AN IDENTIFICATION LABEL, BLACK LETTERS ON A WHITE FIELD. LABEL INCLUDES UNIT NAME AND CIRCUIT THAT FEEDS IT.
   1. 1" MINIMUM HEIGHT LETTERS FOR SERVICE DISCONNECT AND EMERGENCY SHUT-OFF SWITCHES.
   2. 1/2" MINIMUM HEIGHT LETTERS FOR PANELBOARDS, SWITCHBOARDS, RELAY ENCLOSURES AND TRANSFORMERS.
   3. 1/4" MINIMUM HEIGHT LETTERS FOR DISCONNECT SWITCHES AND MOTOR STARTERS.
   4. 1/8" MINIMUM HEIGHT LETTERS FOR DEVICE COVERPLATES.
D. UNDERGROUND LINE WARNING TAPE - INSTALL UNDERGROUND-LINE WARNING TAPE FOR DIRECT-BURIED CABLES AND CABLES IN RACEWAYS. DURING BACKFILLING OF TRENCHES, INSTALL CONTINUOUS UNDERGROUND-LINE WARNING TAPE DIRECTLY ABOVE CABLE OR RACEWAY AT 6 TO 8 INCHES BELOW FINISHED GRADE. USE MULTIPLE TAPES WHERE WIDTH OF MULTIPLE LINES INSTALLED IN A COMMON TRENCH OR CONCRETE ENVELOPE EXCEEDS 16 INCHES OVERALL.
E. PANELBOARDS/SWITCHBOARDS LABEL SHALL INCLUDE - PANEL NAME, VOLTAGE, AMPERAGE, NUMBER OF PHASES AND WIRES, SOURCE AND AVAILABLE FAULT CURRENT WITH DATE CALCULATED. INCLUDE TYPEWRITTEN DIRECTORY OF CIRCUITS IN THE LOCATION PROVIDED BY PANELBOARD MANUFACTURER. INDICATE CIRCUIT LOAD INCORPORATING OWNER'S FINAL ROOM DESIGNATIONS. SPARES SHALL BE FILLED IN BY HAND WITH PENCIL. ON MAIN DISTRIBUTION PANEL DOOR / SWITCHBOARD FRONT PROVIDE A LAMINATED ONE-LINE DIAGRAM OF THE ELECTRICAL SYSTEM AND ALL PANEL CONFIGURATIONS.
F. RECEPTACLES: IDENTIFY PANELBOARD AND CIRCUIT NUMBER FROM WHICH THE DEVICE IS SERVED.
   1. MARK INSIDE OF BOX OR COVERPLATE WITH PERMANENT MARKER. TEST TO ENSURE THAT MARKER LINES ARE NOT VISIBLE ON OUTSIDE OF COVER WHEN IT IS INSTALLED.
   2. MARK OUTSIDE OF COVERPLATE USING LABELER SUCH AS BROTHER PT-90 TO PRODUCE 1/8" BLACK LETTERS (WHITE LETTERS IF COVER IS DARK) ON CLEAR TAPE.

262726 - WIRING DEVICES

A. STRAIGHT-BLADE RECEPTACLES - DUPLEX CONVENIENCE RECEPTACLES, 125V, 20A: COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, UL 498, AND FS W-C-596.
   1. COOPER; 5351 (SINGLE), 5362 (DUPLEX), 5362CH (HALF-CONTROLLED DUPLEX) TR5362 (TAMPER DUPLEX).
   2. HUBBELL; HBL5361 (SINGLE), HBL5362 (DUPLEX), BR20C1 (HALF-CONTROLLED DUPLEX) HBL5362TR (TAMPER DUPLEX).
   3. LEVITON; 5361 (SINGLE), 5362 (DUPLEX), 5362-S1 (HALF-CONTROLLED DUPLEX)5362-SG (TAMPER DUPLEX).
   4. P&S; 5351 (SINGLE), CRB5362 (DUPLEX), 5362CDW (HALF-CONTROLLED DUPLEX) TR5352 (TAMPER DUPLEX).
B. TV OUTLET (POWER & SIGNAL) - RECESSED, 3-GANG, IN-WALL ENCLOSURE WITH 20A DUPLEX RECEPTACLE LOCATED IN LEFT, SINGLE-GANG OPENING. CENTER SINGLE-GANG, LOW-VOLTAGE OPENING WITH 1-1/4" CONDUIT AND PULLSTRING PROVISION FOR SIGNAL CABLE. ROUTE TO ACCESSIBLE CEILING SPACE AND TO FLOOR BOX WHERE APPLICABLE. RIGHT SINGLE-GANG, LOW-VOLTAGE OPENING WITH 1" CONDUIT AND PULLSTRING PROVISION FOR SIGNAL CABLE. ROUTE TO ACCESSIBLE CEILING SPACE.
   1. ARLINGTON; TVBS505SS.
C. GFCI RECEPTACLES - 125V, 20A, DUPLEX, STRAIGHT BLADE, NON-FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA WD 6 CONFIGURATION 5-20R, UL 498, UL 943 CLASS A, AND FS W-C-596. INCLUDE SELF-TESTING AND INDICATOR LIGHT THAT SHOWS WHEN THE GFCI HAS MALFUNCTIONED AND NO LONGER PROVIDES PROPER GFCI PROTECTION.
   1. COOPER; VGF20 (STANDARD), TRVGF20 (TAMPER), WRSGF20 (OUTDOOR).
   2. HUBBELL; GFR5352L (STANDARD), GFRTRST20 (TAMPER), GFTWRST20 (OUTDOOR).
   3. LEVITON; GFNT2 (STANDARD), GFTR2-KW (TAMPER), GFWR2 (OUTDOOR).
   4. P&S; 2097 (STANDARD), 2097TR (TAMPER), 2097TRWR (OUTDOOR).
D. TOGGLE SWITCHES - 120/277V, 20A. COMPLY WITH NEMA WD 1, UL 20, AND FS W-S-896.
   1. COOPER; AH1221 (SINGLE-POLE), AH1222 (TWO-POLE), AH1223 (THREE-WAY), AH1224 (FOUR-WAY).
   2. HUBBELL; HBL1221 (SINGLE-POLE), HBL1222 (TWO-POLE), HBL1223 (THREE-WAY), HBL1224 (FOUR-WAY).
   3. LEVITON; 1221-2 (SINGLE-POLE), 1222-2 (TWO-POLE), 1223-2 (THREE-WAY), 1224-2 (FOUR-WAY).
   4. P&S; CSB20AC1 (SINGLE-POLE), CSB20AC2 (TWO-POLE), CSB20AC3 (THREE-WAY), CSB20AC4 (FOUR-WAY).
E. DEVICE COLOR - AS SELECTED BY ARCHITECT UNLESS OTHERWISE INDICATED OR REQUIRED BY NFPA 70 OR DEVICE LISTING.
F. WALL PLATES
   1. INDOOR FINISHED AREAS - SMOOTH, HIGH-IMPACT THERMOPLASTIC WITH COLOR TO MATCH CORRESPONDING WIRING DEVICES.
   2. INDOOR UNFINISHED AREAS - GALVANIZED STEEL.
   3. OUTSIDE AND WET-LOCATIONS - NEMA 250, COMPLYING WITH TYPE 3R, WEATHERPROOF-IN-USE, DIE-CAST ALUMINUM WITH LOCKABLE COVER.
G. IDENTIFICATION - IDENTIFY PANELBOARD AND CIRCUIT NUMBER FROM WHICH THE DEVICE IS SERVED.
   1. MARK INSIDE OF BOX OR COVERPLATE WITH PERMANENT MARKER. TEST TO ENSURE THAT MARKER LINES ARE NOT VISIBLE ON OUTSIDE OF COVER WHEN IT IS INSTALLED.
   2. MARK OUTSIDE OF COVERPLATE USING LABELER SUCH AS BROTHER PT-90 TO PRODUCE 1/8" BLACK LETTERS (WHITE LETTERS IF COVER IS DARK) ON CLEAR TAPE.
H. WEATHER STRIPPING - BEHIND EXTERIOR WALL DEVICES INSTALL A PRECUT FOAM INSULATION PAD OVER THE FIXTURE AND REINSTALL THE COVER.

260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

A. MINIMUM RACEWAY SIZE: 1 INCH TRADE SIZE FOR TELECOM/DATA AND 3/4 INCH TRADE SIZE FOR ALL OTHER APPLICATIONS.
B. INSTALL NONMETALLIC CONDUIT OR TUBING FOR PROTECTING BARE GROUNDING CONDUCTORS.
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 AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.
F. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE FINISHED SLAB.
G. 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 OF CHANGES IN DIRECTION. SUPPORT CONDUIT WITHIN 12 INCHES OF ENCLOSURES TO WHICH IT IS ATTACHED.
H. UNLESS BURIED, INSTALL ALL CONDUITS PARALLEL OR PERPENDICULAR TO BUILDING LINES.
I. INSTALL RACEWAYS SQUARE TO THE ENCLOSURE AND TERMINATE AT ENCLOSURES WITH LOCKNUTS. INSTALL LOCKNUTS HAND TIGHT PLUS 1/4 TURN MORE. DO NOT RELY ON LOCKNUTS TO PENETRATE NONCONDUCTIVE COATINGS ON ENCLOSURES. REMOVE COATINGS IN THE LOCKNUT AREA PRIOR TO ASSEMBLING CONDUIT TO ENCLOSURE TO ENSURE A CONTINUOUS GROUND PATH.
J. RACEWAYS MAY BE INSTALLED UNDER THE CONCRETE SLAB, BUT NO CONDUITS SHALL BE EMBEDDED WITHIN THE SLAB. DIRECT-BURIED CONDUIT - INSTALL MANUFACTURED RIGID STEEL CONDUIT ELBOWS FOR STUB-UPS AT POLES AND EQUIPMENT AND AT BUILDING ENTRANCES THROUGH FLOOR. ANY METALLIC CONDUIT THAT DOES OR MAY COME INTO CONTACT WITH SOIL SHALL BE COATED WITH TWO COATS OF BITUMASTIC OR TWO LAYERS OF 10 MIL. CORROSION PROTECTION TAPE.
K. INSTALL FIRESTOPPING AT PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES.
L. INSTALL SLEEVES AND SLEEVE SEALS AT PENETRATIONS OF EXTERIOR FLOOR AND WALL ASSEMBLIES. INCLUDE CAST-IRON PIPE SLEEVES SIZED TO ALLOW FOR 1-INCH ANNULAR CLEAR SPACE BETWEEN RACEWAY OR CABLE AND SLEEVE FOR INSTALLING SLEEVE-SEAL SYSTEM WHICH INCLUDES MANUFACTURED EPDM RUBBER INTERLOCKING LINKS SHAPED TO FIT SURFACE OF PIPE AND WITH NUMBER REQUIRED FOR PIPE MATERIAL AND SIZE OF PIPE. INCLUDE STAINLESS STEEL PRESSURE PLATES AND CONNECTING BOLTS AND NUTS.
M. INDOOR RACEWAYS:
   1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
   2. EXPOSED AND SUBJECT TO SEVERE PHYSICAL DAMAGE: RIGID STEEL CONDUIT.
   3. CONCEALED IN NEW CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.
   4. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): LFMC.
   5. DAMP OR WET LOCATIONS: RIGID STEEL CONDUIT.
   6. BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 3R, NONMETALLIC IN DAMP OR WET LOCATIONS.
   7. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
   8. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID STEEL CONDUIT FITTINGS, UNLESS NOTED OTHERWISE.
   9. INSTALL SURFACE RACEWAYS ONLY WHERE SPECIFICALLY INDICATED ON DRAWINGS. INSTALL SURFACE RACEWAY WITH A MINIMUM 2-INCH RADIUS CONTROL AT BEND POINTS.
   10. FLEXIBLE CONDUIT CONNECTIONS: MAXIMUM OF 72 INCHES OF FLEXIBLE CONDUIT FOR RECESSED AND SEMI-RECESSED LUMINAIRES, EQUIPMENT SUBJECT TO VIBRATION, NOISE TRANSMISSION, OR MOVEMENT; AND FOR TRANSFORMERS AND MOTORS. USE LFMC IN DAMP OR WET LOCATIONS SUBJECT TO SEVERE PHYSICAL DAMAGE. USE LFMC OR LFNC IN DAMP OR WET LOCATIONS NOT SUBJECT TO SEVERE PHYSICAL DAMAGE.
N. OUTDOOR RACEWAYS:
   1. EXPOSED CONDUIT: RIGID STEEL CONDUIT.
   2. CONCEALED CONDUIT, ABOVE GROUND: EMT.
   3. UNDERGROUND CONDUIT: RNC, TYPE EPC-40-PVC, DIRECT BURIED. USE TYPE EPC-80-PVC UNDER PAVED SURFACES.
   4. CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): LFNC.
   5. BOXES AND ENCLOSURES, ABOVE GROUND: NEMA250, TYPE 3R.
O. ENCLOSURES – BOXES AND ENCLOSURES FOR PANELBOARD, DISCONNECT SWITCH AND MOTOR CONTROL UNITS, ETC. BASED ON THE INSTALLATION LOCATIONS/ENVIRONMENTS.
   1. INDOOR, DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1.
   2. OUTDOOR LOCATIONS: NEMA 250, TYPE 3R.
   3. KITCHEN/WASH-DOWN AREAS: NEMA 250, TYPE 4X, STAINLESS STEEL.
   4. OTHER WET OR DAMP, INDOOR LOCATIONS: NEMA 250, TYPE 4.
   5. INDOOR LOCATIONS SUBJECT TO DUST, FALLING DIRT, AND DRIPPING NONCORROSIVE LIQUIDS: NEMA 250, TYPE 12.
   6. HAZARDOUS AREAS INDICATED ON DRAWINGS: NEMA 250, TYPE 7/TYPE 9 WITH COVER ATTACHED BY TYPE 316 STAINLESS STEEL BOLTS.
P. GENERAL BOX MOUNTING
   1. MOUNT BOXES AT HEIGHTS INDICATED ON DRAWINGS. IF MOUNTING HEIGHTS OF BOXES ARE NOT INDIVIDUALLY INDICATED, GIVE PRIORITY TO ADA REQUIREMENTS. INSTALL BOXES WITH HEIGHT MEASURED TO CENTER OF BOX UNLESS OTHERWISE INDICATED.
   2. HORIZONTALLY SEPARATE BOXES MOUNTED ON OPPOSITE SIDES OF WALL SO THEY ARE NOT IN THE SAME VERTICAL CHANNEL.
   3. LOCATE BOXES SO THAT COVER OR PLATE WILL NOT SPAN DIFFERENT BUILDING FINISHES.
   4. FASTEN JUNCTION AND PULL BOXES TO OR SUPPORT FROM BUILDING STRUCTURE. DO NOT SUPPORT BOXES BY CONDUITS.
   5. SET METAL FLOOR BOXES LEVEL AND FLUSH WITH FINISHED FLOOR SURFACE.

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Revisions

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Drawn by PMH	Date 10.23.2025
Checked RPM	Job No. PPA#23-0871 AA#25013.01

Sheet Contents
ELECTRICAL SPECIFICATIONS

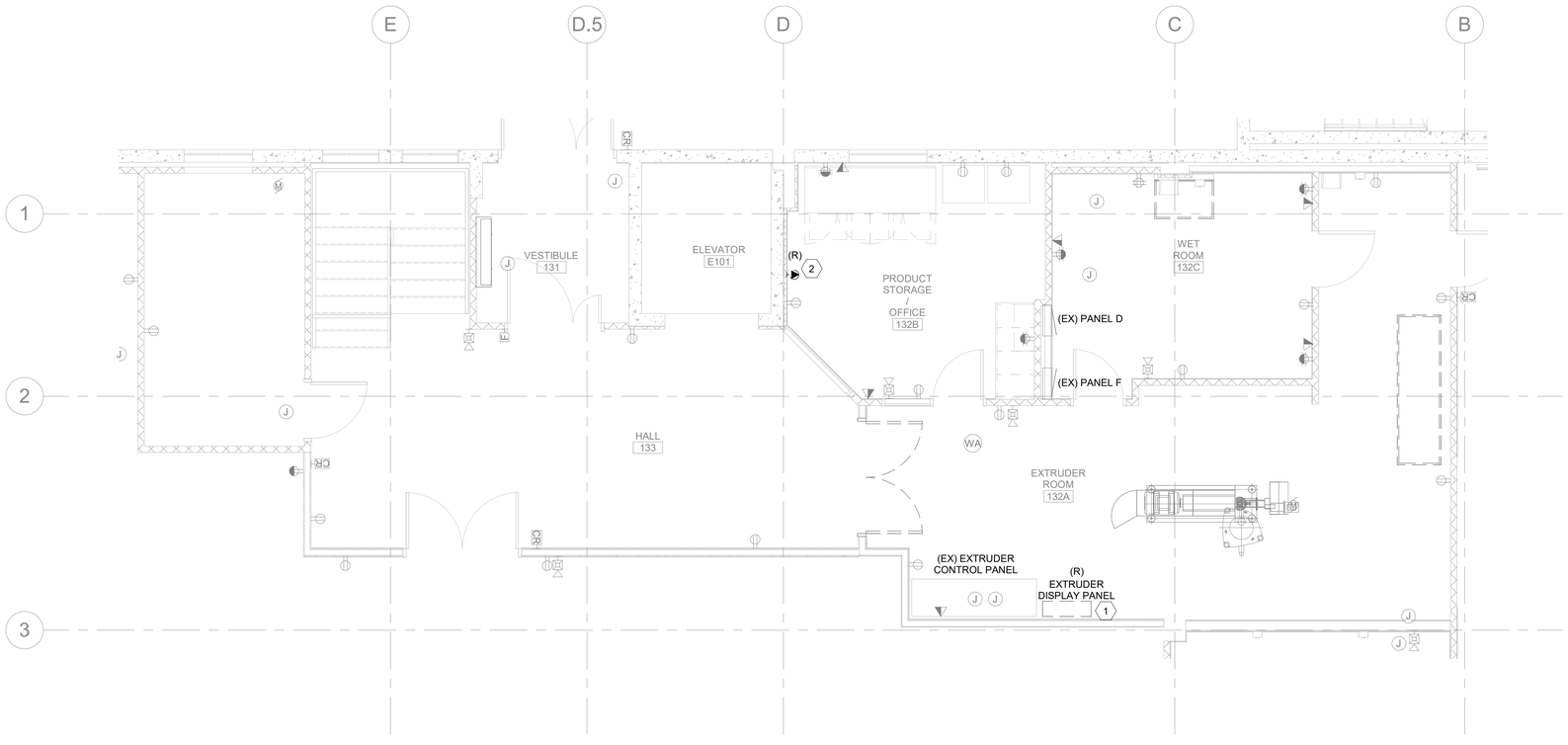
Sheet No.
E004

KEY NOTES:

1. EXTRUDER DISPLAY PANEL TO BE RELOCATED APPROXIMATELY 12FT EAST OF ITS CURRENT LOCATION. SEE ELECTRICAL POWER PLAN FOR NEW LOCATION.
2. SALVAGE EXISTING NEMA 6-20R RECEPTACLE ON CIRCUIT D-34,36 THAT FEEDS PLANETARY MIXER. RECEPTACLE AND CIRCUIT TO BE RELOCATED TO NEW PLANETARY MIXER LOCATION. SEE ELECTRICAL POWER PLAN FOR NEW LOCATION.

ELECTRICAL DEMO NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE ARCHITECT/ENGINEER.
C. ALL WALL REGIONS SHOWN DASHED ARE EXISTING, TO BE DEMO'D, OR IN SOME CASES ARE EXISTING DOORWAYS TO BE WALLED IN. CONTRACTOR SHALL FIELD-VERIFY AFFECTED POWER, LIGHTING AND SIGNAL, PRIOR TO BID.
D. DASHED WALLS, EQUIPMENT, FIXTURES AND DEVICES SHOWN BLACK, OR BLACK AND DASHED ARE EXISTING FOR DEMO, AND ITEMS IN GRAY AND SOLID ARE EXISTING TO REMAIN, UNLESS SPECIFICALLY NOTED OTHERWISE.
E. ALL ITEMS NOTED FOR DEMO SHALL BE COMPLETELY DEMO'D, INCLUDING DISCONNECTS, CONDUIT AND CONDUCTORS BACK TO SOURCE, UNLESS SPECIFICALLY NOTED OTHERWISE.
F. NOT ALL EXISTING DEVICE LOCATIONS HAVE BEEN VERIFIED OR SHOWN ON THESE PLANS. THE CONTRACTOR SHALL FIELD-VERIFY EXSITING CONDITIONS, PRIOR TO BID.



1 ED101 LEVEL 1 - ELECTRICAL POWER DEMO PLAN
1/4" = 1'-0"

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Sheet Contents
LEVEL 1 - ELECTRICAL POWER DEMO PLAN

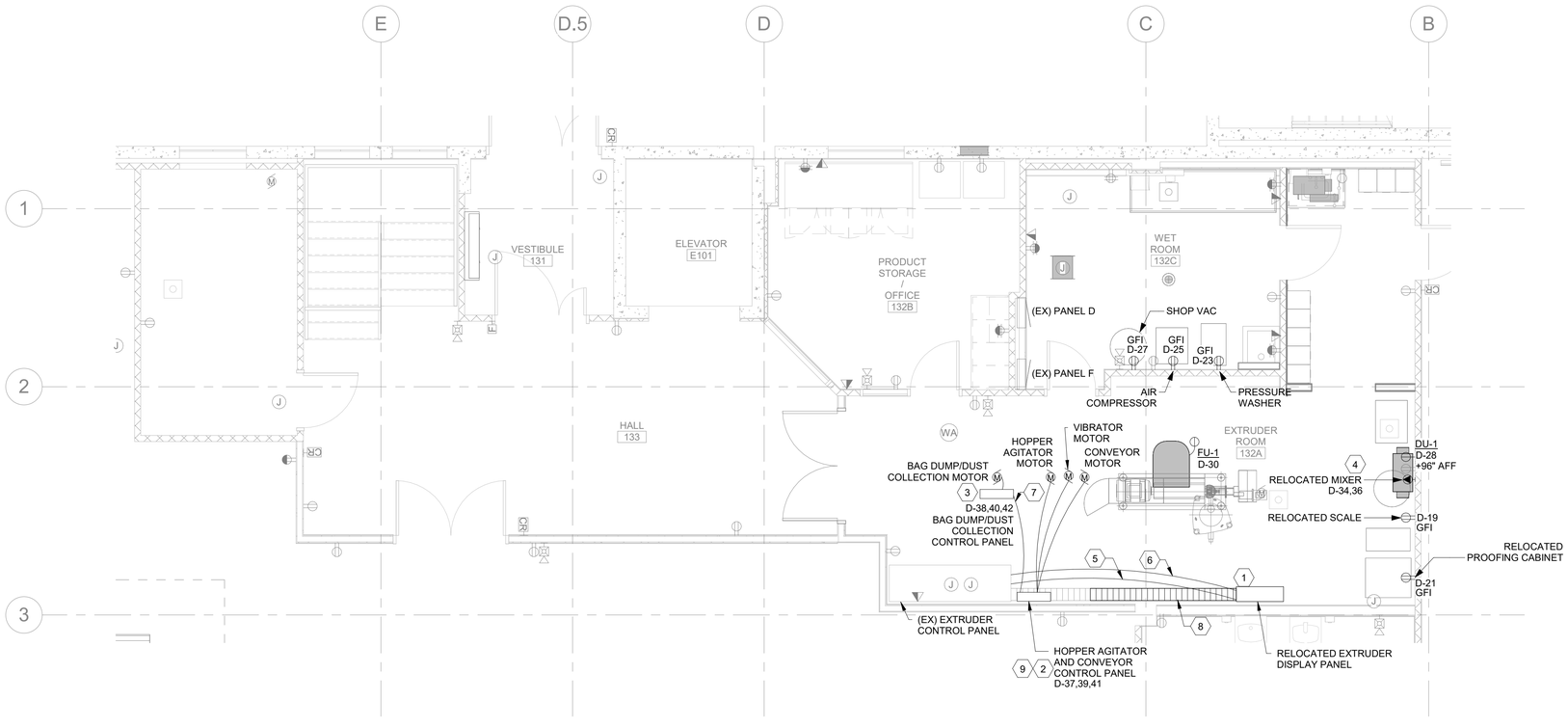
Sheet No.
ED101

KEY NOTES:

1. EC SHALL RELOCATE EXTRUDER DISPLAY PANEL TO THIS LOCATION.
2. PROVIDE (4) #12CU & (1) #12CU GND IN 3/4"C FOR POWER TO HOPPER AGITATOR AND CONVEYOR CONTROL PANEL. EC SHALL ALSO PROVIDE ALL REQUIRED FIELD WIRING FOR SYSTEM, INCLUDING POWER WIRING BETWEEN CONTROL PANEL AND 3HP 208V-3PH CONVEYOR MOTOR, POWER WIRING BETWEEN CONTROL PANEL AND 0.5HP 208V-3PH HOPPER AGITATOR MOTOR, POWER WIRING BETWEEN CONTROL PANEL AND 0.11HP 208V-3PH VIBRATOR/BLOWER MOTOR, AND ALL CONTROL AND SIGNAL WIRING. PROVIDE LFMC CONDUIT FOR ALL FIELD WIRING CONNECTIONS. SEE MANUFACTURER WIRING DIAGRAMS FOR DETAILS. COORDINATE EXACT LOCATIONS WITH SYSTEM INSTALLER PRIOR TO ROUGH-IN.
3. PROVIDE (4) #12CU & (1) #12CU GND IN 3/4"C FOR POWER TO BAG DUMP/DUST COLLECTION CONTROL PANEL. EC SHALL ALSO PROVIDE ALL REQUIRED FIELD WIRING FOR SYSTEM, INCLUDING POWER WIRING BETWEEN CONTROL PANEL AND 1.5HP 208V-3PH MOTOR, AND ALL CONTROL WIRING. PROVIDE LFMC CONDUIT FOR ALL FIELD WIRING CONNECTIONS. SEE MANUFACTURER WIRING DIAGRAMS FOR DETAILS. COORDINATE EXACT LOCATIONS WITH SYSTEM INSTALLER PRIOR TO ROUGH-IN.
4. RELOCATE 6-20R RECEPTACLE AND CIRCUIT D-34,36 THAT FEEDS PLANETARY MIXER TO THIS LOCATION. UPDATE PANEL SCHEDULE OF PANEL D TO REFLECT THAT THIS CIRCUIT FEEDS PLANETARY MIXER.
5. EC SHALL PROVIDE (1) NEW RUN OF 16AWG 12-CONDUCTOR SHIELDED TRAY CABLE FROM EXTRUDER CONTROL PANEL TO RELOCATED DISPLAY PANEL. EC SHALL TERMINATE BOTH ENDS OF CABLE PER MANUFACTURERS REQUIREMENT, MATCHING EXISTING TERMINATION POINTS. AT CONTRACTOR'S OPTION, (2) RUNS OF 16AWG 7-CONDUCTOR SHIELDED TRAY CABLE MAY BE USED IN LIEU OF (1) RUN OF 16AWG 12-CONDUCTOR SHIELDED TRAY CABLE.
6. EC SHALL PROVIDE A 1-1/4" EMPTY EMT CONDUIT BETWEEN EXTRUDER CONTROL PANEL AND RELOCATED DISPLAY PANEL FOR CAT6 CABLE. MSU UIT TO PROVIDE CAT6 CABLE FROM EXTRUDER CONTROL PANEL TO RELOCATED DISPLAY PANEL. COORDINATE WITH OWNER FOR SCHEDULING OF WORK.
7. PROVIDE FIELD WIRING AS REQUIRED BETWEEN CONTROL PANELS. PROVIDE IN LFMC CONDUIT. SEE MANUFACTURER WIRING DIAGRAMS FOR DETAILS.
8. PROVIDE NEW 8' SEGMENT OF CABLE TRAY FOR EXTENSION OF CABLING FROM EXTRUDER CONTROL PANEL TO RELOCATED DISPLAY PANEL. JOIN TOGETHER AT WEST END TO EXISTING CABLE TRAY. PROVIDE AS EATON B-LINE FLEXTRAY 4"Dx8"W ELECTRO-GALVANIZED ZINC. WALL MOUNT WITH 8L BRKT "L" BRACKETS PER MANUFACTURERS RECOMMENDATIONS.
9. FIELD COORDINATE EXACT LOCATION OF HOPPER AGITATOR/CONVEYOR CONTROL PANEL WITH OWNER PRIOR TO ROUGH-IN.

POWER PLAN GENERAL NOTES

A. IT IS ABSOLUTELY NECESSARY FOR ALL TRADES INVOLVED TO COORDINATE WITH EACH OTHER AND VERIFY THAT THERE ARE NO CONFLICTS IN LOCATION OF DUCTS, CONDUITS, DIFFUSERS, BOXES, AND OTHER ITEMS THROUGHOUT THIS PROJECT BEFORE FINAL PLACEMENT OF MATERIALS.
B. ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR ALL CUTTING OF FLOORS, WALLS, CEILINGS, AND ROOFS TO PERFORM THE REQUIRED WORK DEPICTED IN THESE DOCUMENTS. THE CONTRACTOR IS RESPONSIBLE FOR ALL PATCHING OF HOLES TO THE SATISFACTION OF THE OWNER/ENGINEER.
C. ITEMS SHOWN IN GRAY ARE EXISTING TO REMAIN. ITEMS SHOWN IN BLACK ARE NEW, UNLESS NOTED OTHERWISE.



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LEVEL 1 - ELECTRICAL POWER PLAN

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