

# ADDENDUM #03

DATE: August 30, 2022  
 PROJECT: Sininger Hall – School of Business (RFP 23-002)  
 FROM: Baker Architecture + Design  
 TO: All Prospective Offerors

## Addenda Summary:

### **NOTICE TO BIDDERS:**

This Addendum #1 forms a part of the Contract Documents and modifies the original Bidding Documents dated July 15, 2022. All other provisions of the Contract Documents shall remain unchanged. This addendum is hereby made a part of the Contract Documents to the same extent as those provisions contained in the original documents and all itemized listing thereof. Where provisions of the following supplementary data differ from those of the original Contract Documents, this Addendum shall govern and take precedence

**Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to disqualification.**

This Addendum consists of (2) pages of misc. information and (126) pages of attachments. Attachments as listed below

### **A. Questions:**

- 1) *“ Please clarify the condition at Keyed Note 5 on P101 and Keyed Note 2 on PD101”*

**Response: See attached plumbing addenda.**

- 2) *“Stucco and Roofing means logistics, fencing, storage, disposal and any pedestrian protection correct?”*

**Response: Stucco and roofing contractor will work within the site established by the selected GC, for these trades it is assumed the work would fall within an already secured site.**

- 3) *“All flooring means major or minor patch for a clean and uniform product correct ”*

**Response: Selected GC shall be responsible for cleaning and patching floor per demo notes, floor shall be largely prepped for flooring contractor to come in a lay flooring without having to do major repair work.**

- 4) *“Elevator Upgrades means inspections, power and logistics correct?”*

**Response: Correct, selected GC will be required to coordinate schedule of this work.**

- 5) *“Telephone and Data means the electrician would only install pathways and nothing else correct?”*

**Response: Correct.**

### **B. Approved Product Substitutions:**

The Contractor shall bear full responsibility to prove to the Engineer and Architect that the furnished equipment is equivalent to or better than the specified item. Failure to provide such proof will result in rejection of the shop drawing submittal by the Engineer and/or Architect. Prior written or verbal approval by the Engineer or Architect of equipment by other manufacturers will not relieve the Contractor of responsibility to provide equivalence. Any prior

approval given is intended only to provide preliminary agreement that the alternate manufacturer may make equipment that complies with the specification requirements and not that all equipment manufactured by them is acceptable.

It is the responsibility of the supplier to ensure that the substituted products per this and all previous addenda meet or exceed the specified performance criteria and the design intent of the Bid Documents. Prior approval of a manufacturer does not imply an approval of all products by the manufacturer.

The following is list of prior approvals; this list does not relieve the contractor of their responsibility to comply with the intent of the contract documents.

*(\*The following prior approvals are those currently approved through the date of this addenda issuance, not including those already approved in previous addenda.)*

- 1) See attached MEP Addenda for lighting prior approvals.

**C. Project Manual Updates: (Attached – 16 pages):**

Section 00 2011 Appendix A Attachments

Section 00 2021 Appendix B Attachments

**D. Revised Architectural Drawings: (Attached – 6 pages) :**

Sheet G-002 – General Information - Added fire suppression notes and modified sheet index

Sheet AS-101 – Site Demolition Plan - Site concrete demolition extents

Sheet AS-102 – Site Plan - New site concrete extents and PIV, and FDC locations

Sheet AS-103 – Enlarged Site Plan – New site concrete extents and PIV, and FDC locations

Sheet A-101 – First Floor plan – Furniture layout removed

Sheet A-102 – Second Floor plan – Furniture layout removed

**E. Civil Addenda: (Attached – 2 pages) :**

Addition of Fire Suppression sheets.

**F. MEP Addenda: (Attached – 102 pages) :**

Addition of Fire Suppression sheets, specs, prior approvals, and other misc information.

**END OF ADDENDA**

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Tomas Sanchez, RA  
Project Architect  
Baker Architecture + Design

**ATTACHMENT A**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 3.a. EXPERIENCE**  
COMPLETE ONE FORM FOR EACH PROJECT LISTED (MAXIMUM 5)

**PROJECT DESCRIPTION**

Project Type: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Project Name: \_\_\_\_\_ Contact Title: \_\_\_\_\_

Owner: \_\_\_\_\_ Contact Phone No.: \_\_\_\_\_

**DESIGN PROFESSIONAL**

Name of Firm: \_\_\_\_\_ Contact Name: \_\_\_\_\_

Contact Phone No.: \_\_\_\_\_ Contact Title: \_\_\_\_\_

Gross Building Area (Sq. Ft.) \_\_\_\_\_  New  Addition  Renovation

Project Start Date: \_\_\_\_\_ Completion Date: \_\_\_\_\_

Original Contract Amt.: \$ \_\_\_\_\_ Original No. of Days to Complete: \_\_\_\_\_

Final Contract Amount  
With all Change Orders: \$ \_\_\_\_\_ Final Contract Days to Complete:  
with all Time Extensions: \_\_\_\_\_

**PROJECT EXECUTION**

Were Liquidated Damages assessed on this Project?  No  Yes Days \_\_\_\_ \$ \_\_\_\_\_

Percentage of Work Subcontracted: \_\_\_\_\_% Contract Type  Competitive Bid Lump Sum

Negotiated Lump Sum

Guaranteed Maximum Price

Other (Describe)

Major Subcontractors:

Mechanical: \_\_\_\_\_

Electrical: \_\_\_\_\_

Plumbing: \_\_\_\_\_

Roofing: \_\_\_\_\_

**CUSTOMER SATISFACTION**

How was this measured?  Customer Survey  Attached  Yes  No  Other (Describe)

**ATTACHMENT B**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 4 a, b, c, d Resumes**

ATTACH ONE (1) PAGE RESUMES OF THE PROPOSED  
PROJECT MANAGER  
PROJECT SUPERINTENDENT  
SAFETY PROGRAM MANAGER  
OTHER KEY PERSONNEL (OPTIONAL)

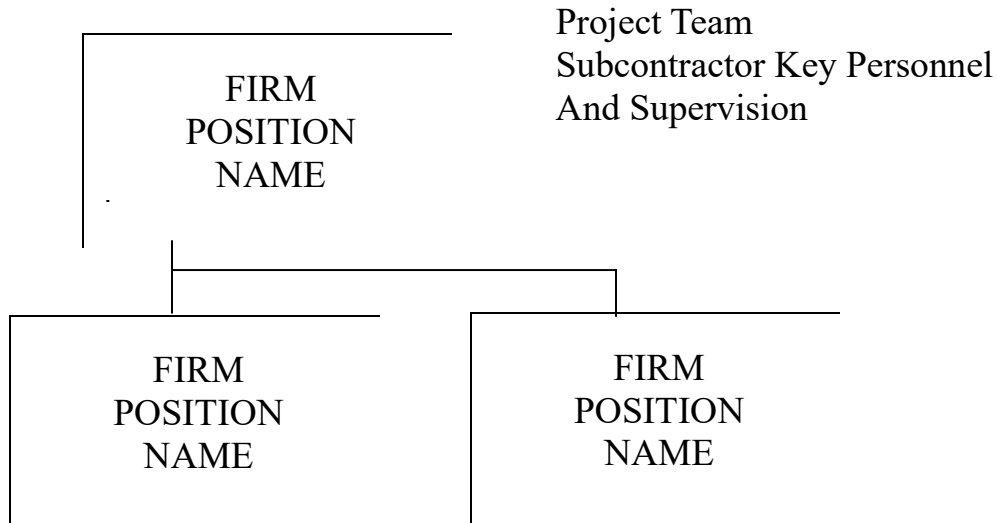
1. EDUCATION  
High School, College, Trade Schools, Trade Seminars, Trade/Management Specialized Courses, Etc.
2. RELATED EXPERIENCE  
Related experience should include the following:
  - a. Position Title
  - b. Duties and Responsibilities
  - c. Major accomplishments
  - d. Number of personnel supervised
3. PROJECT EXPERIENCE  
Identify project experience requested in the Statement at 4.a. (2) (3), 4.b. (2) (3), and 4.c. (2). Include the project Title and Location.
4. Other information that demonstrates the individual's strengths for this project.
5. Project Professionals and Project Owner Reference may be included.



**ATTACHMENT C**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 4.e. Organizational Chart of Project Management Team**

Chart should include the entire



1. Indicate the relationship between PM/Supt. Of the Subcontractors and the General Contractor's PM/SUPT.
2. Indicate the relationship of the Safety Manager of the Subcontractors and General Contractor, and the relationship of the Safety Manager with others on the job site.
3. Indicate the relationship between the QA/QC Manager with other personnel on the job site.



**ATTACHMENT E**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 6.d. Notarized Declaration of Surety**

DOCUMENTATION FROM SURETY

**ATTACHMENT F**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 7.a. Copy of Firm's Written Safety Plan**

SUBMIT ONLY ONE (1) COPY OF SAFETY PLAN WITH SUBMITTAL PACKET

Include Work Loss Incidents and History

**ATTACHMENT G**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 8.d. Letter from Insurance Carrier**

DOCUMENTATION OF INSURABILITY

**ATTACHMENT H**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 9.b. Written Quality Assurance Program**

SUBMIT ONLY ONE (1) COPY WITH SUBMITTAL PACKET

**ATTACHMENT I**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 11.a. Affidavit  
of Non-violation of Labor codes**

**Name of Firm:**

**Address:**

**Project**

**Reference: (Name of Owner & Project)**

**Request for Proposal # \_\_\_\_\_  
Affidavit of Non-violation of Labor Codes**

**To:**

The undersigned officer of \_\_\_\_\_ hereby states that \_\_\_\_\_ has, during the past five (5) years, been free of any determinations by a court or an administrative agency, of repeated or willful violations of laws and/or regulations pertaining to the payment of prevailing wages or employment of apprentices of public works projects.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

NOTARY

State of \_\_\_\_\_

County of \_\_\_\_\_

Signed or attested before me on \_\_\_\_\_ by \_\_\_\_\_

Seal

\_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**ATTACHMENT J**  
GENERAL CONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 12.a.b.c. Judgments, Breach of Contract, Protests**

- A. List any judgments against the firm during the past 5 years.**
- B. List any breach of contract other than for cause.**
- C. If applicable, list any formal bid protests and the outcome, whether denied or upheld.**
- D. List all mediations/arbitrations in the last 5 years. Who initiated? What was the outcome?**



**ATTACHMENT A**  
SUBCONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 3.a. Experience on Similar Projects over Valuation Stated in 3.a**

COMPLETE ONE FORM FOR EACH PROJECT LISTED ON THE QUESTIONNAIRE (MAXIMUM 3)

PROJECT DESCRIPTION

Project Type: \_\_\_\_\_ Owner: \_\_\_\_\_

Project Name and Location: \_\_\_\_\_

Gross Building Area (Sq. Ft.) \_\_\_\_\_  New  Addition  Renovation

Original Contract Amt.: \$ \_\_\_\_\_ Completion Date/Percentage Complete: \_\_\_\_\_

DESIGN PROFESSIONAL

Name of Firm: \_\_\_\_\_ Contact Name: \_\_\_\_\_

GENERAL CONTRACTOR

Name of Firm: \_\_\_\_\_ Contact Name: \_\_\_\_\_

CUSTOMER SATISFACTION

How was this measured?

Customer Survey  Attached  Yes  No  Other (Describe)

**ATTACHMENT B**  
SUBCONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 4 a, b, c, d Resumes**

ATTACH ONE (1) PAGE RESUMES OF THE PROPOSED

1. PROJECT MANAGER
2. PROJECT FOREMAN/SUPERINTENDENT
3. OTHER KEY PERSONNEL (OPTIONAL)

1. EDUCATION

High School, College, Trade Schools, Trade Seminars, Trade/Management Specialized Courses, Etc.

2. RELATED EXPERIENCE

Related experience should include the following:

- (a) Position Title
- (b) Duties and Responsibilities
- (c) Major accomplishments
- (d) Number of personnel supervised

3. PROJECT EXPERIENCE

Identify project experience requested in the Statement at 4.a. (2) (3), 4.b. (2) (3), and 4.c. (2). Include the project Title and Location.

4. Other information that demonstrates the individual's strengths for this project.

5. Project Professionals and Project Owner Reference may be included.



**ATTACHMENT D**  
SUBCONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 7.a. Copy of Firm's Written Safety Plan**

SUBMIT ONLY **ONE (1) COPY** OF SAFETY PLAN WITH SUBMITTAL PACKET

Include Work Loss Incidents & History

**ATTACHMENT E**  
SUBCONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 9.b. Written Quality Assurance Program**

SUBMIT ONLY **ONE (1) COPY** WITH SUBMITTAL PACKET

**ATTACHMENT F**  
SUBCONTRACTOR'S STATEMENT OF QUALIFICATIONS

**REFERENCE: 11.b. Affidavit of non-violation of Labor codes**

Name of Firm: \_\_\_\_\_

Address: \_\_\_\_\_

Project  
Reference: \_\_\_\_\_  
(Name of Owner & Project)

Request for Proposal #  
Affidavit of Non-violation of Labor Codes

To: Partnership for Community Action

The undersigned officer of \_\_\_\_\_ hereby states that  
\_\_\_\_\_ has, during the past five (5) years, been  
free of any determinations by a court or an administrative agency, of repeated or willful  
violations of laws and/or regulations pertaining to the payment of prevailing wages or  
employment of apprentices of public works projects.

\_\_\_\_\_  
Name

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

NOTARY

State of \_\_\_\_\_

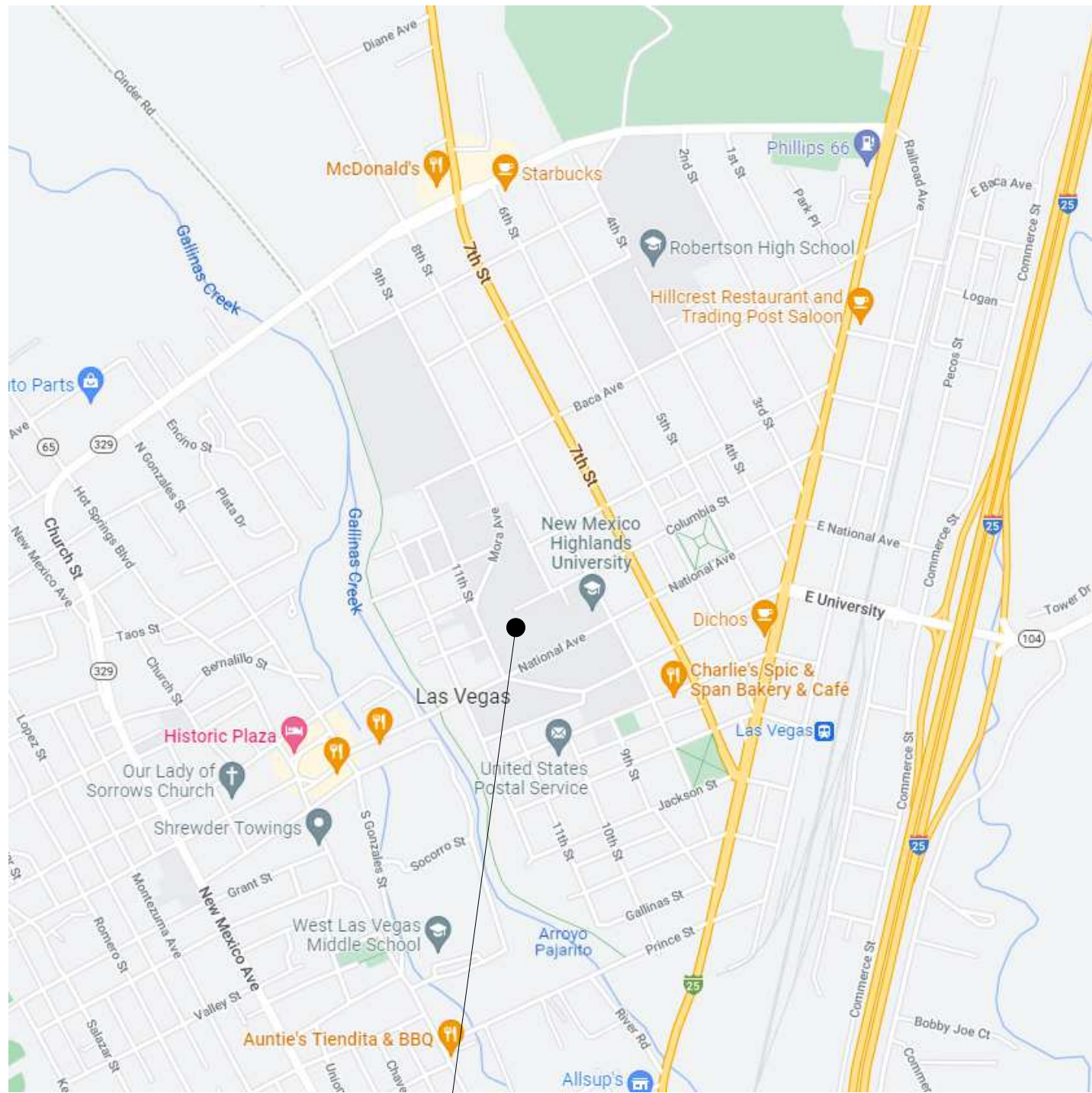
County of \_\_\_\_\_

Signed or attested before me on \_\_\_\_\_ by \_\_\_\_\_

Seal \_\_\_\_\_

My Commission Expires: \_\_\_\_\_





PROJECT LOCATION

PROJECT INFORMATION

OWNER: NEW MEXICO HIGHLANDS UNIVERSITY  
 BOX 9000  
 LAS VEGAS, NM 87701

ARCHITECT: BAKER ARCHITECTURE + DESIGN P.C.  
 505 CENTRAL AVENUE NW, SUITE E  
 ALBUQUERQUE, NM 87102  
 505.254.4697

MEP ENGINEER: TESTUDO ENGINEERING  
 7007 WYOMING BLVD NE SUITE E  
 ALBUQUERQUE, NM 87109  
 505.554.1282

CIVIL ENGINEER: MILLER ENGINEERING CONSULTANTS  
 3500 COMANCHE NE, BUILDING F  
 ALBUQUERQUE, NM 87107  
 505.888.7500

CONTRACTOR: TO BE SELECTED

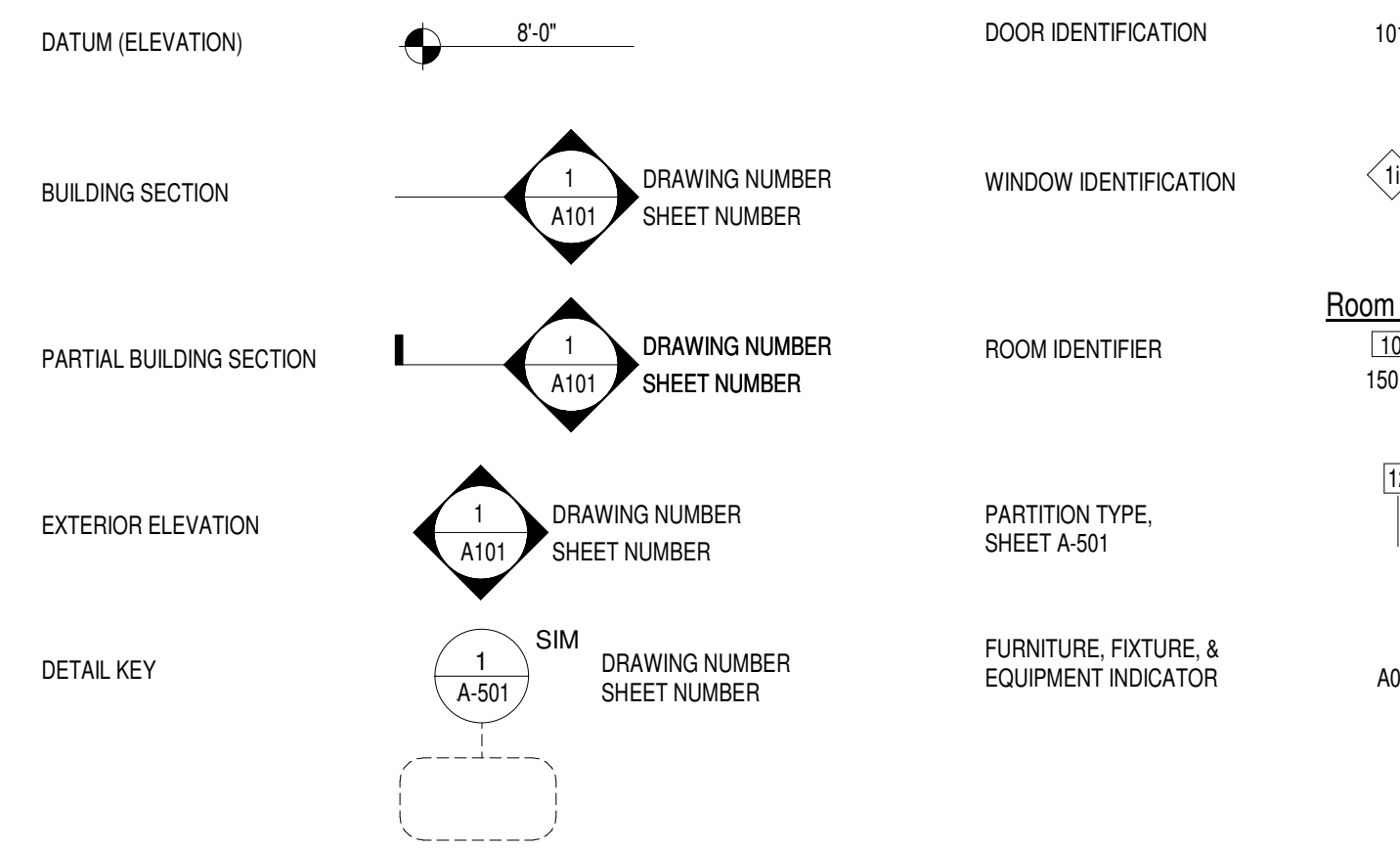
PROJECT DESCRIPTION: INTERIOR RENOVATION WHICH INCLUDES INTERIOR DEMOLITION, NEW FLOOR AND CEILING FINISHES, ALL NEW LED LIGHTING, AND UPDATED MECHANICAL, ELECTRICAL AND PLUMBING

PROJECT ADDRESS: 904 COLUMBIA ST.  
 LAS VEGAS, NM 87701

SHEET INDEX

- GENERAL**
- G-001 - COVER
  - G-002 - GENERAL INFORMATION
  - LS-101 - FIRST FLOOR LIFE SAFETY PLAN
  - LS-102 - SECOND FLOOR LIFE SAFETY PLAN
- CIVIL**
- C-101 - GRADING AND DRAINAGE PLAN (FOR REFERENCE ONLY)
  - C-102 - SITE UTILITY PLAN
  - C-501 - MISCELLANEOUS DETAILS (FOR REFERENCE ONLY)
  - C-502 - MISCELLANEOUS DETAILS (FOR REFERENCE ONLY)
  - C-503 - MISCELLANEOUS DETAILS (FOR REFERENCE ONLY)
  - C-504 - MISCELLANEOUS DETAILS
- MECHANICAL**
- MD-101 - FIRST FLOOR MECHANICAL DEMOLITION PLAN
  - MD-102 - SECOND FLOOR MECHANICAL DEMOLITION PLAN
  - MP-101 - GENERAL NOTES & LEGEND
  - M-101 - FIRST FLOOR MECHANICAL PLAN
  - M-102 - SECOND FLOOR MECHANICAL PLAN
  - M-201 - FIRST FLOOR HVAC PLAN
  - M-202 - SECOND FLOOR HVAC PLAN
  - M-401 - ENLARGED MECHANICAL ROOM PLANS
  - M-501 - MECHANICAL DETAILS
  - M-502 - MECHANICAL DETAILS
  - M-503 - MECHANICAL DETAILS
  - M-601 - MECHANICAL SCHEDULES
  - M-701 - MECHANICAL CONTROLS
  - M-702 - MECHANICAL CONTROLS
  - M-703 - MECHANICAL CONTROLS
- PLUMBING**
- PP-101 - FIRST FLOOR FIRE PROTECTION PLAN
  - PP-102 - SECOND FLOOR FIRE PROTECTION PLAN
  - PP-501 - FIRE PROTECTION NOTES AND DETAILS
  - PD-101 - FIRST FLOOR PLUMBING DEMOLITION PLAN
  - PD-102 - SECOND FLOOR PLUMBING DEMOLITION PLAN
  - P-101 - FIRST FLOOR PLUMBING PLAN
  - P-102 - SECOND FLOOR PLUMBING PLAN
  - P-401 - PLUMBING RISER DIAGRAMS
  - P-501 - PLUMBING DETAILS
  - P-601 - PLUMBING GENERAL NOTES, LEGEND & SCHEDULES
- ELECTRICAL**
- E-001 - SYMBOLS, GEN NOTE, FIXTURE SCHEDULE, IECC CALCS
  - ED-101 - FIRST FLOOR LIGHTING DEMOLITION
  - ED-102 - SECOND FLOOR LIGHTING DEMOLITION
  - ED-201 - FIRST FLOOR POWER DEMOLITION
  - ED-202 - SECOND FLOOR POWER DEMOLITION
  - E-101 - FIRST FLOOR LIGHTING PLAN
  - E-102 - SECOND FLOOR LIGHTING PLAN
  - E-201 - FIRST FLOOR POWER PLAN
  - E-202 - SECOND FLOOR POWER PLAN
  - E-301 - FIRST FLOOR MECHANICAL EQUIPMENT CONNECTIONS
  - E-302 - SECOND FLOOR MECHANICAL EQUIPMENT CONNECTIONS
  - E-401 - FIRST FLOOR FIRE ALARM PLAN
  - E-402 - SECOND FLOOR FIRE ALARM PLAN
  - E-601 - RISER DIAGRAM
  - E-602 - PANEL SCHEDULES
- ARCHITECTURAL**
- AS-101 - SITE DEMOLITION PLAN
  - AS-102 - SITE PLAN
  - AS-103 - ENLARGED SITE PLAN
  - AS-501 - SITE DETAILS
  - AD-101 - FIRST FLOOR DEMOLITION PLAN
  - AD-102 - SECOND FLOOR DEMOLITION PLAN
  - AD-103 - ROOF DEMOLITION PLAN
  - A-101 - FIRST FLOOR PLAN
  - A-102 - SECOND FLOOR PLAN
  - A-104 - FIRST FLOOR DIMENSIONED PLAN
  - A-104 - SECOND FLOOR DIMENSIONED PLAN
  - A-105 - ENLARGED PLANS
  - A-106 - ENLARGED PLANS
  - A-107 - FIRST FLOOR REFLECTED CEILING PLAN
  - A-108 - SECOND FLOOR REFLECTED CEILING PLAN
  - A-109 - ROOF PLAN
  - A-110 - FIRST FLOOR FINISHES PLAN
  - A-111 - SECOND FLOOR FINISHES PLAN
  - A-112 - FIRST FLOOR FURNITURE PLAN (FOR REFERENCE ONLY)
  - A-113 - SECOND FLOOR FURNITURE PLAN (FOR REFERENCE ONLY)
  - A-201 - EXTERIOR ELEVATIONS
  - A-202 - EXTERIOR ELEVATIONS
  - A-203 - INTERIOR ELEVATIONS
  - A-204 - INTERIOR ELEVATIONS
  - A-205 - INTERIOR ELEVATIONS
  - A-206 - INTERIOR ELEVATIONS
  - A-207 - INTERIOR HALLWAY ELEVATIONS
  - A-208 - INTERIOR HALLWAY ELEVATIONS
  - A-209 - INTERIOR HALLWAY ELEVATIONS
  - A-210 - INTERIOR HALLWAY ELEVATIONS
  - A-211 - STAIR ELEVATIONS
  - A-301 - BUILDING SECTIONS
  - A-302 - WALL SECTIONS
  - A-303 - WALL SECTIONS
  - A-501 - DETAILS
  - A-502 - DETAILS
- Room name**
- 101
  - 150 SF
  - 12
  - A01

SYMBOLS



ABBREVIATIONS

AFF ABOVE FINISH FLOOR	E EAST	INSUL INSULATION
ACOUS ACOUSTICAL	EA EACH	JAN JANITOR
ADJ ADJACENT, ADJUSTABLE	ELEC ELECTRIC(AL)	J-BOX JUNCTION BOX
A/C AIR CONDITIONING	EQ EQUAL	KIT KITCHEN
ALUM ALUMINUM	EW EACH WAY	LAM LAMINATE
L ANGLE	EXH EXHAUST	LAV LAVATORY
APPROX APPROXIMATE	EXIST EXISTING	MANF MANUFACTURER
ARCH ARCHITECT(URAL)	FOF FACE OF FINISH	MECH MECHANICAL
ASB ASBESTOS	FOF FACE OF FINISH	MEMB MEMBRANE
ASPH ASPHALT	FT FEET	MTL METAL
BM BEAM	FGL FIBERGLASS	MIR MIRROR
BD BOARD	FIN FINISH(ED)	MISC MISCELLANEOUS
CIP CAST-IN-PLACE	FIN FLR FINISH FLOOR	MOUNT(M) MOUNT(ED)ING
CB CATCH BASIN	FP FIREPROOF	MULL MULLION
CC CEILING	FLASH FLASHING	NRC NOISE REDUCTION COEFFICIENT
CEM CEMENT	FLR FLOOR	N NORTH
CL CENTERLINE	FLUOR FLUORESCENT	NIC NOT IN CONTRACT
CT CERAMIC TILE	FTG FOOTING	NTS NOT TO SCALE
C CHANNEL	FTDN FOUNDATION	NO NUMBER
CO CLEAN OUT	FV FIELD VERIFY	OC ON CENTER
CLR CLEAR	GALV GALVANIZED	OPNG OPENING
COL COLUMN	GC GENERAL CONTRACTOR	OD OUTSIDE DIAMETER
CONC CONCRETE	GL GLASS	PT PAINT
CMU CONCRETE MASONRY UNIT	GLZ GLAZING	PBL PANEL
CONN CONNECTION	GB GRAB BAR	PBO PARTICLEBOARD
CONT CONTINUE	G GROUND	PBO PROVIDED BY OWNER
CJ CONTROL JOINT	GYP BOARD GYPSUM BOARD	PVG PAVING
CUYD CUBIC YARD	HDBD HARDBOARD	PERF PERFORATED
DEMO DEMOLISH, DEMOLITION	HDWD HARDWOOD	PLAS PLASTER
DET DETAIL	HVAC HEATING, VENTILATING, AIR CONDITIONING	PLAM PLASTIC LAMINATE
DIAG DIAGONAL	HT HEIGHT	PLYWOOD PLYWOOD
DIA DIAMETER	HB HOSE BIB	PVC POLYVINYL CHLORIDE
DIM DIMENSION	HW HOT WATER	LB POUND
DW DISHWASHER	IN INCHES	PSF POUNDS PER SQUARE FOOT
DR DOOR	INCL INCLUDE(D)	PSI POUNDS PER SQUARE INCH
DN DOWN	ID INSIDE DIAMETER	PL PROPERTY LINE
DWG DRAWING		

BID LOT SCHEDULE

- BASE BID: COMPLETE PROJECT PER CONSTRUCTION DOCUMENTS, ALL ITEMS INDICATED IN PLAN THAT ARE NOT INCLUDED IN BID LOTS.
- 01 BID LOT #1: ADDITION OF THE OUTDOOR LEARNING SPACE ELEMENTS WHICH INCLUDE STEEL SHADE STRUCTURE, BENCHES AND ANY ELECTRICAL REQUIREMENTS ASSOCIATED.
- 02 BID LOT #2: EMERGENCY BACK-UP POWER GENERATOR. SEE ELECTRICAL SHEETS FOR DETAILS.

WORK BY OTHERS, GC TO COORDINATE WITH OWNER AND OWNER'S SUB-CONTRACTORS' WORK FROM CONSTRUCTION DOCUMENTS:

- SOLAR PV SYSTEMS
- ACCESS CONTROL, LT, AND SECURITY SYSTEMS
- ROOFING AND ROOF RECAP
- LVT, CARPET FLOORING, AND WALK-OFF MATS
- EXTERIOR STUCCO
- WINDOW TREATMENTS
- CLASSROOM EQUIPMENT AND FURNITURE INCLUDING FLATSCREENS AND PROJECTORS
- LANDSCAPING
- ELEVATOR UPGRADES
- WATER CATCHMENT SYSTEM (SEE CIVIL FOR REFERENCE)

GENERAL NOTES

- DO NOT SCALE DRAWINGS. NOTED DIMENSIONS TAKE PRECEDENCE OVER SCALE.
- CONTRACTORS SUBMITTING PROPOSALS FOR THIS WORK SHALL FIRST EXAMINE THE SITE AND BECOME FAMILIAR WITH ALL CONDITIONS THEREON. ALL PROPOSALS SHALL TAKE INTO CONSIDERATION ALL SUCH CONDITIONS AS MAY AFFECT THE WORK UNDER THIS CONTRACT.
- ALL GRADES, LINES AND BENCH MARKS FOR THE NEW CONSTRUCTION SHALL BE ESTABLISHED AND MAINTAINED BY THE CONTRACTOR, WHO SHALL BE RESPONSIBLE FOR THE SAME.
- THE CONTRACTOR SHALL PROTECT ALL STREETS AND SIDEWALKS AND MAINTAIN THEM DURING THE COURSE OF WORK AND MAKE ALL NECESSARY REPAIRS AT HIS OWN EXPENSE.
- THE ARCHITECT DOES NOT ASSUME RESPONSIBILITY FOR JOB SITE SAFETY FOR ANY PERSONS INCLUDING WORKMEN, VISITORS OR ANY ENTITY WHICH MAY ENTER ONTO THE SITE.
- CONTRACTOR'S CHOICE AS TO THE MEANS OF CONSTRUCTION, THE SEQUENCE OF CONSTRUCTION, AND SAFETY PRECAUTIONS INCIDENT THEREOF, ARE NOT PART OF THE ARCHITECT'S RESPONSIBILITY.
- THE CONTRACTOR SHALL VERIFY DRAWING DIMENSIONS AGAINST ACTUAL SITE CONDITIONS AND BOUNDARIES AND SHALL NOTIFY THE ARCHITECT OF ANY AREAS WHICH WOULD DIFFER FROM THE INTENT OF THE DRAWINGS, OR THAT SHOW DISCREPANCY BETWEEN SECTIONS OF THE DRAWINGS AND/OR ACTUAL SITE CONDITIONS PRIOR TO CONSTRUCTION. IN THE EVENT OF THE CONTRACTOR'S FAILURE TO GIVE SUCH NOTICE, HE WILL BE HELD RESPONSIBLE FOR THE RESULTS OF COST RECTIFYING THE SAME.
- DETAILS ARE INTENDED TO SHOW METHOD AND MANNER OF ACCOMPLISHING THE WORK. MINOR MODIFICATIONS MAY BE REQUIRED TO SUIT JOB REQUIREMENTS OR CONDITIONS AND SHALL BE INCLUDED AS PART OF WORK. WORK NOT EXPLICIT IN THE DRAWINGS BUT CLEARLY IMPLIED AS NECESSARY TO COMPLETE THE PROJECT SHALL BE INCLUDED AS FULLY DRAWN.
- NO GUARANTEE FOR QUALITY OF CONSTRUCTION IS IMPLIED OR INTENDED BY THESE DRAWINGS. CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY CONSTRUCTION DEFICIENCIES.
- AFTER JOB COMPLETION, SITE AND BUILDING SHALL BE SWEEP CLEAN, AND ALL SURFACES SHALL BE CLEANED. THE CONTRACTOR IS RESPONSIBLE FOR REMOVING ALL CONSTRUCTION DEBRIS.
- MOISTURE PROTECTION DURING CONSTRUCTION IS THE CONTRACTOR'S RESPONSIBILITY. SHOULD ANY SPECIAL SITUATIONS OR CLIMATIC CONDITIONS OCCUR DURING CONSTRUCTION, THE CONTRACTOR SHALL IMPLEMENT MEASURES REQUIRED TO ASSURE THE PROTECTION OF ALL MATERIALS AND ASSEMBLIES.
- ALL WELDS TO BE DONE BY CERTIFIED WELDERS.
- ALL CONCRETE SIDEWALKS AND OTHER FLATWORK TO BE 4" THICK, 3000 PSI CONC. OVER COMPACTED EARTH INCLUDE WWF THROUGHOUT, 6X6XW1.4XW1.4 WWF, UNO.
- THE DESIGNS, DETAILS AND MODES OF CONSTRUCTION CONTAINED IN THESE DOCUMENTS ARE CONFIDENTIAL. THE RECIPIENTS OF THESE DRAWINGS HEREBY ACKNOWLEDGE AND AGREE THAT THEY ARE THE SOLE PROPERTY OF THE ARCHITECT. RECIPIENTS SHALL NEITHER USE, REVEAL NOR REPRODUCE ANY OF THE DESIGNS, DETAILS OR MODES OF CONSTRUCTION CONTAINED IN THESE DRAWINGS, OUTSIDE OF THE CONTRACTUAL AGREEMENT, WITHOUT THE WRITTEN PERMISSION OF THE ARCHITECT.
- WHERE NECESSARY OR AS REQUESTED, THE CONTRACTOR SHALL PROVIDE SAMPLES, DATA AND PRODUCT LITERATURE AS REQUESTED TO ASSIST THE OWNER OR ARCHITECT IN MAKING SELECTIONS. SAMPLES AND/OR PRODUCT INFORMATION TO BE PROVIDED INCLUDE, BUT ARE NOT LIMITED TO HVAC EQUIPMENT, EPS, LIGHT FIXTURES, AND ACCESSORIES. FOR THE PURPOSE OF ESTIMATING ITEMS NOT FULLY DETAILED, THE CONTRACTOR SHALL PROVIDE AN ALLOWANCE AMOUNT AND SO CONDITION SUCH ESTIMATES.
- PROVIDE REQUIRED FIRE TREATED WOOD OR GALVANIZED STEEL BLOCKING AND BACKING FOR ALL WALL MOUNTED ITEMS WHERE REQUIRED.
- ACCESS PANELS ARE TO BE PLACED WHERE NECESSARY AT ALL LOCATIONS WHERE EQUIPMENT REQUIRES, WHETHER OR NOT INDICATED ON THE DRAWINGS. SEE MECH. DRAWINGS FOR LOCATIONS. S.S. FINISH IN PLUMBING WALLS. PAINTED FINISH IN CEILINGS.
- AT CEILING AREAS W/ EXPOSED STRUCTURE, CONTRACTOR SHALL LOCATE CONDUIT AND WIRES IN WALLS & SOFFITS WHERE POSSIBLE. AT LOCATIONS WHERE CONDUIT & DUCTWORK MUST BE EXPOSED, CONTRACTOR SHALL INSTALL IN A CLEAN & ORDERLY MANNER.
- EXTERIOR DOORS SHALL BE WEATHERSTRIPPED, CERTIFIED AND LABELED.
- FENESTRATION PRODUCTS SHALL BE LABELED WITH CERTIFIED U-VALUE, CERTIFIED SOLAR HEAT GAIN COEFFICIENT (SHGC), AND INFILTRATION CERTIFICATION.
- CAULK AND SEAL AROUND ALL WINDOW AND DOOR FRAMES, AS WELL AS ALL PLUMBING AND ELECTRICAL PENETRATIONS INTO THE BUILDING ENVELOPE, BETWEEN WALL BASE AND FLOORS, AND ALL OTHER OPENINGS IN THE BUILDING ENVELOPE.
- ALL CASEWORK SHOULD BE LAMINATED IN THE SHOP, NOT IN THE FIELD.
- INCLUDE BACKING ON ALL UPPER CASEWORK.
- INCLUDE BLOCKING IN WALL FOR WALL MOUNTED TVS AND MONITORS.

FIRE PROTECTION REQUIREMENTS PER TABLE 903.2.2 GROUP E

- THIS BUILDING WILL BE PROVIDED WITH AN AUTOMATIC SPRINKLER SYSTEM THROUGHOUT. SPRINKLER SYSTEM PLANS SHALL BE SUBMITTED FOR SEPARATE PERMIT. SYSTEM SHALL BE MONITORED.
- SHOP DRAWINGS WILL BE SUBMITTED TO THE FIRE MARSHALL'S OFFICE FOR REVIEW AND APPROVAL OF ANY INSTALLATION OR MODIFICATION TO THE FIRE SPRINKLER SYSTEM, FIRE ALARM SYSTEM, OR ANY OTHER FIRE RELATED SYSTEM.
  - THE FIRE SPRINKLER SYSTEM WILL BE SUPERVISED WHEN REQUIRED BY THE 2009 FIRE CODE.
  - FIRE ALARM WIRING TO BE PLACED IN CONDUIT THROUGHOUT. SEE ELECTRICAL FOR MORE INFORMATION.

FIRE EXTINGUISHERS: FOR LIGHT (LOW) HAZARD AT LEAST ONE 4A60BC 10 LB EXTINGUISHER FOR EACH 3,000 SF. THE MAXIMUM TRAVEL DISTANCE TO AN EXTINGUISHER IS 75 FEET.  
 26,373 / 3,000 = 8.79 - 9 EXTINGUISHERS **10 PROVIDED**

ELEVATOR SHAFT RATING: EXISTING 8" CONCRETE MEETS RATING REQUIREMENT PER TABLE 721.2.1.2(1)

BUILDING CODE COMPLIANCE

COMPLIES WITH 2015 INTERNATIONAL BUILDING CODE  
 2009 N.M. COMMERCIAL BUILDING CODE  
 2018 IECC ENERGY CODE

OCCUPANCY GROUP: B - PER IBC SECTION 304.1 (EDUCATIONAL OCCUPANCY FOR STUDENTS ABOVE THE 12TH GRADE)

TYPE OF CONSTRUCTION: II-B

ALLOWABLE HEIGHT: 2 STORIES, 55' OVERALL

ALLOWABLE AREA: 14,500 PER STORY

PROJECT BUILDING HEIGHT: 2 STORIES, 24' AFF

PROJECT BUILDING AREA: **26,373 SF - GROSS BUILDING**  
 13,970 SF - FIRST FLOOR  
 12,403 SF - SECOND FLOOR

PER TABLE 1004.1.2

AREA	CLASSIFICATION	S.F.	OCC. LOAD FACTOR	NO. OCCUPANTS
BUSINESS	B	10,757	100 GROSS	107.57
LECTURE HALL (FIXED SEATING)	A-3	1,461	143 SEATS	143
STUDENT LOUNGE (CHAIRS & TABLES)	B	808	15 NET	53.86
CONFERENCE ROOM	B	508	15 NET	33.86
ACCESSORY STORAGE/ MECH.	B	1,565	300 GROSS	5.21

TOTAL OCCUPANCY LOAD 343.5 - 344

EXIT REQUIREMENTS PER TABLE 1005.1

EXIT WIDTH REQUIRED = 344 x 0.2 = 68.8'  
 EXIT WIDTH PROVIDED = 216'  
 EXIT STAIRWAY WIDTH REQUIRED = 344 x 0.3 = 103.2'  
 EXIT STAIRWAY WIDTH PROVIDED = 171'

PLUMBING FIXTURE CALCULATIONS PER TABLE 2902.1

WATER CLOSETS

AREA	CLASSIFICATION	OCC. PER WC		NO. OCCUPANTS		QUANTITY OF WC REQUIRED	
		MALE	FEMALE	MALE	FEMALE	MALE	FEMALE
LECTURE	A-3	1 PER 125	1 PER 45	71.5	71.5	0.57	1.59
BUSINESS	B	1 PER 25 FOR THE FIRST 50 AND 1 PER 50 AFTER		201		6	

TOTAL WC REQUIRED 8.16 - 9  
 TOTAL WC PROVIDED 18 (4 URINALS)

LAVATORIES

AREA	CLASSIFICATION	OCC. PER LAVATORY	NO. OCCUPANTS	QUANTITY OF LAV. REQUIRED
LECTURE	A-3	1 PER 200	143	0.72
BUSINESS	B	1 PER 40 FOR THE FIRST 80 AND 1 PER 80 AFTER	201	4

TOTAL LAVATORIES REQUIRED 4.72 - 5  
 TOTAL LAVATORIES PROVIDED 14

DRINKING FOUNTAINS

AREA	CLASSIFICATION	OCC. PER FOUNTAIN	NO. OCCUPANTS	QTY OF FOUNTAINS REQUIRED
LECTURE	A-3	500	143	0.29
BUSINESS	B	100	201	2.01

TOTAL DRINKING FOUNTAINS REQUIRED 2.3 - 3  
 TOTAL DRINKING FOUNTAINS PROVIDED 4



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SININGER HALL  
 RENOVATION



B_AD PROJECT #	2104
FILE:	SININGER_CF.RVT
DATE:	7/15/2022
DRAWN BY:	CM / RP
CHECKED BY:	TS

GENERAL INFORMATION

**G-002**  
 SHEET \_OF\_





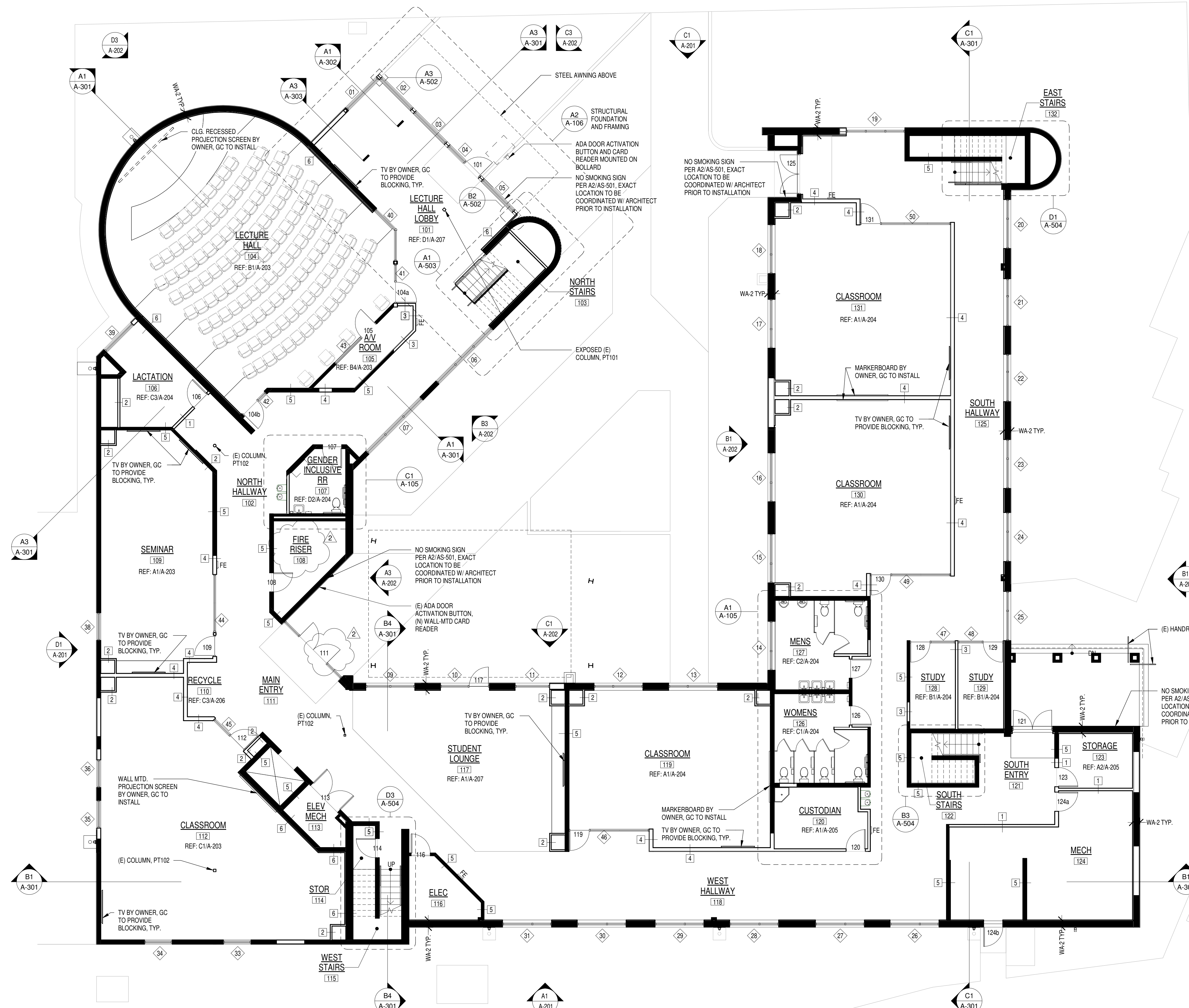












**GENERAL NOTES:**

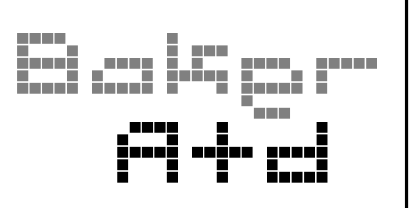
1. PROVIDE BLOCKING IN WALL FOR WALL MOUNTED TVS AND MONITORS. STUCCO BY OTHERS. GC TO REPAIR ANY DAMAGE IN EXTERIOR WALLS, INFILL, PREP ANY NEW WALLS, AND OTHERWISE COMPLETE WORK REQUIRED FOR STUCCO AND STUCCO RESURFACING. GC TO COORDINATE WITH OWNER AND STUCCO CONTRACTOR FOR COMPLETE REQUIREMENTS AND TIMING OF STUCCO WORK.
2. INSTALL CONTINUOUS INSULATION IN FURROUTS ACCORDING TO WA-2 WHERE NOTED ON FLOOR PLANS.

3. NON-FIXED FURNITURE NOT IN GC SCOPE, REMOVED PER ADDENDUM 3

**A1 FIRST FLOOR PLAN**  
SCALE: 1/8" = 1'-0"

**WALL LEGEND**

	1 HOUR RATED WALL
	NEW WALL
	(E) WALL
	SEMI-RECESSED FIRE EXTINGUISHER



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CONSULTANTS

**SINGER HALL  
RENOVATION**



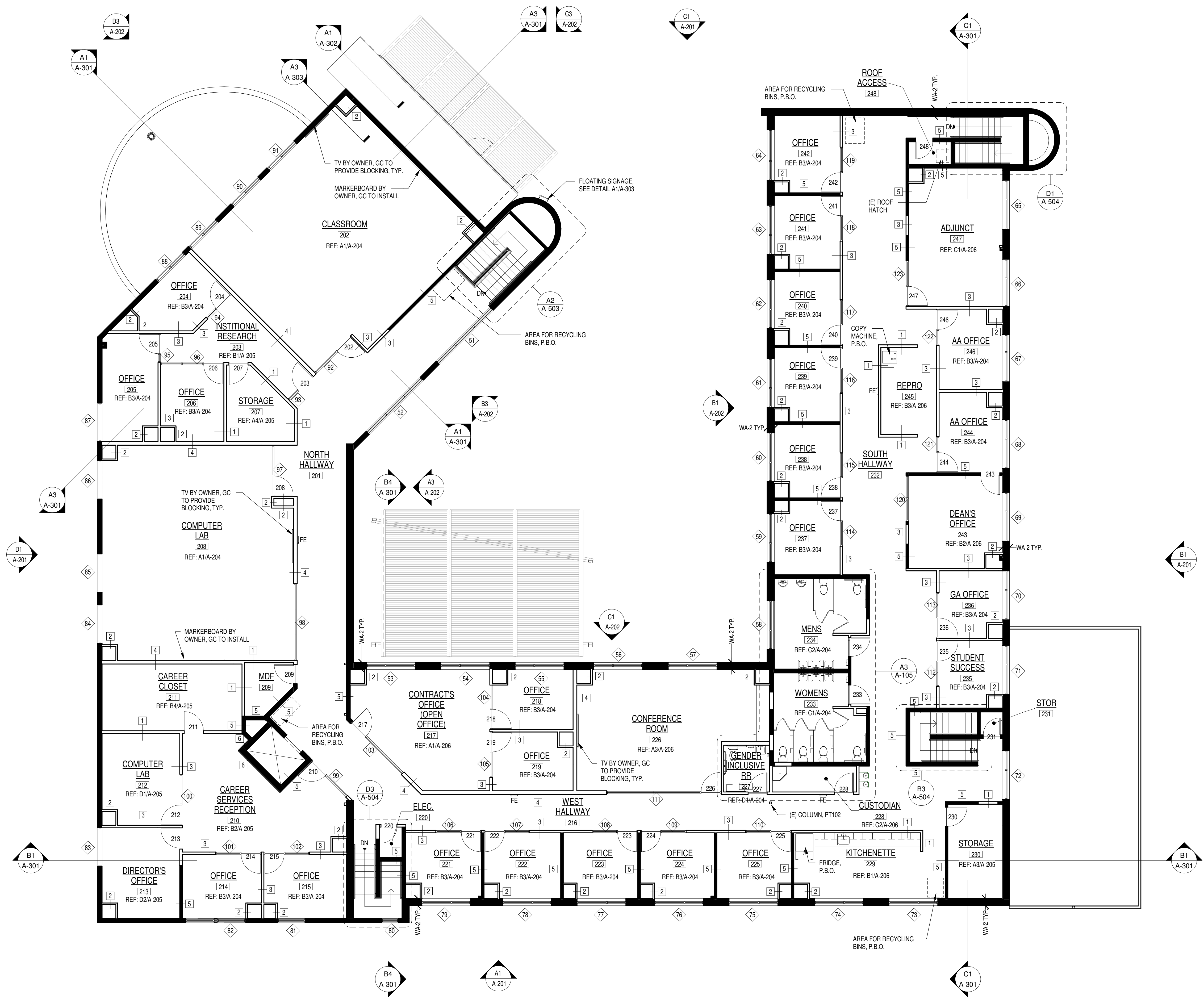
MARK	DATE	DESCRIPTION
3	08/30/22	Addenda 3
2	08/24/22	Addenda 2

B\_AD PROJECT # 2104  
FILE: SINGER CF.RVT  
DATE: 7/15/2022  
DRAWN BY: CM / RP  
CHECKED BY: TS

**FIRST FLOOR PLAN**

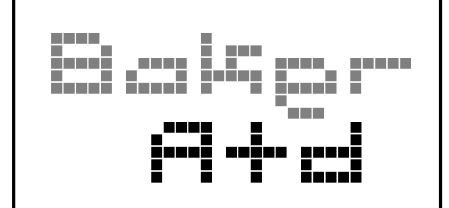
**A-101**  
SHEET \_ OF \_





**GENERAL NOTES:**

1. PROVIDE BLOCKING IN WALL FOR WALL MOUNTED TVS AND MONITORS. STUCCO BY OTHERS, GC TO REPAIR ANY DAMAGE IN EXTERIOR WALLS, INFILL, PREP ANY NEW WALLS, AND OTHERWISE COMPLETE WORK REQUIRED FOR STUCCO AND STUCCO RESURFACING. GC TO COORDINATE WITH OWNER AND STUCCO CONTRACTOR FOR COMPLETE REQUIREMENTS AND TIMING OF STUCCO WORK.
2. INSTALL CONTINUOUS INSULATION IN FURROUTS ACCORDING TO WA-2 WHERE NOTED ON FLOOR PLANS.
3. NON-FIXED FURNITURE NOT IN GC SCOPE. REMOVED PER ADDENDUM 3



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**SINGER HALL  
RENOVATION**



MARK	DATE	DESCRIPTION
3	08/30/22	Addenda 3

B_AD PROJECT #	2104
FILE:	SINGER CF.RVT
DATE:	7/15/2022
DRAWN BY:	CM / RP
CHECKED BY:	TS

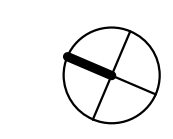
**SECOND FLOOR  
PLAN**

**A-102**  
SHEET \_ OF \_

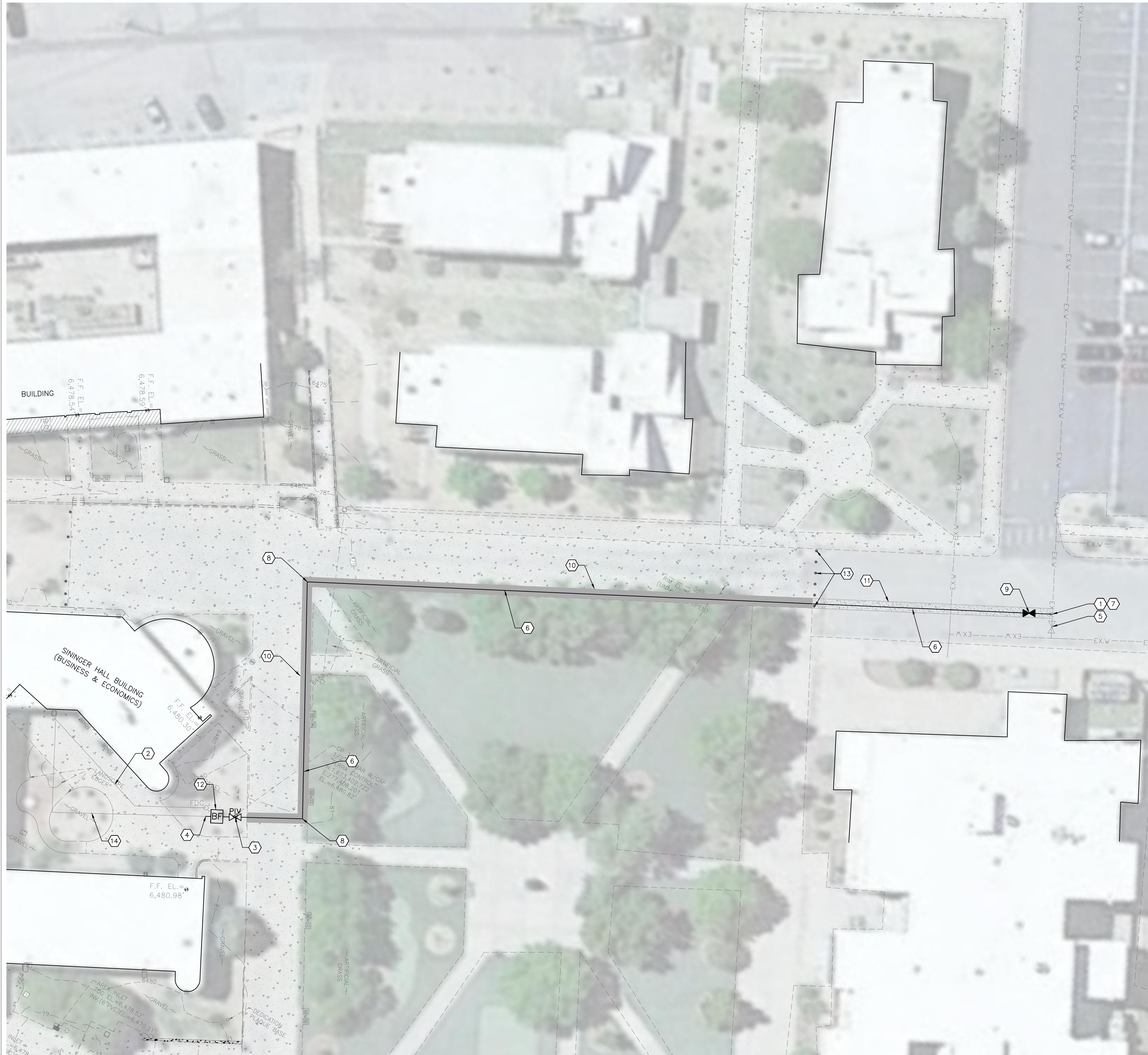
**A1 SECOND FLOOR PLAN**  
SCALE: 1/8" = 1'-0"

**WALL LEGEND**

- 1 HOUR RATED WALL
- NEW WALL
- (E) WALL
- SEMI-RECESSED FIRE EXTINGUISHER





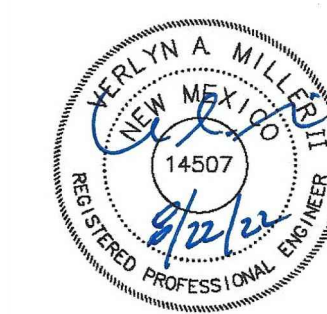
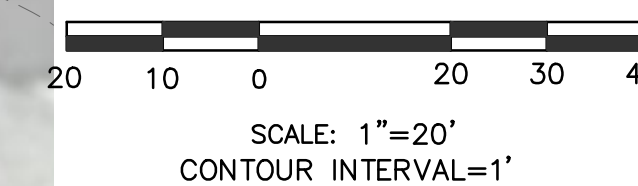
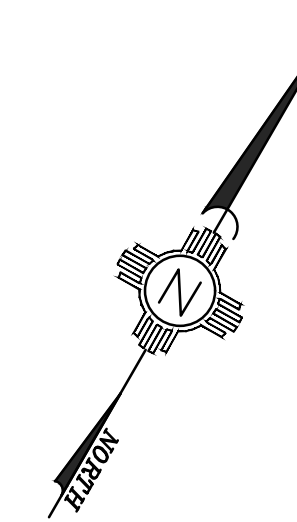


**LEGEND:**

- W — PROPOSED WATER SERVICE LINE
- SAS — PROPOSED SANITARY SEWER LINE
- - - W - - - EXISTING WATER SERVICE LINE
- - - SAS - - - EXISTING SANITARY SEWER LINE
- PROPOSED CLEANOUT
- Ⓜ PROPOSED WATER METER
- ⦿ PROPOSED FIRE HYDRANT
- PROPOSED MANHOLE
- ⊗ PROPOSED GATE VALVE
- ⊗ PROPOSED POST INDICATOR VALVE
- ⦿ PROPOSED FIRE HYDRANT
- ⊕ PROPOSED FIRE DEPARTMENT CONNECTION
- Ⓜ PROPOSED REDUCED PRESSURE BACKFLOW PREVENTER

**WATER KEYED NOTES:**

1. CONNECT NEW 6" FIRE LINE TO EXISTING 6" WATER LINE MAIN. CONTRACTOR TO FIELD VERIFY LOCATION PRIOR TO CONSTRUCTION.
2. REMOVE FIRE DEPARTMENT CONNECTION (FDC). SEE SHEET FP-101.
3. NEW 6" POST INDICATOR VALVE (PIV) SEE SHEETS C-501. CONTRACTOR SHALL VERIFY LOCATION WITH NEW MEXICO HIGHLANDS UNIVERSITY AND THE PROJECT ENGINEER PRIOR TO CONSTRUCTION. SEE ELECTRICAL/FIRE ALARM SYSTEM FOR SUPERVISORY SWITCH FOR TAMPER.
4. CONNECT NEW 6" FIRE LINE TO NEW BUILDING. IN ACCORDANCE WITH A.P.W.A STANDARD DRAWINGS AND SPECIFICATIONS. SEE MECHANICAL PLANS FOR LOCATION AND ELEVATION.
5. EXISTING ISOLATION VALVES.
6. NEW 6" FIRE LINE.
7. 6" NEW 6" X 6" X 6" FIRE LINE TEE. CONTRACTOR SHALL USE RESTRAINING JOINTS IN ACCORDANCE WITH A.P.W.A STANDARD DRAWINGS AND SPECIFICATIONS
8. NEW 6" X 6" X 90° WATER LINE BEND. CONTRACTOR SHALL USE RESTRAINING JOINTS IN ACCORDANCE WITH A.P.W.A STANDARD DRAWINGS AND SPECIFICATIONS.
9. NEW 6" GATE VALVE. CONTRACTOR SHALL VERIFY LOCATION WITH NEW MEXICO HIGHLANDS UNIVERSITY AND THE PROJECT ENGINEER PRIOR TO CONSTRUCTION.
10. SAWCUT EXISTING CURB AND GUTTER, AND CONCRETE TO CLEAN STRAIGHT EDGE. REMOVE DISPOSE AND REPLACE EXISTING CONCRETE AS NECESSARY TO INSTALL NEW FIRE LINE. MATCH EXISTING SECTION OF CONCRETE, BASE COURSE AND SUBGRADE PREP. (4' MAX. WIDTH) IN ACCORDANCE WITH A.P.W.A STANDARD DRAWINGS AND SPECIFICATIONS.
11. SAWCUT EXISTING ASPHALT, TO CLEAN STRAIGHT EDGE. REMOVE DISPOSE AND REPLACE EXISTING ASPHALT AS NECESSARY TO INSTALL NEW FIRE LINE. MATCH EXISTING ASPHALT SECTION, BASE COURSE AND SUBGRADE PREP. (4' MAX. WIDTH) IN ACCORDANCE WITH A.P.W.A STANDARD DRAWINGS AND SPECIFICATIONS.
12. NEW BACK FLOW PREVENTER/PRESSURE RELEASE VALVE, SEE DETAIL SHEET C-504.
13. EXISTING BOLLARDS TO REMAIN.
14. 6" FIRE LINE. SEE SHEET FP-101 FOR CONTINUATION.



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**SINGER HALL  
 RENOVATION  
 SITE UTILITY  
 PLAN**



B\_AD PROJECT # 2104  
 FILE: SITE UTILITY PLAN  
 DATE: 8/04/2022  
 DRAWN BY: RFH  
 CHECKED BY: VAM

SITE UTILITY PLAN

**C-102**  
 SHEET OF

T:\Clients\NM\Highlands\Singinger Hall\Gisem\ACAD\SHEETS\SITE UTILITY\PLAN.dwg GRADING PLAN 8/23/2022 11:02:27 AM  
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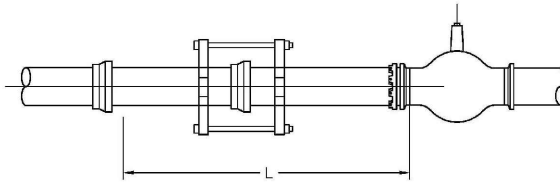
**REDUCER**

RESTRAIN EITHER L <sub>s</sub> OR L <sub>l</sub> LENGTH	(L <sub>s</sub> ) L SMALL		(L <sub>l</sub> ) L LARGE	
	UNOBSTRUCTED STRAIGHT RUN LENGTH, FEET	RESTRAINED	LARGE SIDE RESTRAINED LENGTH, FEET	RESTRAINED
6" x 4"	42	28		
6" x 4"	39	30		
8" x 6"	39	30		
10" x 6"	87	53		
10" x 8"	36	29		
12" x 8"	81	54		
12" x 10"	36	30		
14" x 10"	78	55		

**GATE VALVES**

LINE SIZE	RESTRAINED LENGTH L, BOTH SIDES OF VALVE, FEET
4"	39
6"	55
8"	72
10"	88
12"	102
14"	116

THESE LENGTHS MAY BE USED WHERE ENOUGH ROW PIPE EXITS TO INSTALL THE RESTRAINT JOINTS ALONG A STRAIGHT PIPE RUN.



**THRUST RESTRAINT GENERAL NOTE**

- RESTRAINED PIPE LENGTHS FOR PVC USING 65MA IRON THRUST RESTRAINTING SYSTEM.
- LENGTHS MAY OVERLAP TO DETERMINE GREATEST RESTRAINT LENGTH IN ANY ONE DIRECTION.
- CONTRACTOR SHALL MINIMIZE NUMBERS OF RESTRAINTED JOINTS REQUIRED BY USING 20' LONG SECTIONS OF PIPE WITHIN RESTRAINTED LENGTH WHERE POSSIBLE. DIVIDE LENGTH BY 20 AND TRUNCATE DECIMAL PORTION OF NUMBER TO DETERMINE THE NUMBER OF REQUIRED RESTRAINTED JOINTS.
- SPECIAL CONSIDERATION MAY BE NEEDED TO MEET CERTAIN FIELD CONDITIONS.
- RESTRAINT LENGTHS MAY EXTEND INTO EXISTING WATER MAINS, REQUIRING RESTRAINTED FITTINGS TO BE PLACED AT EXISTING WATERLINE JOINTS FOR THE LENGTH SPECIFIED IN THE TABLES ON THIS SHEET.
- CONCRETE BLOCKING, PER CSA STANDARDS DRAWING 2202, SHALL BE USED IN LIEU OF RESTRAINTED JOINTS AT ALL CAPS. DESIGN ASSUMPTIONS:  
SAFETY FACTOR: 1.5  
PRESSURE: 150 PSI  
SOIL TYPE: GM & SM - SILTY GRAVELS AND SILTY SANDS  
PIPE: PVC  
BENCH TYPE: 3 (PIPE BEDDED IN 4 INCHES MINIMUM LOOSE SOIL, BACKFILL LIGHTLY CONSOLIDATED TO TOP OF THE PIPE)

**TEES**

LINE SIZE	BRANCH SIZE 6"		BRANCH SIZE 8"		BRANCH SIZE 10"		BRANCH SIZE 12"	
	L <sub>s</sub> =5'	L <sub>l</sub> =10'	L <sub>s</sub> =15'	L <sub>l</sub> =20'	L <sub>s</sub> =15'	L <sub>l</sub> =20'	L <sub>s</sub> =15'	L <sub>l</sub> =20'
6"	36	18	FJO	FJO	58	44	30	16
8"	30	6	FJO	FJO	53	35	16	FJO
10"	24	FJO	FJO	FJO	48	24	1	FJO
12"	17	FJO	FJO	FJO	43	14	FJO	FJO
14"	FJO	FJO	FJO	FJO	21	FJO	FJO	FJO

FJO: RESTRAINT REQUIRED AT FITTING JOINT ONLY

**HORIZONTAL BENDS**

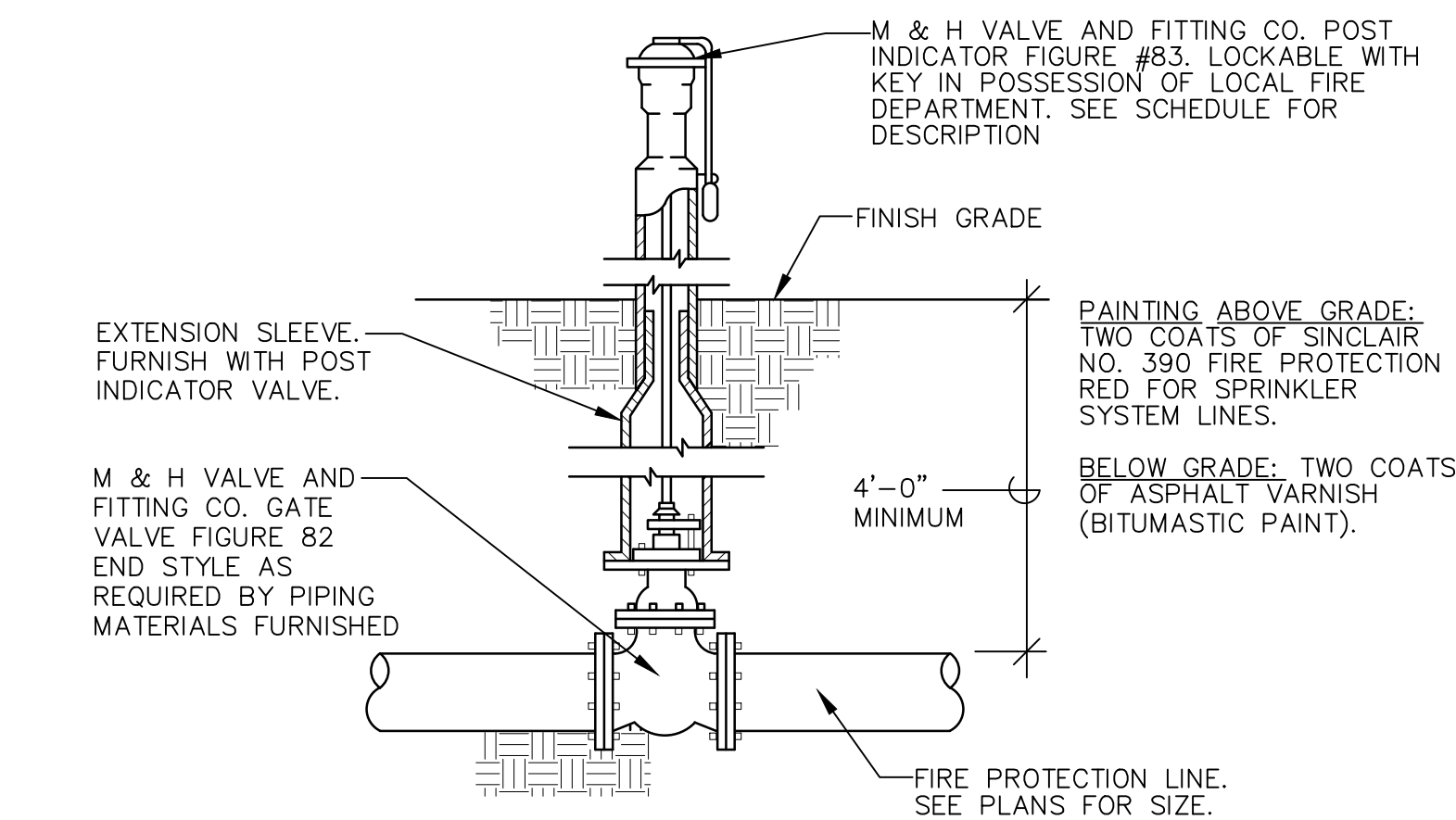
LINE SIZE	BEND ANGLE			
	11°	22°	42°	90°
6"	2	5	10	25
8"	3	6	13	32
10"	4	8	16	38
12"	4	9	19	45
14"	5	10	21	51

**VERTICAL OFFSETS**

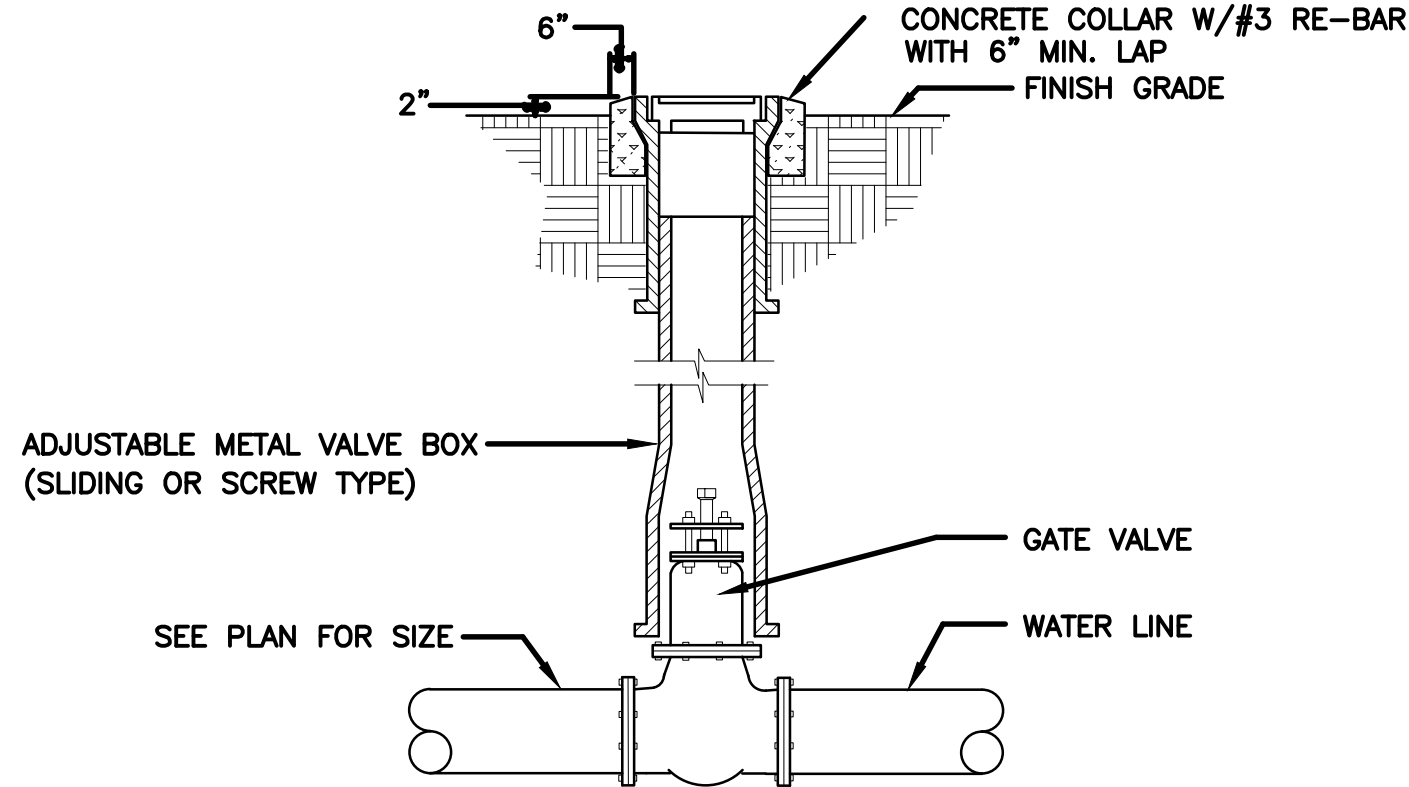
ADDITIONAL DESIGN PARAMETERS  
SHALLOW END DEPTH = 3.0'  
DEEP END DEPTH = 6.0'

LINE SIZE	22° BEND				45° BEND			
	DEEP END L <sub>s</sub> , FEET	SHALLOW END L <sub>s</sub> , FEET	DEEP END L <sub>l</sub> , FEET	SHALLOW END L <sub>l</sub> , FEET	DEEP END L <sub>s</sub> , FEET	SHALLOW END L <sub>s</sub> , FEET	DEEP END L <sub>l</sub> , FEET	SHALLOW END L <sub>l</sub> , FEET
6"	3	11	5	23				
8"	3	14	7	30				
10"	4	17	8	36				
12"	5	20	10	42				
14"	5	23	11	48				

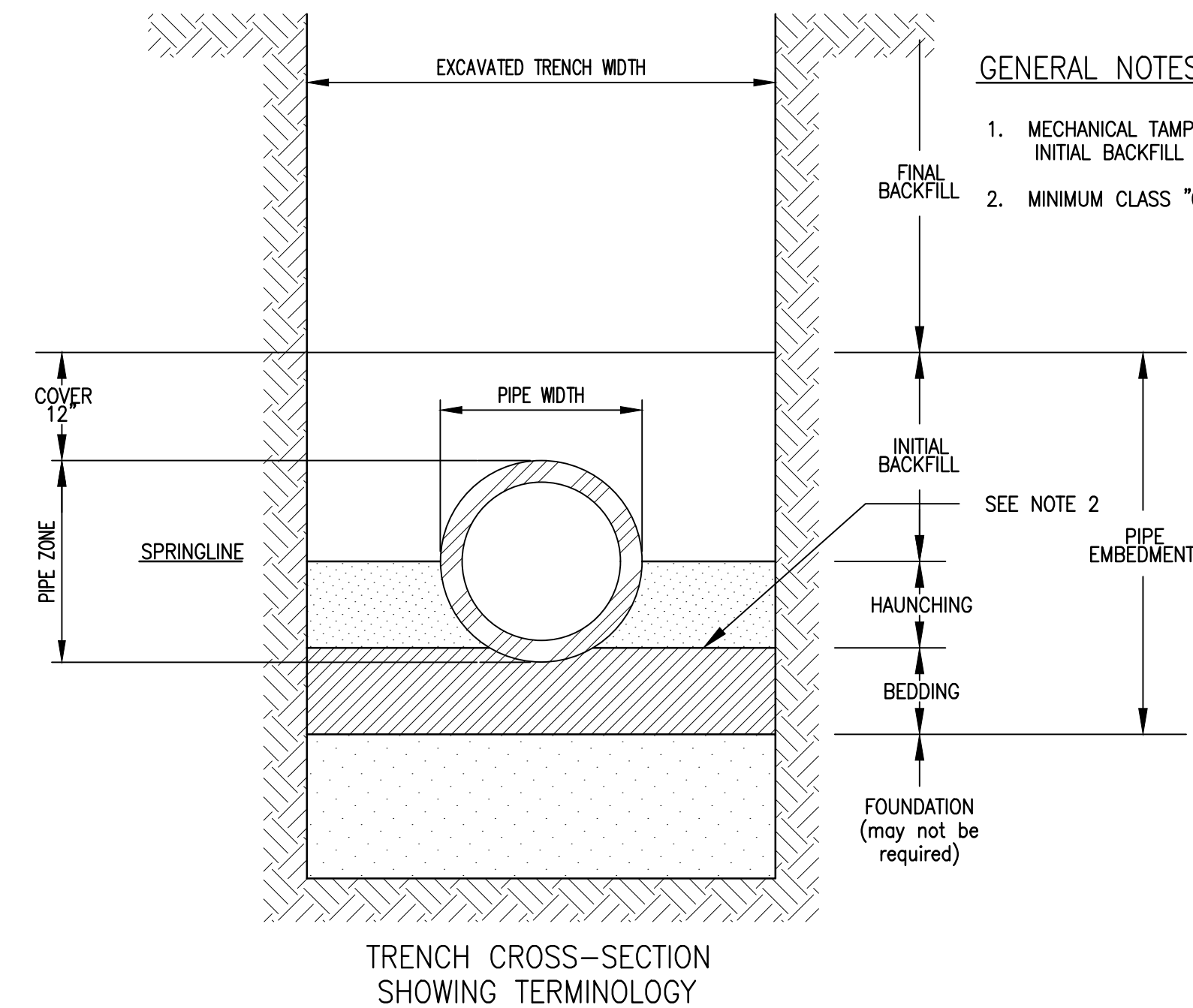
**A1 PIPE RESTRAINT LENGTHS**  
NOT TO SCALE



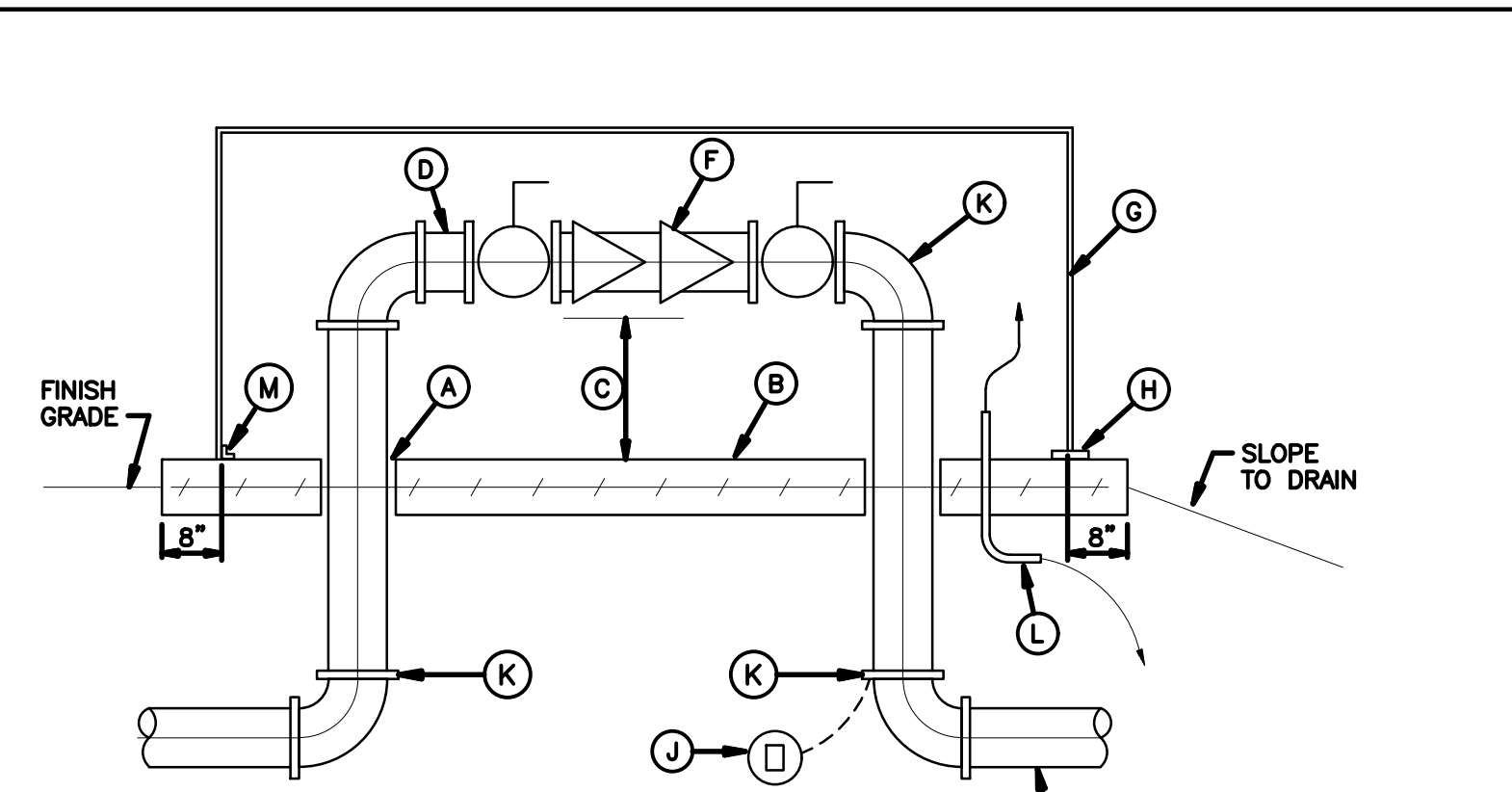
**C3 POST INDICATOR VALVE DETAIL**  
SCALE: NOT TO SCALE



**VALVE BOX DETAIL**  
SCALE: NONE



**D5 TRENCHING DETAILS**  
SCALE: NOT TO SCALE



- NOTE:**
- 1/2" CLOSED CELL INSULATION SLEEVE.
  - 4" 3000 PSI CONCRETE SLAB WITH #4 BARS @ 12" O.C. 50"X24" PAD SIZE.
  - 18" MINIMUM CLEAR.
  - PIPE SPOOL.
  - STEEL OR CONCRETE PIPE STANDS.
  - REDUCED PRESSURE PRINCIPLE BACKFLOW PREVENTION ASSEMBLY BFP-1, SEE SCHEDULE
  - THERMAL INSULATED - ELECTRIC HEATED ENCLOSURE, HE-1, SEE SCHEDULE, INSTALL PLUMB. LEVEL & SQUARE.
  - DRAIN, DRAIN TO DAYLIGHT.
  - BUILDING FIRE PROTECTION LINE.
  - CATHODIC PROTECTION ANODE BAG AT METALLIC BURIED FITTINGS.
  - RESTRAINED JOINTS TYPICAL BELOW GRADE (FLANGED ABOVE GRADE).
  - ELECTRICAL POWER - SEE ELECTRICAL PLANS.
  - STAINLESS STEEL MOUNTING HARDWARE.

**REDUCED PRESSURE BACKFLOW PREVENTER ASSEMBLY (BFP-1)**  
SCALE: NONE

**FIRE PROTECTION EQUIPMENT SCHEDULE**

BFP-1	BACKFLOW PREVENTOR: FEBCO MODEL 860U REDUCED PRESSURE BACKFLOW PREVENTION DEVICE WITH UNION END BALL VALVES, CHECK VALVE ASSEMBLY WITH STAINLESS STEEL SPRINGS, BRONZE BODY, WORKING PRESSURE OF 175 PSI AND WATER TEMPERATURES OF 32 F TO 140 F, USC AND IAPMO APPROVED, FURNISH WITH AG-1 AIR GAP DRAIN AND PIPE FULL SIZE TO OUTSIDE, SIZE AS SHOWN ON DRAWING.
HE-1	HEATED ENCLOSURE: FLIP TOP FIBERGLASS UNIT WITH HEAT. MINIMUM 1/8" THICK THIXOTROPIC POLYESTER RESIN REINFORCED WITH FIBERGLASS, SMOOTH MOLDED EXTERIOR, UV PROTECTED FINISH, 1 1/4" INSULATION(R-8), LOCKABLE FLIP TOP, ONE WAY DRAIN OPENINGS, 90 WATT HEATER, UNIT SHALL BE ASSE 1060 CERTIFIED, SELECTION BASED ON HOT BOX MODEL HB2 OR APPROVED EQUAL.



B_AD PROJECT #	2104
FILE:	SITE UTILITY PLAN
DATE:	8/22/2022
DRAWN BY:	RFH
CHECKED BY:	VAM



# TESTUDO ENGINEERING ADDENDUM

**Date:** August 30, 2022  
**To:** Tomas Sanchez; Baker Architecture  
**From:** Wayne Yevoli; Testudo Engineering  
**RE:** NMHU Sininger Hall – Addendum  
**Project #:** 21092

---

Please include the following items in your next addendum for the above referenced project:

## Specifications

- Added Division 21 Fire Protection Specifications
  - 210000 Fire Suppression Index
  - 210500 General Fire Suppression Requirements
  - 210513 Common Motor Requirements for Fire Suppression
  - 211300 Automatic Sprinkler Systems
  - 213100 Fire Protection System Centrifugal Pumps
- Added specification section 260513 Medium Voltage MV Cable.
- Added specification section 261200 Medium Voltage Transformers

## Drawings

Added Sheet FP-101

Added Sheet FP-102

Added Sheet FP-501

Sheet P-101 – replace sheet in entirety

Sheet P-102 – replace sheet in entirety

Sheet P-401 – omitted a water heater on first and second floor.

Sheet P-501 – Added details and modified water entrance detail.

Sheet P-601 – Added sink and backflow preventor.

Sheet M-101 – Added HVAC piping for Lecture Hall fan coil units and added fan coils for Study Rooms 128 & 129.

Sheet M-102 – Added HVAC piping for Lecture Hall fan coil units.

Sheet M-201 – replace sheet in entirety.

Sheet M-202 – replace sheet in entirety.

Sheet M-401 – replace sheet in entirety.

Sheet M-501 – Added detail.

Sheet M-502 – Added detail.

Sheet M-601 – replace sheet in entirety.

Sheet E-001 – replace sheet in entirety.

Sheet ED-101 – replace sheet in entirety.

Sheet ED-102 – replace sheet in entirety.

Sheet ED-201 – replace sheet in entirety.

Sheet ED-202 – replace sheet in entirety.

Sheet E-101 – replace sheet in entirety.  
 Sheet E-102 – replace sheet in entirety.  
 Sheet E-201 – replace sheet in entirety.  
 Sheet E-202 – replace sheet in entirety.  
 Sheet E-301 – replace sheet in entirety.  
 Sheet E-302 – replace sheet in entirety.  
 Sheet E-401 – replace sheet in entirety.  
 Sheet E-402 – replace sheet in entirety.  
 Sheet E-601 – replace sheet in entirety.  
 Sheet E-602 – replace sheet in entirety.

#### Prior Approvals

Each equipment item for which the Contractor desires to install equipment other than the specific item identified in the equipment schedule or equivalent equipment by manufacturers specifically named in the schedule, the Contractor shall bear full responsibility to prove to the Engineer that the furnished equipment is equivalent to or better than the specified item. Failure to provide such proof will result in rejection of the shop drawing submittal by the Engineer. Prior written or verbal approval by the Engineer of equipment by other manufacturers will not relieve the Contractor of responsibility to provide equivalence. Any prior approval given is intended only to provide preliminary agreement that the alternate manufacturer may make equipment that complies with the specification requirements and not that all equipment manufactured by him is acceptable.

<u>Equipment</u>	<u>Approved Manufacturer</u>
Fixture Package	RKL Sales – Approved as noted
<ul style="list-style-type: none"> <li>• Final aesthetic acceptance by architect – all types.</li> <li>• Exceptions taken as listed:               <ul style="list-style-type: none"> <li>○ Type A &amp; AE – Finish shall be black</li> <li>○ Type B &amp; BE – Fixture exceeds design wattage allowance. Finish trim shall be black.</li> <li>○ Type D &amp; DE – Fixture does not satisfy specified lumen performance. Manufacturer is acceptable if provided with characteristics similar to those specified.</li> <li>○ Type F – Revise to match design wattage allowance. Acceptable without occupancy sensor; fixture is intended to be manually controlled by timer switch.</li> <li>○ Type R5 – Acceptable with white flange as specified.</li> <li>○ Type S6 – Acceptable with 4K temperature.</li> </ul> </li> </ul>	
Lighting Controls	RKL Sales – Approved as noted
<ul style="list-style-type: none"> <li>• Lighting Controls – Acceptable; final quantities, accessories, and commissioning must be included in vendor’s package and/or included by contractor. No change orders will be considered for miscellaneous components reasonably inferred or illustrated directly or indirectly by the contract documents.</li> </ul>	
Fixture Package	Schroeder Sales – Approved as noted
<ul style="list-style-type: none"> <li>• Final aesthetic acceptance by architect – all types.</li> <li>• Exceptions taken as listed:               <ul style="list-style-type: none"> <li>○ Type A, AE, B, BE &amp; S – Rejected; finish must be factory applied field painting not acceptable.</li> <li>○ Type B &amp; BE – Fixture exceeds design wattage allowance.</li> <li>○ Type F – Acceptable with light engine 2B25.</li> <li>○ Type W &amp; WEM – Acceptable with Type II distribution.</li> </ul> </li> </ul>	



Lighting Controls                      Schroeder Sales – Approved as noted

- Douglas Lighting Controls – Acceptable; final quantities, accessories, and commissioning must be included in vendor's package and/or included by contractor. No change orders will be considered for miscellaneous components reasonably inferred or illustrated directly or indirectly by the contract documents.

End of Addendum

**SECTION 21 0000****FIRE SUPPRESSION INDEX****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. The general provisions of the Contract, including General Special Conditions and the General Requirements, apply to the work specified in this section.

**1.2 DESCRIPTION OF WORK**

- A. Furnish all service tools, equipment, etc., which are required for the complete installation of all Fire Suppression Work, as indicated on the Drawings and specified herein. Fire Suppression work indicated on the Drawings and/or specifications covering other trades shall conform to Division 21 of these Specifications.
- B. Work or equipment not indicated or specified, which is necessary for the complete and proper operation of the Fire Suppression systems, shall be accomplished without additional cost to the Owner.
- C. Furnish all labor and materials required for fire suppression service and control connections to all the various items of equipment requiring fire suppression service throughout the project shown on the Contract Drawings (even if not shown on the Fire Suppression Drawings). Coordinate with other trades for the installation of required connections and service.

**1.3 FIRE SUPPRESSION DIVISION INDEX**

210500	GENERAL FIRE SUPPRESSION REQUIREMENTS
210513	COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT
211300	AUTOMATIC SPRINKLER SYSTEMS
213100	FIRE PROTECTION SYSTEM CENTRIFUGAL PUMPS

**PART 2 – PRODUCTS****PART 3 – EXECUTION****END OF SECTION**

**SECTION 210500****GENERAL FIRE SUPPRESSION REQUIREMENTS****PART 1- GENERAL****1.1 SUMMARY**

- A. Section Includes: General Mechanical Requirements specifically applicable to Division 21 sections in addition to Division 1- General Requirements.
- B. Scope:
  - 1. The work covered by this division consists of performing all operations in connection with the installation of fire protection system including site utility work as indicated under this section. This entire section applies to all fire protection systems and any and all interface with mechanical and electrical systems work and all mechanical, electrical, and civil sections of these specifications. This Contractor shall read and comply with all sections of these specifications including all General and Special Conditions.

**1.2 REFERENCES**

- A. Standard Requirements:
  - 1. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. All work shall be executed in accordance with the local and state codes, ordinances, and regulations governing the particular class of work involved. This Contractor shall be responsible for the final execution of the work under this heading to suit these requirements. In the event of a conflict between the various codes and standards, the more stringent shall govern. Where these specifications and accompanying drawings conflict with these requirements, the Contractor shall report the matter to the Architect/Engineer. The Architect/Engineer shall prepare any supplementary drawings required, illustrating how the work may be installed so as to comply. On approval of the change by the Architect/Engineer, the Contractor shall install the work in a satisfactory manner without additional cost to the Owner. On completion of the various parts of the work, the installation shall be tested by the constituted authorities and approved, and on completion of the work, this Contractor shall obtain and deliver to the Owner final certificates of acceptance. This Contractor shall furnish copies of each certificate to the Architect/Engineer.
- C. The Contractor shall secure all permits and licenses for his work and shall pay all fees in connection with such permits and licenses.
- D. The contractor shall hold and save the Owner free and harmless from liability of any nature or kind arising from his failure to comply with codes and ordinances.
- E. Any and all meter deposits and all utility extension costs shall be paid by the Contractor whose work is done in connection with the service that the meter is connected to.

- F. Schedule of Referenced Organizations: The following is a list of the acronyms of organizations referenced in these Specifications:
1. AABC Associated Air Balance Council
  2. ADC Air Diffusion Council  
435 North Michigan Ave.  
Chicago, IL 60611
  3. AGA American Gas Association  
1515 Wilson Boulevard  
Arlington, VA 22209
  4. AMCA Air Movement and Control Association  
30 West University Drive  
Arlington Heights, IL 60004
  5. ANSI American National Standards Institute  
1430 Broadway  
New York, NY 10018
  6. ASHRAE American Society of Heating Refrigerating and Air  
Conditioning Engineers  
345 East 47th Street  
New York, NY 10017
  7. ASME American Society of Mechanical Engineers  
345 East 45th Street  
New York, NY 10017
  8. ASPE American Society of Plumbing Engineers  
960 Illuminating Building  
Cleveland, OH 44113
  9. ASTM American Society for Testing and Materials  
1916 Race Street  
Philadelphia, PA 19103
  10. AWWA American Water Works Association  
6666 West Quincy Avenue  
Denver, CO 80235
  11. AWS American Welding Society  
2501 NW 7th Street  
Miami, FL 33125
  12. CISPI Cast Iron Soil Pipe Institute  
1499 Chain Bridge Road  
McLean, VA 22101
  13. FM Factory Mutual System  
1151 Boston-Providence Turnpike  
Norwood, MA 02062
  14. FS Federal Specification  
General Services Administration  
Specifications and Consumer Information Distribution  
Section (WFSIS)  
Washington Navy Yard, Building 197  
Washington, DC 20407
  15. NBFU National Board of Fire Underwriters  
5530 Wisconsin Avenue, Suite 750  
Chevy Chase, Maryland 20815
  16. NEC National Electric Code (of NFPA)
  17. NEBB National Environmental Balancing Bureau

- 8224 Old Courthouse Road  
Vienna, VA 22180
18. NEMA National Electrical Manufacturer's Association  
2101 L Street, NW  
Washington, DC 20037
19. NFPA National Fire Protection Association  
Battery March Park  
Quincy, MA 02269
20. NSF National Sanitation Foundation  
Box 1468  
Ann Arbor, MI 48106
21. OSHA Occupational Safety and Health Administration  
U.S. Department of Labor
22. PDI Plumbing and Drainage Institute  
5342 Boulevard Place  
Indianapolis, Indiana 46208
23. SMACNA Sheet Metal and Air Conditioning Contractor's  
National Association  
8224 Old Courthouse Road  
Vienna, VA 22180
24. TIMA Thermal Insulation Manufacturers Association  
Technical Services  
1420 King Street  
Alexandria, VA 22314
25. UL Underwriters Laboratories, Inc.  
333 Pfingston Road  
Northbrook, IL 60062

- G. Underwriters Laboratories Inc. (UL): All materials, appliances, equipment, devices or appurtenances shall conform to the applicable standards of Underwriters Laboratories Inc., where such standards have been established.

### 1.3 DRAWINGS

- A. Drawings and specifications (also known as contract documents) shall be considered as cooperative, and work or materials called for by one and not mentioned in the other, or vice versa, shall be done and furnished as though treated by both.
- B. In the cases of discrepancies in figures, drawings, or specifications, the Architect/Engineer shall be notified immediately and his decision shall determine the necessary adjustment. Without such decision, said discrepancies shall not be adjusted by the Contractor save only at his expense, and, in case of any settlement or any complication arising from such adjustment to the Contractor, he shall bear all extra expense involved.
- C. Should it appear that the work intended to be installed and/or provided, or any of the matters relative thereto, are not sufficiently detailed or explained on the drawings or specifications, the Contractor shall apply to the Architect/Engineer for such further drawings or explanations as may be necessary, allowing a reasonable time for the Architect/Engineer to supply same, and the Contractor shall conform to same as part of the Contract.

- D. Should any doubt or question arise in respect to the true meaning of the drawings or specifications, reference shall be made to the Architect/Engineer whose decision shall be final and conclusive. No alleged oral admission, condonation, or inadvertent neglect on the part of the Architect/Engineer will be accepted as an excuse for inferior work.
- E. The fire protection and related plans do not give exact details as to elevations of ductwork and piping, exact locations, etc., and do not show all offsets, control lines, pilot lines, and other installation details. The Contractor shall carefully lay out his work at the site to conform to the structural conditions, provide proper grading of lines, to avoid all obstructions, to conform to details of installation supplied by the manufacturer of the equipment to be installed, and thereby to provide an integrated, satisfactory operational installation.
- F. Should the particular equipment which any Bidder proposes to install, require other space conditions than those indicated on the drawings, the Bidder shall arrange for such space with the Architect/Engineer before submitting his bid. Should changes become necessary on account of failure to comply with these details, the Contractor shall make such necessary changes at his (the Contractor's own expense).
- G. The Contractor shall submit working scale drawings of all his apparatus and equipment which in any way varies from these specifications and plans which shall be checked by the Architect/Engineer and approved before the work is started, Contractor before work proceeds. Interference with structural conditions shall be corrected by the Contractor.
- H. All equipment shall be installed in accordance with the manufacturer's recommendations. Provide all accessories and components for optimum operation as recommended by the manufacturer.
- I. Utilities: The location, size, and pressure of utility lines are shown in accordance with the data given this office by others. As Architect/Engineers, we cannot and do not guarantee the accuracy of this data. Each Bidder shall check and verify this data. The points of connection to utility lines are approximate only and shall be verified by each Bidder prior to submitting his Bid.
- J. Site visit: The Contractor shall visit the site prior to bidding and satisfy himself as the conditions under which the mechanical systems are to be installed. No subsequent allowance shall be made in his behalf for failure to make such a visit. Contractor shall examine all work noted under the demolition drawings and all new work and shall satisfy himself as to the extent of work required to be completed.

#### **1.4 SYSTEM DESCRIPTIONS**

- A. See drawings for fire protection system requirements.

#### **1.5 PRIOR APPROVALS**

- A. Each equipment item for which the Contractor desires to install equipment other than the specific item identified in the equipment schedule or equivalent equipment by manufacturers specifically named in the schedule, the Contractor shall bear full responsibility to prove to the Engineer that the furnished equipment is equivalent to or better than the specified item. Failure to provide such proof will result in rejection of the

shop drawing submittal by the Engineer. Prior written or verbal approval by the Engineer of equipment by other manufacturers will not relieve the Contractor of responsibility to provide equivalence. Prior approval is not required, however, any prior approval given is intended only to provide preliminary agreement that the alternate manufacturer may make equipment that complies with the specification requirements and not that all equipment manufactured by him is acceptable.

## 1.6 SHOP DRAWINGS

- A. Shop drawings or fully descriptive catalog data shall be submitted by the Contractor for all items of material and equipment furnished and installed under this Contract. This shall include piping, ductwork, mechanical equipment, plumbing equipment, control items, etc. The Contractor shall submit to the Architect/Engineer a sufficient number of copies of all such shop drawings or catalog data to provide him with as many review copies as he may need, plus three (3) copies for retention by the Architect/Engineer. No materials or equipment shall be installed until officially approved by the Architect/Engineer.
- B. Before submitting Shop Drawings to the Architect/Engineer for review, the Contractor shall examine them and satisfy himself that they are correctly representative of the material or equipment to which they pertain. The Contractor shall so note these Drawings before submitting them. The Contractor's review of Shop Drawings is not intended to take the place in any way of the official review of the Architect/Engineer, and the Shop Drawings which have not been reviewed by the Architect/Engineer shall not be used in fabrication or installing any work.
- C. The review of Shop Drawings or catalog data by the Architect/Engineer shall not relieve the Contractor from responsibility for deviations from the plans and Specifications unless he has, in writing, specifically called attention to such deviations as the time of submission and has obtained the permission of the Architect/Engineer thereon, nor shall it relieve him from the responsibility for error of any kind in Shop Drawings. When the Contractor does call such deviations to the attention of the Architect/Engineer, he shall state in his letter whether or not such deviations involve any extra cost. If this is not mentioned, it will be assumed that no extra costs is involved for making the change.
- D. After receiving approval on the make and type of materials, the Contractor shall order such materials in sufficient time so that no delay or changes will be caused. This is done to facilitate progress on the job and failure on the part of the Contractor shall render him liable to stand the expense of any and all delays occasioned by failure on this part to provide necessary details. All shop drawings shall be delivered to the Architect/Engineer's office within thirty (30) days from the date of the contract.
- E. Shop drawings will be returned unchecked unless the following information is included: reference to all pertinent data in the Specifications or on the drawings, size and characteristics of the equipment, name of the project and a space large enough to accept an approval stamp. The data submitted shall reflect the actual equipment performance under the specified conditions and shall not be a copy of the scheduled data on the drawings.

## 1.7 SUBMITTALS

- A. Submittal data shall be organized in commercial quality, three ring binders with durable and cleanable covers. Product information for each piece of equipment shall be separated by an indexing leaf with clear tabs. The product name and symbol (i.e. AHU/Air Handling Unit) shall be typed on white paper inserts and placed in appropriate tab. Complete data must be furnished showing performance, quality and dimensions. A signed review by the Architect/Engineer must be obtained before purchasing any equipment.
- B. No review of the fire protection system shall be completed without all shop drawings, equipment, hydraulics, etc. being delivered as one package. No exceptions.
- C. The following items shall be submitted for review by the Architect/Engineer but are not limited to:
  - 1. Utilities Piping & Materials whether furnishes by the contractor or others.
  - 2. Fire Protection Drawings & Hydraulic Calculations
  - 3. Cross Connection Control Devices
  - 4. Piping Material
  - 5. Fire Protection Equipment – including alarm valve, tamper switch, etc.
  - 6. Ductwork Shop Drawings – as part of fire protection drawings.

## 1.8 QUALITY ASSURANCE

- A. General: Comply with Division 1.
- B. Welder Qualifications: Welders shall be certified by the American Society of Mechanical Engineers (ASME) National Certified Pipe for the type of work being performed. Current operators' certificates in accordance with ASME standards shall be on file at the site and shall be available to the Architect/Engineer for examination. Coupons shall be available for review by the Architect and Engineer.
- C. Locations of all pipes, ducts, outlets, appliance, etc., as shown on the drawings, are approximate only and are understood to be subject to such revisions as may prove necessary or desirable at the time the work is installed. Each Contractor will be required to install his work with relation to existing building conditions and shall be entirely responsible for the correctness of his work with reference to finished elevations, etc. Piping shown on the drawings is diagrammatic only and their exact locations, depths, and invert elevations shall be as required for proper flow and coordination with other trades.
- D. The contract drawing depicts graphically the arrangement of piping and ductwork. Should local conditions necessitate a rearrangement, or if any of the piping or ductwork can be installed to better advantage in a different manner, the Contractor shall, before proceeding with the work, prepare and submit three (3) copies of Drawings of the proposed arrangement for the Architect/Engineer's review.
- E. If the Contractor proposes to install equipment, including piping and ductwork, requiring space conditions other than those shown, or to rearrange the equipment, he shall assume full responsibility for the rearrangement of the space and shall have the Architect/Engineer review the change before proceeding with the work. The request for such change shall be accompanied by Shop Drawings of the space in question.



- F. Each Contractor is responsible for the proper location and size of all slots, holes, or openings in the building structure pertaining to his work, and for the correct location of pipe sleeves.
- G. Each Contractor shall coordinate his work with that of all other trades that it may be installed in the most direct and workmanlike manner without hindering or handicapping the other trades. Piping interferences shall be handled by giving precedence to pipelines which require a stated grade for proper operation. Drainage lines shall take precedence over water lines in determination of elevations. In all cases, lines requiring a stated grade for their proper operation shall have precedence over electrical conduit and ductwork.
- H. All oiling devices and all parts of equipment requiring adjustment shall be easily accessible. Lubricate all equipment properly in accordance with manufacturer's instructions. Furnish zerk grease fittings on all greaseable bearings.
- I. Equipment and Materials: The materials and equipment shall be new and shall be the standard products of the manufacturers regularly engaged in the production of piping plumbing equipment, and fire protection equipment, and shall be the manufacturer's latest standard design. Where two or more units of the same class of equipment are required, these units shall be the products of the same manufacturer. However, the component parts of the systems need not be the products of the same manufacturer. Specific equipment specified hereinafter is to be considered a standard of quality and operation. In general, all capacities of equipment, and motor and starter characteristics are shown in schedules on the drawings. Reference shall be made to the schedules for specific information. The capacities shown are minimum capacities. Variations in the characteristics will be permitted only on written approval of the Architect/Engineer. All equipment shall be shipped to the job with not less than a prime coat of paint or as specified hereinafter. Insofar as is possible all items of the same type (i.e., pumps, fans, etc.) shall be by the same manufacturer. Where installation instructions are not included in these specifications or on the plans, the manufacturer's instructions shall be followed. All equipment affected by altitude shall be rated to operate at the altitude where it is to be installed.
- J. Excavation and Backfilling: This Contractor shall do all necessary excavation and backfill for the installation of the Mechanical systems as may be required. Curb cuts, asphalt and concrete patching, cutting and patching existing floor, etc., shall be part of this Contractor's responsibility. No extra payment will be made for rock excavation. Trenches for all underground piping shall be excavated to the required depths. The bottoms of trenches shall be tamped hard and graded to secure maximum fall. Bell holes shall be excavated to assure the pipe resting for its entire length on solid ground. Should rock be encountered, it shall be excavated to a depth of 6 inches below the bottom of the pipe, and before laying the pipe, the space between the bottom of the pipe and the rock surface shall be filled with gravel, thoroughly tamped. Pipe laid in trenches dug in fill shall be supported down in the trenches and shall be filled. No roots, rocks or foreign materials of any description shall be used in backfilling the trenches. The backfill material shall be identical to the surrounding fill material and shall be placed in 6-inch layer, wetted, and compacted to the density of the adjacent soil. See Division 2 for additional information for site utilities. All surplus materials shall be hauled from the project by the Contractor at his expense.

- K. Cutting and Repairing:
1. Responsibility of the Contractor whose work is involved. Coordinate with others to prevent unnecessary cutting and repairing.
  2. Lay out and locate equipment, openings, and chases. Install sleeves, inserts, and supports. Arrange with those whose work is involved to do cutting and replacing caused by negligence or error with costs reimbursed by the Contractor at fault. Cutting and replacing of existing work shall be the responsibility of the Contractor whose work is being installed.
  3. Removal or terminating connections of existing work which is abandoned or replaced shall also be done hereunder to provide correct and finished work.
- L. Foundations: All equipment shall be provided with suitable foundations and supports. It shall be the responsibility of the Contractor to provide for the proper locations of these foundations and supports. This applies to all rooftop equipment also.
1. All concrete foundations required by equipment furnished by the Mechanical Contractor shall be constructed by them (except where otherwise noted) the conformity with the recommendations of the manufacturer of the respective equipment, and with the approval of the Architect/Engineer. All corners of the foundations shall be neatly chamfered. Foundation bolts shall be placed in the forms when the concrete is poured. Allow 1 inch below the equipment base for alignment, leveling and grouting with nonshrinking grout. Grouting shall be done after the equipment is leveled in place. After the grout has hardened, the foundation bolts shall be pulled up tight and the equipment shimmed, if necessary. After removal of the forms, the surface of the foundation shall be rubbed.
  2. Unless otherwise noted, foundations shall be a minimum of 6-inch high. All concrete work performed by these Contractors shall conform entirely to the requirements of the Concrete Specifications which describe this class of work.
- M. Code Requirements: Comply with state and local code requirements and ordinances. Call for inspections required by responsible building inspection authority.
- N. Applicable Building Codes and Ordinances: Including the latest edition of each code, but not limited to the following:
1. International Building Code.
  2. Uniform Mechanical Code.
  3. Uniform Plumbing Code.
  4. Governing Fire Department Requirements
  5. Utility Company Requirements
  6. National Fire Protection Association Standards
  7. NFPA 70 - National Electrical Code
  8. NFPA 90A - Installation of Air Conditioning and Ventilating Systems
  9. NFPA 90B - Installation of Warm Air Heating and Air Conditioning Systems
  10. NFPA 13 - Sprinkler Systems
  11. NFPA 101 - Life Safety
  12. NFPA 96 - Installation of Equipment for the Removal of Smoke and Grease Laden Vapors from Commercial Cooking Equipment
- O. Access Panels
1. Similar to Milcor, or as noted on the drawings, size as required for concealed expansion joints, valving, gauges, balancing dampers, valves, traps, pitot stations,

equipment and similar items requiring accessibility. Notify the General Contractor of each access panel location and the required size. Panels shall be proper type for ceiling or wall in which they are installed. The panels shall be furnished under this section of the Specifications, unless otherwise directed, but shall be coordinated to be compatible with walls and ceilings furnished under other sections.

### **1.9 DELIVERY, STORAGE AND HANDLING**

- A. General: Comply with Division 1
- B. Large Items: Make arrangements with other trades on the job for introduction into the building of equipment too large to pass through finished openings.
- C. Acceptance: Check and sign for materials to be furnished by others for installation under Division 15 upon delivery. Contractor shall be responsible for the storage and safekeeping of such materials from time of delivery until final acceptance.
- D. Protection: Close ends of pipe and ductwork at the close of each working day during construction to prevent entry of foreign material. Protect insulation against dirt, water, chemical or mechanical damage before, during and after installation. Protect fixtures and equipment against damage during mechanical work with heavy paper or plastic until final clean-up.
- E. Storage: Store equipment in covered enclosure or wrap with weather tight 6 mil Visqueen.
- F. Shipping Protection: Protective casings, crating, and coverings to remain in place until start-up of equipment.

### **1.10 PROJECT CONDITIONS**

- A. Performance: All systems are to be rated at 5,500 ft. elevation.

### **1.11 SEQUENCING AND SCHEDULING**

- A. General: Comply with Division 1.
- B. Schedule: Coordinate and order the progress of mechanical work to conform to the progress of the work of the other trades. Complete the entire installation as soon as the condition of the building will permit.
- C. Utility Interruptions: Schedule mechanical utility interruptions with the Architect/Engineer/Owner minimum of seven (7) days prior to the requested outage. Plan work so that duration of the interruptions a maximum of one day.

### **1.12 CONTROLS WIRING AND ELECTRICAL EQUIPMENT**

- A. All mechanical equipment controls wiring, conduit, relays, interlocks, and all accessories required for a completely operational controls system shall be the complete responsibility of the mechanical contractor. The contractor has the option to hire the project electrical

contractor to install fire protection controls wiring and conduit. Refer to specification 251000 for installation requirements.

- B. Electrical items such as disconnect switches and motor starters associated with equipment provided by all Mechanical Divisions, when specifically mentioned to be furnished by the Mechanical Contractor, whether in these specifications or on the Electrical or Mechanical Drawings, shall be furnished by the Contractor. These items shall be mounted and connected as required for a completely operational system.
- C. All electrical equipment characteristics (voltage, etc.) must be verified by the Contractor prior to ordering. If the Contractor proposes to furnish motors varying in horsepower and/or characteristics from those specified, he shall first inform the Architect/Engineer of the change and shall then coordinate the change with the Electrical Contractor and shall pay all additional charges in connection with the change.
- D. All motors shall meet all the requirements of all Electrical Divisions.
  - 1. All motors shall be built in accordance with the current applicable IEEE, ASA, and NEMA standards. All general purpose motors shall be open drip-proof machines for installation indoors and/or in protected locations. Totally enclosed fan cooled (TEFC) motors shall be used in all areas of exposure to weather or other environmental contamination. All motors shall have copper windings. All motors to have minimum power factor of 85% or have switched correction to 90%. Unless indicated otherwise, motors shall be NEMA design B with a service factor of 1.15 with 40°C rise and total temperature rise of 65°C ambient and when powered from the system voltage feeding the motor. TEFC motors shall a service factor of 1.00 with total temperature is of 65°C in the above conditions. Motors located in areas exceeding 40°C ambient shall be factory-rated for the ambient temperature of the motor environment. Single phase motors shall generally be NEMA Type N split phase induction motors with built-in thermal protectors. Single phase motors connected on loads requiring high starting torque shall be capacitor-start induction motors. Single phase motors of 1/10 HP or less may be shaded pole induction motors.

### 1.13 PROTECTION AGAINST HAZARDOUS CONDITIONS

- A. The Contractor shall take precautions against hazardous construction conditions at all times during construction. The final condition of the facilities shall be safe, and where safety to operating personnel is jeopardized, suitable signage shall be posted.
- B. Protruding metal (bolts, steel angles, etc.) potentially hazardous to maintenance and operating personnel, shall be cut back and/or protected to reduce the risk of injury. All openings between floors shall be protected with barriers around the openings, gratings across the openings, or steel bars through the openings to avoid and protect against injury.

### 1.14 HAZARDOUS SIGNS

- A. Equipment room contains moving or rotating parts, floor openings, or other potentially hazardous environments and shall include a sign on the door entering it that shall read similar to the following: **Hazardous Area - Authorized Personnel Only.**

**1.15 OPERATING AND MAINTENANCE INSTRUCTIONS**

- A. The Fire Protection Contractor shall furnish to the Owner a bound manual in triplicate, containing complete repair parts lists, and operating, service, and maintenance instructions on all mechanical equipment, fixtures, and systems.
- B. The Fire Protection Contractor shall also provide training as required by NFPA to the Owner's operation and maintenance personnel.

**1.16 OPERATION PRIOR TO ACCEPTANCE**

- A. The Owner shall have the right to operate any and all apparatus as soon as and as long as it is in operating condition, after Owner personnel have received operational training, whether or not such apparatus has been accepted as complete and satisfactory, except that this shall not be construed to mean operations before any required alterations or repairs have been made. This operation does not indicate acceptance of the equipment by the Owner. When the Contractor enters into a contract with the Owner, he agrees to the above.

**1.17 WARRANTY AND SERVICE PROGRAM**

- A. Due to the critical performance requirements and to clearly establish warranty responsibility for this project, the Contractor shall provide a full service maintenance and warranty program to the Owner for one full year after beneficial occupancy (substantial completion).
- B. This service program shall be included as part of the base bid and shall include service, maintenance, repair, replacement, lubrication, temperature control calibration and repairs, and documenting proof for all service and maintenance work on all equipment and system furnished by the Contractor.
- C. A single representative in the employment of the Contractor shall be responsible for coordination and follow through of this program. This representative's name and phone number shall be submitted to the Owner as part of the maintenance manuals and supportive data. The Contractor shall respond to a request for service with 24 hours if so requested.
- D. During this first year of operation, the following sequence of maintenance service shall be performed as a minimum.
  - 1. Clean strainers in piping.
  - 2. Pumps be lubricated and oiled once every four (4) months.
  - 3. System controls shall be calibrated throughout the facility at the end of six (6) months (following substantial completion). Any leaks in the piping systems shall be repaired.
  - 4. All equipment manufacturer's service recommendations shall be followed during this period.

**1.18 FLUSHING AND DRAINING**

- A. It shall be the responsibility of this Contractor to properly drain and flush all ducts and pipes before use or acceptance to ensure that all debris is completely removed. Damage

caused by such debris remaining in the ducts or pipes shall be repaired by this Contractor at his expense. This Contractor shall demonstrate to the Architect/Engineer's representative that all piping is clean.

#### **1.19 CLEANING**

- A. This Contractor shall remove from the building construction site all rubbish and dirt as it accumulates under the contract. At completion, all areas shall be broom cleaned and all obstructions, surplus materials, etc., removed.

#### **1.20 GUARANTEE**

- A. The Contractor shall guarantee all materials, equipment, and workmanship furnished and installed by him under this Contract, to be free from all defects of workmanship and materials, and shall agree to replace at his expense, without expense to the Owner, at any time within one year after installation is accepted by the Architect/Engineer, any and all defective equipment, parts, etc., that may be found. (This excludes normal maintenance and daily servicing of equipment which is the Owner's responsibility.)

#### **1.21 FLOOR, WALL, AND CEILING PLATES**

- A. Where exposed pipes pass through floors, finished walls, or finished ceiling, they shall be fitted with chromium-plated escutcheons of an approved pattern. Escutcheons and plates in Mechanical Rooms do not require chrome finish.
- B. This Contractor shall be responsible for providing and installing all counter flashing. All openings in the roof shall be flashed and counterflashed. Use four pound lead flashing materials for all vent lines and welded flashing in steel lines passing through roof. The Mechanical Contractor shall notify the General Contractor where each roof penetrations are and the size of the opening.

#### **1.22 PIPE SLEEVES**

- A. Schedule 40 steel pipe sleeves or pipe sleeves made of No. 20 gauge galvanized steel, properly secured in place with approximately 1/4" space between each sleeve and the surface of the pipe and/or insulation passing through it, shall be provided for all pipes passing through concrete floors, roofs, and masonry walls. All pipe sleeves shall be fixed in place as the walls and floors are built up. The Contractor shall furnish and locate all sleeves and pipes passing through concrete floors, exterior masonry walls, and roofs shall be made watertight with approved non-hardening plastic material. Sleeves through pipe chase or equipment room floors shall project a minimum of 2-inch above the floor and shall be of black steel pipe with waterproof flange at center of floor thickness. Each sleeve through a fireproof wall shall be packed with approved fireproof rope in the annular space.

#### **1.23 PIPE HANGERS**

- A. Pipe hangers shall be Fee and Mason of a type suitable for each use. Perforated straps shall not be used in any work. For ferrous pipes up to and including 4 inch in size, use Fee and Mason Fig. 199 malleable iron, adjustable, split ring, swivel hanger. For piping larger than 4 inch, use Fee and Mason Fig 239 steel clevis hanger. Where several pipes

are parallel at the same elevation, trapeze hangers may be used. Where trapeze hangers are used, the pipes shall be supported on rollers where indicated on the Drawings.

- B. Hanger rod sizes shall conform to the following schedule:
- |    |                             |           |
|----|-----------------------------|-----------|
| 1. | Pipe up to and including 2" | 3/8" rods |
| 2. | Pipe 2-1/2", 3" and 3-1/2"  | 1/2" rods |
| 3. | Pipe 4" and 5"              | 5/8" rods |
| 4. | Pipe 6"                     | 3/4" rods |
| 5. | Pipe 8", 10", and 12"       | 7/8" rods |
- C. Unless shown otherwise on the Plans, all horizontal runs of ferrous piping shall be suspended from the floor or roof construction, as the case may be, by means of hangers with the following spacing:
- |    |                                 |     |
|----|---------------------------------|-----|
| 1. | Pipe up to and including 1-1/4" | 8'  |
| 2. | Pipe 1-1/2" and 2"              | 10' |
| 3. | Pipe 2-1/2" and 3"              | 12' |
| 4. | Pipe 3 1/2" and 4"              | 14' |
| 5. | Pipe 5" and 6"                  | 16' |
- D. There shall be a hanger within 2 inch of each elbow or tee. Additional supports shall be provided for valves, strainers, etc. Vertical risers shall be supported by approved riser clamps at each floor. Vertical pipes within a space shall have not less than two supports.
- E. Supports and hangers shall be installed to permit free expansion and contraction in the piping systems. Hangers shall permit vertical adjustment to maintain proper pitch. Where necessary to control expansion and contraction, the piping shall be guided and firmly anchored. No piping shall be self-supporting, nor shall it be supported from equipment connection.
- F. Expansion bolts shall be Ackerman-Johnson or Hilti.
- G. Beam clamps suitable for use with this type of steel construction involved shall be Grinnell.

#### **1.24 PRESSURE VESSEL CERTIFICATION**

- A. Not used.

#### **1.25 ISOLATION**

- A. Excessive vibration or objectionable noise created in any part of the building by the operation of any equipment furnished and/or installed under the Mechanical Contract will be extremely objectionable and the Contractor shall take all precautions against the same by isolating the various items of equipment from the building structure and by such other means as may be necessary to eliminate all excessive vibration and objectionable noise produced by any equipment installed by them, and consequently, they shall design all foundations, supports, etc., for their equipment, and all piping with this end in view. In addition, these Contractors shall supervise the construction of all foundations and supports, whether they build them or not, in order that they may be constructed in such a manner as to prevent the transmission of objectionable noise and/or excessive vibration. Submit calculations on all vibration isolation equipment.

- B. All equipment having moving parts shall be isolated from the building structure by means of Korfund isolation materials, unless specifically noted otherwise. All isolators shall be the same brand and shall be supplied from the same source. Equipment manufacturer's recommendations shall be followed in the isolation of equipment.
- C. Vibration isolators shall have sufficient resilience to meet the following minimum efficiencies:
- | <u>Motor HP</u> | <u>Equipment Room</u> |
|-----------------|-----------------------|
| Up to 5         | 90%                   |
| 7-1/2 to 15     | 93%                   |
| 20 to 40        | 95%                   |
| 50 to 100       | 97.5%                 |
- D. Spring isolators shall be of the housed type with ribbed pads bonded to the underside of the baseplate or may be unhoused stable springs. Isolators shall be furnished with snubbers and limit stops where so recommended by the equipment manufacturer.
- E. The Supplier of the isolating equipment shall, upon completion of the job, check all isolating materials and verify that they are installed properly, and submit a report in writing to the Architect/Engineer.

#### **1.26 TESTING**

- A. Before completion of this project, the Contractor shall test all materials and equipment which normally require testing. Submit fire pump test per specification. All piping, etc., shall be tested to meet code requirements or the Specification requirements, whichever is more stringent.
- B. All equipment shall be operated sufficiently long enough to prove to the Architect/Engineer that the equipment performs satisfactorily and meets the requirements set forth on the Plans or in these Specifications.

#### **1.27 CERTIFICATIONS**

- A. Before receiving final payment, the contractor shall verify that all equipment furnished and all work done is in compliance with all applicable codes mentioned in these Specifications. Submit certifications and acceptable certificates to the Architect/Engineer.

#### **1.28 GENERAL PIPING INSTALLATION REQUIREMENTS**

- A. Provisions for Drainage: All piping systems shall be installed so that they may be easily drained. Drain caps, plugs, or hose bibbs shall be installed at low points. Grade piping toward drain locations.
- B. Alignment: All installed pipelines shall be straight and shall remain straight against strains. Proper allowance shall be made for expansion and contraction.
- C. Clean as Installed: All piping shall be kept free from scale or loose dirt when installed and must be kept clean during the completion of the installation. All openings in the piping system shall be capped or plugged while awaiting further connections. All



detergents, solvents and other cleaning agents shall be compatible with the materials of fabrication of the system in which they are used. They shall not adversely affect the materials of mechanisms in the systems and they shall be acceptable to equipment manufacturers. All detergents, solvents, and other cleaning agents shall also be compatible with the process streams to be handled by the systems in which they are used.

- D. Insulated Fittings: Install between any dissimilar metals such as steel and copper.
- E. Expansion and Contraction: The Contractor shall make all necessary provisions for expansion and contraction with proper fittings, anchors, dresser couplings, loops, etc. Install flexible connectors on each pipe at each building expansion joint.
- F. Welding: Refer to Paragraph 1.29 of this section of these specifications.
- G. Bending: No bending of pipe will be permitted.
- H. General: The installation shall be coordinated with respect to space available with heating, cooling, ventilating, and electrical installation. In every instance where there is a conflict in the routing of the piping and the ducting, the routing of the ducting shall govern. Installed piping shall not interfere with the operation or accessibility of doors or windows, shall not encroach on aisles, passageways, and equipment, and shall not interfere with the servicing or maintenance of equipment. Pipe shall be cut accurately to measurements established at the construction site and shall be worked into place without springing or forcing, properly clearing all openings and equipment. Cutting or weakening of structural members to facilitate piping, installation is not permitted. Pipes shall have burrs removed by reaming and shall be so installed as to permit free expansion and contraction without damage to joints or hangers. Piping above ground shall be run parallel with the lines of the building unless otherwise noted on the drawings. Unless otherwise shown on the drawings, horizontal piping shall pitch down in the direction of flow with grade of not less than 1 inch in 40 feet. Piping connections to equipment shall be in accordance with details shown on the drawings or as recommended by the equipment manufacturer. Service pipe valves and fittings shall be kept a sufficient distance from other work to permit finished covering not less than 1/2 inch from such other work, and not less than 1/2 inch between finished covering on the different services.
- I. Installation of Valves: Valves shall be installed at the locations shown on the drawings and where specified and where directed at site. Gate valves shall be used unless otherwise shown, specified, or directed. All valves shall be installed with their stems horizontal or above. Where tight shutoff is required, a composition seat globe valve or resilient seat ball valve shall be used.
- J. All valves which must be used during operation, all control valve assemblies, instrument control cases, liquid level controls, gage glasses, orifices, relief valves, and other equipment which must be observed, adjusted, or serviced during operation shall be located conveniently accessible from an operating platform or grade.
- K. In general, relief valves within processing unit limits shall be located conveniently accessible from an operating platform or grade.
  - 1. Those in non-hazardous service, such as water, shall discharge directly to outside.

2. Relief valves should have no piping between the vessel or line and the valve inlet, except as shown on the drawings.
  3. Relief valves shall be installed in a vertical position. Vent piping shall be braced and supported in a manner that will not produce excessive stresses in the relief valve and will permit removal of the relief valve without necessary temporary supports for the vent lines.
- L. Equipment Connections: All piping connections to pumps and other equipment shall be installed without strain at the pipe connection of the equipment. The contractor shall be required as directed to remove the bolts in flanged connections or disconnect piping to demonstrate that the piping has been so connected. Pipe connections to equipment shall be made with unions or flanged fittings. Provide removable headers for large equipment for service access.
- M. Joints
1. Flanged Joints: All flanged joints shall be face matched. Raised face flanges shall not be mated to flat-faced cast-iron flanges on valves or equipment. The raised face must be turned off. All flanged bolt holes shall straddle the horizontal and vertical center line unless otherwise noted.
  2. Screwed Joints: Screwed pipe joints shall have American Standard Taper Pipe Threads ANSI-B2.1 Latest Edition. Burrs formed when cutting pipe shall be removed by reaming. Care shall be taken that the inside of pipe is thoroughly clean and free of cutting oil and foreign matter before installation. Joints shall be made perfectly tight by the use of Teflon tape or approved Teflon thread sealing and lubricating compound.
  3. Solder-Joints: Tubing shall be cut square and burrs removed. Both inside of fittings and outside of tubing shall be well cleaned with steel wool or wire brush before seating. Care shall be taken to prevent annealing of fittings and hard drawn tubing when making connections. Joints for serrated fittings on water, compressed air below 60 psig, and vacuum lines shall be made with a 95 percent tin and 5 percent antimony. Cored solder or solder containing lead will not be permitted.
- N. Reducers: Reduction in pipe size shall be made with one piece reducing fittings. Bushings reducing at least two pipe sizes will be acceptable only when there is no room for reducing couplings or swaged nipples.
- O. Unions: All piping unions shall be of the ground joint type constructed from materials equivalent in alloy composition and strength to other fittings specified with which they are used. Union Pressure classes and end connections shall be the same as the fittings used in the lines with the unions. Steel unions shall have hardened stainless steel seating surfaces on both faces.

## 1.29 WELDING

- A. All welding of piping covered by this specification, regardless of condition of service shall be accompanied as follows:
1. The welding shall be in accordance with the recommendations of the American Welding Society. Mitering of pipe to form elbows, notching to form these, or any similar construction will not be permitted. Welding fittings shall be installed on all welded lines. Joints to be welded shall be properly aligned and spaced,

using special welding clamps where necessary. All welders to be employed shall have passed qualification tests prescribed by the National Certified Pipe Welding bureau (or by another reputable testing laboratory or agency) using procedures approved by the American Society of Mechanical Engineers or the American Welding Society. The welders will be required to pass qualification tests when the work of the welder creates a reasonable doubt as to his proficiency. Tests shall be conducted at no additional expense to the Owner.

2. Each welder shall, in addition to having passed the prescribed qualification tests (as noted in Paragraph 1.30.A.1), prepare sample coupons at the job site on a portion of pipe that is cut such that the cross section of the weld is open to view. The sample weld should be prepared using a 6 inch diameter pipe. The sample shall reflect a continuous weld with perpendicular cut out to show the weld in cross sectional view. This sample, when accepted and approved by a certified welding inspector, shall be used as a standard of quality to compare to other welds that this welder will be performing on the job. This same sample weld will also be a basis for accepting or rejecting the welder for working on this project. The sample weld shall be identified with a date and the welder's name and shall be kept at the site throughout the project.
3. All welding on pressure piping shall conform to all of the requirements of the American Society of Mechanical Engineers Code for Pressure Piping - B31.1 (An American National Standards Institute publication), as defined in the latest edition of the ANSI Power Piping B31.1 Manual. All welding shall also conform to all of the requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code. All chapters, current addenda and supplements of these manuals shall apply. This code shall be used to establish standards of performance and quality of welds. However, the Owner reserves the right to perform radiographic testing of all welds, to compare any of the welds to the approved "standard" sample welds of each welder, and to compare the welds to the welding diagrams and sketches of those recommended in the ANSI B31.1 Power Piping Manual. The intent is to obtain the highest quality welding job possible. The cost of any initial radiographic testing, for random inspection, shall be paid for by the Owner. If radiographic random testing reveals that a weld is defective, the Contractor shall bear the cost of all repairs and re-testing necessary to be made to subject weld until conformance with radiographic tests is reached. The potential for random radiographic testing and welding quality control applies to all pressure piping systems in this project, including systems below 100 psig. If a question should arise regarding the possibility of faulty welding or if there are obvious visual defects in the welding, the Contractor shall be required to correct such deficiencies to a quality level consistent with the recommendations, welding diagrams and sketches in the ANSI B31.1 Manual. The quality level shall also reflect that of the approved sample welds accomplished by each welder for this particular project.

### **1.30 TESTING FOR PIPING SYSTEMS**

- A. General: Before insulation is applied, all piping, equipment, and accessories installed under this contract shall be inspected and tested by the Contractor. All labor, material, and equipment required for testing shall be furnished by the Contractor. The Contractor shall be responsible for all repairs and retesting as required. All instruments and other equipment whose safe pressure range is below that of the test pressure shall be removed from the line or blanked off before applying tests. Prior to performing tests, all lines shall

be "blown" free of all loose dirt and foreign particles. The lines shall then be thoroughly flushed with water (liquid lines only) at a sufficient flow rate and period of time, to ensure complete cleaning of the lines of all dirt, scale, and foreign matter. Satisfactory flushing of the lines shall be subject to approval. After testing and flushing lines, all filters and strainers shall be cleaned.

- B. Safety: Since the Risk of failure, with the attendant possibility of injury, is appreciable greater with further testing, all safety measures required by codes or ordinance or reasonable applicable to the situation shall be taken.
- C. Concealment: Equipment or piping to be pressure tested shall not be insulated, covered, or concealed prior to that test. Compression joint underground piping may be backfilled prior to pressure test except that joints shall remain exposed until after the test, but tie rods, clamps, etc., shall be in place and fastened.
- D. Pressure Ratings: These tests shall not be used to establish pressure ratings.
- E. System Protection: Protect all piping and equipment against overpressure, collapse from vacuum, and hydraulic shock during the filling, testing and draining procedures. Seats of iron valves shall not be subjected to a pressure in excess of the maximum cold working pressure of the valve. Pressure tests against other closed valves shall not exceed twice the normal rating. Note that where significant differences in elevation exists, there is a risk of overpressure in the lower portions of the system in order to attain test pressure in the upper portion of the system
- F. Test Temperature: Apply test pressure only after the system and test medium are at approximately the same temperature, preferably not less than 60°F. Note that some applicable codes require testing above a specified minimum temperature.
- G. Sectionalizing: Systems may be separated into sub-systems for testing if such action will expedite or simplify the testing.
- H. Temporary Supports: During hydrostatic testing of lines provide temporary supports to prevent oversteering supports or hangers. When tests are completed, remove all temporary supports, locks, stops, etc., and adjust supports for their cold load and alignment.
- I. Testing: Fire protection water piping shall be tested hydrostatically at the test pressures specified and duration required by NFPA. Leaks shall be located by soap testing.
- J. Test Report
  - 1. A detailed report of pressure tests on piping and equipment shall be forwarded in duplicate to the Architect/Engineer. This report shall show date of test, lines tested, test medium, length of time test pressure was held, pressure drop or rise, and extent of venting or repressurizing.

### **1.31 COOPERATION WITH OTHER TRADES**

- A. The Contractor shall refer to other sections of these specifications covering the work of other trades which must be carried out in conjunction with the mechanical work so that

the construction operations can proceed without harm to the Owner from interference, delay or absence of coordination.

### **1.32 FIELD MEASUREMENTS**

- A. The Contractor shall verify the dimensions covering the mechanical work at the building. No extra compensation shall be claimed or allowed on account of difference between actual dimensions and those indicated on the drawings. He shall examine the adjoining work on which Mechanical work is dependent for maximum efficiency and shall report any work which must be corrected. No waiver of responsibility for defective work shall be claimed or allowed due to failure to report unfavorable work conditions affecting Mechanical work.

### **1.33 SAFETY GUARDS**

- A. The Mechanical Contractor shall furnish and install safety guards required in order to obtain certificates of inspection from all authorities having jurisdiction. All belt driven equipment, projecting shafts, and other rotating parts shall be enclosed or adequately guarded. Provide coupling guards on all rotating shafts.

### **1.34 PROTECTION**

- A. All work, equipment, and materials shall be protected at all times to prevent obstruction, damage, or breakage. All pipe openings shall be closed with caps or plugs during installation. All equipment shall be covered and protected against dirt, water, chemical, or mechanical injury. At the completion of the work, all equipment shall be thoroughly cleaned and the entire system shall be delivered in a perfect, unblemished condition.

### **1.35 PAINTING AND IDENTIFICATION**

- A. All equipment shall be delivered to the job with suitable factory finish. Should the finish be marred in transit or during installation, it shall be finished to present a neat, workmanlike appearance.
- B. Except as elsewhere hereinafter specifically required, any painting of equipment, piping, ductwork, grilles, insulation, etc., furnished and installed under this Section of the Specifications will be done by the Painting Contractor. However, the Mechanical Contractor shall leave his equipment clean and free from any grease, dirt, rust, etc., and in suitable condition for painting.
- C. No nameplates on equipment shall be painted, and suitable protection shall be afforded to the plates to prevent their being rendered illegible during the painting operation.
- D. The piping shall be painted the basic color as indicated in other sections of these specifications and shall be marked every 10 feet on centers with Brady pipe markers. Arrows, approximately 6 inch in length and spaced about 10 feet on centers shall indicate the direction of the flow pipe. Locate additional labels as required in Mechanical Rooms. Staple in place, brush with clear lacquer. Markers shall state pipe size, flow direction, and pipe usage (such as "cold water," etc.).

**1.36 RECORD DRAWINGS**

- A. The Contractor shall, during the execution of the work, maintain a complete set of drawings upon which all dimensional locations of equipment piping and all deviations and/or changes in the work shall be recorded. Water, storm, and drainage mains shall be delivered to the Architect/Engineer in good condition upon the completion and acceptance of the work and before final payment is made.

**1.37 SUPPLIER RESPONSIBILITY**

- A. Each supplier, whether furnishing equipment as specified or as a substitution shall be responsible for certifying that the equipment is properly installed and that the warranty is valid. Submit written reports on the installation and the equipment performance when requested to do so by the Architect/Engineer (or his representative). Each supplier shall be responsible for furnishing qualified personnel at the job site at anytime requested by the Architect/Engineer (or his representative) during the construction or warranty periods.

**END OF SECTION**

**SECTION 210513****COMMON MOTOR REQUIREMENTS FOR FIRE-SUPPRESSION EQUIPMENT****PART 1 – GENERAL****1.1 RELATED DOCUMENTS**

- A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

**1.2 DESCRIPTION OF WORK**

- A. It is the intent of this specification to define all motors furnished under all sections of the specifications for this project which will provide efficient operation, reliability, ease of maintenance, and repair along with reduced operation costs.
- B. All general purpose motors shall be open drip-proof machines for installation indoors and/or in protected locations. Totally enclosed fan cooled (TEFC) motors shall be used in all areas of exposure to weather or other environmental contamination. Motors shall be rated explosion-proof when located in hazardous atmospheres.
- C. Motors mounted in direct sun shall be provided with a shield to forbid direct radiation from the sun when the sun is 45 degree or greater above the horizon.
- D. All supply fan motors mounted in air handling units shall have Class F insulation.
- E. Open drip-proof motors shall be NEMA design B with Class B insulation and a 1.15 service factor with 40 degree C ambient and a total temperature rise of 65 degree C.
- F. TEFC motors shall be NEMA design B with Class F insulation and a 1.15 service factor with 40 degree C ambient and a total temperature rise of 65 degree C.
- G. Severe duty motors shall be NEMA design B with Class F insulation and a 1.15 service factor with 40 degree C ambient and a total temperature rise of 65 degree C.

**1.3 GENERAL**

- A. All motors covered by this specification shall conform to all applicable requirements of NEMA, IEEE, ANSI and NEC Standards. They shall be free from defective material and workmanship and fully capable of performing in accordance with the manufacturer's nameplate rating.
- B. Motors shall be approved by Underwriter's Laboratories (UL) for the service specified.
- C. Unless otherwise specified, motors shall be suitable for operation in either direction-- (CW or CCW) or rotation.
- D. Motors shall be Westinghouse II, Reliance XE, Gould E-PLUS, GE Energy Savery, or approved equal.

- E. All fractional H.P. motors shall be permanent split capacitor (P.S.C.) with U.L. listed overload protection. The protector shall be calibrated to trip out when the winding reaches a pre-determined temperature and automatically reset when the temperature returns to a safe limit.

#### **1.4 EFFICIENCY**

- A. All motors shall be special high efficiency design. These motors shall be different than manufacturers' standard product, in that losses are reduced by incorporation of design features including the use of low loss lamination steel, increase in stator/rotor length, increase in copper windings, utilization of high efficiency ventilating fan, computer optimized slot configuration and air gap.
- B. All motors shall be all copper wound, high power factor, high efficiency motors. Motor efficiency shall be as determined by IEEE Standard 112A, test method B. Test results shall be submitted to the Engineer.
- C. Manufacturer to furnish % efficiency, % PF, amps at Full Load, 3/4 Load, and 1/2 Load with quotation and be prepared to furnish actual test results on individual ratings if required.

### **PART 2 – PRODUCTS**

#### **2.1 GENERAL**

- A. Motors shall be 60 Hertz voltage as indicated on drawings, Squirrel Cage induction type suitable for across-the-line starting and continuous duty.
- B. Motors shall have copper windings.
- C. All motors shall be suitable for application without exceeding Class B rise in ambient temperatures up to and including 65 degree C at 1.15 Service Factor. Motor nameplates shall state suitability for 65 degree C ambient application.
- D. All motors shall be suitable for application without exceeding Class B temperature rise at altitudes up to and including 9900 feet at a 1.00 Service Factor.
- E. Motors shall operate successfully under running conditions at rated load with +10% of rated voltage or +5% of rated frequency or a combined variation in voltage and frequency of +10% (sum of absolute values).
- F. Motors will have at least a nominal 85% power factor rating at full load and rated voltage. Exclusion from this requirement are motors which draw less than 1,000 watts at full load and motors with synchronous speeds less than 1800 RPM. Test verification shall be available upon request.

#### **2.2 INSULATION**

- A. Motors shall have non-hygroscopic Class B or Class F insulation system as required; however, temperature rise shall not exceed Class B rise at rated load per NEMA Standards.



- B. The insulation system shall be provided with sufficient treatment so that the completed insulation system will have a minimum resistance of 1.5 megohms after 168 hours of testing to a humidity chamber maintained at 100% relative humidity and 40 degree C ambient.

### **2.3 TESTS**

- A. Each motor shall be given a routine factory test per NEMA and ASA Standards to ensure compliance with this specification.

### **2.4 BEARINGS**

- A. Bearings shall be shielded, regreasable, vacuum degassed steel ball bearings, specially selected for electric motor service and long-life expectancy (B-10 MINIMUM).
- B. Bearings shall be lubricated with a premium moisture resistant grease formulated to operate over a temperature range of -20 degree F to +300 degree F.
- C. Bearing identification by AFBMA number shall be shown on motor nameplate.

### **2.5 ENCLOSURES**

- A. Construction shall be of rugged corrosion resistant metal including a one-piece frame, brackets, conduit box and fan shroud.
- B. Fans shall be bi-directional and constructed of low inertia inert material.

### **2.6 CONDUIT BOXES**

- A. Conduit boxes are to be diagonally split, rotatable in 90 degree turns, gasketed cast iron construction with threaded conduit holes.
- B. Ground lug suitable for grounding motor frame shall be furnished inside of conduit box.
- C. A neoprene lead seal separator gasket shall be mounted between motor frame and conduit box to prevent entry of moisture and dust into the motor.
- D. Conduit box size must meet or exceed minimum as shown in NEC Standards based on motor full load current.

### **2.7 HARDWARE**

- A. Corrosion-resistant cadmium plated grease plugs shall be provided for relubrication of bearings.
- B. An external shaft flinger shall be provided on the shaft to prevent entrance of moisture or dust into the bearings.
- C. All motors Frame 182T and larger shall have lifting eyebolts for lifting the entire motor.

- D. An easy-to-read nameplate shall be provided on each motor and shall include at least the following information:
1. Horsepower
  2. RPM
  3. NEMA Design
  4. Phase
  5. Hertz
  6. Service Factor
  7. Ambient Temperature
  8. Frame Size
  9. Duty
  10. Class of Insulation
  11. Locked KVA Code
  12. Full Load Amps
  13. Model or Catalog Number
  14. Bearing Identification
  15. Guaranteed Minimum Efficiency
  16. Nominal Efficiency
  17. Voltage

## 2.8 MOTOR CONSTRUCTION

- A. Motors shall be dynamically balanced to limits as indicated below:

Speed	Maximum Amplitude (Peak-to-Peak)
3500 & Above	.0010
1700 to 3499	.0015
Less than 1700	.0020

## 2.9 FINISH

- A. All external surfaces shall be prime painted with red oxide zinc chromate primer to prevent corrosion.
- B. The finish coat of paint shall be a full-gloss epoxy enamel paint. External finish shall protect against moisture and have superior heat resistance to withstand the effects of sunlight and outdoor weathering without chipping or cracking.

## 2.10 EFFICIENCY

- A. Motors furnished shall meet or exceed the efficiency listed on the following Table.

**HIGH EFFICIENCY MOTORS**

HP	3600 RPM EFFICIENCY		1800 RPM EFFICIENCY		1200 RPM EFFICIENCY	
	NOMINAL	MINIMUM	NOMINAL	MINIMUM	NOMINAL	MINIMUM
1	81.5	78.5	84.0	81.5	78.5	75.5
1.5	81.5	78.5	84.0	81.5	84.0	75.5
2	84.0	81.5	84.0	81.5	86.5	84.0
3	86.5	84.0	88.5	86.5	88.5	86.5
5	88.5	86.5	90.2	88.5	88.5	86.5
7.5	88.5	86.5	90.2	88.5	88.5	86.5
10	88.5	86.5	90.2	88.5	90.2	88.5
15	90.2	88.5	91.7	90.2	90.2	88.5
20	90.2	88.5	91.7	90.2	91.7	90.2
25	90.2	88.5	93.0	91.7	91.7	90.2
30	91.7	90.2	93.0	91.7	91.7	90.2
40	91.7	90.2	93.0	91.7	93.0	91.7
50	91.7	90.2	94.1	93.0	93.0	91.7
60	93.0	91.7	94.1	93.0	93.0	91.7
75	94.1	93.0	94.1	93.0	94.1	93.0
100	94.1	93.0	95.0	94.1	94.1	93.0
150	94.1	93.0	95.0	94.1	94.1	93.0
200	94.1	93.0	95.0	94.1	95.0	94.1
250	95.0	94.1	95.0	94.5	-	-

**END OF SECTION**

**SECTION 211300****AUTOMATIC SPRINKLER SYSTEMS****PART 1 – GENERAL****1.1 WORK INCLUDED**

- A. This specification, in conjunction with the contract drawings and all other specifications indicate materials and operations required for the installation of automatic sprinkler systems, including design, shop drawings, equipment, underground supply system, pipe and fittings above ground, fire department connections, sprinkler systems, guard rail, operating instructions, identification, tests, and sterilization of piping and system.
- B. Any variation of the specification's intent or apparent conflict from this specification shall be submitted to the ARCHITECT/ENGINEER for written response. The response shall be incorporated into the drawings and shall be the final word on the item. The Contractor shall incorporate any change at no charge to the Owner.

**1.2 REFERENCES**

- A. This specification section is not limited to the following specification:
  - 210000 – PIPE AND PIPE FITTINGS
  - 210500 – GENERAL FIRE SUPPRESSION REQUIREMENTS
  - 210513 – COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT
- B. The current editions of the following standards are a part of this specification.
  - 1. National Fire Protection Association (NFPA) Standards.
    - a) 13 Standard for the Installation of Sprinkler Systems.
    - b) 24 Private Fire Service Mains.
    - c) 70 National Electrical Code.
    - d) 72 National Fire Alarm Code.
    - e) 25 Standard for Inspection, Testing and Maintenance of Water Based Fire Protection Systems.
  - 2. American Water Works Association Standard Specifications.
    - a) C600 Standard for the Installation of Ductile-Iron Water Mains and Their Appurtenances.
    - b) C151 Ductile-Iron Pipe
    - c) C110 Ductile-Iron and Gray Iron Fittings.
    - d) C111 Rubber Gasket Joints for Ductile-Iron and Gray Iron Pressure Pipe and Fittings.
    - e) C104 Cement-Mortar Lining for Ductile-Iron and Gray Iron Pipe and Fittings.
    - f) C500 Metal Seated Gate Valves for Water Supply Service.
    - g) C601 Standard for Disinfecting Water Mains.
- C. Underwriters' Laboratories, Inc. (UL), Publication: Fire Protection Equipment List.
- D. Factory Mutual System Publication: Approval Guide.

- E. American Insurance Association Publication: Internal cleaning of sprinkler piping (GP-4).

### 1.3 SYSTEM DESCRIPTION

#### A. Design

1. The designer of the fire protection systems shall be:
  - a) A registered Professional Fire Protection Engineer in the State of New Mexico. The registered Professional Engineer shall stamp all plans.
2. The contractor is responsible for the design and installation of the fire protection system in accordance with these specifications and the contract drawings. The Contractor shall coordinate with architectural, civil, mechanical, and electrical, design and construction documents, to ascertain the required information, to affect a properly designed fire protection system for the building construction and occupancy classification.
  - a) The contractor is responsible to design the automatic sprinkler system in accordance with these specifications and the contract drawings. The contractor shall refer to all architectural, mechanical, and electrical drawings, to ascertain the required information, to affect a properly designed sprinkler system for the building construction and occupancy classification.
3. The design of fire protection systems shall be complete with all necessary accessories for proper operation and shall include seismic support details.
4. The fire protection water supply lines, controlling devices, protective devices, alarm systems, supervisory devices, and related equipment shall be compatible so that all equipment will function together as specified.
5. The design shall comply with all mandatory, advisory interpretations, and recommended applicable rules of the latest editions of the referenced codes and standards in Section 1.3, "References," except where otherwise noted on the drawings or specified herein.
6. The Contractor shall produce design drawings that indicate the extent and arrangement of the fire protection system.
7. The contract drawings indicate the extent and general arrangement of the automatic sprinkler systems.

#### B. Spacing and Pipe Sizing

1. Unless otherwise specified or shown on the drawings, the sprinkler system shall be a wet pipe system, utilizing a Light Hazard hydraulic design.
2. Hydraulically system shall be designed on the contract drawings having the following characteristics:
  - a) The design area shall be the hydraulically most demanding "rectangular area" having a dimension parallel to the branch lines equal to 1.4 times the square root of the area of sprinkler operation.
  - b) Maximum water flow velocity shall not exceed 20 feet per second in any sprinkler system piping of hydraulically designed systems.
  - c) The hose allowance shall be added to the sprinkler requirement at the point(s) where the hose station(s) connect(s) to the sprinkler system. The selected hose station(s) shall be within or nearest to the area of sprinkler application.
  - d) Hydraulic design shall be based upon the water supply data shown on the drawings or obtained from the local Municipal Water Department.

- e) Hydraulic calculation methods shall be used as a minimum for Light Hazard, wet-pipe systems, unless otherwise specified. The minimum operating area allowed shall be either 1500 feet<sup>2</sup> or the entire area for smaller systems. No allowances or reductions shall be permitted without written approval from the ARCHITECT/ENGINEER.
  - f) Extend all (regardless of job size) hydraulic calculations back to the effective point of connection including the sprinkler lead-in to the fire water main supplying the building, unless indicated on the contract drawings.
  - g) The distance between sprinklers either on branch lines or between branch lines shall not be less than 6 feet distance apart.
- C. Seismic Protection
- 1. Seismic protection for automatic sprinkler systems is required for all new systems.
    - a) Seismic separation joints are required in areas separating the modified area of the sprinkler system and that area which is not to be upgraded for seismic protection.
    - b) The installation guidelines for seismic protection in NFPA 13 shall be used. Where an alternative method (other than NFPA 13) of providing seismic protection of a sprinkler system is to be used, only UL Listed or FM Approved material shall be permitted. The alternative method shall have a design based on a dynamic seismic analysis certified by a registered Professional Engineer in the State of New Mexico and the registered PE shall stamp all drawings.
- D. Protection of Areas Subject to Freezing
- 1. All anti-freeze systems require the installation of a reduced pressure backflow prevention (RPBFP) device. If a RPBFP is installed on the entire sprinkler system, then no additional RPBFP is required for the anti-freeze system.
  - 2. Gridded or looped dry pipe or preaction systems are not allowed. The design for these systems shall be of the conventional tree design.
- E. Fire Department connections shall be as follows:
- 1. Install Fire Department connections, where shown on the drawings.
  - 2. When the sprinkler system hydraulic demand (not including exterior hose demand) exceeds 1000 gpm, a 6-inch 3-way Fire Department connection shall be provided.
  - 3. A single fire department connection shall be provided to supply all fire protection systems for a building that has greater than 5 sprinkler risers.
- F. Elevator Shafts and Machine Rooms
- 1. Sprinklers are required at the tops of all elevator shafts and in the elevator equipment rooms. Sprinklers shall be protected from freezing.
  - 2. Provide an OS&Y gate valve to shut off all sprinkler water flow into the elevator shaft and into the elevator machine room. Where possible, piping should be arranged such that a single valve can shut off water to both locations.
  - 3. The valve(s) shall be at a readily accessible location, no more than 7'0" above finished floor, inside a clearly marked wall cabinet.

## 1.4 SUBMITTALS

- A. Shop Drawing Submittals
1. Provide as required by Division 1, Descriptive Submittals, to the ARCHITECT/ENGINEER.
  2. As soon as practicable after award of contract and prior to fabrication, contractor shall submit to the ARCHITECT/ENGINEER for approval, complete shop drawings, manufacturers' catalog data, system and component operating instructions and hydraulic calculations for the sprinkler system and underground piping shown on plot plans.
  3. NO INSTALLATION WILL BE PERMITTED prior to the ARCHITECT/ENGINEER approval of complete shop drawings.
- B. Presentation:
1. New Sprinkler Systems
    - a) New drawings shall be identical in size, scale, orientation, and title as the original building construction contract drawings unless otherwise noted.
- C. Drawing Details
1. Unless otherwise specified or shown on drawings, new floor plans and full height cross sections shall be drawn at a scale of 1/4" = 1'-0" and arranged such that the north arrow points to the top or to the left of the sheet. Other details shall be drawn to a larger scale, as required. Riser elevation details shall be drawn to a scale of 1/2" = 1'-0"
  2. No more than one building or one floor shall be shown on a sheet.
  3. Drawings shall show all details required and recommended by NFPA 13, for "Working Plans" in addition to the following:
    - a) A name or room number shall appear in each room; and a scaled key plan, oriented the same as the floor plan, shall appear on each partial plan sheet.
    - b) All obstructions to the sprinkler layout shall be shown, including but not limited to, HVAC ducts, lighting, electrical buss ducts.
    - c) Building column lines shall be labeled.
    - d) Existing work and new construction shall be clearly differentiated on the drawings (where applicable).
    - e) All lines and details shall be drawn; "opposite hand" or mirror image IS NOT acceptable -- separate drawings shall be made.
    - f) All pipe lengths shall be shown, center-to-center of fittings.
    - g) Where more than one type of pipe is used, each piece of pipe shall be identified as to type on the drawings.
    - h) The drawings shall be kept neat and well arranged, with legible notes and figures to permit photographic reduction to one half size or smaller.
    - i) No lettering shall be smaller than 1/8 inch.
- D. Plot Plans
1. Plot plans shall be drawn to 1" = 20'-0" unless otherwise shown on the contract drawings.
  2. Previous references to orientation, legibility, and lettering shall apply.
  3. Plot plans shall show all details required by NFPA 13 and 24.

- E. As-Built Drawings
  - 1. Upon completion of the work, the Contractor shall revise all drawings to agree with the construction as actually accomplished. The notation "As-Built" shall be entered in the revision block, dated and initialed.
  - 2. The As-Built drawings shall show the entire sprinkler system as it existed at the completion of the contract work.
  - 3. The original As-Built drawings shall be delivered as directed by the ARCHITECT/ENGINEER.

## **1.5 ALTERNATES/ALTERNATIVES**

- A. Where specific manufacturers or model numbers are mentioned in these specifications, proposed substitutions shall be included in the submittal package furnished to the ARCHITECT/ENGINEER for approval after contract award.
- B. If UL-listed or FM-approved equipment is commercially available, none other will be approved.

## **1.6 WARRANTY**

- A. All sprinkler system components furnished under this contract shall be guaranteed against defective design, materials, and workmanship for the full warranty time, which is standard with the manufacturer and/or supplier, but in no case less than one year from the date of system acceptance.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. Materials and equipment used in the installation of the sprinkler system shall be new and listed by the UL Fire Protection Equipment Directory or the FM Approval Guide, latest edition. The standard products and the latest design of the manufacturer shall be used, and installed per their listing, approval, or manufacturer recommendations. All products listed or approved by prior editions of the UL Director of FM Approval Guide will not be acceptable, if not listed or approved in the most recent edition of the directory or approval guide.
- B. Where two or more units of the same class of equipment are required, these units shall be products of the same manufacturer (e.g., couplings shall be from one manufacturer.) All materials shall be installed per their listing or approval and per the manufacturer's recommendations and specifications.
- C. Tape for screwed joints shall be minimum ½-inch wide.
- D. Corrosion protection tape shall be Scotchwrap 51, manufactured by 3M Company or approved equivalent.

### **2.2 SPRINKLERS**

- A. Types



1. Unless otherwise specified, allowed per other section of this document, or shown on the drawings, sprinklers shall be nominal, ½-inch orifice, automatic, closed-head sprinklers rated at 155°F (68°C) Quick Response, frangible bulb type fusible element.
  2. Higher temperature rated sprinklers shall be installed where heads are exposed to high ambient temperature, exposed to the direct rays of the sun, beneath skylights or windows and installed in the vicinity of heating equipment, or in attics. The sprinkler temperature chosen shall be a minimum of 50°F above the maximum ambient temperature, and no greater than 100°F above the ambient conditions, unless specifically directed by NFPA 13.
  3. Rooms containing electrical equipment shall be protected with sprinklers having the following minimum temperature ratings, but no less than 50°F above normal ambient room temperature:
    - a) Transformer and Switchgear rooms; 212°F (100°C)  
Elevator machine rooms
    - b) Computer rooms 155°F (68°C) QR
    - c) Top of elevator shafts 212°F (100°C)
  4. On-Off sprinklers are not allowed. FM approved or UL listed on-off sprinkler systems, like the Viking FireCycle (or approved equal), are allowed.
  5. Quick Response (QR) sprinklers, where specified on the drawings, shall have a Response Time Index (RTI) of 50 or less in English units and 28 or less in metric units.
  6. Sidewall sprinklers shall be Underwriters' Laboratories listed or Factory Mutual approved for Ordinary Hazard Occupancy.
  7. Extended coverage sprinklers are not allowed.
  8. Only sprinklers with a "Belleville" type seal shall be used. No O-Ring sealed sprinklers shall be allowed either in "crush" seals or "radial" seal styles. Sprinklers shall be of all brass frame construction with a coated metal to metal seating mechanism.
  9. Only sprinklers with integral shields listed by UL as "intermediate level" sprinklers or by FM as "racked storage" sprinklers are acceptable indoor where shield are required over ordinary sprinklers. Shop-made water shields are not allowed, nor are after market attachments designed as water shields. "Heat collection devices" for use with sprinklers shall not be allowed.
- B. Protection Against Freezing
1. Horizontal dry sidewall sprinklers shall be used in lieu of antifreeze loops for narrow unheated areas adjacent to heated areas, such as docks, covered loading platforms, vehicular air locks, elevator hoistways, and gas bottle or other storage sheds.
  2. The depth of the protected space shall not exceed 10 feet.
  3. The dry sprinkler shall extend a minimum of 12 inches into the heated space. For refrigerated spaces, the length dry sprinklers shall extend into the heated space shall be as specified by the ARCHITECT/ENGINEER.
- C. Position and Finish
1. Sprinklers installed on exposed piping shall be manufacturer's standard finish pendent sprinklers. Sprinklers and escutcheons installed below dropped ceilings shall have a finish matching the color of the ceiling tile. Only factory applied finishes shall be acceptable. If the factory has a finish that cannot match the ceiling tile color, standard finish sprinklers are allowed.

2. In rooms where sprinkler heads penetrate a suspended ceiling, only quick response, semi-recessed or recessed sprinklers are acceptable. Standard pendant sprinklers with “cup and skirt” escutcheons, one-piece escutcheons, or flush or concealed sprinklers are not allowed.
3. Escutcheons, head guards, and water shield from the supplied sprinkler manufacturer shall be used solely with the installed sprinkler. No after market escutcheons, head guards, or water shields are allowed.
4. Head guards shall be two-piece, universal attachments, bolted in place on the sprinkler. “Snap-on” one-piece units are not allowed.

### **2.3 PIPE**

- A. Pipe for installation above ground shall be metal conforming to the requirements of NFPA 13. No plastic pipe is permitted in any location whether or not permitted by NFPA. Pipe shall be listed by UL and be FM approved, and installed per its listing and approval and meet the following requirements:
  1. Mechanical rolled groove pipe or cut groove pipe shall not be used at fire protection risers or for segmented arcs. Use swing jolt at locations of segmented arcs.
  2. Unless otherwise specified, the minimum steel pipe wall thickness shall be Schedule 10 for pipe sizes 3 inches or larger. Pipe sizes smaller than 3 inches shall be Schedule 40. Threaded or cut groove steel pipe shall be Schedule 40 for sizes less than 8 inches and a minimum of Schedule 30 in sizes 8 inches and larger for pressures up to 300 psi.
  3. Mechanical rolled groove pipe or welded pipe shall be a minimum of Schedule 10 for sizes 3 inches up to 5 inches, 0.134-inch wall thickness for 6 inches, and 0.188-inch wall thickness for 8- and 10-inch pipe for pressures up to 300-psi.
  4. Steel pipe, installed for the water motor alarm line, piping from drain line valves and inspector’s test valves, dry pipe and preaction sprinkler system piping, and where pipe is exposed to outdoor weather, etc., shall be internally and externally galvanized. Galvanized fittings are required where galvanized piping is used. Any piping leading to a pressure-operated waterflow indication device shall also be galvanized. The starting point is on the alarm connection to the alarm check valve.
- B. Mechanical rolled groove pipe or cut groove pipe shall not be used at fire protection risers or for segmented arcs. Use swing jolt at locations of segmented arcs.

### **2.4 PIPE FITTINGS**

- A. Pipefittings for installation above ground shall conform to the requirements of NFPA 13 and shall be FM approved or UL listed.
  1. Mechanical groove couplings are required on all 4 inches and larger pipe.
  2. Plain-end pipe couplings shall not be used in any new installation.
  3. Galvanized pipefittings shall be installed where galvanized piping is specified.
  4. Welded branch outlet fittings (weld-o-lets, groove-o-lets, etc) shall be minimum Schedule 10 for pipe sizes 3 inches or larger. Pipe sizes smaller than 3 inches shall be Schedule 40 standard wall pipe thickness. Welded outlets shall be UL listed or FM approved, affixed with the UL or FM identification stamps, and pressure rated for 300-PSI maximum.

5. Adjustable, two-piece drop nipples shall not be used. All drop nipples shall be one-piece, non-adjustable units with a minimum 1-inch diameter.

## **2.5 PIPE HANGERS, SUPPORTS AND SEISMIC BRACING**

- A. Pipe hangers, and hangar assemblies shall be UL listed or FM approved.
- B. C-clamps and beam clamps shall have lock nuts and retaining straps, or clips, and pipe rings shall be of the solid-band adjustable swivel type.
- C. Provide rod-ceiling plates at finished ceilings for coach screw rods, expansion shields, and toggle hangers.
- D. All seismic bracing devices and flexible couplings shall be specifically UL listed or FM approved and installed per their listing or approval.
- E. When fastening hangars to purlins, bolt-through fastening methods shall be used. Beam clamps with restraining straps shall not be used in any circumstance.
- F. All seismic brace members shall be continuous. Under no circumstances shall members be spliced or offset.
- G. Tension-only seismic bracing systems shall meet the following.
  1. The tension-only system shall be UL or FM approved for seismic service, and installed in accordance with listing limitations and installation instructions.
  2. A means to prevent vertical motion due to seismic forces shall be installed at the brace location.
  3. Two tension only braces shall be installed in opposing directions at each brace location.

## **2.6 FIRE PROTECTION CHECK VALVES**

- A. Check valves in sprinkler system shall be UL listed or FM approved, have hand hole covers to provide adequate access to facilitate inspection and repair, without the removal of the valve from the system, and shall be listed for installation in the vertical or horizontal position. Wafer check valves are unacceptable. All check valves shall have a working water pressure of 250 PSI.
- B. Alarm check valves (wet pipe, dry pipe, deluge, preaction, etc.) shall be provided on all sprinkler risers and have the following.
  1. The alarm check valve (ACV) shall be equipped with a removable hand hole cover assembly and shall be listed for installation in the vertical or horizontal position.
  2. The ACV shall be equipped with gauge connections on the system side and supply side of the valve clapper.
  3. ACV trim piping and fittings shall be internally and externally galvanized.
  4. Ported alarm connections on the ACV shall be to a retard chamber to absorb variable pressure surges.
  5. Only “Flange x Flange” ACV devices shall be installed.

6. Wet-pipe systems shall use a variable-pressure alarm check valve. Plain-type check valves are not allowed. Sprinkler alarm valve shall be equipped with an external bypass to eliminate false water flow alarms.
- C. Backflow prevention devices shall be installed on all sprinkler systems as follows.
1. A reduced pressure backflow prevention assembly (RPBFP) shall be installed to prevent cross-connection contamination between potable water systems and any fire sprinkler system, at the service connection for the fire sprinkler system.

## **2.7 FIRE PROTECTION INTERIOR CONTROL VALVES**

- A. Each system shall have interior control valves as follows:
1. A control valve shall be installed for isolation of each floor of multistory buildings.
  2. Interstitial spaces, in-rack sprinkler systems, mezzanines, etc., shall have control valves for system isolation at the feed-main.
  3. All control valves shall be provided with an electric valve supervision device, connected to the Fire Alarm System.
  4. All inside control valves shall be OS&Y. Butterfly valves are not permitted. Valves shall be manufactured in accordance with AWWA Standard C500 and have a clear waterway equal to the full nominal diameter of the valve. Valves shall be provided with a handwheel, with arrow cast in metal to indicate direction of opening.

## **2.8 SUPERVISORY DEVICES**

- A. When specified on the contract drawings, supervisory devices shall be compatible with the Fire Alarm System.
- B. Provide the equipment listed below.
1. Electric valve supervision switches shall be installed for all internal (inside) and external (outside) fire protection valves 2-1/2 inches or larger. The devices shall be electrical; single-pole, double-throw; with normally closed contacts and include design that signals controlled valve is in other than fully open position.
  2. For wet pipe sprinkler systems, install vane-type waterflow alarm initiation devices with 250-psig pressure rating and designed for horizontal or vertical installation. Include two single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts and complete with tamperproof cover that sends signal if removed.
  3. All vane type waterflow alarm initiation devices shall be equipped with an adjustable delay of audible alarm initiation. Adjustment range shall be from 0 to 120 seconds. Vane type waterflow switch shall be Potter Model VSR-F or approved equal.
  4. Waterflow vane-type alarm initiation devices shall be labeled as to the correct orientation of flow when mounted on system piping. When drilling of the system riser it is necessary to mount flow switch, the drilled out disc (coupon) shall be retrieved and attached to the mounting u-bolt of the flow switch.
  5. Where pressure operated waterflow alarm initiation devices are used, any valve installed upstream of the device on the alarm line shall be electrically supervised, using the Potter Model BVS or approved equal. Pressure operated alarm initiation devices shall be an electrical-supervision type, waterflow switch with

retard feature. The device shall include single-pole, double-throw, normally closed contacts and design that operate on rising pressure and signals waterflow.

a) EXCEPTION: Where the waterflow alarm initiation device is used only for the purpose of an outside electric bell in lieu of the water motor gong device.

6. Any device that is to be installed in a hazardous location defined by NFPA 70 shall be rated for occupancy.

## **2.9 FIRE DEPARTMENT CONNECTIONS**

- A. Fire Department connections shall have a minimum of two 2-1/2-inch inlets with National Standard Hose (NWSH) threads, internal double clapper check valve, brass plugs, and attached chains.
- B. Fire Department connections shall be installed at each new alarm check valve, dry pipe valve, deluge and preaction valve and standpipe, unless the sprinkler system is supplied by a Fire Department connection in the yard main, or as otherwise noted in NFPA 13.
- C. The completed installations shall include a metal sign or escutcheon plate, with raised lettering, marked "FIRE DEPARTMENT CONNECTION STANDPIPE-AUTO S0KR," "AUTOMATIC SPKR," or "STANDPIPE," as appropriate. Additional signs for systems such as foam water sprinkler systems or other alternative designed systems, as required by other NFPA Standards, shall also be provided by the Contractor where required.

## **PART 3 – EXECUTION**

### **3.1 INSTALLATION**

- A. Responsibilities
  1. The Contractor is responsible for the installation of the automatic sprinkler system in accordance with these specifications and the contract drawings. The Contractor shall coordinate with architectural, mechanical, and electrical, design and construction documents, to ascertain the required information, to effect a properly designed and installed sprinkler system for the building construction and occupancy classification.
  2. The installation of the automatic sprinkler system shall be complete with all necessary accessories for proper operation and shall be accomplished by a licensed sprinkler contractor or licensed company regularly engaged in this type of work, and in accordance with requirements of the National Fire Protection Association Standards (NFPA).
  3. An individual with a minimum NICET Level II shall supervise the installation.
  4. The fire protection system installation shall be coordinated with the other trades (mechanical, electrical and structural, etc.).
  5. The installation shall comply with all mandatory, advisory interpretations, and recommended applicable rules of the latest editions of the standards listed in Section 1.3 of this document, except where otherwise noted on the drawings or specified herein.
- B. Contamination and Obstruction Prevention
  1. Pipe interiors shall be kept free of debris.

- C. Pipe and Fittings Aboveground
1. Pipe, fittings, and hangers shall be installed where shown on the drawings and in accordance with the requirements of NFPA 13.
  2. Overhead sprinkler piping, drain and test piping, fire department connection piping, etc. installed through exterior walls shall be galvanized. All sprinkler piping shall be substantially supported from building structure and only UL listed or FM approved type hangers shall be used. Sprinkler lines under ducts shall not be supported from ductwork but shall be supported from building structure (with trapeze hangers where necessary).
  3. Flanged Fittings or Mechanical Groove Couplings
    - a) Flanged fittings or mechanical groove couplings shall be used at the base of risers, in the risers of multiple-story sprinkler systems at each floor-system connection, and in feed main. Flanged fitting shall be used for alarm valve assemblies.
    - b) A flanged tapered reducer shall be installed at the flange and spigot piece when riser is smaller than the underground supply line.
    - c) Pipe shall be installed straight and true with no greater deflection at mechanical groove pipe couplings than is recommended by the manufacturer.
    - d) Pipe end couplings are not acceptable.
    - e) Only rigid-type mechanical couplings shall be used, unless specifically directed by NFPA 13 such as for specific seismic locations. Only in those areas identified by NFPA 13 where flexible type mechanical couplings are specified will the use of flexible couplings be permitted. All other parts of the system shall use rigid-type mechanical groove couplings.
  4. Pipe Hangers and Anchors
    - a) Hanger rods for all equipment, pipes, ducts, trapezes, vibration isolators, etc., shall be installed straight, true and plumb. Do not bend or flex hanger rods to accommodate sloping structures, avoid obstacles, or for any other purpose. Where necessary, utilize swivel beam clamps, beveled or swivel hardware, angled, swivel or hinged brackets spanning members or other appropriate means of connection.
    - b) Offsets in hanger rods will not be permitted.
    - c) Concrete anchors shall be installed by drilling and installing a UL listed or FM approved anchor. Explosive driven fasteners as a method of installing anchors or hangers shall not be permitted.
    - d) Supports, hangers, braces, etc., shall be attached to the building primary structural members only.
    - e) When fastening hangers or braces to bar joists, the fastener shall be located within 4 inches of the panel point on the bar joist.
    - f) All piping larger than 4 inches in diameter shall be supported from a minimum of two-bar joists when run parallel to a bar joist.
  5. Welded Joints
    - a) Welded joints are acceptable when shop fabricated in conformance to provisions of NFPA 13.
  6. Screwed Joints
    - a) Teflon paste and tape shall be used as pipe-joint compound at screwed joints.
  7. Bushings
    - a) Bushings shall not be permitted.

8. Control Valves
  - a) Control valves shall be provided with identification signs describing the areas protected. Where the valve location is concealed above the ceiling, a sign below the ceiling shall indicate the valve location and identify the protected area.
9. Wall, Ceiling, and Floor Penetrations
  - a) Pipe sleeves shall be installed and properly secured in place at all points where sprinkler piping passes through concrete or masonry construction. Sleeves through all walls and floors shall provide adequate clearance for slight movement of the piping. The guidance in NFPA 13 guidance for seismic areas shall be followed.
  - b) Sleeves for pipes passing through floors of concrete or waterproof construction shall project 3 to 6 inches above floors to prevent leakage. Sleeves through walls shall be cut flush with each surface unless otherwise specified. Sleeves shall be caulked to make penetration watertight.
  - c) Unless otherwise specified, sleeves shall be of Schedule 40 steel and a minimum of two pipe sizes larger in diameter than the passing pipe.
  - d) Holes through walls, floors, and ceilings of other than concrete or masonry construction shall be large enough to accommodate pipe expansion. Holes through existing concrete floors and walls shall be core drilled to provide clean, neat holes. Spaces between pipe and sleeve or pipe and opening for floors and exterior walls shall be filled with a non-hardening sealant material and made watertight.
  - e) Where fire rated barriers are penetrated, a UL listed fire barrier system shall be installed to retain the fire resistance rating of the barrier.
  - f) Escutcheons shall be provided at wall, ceiling and floor penetrations of piping in occupied areas.
10. The cutting of structural members for the passage of sprinkler piping or for pipe-hanger fastenings is not permitted.
11. Joints
  - a) Joints shall be made in accordance with the requirements of NFPA 13.
  - b) Joints shall be left exposed until final inspection and testing have been witnessed.
  - c) Swing joints are preferred for connecting pendent sprinklers to branch lines.
12. Dielectric unions shall be used to connect dissimilar metals (such as steel to copper) to prevent electrolytic action.

### **3.2 SPRINKLER SYSTEM ALARM CHECK VALVES**

- A. Alarm Check Valves (ACV) shall be provided with internally and externally galvanized trim piping and fittings, pressure gages, a retarding chamber, water motor gong, alarm switch, testing bypass, and all necessary pipe, fittings and accessories.
- B. The retarding chamber drain line shall be piped independently of the main drain line.
- C. The drain line from the water motor gong shall be piped to discharge through the wall as close to the grade line as possible.

- D. Piping between the ACV and a pressure actuated alarm-initiating device shall be galvanized piping not less than 3/8-inch nominal pipe size.
- E. Piping supplying the retard chamber, water motor gong, and water motor gong drain shall be galvanized. Galvanized fittings are to be used where galvanized piping is required.

### **3.3 SPRINKLERS**

- A. Pendent sprinklers below ceiling shall be aligned, and parallel to ceiling features, walls, etc. In areas without a suspended ceiling, install sprinkler piping as high as possible, using necessary fittings and auxiliary drains to maintain maximum clear headroom.
- B. Where two sprinkler systems abut the pendent sprinklers shall be aligned in different directions to distinguish the boundaries of each sprinkler system.
- C. Sprinklers shall not be installed closer than 6 feet apart.
- D. Dry pendant and horizontal dry sidewall sprinklers shall only be installed in screwed tee fittings.
- E. Ceiling Areas: Where suspended ceilings are installed, the sprinkler contractor shall install pendent sprinklers as shown on the reflected ceiling plans. Where these plans do not specify the location of the pendent sprinklers, the Contractor shall obtain the reflected ceiling plans and design sprinkler locations at least six inches from ceiling tile edges, 2 feet 6 inches from HVAC supply and return louvers, dimension the locations, follow a repetitive pattern, and locate sprinklers along straight lines to the extent possible. Swing joints shall feed pendant sprinklers from 1-inch outlet tees in branch lines.
- F. Stairs: Sprinklers shall be installed throughout stairways, and at every landing.

### **3.4 ELEVATOR SHAFTS AND MACHINE ROOMS**

- A. Sprinklers at the tops of all elevator shafts and in the elevator equipment rooms shall be protected from freezing.
- B. Provide an OS&Y gate valve to shut off all sprinkler water flow into the elevator shaft and into the elevator machine room. Where possible, piping should be arranged such that a single valve can shut off water to both locations, and shall be at a readily accessible location, no more than 7'0" above finished floor, inside a clearly marked wall cabinet.

### **3.5 DRAINS**

- A. Two-inch drains shall be installed on all main risers and downstream of any interior sectional valves and shall be piped to drain.
- B. A pressure gage cock and approved gage shall be installed downstream of interior sectional valves of 4-inch size and larger. 3/4-inch valve auxiliary drains with standard hose threads and caps shall be installed at all low points in the system, where more than five sprinklers are trapped. Where the capacity of trapped piping exceeds 20 gallons, the overflow shall be piped to drain.



- C. Inspector's test connections shall be installed on each sprinkler system as near the most hydraulically remote end of the system as possible. The orifice shall be sized to discharge a flow equivalent to the smallest orifice sprinkler in the system. The inspector's test valve shall be located not more than seven feet above the floor in a visible, easily accessible location. For antifreeze systems, the orifice shall be replaced by a plugged outlet.
- D. Drains shall be piped to discharge to drain, and the discharge shall be visible either by open-end or sight drain fitting.
- E. Drains and inspector's test connections through outside walls shall be run through the walls as close to the floor or grade line as possible, terminating with a 45-degree galvanized elbow turned down to splash blocks.
- F. Concrete splash blocks, 18" x 18" x 4" minimum in size, shall be installed under each drain or test outlet. The top of the block shall be 1 inch above grade, with a slope of 1/2 inch per foot away from the building wall.

### **3.6 FIRE DEPARTMENT CONNECTIONS**

- A. The check valve and normally open automatic ball drip (ABD) shall be located at points where they will not be subject to freezing temperatures, and the discharge from the ball drip shall be piped to drain. The ball drip shall close when the flow of water through the valve is in the range of 4 through 10 gpm. All ball drips shall be rated at 175 psi. Use valve- drains in place of automatic ball drip drains when the static head of water above the ABD will exceed 11'6". Check valves shall be UL or FM approved and shall have bodies with the UL or FM stamp.
- B. The Fire Department connection shall be installed between 18 inches and 36 inches above grade.

### **3.7 IDENTIFICATION**

- A. Control, drain, test, and alarm valves and zone waterflow switches shall be provided with identification signs of the standard design adopted by the automatic-sprinkler industry, or their equivalent.
- B. A hydraulic data information nameplate shall be secured to the riser with durable wire, chain, or equivalent, directly above the controlling alarm check valve and shall include the following design data.
  - 1. Building designation
  - 2. Location of remote area
  - 3. Design density
  - 4. Area of application
  - 5. System demand (gpm and psi at base of riser)
  - 6. Data shall be permanently engraved on the nameplate as follows:
    - a) Material shall be durable plastic or aluminum; Minimum height of lettering is 1/8".
- C. The Contractor shall furnish and place in a plastic envelope attached to each sprinkler alarm check valve riser, one complete set of typed or printed maintenance and operating

instructions, a set of prints of the as-built working drawings and hydraulic calculations of the sprinkler system.

- D. Contractor shall supply each riser with a cabinet containing maintenance and repair equipment (spare heads, wrench, etc.)
- E. Each Contractor shall affix an identification tag on each system riser indicating
  - Name of the Contractor
  - Business Address of the Installing Contractor
  - Phone Number
  - 24-hour emergency contact phone number

### **3.8 FLUSHING**

- A. Before connecting sprinkler systems to the main supply, each sprinkler supply line shall be flushed out thoroughly by the Sprinkler Contractor through an unrestricted opening not less than 4 inches in diameter. Minimum flowing quantities are specified in NFPA 13.
- B. Failure to comply with this requirement shall necessitate flushing of the entire sprinkler system by the Contractor at no additional cost to the Owner.
- C. A 4-inch temporary pipe or two 2-1/2" fire hoses shall be provided by the Contractor to discharge water to a suitable location, as designated by the ARCHITECT/ENGINEER.

### **3.9 TESTING**

- A. Aboveground Tests:
  - 1. Prior to acceptance of the installation, the Contractor shall subject the system to the tests required by NFPA 13 for the completion of the Contractor's Material and Test Certificate. In addition, complete operating test of dry pipe, preaction, deluge, water-spray and foam water systems shall be performed.
  - 2. Hydrostatic testing shall be performed before any ceiling is installed below the sprinkler piping. Each water control valve shall be fully opened and closed under water pressure to ensure proper operation.
  - 3. Where sprinkler locations are roughed-in, using plugged drop nipples projecting below the level of the finished ceiling, the hydrostatic testing shall be performed two times.
    - a) First, after the system is completed using the plugged drops, and before the ceiling panels are installed.
    - b) Second, after the plugged drop nipples are cut to length for the finished ceiling, or replaced with other drop nipples of the correct length, and the sprinklers installed.
  - 4. The addition of sodium silicate (also known as water-glass) and related substances before hydrostatic testing, to stop water leakage, is not permitted.
  - 5. Pipe interiors shall be kept free of debris.
- B. Alarm Testing
  - 1. Contractor shall be responsible for testing new alarms and modified alarms installed under this contract. Defective alarms shall be replaced immediately.

**3.10 PROTECTION AGAINST FREEZING**

- A. Sprinkler piping passing through any unheated spaces in, under, or outside buildings exposed to freezing, shall be protected as shown on the plans or in accordance with the methods specified in NFPA 13. Exposed to freezing is defined as any location where the temperature may drop below (40°F) 5°C at any time during the year.
- B. Heating shall be provided for sprinkler-protected spaces in lieu of providing anti-freeze systems except where otherwise noted on the drawings or specified herein.

**3.11 PROTECTION FOR BACKFLOW PREVENTION**

- A. A reduced pressure backflow prevention assembly (RPBFP) shall be installed on all new systems and where shown on the drawings for modifications to systems to prevent cross-connection contamination between potable water systems and any fire sprinkler system. Install the RPBFP at the service connection for the fire sprinkler system or as noted on the contract drawings.
- B. RPBFP assemblies shall be either FM approved or UL listed and be approved by the Foundation for Cross-Connection Control and Hydraulic Research, University of Southern California (USC-FCCHR) and the International Association of Plumbing and Mechanical Officials (IAPMO).
- C. Backflow prevention assemblies used or installed under this contract shall be tested by a “Certified Backflow Control Assembly Tester” who possesses a current (within three (3) years from date of issuance) certificate that confirms successful completion of an approved training course.
- D. RDBFP assemblies shall be installed in accordance with AWWA Manual M14 requirements, or as directed by the SDR.
- E. If RDBFP devices will be installed outside the building they must be in heated enclosures and with adequate space for inspection, tests and maintenance.
- F. Adequate drainage shall be provided for RDBFP and meet the following:
  - 1. Discharge shall be piped full size (of the relief valve) and extended to a drain.
  - 2. Discharge piping shall be sloped 1/8” per foot and be Schedule 40, galvanized.
  - 3. French Drains are not allowed.
- G. The Contractor shall perform an operational test on any new backflow prevention assemblies used or installed under this contract.

**3.12 PAINTING AND LABELING**

- A. Contractor shall paint those portions of fire protection as required by Painting Specification 09900. Labeling shall be as follows:
  - 1. Sprinkler system (e.g., inspectors tests, drain valves) shall be labeled with all information required by NFPA Standard 13.
  - 2. Labeling shall be accomplished with the use of permanently marked weatherproof metal or rigid plastic identification signs. The signs shall be secured with corrosion-resistant wire, chain, or other approved means. These

signs shall be provided by the manufacturer, manufacturer's representative, or installer of the sprinkler system.

3. Sprinkler riser shall be labeled with building and sprinkler system riser numbers. Labeling shall be accomplished with the use of "Brady" or approved equal self-sticking labels. The color and size shall contrast the surface that it is applied to.

### 3.13 DISINFECTION

- A. Piping installed under this contract shall be disinfected per AWWA C651 before it is placed in operation, by using one of the following methods.
- B. Continuous Feed Method
  1. Place calcium hypochlorite in pipe sections when installing pipe or inject liquid chlorine into the system via the injection port. Pipe is filled with water and chlorine concentration shall remain at 10 mg/l for a minimum of 24 hours. During this time, all valves in new section will be cycled open and closed to allow for adequate disinfection. Valves connecting the new or repaired line with mains in active service shall remain closed to prevent chlorine pollution.
  2. Samples shall be drawn at 1-, 4-, 8-, 12-, 16-, 20-, and 24-hour marks to determine the chlorine concentration. Acceptable tests are the N-diethyl-p-phenylenediamine (DPD) drop dilution method (AWWA C651, Appendix A) or the High Range Test Kit. The tests shall be done by the Contractor.
- C. Slug Method
  1. Similar to the continuous feed method. Follow AWWA C651. Chlorine concentration to be 100 mg/l for a minimum of 3 hours. During this time, all valves shall be cycled open and closed to allow for adequate disinfection. Valves connecting new or repaired lines with mains in active service shall remain closed to prevent chlorine pollution.
  2. Samples shall be drawn every 15 minutes to determine concentration. Acceptable tests are the DPD drop dilution method or the High Range Test Kit. The tests shall be conducted by the Contractor.
- D. Repairing or Cutting into Existing Mains
  1. New interior piping surfaces shall be swabbed with a one-percent hypochlorite solution. The section being modified shall be subjected to a high chlorine disinfection process per AWWA C651. The concentration shall be a minimum of 300 mg/l for 15 minutes.
  2. Samples shall be drawn before the chlorine is injected and every 5 minutes thereafter. Chlorine concentration shall be tested by the Contractor using the High Range Test Kit.
- E. Flushing
  1. After the lines have been chlorinated using one of the above methods, it becomes necessary to flush the lines with water until test sample indicates that the water is suitable for drinking. The residual chlorine concentration in the water is to be between 0.2 and 2.0 mg/l, as measured using a Low Range Test Kit.
- F. Bacteriological Testing
  1. All new and modified water lines require testing for coliform organisms per AWWA C651. The testing shall occur after successful chlorination and flushing

of the lines. Samples shall be taken from the new line in sodium thiosulfate treated sterile bottles and analyzed as specified by APHA's Standard Methods for the Examination of Water and Wastewater.

2. Results shall be recorded with the original documentation of results attached. These will be used for auditing purposes.
3. Fire protection lines will not be accepted until a negative bacteriological test is performed. Lines will be chlorinated and flushed repeatedly, until such a negative test is accomplished.

**END OF SECTION**

**SECTION 213100****FIRE PROTECTION SYSTEM CENTRIFUGAL PUMPS****PART 1 – GENERAL****1.1 REQUIREMENTS**

- A. This specification deals with the installation of centrifugal pumps supplying water for private fire protection. Items considered include water supplies, suction, discharge and auxiliary equipment; power supplies, electric drive and control; acceptance tests, operation and maintenance. Pumps shall be installed in strict accordance with the requirements of the latest editions of the National Fire Protection Association, particularly Life Safety Code NFPA 101, NFPA 13, 20, 24, and 70.

**1.2 RELATED SECTIONS**

210000 - FIRE SUPPRESSION INDEX  
210500 - GENERAL FIRE SUPPRESSION REQUIREMENTS  
210513 - COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT  
211300 - AUTOMATIC SPRINKLER SYSTEMS  
220500 - PIPE AND PIPE FITTINGS  
220523 – VALVES

SEE DIVISION 26 FOR ELECTRICAL WORK RELATED TO THIS SECTION.

**1.3 SUBMITTALS**

- A. Shop drawing submittals shall include, but not be limited to, the following:
1. Fire and jockey pump cut sheets with all pump capacities, UL/FM approval, pump characteristics, features and accessories clearly indicated.
  2. Pump curves with selection point clearly indicated.
  3. Fire Pump Controller and remote annunciator cut sheets with features and options clearly indicated, wiring diagrams, nameplate text and a written system operational sequence.
  4. Jockey pump controller cutsheets with features and options clearly indicated.
  5. Electrical Standards: Provide electric motors and products which have been listed and labeled by Underwriter's Laboratories, Inc. (UL) and comply with National Electrical Manufacturers' Association (NEMA) standards.
  6. Certification, Pump Performance: Provide pumps whose performance, under specified conditions, is certified by the manufacturer.

**PART 2 – PRODUCTS****2.1 MATERIALS AND EQUIPMENT**

- A. Prior to shipment of new equipment, a complete plan and detailed shop drawing describing fire pump and jockey pumps, drivers, controllers, power supply, fittings, suction and discharge connections, and water supply shall be approved by the Engineer. All equipment and materials used in the installation of Centrifugal Fire Pump System shall be UL and/or FM. approved and shall be the standard product and latest design of

manufacturer. The Contractor shall furnish eight (8) copies of shop drawings and submittal data to the Architect for review. The pump manufacturer's representative shall be responsible for the startup, test and adjustment of the complete unit assembly including controls, as indicated in "Standard for Installation of Centrifugal Fire Pumps" NFPA 20.

1. Certified shop test curves showing head capacity, efficiency, and brake horsepower of the pump shall be furnished by the manufacturer to the purchaser. The purchaser shall furnish this data to the authority having jurisdiction.
- B. Pumps shall be provided with a nameplate.
- C. Manufacturers: Provide products complying with these specifications and produced by one of the following:
1. Pumps:
    - a. Allis-Chalmers Corporation
    - b. Aurora Pump Company.
    - c. Patterson
    - d. Peerless
  2. Fire Pump Controllers:
    - a. Firetrol, Inc.
    - b. Metron.

## 2.2 PRESSURE GAUGES

- A. A pressure gauge having a dial not less than 3-1/2 in. in diameter shall be connected near the discharge casting with a 1/4 in. gauge valve. The dial shall indicate pressure to at least twice the rated working pressure of the pump, but not less than 200 psi. The face of the dial shall read in pounds per square inch with the manufacturer's standard graduations.
- B. A compound pressure and vacuum gauge having a dial not less than 3-1/2 in. in diameter shall be connected to the suction pipe near the pump with a 1/4 in. gauge valve.
1. The face of the dial shall read in inches (mm) of mercury (Hg) or pounds per square inch for the suction range. It shall have a pressure range of at least twice the rated working pressure of the pump, but not less than 200 psi.
- C. Circulation Relief Valve: Each pump shall be provided with an automatic relief valve set below the shut-off pressure minimum expected suction pressure. It shall provide circulation of sufficient water to prevent the pump from overheating when operating with no discharge. A 3/4 in. automatic relief valve shall be used for pumps with a rated capacity not to exceed 2500 gpm. Provision shall be made for a discharge to outside.

## 2.3 PIPE AND FITTINGS

- A. Steel pipe shall be used aboveground and for connection to underground suction and underground discharge piping. To prevent tuberculation, suction pipe shall be galvanized or painted on the inside prior to installation, with a paint recommended for submerged surfaces. Thick bituminous linings shall not be used. Section 221000 - Water Supply Piping for piping description.

- B. All provisions for welded pipe shall be in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems."
- C. Suction pipe shall have a pressure rating not less than that required for yard piping. It shall be installed and tested in accordance with NFPA 24, "Standard for Private Fire Service Mains and Their Appurtenances."
- D. When the suction pipe and pump suction flange are not of the same size they shall be connected with an eccentric tapered reducer in such a way as to avoid air pockets.
- E. Control Valves: A listed O.S. & Y. gate valve shall be installed in the suction pipe. Butterfly valves are not permitted.
- F. The discharge assembly shall consist of pipe, valves, and fittings extending from the pump discharge flange to the system side of the discharge valve. The pressure rating of the discharge assembly shall be adequate for the maximum protection system. Steel pipe with flanges (flanges welded to the pipe are preferred), screwed or mechanical grooved joints shall be used aboveground. All pump discharge pipe shall be hydrostatically tested in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems" and NFPA 24, "Standard for Private Fire Service Mains and Their Appurtenances." A listed check valve shall be installed in the pump discharge assembly. A listed indicating gate valve shall be installed on the fire protection system side of the check valve.

#### **2.4 RELIEF VALVES**

- A. Where pumps are driven by constant-speed motors and the pump shut-off pressure plus the static suction pressure exceeds the pressure for which the system components are rated relief valves are required. Furnish and install a relief valve in the discharge of each pump set to open at 90 psig. Each relief valve shall be located between the pump and the pump discharge check valve and shall be so attached that it can be readily removed for repairs without disturbing the piping. Extend discharge piping to outside building in an approved manner.
- B. Pressure relief valves are of two types: The spring-loaded and the pilot-operated diaphragm type.
- C. The relief valve shall discharge into an open pipe or into a cone or funnel secured to the outlet of the valve. Water discharge from the relief valve shall be readily visible or easily detectable by the pump operator. Splashing of water into the pump room shall be avoided. If a closed-type cone is used, it shall be provided with means for detecting motion of water through the cone. A shut-off valve shall not be installed in the relief valve supply or discharge piping.

#### **2.5 HOSE VALVES**

- A. Hose valves shall be UL and/or FM approved. The number and size of hose valves used for pump testing shall be as shown on Drawings.
- B. Hose valve(s) shall have the NH standard external thread, for the valve size specified, as specified in NFPA 1963, "Standard for Screw Threads and Gaskets for Fire Hose Connections." The hose valve header shall be located outside and there is danger of



freezing, a listed indicating gate valve and drain valve or ball drip shall be located in the pipeline to the hose header.

## 2.6 SHOP TESTS

- A. Each individual pump shall be tested at the factory to provide detailed performance data and to demonstrate its compliance with specifications. Before shipment from the factory, each pump shall be hydrostatically tested by the manufacturer for a period of time not less than 5 minutes. The test pressure shall be not less than one and one-half times the head capabilities of the maximum diameter impeller for the casing at shut-off, plus the manufacturer's maximum allowable suction head but in no case less than 250 psi. Pump casings shall be essentially tight at the test pressure. During the test, no objectionable leakage shall occur at any joint.

## 2.7 HORIZONTAL OR VERTICAL PUMPS

- A. General: Horizontal or vertical pumps shall be split-case design. End suction pumps shall be single state, centerline discharge design manufactured to American National Standards Institute, Inc., Standard B73.1, "Specifications for Horizontal End Suction Centrifugal Pumps for Chemical Process." Pumps shall furnish not less than 150 percent of rated capacity of not less than 65 percent of total rated head. The shut-off head shall not exceed 120 percent of rated head for split-case pumps, not 140 percent for end suction pumps.
- B. Fire Pump Schedule: Fire Pump Aurora Series 485 capable of 250 gpm at 50 psi discharger pressure with 30 horsepower motor at 208 volt/3 phase.
- C. Fittings: Where necessary, the following fittings for the pump shall be provided by the pump manufacturer authorized representative.
1. Automatic air release
  2. Circulation relief valve
  3. Pressure gauges
    - a) The following fittings shall be provided where required or as shown on Drawings:
      - 1) Eccentric tapered reducer at suction inlet
      - 2) Hose valve manifold with hose valves
      - 3) Flow measuring device
      - 4) Relief valve and discharge cone
      - 5) Splash shield between pump and motor
    - b) Split-case pumps which are automatically controlled shall be provided with a listed float-operated air release not less than 1/2 in. in size, to automatically release air from the pump.
- D. Foundation And Setting
1. The pump and driver shall be mounted on a common base plate and connected by a flexible coupling. The base plate shall be securely attached to a solid foundation in such a way that proper pump and driver shaft alignment will be assured. The foundation shall be sufficiently substantial to form a permanent and rigid support for the base plate. The base plate, with pump and driver mounted on it, shall be set level on the foundation. Pumps and drivers shall be aligned in

accordance with the latest edition of "Hydraulic Institute Standards for Centrifugal, Rotary and Reciprocating Pumps."

## 2.8 JOCKEY PUMP

- A. General: Provide a complete and operational electric driven fire jockey pump and jockey pump controller as specified herein and as scheduled and as shown on the Drawings.
- B. Pump:
  - 1. The jockey pump 1-1/2 horsepower at 208 volt/3 phase shall be bronze fitted, horizontal regenerative, turbine vane type with cast iron casing, bronze impeller, stainless steel shaft, mechanical seals, grease lubricated ball-bearings and a relief valve. Jockey pump capacities shall be as scheduled on the Drawings. Pumps, casings, flanges, and mechanical seals shall be rated for operation with the working pressures scheduled.
  - 2. The jockey pump shall be mounted on a fabricated cast iron drip lip base and shall be close-coupled to an open dripproof motor. Motor electrical characteristics and capacity shall be as scheduled or listed on the drawings.
- C. Relief Valve: Provide the fire jockey pump with a factory-mounted bypass relief valve complete with piping. Set relief valve to relieve at a pressure of 25 psig above design total dynamic head to prevent motor overload and system damage.
- D. Controller: The jockey pump controller shall contain a FVNR magnetic starter with 3-phase overload protection, fused disconnect, control power transformer, H-O-A selector switch and an adjustable mercury-in-tube pressure control all housed in a NEMA 1 enclosure with door mounted disconnect handle.
- E. Field Service: The pump supplier shall provide pump checkout, start-up, testing and adjusting of system components and shall perform field certification testing on the installed jockey pump. The pump supplier shall also train the Owner's Engineer in the proper operation and maintenance of the jockey pump system.

## 2.9 ELECTRIC DRIVE CONTROLLERS AND ACCESSORIES

- A. General: This provides requirements for the installation and minimum performance of electric controllers, both automatic and non-automatic, and electric switching for electric motors driving fire pumps. Accessory devices, including alarm monitoring and signaling means are included when necessary to ensure the minimum performance of the aforementioned equipment. Motors shall be rated for continuous duty and shall not be used at voltages exceeding 110 percent of rated voltage. The pump manufacturer's representative shall supply a motor of a size compatible with duty intended. Motors shall be derated according to NEMA Standard MG1-Part 14 for use above 3300 ft. All electrical equipment shall comply with the latest provisions of NFPA 70, "National Electric Code."
- B. Controllers
  - 1. All controllers shall be specifically listed for electric motor-driven fire pump service. Any controller selected shall have a short-circuit current withstand rating at least equal to the available short-circuit current for the circuit in which it

- is used. All controllers shall be completely assembled, wired, and tested by the manufacturer before shipment from the factory.
2. All controllers shall be marked "Fire Pump Controller" and shall show plainly the name of the manufacturer, the identifying designation, and the complete electrical rating. It shall be the responsibility of the pump manufacturer or a representative to make necessary arrangements for the service and adjustment of the equipment during the installation, testing, and warranty periods.
  3. Controllers shall be located as close as is practical to the motors they control and shall be within sight of the motors. Controllers shall be so located or so protected that they will not be injured by water escaping from pumps or pump connections. Current-carrying parts of controllers shall be not less than 12 in. above the floor level.
  4. All switching equipment for manual use in connecting or disconnecting or starting or stopping the motor shall be externally operable as defined in NFPA 70, "National Electrical Code". The isolating switch shall meet requirements of this paragraph and paragraphs below. A wiring diagram shall be provided and permanently attached to the inside of the controller enclosure. All field wiring terminals shall be plainly marked to correspond with the wiring diagram furnished. Each motor control device and each switch and circuit breaker shall be marked to plainly indicate the name of the manufacturer, the designated identifying number and the electrical rating in volts, horsepower, amperes, frequency, phases, etc., as may be appropriate. The markings shall be so located as to be visible after installation. Complete instructions covering the operation of the controller shall be provided and conspicuously mounted on the controller. A manually operable motor circuit switch or a molded cast switch, either having a horsepower rating equal to the motor horsepower.
  5. The motor branch circuit shall be protected by a circuit breaker, as defined in Article 100 of NFPA 70, "National Electrical Code", which shall be connected directly to the load side of the isolating means and shall have one pole for each ungrounded branch circuit conductor.
  6. Alarm and Signal Devices on Controller: A pilot lamp shall be connected to a pair of power supply conductors directly on the line side of the motor starter F (load side of the circuit breaker). This lamp will indicate that the circuit breaker is closed and that power is available at the controller for starting. The lamp shall be accessible for replacement.
- C. Motor Starters: The motor starter shall be of the magnetic type with a contact in each ungrounded conductor. For electrical operation of reduced voltage starters, timed automatic acceleration shall not exceed 10 seconds. Starting resistors shall be designed to permit one 5-second starting operation in each 80 seconds for a period of not less than 1 hour. The operating coil for the main controller shall be supplied directly from the main power voltage and not through a transformer.
- D. Automatic Controller Accessories
1. Water Pressure Control: In the controller circuit there shall be provided a pressure-actuated switch having independent high and low calibrated adjustments. This switch shall be responsive to water pressure in the fire protection system. The pressure-sensing element of the switch shall be capable of withstanding a momentary surge pressure of 400 psi without losing its accuracy. Suitable provision shall be made for relieving pressure to the pressure-

actuated switch, to allow testing of the operation of the controller and the pumping unit.

- a) The pressure sensing line connection shall be made between the pump discharge check valve and the discharge control valve. Corrosion-resistant metallic pipe or tube and fittings shall be used for the pressure sensing line. This line shall be 1/2 in. nominal size, be suitable for the system pressure, and be made of material such as brass, copper or series 300 stainless steel.
2. With pumping unit operating the control c circuits leaving or entering the fire pump controller shall be so arranged as to prevent failure to start due to fault. Breakage, disconnecting, shorting of the wires or loss of power to these circuits may cause continuous running of the fire pump but shall not prevent the controller from starting the fire pump due to causes other than these external circuits.
3. For sprinkler systems where an automatically controlled pumping unit constitutes the sole supply, the controller shall be wired for manual shutdown. Manual shutdown shall also be provided where required by the authority having jurisdiction.
4. Shutdown shall be accomplished by manual operation of reset push-button on outside of controller enclosure, which, in the case of automatic controllers, shall return the controller to full automatic position.
5. Switch Location: Special precautions shall be taken in locating the pressure-actuated switch to prevent any water leakage from coming in contact with high-voltage components.
6. The low-voltage control circuit shall be supplied from the high-voltage source through a step-down control circuit transformer protected by suitable high-voltage fuses. Its current supply shall be interrupted when the isolating switch is in the open position.
7. For these controllers, specifications differ from 4.03. A pilot lamp shall be provided to indicate that power is available. The lamp operating voltage shall be less than the lamp voltage rating in order to ensure long life. The current supply for the lamp shall come from the secondary of the control circuit transformer through resistors, if found necessary, or from a small capacity step-down transformer which shall reduce the control transformer secondary voltage to that required for the pilot lamp.

### **PART 3 – EXECUTION**

#### **3.1 INSTALLATION AND TESTING REQUIREMENTS**

- A. Installation of centrifugal fire pump shall be in strict accordance with NFPA 20 and the contract documents.
- B. All equipment related to this section shall be installed and provided as described in the equipment schedule in the contract documents.

#### **3.2 HYDROSTATIC TESTS**

- A. Hydrostatic tests for fire pump piping shall be in accordance with NFPA 24 “Standard for Private Fire Service Mains and Appurtenances” and flushing of the piping assembly shall be conducted in accordance with the requirements of the applicable NFPA standards for

pressure and duration. Hydrostatic tests shall be verified by completion of the Contractor's certificate of material and test similar to NFPA 13. The installing Contractor shall furnish certificate of test prior to start of fire pump field acceptance test.

### **3.3 PUMP FIELD ACCEPTANCE TESTS**

- A. The acceptance test of the pump installation shall be the responsibility of the installing Contractor. The pump manufacturer or his representative shall be present for the acceptance test. The authority having jurisdiction shall be notified as to time and place of the field acceptance test.
- B. A copy of the manufacturer's certified pump test characteristic curve shall be available for comparison of results of field acceptance test. The fire pump as installed shall equal the performance as indicated on the manufacturer's certified shop test characteristic curve within the accuracy limits of the test equipment. The fire pump shall perform at minimum, rated and peak loads without objectionable overheating of any component. Vibrations of the fire pump assembly shall not be of a magnitude to warrant potential damage to any fire pump component.
- C. Test Equipment: Test equipment shall be provided to determine net pump pressures, rate of flow through the pump, volts and amperes for electric motor driven pumps and speed. The test equipment shall be furnished by either the authority having jurisdiction, or the installing Contractor or the pump manufacturer, depending upon the prevailing arrangements made between the above-mentioned parties.
- D. The minimum rated and peak loads of the fire pump shall be determined by controlling the quantity of water discharged through approved test devices. The quantity of water discharging from the fire pump assembly shall be determined and stabilized. Immediately thereafter, the operating conditions of the fire pump and driver shall be measured.
- E. For electric motors operating at rated voltage and frequency, the ampere demand shall not exceed the product of a full load ampere rating times the allowable service factor as stamped on the motor nameplate. For electric motors operating under varying voltage, the product of the actual voltage and rated full load current times the allowable service factor. The voltage at the motor shall not vary more than 5 percent below or 10 percent above rated voltage during the test. The fire pump unit shall be started and brought up to rated speed without interruption under the conditions of a discharge equal to peak load.

### **3.4 CONTROLLER ACCEPTANCE TEST**

- A. Fire pump controller shall perform not less than 10 automatic and 10 manual operations during the acceptance test. A fire pump driver shall be operated for a period of at least 5 minutes at full speed during each of the above operations. The automatic operation sequence of the controller shall start the pump from all provided starting features. This shall include pressure switches, or remote starting signals.
- B. Alarm conditions, both local and remote, shall be simulated to demonstrate satisfactory operation.

- C. The fire pump shall be in operation for not less than 1-hour total time during all of the foregoing tests.

### **3.5 FIRE PUMP MAINTENANCE**

- A. A preventive maintenance program shall be established by the pump manufacturer representative in accordance with the pump manufacturer's recommendations. And provided to the user records shall be maintained on all work performed on the pump, driver, and controller.
- B. Replacement components, which are of a unique or special design, shall be noted and shall be identified as being available for purchased from the manufacturer's representative.

### **3.6 FIELD TESTING**

- A. **Factory Testing:** The fire pump shall be factory tested and certified in accordance with NFPA 20. Certified performance test results and curves shall be delivered to the Engineer for review prior to final fire pump acceptance.
- B. **Field Service:** The pump supplier shall provide pump checkout, start-up, testing and adjusting of system components and shall perform field certification testing on the installed fire pump. The pump supplier shall also train the Owner's Engineer in the proper operation and maintenance of the fire pump system.
- C. **Start-Up Services:**
  - 1. **General:** The pump supplier shall provide pump checkout, start-up, testing and adjusting of system components for the pump(s). The pump supplier shall also train the Owner's Engineer in the proper operation and maintenance of this pump system.
  - 2. **Checkout:** After pumps have been in operation for 90 days, the contractor shall check all seals and replace any which are defective.
- D. **Testing:**
  - 1. **General:** Test and adjust all installed plumbing pumps, controllers, and annunciators to verify proper operation as specified herein and as recommended by the manufacturers. Where specified hereinabove, start-up, testing, and adjustment shall be provided by a representative of the equipment supplier.
  - 2. **Functional Tests:** Test pumps, controllers, and annunciators to verify that all control, alarm and indicator functions operate properly and to verify that pump discharge pressures and flows are as specified.
  - 3. **Fire Pump Testing:** Each fire pump shall be field flow tested by a representative of the manufacturer and certified in accordance with NFPA 20.

**END OF SECTION**

**SECTION 26 513****MEDIUM VOLTAGE CABLE****PART 1 - GENERAL****1.1 SUMMARY**

- A. This section covers medium voltage cable, installation, and testing. Medium voltage, shielded power cables, sized per the Plans, related terminations and accessories for medium voltage electrical distribution systems, nominal 12.5kV services, are included in this section. Specifically included:
1. Single conductor, medium voltage power cable.
  2. Cable grounding, grounding accessories and tools.
  3. Medium voltage cable terminations.
  4. Testing of medium voltage cable, splices and terminations.
- B. Certification of the Qualifications of Medium-Voltage Cable Installers: The Contractor shall have current New Mexico EL-1 and EE-98 licenses. The Contractor shall submit a certification of attendance to, and for the approval of, the Engineer which contains the names of the Personnel who have successfully completed course(s) the splicing and termination of medium-voltage cables approved for installation under this contract. The certificate of attendance shall be current within five years of performing any cable terminations. The certification shall be accompanied by satisfactory proof of the training and experience of persons listed by the contractor as cable installers.
- C. Related Documents:
1. Drawings and general provisions of the Contract apply to this Section.
  2. Review these documents for coordination with additional requirements and information that apply to work under this Section.
- D. Related Sections:
1. Division 01 Section "General Requirements."
  2. Division 26 Section "Common Work Results for Electrical".
  3. Division 26 Section "Pad Switchgear".

**1.2 REFERENCES**

- A. General:
1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and more stringent shall apply.
  2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
  3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
  4. Refer to Division 26 Section "Common Results for Electrical" for codes and standards, and other general requirements.
  5. All Standards shall be latest edition.
- B. ASTM International:
1. ASTM B-3, B-8, and B-496 - American Society for Testing Materials.

- C. NFPA 70 - National Electrical Code.
- D. IEEE C2 - the NESC (National Electrical Safety Code).
- E. ICEA Publication No. S-93-639 NEMA WC7 - Insulated Cable Engineers Association.
- F. IEEE 48 - Test Procedures and Requirements for High-Voltage Alternating-Current Cable Terminations.
- G. NEMA WC 8 - Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
- H. NETA – National Electrical Testing Association
- I. Underwriters' Laboratories, Inc. (UL 1072).

### **1.3 ACTION SUBMITTALS**

- A. Submit under provisions of Division 26 Section "Common Results for Electrical - Review of Materials" and Division 01 Section "General Requirements."
- B. Product Data: For each size and type of cable and cable termination and accessory indicated.
- C. Manufacturer's product literature illustrating the following:
  - 1. Cable characteristics.
  - 2. Cable terminations including all deadbreak break modules and matching deadbreak break elbows.
  - 3. Description of materials to be used for circuit labeling.
  - 4. Cable pulling compounds, lubricants and pull-string.

### **1.4 INFORMATIONAL SUBMITTALS**

- A. Material Certificates: For each cable and accessory type, signed by manufacturers.
- B. Cable pulling tension calculations and recorded values.
- C. Manufacturer's Documentation: After approval by the Engineer of cable & cable terminations to be used, the cable manufacturer shall furnish the following information:
  - 1. Source quality-control test reports. This includes proof that cable has been manufactured within twelve (12) months of its installation.
  - 2. Copy of the manufacturer's splicing and termination procedures for approval.
- D. Certifications and resumes of cable splicer(s) and terminator(s). See Section 1.4.C below.

### **1.5 QUALITY ASSURANCE**

- A. All conductors and cable shall conform to ICEA standards. Cable warranty shall begin upon the date of cable installation acceptance. Each length of cable delivered to the job shall have a certified test report from the factory stating that the cable meets the minimum standards for cables of this type as established by ICEA. The test report shall



also include month and year of manufacture which shall not exceed twelve (12) months prior to the delivery to the site. Copies of this report shall be delivered to the Owner's representative before the cable is installed.

- B. **Manufacturer's Qualifications:** Company experienced in manufacturing Products specified in this Section with minimum of ten (10) years.
- C. **Cable Splicer & Terminator Qualifications:**
  - 1. **Workers' Competency:** Submit high voltage cable splicer certification of competency and experience 30 days before splices or terminations are made in high voltage cables. Splicer experience during the immediate past three years shall include performance in splicing and terminating cables of the types and classification being provided under this Contract. In lieu of a certification of competency, a Subcontractor may demonstrate the qualifications of a proposed cable splicer through formal training and relevant experience in splicing cables of the type and class under this Subcontract.
  - 2. Before assigning cable splicer to work covered by this specification, the Contractor shall provide the Engineer with the names of the cable splicers to be employed, together with satisfactory proof that each splicer has had at least three years' experience in splicing high-voltage cables and is experienced with the type and rating of cables to be spliced. In addition, each cable splicer may be required to make an approved dummy splice in the presence of the Project Manager in accordance with manufacturer's instructions, before the splicer is accepted to splice cable covered by this Specification.
  - 3. Material for dummy splices shall be furnished by the Contractor.
- D. **Source Limitations:** Obtain cables, grounding, terminations, and associated materials through one source. Limit the number of manufacturers selected as much as possible.
- E. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to the Authority Having Jurisdiction and marked for intended use.
- F. Comply with IEEE C2 (NESC) and NFPA 70.
- G. Comply with ASTM B3 and B8 for copper wiring, conductors, and cables.
- H. **NRTL (Nationally Recognized Testing Laboratory) Listing:** Products shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for electrical and fire safety.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. **Conductors, terminations, and all associated elements shall be rated 15kV.** Conductors shall be copper, single conductor primary cable with EPR 133% rubber insulation, bare copper tape, 5 mils minimum, shall be applied with a helical lap not less than 12.5% of its width, and PVC outer jacket.

## 2.2 MANUFACTURERS

- A. Cable: Subject to compliance requirements, provide products by one of the following:
  - 1. Okonite
  - 2. Cablec
  - 3. Southwire
- B. Cable Terminations: Subject to compliance requirements, provide products by one of the following:
  - 1. Elastimold (Thomas & Betts)
  - 2. 3M; Electrical Products Division
  - 3. Richards Manufacturing Co.
- C. Fire and Electric Arc Proofing (if required): Provide 3M, Type 77, Scotch Brand or approved equal.

## 2.3 15KV CABLE

- A. Cable Type: Single conductor, jacketed, 15KV rated, Type MV-105 approved for NEC applications.
- B. Comply with UL 1072, AEIC CS 8, ICEA S-93-639/NEMA WC74, and ICEA S-97-682.
- C. Conductor:
  - 1. Material shall be annealed, uncoated, soft drawn copper in conformance with ASTM B-3.
  - 2. The conductors stranding shall be Class B, concentric lay in accordance with ASTM B8 (compressed construction) or ASTM B496 (compact construction) if a slightly smaller cable diameter is needed.
  - 3. Class B stranding per ASTM B-496.
- D. Conductor Strand Screen/Shielding:
  - 1. A semi-conducting shielding compound shall be applied by extrusion directly to the surface of the stranded conductor.
  - 2. The semi-conducting material shall be compatible with the copper conductor and shall effectively bond to the insulation.
  - 3. The semi-conducting shielding shall strip clean from the conductor for make-up of terminations and splices.
- E. Conductor Insulation:
  - 1. Discharge free, EPR insulation, color contrasted with strand and insulation screens.
  - 2. The insulation material shall meet or exceed ICEA S-94-649, AEIC CS8, and CSA C68.5. It shall meet the electrical and physical requirements specified in Part 3, ICEA S-93-639.
  - 3. Temperature Rating: 221 deg F (105 deg C) normal operation, 284 deg F (140 deg C) emergency overload operation, and 482 deg F (250 deg C) for short circuit conditions.
  - 4. Voltage Rating: 15 kV
  - 5. Insulation Thickness: 133 percent insulation level and insulated with a high quality, heat, moisture, impact, ozone, and corona resistant thermosetting EPR

- that is suitable for use in wet or dry locations, in underground conduit and duct systems, and direct buried applications.
6. The average insulation thickness shall be not less than 220 mils; the minimum thickness at any point shall not be less than 90 percent of the specified average thickness.
- F. Insulation Screen/Shielding:
1. Extruded, semiconducting material meeting requirements of ICEA S-93-639/NEMA WC74 & S-97-682, and AEIC CS8. Substitution of a non-metallic semiconducting tape for the extruded covering is not acceptable.
  2. Note: cables using the extruded energy suppression and stress control material for the strand screen may use the same semiconducting material for the 15kV insulation screen.
  3. The extruded covering shall be at least 24 mils thick and shall be in intimate contact with the insulation. Covering shall be removable without damaging the insulation; leaving no residue that cannot be readily removed. Insulation screens must be clean stripping.
- G. Copper Tape Shield
1. Bare copper tape 5 mils minimum shall be applied with a helical lap not less than 12.5% of its width.
- H. Overall/Outer Jacket:
1. The cable shall have an overall sunlight resistant (UV) poly-vinyl chloride jacket
  2. The overall jacket shall be free stripping.
- I. Electrical and Physical Tests:
1. Qualification tests in compliance with Section B, AEIC CS8 are required for each shielded cable furnished.
  2. All materials used in construction of the cables shall be tested in compliance with the application paragraphs of ICEA S-93-639.
  3. All completed cables shall successfully pass the following tests prescribed in ICEA publication S-93-639 NEMA WC 74:
    - a. Par. 6.5 - Aging.
    - b. Par. 6.27 - Voltage.
    - c. Par. 6.28 - Insulation Resistance.
    - d. Par. 6.29 - Partial Discharge Extinction (Corona) Level.
    - e. Par. 6.23 - Discharge Residence.
  4. Test methods and frequency of tests (for tests in F-2 and F-3 above) shall be as prescribed in Part 6 ICEA S-93-639.
- J. Cable Identification: The following information shall be indicated, by means of a surface legend printed in compatible ink of contrasting color, at intervals not to exceed 24 inches (600 mm) over the entire length of the cable:
1. Manufacturer's name.
  2. Conductor material.
  3. Conductor size.
  4. Maximum rated voltage.
  5. Insulation material.
  6. Letter designating cable type.
  7. Shielded or non-shielded.

- 8. Date of manufacture.
- K. Shipment: The cable shall be shipped in continuous lengths. No cable splices are allowed. The shipment shall be made on carefully inspected non-returnable reels if possible. Cable ends shall be securely fastened to the reel using polypropylene rope ties. Metal ties shall not be used. Cable ends shall be completely sealed against moisture and contaminants. The cable on the reel shall be protected with plywood or tekboard lagging held securely in place with steel banding.
- L. Conductor and Shield Continuity: Each length of completed cable shall be tested for conductor and shield continuity. A simple continuity test can be accomplished by grounding the conductor at the source and checking for continuity from the end of each tap with an ohmmeter or with a battery and ammeter. See Sections 3.3 and 3.4 below.
- M. Reports: Certified copies of Production Tests shall be furnished for each shipment of cable.

**2.4 CABLE TERMINATIONS**

- A. General: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators (deadbreaks) with matching, stationary, plug-in, deadbreak-front terminals designed for cable voltage and for sealing against moisture. Elbow-type unit with 600-A continuous-current rating; designed for de-energized disconnecting and connecting; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
- B. Construction: 100% peroxide-cured construction includes insulation and conductive EPDM materials. Deadbreaks shall be fully shielded and submersible, rated 15/25KV and 600A minimum.
- C. Deadbreaks shall be designed for use on solid dielectric cable (XLPE or EPR) with extruded semi-conducting shields and concentric neutral, with or without a jacket. Provide adapters as required for terminating tape shield and drain wire jacketed cables.
- D. Deadbreaks shall be useable on any comparably rated bushing interface that meets the requirements of IEEE 386. All T-bodies, cable adapters, insulating plugs, and compression connectors shall be designed to be interchangeable with those currently available from other major manufacturers that also meet the requirements of the IEEE 386 standard.
- E. Minimum ratings of the fully assembled deadbreaks as follows:
  - 1. Standard Voltage Class,
 

kV.....	15
---------	----
  - 2. Max Rating Phase-to-Phase,
 

kV.....	14.4
---------	------
  - 3. Max Rating Phase-to-Ground,
 

kV.....	8.3
---------	-----
  - 4. AC 60 Hz 1 Minute Withstand,
 

kV.....	34
---------	----
  - 5. DC 15 Minute Withstand,
 

kV.....	53
---------	----

6.	BIL and Full Wave Crest, kV.....	95
7.	Min Partial Discharge Extinction, kV.....	11
8.	Continuous Rating, A.....	600
9.	4 Hour Overload Rating, A.....	900
10.	Short Time Rating, kA.....	25.5

F. Easily connected or disconnected using standard hand tools and equipment in de-energized state.

G. Each deadbreak kit to be provided complete with:

1. Elbow connector housing
2. Copper compression connector/lug
3. Shear bolt connector/lug
4. Stud
5. Insulating plug with cap
6. Tube of lubricant
7. Cable adapter
8. Installation instructions
9. Crimp chart

**2.5 CABLE SPLICES**

A. Cable splices are not allowed. Run underground cables continuous between end termination points.

**2.6 CIRCUIT LABELS**

A. Manufacturers:

1. Almetek Industries, Type E-Z -Tag or equal.
2. Substitutions: Under provisions of Division 01 Section "General Requirements".

B. Description: Cable circuit labels shall be 1-1/2 (38 mm) high, polyethylene, with black on yellow characters, in a polyethylene holder, attached to the cable by two nylon self locking ties.

**PART 3 - EXECUTION**

**3.1 15KV CABLE INSTALLATION**

A. Carefully protect cable from mechanical damage. Provide suitable mechanical protection for reels.

B. Pull cable directly from reels into the ducts or conduits. It may not be laid on the ground or otherwise handled for cutting or sorting. Pulling lubricant, UL-listed and compatible with the cable being pulled, as manufactured by IDEAL, Y-ER-EAS, or equal, shall be generously applied. Pulling tension (lbs) not to exceed 0.008 times the circular-mil

cross-sectional area of the conductor. Cables shall not be pulled through more than one intermediate manhole on one pull. Cable ends shall be sealed against moisture after pulling. Pull ropes shall be non-metallic to prevent cutting of duct materials.

- C. Pulling tension and side wall pressure shall not exceed the manufacturer's allowable values. Pulling tension shall be continuously monitored during a pull by use of a dynamometer. The dynamometer shall have been calibrated within a year of its use on the project. If the pulling tension or sidewall pressure is exceeded during a pull, the cable shall be considered damaged and shall be replaced by the Subcontractor.
- D. Installation of Cables in Manholes and Handholes: Cable shall not be installed utilizing the shortest route but shall be routed along those walls providing the longest route and the maximum spare cable lengths. Cables shall be formed closely parallel to the walls, shall not interfere with duct entrances, and shall be supported on brackets and cable insulators, spaced at a maximum of four feet. In existing manholes and handholes where new ducts are to be terminated or where new cables are to be installed, the existing installation of cables, cable supports, and grounding shall be modified as required for a neat and workmanlike installation with cables properly arranged and supported.
- E. Split wire-basket cable grips shall be used to restrain conductors in manholes, handholes, and pull boxes on downhill duct runs.
- F. Splicing of cable within manholes is not allowed. Cables shall be continuous until terminations.
- G. Maintain existing phase rotation of the system as required for all new sections of cables. Perform phase rotation verification in conjunction with Owner's staff.

### **3.2 CABLE TERMINATIONS**

- A. Cable terminations shall be per written Manufacturer instructions. The Contractor shall furnish for approval two (2) copies of the manufacturer's termination procedures.
- B. Terminating cables onto deadbreaks is a complex, precise, and time-consuming process requiring great care. Cable terminations shall only be done by a qualified contractor specializing in high-voltage splicing, terminations, and testing. Utilize experienced cable splicers having experience specified in the Quality Assurance article above. Follow written manufacturer instructions.
- C. Grounding of Shielded Cables: Provide a No. 12 AWG or larger solid copper ground connection brought out of each deadbreak break termination in a watertight manner and grounded to the ground bus within the switch. Wire shall be trained to the sides of the enclosure in a manner to avoid interference with the working area.
- D. The ground bus and bare copper-conductor ground wires shall be bonded to the new ground rods and grounds provided in manhole or vault.

### **3.3 15KV CABLE LABELING**

- A. 15KV circuits shall have each phase tagged (A, B, or C) at termination points and on either side of each splice in a manhole, using plastic tie-tags.

- B. At each manhole, handhole or pull box, 15kV circuit labels, as shown on the drawings, shall be attached to each cable group. As the cable enters it shall be labeled to identify the source. As the cable leaves it shall be labeled to identify its destination. At approximately the center of the cable group it shall be identified with its feeder circuit designation.

### **3.4 15KV CABLE TESTING IMMEDIATELY AFTER INSTALLATION**

- A. Immediately after cables have been installed, the Contractor shall notify the Owner when the installation is available for testing. The Owner shall have a representative onsite to witness testing.
- B. Each conductor shall be individually tested with other conductors grounded. Shields shall be grounded. Record all test results.
- C. A shield continuity test shall be performed by the ohmmeter method. Record all ohmic values.
- D. The Contractor shall produce a written record of tests and, upon completion of the project, assemble and certify a final test report no later than ten days after completion of the tests. The Owner shall receive three (3) copies of the final test report.

### **3.5 15KV CABLE TESTING AFTER END TERMINATION PREPARATION**

- A. Immediately after cables have been spliced and cable ends prepared for termination, but not connected to equipment, the Contractor shall notify the Owner when the installation is available for testing. The Owner shall have a representative onsite to witness testing.
- B. Each conductor shall be individually tested with other conductors grounded. Shields shall be grounded.
- C. A shield continuity test shall be performed by the ohmmeter method. The ohmic value shall be recorded.
- D. The Contractor shall produce a written record of tests and, upon completion of the project, assemble and certify a final test report no later than ten days after completion of the tests. The Owner shall receive three (3) copies of the final test report.

### **3.6 TEST REPORTS**

- A. Submit test reports in accordance with the “General Conditions” of this specification. Test reports shall certify that all cables, terminations and splices have met the minimum acceptance standards. Test reports shall be in log form and include the cable segment, date, time and personnel present during testing.

**END OF SECTION**

**SECTION 261200****MEDIUM VOLTAGE TRANSFORMERS****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

- A. The general provisions of the Contract, including General and Special Conditions and the General Requirements, apply to the work specified in this section.

**1.2 DESCRIPTION OF WORK**

- A. Furnish and install transformers complete with all necessary appurtenances to perform the voltage transformation as required.

**1.3 QUALITY ASSURANCE**

- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of transformers and are based on the specific system indicated and shall be the latest edition of standards specified.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with IEEE C2.
- D. Comply with DOE 2016 (dry tape up to 35 kV primary and 2500 kVA).
- E. Liquid filled: Comply with ANSI C57.12.10, ANSI C57.12.28.
- F. Dry tape: Comply with IEEE C57.12.01, ANSI C57.21.50, ANSI C57.12.51, IEEE C57.12.56, IEEE C57.12.91, and IEEE C57.94.
- G. Oil or dry type: IEEE C57.12.70 and IEEE C57.12.80.
- H. Comply with NFPA 70.

**1.4 SUBMITTALS**

- A. Submit complete shop drawings with outline dimensions, wiring diagrams, catalog cuts and descriptive literature, including no load loss, total loss, regulation at 100% and 80% power factor, and net weight. If requested by the Engineer, submit production line impulse test reports.
- B. Certification of the Qualifications of Medium-Voltage Cable Installers: The Contractor shall have current New Mexico EL-1 and EE-98 licenses. The Contractor shall submit a certification of attendance to, and for the approval of, the Engineer which contains the names of the Personnel who have successfully completed course(s) the splicing and termination of medium-voltage cables approved for installation under this contract. The certificate of attendance shall be current within five years of performing any cable



terminations. The certification shall be accompanied by satisfactory proof of the training and experience of persons listed by the contractor as cable installers.

## 1.5 RELATED WORK IN OTHER SECTIONS

- A. Site work, services.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ABB.
  2. Cooper Industries; Cooper Power Systems Division.
  3. Cutler-Hammer.
  4. GE Electrical Distribution & Control.
  5. Square D; Schneider Electric.

### 2.2 PADMOUNTED TRANSFORMERS

- A. General: Sizes and characteristics as shown on drawings, loop or radial feed as shown on drawings. Unless otherwise specified on the drawings, transformers to be three-phase 60 hertz, 65 degree C temperature rise, liquid filled, self-cooled, pad mounted, compartmentalized distribution transformers, rated 1,500 KVA and below for use with separable insulated high-voltage connectors rated 8.3/14.4 KV. All characteristics, definitions, terminology, and voltage designations, except as otherwise specified herein, shall be in accordance with applicable provisions of the latest edition of ANSI C57.12.26, or its C57.12.00, C57.12.90, and C57.12.80, or the latest editions. Transformers shall be of triplex or five-legged core design and connected wye-wye with primary and secondary neutrals internally connected and brought out to a neutral bushing in the secondary compartment. All windings shall be copper.
- B. ELECTRICAL CHARACTERISTICS: KVA ratings will be as indicated on the drawings. Voltage ratings and tap ratings shall be 2-2 1/2% above and below. Taps shall be suitable for de-energized operation only. The tap changer switch shall be ganged and shall be externally operable. The operating handle shall be located either in the high compartment above the low voltage bushings or in the secondary compartment above the low voltage bushings. The tap changer shall be set on the 100% tap at the factory and shall be secured to prevent inadvertent change from this position. Minimum impedance's will be as follows:

KVA	SECONDARY VOLTAGE	IMPEDANCE
UP TO 500	208Y/120	4.5%
UP TO 500	480Y/277	4.5%
750 & ABOVE	208Y/120	5.75%
750 & ABOVE	480Y/120	5.75%

- C. Construction: The padmounted transformer shall consist of the transformer tank, high voltage cable terminating compartment and the low voltage cable terminating compartment. The transformer tank and compartments shall be assembled as a raintight

and weatherproof tamper resistant integral unit suitable for mounting on a flat surface. There shall be no exposed screws, bolts, or other fastening or hinging devices (other than the pentahead specified) which are externally removable. There shall be no opening through which foreign objects such as sticks, or wires might be inserted to contact energized parts. Suitable means for padlocking the compartment door(s) shall be provided. Normal entry shall be possible only with the use of proper access tools. The high- and low-voltage compartments shall be located side by side on one side of the transformer tank. When facing the compartment, the low voltage compartment shall be on the right. Construction of the unit shall be such that it can be lifted, skidded and slid onto place on the mounting pad without disturbing the entrance cables. The transformer tank base shall be raised above the pad to protect the bottom finish during installation and to minimize corrosion due to moisture accumulation. The base shall be cross braced to permit rolling in two directions. All external surfaces of ferrous material used in the construction of the assembly shall have undercoating over the regular finish, applied to the bottoms of the components and extending up the side to a point 1 inch above the bottom of their bases. All exterior surfaces shall be painted using a system of coordinated and thoroughly tested materials and application techniques that will assure long life in outdoor exposure. The finish shall be weather-resistant, green color Munsell No. 7.0 GY 3.29/1.5. Total paint thickness measured anywhere on inside or outside of transformer and cabinet shall not be less than 3.5 mils. All external surfaces shall be constructed of steel, 13 USS gauge or thicker. The transformer and compartment hoods shall be crowned to ensure water runoff.

- D. High- and Low-Voltage Compartments: Terminal compartments shall be full height, air filled compartments with separate hinged doors. The compartments shall be completely isolated from each other by a steel barrier without opening or discontinuity of any kind. The edges of the access doors shall be formed to provide a close-fitting mating surface, with internal insertion-prevention lip that will be shaped to resist entry or prying by screwdrivers, wrecking bars, tire irons, single-socket lug wrenches or other readily accessible tools. Hinges and hinge pins shall be passivated AISI Type 304 stainless steel or equivalent corrosion-resistant metal. There shall be a threaded fastening device for the high voltage door, accessible only through the low voltage compartment. Screen door latches with wing nuts, gravity hooks, etc. are unacceptable. The compartment doors shall have a minimum of three-point latching and the handle shall have provisions for pad locking. The padlocking device shall be so designed and located as to resist prying or breaking off by screwdrivers, wrecking bars, tire irons, single-socket lug wrenches or other readily accessible tools and to inhibit removal of the padlock with a bolt cutting device or hacksaw. In addition to the regular locking provisions above, the access doors shall be secured by a captive, recessed pentahead bolt. Bolts and associated hardware must be rust and corrosion resistant and the design shall minimize the possibility of misalignment and cross-threading. The design must be such that wire entry through the bolt hole into the compartment(s) is prohibited when the bolt is removed. The non-rotating cup shall be permanently attached. The captive pentahead bolt shall be coordinated with the latch and padlock to prevent unlatching and insertion of the padlock into the hasp when and until the bolt is completely threaded, respectively. The captive pentahead shall also function as an interlock device to pin the latch closed. Both compartment doors shall be equipped with stops for holding each door in a 90-degree open position. The stops shall be captive to prevent loss of the device. Doors on the high- and low-voltage compartments shall be of sufficient size to provide adequate working space when open. The bottom edge of the transformer shall provide for flush mounting on a flat rigid surface to prevent wire entry into the compartment.

- E. Bushings and Terminals: Electrical characteristics of completely assembled low-voltage terminations shall comply with Table 4 of ANSI C57.12.26, or the latest edition unless otherwise stated herein. All low voltage terminals shall be insulated from the tank with 1.2 KC OF % KV class bushings as applicable. Terminals of 480Y/277 and 208Y/120-volt windings shall be arranged to the specified dimensions shown in Figures 7 and 8 (a) of ANSI C57.12.26, or the latest edition. In-line arrangements are unacceptable. The high voltage neutral shall be connected to the low voltage neutral internally with provision for opening this connection for testing. The low voltage neutral shall be a fully insulated bushing. A ground pad shall be provided. A removable copper ground strap shall be provided and connected between the neutral bushing and ground pad. The ground strap shall be capable of carrying a line to ground fault of the magnitude and duration defined in ANSI C57.12.00b, or the latest edition. A hand hole shall be provided to access the removable connection specified in 7.3. Low voltage terminals shall be spades with NEMA hole spacing to provide the number of holes given in the following table.

**Secondary Terminal Construction**

Secondary Voltage	Transformer KVA Size/Hole Count						
	75	150	300	500	750	1000	1500
208Y/120	4	6	6	8	8	--	--
480Y/277	4	6	6	6	6	8	8

- F. High voltage terminals shall be bolted type bushing wells in accordance with ANSI/IEEE 386, or the latest edition and ANSI C57.12.26, or the latest edition. Bushing wells shall be in accordance with Figure 1 of ANSI/IEEE 386, or the latest edition, and shall be arranged in accordance with the specific dimensions of Figures 5 and 7 of ANSI C57.12.26, or the latest edition. Transformers design shall allow field replacement of the high voltage bushing wells and low-voltage bushings by means of common hand tools and oil-handling equipment, without totally untying the transformer.
- G. Accessories: The following accessories are required on all transformers:
  - 1. Pressure relief device. The following are approved:
    - a) Qualitrol 202 Series
    - b) Tomco/Beta 1712K-3
  - 2. Upper filter valve or plug.
  - 3. Full-Capacity Voltage Taps: Four nominal 2.5% taps, 2 above and 2 below rated primary voltage; accessible by removing the enclosure panels.
  - 4. Combination drain, lower filter valve, and sampling device.
  - 5. The following accessories are required on all transformers rated 750 KVA and above:
    - a) Liquid level gauge.
    - b) Top oil thermometer.
- H. A suitable marking inside the tank shall indicate the correct liquid level at 25 degree C temperature.
- I. Jacking, Rolling, Lifting, and Mounting Facilities: Suitable jack bosses or equivalent jacking facilities shall be provided on the tank. vertical clearance for a jack shall be 1-1/2 inches minimum, 3-1/2 inches maximum. Transformer base shall be arranged for rolling

in two directions: Parallel to and at right angles to the center line of the high-voltage bushings. These lugs shall be of adequate strength and size and arranged on the tank to provide a suitable lift for the completely assembled unit. A 3/4 inch minimum and a 1-1/2-inch maximum internal flange shall be provided at the base of the high-voltage and low-voltage compartments, to provide means of anchoring the unit to the pad.

- J. Terminal Markings: External terminals shall be marked H1, H2, H3, HoXo, X1, X2, X3, by stenciled yellow lettering on the tank. A winding diagram with high and low-voltage connections shall be shown on the instruction nameplate.
- K. Instruction Nameplate: Instruction nameplate shall be located on the inside of the low-voltage compartment door. Instruction nameplate shall contain the information specified in paragraph 5.12 ANSI C57.12.00, or the latest edition nameplate B, and shall be easily readable. Nameplate shall indicate that the transformer oil contained less than 1 ppm PCB at time of manufacture.
- L. Oil Preservation: Transformers shall be of sealed tank construction, so designed that the interior is sealed from the atmosphere and the gas plus oil volume remains constant. The transformer shall remain effectively sealed for all temperatures to plus 105 degree C top oil.
- M. Tanks: The tank shall be of sufficient strength to withstand a pressure of 7 psi gage, without permanent distortion.
- N. Overcurrent Protection: Internal fuse protection shall be accomplished through the use of drawout, load break, current limiting fuses in a dry well. Fuses to be sized for transformer protection. Fuses shall be in series with a gang-operated, load break oil switch in the configuration as shown on drawings.
- O. Switching: Provide an oil-immersed, gang-operated, two-position, loadbreak, manually operated switch.

### **2.3 GROUNDING**

- A. The materials, equipment, and devices related to the grounding system are specified under other sections of these specifications.

## **PART 3 - EXECUTION**

### **3.1 SEPARATELY DERIVED SYSTEMS**

- A. Transformers creating separately derived distribution systems such as dry type transformers shall utilize the equipment ground bars in the transformer enclosure for both secondary equipment ground and secondary neutral ground. The size of grounding conductor from the transformer to the main equipment ground shall be determined by considering the transformer secondary as a service.

### **3.2 TESTING**

- A. The Contractor shall test the complete grounding system with a megger at the service ground bar and shall submit a written report to the Engineer for approval. The service

shall not be energized if the test shows more than 5 ohms, unless approved by the Architect.

### **3.3 GROUNDING CONNECTIONS**

- A. Clean surfaces thoroughly before applying ground lugs or clamps. If the surface is coated, the paint, enamel or lacquer must be removed. Where galvanizing is removed from metal, it shall be painted or touched up with "Galvanox."

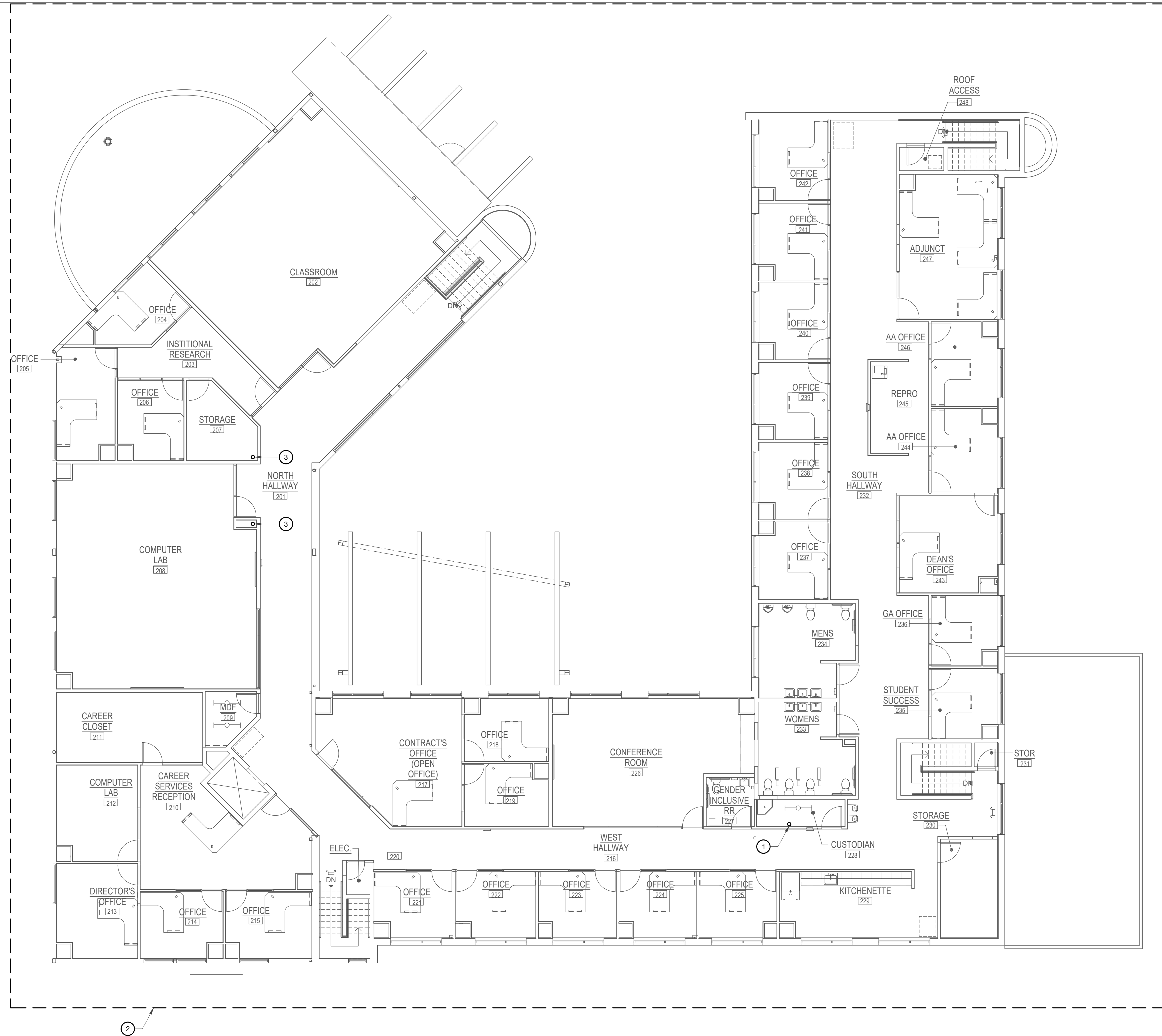
### **3.4 IDENTIFICATION**

- A. Provide an engraved micarta label on front of the tank indicating the transformer power source and the panel fed by the transformer.

**END OF SECTION**

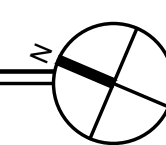






**SECOND FLOOR FIRE PROTECTION PLAN**

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



**GENERAL NOTES**

- A. REFER TO SHEET FP-501 FOR DETAILS.
- B. SEE SHEET FP-501 FOR NOTES APPLICABLE TO THIS SHEET.

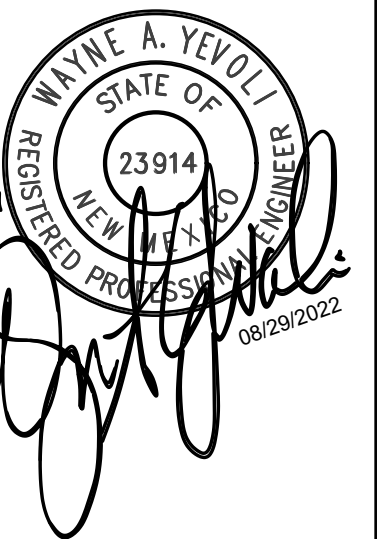
**KEYED NOTES**

- 1. POSSIBLE PIPING RISES UP FROM BELOW. COORDINATE WITH OWNER AND ARCHITECT ON EXACT LOCATION.
- 2. ENTIRE BUILDING SHALL BE PROTECTED BY A FIRE PROTECTION SYSTEM PER SPECIFICATIONS AND NOTES ON SHEET FP-101.
- 3. LINE SIZE (DETERMINED BY FIRE PROTECTION CONTRACTOR).

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1 08/29/22 ADDENDUM

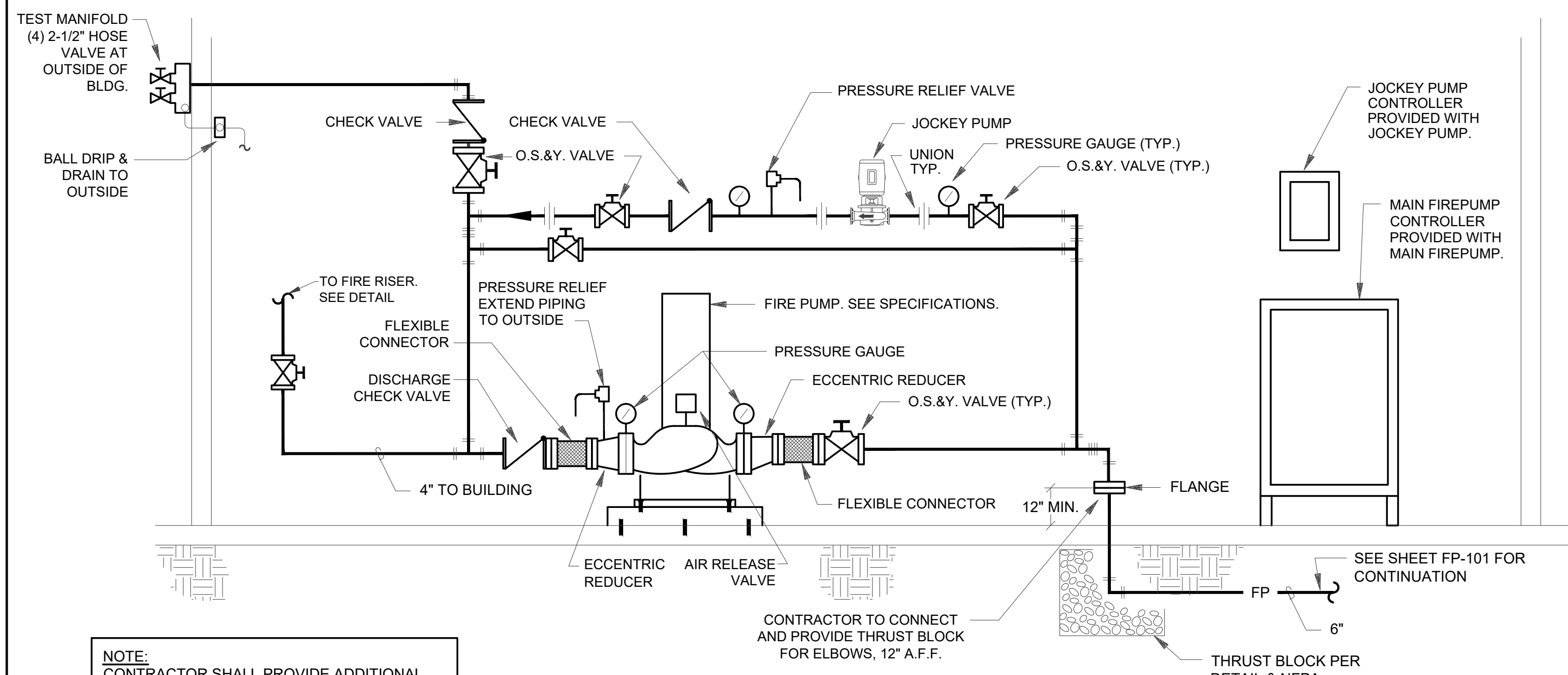
B\_AD PROJECT # 2104  
FILE: 21092\_FP102.dwg  
DATE: 08/09/2022  
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CHECKED BY: WAY

**SECOND FLOOR FIRE  
PROTECTION PLAN**



**FP-102**  
SHEET \_ OF \_

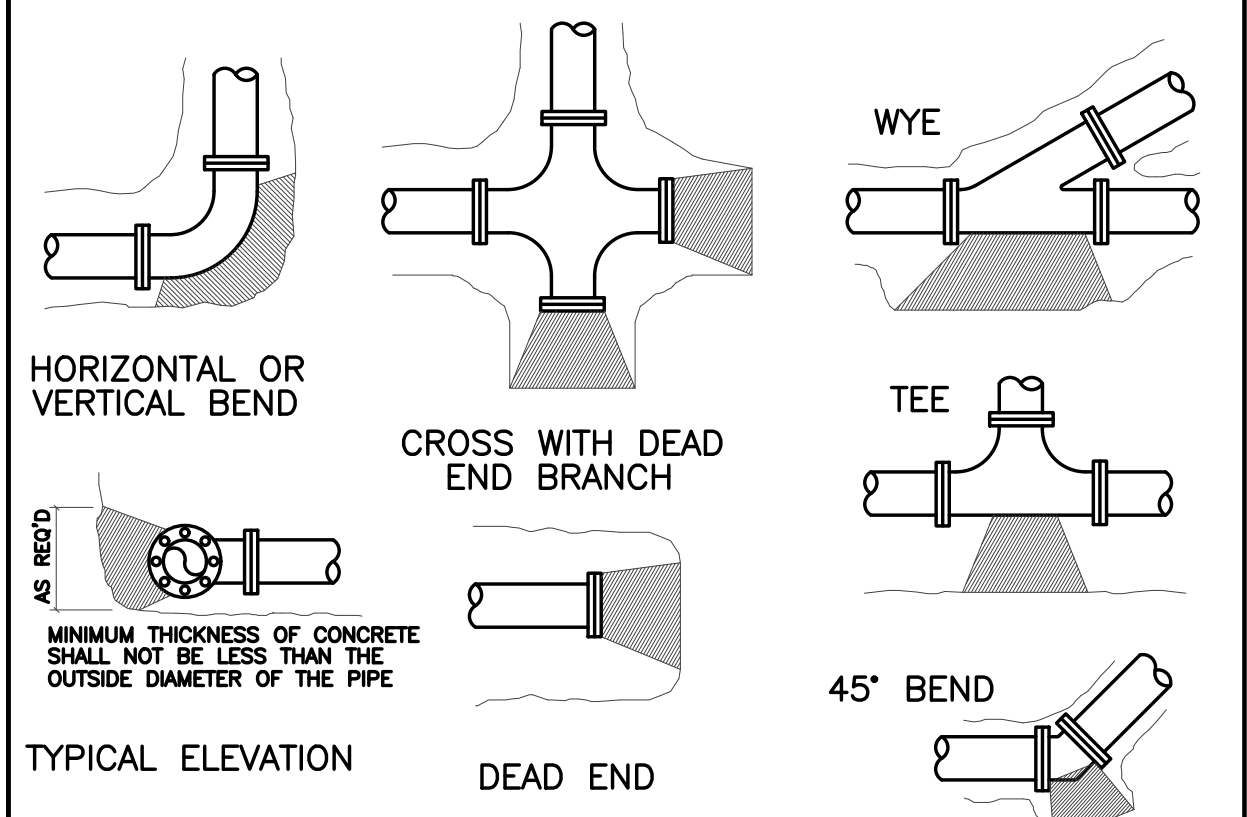




**NOTE:**  
CONTRACTOR SHALL PROVIDE ADDITIONAL SUPPORTS FOR PIPING TO ACCOUNT FOR ALL LATERAL MOVEMENT DUE TO THRUST FROM FIRE PUMP DISCHARGE PRESSURE.

**FIRE PROTECTION PUMP SCHEMATIC**

SCALE: NONE



1. PROVIDE BEND BREAK BETWEEN FITTINGS AND CONCRETE AT DEAD ENDS.
2. THRUST BLOCKING SHALL BE CAST IN PLACE CONCRETE WITH A MINIMUM COMPRESSIVE STRENGTH OF 2000 PSI.
3. THRUST BLOCKING SHALL BE CAST AGAINST UNDISTURBED EARTH. FORMS SHALL BE USED AS REQUIRED. CONCRETE SHALL NOT BE ALLOWED TO SPILL OVER THE JOINT OR AGAINST THE PIPE.

PIPE SIZE	BENDS				TEES	PLUGS
	90°	45°	22-1/2°	11-1/4°		
4	1.50	.75	.50	0.00	1.00	1.00
6	3.00	1.75	1.00	0.00	2.25	2.25
8	5.50	3.00	1.50	1.00	3.75	3.75

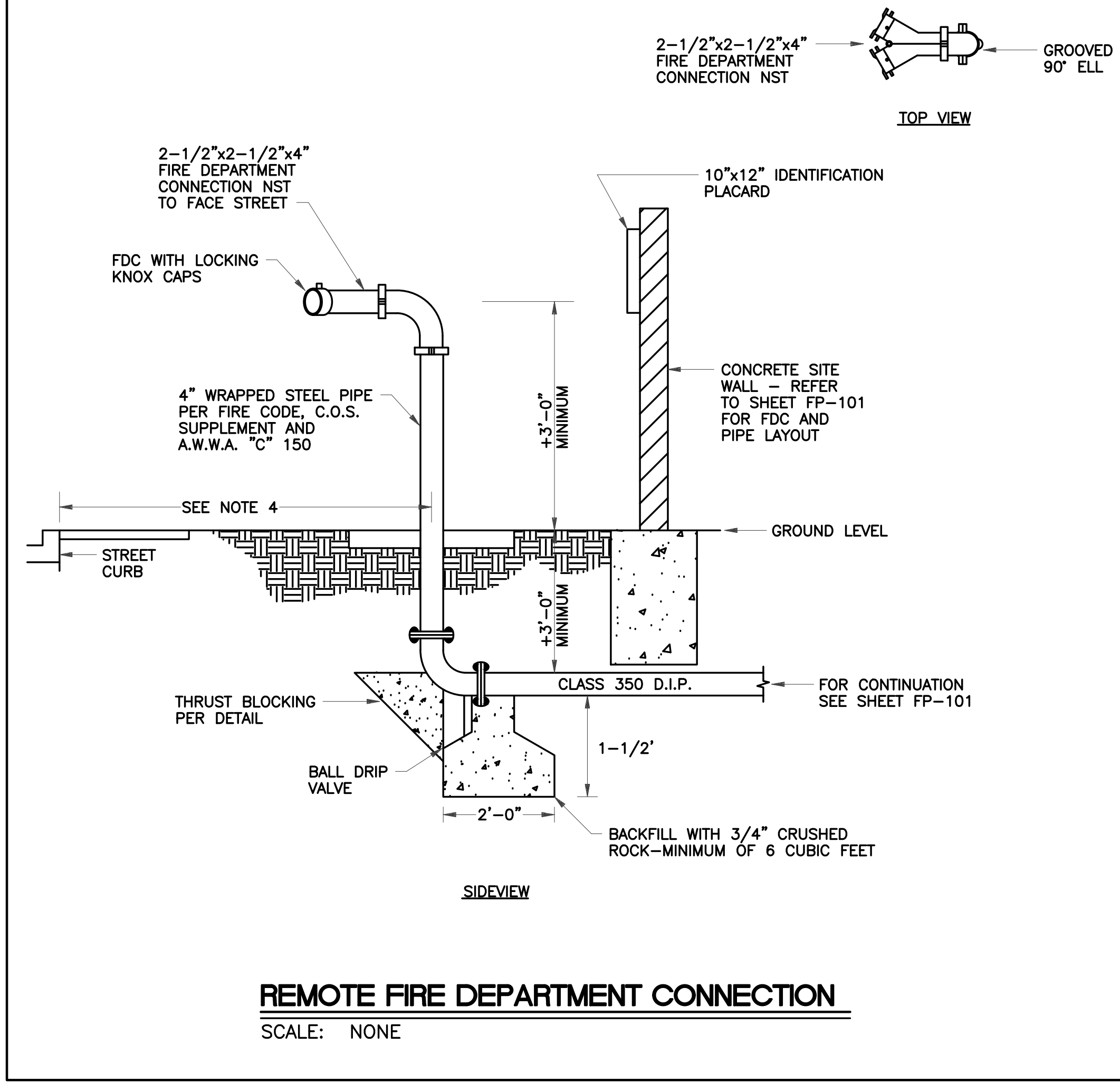
AREAS BASED ON INTERNAL STATIC PRESSURE OF 150 P.S.I. AND A SOIL BEARING CAPACITY OF 2000 P.S.I.

**CONCRETE THRUST BLOCKING**

SCALE: NONE

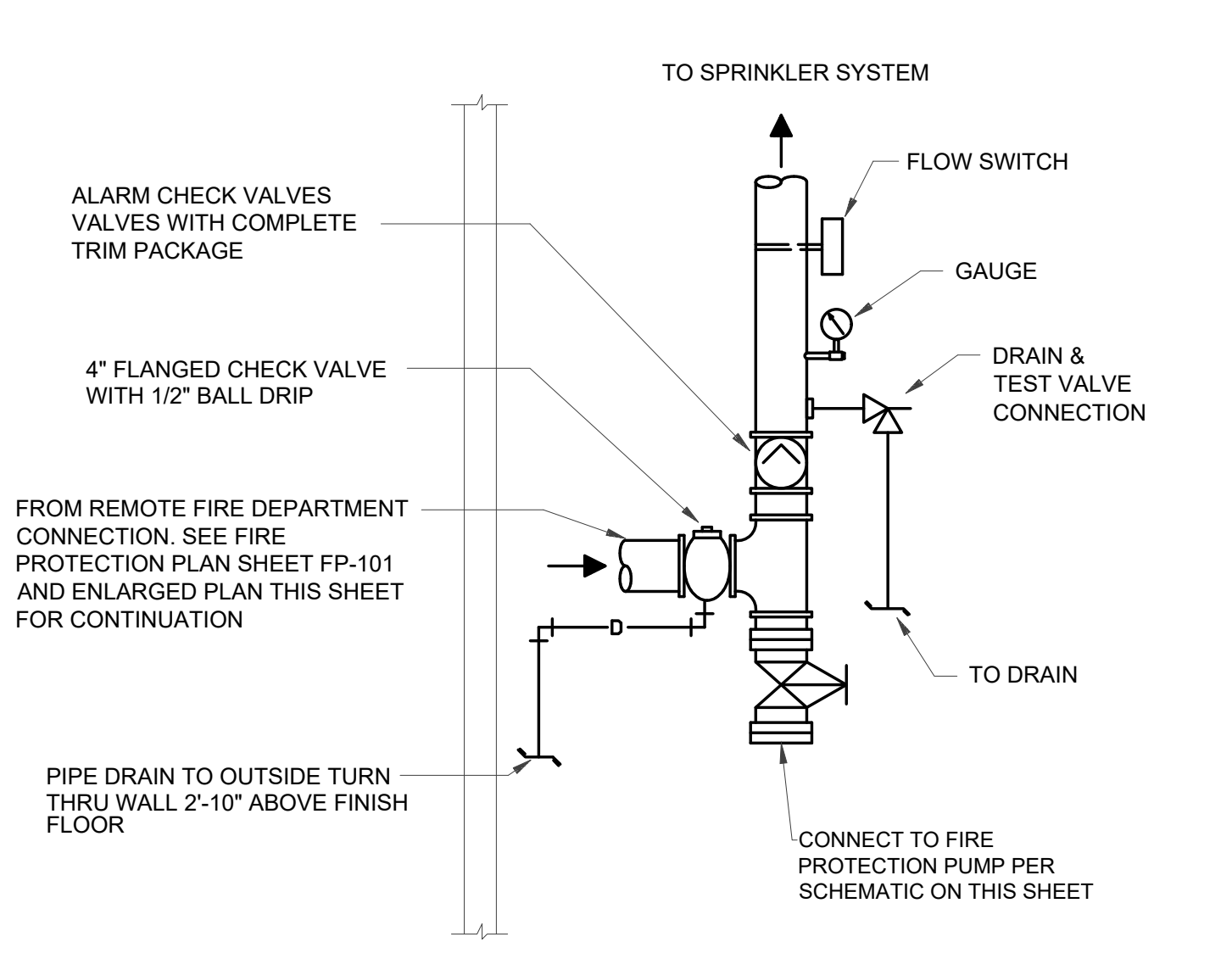
**FIRE PROTECTION GENERAL NOTES**

- A. THE ENTIRE BUILDING SHALL BE PROVIDED WITH A COMPLETE AUTOMATIC, WET PIPE, FIRE PROTECTION SPRINKLER SYSTEM. IN AREAS WITH CEILINGS, ALL PIPING SHALL BE CONCEALED. IN AREAS WHERE PIPING IS EXPOSED, ALL PIPE, FITTINGS AND HANGERS SHALL BE PAINTED, COLOR AS DIRECTED BY ARCHITECT. ALL EXPOSED PIPING SHALL BE RUN AS HIGH AS POSSIBLE AND SHALL BE COORDINATED WITH STRUCTURE, DUCTWORK, ROOF OPENINGS AND LIGHTING TO BE AS INCONSPICUOUS AS POSSIBLE. LAYOUT SHALL BE SUBMITTED FOR APPROVAL STATE FIRE MARSHALS OFFICE AND NM OGD ARCHITECT. ALL REQUIRED APPROVALS SHALL BE OBTAINED BEFORE ORDERING MATERIALS OR BEGINNING FABRICATION. ALL HEADS SHALL BE CHROME PLATED, TEMPERATURE RATED AT 165 DEGREES F., EXCEPT 212 DEGREES F IN MECHANICAL ROOMS AND OTHER AREAS AS OUTLINED IN NFPA 13.
- B. DESIGN AND INSTALLATION SHALL CONFORM TO THE LATEST EDITIONS OF NFPA 13, 101, AND I.B.C. AND THE SPECIFICATIONS.
  1. THE ENTIRE BUILDING INCLUDING UPPER FLOOR SHALL BE PROTECTED USING A HAZARD CLASSIFICATION OF LIGHT HAZARD EXCEPT WHERE REQUIRED BY NFPA IN ROOM 162; CONVERTER AREA (ROOM 163) SHALL BE CLASSIFIED ORDINARY HAZARD GROUP 1.
  2. PIPE RISES TO UPPER FLOOR SHALL BE INSTALLED IN STORAGE ROOM JANITOR CLOSET. COORDINATE LOCATIONS WITH ARCHITECT.
  3. NEW BACKFLOW PREVENTION DEVICE SHALL BE.
- C. DUE TO LIMITED CEILING SPACE, COORDINATION WITH OTHER TRADES SHALL BE REQUIRED PRIOR TO ANY PIPING INSTALLATION. IF SPRINKLER CONTRACTOR FAILS TO PROPERLY COORDINATE HIS PIPING WITH OTHER TRADES, RELOCATION OF SPRINKLER PIPING, ETC., SHALL BE AT HIS OWN EXPENSE, AS DIRECTED BY THE ARCHITECT AND ENGINEER.
- D. SPRINKLER SHOP DRAWINGS SHALL SHOW ALL DUCTWORK, DIFFUSER LOCATIONS, LIGHTS, BUS DUCTS AND OTHER PIPING MAINS, ETC., REQUIRING COORDINATION WITH SPRINKLER MAINS, SPRINKLER HEADS, ETC.
- E. COORDINATE LOCATIONS OF FLOW SWITCHES AND TAMPER SWITCHES WITH ELECTRICAL CONTRACTOR AND PAY FOR ALL REQUIRED ELECTRICAL CONNECTIONS BACK TO MAIN FIRE ALARM PANEL FROM ALL FLOW SWITCHES AND TAMPER SWITCHES, INCLUDING BACK FLOW PREVENTIONS AND POST INDICATOR VALVE.
- F. PROVIDE AND INSTALL "DRY-TYPE", PENDENT (FREEZE-PROOF) SPRINKLER HEADS AT ALL UNHEATED SPACES, DOCK OVERHANG AND AT ALL LOCATIONS SUBJECT TO FREEZING.
- G. THE FIRE PROTECTION CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING EXISTING SITE CONDITIONS, WATER PRESSURE AND FIRE FLOW, BEFORE SUBMITTING HIS BID. THIS CONTRACTOR SHALL EXTEND NEW FIRE PROTECTION SUPPLY PIPING FROM EXISTING FIRE PROTECTION RISER FLANGE IN FIRE PROTECTION RISER ROOM TO ENTIRE BUILDING.
- H. CONTRACTOR SHALL PROVIDE COMPLETE HYDRAULIC CALCULATIONS FOR FIRE PROTECTION SYSTEM.



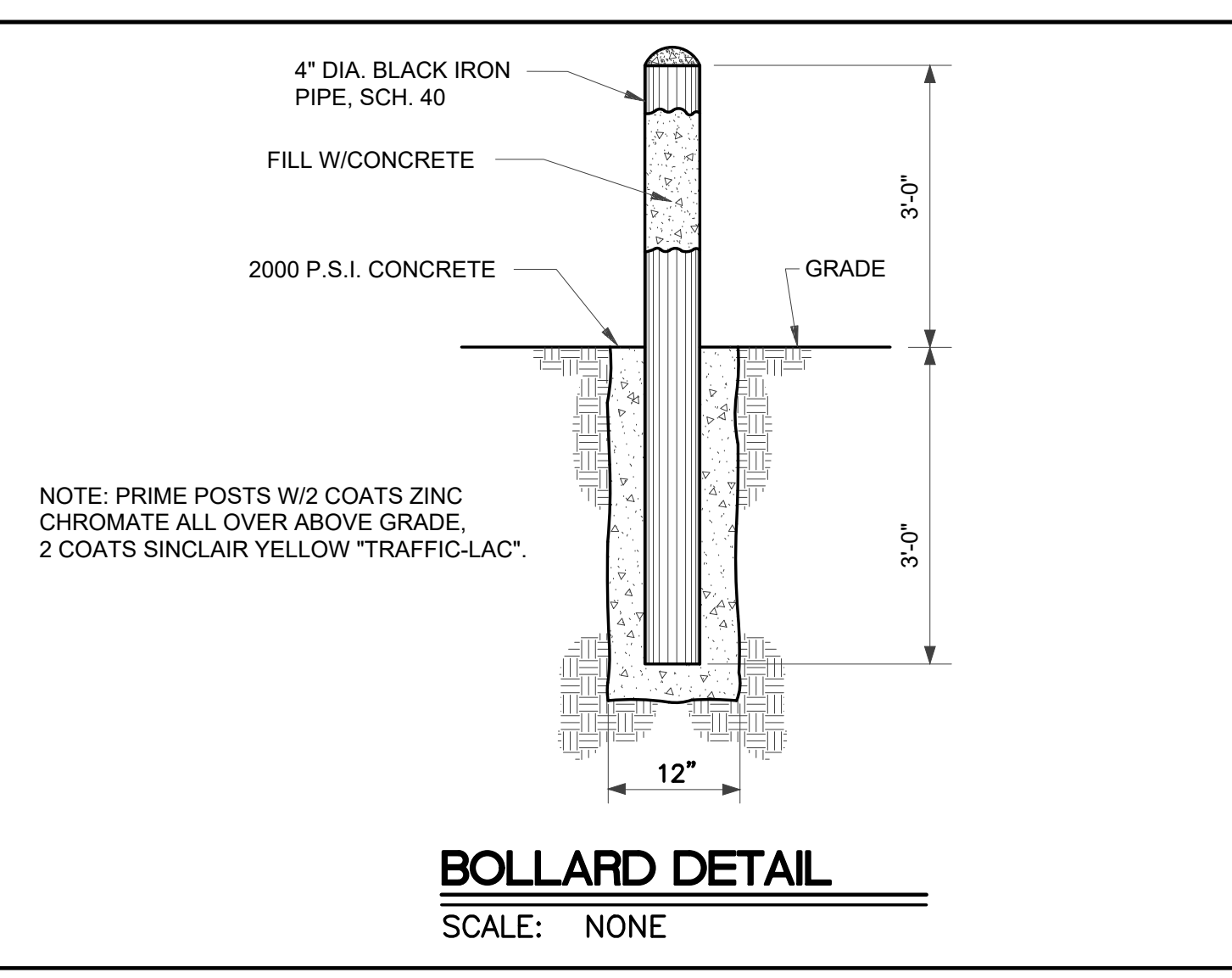
**REMOTE FIRE DEPARTMENT CONNECTION**

SCALE: NONE



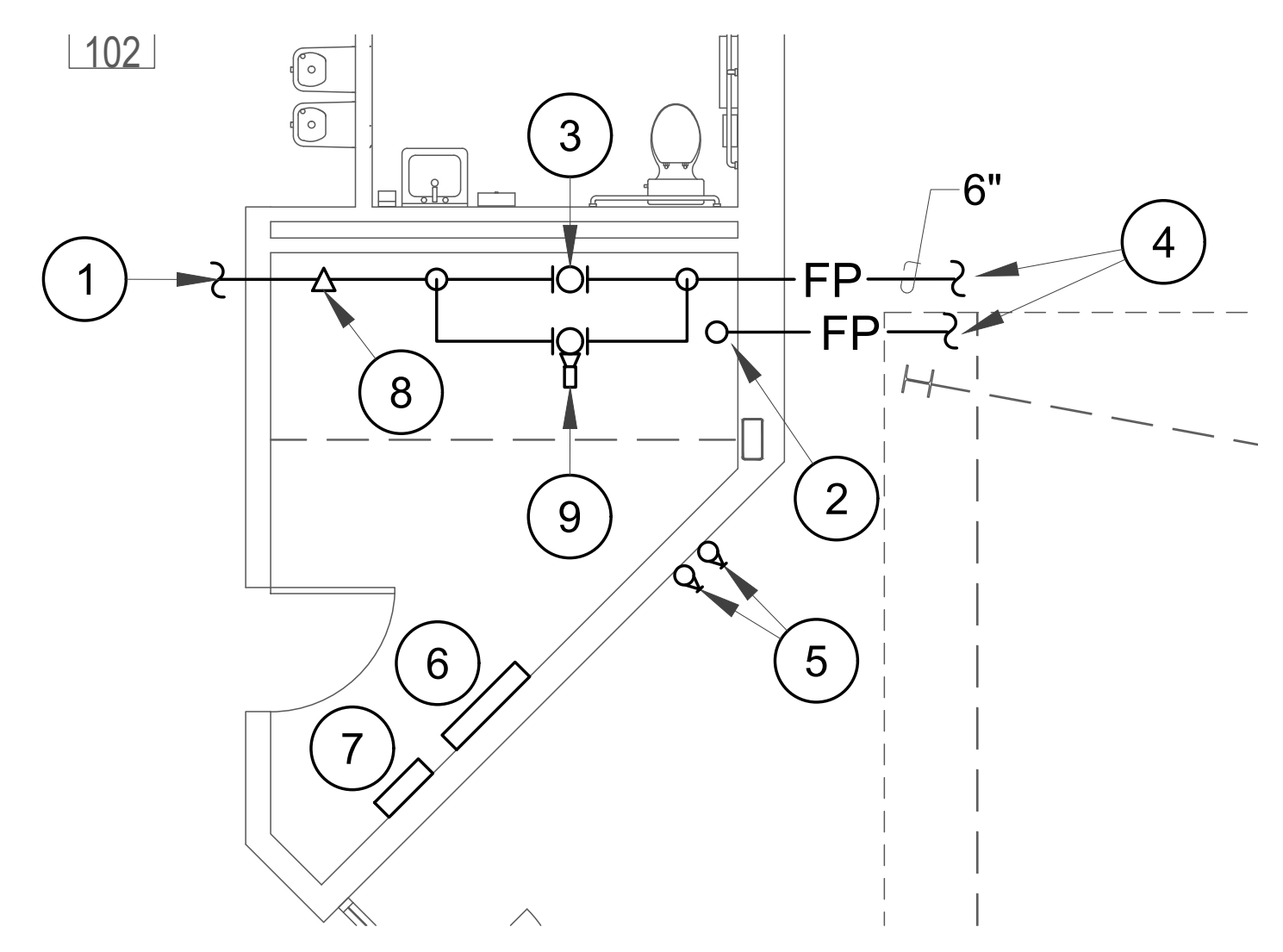
**FIRE ALARM VALVE DETAIL**

SCALE: NONE



**BOLLARD DETAIL**

SCALE: NONE



**ENLARGED FIRST FLOOR FIRE PROTECTION ROOM**

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

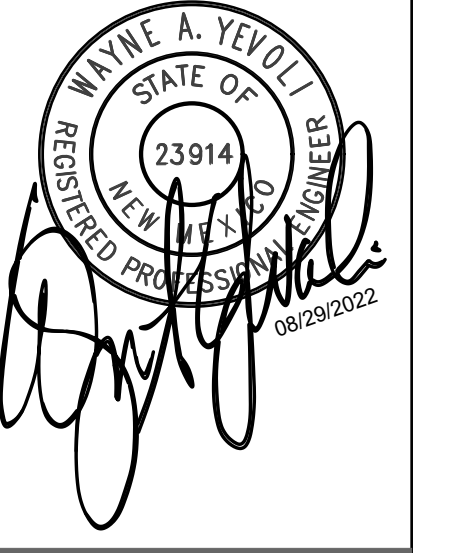
**KEYED NOTES**

1. FIRE PROTECTION PIPING TO BUILDING.
2. FIRE PROTECTION PIPING FROM REMOTE FIRE DEPARTMENT CONNECTION, REFER TO FIRE ALARM VALVE DETAIL THIS SHEET.
3. FIRE PUMP AND PIPING INSTALLED PER DETAIL THIS SHEET.
4. SEE SHEET FP-101 FOR CONTINUATION.
5. FIRE PUMP TEST MANIFOLD.
6. FIRE PUMP CONTROLLER.
7. JOCKEY PUMP CONTROLLER.
8. FIRE PROTECTION RISER, SEE DETAIL.
9. JOCKEY PUMP INSTALL PER DETAIL.

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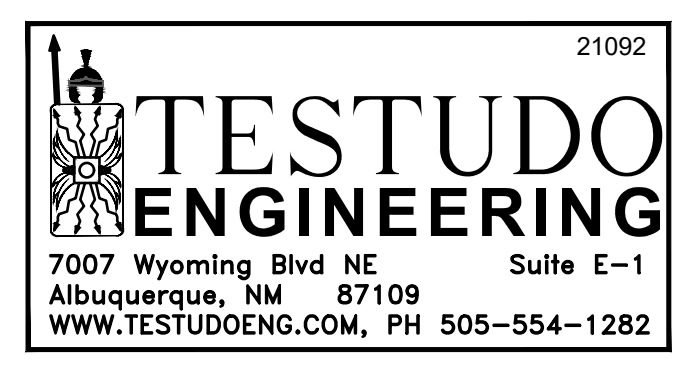


1 08/29/22 ADDENDUM

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FILE: 21092\_FP501.dwg  
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FIRE PROTECTION NOTES AND DETAILS

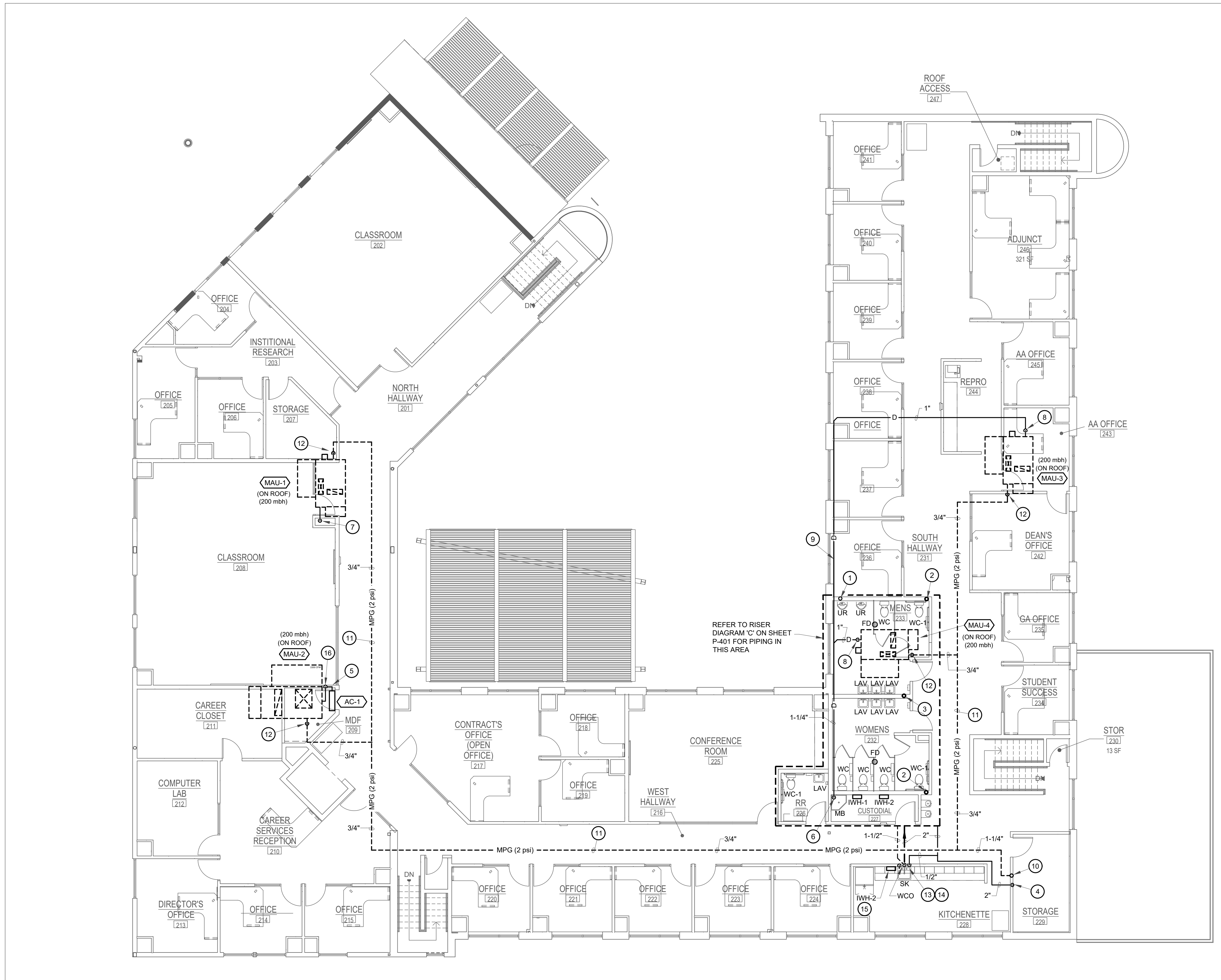
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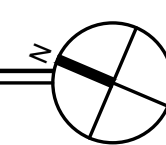






**SECOND FLOOR PLUMBING PLAN**

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

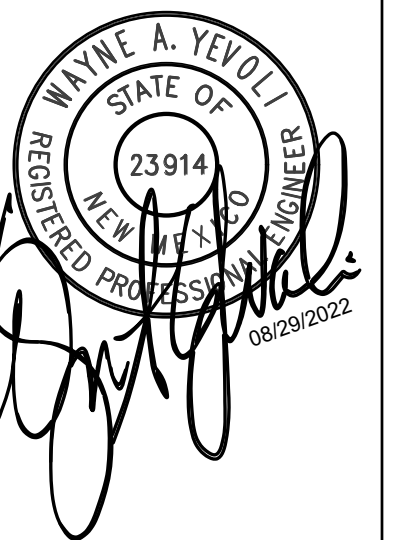


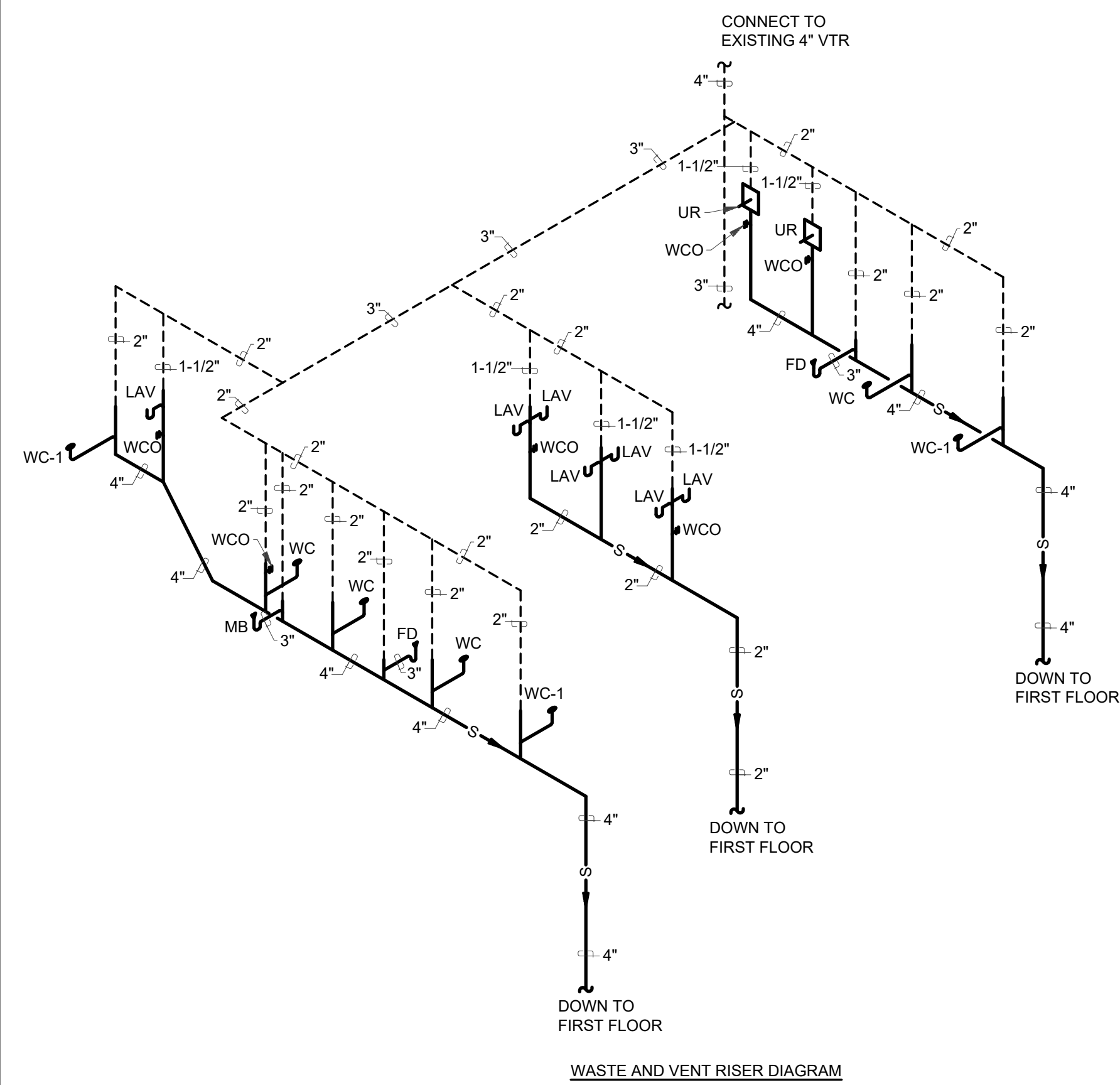
**GENERAL NOTES**

- A. REFER TO SHEET P-501 FOR DETAILS.
- B. REFER TO SHEET P-601 FOR LEGEND, SCHEDULES & NOTES.

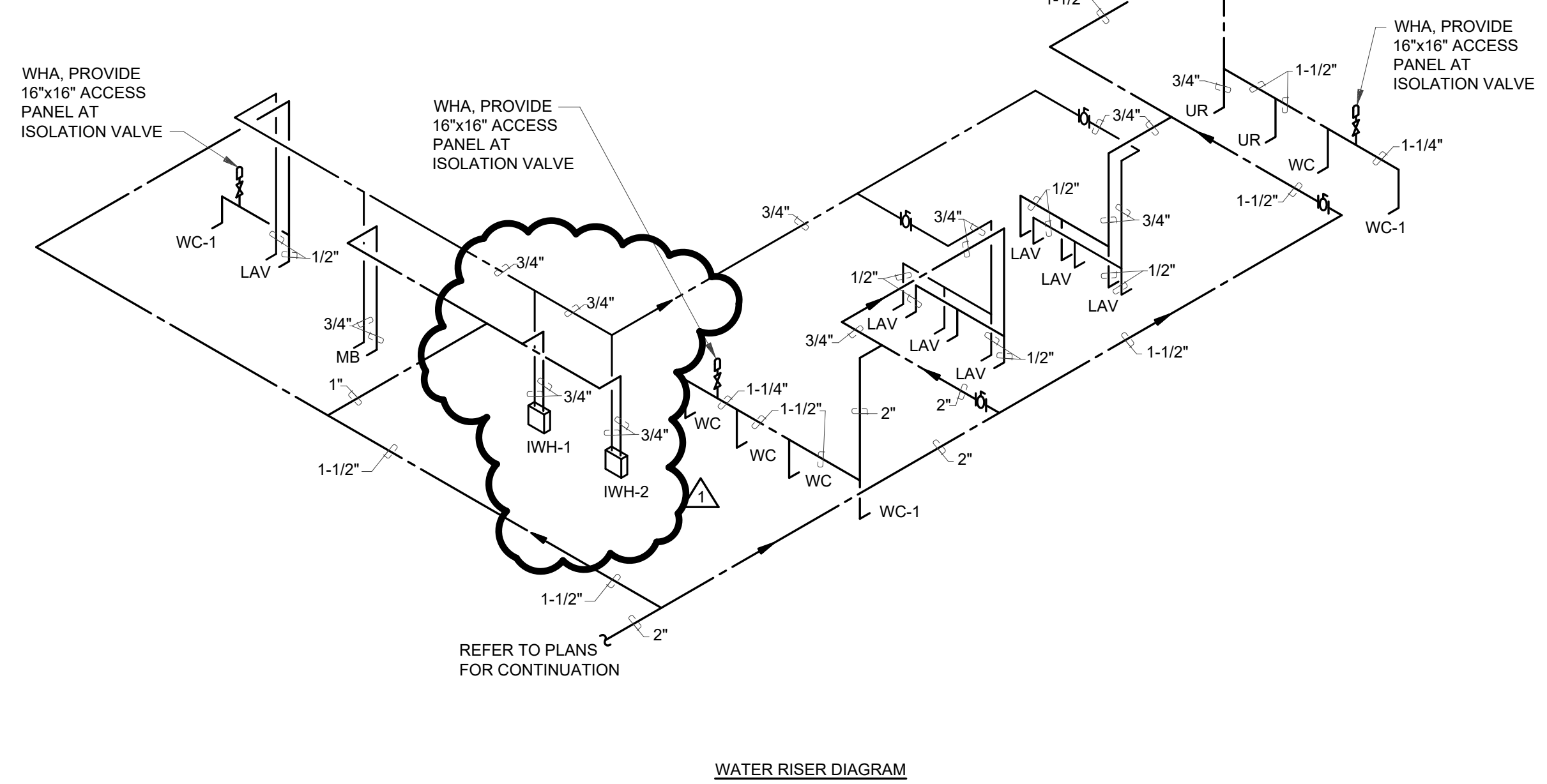
**KEYED NOTES**

1. 3" VENT FROM FIRST FLOOR UP IN WALL TO CEILING SPACE. REFER TO SHEET P-101 FOR CONTINUATION. FIELD VERIFY EXISTING CONDITIONS.
2. 4" SANITARY SEWER DOWN TO FIRST FLOOR. REFER TO SHEET P-101 FOR CONTINUATION. FIELD VERIFY EXISTING CONDITIONS.
3. 2" SANITARY SEWER DOWN TO FIRST FLOOR. REFER TO SHEET P-101 FOR CONTINUATION. FIELD VERIFY EXISTING CONDITIONS.
4. 2" CW FROM BELOW UP IN WALL TO CEILING SPACE AND ROUTE AS SHOWN. REFER TO SHEET P-101 FOR CONTINUATION.
5. CONNECT AC UNIT CONDENSATE PIPING TO MAKE-UP AIR UNIT CONDENSATE DRAIN IN CEILING SPACE.
6. 1-1/4" CONDENSATE DRAIN LINE DOWN IN WALL FROM CEILING SPACE AND TERMINATE AT MOP BASIN RIM HEIGHT WITH TURN DOWN.
7. 1" CONDENSATE FROM MAU ON ROOF AND DOWN CHASE TO FLOOR BELOW. SEAL ROOF PENETRATION WEATHER TIGHT. PROVIDE TRAP AT UNIT AND INSTALL PER DETAIL ON DETAIL SHEET.
8. 1" CONDENSATE PIPING FROM MAU ABOVE AND DOWN THRU ROOF. SEAL ROOF PENETRATION WEATHER TIGHT. PROVIDE TRAP AT UNIT AND INSTALL PER DETAIL ON DETAIL SHEET.
9. CONDENSATE PIPING SHALL RUN AT 1/8" PER LINEAR FOOT.
10. GAS LINE UP IN WALL FROM FIRST FLOOR TO ROOF. SEAL ROOF PENETRATION WEATHER TIGHT.
11. GAS LINE ON ROOF WITH PIPE SUPPORTS. INSTALL SUPPORTS PER DETAIL ON DETAIL SHEET.
12. CONNECT GAS LINE TO UNIT AND PROVIDE GAS PRESSURE REGULATOR FOR 200 MBH AT 7" LEAVING WATER COLUMN, GAS VALVE, UNION AND DIRT LEG.
13. 1/2" CW LINE DOWN IN WALL FROM CEILING SPACE TO SINK. BRANCH 1/2" CW LINE IN WALL AND CONNECT TO WATER HEATER BELOW COUNTER PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS.
14. VENT LINE UP IN WALL FROM SINK TO CEILING SPACE.
15. INSTALL WATER HEATER BELOW COUNTER PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS.
16. 1" CONDENSATE PIPING FROM MAU ON ROOF AND DOWN IN WALL TO FLOOR BELOW. ROOF PENETRATION SHALL BE SEALED WEATHER TIGHT. PROVIDE TRAP AT UNIT AND INSTALL PER DETAIL ON DETAIL SHEET.

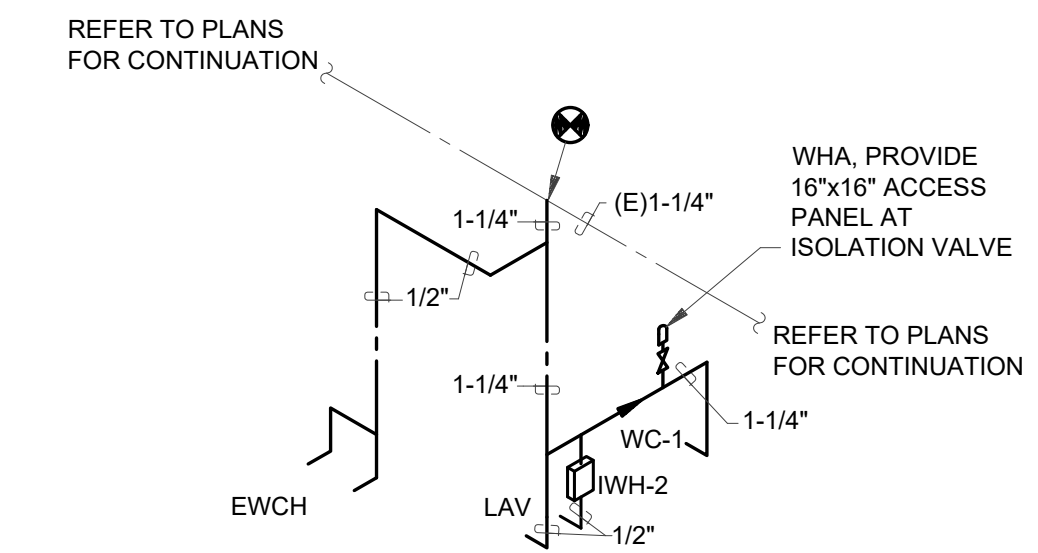




WASTE AND VENT RISER DIAGRAM

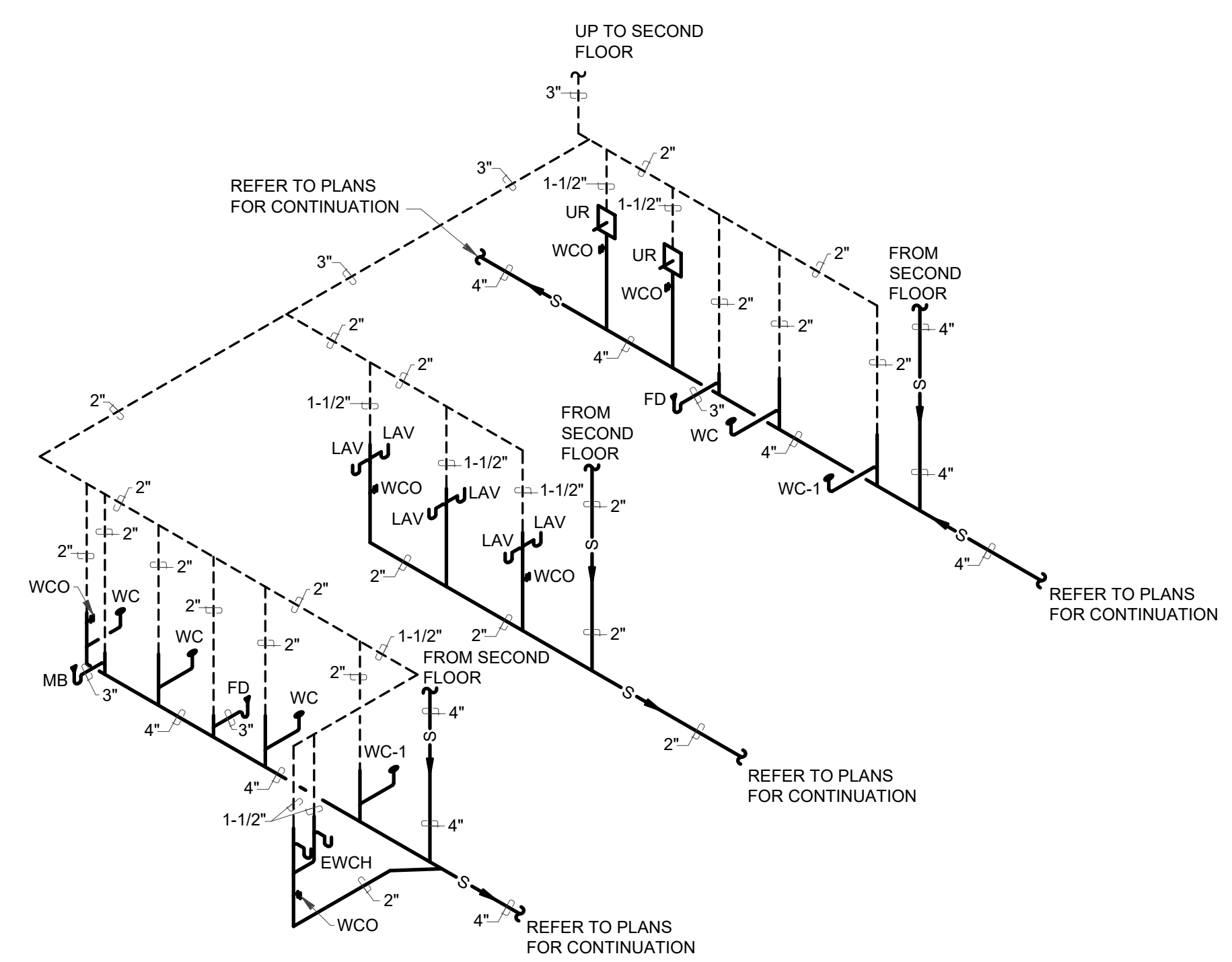


WATER RISER DIAGRAM

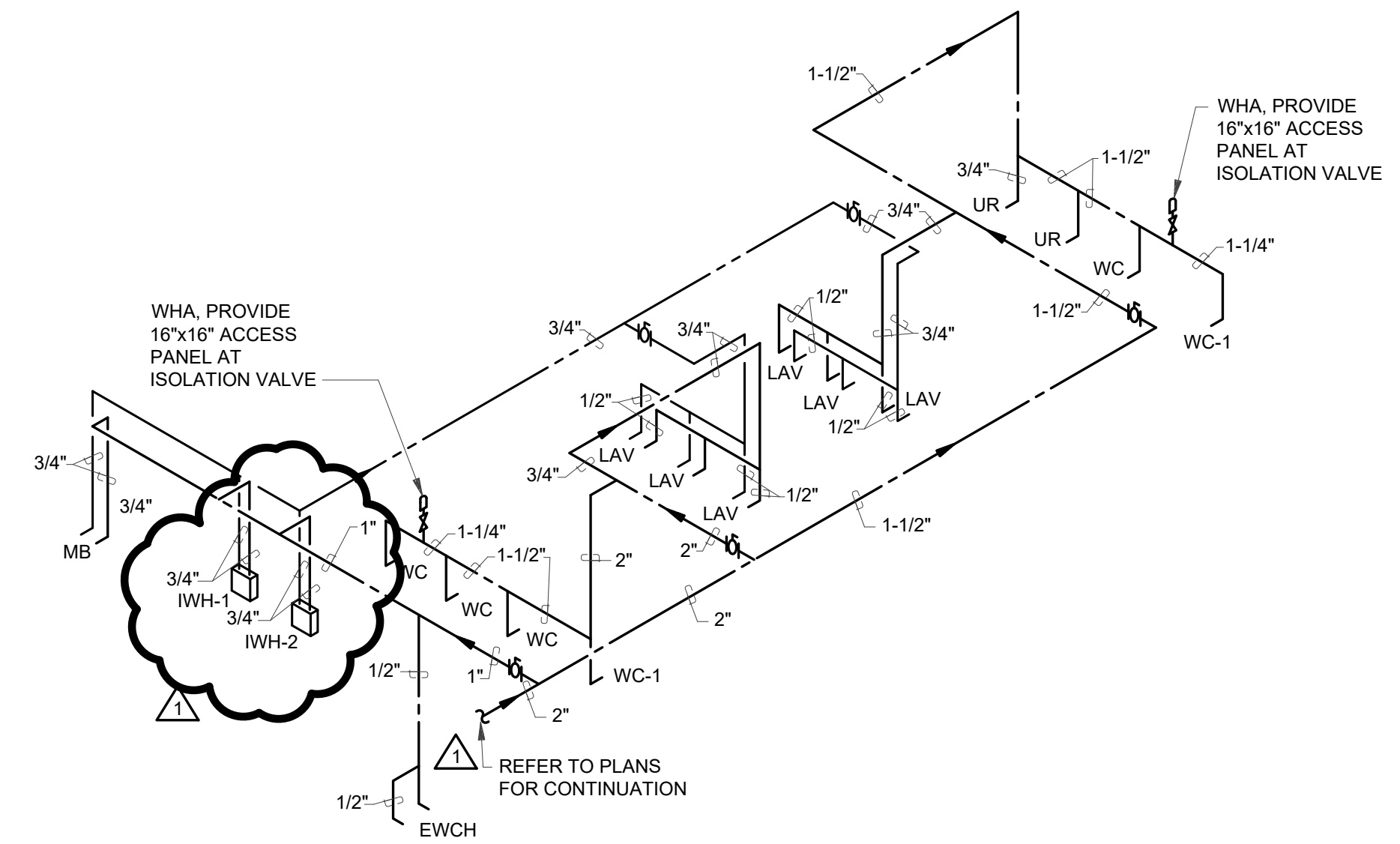


WATER RISER DIAGRAM

**PLUMBING RISER DIAGRAM 'C'**  
NOT TO SCALE

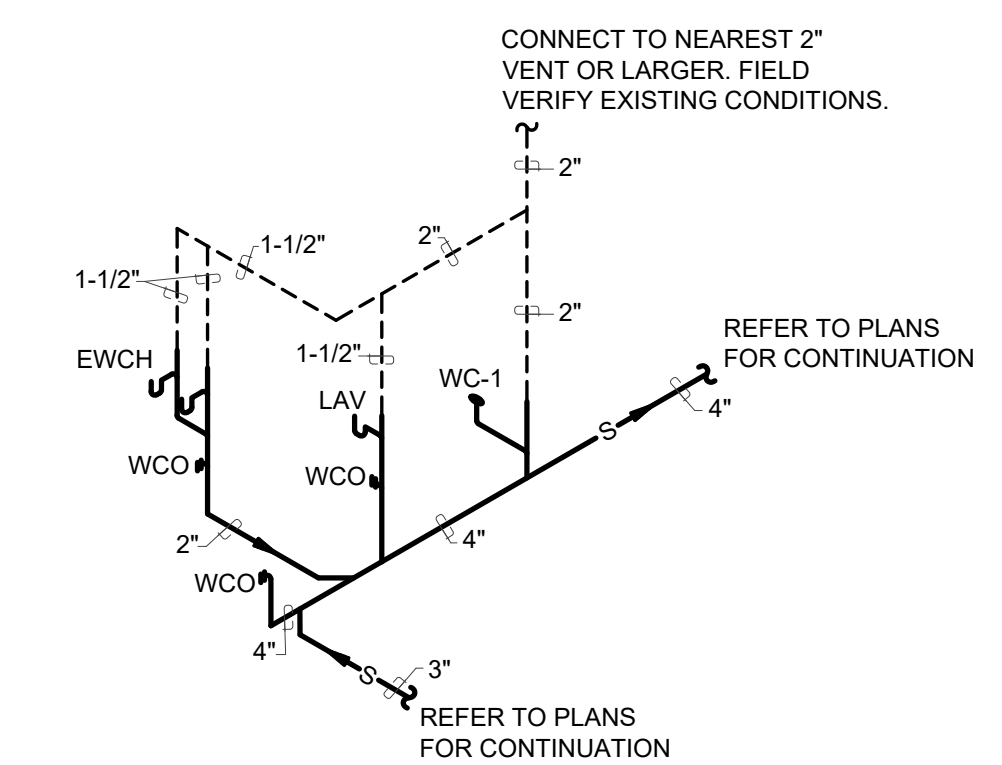


WASTE AND VENT RISER DIAGRAM



WATER RISER DIAGRAM

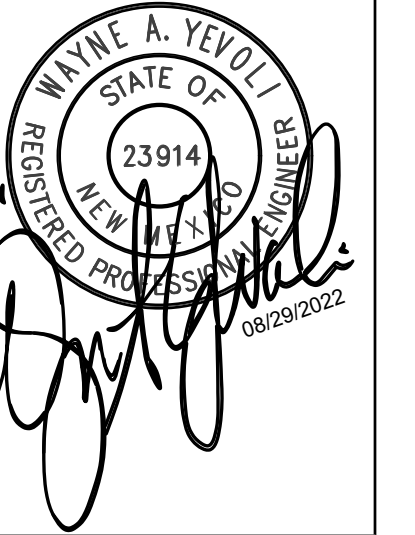
**PLUMBING RISER DIAGRAM 'B'**  
NOT TO SCALE



WASTE AND VENT RISER DIAGRAM

**PLUMBING RISER DIAGRAM 'A'**  
NOT TO SCALE

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1	08/29/22	ADDENDUM
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FILE:	21092_P401.dwg
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**PLUMBING RISER  
DIAGRAMS**

21092  
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PLUMBING EQUIPMENT/FIXTURE SCHEDULE	
SYMBOL	DESCRIPTION
FCO	FLOOR CLEANOUT: J.R. SMITH 4023, CAST IRON C.O., WITH ROUND SCORIATED TOP.
WCO	WALL CLEANOUT: J.R. SMITH 4530-Y CAST IRON C.O. TEE WITH BRASS PLUG AND ROUND STAINLESS STEEL ACCESS COVER WITH VANDAL PROOF SCREW.
TG	TRAP GUARD: SURE SEAL INLINE TRAP SEALER, SIZE TO MATCH FLOOR SINK / FLOOR DRAIN PER PLANS.
TMV	THERMOSTATIC MIXING VALVE: LEONARD MODEL 170-LF-BRKT-BV CAPABLE OF .25 GPM MINIMUM FLOW, 125 PSI MAXIMUM PRESSURE WITH 3/8" CONNECTIONS, LEAD FREE BRONZE BODY, THERMOSTATIC, WITH LOCKING TEMPERATURE ADJUSTMENT, MOUNTING BRACKET, CABINET WITH STEEL BAKED ENAMEL CONSTRUCTION, HINGED HARD DOOR AND CYLINDER LOCK. TEMPERATURE LIMITED TO 110°F.
CP-1	HOT WATER CIRCULATOR: TACO '00' SERIES MODEL 009 CARTRIDGE CIRCULATOR, CIRCULATOR WITH 1" FLANGE CONNECTIONS, STAINLESS STEEL CASING, 10 GPM, 35 HEAD-FEET, 3250 RPM, 1/8 HP, 115V/1PH/60HZ, PROVIDE OUTLET ON WALL ADJACENT TO PUMP AND WITH ENGRAVED PHENOLIC RESIN NAMEPLATE ATTACHED READING "HOT WATER CIRCULATOR ON-OFF".
BV	BALANCING VALVE: BELL & GOSSET A-549LFP (3/4") CIRCUIT SETTER PLUS, LEAD FREE, BRASS BODY, 400 PSIG MAXIMUM WORKING PRESSURE, -4°F TO 250°F MAXIMUM OPERATING TEMPERATURE, CALIBRATED NAMEPLATE, MEMORY STOP INDICATOR, INTERNAL CHECK VALVES, 1/4" NPT TAPPED AND PLUGGED DRAIN PORT.
WHA	WATER HAMMER ARRESTOR: J.R. SMITH 5000 STAINLESS STEEL, SEALED AIR CHARGE, 1" IPS, PROPERLY SIZED FOR FIXTURE LOAD AT POINT OF INSTALLATION.
FD	FLOOR DRAIN: J.R. SMITH 2005-U, CAST IRON BODY WITH NICKEL BRASS STRAINER, CLAMPING COLLAR, VANDAL-PROOF SCREWS, COMPLETE WITH TRAP GUARD (TG), SIZE TO MATCH FLOOR DRAIN.  TRAP 3" VENT 2" CW - HW -
FS	FLOOR SINK: JR SMITH 3150-P, 12 X 12 X 8, CAST IRON, ACID RESISTING ENAMEL INTERIOR AND TOP, ALUMINUM DOME, STRAINER AND NICKEL BRONZE TOP, 1/2 GRATE, COMPLETE WITH TRAP GUARD (TG), SIZE TO MATCH FLOOR SINK.  TRAP 3" VENT 2" CW - HW -
IWH-1	TANKLESS ELECTRIC WATER HEATER: RHEEM TANKLESS WATER HEATER MODEL RTEK-18, HAVING AN INPUT RATING OF 18000 WATTS, 750 AMPS, 208 VOLT, 99% THERMAL EFFICIENCY, THE HEATER SHALL HAVE A MINIMUM ACTIVATION FLOW RATE OF 0.3 GPM WITH 1.5 GPM AT 61 DEGREE TEMPERATURE RISE, MAXIMUM FLOW RATE IS 7.0 GPM, 3/4" CONNECTIONS, PRESET TEMPERATURE OF 123°F.
IWH-2	TANKLESS ELECTRIC WATER HEATER: RHEEM TANKLESS WATER HEATER MODEL RTEK-06 (POINT OF USE), HAVING AN INPUT RATING OF 6000 WATTS, 25 AMPS, 208 VOLT, 99% THERMAL EFFICIENCY, THE HEATER SHALL HAVE A MINIMUM ACTIVATION FLOW RATE OF 0.3 GPM WITH 0.5 GPM AT 56 DEGREE TEMPERATURE RISE, MAXIMUM FLOW RATE IS 2.0 GPM, 1/2" CONNECTIONS, PRESET TEMPERATURE OF 118°F.
ET	EXPANSION TANK: AMTROL MODEL ST-20VC PRESSURIZED DIAPHRAM-TYPE EXPANSION TANK. UNIT SHALL BE DESIGNED FOR USE WITH DOMESTIC HOT WATER, STAINLESS STEEL FITTINGS, INSTALLATION AS SHOWN ON THE DRAWINGS AND SHALL BE DESIGNED FOR MAX WORKING PRESSURE OF 150 PSI AT 200 F, INITIAL CHARGE PRESSURE SHALL BE 55 PSI, UNIT SHALL HAVE A TANK CAPACITY OF 8 GALLONS, MAX ACCEPT VOLUME 3.2 GALLONS, 12" DIAMETER AND 19" HEIGHT, 3/4" NPTF CONNECTION. TANK SHALL BE MANUFACTURED BY AMTROL OR APPROVED EQUAL.
BFP	BACKFLOW PREVENTOR: WATTS SERIES LF009 REDUCED PRESSURE BACKFLOW PREVENTION DEVICE, LEAD FREE, TWO IN-LINE CHECK VALVES, CAPTURED SPRINGS AND REPLACEABLE CHECK SEATS WITH AN INTERMEDIATE RELIEF VALVE, WORKING PRESSURE UP TO 175 PSI AND WATER TEMPERATURES OF 33 F TO 180 F, USC APPROVED. FURNISH WITH AIR GAP DRAIN AND PIPE FULL SIZE THROUGH EXTERIOR WALL WITH FLAPPER VALVE, 2-1/2" SIZE.
BFP-1	BACKFLOW PREVENTOR: WATTS SERIES LF009 REDUCED PRESSURE BACKFLOW PREVENTION DEVICE, LEAD FREE, TWO IN-LINE CHECK VALVES, CAPTURED SPRINGS AND REPLACEABLE CHECK SEATS WITH AN INTERMEDIATE RELIEF VALVE, WORKING PRESSURE UP TO 175 PSI AND WATER TEMPERATURES OF 33 F TO 180 F, USC APPROVED. FURNISH WITH AIR GAP DRAIN AND PIPE FULL SIZE THROUGH EXTERIOR WALL WITH FLAPPER VALVE, 3/4" SIZE.

### DEMOLITION GENERAL NOTES

- CONTRACTOR SHALL VERIFY LOCATION OF ALL PIPING, EQUIPMENT, ETC. SERVED BY EXISTING EQUIPMENT TO BE REMOVED. CONTRACTOR SHALL REMOVE SUCH ITEMS ONLY IF THEY DO NOT SERVE FIXTURES TO REMAIN. ALL PIPING SHALL BE CAPPED IN A CONCEALED LOCATION.
- CONTRACTOR SHALL BE RESPONSIBLE FOR REPAIRING AND FINISHING SURFACES (WALLS, FLOORS, CEILINGS) DAMAGED DURING REMOVAL OF EQUIPMENT AND PIPING UNLESS REMOVAL OR RENOVATION OF SURFACE IS COVERED UNDER ANOTHER SECTION OF THIS CONTRACT.
- CONTRACTOR SHALL DISPOSE OF OR RETURN ALL PLUMBING FIXTURES, PIPING, ETC. TO OWNER IN ACCORDANCE WITH DIRECTION OF THE ARCHITECT.
- REMOVE ANY COLD WATER, HOT WATER, GAS, WASTES OR VENT PIPING (NOT SHOWN) UNCOVERED IN EXISTING PARTITIONS TO BE REMOVED; REMOVE BACK TO ACTIVE LINE AND CAP.
- PLUG OR SEAL ALL SOIL, WASTE AND VENT OPENINGS AS DIRECTED FOR A SMOOTH FINISH FLOOR.
- PIPE ROUTING IS APPROXIMATE ONLY; EACH BIDDER SHALL SATISFY HIMSELF AS TO EXISTING BUILDING CONDITIONS BEFORE SUBMITTING HIS BID. NO ALLOWANCE SHALL BE MADE AFTER CONTRACT IS AWARDED TO ALLOW FOR LACK OF PRE-BID INSPECTION OF BUILDING BY SUCCESSFUL BIDDER.
- COORDINATE WORK WITH OTHER TRADES TO MINIMIZE CONFLICTS AND "DOWN TIME".

PLUMBING EQUIPMENT/FIXTURE SCHEDULE	
SYMBOL	DESCRIPTION
WC	WATER CLOSET: AMERICAN STANDARD "MADERA FLOWISE" MODEL 3451.001, 1.28 GPF, FLOOR MOUNTED, SIPHON JET ACTION, VITREOUS CHINA, HIGH EFFICIENCY, LOW CONSUMPTION TOILET, ELONGATED RIM, 15" RIM HEIGHT, BOLT CAPS, 1-1/2" TOP INLET SPUD AND COLOR WHITE. COMPLETE WITH SLOAN ROYAL 111 FLUSH VALVE (1.28 GPF) HIGH EFFICIENCY (WATERSENSE CERTIFIED) WITH VACUUM BREAKER, 1" SCREWDRIVER ANGLE STOP AND FLUSH CONNECTION, SOLID WHITE PLASTIC SEAT WITH OPEN FRONT LESS COVER, EXTENDED BACK AND SELF-SUSTAINING CHECK HINGE. WATER CLOSET IS A "WATER EFFICIENT PRODUCT".  TRAP 4" VENT 2" CW 1" HW --
WC-1	WATER CLOSET: AMERICAN STANDARD "MADERA FLOWISE" MODEL 3043.001, 1.28 GPF, FLOOR MOUNTED, SIPHON JET ACTION, VITREOUS CHINA, HIGH EFFICIENCY, LOW CONSUMPTION TOILET, ELONGATED RIM, 16-1/2" RIM HEIGHT, BOLT CAPS, 1-1/2" TOP INLET SPUD AND COLOR WHITE. COMPLETE WITH SLOAN ROYAL 111 FLUSH VALVE (1.28 GPF) HIGH EFFICIENCY (WATERSENSE CERTIFIED) WITH VACUUM BREAKER, 1" SCREWDRIVER ANGLE STOP AND FLUSH CONNECTION, SOLID WHITE PLASTIC SEAT WITH OPEN FRONT LESS COVER, EXTENDED BACK AND SELF-SUSTAINING CHECK HINGE. UNIT SHALL MEET ALL ADA REQUIREMENTS FOR THE PHYSICALLY CHALLENGED. WATER CLOSET IS A "WATER EFFICIENT PRODUCT".  TRAP 4" VENT 2" CW 1" HW --
UR	URINAL: AMERICAN STANDARD "WASHBROOK FLOWISE" MODEL 6590.001 (WATERSENSE CERTIFIED), 0.5 GPF LOW CONSUMPTION, VITREOUS CHINA, FLUSHING RIM, WALL HANGER, 3/4" TOP INLET SPUD AND COLOR WHITE. COMPLETE WITH JR SMITH NO. 0636 URINAL SUPPORT, AMERICAN STANDARD 6045051 002 MANUAL-OPERATED FLUSH VALVE (0.5 GPF) WITH VACUUM BREAKER (WATERSENSE CERTIFIED), SCREWDRIVER ANGLE STOP AND FLUSH CONNECTION. UNIT SHALL MEET ALL ADA REQUIREMENTS FOR THE PHYSICALLY CHALLENGED.  TRAP 2" VENT 1-1/2" CW 3/4"
LAV	LAVATORY: AMERICAN STANDARD "LUCERNE" WALL MOUNTED 20"X18" NOMINAL SIZE 0355.012 FOR FLOOR MOUNTED CONCEALED ARM CARRIER (JR SMITH) WITH T&S BRASS B-0890-CR-WS FAUCET 4" CENTER DECK MOUNT MIXING FAUCET WITH B-0199-03-N05 (0.5 GPM) NON-AERATED (WATERSENSE CERTIFIED) AND 4" VANDAL PROOF WRISTBLADE HANDLES. PROVIDE AND INSTALL GRID DRAIN, WATTS STAINLESS STEEL FLEXIBLE RISER, ANGLE STOPS, P-TRAP WITH WASTE-TO-WALL CONNECTION AND PLUMBEREX PRO-EXTREME UNDER LAV PROTECTOR. COMPLETE WITH THERMOSTATIC MIXING VALVE (TMV) LEONARD 170-LF, 0.25 GPM MINIMUM FLOW, TMV TO BE SET TO 110 DEGREE OUTPUT TEMPERATURE AND INSTALLED PER MANUFACTURE RECOMMENDATIONS.  TRAP 1-1/4" VENT 1-1/2" CW 1/2" HW 1/2"
EWCH	ELECTRIC WATER COOLER: ELKAY MODEL LZWS-EDFP217K, WALL MOUNTED, BOTTLE FILLING STATION, BI-LEVEL, ADA COMPLIANT, FILTERED NON-REFRIGERATED, STAINLESS STEEL, WATERSENTRY FILTRATION SYSTEM, STAINLESS STEEL BASIN WITH INTEGRAL DRAIN, FLEXI-GUARD SAFETY BUBBLER, LAMINAR FLOW, REAL DRAIN, VISUAL FILTER MONITOR, ELECTRONIC BOTTLE FILLER SENSOR WITH MECHANICAL FRONT BUBBLER BUTTON ACTIVATION, 115V/60HZ, 1.0 F.L. AMPS, 15 RATED WATTS, CHROME PLATED CAST BRASS ANGLE SUPPLY WITH LOOSE KEY STOP, FLOOR SUPPORT, CHROME PLATED CODE APPROVED ADJUSTABLE "P" TRAP WITH WASTE-TO-WALL.  TRAP 1-1/4" VENT 1-1/2" CW=1/2"
MB	MOP BASIN: FIAT MODEL TERRAZZO TSB3003, SIZE 36" X 24" X 12" DEEP, ONE PIECE PRECAST TERRAZZO, UNIT SHALL HAVE 12" HIGH WALLS OUTSIDE AND 10" INSIDE AT LOWEST WALL, NOT LESS THAN 2" WIDE SHOULDERS, COMPLETE WITH QDC QUICK DRAIN CONNECTORS, CHROME PLATED BRASS DRAIN, 830AA SERVICE SINK FAUCET WITH 5 GPM FLOW RESTRICTOR, 832AA HOSE & HOSE BRACKET, 833AA SILICONE SEALANT, MSG WALL GUARDS, INTEGRAL STOP, ADJUSTABLE WALL BRACE, PAIL HOOK AND 3/4" HOSE THREAD ON SPOUT AND 889-CC MOP HANGER.  TRAP 3" VENT 2" CW 1/2" HW 1/2"
LS	LIFT STATION: TWO EACH LIBERTY PUMPS 1100 SERIES PRE-ASSEMBLED DUPLEX SEWAGE SYSTEM MODEL 1103/L5E2M. NON-CLOG, CAST IRON, VERTICAL SUBMERSIBLE DUPLEX SEWAGE EJECTOR, CAPABLE OF PASSING 2" SOLIDS AND DELIVERING 110 GPM AT 12 FEET HEAD WITH 1/2 HP, 230 VOLT, 1 PHASE, 6.8 FLA, TOTALLY ENCLOSED MOTOR, 3" DISCHARGE, 30" DIAMETER, 36" DEEP SUMP (REFER TO DETAIL) WITH BOLT ON POWDER COATED STEEL, 4" PREASSEMBLED INLET HUB AND OUTLET PIPE GROMMETS, FLOAT SWITCH BRACKET, CORD SEALS, COMPLETE WITH ALTERNATORS, MOTOR STARTERS, DOUBLE FLOAT SWITCH, HIGH AND LOW WATER ALARM, AND DUPLEX NEMA 4X CONTROL PANEL, GUIDE RAIL SYSTEM. COMPLETE WITH ALL ACCESSORIES REQUIRED FOR A COMPLETE OPERATING SYSTEM, SELECTION BASED ON LIBERTY PUMPS OR APPROVED EQUAL.
SK	COUNTER SINK: ELKAY "LUSTERTONE" LRAD-252160 SINGLE COMPARTMENT, ADA COMPLIANT, 18 GAUGE TYPE 304 STAINLESS STEEL, SELF-RIMMING, UNDERSIDE UNDERCOATED, THREE FAUCET HOLES, T&S BRASS NO. B-2866-05 DUAL HANDLE FAUCET WITH SWIVEL/RIGID GOOSENECK SPOUT AND B-0199-01-F10, 1.0 GPM AERATOR, LK-35 DUO-STRAINER WITH 1-1/2" TAILPIECE, CHROME PLATED CAST BRASS ANGLE SUPPLIES WITH LOOSE KEY STOPS, CHROME PLATED CODE APPROVED ADJUSTABLE "P" TRAP WITH WASTE TO WALL, SINK SIZE 25" X 21-1/4" X 6" DEEP, INSULATE ALL WATER PIPING AND TRAP BELOW LAVATORY WITH TRAP WRAP, KIT NUMBER 500R.  TRAP 1-1/2" VENT 1-1/2" CW 1/2" HW 1/2"

### PLUMBING GENERAL NOTES

- ALL PIPING SHALL BE CONCEALED WHERE POSSIBLE. ALL EXPOSED PIPING, WHERE CONCEALMENT IS NOT POSSIBLE, SHALL BE INSTALLED AND PAINTED AS DIRECTED BY THE ARCHITECT.
- ALL PIPING SHALL BE INSULATED, SEE SPECIFICATIONS.
- ALL BRANCHES SHALL BE VALVED AND ALL VALVES SHALL HAVE UNIONS ADJACENT. ACCESS PANELS AND DOORS SHALL BE FURNISHED TO GENERAL CONTRACTOR FOR INSTALLATION AND ACCESS TO VALVES WHERE REQUIRED. LOCATE ADDITIONAL VALVES AS SHOWN ON DRAWINGS. SEE SPECIFICATIONS FOR ACCESS DOOR REQUIREMENTS.
- ALL PIPING SHALL PITCH TO DRAIN, AND CONTRACTOR SHALL PROVIDE VALVING FOR SYSTEM DRAINAGE. CONTRACTOR SHALL DELIVER A MARKED-UP SET OF PLANS TO THE OWNER (PRIOR TO FINAL PAYMENT) SHOWING ALL BRANCH VALVES AND ALL DRAINAGE POINTS.
- CARE SHALL BE TAKEN TO AVOID MECHANICAL DUCTWORK, ELECTRICAL EQUIPMENT AND AIR HANDLING EQUIPMENT ABOVE CEILING. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ROUTING OF PIPING WITH CEILING CONTRACTOR AND SHEET METAL CONTRACTOR. RELOCATION OF PIPING AS A RESULT OF POOR COORDINATION BY THIS CONTRACTOR SHALL BE AT HIS OWN EXPENSE.
- NO WATER PIPING SHALL BE LOCATED IN OUTSIDE WALLS, UNLESS SHOWN TO BE AND THEN PIPING TO BE INSULATED AND LOCATED AS CLOSE AS POSSIBLE TO INSIDE OF WALL CAVITY WITH ADDITIONAL INSULATION BETWEEN PIPING AND EXTERIOR OF WALL.
- WRITTEN PRIOR APPROVAL REQUIRED FOR ALL PROPOSED SUBSTITUTIONS OF EQUIPMENT AND MATERIALS, RECEIVED BY ENGINEER, 10 DAYS PRIOR TO BID DATE OF PROJECT TO ALLOW ADEQUATE TIME FOR REVIEW AND RESPONSE.
- ALL TRENCHING AND BACKFILL FOR PIPING SHALL BE THE RESPONSIBILITY OF THIS CONTRACTOR.
- ALL SEWER PIPING BELOW FLOOR SLAB (BELOW GRADE) SHALL BE STANDARD WEIGHT HUB AND SPIGOT CAST IRON.
- ALL PIPE PENETRATIONS THRU FIRE-RATED ASSEMBLIES SHALL BE SLEEVED AND SEALED WITH CODE-APPROVED FIRE BARRIER MATERIALS.
- SECURE ALL PIPING TO WALLS FOR A RIGID INSTALLATION WITH UNISTRUT BRACKETS AND GASKETED PIPE CLAMPS.
- ALL HORIZONTAL SEWER LINES SHALL BE SLOPED AT 1/4" PER FOOT TOWARD THE POINT OF DISPOSAL.
- PIPE ROUTING IN EXPOSED STRUCTURE AND UNDER VIGAS/GLUELAMIS IS NOT ALLOWED.

PLUMBING SYMBOL LEGEND		
ABBR.	SYMBOL	DESCRIPTION
		EQUIPMENT DESIGNATION
		KEYED NOTES
TYP		TYPICAL
OFCl		OWNER FURNISHED, CONTRACTOR INSTALLED
(E)		EXISTING
POC		POINT OF CONNECTION
FCO		FLOOR CLEANOUT
WCO		WALL CLEANOUT
VTR		VENT THRU ROOF
		RISER DOWN
		RISER UP
		DROP
		RISER UP
HB		HOSE BIBB / WALL HYDRANT
CW		COLD WATER LINE
HW		HOT WATER LINE
HWR		CIRCULATING HOT WATER
V		VENT PIPING
S		SEWER OR WASTE LINE
G		GAS PIPING
D		CONDENSATE DRAIN LINE
GW		GREASE WASTE LINE
FD		FLOOR DRAIN
FS		FLOOR SINK
CAP		CAP ON END OF PIPE
		FLANGED CONNECTION
		VALVE IN RISER
		THERMOMETER
		PRESSURE GAUGE
		FLOW SWITCH
		PRESSURE GAUGE W/ GAUGE COCK
		GATE VALVE
		GLOBE VALVE
		CHECK VALVE
		PLUG VALVE
		CONTROL VALVE (THREE-WAY)
		CONTROL VALVE (TWO-WAY)
		RELIEF VALVE
		PRESSURE REDUCING VALVE
		BALL VALVE
		BALANCING VALVE (BV)
		STRAINER
		UNION

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1 08/29/22 ADDENDUM

B\_AD PROJECT # 2104

FILE: 21092\_P601.dwg

DATE: 08/09/2022

DRAWN BY: TD

CHECKED BY: WAY

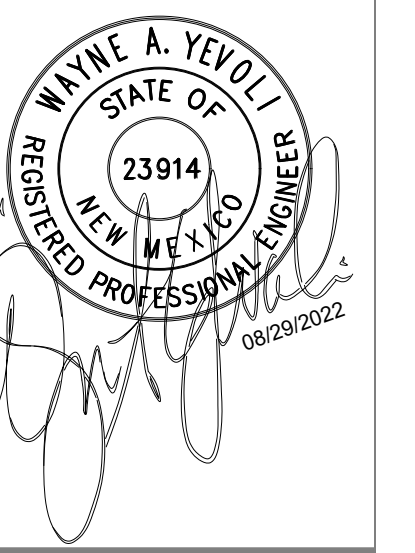
PLUMBING  
GENERAL NOTES,  
LEGEND &  
SCHEDULES

21092  
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**P-601**  
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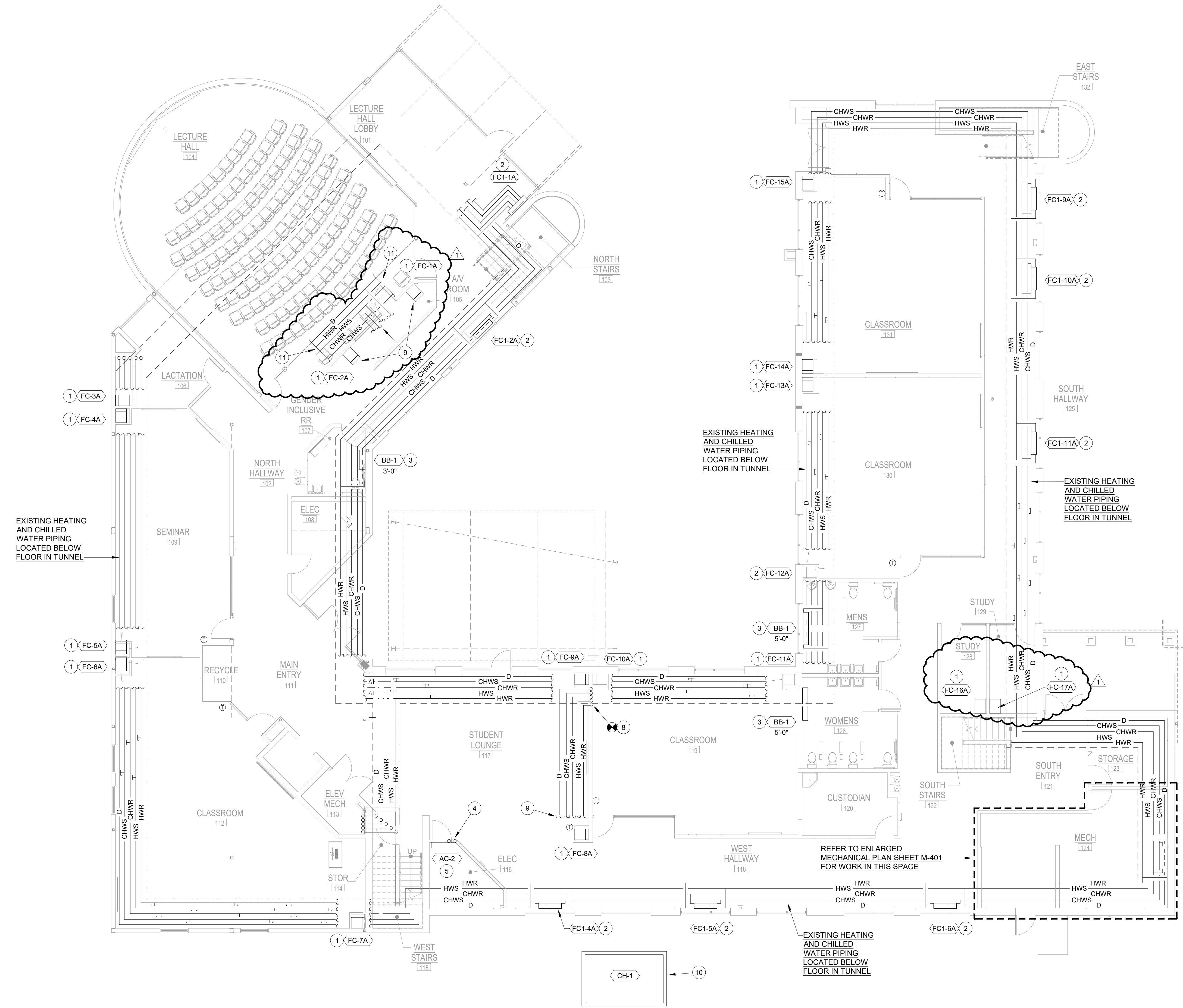


1 08/29/22 ADDENDUM

B\_AD PROJECT # 2104  
FILE: 21092\_M101.dwg  
DATE: 08/09/2022  
DRAWN BY: MO  
CHECKED BY: WAY

**FIRST FLOOR  
MECHANICAL  
PLAN**

**M-101**  
SHEET OF



**GENERAL NOTES**

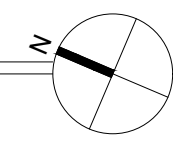
- A. REFER TO SHEET M-501 / M-502 FOR DETAILS.
- B. REFER TO SHEET M-601 / M-602 FOR LEGEND, SCHEDULES & NOTES.

**KEYED NOTES**

1. INSTALL NEW VERTICAL CONCEALED FAN COIL UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONNECT NEW HEATING, COOLING AND DRAIN PIPING TO EXISTING PIPING. REFER TO EQUIPMENT SCHEDULE FOR PIPE SIZES.
2. INSTALL NEW FLOOR MOUNTED FAN COIL UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONNECT NEW HEATING, COOLING AND DRAIN PIPING TO EXISTING PIPING.
3. INSTALL NEW BASEBOARD HEATING UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONNECT NEW HEATING PIPING TO EXISTING PIPING.
4. REFRIGERANT PIPING FROM SECOND FLOOR AND CONNECT TO WALL MOUNTED AC UNIT.
5. INSTALL WALL MOUNT AC UNIT ABOVE DOOR PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. REFER TO DETAIL ON DETAIL SHEET.
8. CONNECT NEW HVAC PIPING TO EXISTING PIPING IN TUNNEL. EXTEND PIPING UP IN WALL CEILING SPACE.
9. EXTEND NEW HVAC PIPING IN CEILING SPACE AND CONNECT TO NEW FAN COIL UNIT PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. REFER TO DETAIL ON DETAIL SHEET.
10. INSTALL NEW CHILLER AT EXISTING LOCATION AND RE-CONNECT TO EXISTING CHILLED WATER PIPING. REFER TO DETAIL AND CHILLED WATER PIPING DIAGRAM ON DETAIL SHEETS.
11. HEATING, COOLING, AND DRAIN PIPING IN CEILING SPACE. SEE SHEET M-102 FOR CONTINUATION.

**FIRST FLOOR HVAC PIPING PLAN**

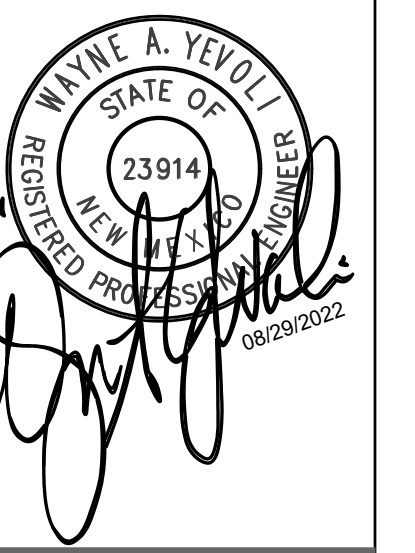
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1	08/29/22	ADDENDUM
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B_AD PROJECT #	2104
FILE:	21092_M102.dwg
DATE:	08/09/2022
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CHECKED BY:	WAY

**SECOND FLOOR  
MECHANICAL  
PLAN**

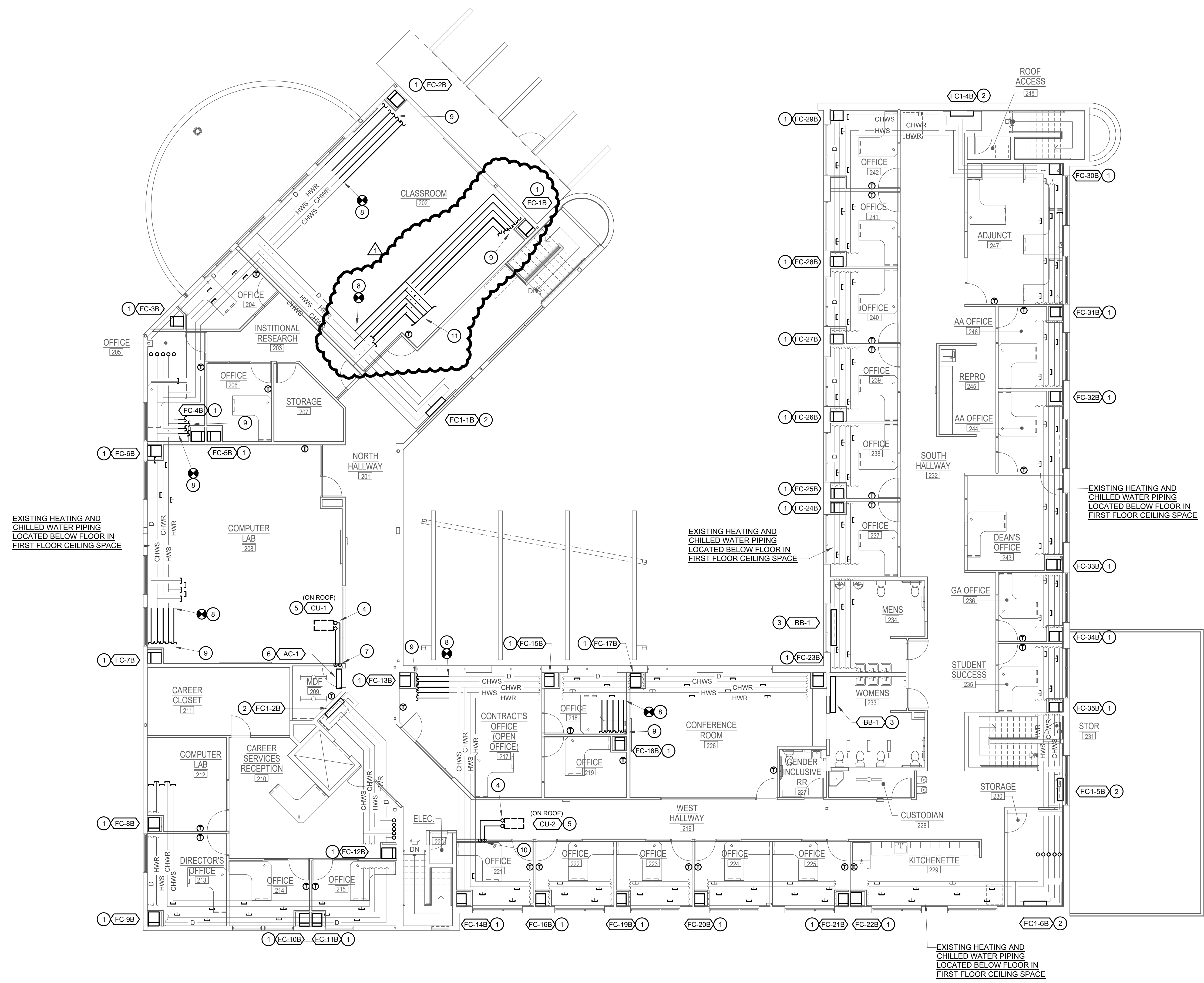
**M-102**  
SHEET OF

**GENERAL NOTES**

- A. REFER TO SHEET M-501 / M-502 FOR DETAILS.
- B. REFER TO SHEET M-601 / M-602 FOR LEGEND, SCHEDULES & NOTES.

**KEYED NOTES**

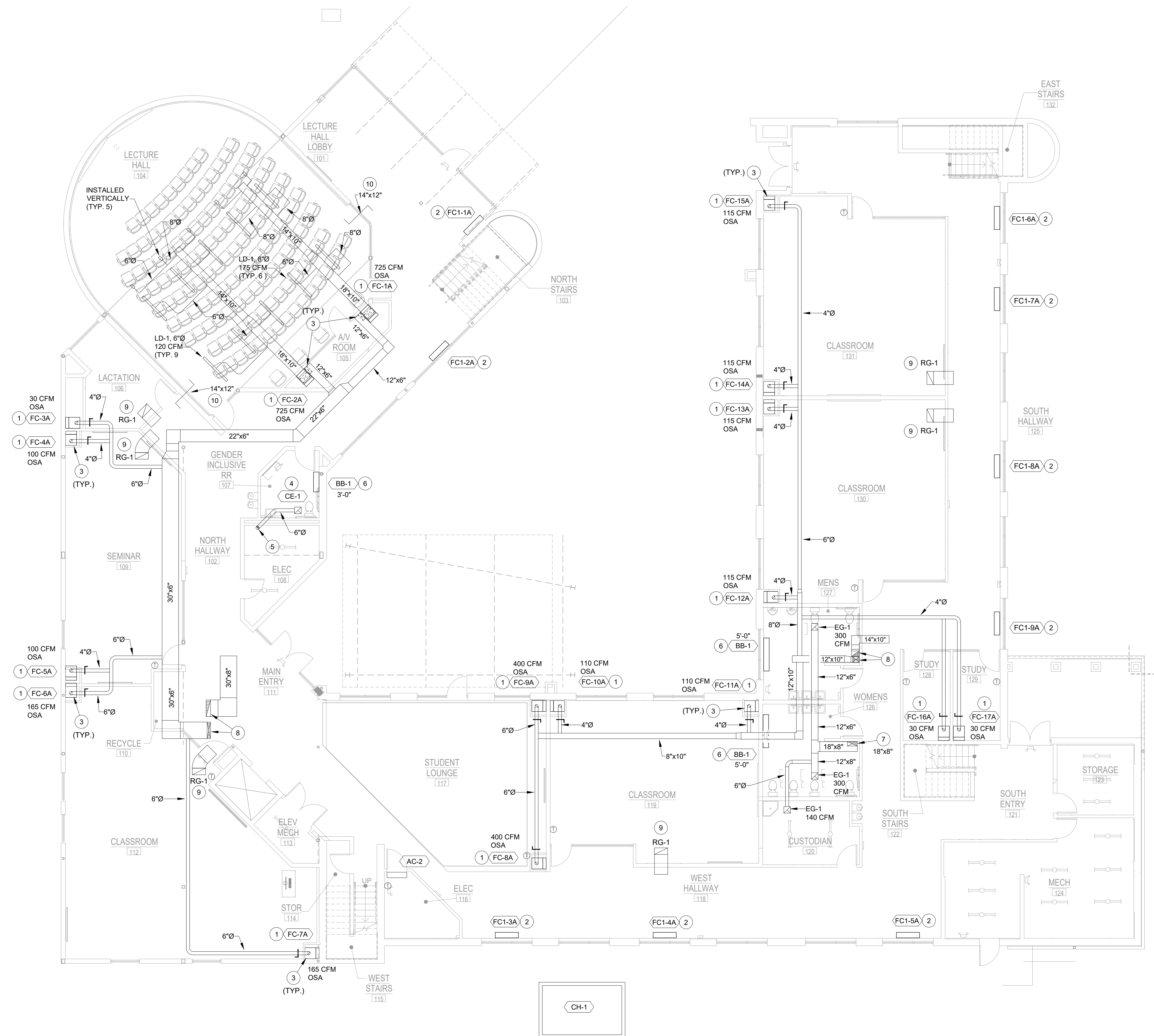
1. INSTALL NEW VERTICAL CONCEALED FAN COIL UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONNECT NEW HEATING, COOLING AND DRAIN PIPING TO EXISTING PIPING. REFER TO EQUIPMENT SCHEDULE FOR PIPE SIZES
2. INSTALL NEW FLOOR MOUNTED FAN COIL UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONNECT NEW HEATING, COOLING AND DRAIN PIPING TO EXISTING PIPING.
3. INSTALL NEW BASEBOARD HEATING UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. CONNECT NEW HEATING PIPING TO EXISTING PIPING.
4. REFRIGERANT PIPING DOWN THROUGH ROOF FROM CONDENSER TO CEILING SPACE.
5. INSTALL CONDENSER ON ROOF PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. REFER TO DETAIL ON DETAIL SHEET.
6. INSTALL WALL MOUNT AC UNIT ABOVE DOOR PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. REFER TO DETAIL ON DETAIL SHEET.
7. REFRIGERANT PIPING DOWN IN WALL FROM CEILING SPACE TURN OUT AND CONNECT TO WALL MOUNTED AC UNIT.
8. CONNECT NEW HVAC PIPING TO EXISTING PIPING IN FIRST FLOOR CEILING SPACE.
9. EXTEND NEW HVAC PIPING IN CEILING AND CONNECT TO NEW FAN COIL UNIT PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. REFER TO DETAIL ON DETAIL SHEET.
10. REFRIGERANT PIPING DOWN IN WALL FROM CEILING SPACE TO FIRST FLOOR. SEE FIRST FLOOR HVAC PIPING PLAN SHEET M-101 FOR CONTINUATION.
11. NEW HEATING, COOLING AND DRAIN PIPING IN FIRST FLOOR CEILING SPACE. EXTEND AND CONNECT TO UNITS SERVING LECTURE HALL. SEE SHEET M-101 FOR CONTINUATION.



**SECOND FLOOR HVAC PIPING PLAN**  
SCALE: 1/8"=1'-0"

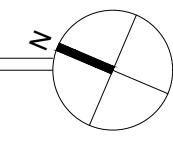
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**FIRST FLOOR HVAC PLAN**

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



**GENERAL NOTES**

- A. REFER TO SHEET M-501 FOR DETAILS.
- B. REFER TO SHEET M-601 FOR LEGEND, SCHEDULES & NOTES.

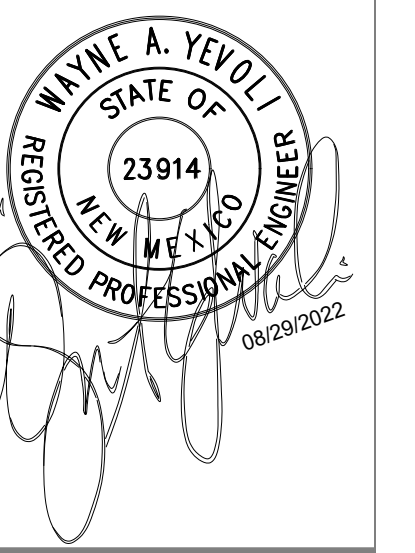
**KEYED NOTES**

1. INSTALL NEW VERTICAL CONCEALED FAN COIL UNIT AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS. REFER TO DETAIL ON DETAIL SHEET.
2. INSTALL NEW FLOOR MOUNTED FAN COIL UNIT WITH VENTILATION AIR DAMPER THROUGH WALL AT THIS LOCATION PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS.
3. VENTILATION AIR DUCTWORK IN CEILING SPACE AND CONNECT TO TOP OF FAN COIL UNIT. PROVIDE WITH MANUAL BALANCING DAMPER.
4. INSTALL CEILING EXHAUSTER PER DETAIL ON DETAIL SHEET.
5. EXHAUST DUCTWORK FROM CEILING SPACE TO SECOND FLOOR. SEE SECOND FLOOR PLAN SHEET M-202 FOR CONTINUATION.
6. INSTALL BASEBOARD HEATER PER DETAIL ON DETAIL SHEET.
7. EXHAUST DUCTWORK FROM SECOND FLOOR TO CEILING SPACE. SEE SHEET M-202 FOR CONTINUATION.
8. VENTILATION AND RETURN AIR DUCTWORK FROM SECOND FLOOR TO CEILING SPACE. SEE SHEET M-202 FOR CONTINUATION. PROVIDE 1" ACOUSTIC LINER FOR RETURN AIR DUCTWORK.
9. PROVIDE RETURN AIR GRILLE WITH SOUND ELBOW PER DETAIL ON DETAIL SHEET. EXTEND ELBOW THROUGH WALL INTO CEILING SPACE OF HALLWAY AS SHOWN.
10. PROVIDE RETURN AIR TRANSFER BOOT PER DETAIL ON DETAIL SHEET.

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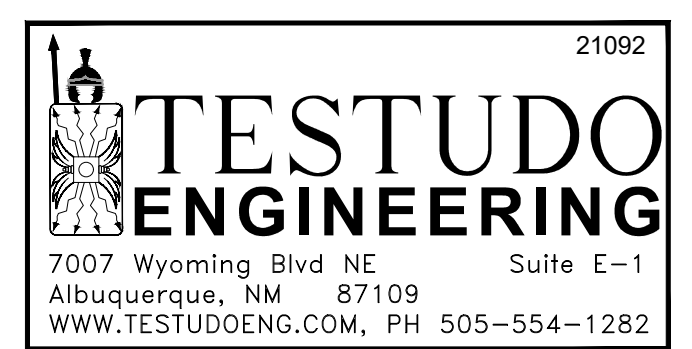
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1 08/29/22 ADDENDUM

B\_AD PROJECT # 2104  
FILE: 21092\_M201.dwg  
DATE: 08/09/2022  
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CHECKED BY: **WAB**

**FIRST FLOOR  
HVAC PLAN**



**M-201**  
SHEET OF 1







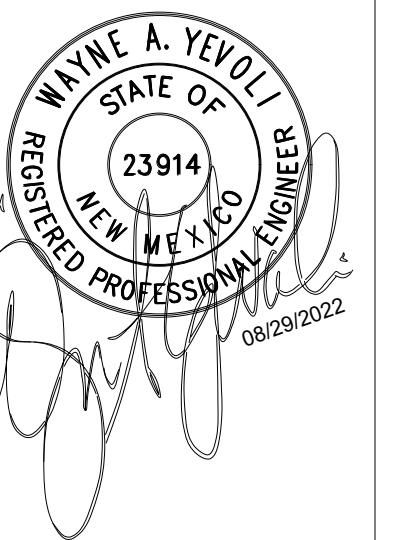
**GENERAL NOTES**

- A. REFER TO SHEET M-501 / M-502 FOR DETAILS.
- B. REFER TO SHEET M-601 / M-602 FOR LEGEND, SCHEDULES & NOTES.

**KEYED NOTES**

1. REMOVE EXISTING WATER HEATER IN ITS ENTIRETY INCLUDING ALL ASSOCIATED PIPING AND FLUE. REMOVE CW, HW, AND GAS PIPING BACK TO MAIN PIPING AND CAP. FIELD VERIFY EXISTING LOCATION.
2. REMOVE EXISTING GLYCOL FEED IN ITS ENTIRETY INCLUDING ASSOCIATED PIPING BACK TO MAINS AND CAP.
3. REMOVE EXISTING BOILER IN ITS ENTIRETY INCLUDING ALL ASSOCIATED PIPING AND FLUES. REMOVE CW, HW, AND GAS PIPING BACK TO MAIN PIPING AND CAP FOR RE-CONNECTION TO NEW BOILER. FIELD VERIFY EXISTING LOCATION.
4. DISCONNECT AND REMOVE EXISTING CHILLED WATER PUMP IN ITS ENTIRETY. PIPING SHALL REMAIN FOR RE-CONNECTION TO NEW PUMP.
5. DISCONNECT AND REMOVE EXISTING HEATING WATER PUMP IN ITS ENTIRETY. PIPING SHALL REMAIN FOR RE-CONNECTION TO NEW PUMP.
6. REMOVE EXISTING EXPANSION TANK IN ITS ENTIRETY INCLUDING PIPING.
7. REMOVE EXISTING CHILLED AND HEATING WATER PIPING BACK TO APPROXIMATELY 2'-0" ABOVE FINISH FLOOR FOR RE-CONNECTION TO NEW CHILLED AND HEATING WATER PIPING, PUMPS, AND BOILERS. REFER TO BOILER AND CHILLED WATER PIPING SCHEMATICS SHEET M-503.
8. INSTALL NEW BOILER AT THIS LOCATION PER ALL MANUFACTURER'S REQUIREMENTS AND CLEARANCES.
9. INSTALL NEW 6" THICK HOUSEKEEPING PAD TO EXTEND 6" BEYOND THE EQUIPMENT TO BE INSTALLED ON IT. PAD SHALL BE 3000 PSI AT 28 DAYS.
10. EXTEND NEW GAS LINE BELOW ROOF STRUCTURE. TURN DOWN AND CONNECT TO EACH BOILER. PROVIDE DIRT LEG, GAS COCK, UNION, AND FLEXIBLE CONNECTION.
11. EXTEND NEW STAINLESS STEEL BOILER FLUES AND PENETRATE UP THROUGH ROOF AT THIS LOCATION. MAKE PENETRATION WEATHER TIGHT AND ENSURE THE FLUE OUTLET IS NOT WITHIN 10 FEET OF ANY AIR INTAKES. INSTALL PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS.
12. EXTEND NEW COMBUSTION AIR INTAKE FROM NEW BOILER AND PENETRATE UP THROUGH ROOF. MAKE PENETRATION WEATHER TIGHT AND ENSURE THAT INTAKE IS NOT WITHIN 10 FEET OF ANY EXHAUST OUTLET OR SEWER VENT.
13. INSTALL NEW HOT WATER PRIMARY PUMPS AT THIS LOCATION PER ALL MANUFACTURER'S REQUIREMENTS AND CLEARANCES.
14. EXPANSION TANK, REFER TO PIPING DIAGRAMS SHEET M-503.
15. GLYCOL FEED TANK, REFER TO PIPING DIAGRAMS SHEET M-503.
16. BUFFER TANK, REFER TO PIPING DIAGRAMS SHEET M-503.
17. INSTALL UNIT HEATER AT THIS LOCATION PER DETAIL ON DETAIL SHEET. EXTEND COMBUSTION AIR / EXHAUST UP THROUGH ROOF AND TERMINATE WITH CONCENTRIC KIT (PROVIDED WITH UNIT) PER MANUFACTURERS GUIDELINES AND RECOMMENDATIONS.
18. CONNECT NEW CHILLED AND HEATING WATER PIPING TO EXISTING PIPING AT THESE LOCATIONS. REFER REFER TO PIPING DIAGRAMS SHEET M-503
19. CONNECT NEW GAS LINE TO EXISTING AT THIS LOCATION. FIELD VERIFY EXISTING LOCATION.
20. REFER TO PLUMBING PLANS FOR GAS PIPE SIZING AND NOTES.

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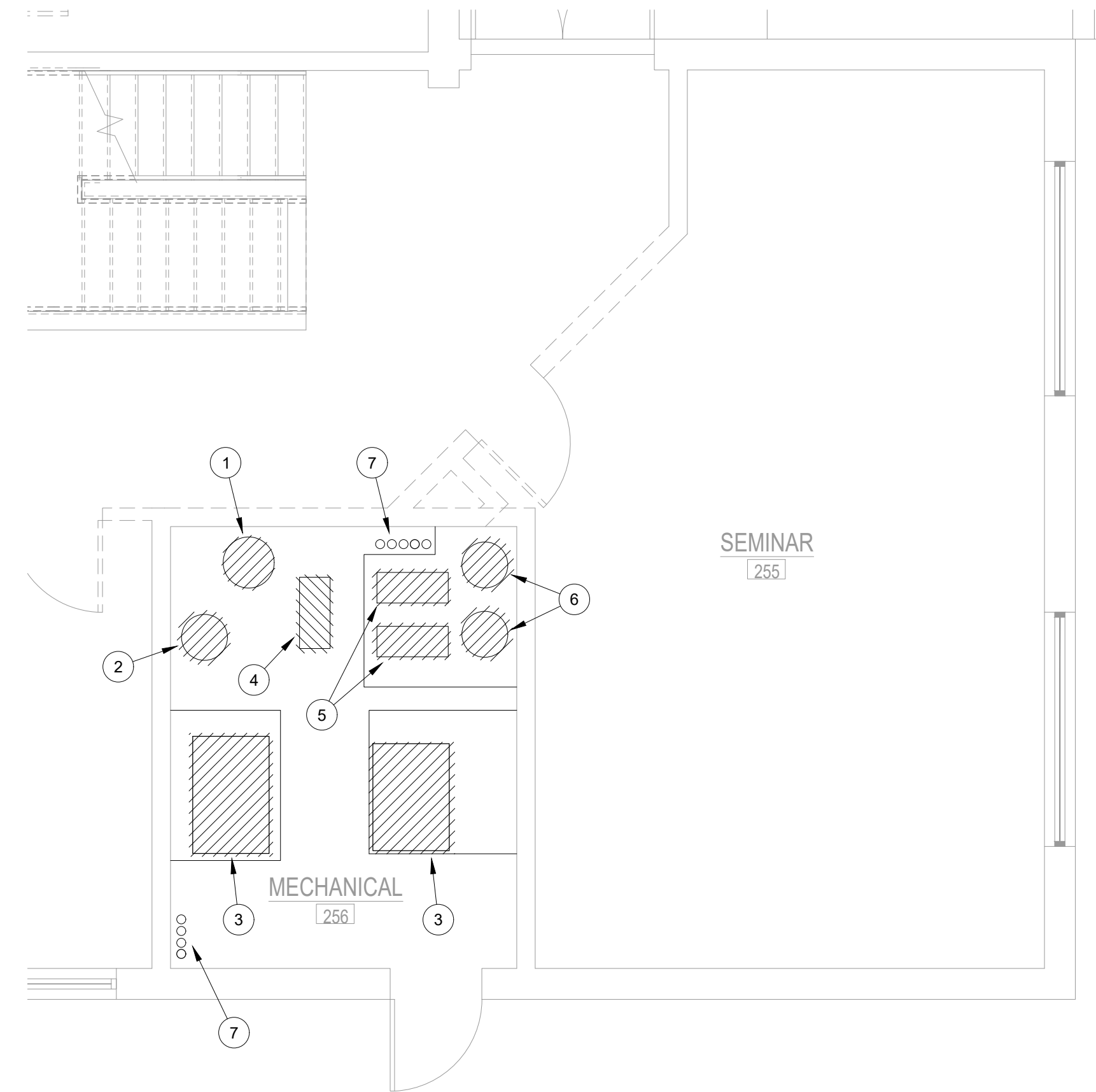
1 08/29/22 ADDENDUM

B\_AD PROJECT # 2104  
FILE: 21092\_M401.dwg  
DATE: 08/09/2022  
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ENLARGED  
MECHANICAL  
ROOM PLANS

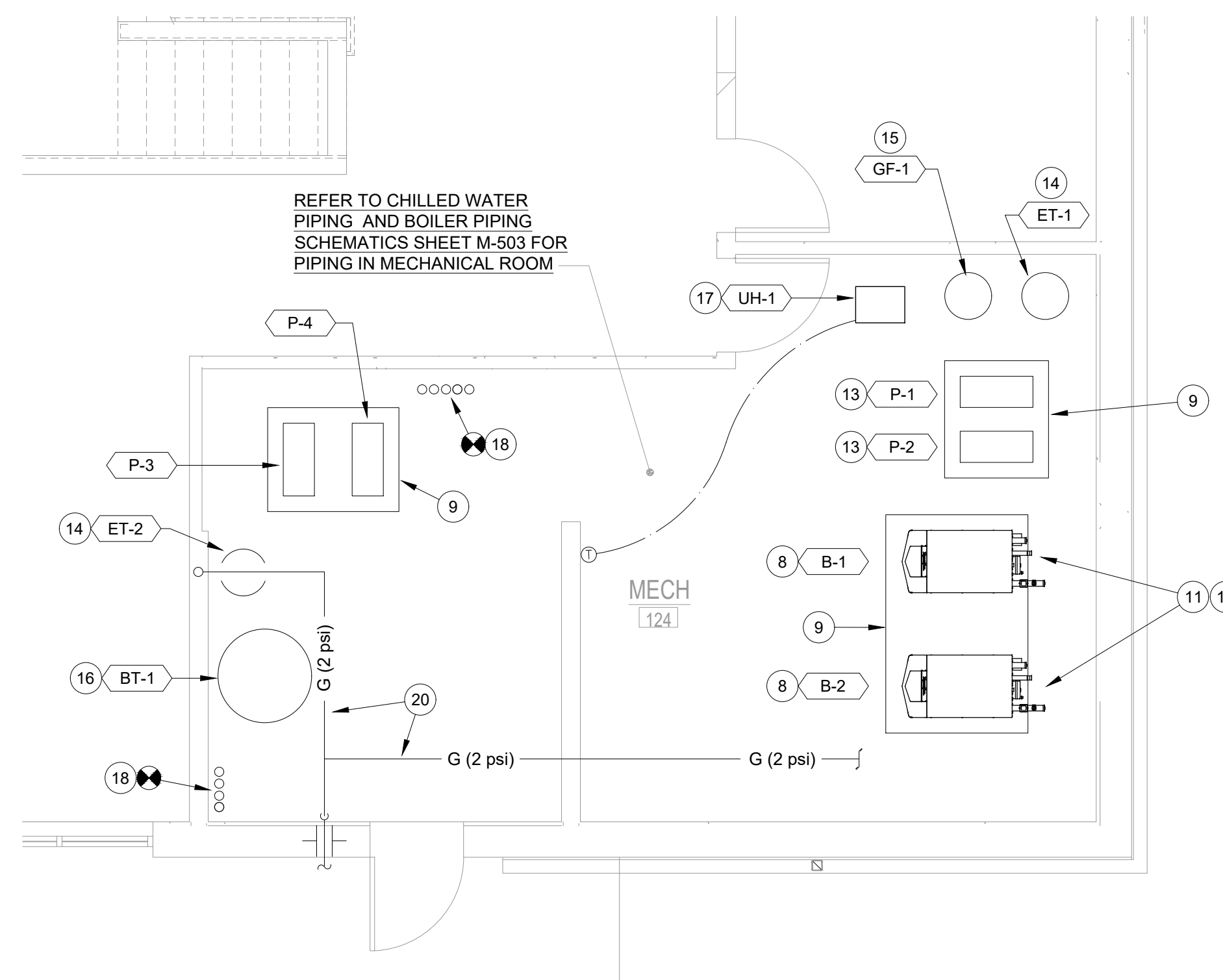
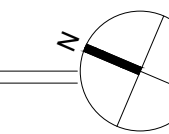


**M-401**  
SHEET OF



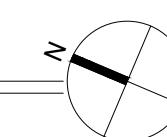
**ENLARGED MECHANICAL ROOM DEMOLITION PLAN**

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



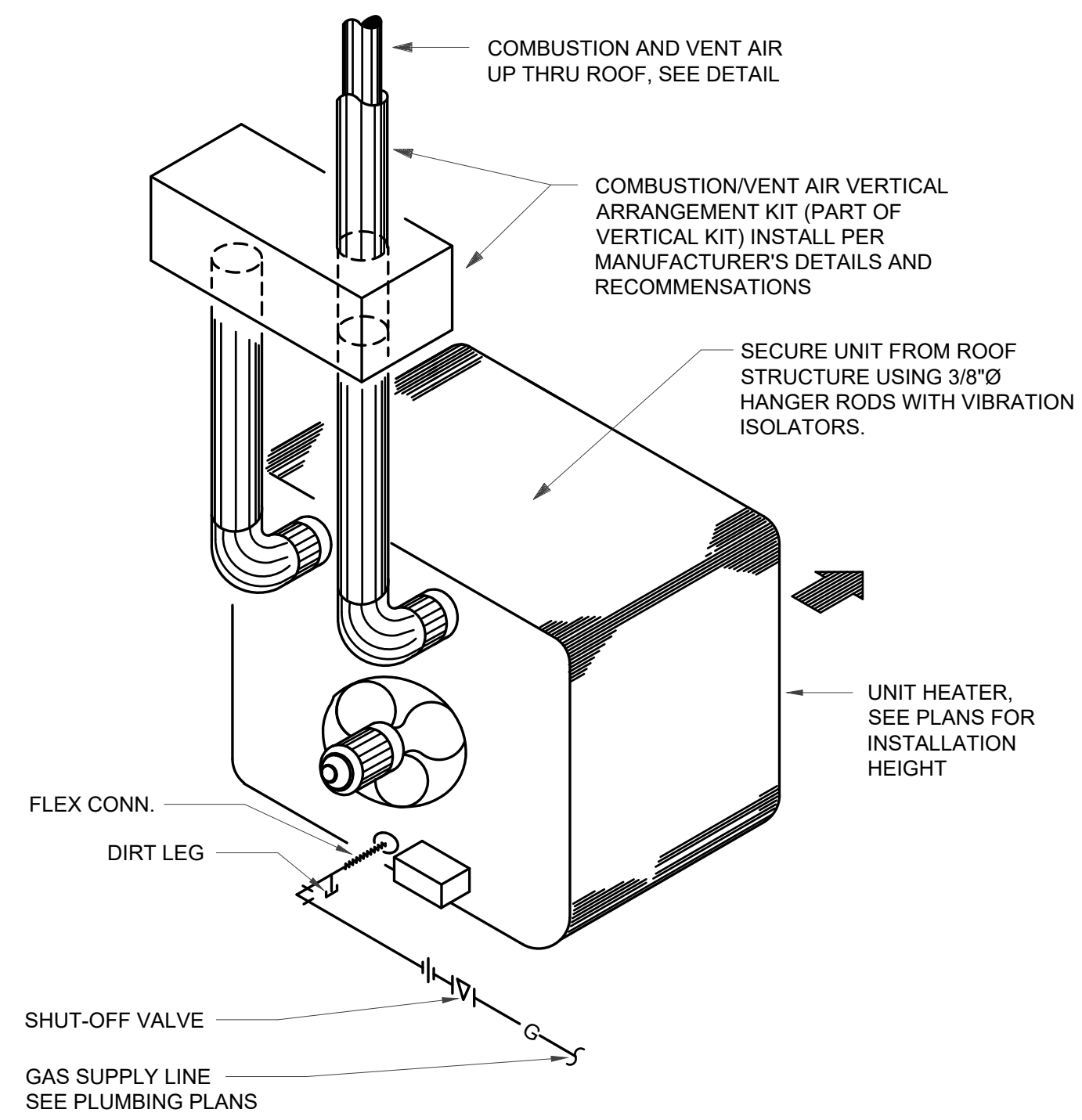
**ENLARGED MECHANICAL ROOM PLAN**

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

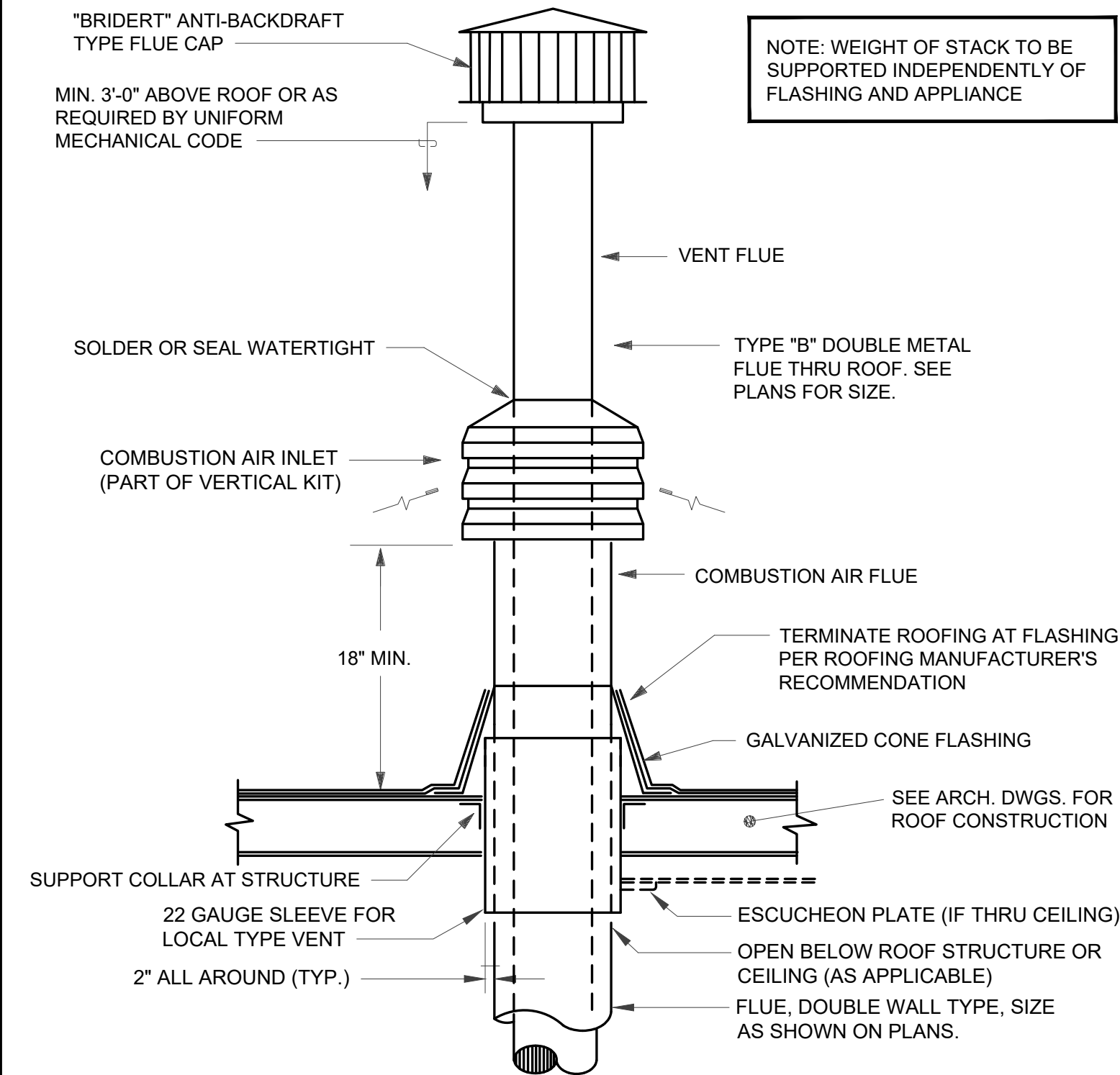




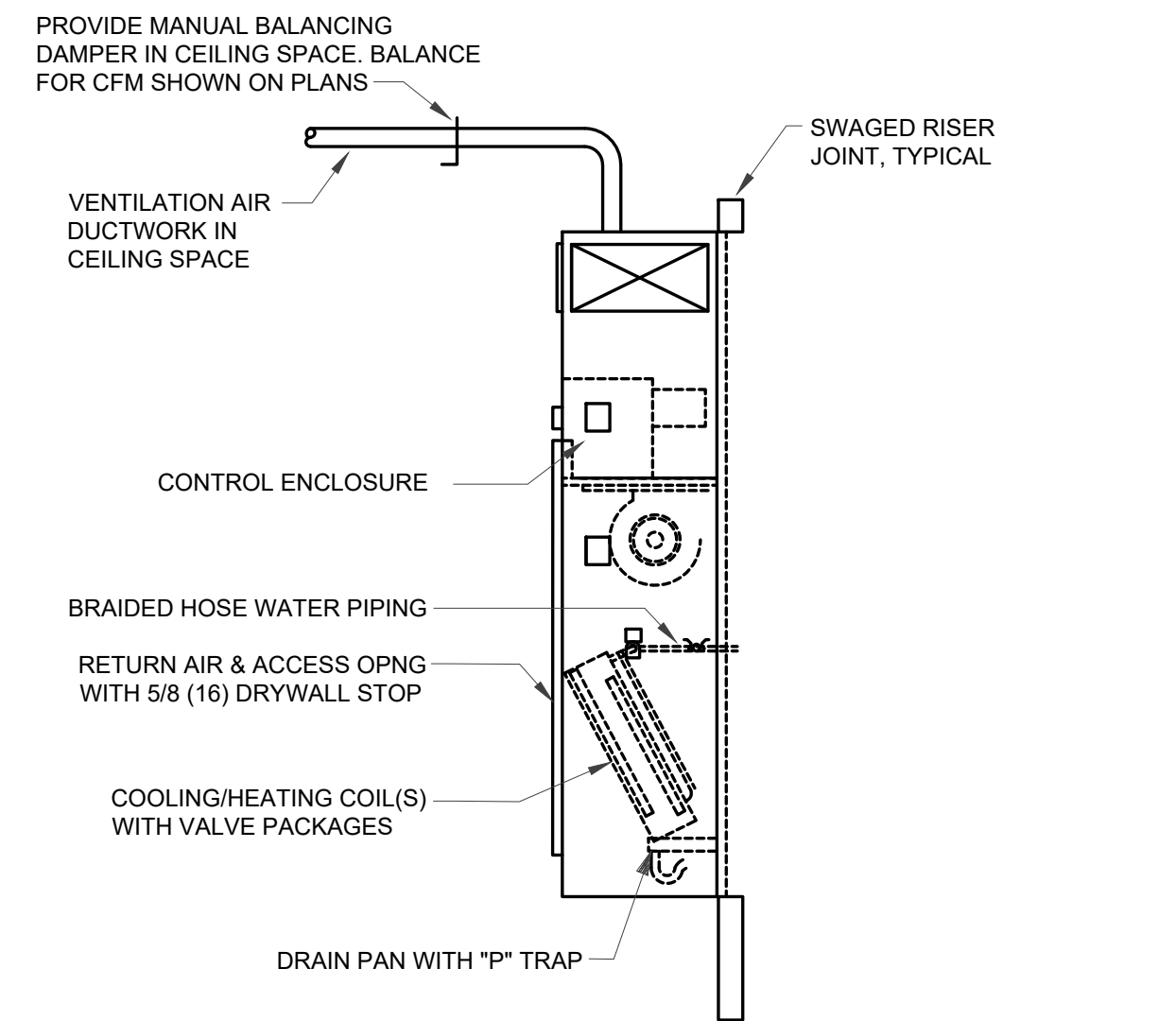




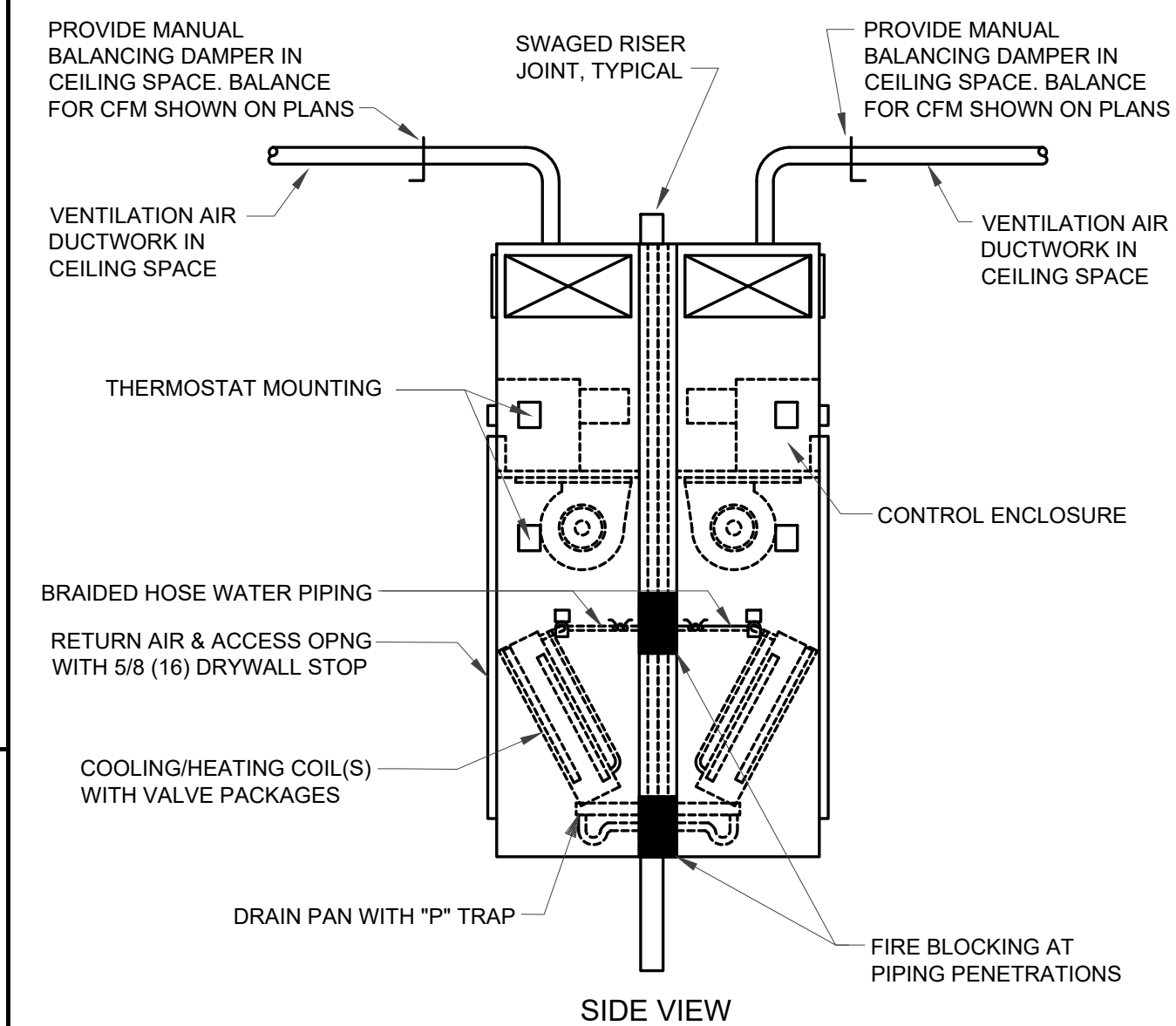
**GAS FIRED UNIT HEATER DETAIL**  
SCALE: NONE



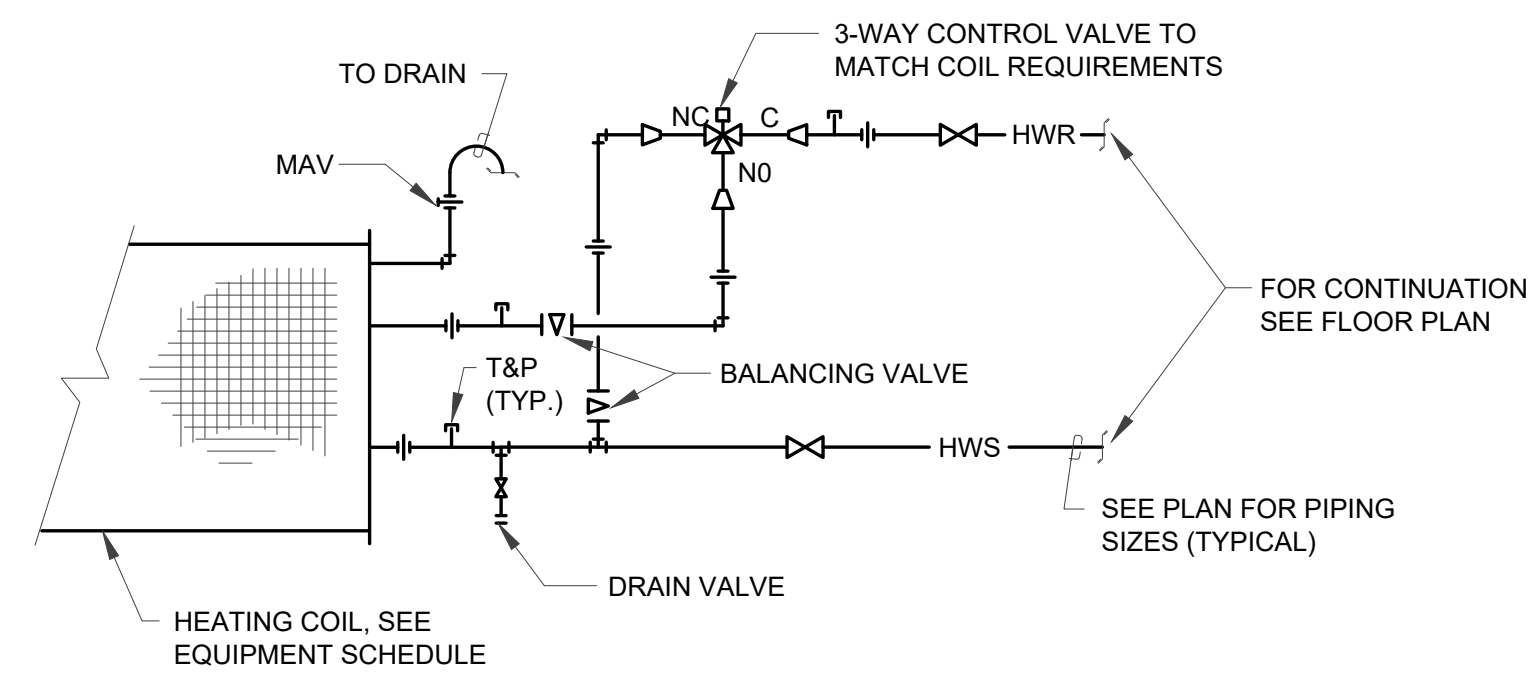
**SEPARATED COMBUSTION AIR/FLUE THRU ROOF DETAIL**  
SCALE: NONE



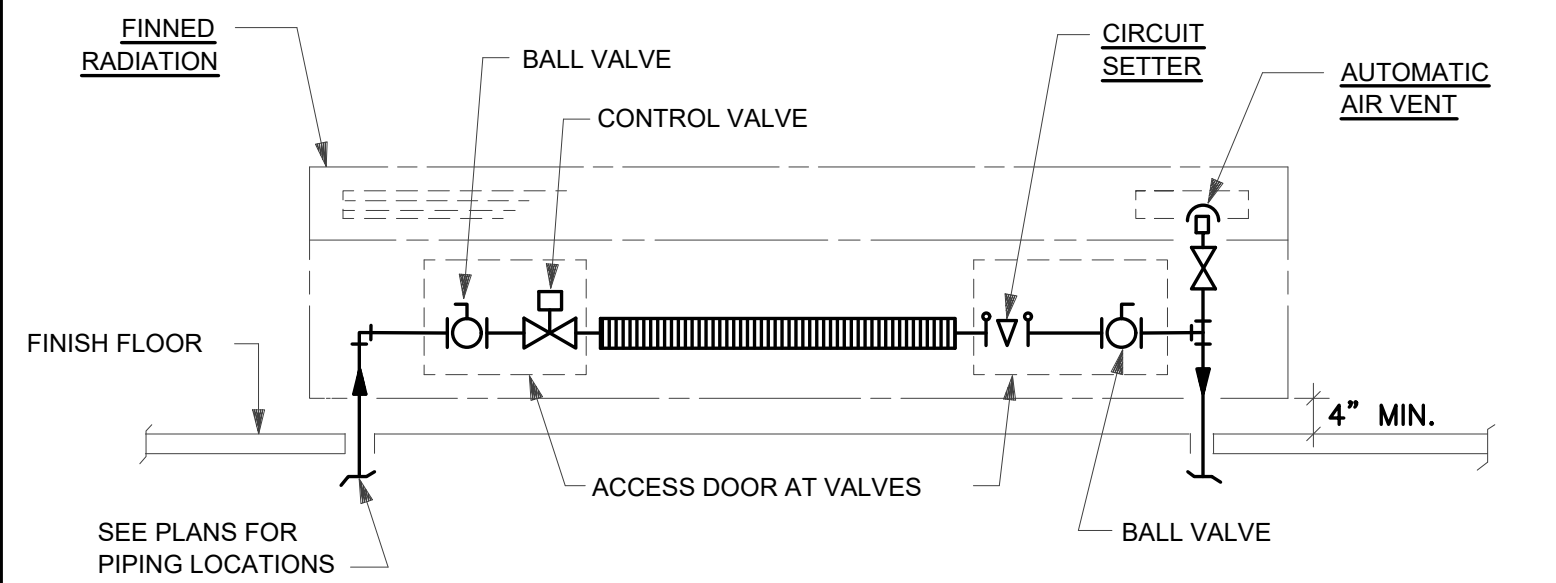
**VH FAN COIL UNITS - HI RISE VERTICAL**  
SCALE: NONE



**VH FAN COIL UNITS - HI RISE VERTICAL**  
SCALE: NONE

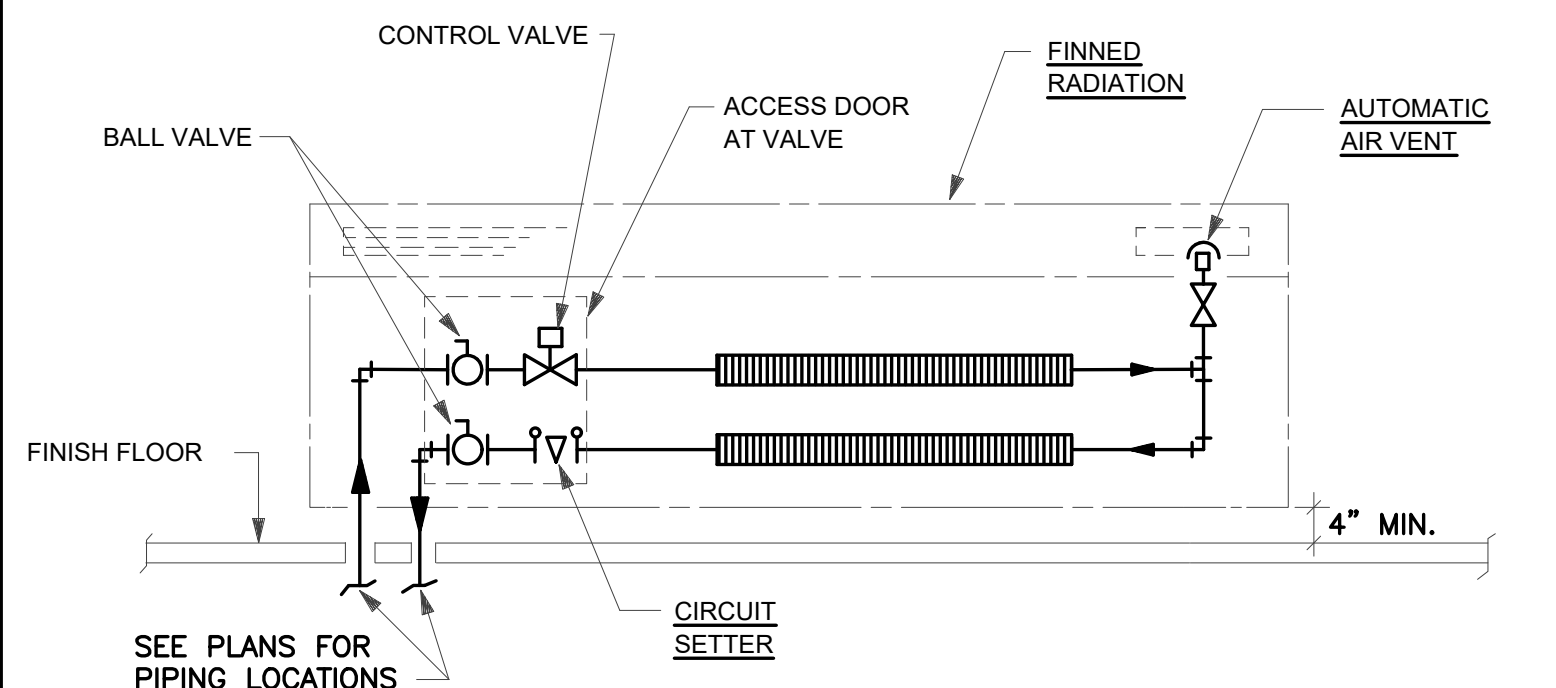


**THREE WAY HEATING COIL PIPING DIAGRAM**  
SCALE: NONE (FOR AIR HANDLING UNITS INSTALLATION)

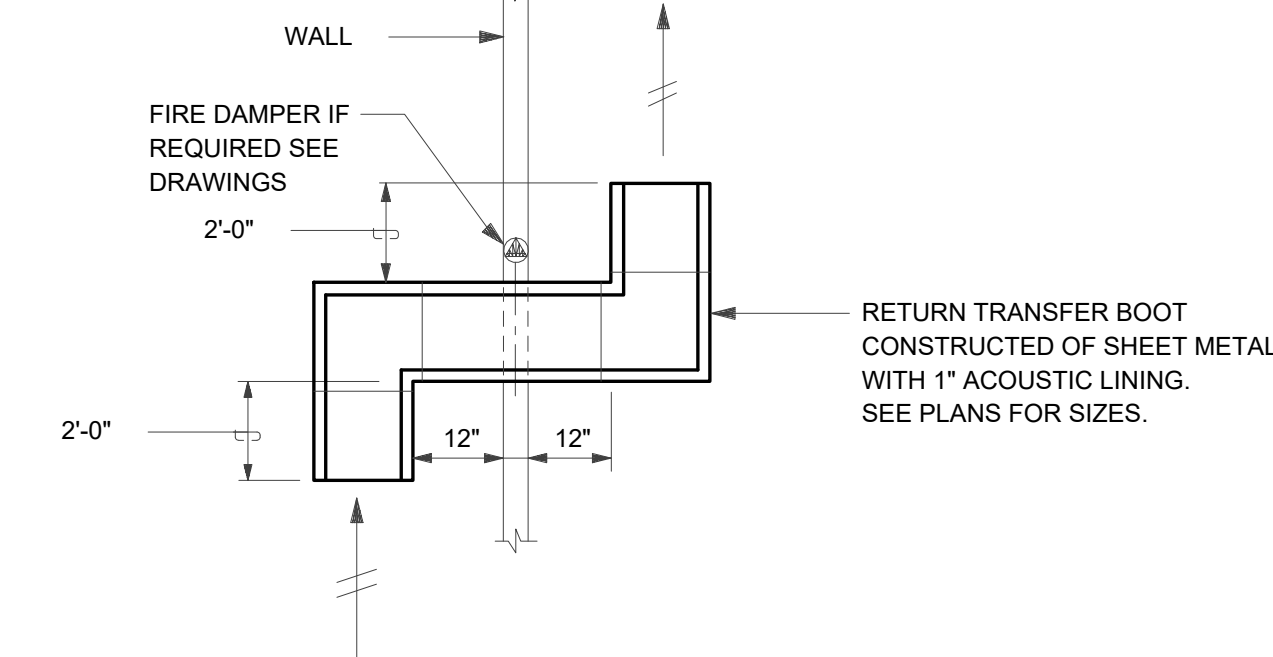


**ONE ROW ELEMENT**

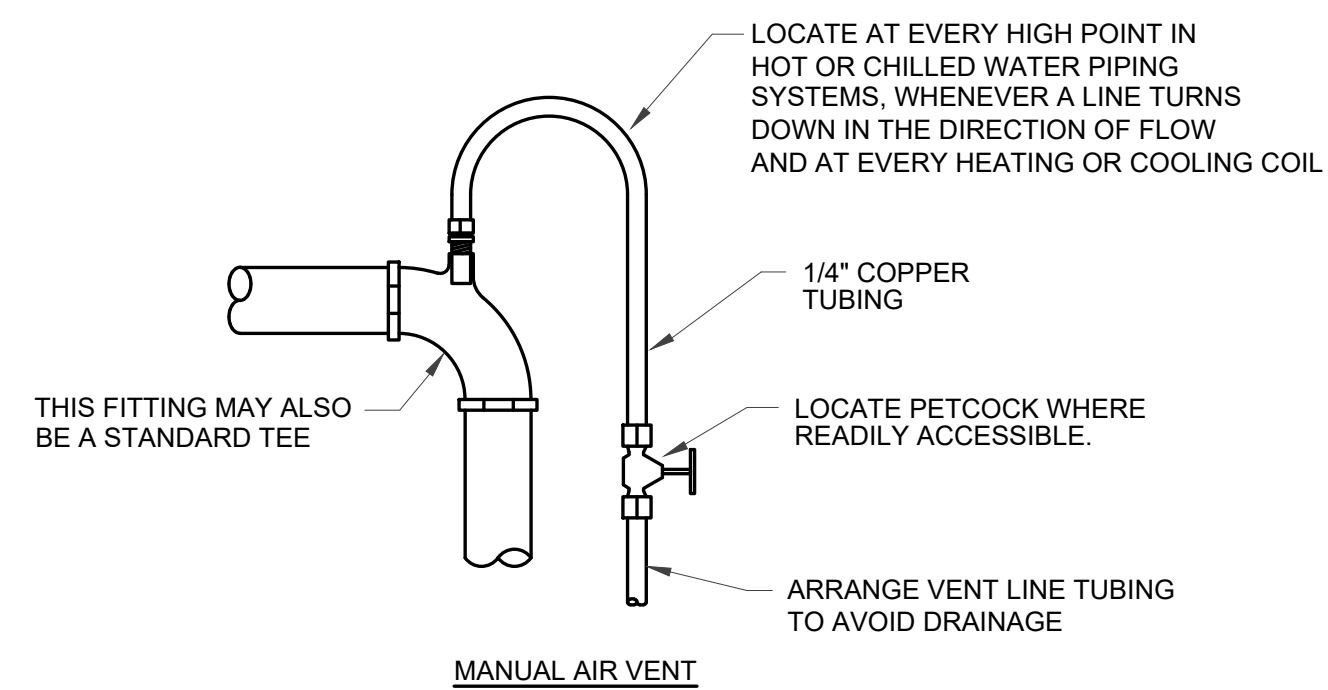
- NOTES:  
1. SECURE UNIT TO WALL ACCORDING TO MFR'S DETAILS AND RECOMMENDATIONS.  
2. SEE MECHANICAL EQUIPMENT SCHEDULE FOR DESCRIPTION OF BASEBOARD RADIATION.  
3. PROVIDE ACCESS PANELS TO ALL VALVES & EQUIPMENT



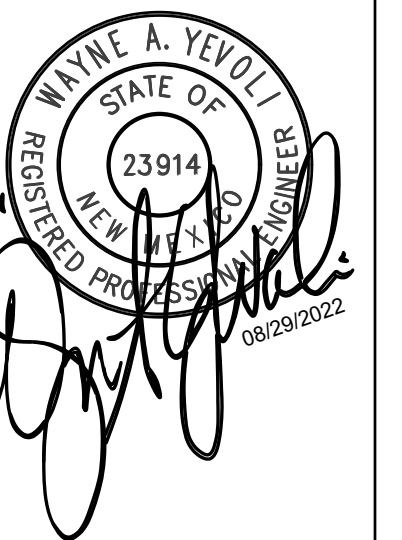
**TWO ROW ELEMENT**  
**FINNED RADIATION DETAIL**  
SCALE: NONE



**RETURN AIR TRANSFER BOOT DETAIL**  
SCALE: NONE



**AIR VENT DETAIL**  
SCALE: NONE





VERTICAL CONCEALED FAN COIL UNIT SCHEDULE																												
MARK	ENVIRO-TEC MANUFACTURER MODEL #	SUPPLY FAN					HEATING WATER COIL					CHILLED WATER COIL					ELECTRICAL			APPROX WEIGHT LBS								
		MAX CFM	ACTUAL CFM	EXT SPIN	DRIVE	ECM MOTOR HP	TOTAL MBH	EAT F	LAT F	GPM	EWT F	LWT F	WPD FT	CONN. SIZE	ROWS	TOTAL MBH	EAT F	LAT F	GPM		EWT F	LWT F	WPD FT	CONN. SIZE	ROWS	VOLT/PHASE HERTZ	MCA	FLA
FC-1A	VHC-12	1,224	935	0.25	DIRECT	1/4	48.57	70	129	4.8	180	160	3.54	5/8"	1	25.49	80	51	5.4	45	55	16.68	7/8"	3	115/160	6.13	5.0	325
FC-2A	VHC-12	1,224	935	0.25	DIRECT	1/4	48.57	70	129	4.8	180	160	3.54	5/8"	1	25.49	80	51	5.4	45	55	16.68	7/8"	3	115/160	6.13	5.0	325
FC-3A	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-4A	VHC-4	475	325	0.25	DIRECT	1/25	19.01	70	100	1.9	180	160	2.38	5/8"	1	9.43	80	51	2.0	45	55	13.09	5/8"	3	115/160	1.06	0.85	250
FC-5A	VHC-4	475	325	0.25	DIRECT	1/25	19.01	70	100	1.9	180	160	2.38	5/8"	1	9.43	80	51	2.0	45	55	13.09	5/8"	3	115/160	1.06	0.85	250
FC-6A	VHC-10	985	775	0.25	DIRECT	1/5	43.12	70	100	4.4	180	160	2.86	5/8"	1	22.1	80	51	4.6	45	55	13.52	7/8"	3	115/160	3.38	2.70	325
FC-7A	VHC-10	985	775	0.25	DIRECT	1/5	43.12	70	100	4.4	180	160	2.86	5/8"	1	22.1	80	51	4.6	45	55	13.52	7/8"	3	115/160	3.38	2.70	325
FC-8A	VHC-10	985	775	0.25	DIRECT	1/5	43.12	70	100	4.4	180	160	2.86	5/8"	1	22.1	80	51	4.6	45	55	13.52	7/8"	3	115/160	3.38	2.70	325
FC-9A	VHC-10	985	775	0.25	DIRECT	1/5	43.12	70	100	4.4	180	160	2.86	5/8"	1	22.1	80	51	4.6	45	55	13.52	7/8"	3	115/160	3.38	2.70	325
FC-10A	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-11A	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-12A	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-13A	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-14A	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-15A	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-16A	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-17A	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-18	VHC-10	985	775	0.25	DIRECT	1/5	43.12	70	100	4.4	180	160	2.86	5/8"	1	22.1	80	51	4.6	45	55	13.52	7/8"	3	115/160	3.38	2.70	325
FC-19	VHC-10	985	775	0.25	DIRECT	1/5	43.12	70	100	4.4	180	160	2.86	5/8"	1	22.1	80	51	4.6	45	55	13.52	7/8"	3	115/160	3.38	2.70	325
FC-20	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-21	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-22	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-23	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-24	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-25	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-26	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-27	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-28	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-29	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-30	VHC-8	864	700	0.25	DIRECT	1/6	34.95	70	100	3.5	180	160	11.36	5/8"	1	18.54	80	51	3.9	45	55	15.75	5/8"	3	115/160	3.25	2.60	300
FC-31	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-32	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-33	VHC-6	601	425	0.25	DIRECT	1/15	25.36	70	100	2.6	180	160	8.07	5/8"	1	12.09	80	51	2.5	45	55	8.07	5/8"	3	115/160	1.63	1.30	300
FC-34	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250
FC-35	VHC-3	356	295	0.1	DIRECT	1/35	17.86	70	100	1.8	180	160	2.16	5/8"	1	8.79	80	51	1.8	45	55	11.29	5/8"	3	115/160	0.8	0.64	250

- NOTES:
- PROVIDE SUPPLY FAN. COORDINATE WITH ELECTRICAL ON PROVIDING STARTER AND DISCONNECT.
  - ISOLATION FOR MOTOR AND MOUNT FROM CABINET AND BLOWER.
  - UNIT SUPPLY FAN SHALL BE FORWARD CURVE HORIZONTAL DISCHARGE TYPE.
  - MANUFACTURER SHALL PROVIDE SUSPENSION SUPPORT AS AN INTEGRAL PART OF THE UNIT.
  - PROVIDE UNIT DIMENSIONS ON EQUIPMENT SUBMITTAL AND COORDINATE WITH STRUCTURAL ARCHITECTURAL PLANS.
  - PROVIDE FILTER SECTION ON UNIT WITH HOLDING FRAME, 30% EFFICIENT PRE-FILTER.
  - UNIT SHALL BE OF SINGLE WALL CONSTRUCTION WITH MATTE FACE INSULATION (MINIMUM R-13).
  - ACCESS DOORS SHALL BE THE SAME CONSTRUCTION AS THE UNIT CASING.
  - HEATING COIL SHALL BE NON-FREEZE TYPE.
  - CONTROLS CONTRACTOR SHALL PROVIDE UNIT WITH DDC CONTROLS PACKAGE AND CONNECT UNIT TO DDC BUILDING CONTROL SYSTEM.
  - UNIT IS SELECTED AT AN ELEVATION OF 6,500 FT ABOVE SEA LEVEL.
  - PROVIDE UNIT WITH ALL SERVICE AND OPERATIONAL CLEARANCES AS REQUIRED, INCLUDING ALL CLEARANCES REQUIRED BY NEC ARTICLE 110, AND ALL CLEARANCES TO COMBUSTIBLES (WHERE APPLICABLE).
  - COORDINATE COIL CONNECTION SIDE WITH DESIGN.
  - PROVIDE WITH TWO SUPPLY AIR REGISTERS FOR DUAL AIR THROW CONFIGURATION. COORDINATE LOCATION WITH ROOM LAYOUT.

APPROVED EQUIVALENT MANUFACTURER: CARRIER, MCQUAY OR APPROVED EQUAL

MAKE-UP AIR UNIT SCHEDULE															
MARK	DX COOLING				TOTAL MBH	SENS. MBH	HEAT EXCHANGER DATA INPUT (MBH)	OUTSIDE AIR CFM	OUTSIDE AIR TEMP °F	EER	POWER SUPPLY	MCA	MROPD	APPROX. WT. (LBS)	MANUFACTURER MODEL #
	CFM	BHP	TOTAL SP"	EAT °F DB/WB											
MAU-1	1000	.85	2.1	100 / 65.0	49.312	49.312	160	NOTE 5	-10.0	12.1	208 / 3 / 60	35.7	45	1,550	DAIKIN DPS004A
MAU-2	2200	.6	2.1	100 / 65.0	80.478	60.316	200	NOTE 5	-10.0	12.1	208 / 3 / 60	49	60	2,600	DAIKIN DPS007A
MAU-3	1500	.85	2.1	100 / 65.0	49.312	49.312	160	NOTE 5	-10.0	12.1	208 / 3 / 60	35.7	45	1,550	DAIKIN DPS004A
MAU-4	1000	.85	2.1	100 / 65.0	49.312	49.312	160	NOTE 5	-10.0	12.1	208 / 3 / 60	35.7	45	1,550	DAIKIN DPS004A

- NOTES:
- UNITS ARE SELECTED AT AN ELEVATION OF 6500 FEET ABOVE SEA LEVEL. PROVIDE PROPER BURNERS AND ORIFICES FOR SITE ELEVATION.
  - INDOOR FAN SHALL BE BELT DRIVEN AND SHALL RUN CONTINUOUSLY DURING OCCUPIED PERIODS.
  - EXTERNAL STATIC PRESSURE DOES NOT INCLUDE ANY PRESSURE DROP ASSOCIATED WITH MAKE-UP AIR UNIT ACCESSORIES.
  - PROVIDE ALL REQUIRED SERVICE AND OPERATIONAL CLEARANCES, INCLUDING ALL REQUIRED CLEARANCES TO COMBUSTIBLES AND ALL CLEARANCES REQUIRED BY NEC ARTICLE 110.
  - REFER TO HVAC PLANS FOR OUTSIDE AIR CFM.

- ACCESSORIES:
- 18" HIGH INSULATED ROOF CURB, SLOPED TO MATCH PITCH OF ROOF TO ALLOW UNIT TO SIT LEVEL.
  - ECONOMIZER WITH POWER EXHAUST RELIEF.
  - COMPRESSOR SHORT CYCLE PROTECTION.
  - ELECTRONIC PROGRAMMABLE THERMOSTAT WITH AUTO HEAT/COOL SWITCHOVER AND KEYPAD LOCKOUT CAPABILITY. ALL CONTROL WIRING SHALL BE PROVIDED AND INSTALLED BY DIVISION 15.
  - 2" FILTERS EQUAL TO MERV 13 MINIMUM.
  - CONDENSER COIL HAIL GUARD ASSEMBLY.
  - OUTSIDE AIR HOOD WITH MOTORIZED OUTSIDE AIR DAMPER. DAMPER SHALL CLOSE WHEN INDOOR FAN IS OFF.

APPROVED EQUIVALENT MANUFACTURER: TRANE, RHEIM

BOILER SCHEDULE									
MARK	MANUFACTURER MODEL #	INPUT MBH	OUTPUT MBH		GPM	LWT (F)	THERM. % EFF.	ELECTRICAL	APPROX WEIGHT LBS
			@SL	@ALT					
B-1	LOCHNVAR KBX-0800N	800	776	-	80	160	97	120V 1 PH - 5.4 MCA	325
B-2	LOCHNVAR KBX-0800N	800	776	-	80	160	97	120V 1 PH - 5.4 MCA	325

- NOTES:
- INTEGRATE INTO DDC SYSTEM. BOILERS SHALL OPERATE IN LEAD / LAG STAND-BY ORDER
  - STAINLESS STEEL HEAT EXCHANGER.
  - HIGH-LOW GAS PRESSURE SWITCH.
  - LOW WATER CUT-OFF.
  - FLOW SWITCH.
  - PRESSURE RELIEF VALVE.
  - AQUASTAT.
  - THERMOSTAT AT INLET AND OUTLET.
  - GAS REGULATOR AND PRESSURE SWITCH. HIGH LIMIT WITH MANUAL RESET AND FLOW SWITCH.
  - REDUNDANT GAS VALVES.
  - HIGH-LOW AIR PRESSURE SWITCH.
  - HOT SURFACE IGNITION WITH ELECTRONIC SUPERVISION, FACTORY MUTUAL, AND FRING CONTROLS REQUIRED BY REGION OF INSTALL.
  - CONDENSATE NEUTRALIZATION KIT.
  - BOILER CIRCULATOR PUMPS PART OF BOILER
  - STAINLESS STEEL EXHAUST FLUE AND COMBUSTION INTAKE

CHILLER SCHEDULE															
TAG	Model	TRANE CHILLER			Evaporator					Condenser		Unit Acoustics			
		Capacity (ton)	Voltage (vol/Hz/ph)	MCA	Performance [EER] (Btu/W.h)	IPLV (IP Btu/W.h)	Flow (gpm)	PD (ft H <sub>2</sub> O)	EWT (°F)	LWT (°F)	Fluid Type	Ambient (°F)	Altitude (ft)	Sound Power	Sound Pressure
CH-1	CGAM	80	208/60/3	354	9.86	15.14	183.4	15.7	54.99	45	WATER	95	6500	91 dBA	64 dBA

- Notes:
- Unit capacity and IPLV are minimums that must be met
- Unit sound pressure levels and MCA/MOCP are maximums, not to be exceeded under any circumstances
- Unit selected and rated with 30% propylene glycol, at 6500' of elevation
- Unit high ambient capability to 125F
- Unit must have condenser and base lowered guards
- Provide with electronic expansion valve
- Provide with microchannel condenser coil
- Provide with BACNET MSTP interface
- Provide with ground fault protection
- Provide with phase and voltage monitor
- Provide with strainer from the chiller supplier
- Provide with thermal dispersion flow indicators
- Unit design has unit mounted disconnect switch
- Provide with 1 year parts, labor, and refrigerant warranty
- Provide with 5 year compressor warranty
- Unit must not exceed the specified sound data under any circumstances (chiller supplier must provide sound attenuation as required to meet sound data)
- Provide with scroll compressor(s) w/ VFD(s) and variable volume ratio technology
- Unit must



ELECTRICAL SYMBOL LEGEND (ALL SYMBOLS SHOWN ARE NOT NECESSARILY USED ON THE DRAWINGS)			
SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	EXISTING CONDUIT TO BE REMOVED.		CEILING JUNCTION BOX.
	HOME-RUN CONDUIT.		WALL JUNCTION BOX.
	CONDUCTOR TICK MARKS: NEUTRAL, PHASE, SWITCHED, AND GROUND CONDUCTORS RESPECTIVELY.		DUPLEX RECEPTACLE, 18" AFF. (#) INDICATES CIRCUIT.
	CAPPED CONDUIT / CONDUIT STUB-OUT.		GFCI PROTECTED DUPLEX RECEPTACLE. RECEPTACLES WITH TRIP RESET SHALL BE IN READILY ACCESSIBLE LOCATION.
	1" CONDUIT STUBBED TO ABOVE ACCESSIBLE CEILING		SLAVE GFCI-PROTECTED RECEPTACLE (NEC 422.52) FOR ELECTRIC DRINKING FOUNTAIN (EDF) CONCEALED WITHIN CASE.
	CONDUIT SEAL.		QUADPLEX RECEPTACLE, 18" AFF TO CENTER.
	ELECTRICAL KEYED NOTE TAG.		GROUND FAULT CIRCUIT INTERRUPTER (GFCI) DUPLEX RECEPTACLE WITH WEATHER-RESISTANT (WR) COVER.
	KITCHEN ITEM TAG, SEE KITCHEN EQUIPMENT ELECTRICAL CONNECTION SCHEDULE.		SPLIT-WIRED DUPLEX RECEPTACLE
	MECHANICAL UNIT TAG (EXAMPLE: BOILER B-2 INDICATED); SEE MECHANICAL EQUIPMENT SCHEDULE.		CEILING MOUNTED DUPLEX RECEPTACLE.
	O.F.C.I. OWNER FURNISHED, CONTRACTOR INSTALLED.		SPECIAL RECEPTACLE, TYPE AS NOTED.
	E <sup>OH</sup> OVERHEAD PRIMARY ELECTRICAL LINE.		FLUSH FLOOR MOUNTED DUPLEX RECEPTACLE.
	E <sub>UG</sub> PRIMARY ELECTRICAL UNDERGROUND FEEDER.		ISOLATED GROUND DUPLEX RECEPTACLE
	E.G.R. EQUIPMENT GROUND.		DUPLEX RECEPTACLE WITH BUILT-IN USB CHARGER OUTLET.
	AFF ABOVE FINISH FLOOR.		GANGABLE 3-COMPARTMENT MEDIA CENTER.
	AC ABOVE COUNTER.		3 COMPARTMENT TV MEDIA CENTER
	WR WEATHER-RESISTANT.		CABLE TRAY.
	GFCI GROUND FAULT CIRCUIT INTERRUPTER.		MULTI-RECEPTACLE RACEWAY (PLUGMOLD).
	AHJ AUTHORITY HAVING JURISDICTION.		SURFACE MOUNTED PANELBOARD, REFER TO ASSOCIATED PANEL SCHEDULE.
	\$ \$ <sub>a</sub> SINGLE-POLE WALL SWITCH. SUBSCRIPT DESIGNATES CONTROL OF PARTICULAR LIGHTING FIXTURES.		FLUSH MOUNTED PANELBOARD, REFER TO ASSOCIATED PANEL SCHEDULE.
	\$ \$ <sub>3</sub> \$ \$ <sub>4</sub> THREE-WAY AND FOUR-WAY SWITCHES, RESPECTIVELY.		DISTRIBUTION POWER PANEL, REFER TO ASSOCIATED PANEL SCHEDULE.
	\$ <sup>WR</sup> WEATHER-RESISTANT SWITCH.		DRY-TYPE, STEP-DOWN / STEP-UP TRANSFORMER.
	\$ <sup>K</sup> KEY-OPERATED SWITCH.		NON-FUSED DISCONNECT SWITCH, NEMA 3R IF OUTSIDE, AMPS / POLES INDICATED.
	\$ <sup>D</sup> DIMMER SWITCH, 1200W MINIMUM WATTAGE.		FUSED DISCONNECT SWITCH, NEMA 3R IF OUTSIDE, AMPS/ POLES / FUSE SIZE INDICATED.
	\$ <sup>TT</sup> MECHANICALLY WOUND TWIST-TIMER SWITCH OR ELECTRONIC TIME SWITCH.		MOTOR STARTER.
	\$ <sup>T</sup> THERMAL SWITCH.		DOMAIN CONTROLLER, FUSIBLE TERMINALS FOR POWER, NEMA 3R IF OUTSIDE.
	\$ <sup>OC</sup> OCCUPANCY SENSOR SWITCH, WATT-STOPPER DUAL TECHNOLOGY #DW-100 OR EQUAL.		CLOCK.
	\$ <sup>OC</sup> DUAL-TECHNOLOGY OCCUPANCY DIMMER SWITCH, WATT-STOPPER #DW-311-WH OR EQUAL.		COMBINATION CLOCK/SPEAKER UNIT.
	\$ <sup>OCF</sup> DUAL-TECHNOLOGY OCCUPANCY SENSOR WITH FAN DELAY CONTROL. WATT STOPPER #WDT200W OR EQUAL.		SPEAKER, CEILING MOUNTED
	\$ <sup>3OC</sup> 3-WAY / MULTI-WAY OCCUPANCY SENSOR SWITCH, WATT-STOPPER DUAL TECHNOLOGY #DW-103 OR EQUAL.		SURFACE MOUNTED SOUND SYSTEM SPEAKER.
	\$ <sup>EC</sup> LIGHTING CONTROL OCCUPANCY SENSOR, CEILING MOUNTED.		EVAPORATIVE COOLER SWITCH.
	\$ <sup>PF</sup> PADDLE FAN / LIGHT CONTROL SWITCHES. SWITCHES ALLOW INDEPENDENT CONTROL OF FAN SPEED AND LIGHTING. 2'X4' LAY-IN LIGHTING FIXTURE (TROFFER), TYPE INDICATED BY LETTER (TYPICAL).		MICROPHONE OUTLET.
	\$ <sup>EM</sup> "EM" INDICATES LIGHTING FIXTURE IS SUPPLIED WITH AN EMERGENCY BATTERY PACK.		CALL-IN SWITCH (PUSH-TO-CALL) FOR INTERCOM SYSTEM.
	\$ <sup>1x4</sup> 1'X4' SURFACE MOUNTED LIGHTING FIXTURE.		THERMOSTAT
	\$ <sup>1x4R</sup> 1'X4' RECESSED (FLANGED) MOUNTED LIGHTING FIXTURE.		COMBINATION VOICE/DATA OUTLET, UP 18" U.N.O. EXTEND 3/4" CONDUIT WITH PULL STRING TO ACCESSIBLE CEILING. FLUSH CEILING VOICE/DATA OUTLET. EXTEND 3/4" C. WITH PULL STRING TO CEILING.
	\$ <sup>2x2</sup> 2'X2' LAY-IN LIGHTING FIXTURE (TROFFER).		FLUSH FLOOR VOICE/DATA OUTLET. EXTEND 3/4" C. WITH PULL STRING TO CEILING.
	\$ <sup>US</sup> UTILITY STRIP FIXTURE.		CATV OUTLET
	\$ <sup>LP</sup> LINEAR PENDANT MOUNTED LIGHTING FIXTURE, LENGTH AS INDICATED.		SURVEILLANCE CAMERA. PTZ = PAN, TILT, ZOOM. WEATHER-RESISTANT IF LOCATED ON BUILDING EXTERIOR.
	\$ <sup>4WB</sup> 4' WALL BRACKET MOUNTED LIGHTING FIXTURE.		EMERGENCY PUSH BUTTON.
	\$ <sup>WB</sup> WALL BRACKET LIGHTING FIXTURE.		PROJECTOR.
	\$ <sup>PL</sup> POLE MOUNTED AREA LIGHTING FIXTURE, SINGLE-HEAD.		DOOR ACCESS CARD READER.
	\$ <sup>PLD</sup> POLE MOUNTED AREA LIGHTING FIXTURE, DOUBLE-HEAD.		INTERCOM HEAD-END UNIT.
	\$ <sup>RD</sup> RECESSED DOWNLIGHT FIXTURE.		BARE SOFT-DRAWN.
	\$ <sup>SD</sup> SURFACE MOUNTED DRUM TYPE LIGHTING FIXTURE.		DOORBELL SYSTEM PUSHBUTTON.
	\$ <sup>BL</sup> BOLLARD LIGHTING FIXTURE.		DOORBELL/CHIME.
	\$ <sup>HB</sup> HIGH-BAY LIGHTING FIXTURE.		MAGNETIC DOOR HOLD OPEN DEVICE.
	\$ <sup>LB</sup> LOW-BAY LIGHTING FIXTURE.		MAGNETIC DOOR LOCK.
	\$ <sup>FIG</sup> FLUSH IN-GROUND LIGHTING FIXTURE.		WIRELESS ACCESS POINT.
	\$ <sup>TLS</sup> TWIN-LAMP AUTOMATIC MOTION-SENSOR FLOODLIGHT.		PHOTOCELL.
	\$ <sup>EWL</sup> EXTERIOR WALLPACK LIGHTING FIXTURE.		GAS SOLENOID VALVE FOR KITCHEN AUTO GAS SHUT-OFF.
	\$ <sup>IWS</sup> INTERIOR WALL SCONCE LIGHTING FIXTURE.		DOOR OPERATOR PUSH-PAD UNIT (ADA COMPLIANT).
	\$ <sup>EWS</sup> EXTERIOR WALL SCONCE LIGHTING FIXTURE.		MODULAR FURNITURE POWER CONNECTION POINT.
	\$ <sup>SL</sup> STEP LIGHT LIGHTING FIXTURE.		MAGNETIC DOOR HOLD OPEN DEVICE.
	\$ <sup>PHD</sup> PENDANT HUNG DECORATIVE LIGHTING FIXTURE.		MOTION SENSOR FOR SECURITY/INTRUSION ALARM SYSTEM.
	\$ <sup>SM</sup> STANCHION MOUNTED SIGN-LIGHTER FIXTURE.		SECURITY/INTRUSION ALARM SYSTEM DOOR SWITCH.
	\$ <sup>GM</sup> GOOSENECK MOUNTED LIGHTING FIXTURE.		FIRE ALARM DUCT SMOKE DETECTOR.
	\$ <sup>TM</sup> TRACK MOUNTED LIGHTING ASSEMBLY, ONE FIXTURE HEAD INDICATED.		FIRE ALARM STROBE UNIT.
	\$ <sup>TE</sup> TWIN-EYE EMERGENCY LIGHTING UNIT WITH BATTERY BACK-UP. TYPE "EM", REFER TO LUMINAIRE SCHEDULE.		FIRE ALARM AUDIO/STROBE UNIT.
	\$ <sup>EE</sup> EXTERIOR EMERGENCY LIGHTING UNIT WITH BATTERY BACK-UP. TYPE "EMX", REFER TO LUMINAIRE SCHEDULE.		FIRE PROTECTION SPRINKLER SYSTEM POST INDICATOR VALVE.
	\$ <sup>ES</sup> EXIT SIGN, SINGLE FACE INDICATED BY SHADED QUADRANT. TYPE "EXIT", REFER TO LUMINAIRE SCHEDULE.		FIRE ALARM SMOKE DETECTOR.
	\$ <sup>ESD</sup> EXIT SIGN, DOUBLE-FACED, DIRECTIONAL ARROWS INDICATED.		CEILING MOUNTED FIRE ALARM AUDIO/STROBE UNIT.
	\$ <sup>CE</sup> COMBO EXIT SIGN/EMERGENCY TWIN-EYE UNIT TYPE "XEM", REFER TO LUMINAIRE SCHEDULE.		FIRE ALARM MANUAL PULL STATION.
	\$ <sup>PF</sup> PADDLE FAN, WITH OR WITHOUT LIGHT PER LUMINAIRE SCHEDULE.		FIRE ALARM CONTROL PANEL (FACP).
	\$ <sup>FARA</sup> FIRE ALARM REMOTE ANNUNCIATOR (FARA).		FIRE ALARM REMOTE ANNUNCIATOR (FARA).

### IECC ELECTRICAL & LIGHTING COMPLIANCE

THE ELECTRICAL DESIGN ILLUSTRATED BY THESE PLANS AND SPECIFICATIONS IS IN COMPLIANCE WITH THE 2018 INTERNATIONAL ENERGY CONSERVATION CODE SECTION(S) C405, C408, C501-5, CA101-3, R202.4.5, R404, AND R501-5 AS SPECIFICALLY APPLICABLE TO THIS PROJECT AS FOLLOWS:

- C405.2 - LIGHTING CONTROLS (MANDATORY)
  - REFER TO LIGHTING PLAN(S) AND/OR DETAIL(S) FOR PROJECT REQUIREMENTS.
- C405.3 - INTERIOR LIGHTING POWER REQUIREMENTS
  - TABLE C405.3.2(1)
 

ALLOWABLE INTERIOR POWER FOR THIS PROJECT IS: 21,362 ACTUAL INTERIOR POWER IS: 12,626
- C405.4 - EXTERIOR LIGHTING POWER REQUIREMENTS (MANDATORY)
  - TABLE C405.4(1)
 

- THIS PROVIDE IS IN LIGHTING ZONE # 2.
  - TABLE 405.4.2(2)
 

- BASE SITE ALLOWANCE: 400W  
- PARKING AREAS AND DRIVES: 0.04 W/FT<sup>2</sup>  
- WALKWAYS/RAMPS < 10'-0" WIDE: 0.5W/LINEAR FT  
- WALKWAYS/RAMPS > 10'-0" WIDE, PLAZA AREAS, SPECIAL FEATURE AREAS: 1.10 W/FT<sup>2</sup>  
- PEDESTRIAN AND VEHICULAR ENTRANCES AND EXITS: 14W/LINEAR FT  
- ENTRY CANOPIES: 0.25W/FT<sup>2</sup>
  - TABLE 405.4.2(3)
 

- BUILDING FACADES: 0.075W/FT OF GROSS ABOVE-GRADE WALL AREA

ALLOWABLE EXTERIOR POWER FOR THIS PROJECT IS: EXISTING ACTUAL EXTERIOR POWER IS: 1,455
- C405.6 - ELECTRICAL TRANSFORMER (MANDATORY)
  - LOW VOLTAGE DRY-TYPE DISTRIBUTION ELECTRICAL TRANSFORMERS SHALL MEET THE MINIMUM EFFICIENCY REQUIREMENTS AS TESTED AND RATED IN ACCORDANCE WITH DOE 10 CFR 431.
  - C405.6
 

- REFER TO SINGLE LINE DIAGRAM ON SHEET E-601 FOR TRANSFORMER(S) APPLICABLE TO THIS PROJECT.
- C405.9 - VOLTAGE DROP IN FEEDERS AND BRANCH CIRCUITS
  - REFER TO GENERAL NOTE "Q" FOR PROJECT VOLTAGE DROP LIMITATIONS.

THIS FACILITY COMPLIES WITH THE MAXIMUM EXTERIOR POWER REQUIREMENTS.

### PROJECT GENERAL ELECTRICAL NOTES:

- ALL ELECTRICAL WORK SHALL COMPLY WITH THE 2017 NATIONAL ELECTRICAL CODE (NEC) AND REGULATIONS OF STATE AND LOCAL AUTHORITIES HAVING JURISDICTION (AHJ) IN A NEAT AND WORKMANLIKE MANNER.
- CONTRACTOR SHALL COORDINATE WITH SERVING UTILITY COMPANY NEW SERVICE DEPARTMENT AND OBTAIN A PROJECT SPECIFIC "STANDARDS LETTER" PRIOR TO BIDDING, ORDERING, OR COMMENCING WITH THE ELECTRICAL DISTRIBUTION PORTION OF THIS PROJECT.
- ALL REQUIREMENTS OF THE SERVING UTILITY COMPANY FOR ELECTRICAL SERVICE SHALL BE INCLUDED IN THE CONTRACTOR'S BID.
- CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES PROVIDING TELEPHONE, CATV, AND INTERNET IN ORDER TO ASCERTAIN JOB SPECIFIC UTILITY REQUIREMENTS AND COMPLIANCE WITH THOSE REQUIREMENTS SHALL BE INCLUDED IN THE CONTRACTOR'S BID.
- BY SUBMITTING A BID, THE CONTRACTOR AFFIRMS THEY HAVE FAMILIARIZED THEMSELVES WITH THE PROJECT SITE, PLANS, SPECIFICATIONS AND ALL APPLICABLE CODES IN ORDER TO PROVIDE A COMPREHENSIVE AND COMPLETE BID.
- ALL DEVICES SHALL BE WHITE WITH COMPATIBLE PLASTIC PLATES, INSTALLED FOR ADA COMPLIANCE UNLESS NOTED OTHERWISE.
- ALL TELEPHONE, DATA, SECURITY, CATV, SOUND AND INTERCOM LOW VOLTAGE SYSTEMS ARE PROVIDED BY OTHERS UNLESS NOTED OTHERWISE. NOTE: \* LOW VOLTAGE CONTRACTORS ARE REQUIRED TO OBTAIN INDEPENDENT PERMITS FROM THE AHJ PRIOR TO STARTING THEIR WORK.
- UTILIZE "DEEP" 4-SQUARES WHERE REQUIRED TO COMPLY WITH NEC 314.16 EXTRA CONSIDERATION SHALL BE GIVEN TO BOXES SUPPLYING HOME-RUNS.
- CONFIRM EXACT ROUGH-IN DIMENSIONS WITH ARCHITECTURAL DRAWINGS, AND APPLICABLE KITCHEN/APPLIANCE EQUIPMENT, AND FURNITURE/MILL-WORK PLAN(S). EXTRA CARE SHALL BE EXERCISED IN COORDINATING THE EXACT REQUIREMENT(S) OF SPECIALTY EQUIPMENT INCLUDING, BUT NOT LIMITED TO, MECHANICAL EQUIPMENT, PLUMBING EQUIPMENT, MEDICAL EQUIPMENT, OR PROCESSING EQUIPMENT.
- ELECTRICAL DEVICES INSTALLATION SHALL COMPLY WITH ACCESSIBILITY (ADA) STATUTE ICC/ANSI 117.1 SECTION 308. SPECIFICALLY: MOUNT APPLICABLE SWITCHES, RECEPTACLES, AND ENVIRONMENTAL CONTROLS SO THAT THEY ARE LOCATED WITH THE TOP OF THE DEVICE NO HIGHER THAN 48" ABOVE FINISHED FLOOR (AFF) AND THE BOTTOM OF THE DEVICE NO LOWER THAN 15" AFF.
- GENERAL CONTRACTOR TO SAW-CUT / REMOVE / PATCH EXISTING ARCHITECTURAL SURFACES INCLUDING BUT NOT LIMITED TO SLABS, WALLS AND ROOFS.
- SHARED NEUTRALS ARE NOT PERMISSIBLE UNLESS NOTED OTHERWISE.
- CONDUCTOR TICK MARKS, WHERE SHOWN, ARE SHOWN FOR CONVENIENCE ONLY. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ALL CONDUCTORS WHETHER SHOWN OR NOT INCLUDING "TRAVELERS" AS NECESSARY FOR COMPLETELY OPERATIONAL SYSTEMS.
- BRANCH CIRCUITING SHALL BE COPPER WIRE IN MC CABLE UNLESS SPECIFICALLY NOTED OTHERWISE. MINIMUM WIRE SIZE IS #12 AWG. WHEN CONDUIT IS UTILIZED, ALL FITTINGS SHALL BE COMPRESSION TYPE AND COLOR CODING VINYL BANDS IDENTIFYING DIFFERENT SYSTEMS SHALL BE AFFIXED AT EACH BOX, PANELBOARD, AND EVERY ACCESSIBLE 10'-0"
- THE ELECTRICAL CONTRACTOR SHALL INSTALL ALL CONDUIT REQUIRED FOR MECHANICAL SYSTEMS CONTROLS. ALL CONTROLS WIRING SHALL BE INSTALLED AND TERMINATED BY CONTROLS CONTRACTOR. COORDINATE LOCATION AND ROUTING OF CONTROLS CONDUIT WITH MECHANICAL PLANS AND WITH MECHANICAL SEQUENCE OF CONTROLS.
- ALL PANELS AND DISTRIBUTION BOARDS, NEW/EXISTING SHALL HAVE TYPEWRITTEN DIRECTORIES AND EQUIPMENT I.D. NAMEPLATES UPON COMPLETION OF ANY ELECTRICAL MODIFICATIONS UNDER THIS CONTRACT.
- CONTRACTOR SHALL CONSIDER AND MAKE ADJUSTMENTS IN CONDUIT/WIRE SIZE(S) TO ACCOUNT FOR VOLTAGE DROP PRIOR TO COMMENCING WITH WORK UNDER THIS CONTRACT. VOLTAGE DROP SHALL NOT EXCEED THE FOLLOWING IN ACCORDANCE WITH IECC 2018 C405.9:
 

FEEDERS = 2%      BRANCH WIRING = 3%
- CONTRACTOR SHALL COMPLY WITH NEC 110.16. AFFIX PERMANENT ARCH-FLASH HAZARD WARNING LABEL(S) ON ALL APPLICABLE ELECTRICAL EQUIPMENT MODIFIED OR INSTALLED UNDER THIS CONTRACT.
- FOR ELECTRICAL DISTRIBUTION SYSTEMS HAVING A MAIN DISCONNECT RATING OF 1,000-AMPS OR MORE, CONTRACTOR SHALL OBTAIN THIRD PARTY OVER-CURRENT PROTECTION STUDY. ALL OVER-CURRENT DEVICES SHALL BE "SET" OR ADJUSTED TO COMPLY WITH COORDINATION STUDY PRIOR TO FINAL COMMISSIONING. A FULL COPY OF THE COMPLETED STUDY ALONG WITH CONTRACTOR'S CERTIFICATION OF COMPLIANCE SHALL BE INCLUDED IN THE PROJECT'S "CLOSE-OUT" DOCUMENTATION.
- ALL EQUIPMENT AND WORKMANSHIP FURNISHED UNDER THIS CONTRACT SHALL BE WARRANTABLE TO BE FREE FROM ANY DEFECT FOR A PERIOD EQUAL TO 1-YEAR FROM THE DATE OF FINAL ACCEPTANCE BY THE OWNER.

LUMINAIRE SCHEDULE										
NMHU SININGER HALL										
TYPE	MANUFACTURER	CATALOG NUMBER	LAMP(S)			DESCRIPTION	VOLT.	LUMENS	MOUNTING	COMMENTS
			CRI	WATTS	TYPE					
A	COLUMBIA	#VS22-40-WHE-G-ED-U-BLK	80	18	LED	2X2 EDGE-LIT FLAT PANEL	UNV	2243	RECESSED	BLACK FINISH
AE	COLUMBIA	#VS22-40-WHE-G-ED-U-ELL14ST-BLK	80	18	LED	2X2 EDGE-LIT FLAT PANEL	UNV	2243	RECESSED	BLACK FINISH, BATTERY BACKUP
B	COLUMBIA	#VS22-40-WHE-G-ED-U-BLK	80	11	LED	2X2 EDGE-LIT FLAT PANEL	UNV	1425	RECESSED	BLACK FINISH
BE	COLUMBIA	#VS22-40-WHE-G-ED-U-ELL14ST-BLK	80	11	LED	2X2 EDGE-LIT FLAT PANEL	UNV	1425	RECESSED	BLACK FINISH, BATTERY BACKUP
D	ORACLE	#OLS-WD1-2-S-6-D1000L-U500L-1-DIM10-MVOLT-40K-85-BLK	85	76	LED	DIRECT/INDIRECT LINEAR	UNV		PENDANT	
DE	ORACLE	#OLS-WD1-2-S-6-D1000L-U500L-1-DIM10-MVOLT-40K-85-BLK-O-EMG-LED-10W	85	76	LED	DIRECT/INDIRECT LINEAR	UNV		PENDANT	BATTERY BACK-UP
R6	PRESCOLITE	#LTR-6RD-H-ML-20L-DMV-120-LTR-6RD-T-ML-2750T-9-WD-SS-3L-WT-B24	90	36	LED	6" ROUND DOWN LIGHT	120	2000	RECESSED	
S4	COLUMBIA	#LCL-4-40-ML-ED-U-BLK	80	42	LED	LENSED STRIP LIGHT	UNV	5411	SURFACE	BLACK FINISH
S6	PRESCOLITE	#LBS6S 6RD CS9 WH	90	13.1	LED	DOWN LIGHT	UNV	1100	SEMI RECESSED	
W	TRACE LITTE	#TLED111P-66-VS-4K-WH	85	43	LED	WALL PACK	UNV	3386	WALL	
XEM	EXITRONIX	#CLED-U-WH-G2	-	-	LED	COMBO EXIT/EMERGENCY UNIT	UNV	-	WALL	BATTERY BACK-UP
WEM	TRACE LITTE	#TLED111P-66-VS-4K-BB-WH	85	43	LED	WALL PACK	UNV	3386	SURFACE	BATTERY BACK-UP
EM	EXITRONIX	#LED-52-WH-G2 (RL52 REMOTE LAMP)	-	-	LED	EMERGENCY TWIN-EYE UNIT	UNV	-	SURFACE	BATTERY BACK-UP

NOTES: 1. ALL EMERGENCY BALLASTS SHALL BE FACTORY INSTALLED.  
2. ALL FIXTURES SHALL CONFORM TO APPLICABLE CODES INCLUDING BUT NOT LIMITED TO NIGHT SKY ACT(S) AND ENERGY CONSERVATION STATUTES.  
3. ANY SUBSTITUTIONS REQUIRE WRITTEN APPROVAL 10 DAYS PRIOR TO BID (ACUITY, HUBBELL AND SIGNIFY) ARE GENERALLY ACCEPTED EQUALS.

09-2022

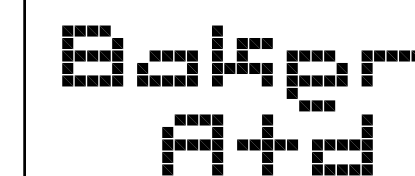
### ELECTRICAL SHEET INDEX

- E-001 SYMBOLS, GEN NOTES, FIXTURE SCHEDULE, IECC CALCS
- E-101 FIRST FLOOR LIGHTING DEMOLITION
- E-102 SECOND FLOOR LIGHTING DEMOLITION
- E-201 FIRST FLOOR POWER DEMOLITION
- E-202 SECOND FLOOR POWER DEMOLITION
- E-101 FIRST FLOOR LIGHTING PLAN
- E-102 SECOND FLOOR LIGHTING PLAN
- E-201 FIRST FLOOR POWER & SPECIAL SYSTEMS PLAN
- E-202 SECOND FLOOR POWER & SPECIAL SYSTEMS PLAN
- E-301 FIRST FLOOR MECHANICAL EQUIPMENT CONNECTIONS
- E-302 SECOND FLOOR MECHANICAL EQUIPMENT CONNECTIONS
- E-401 FIRST FLOOR FIRE ALARM PLAN
- E-402 SECOND FLOOR FIRE ALARM PLAN
- E-601 RISER DIAGRAM
- E-602 PANEL SCHEDULES

21092

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SININGER HALL RENOVATION



1 | 08/29/22 | ADDENDUM

B\_AD PROJECT # 2104

FILE: 21092\_E-001\_8-29-22.dwg

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ELECTRICAL GENERAL NOTES, LEGEND & SCHEDULES

**E-001**

SHEET OF



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**SINGER HALL  
RENOVATION**



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B\_AD PROJECT # 2104  
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DATE: 8/29/2022  
DRAWN BY: JT  
CHECKED BY: FS

FIRST FLOOR  
DEMOLITION  
LIGHTING PLAN

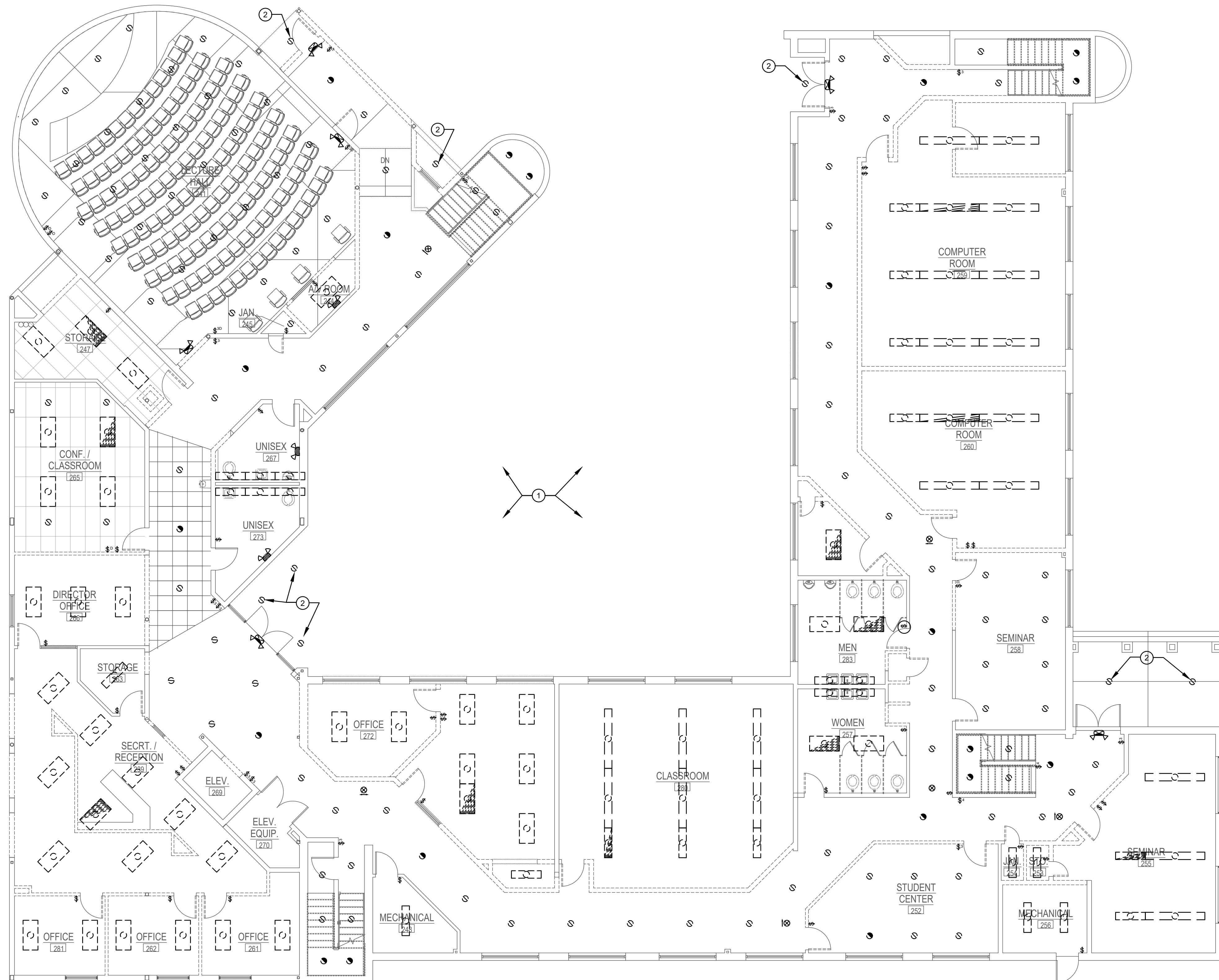
**ED-101**  
SHEET OF

**DEMOLITION GENERAL NOTES**

- A. AS-BUILT CONDITIONS ARE ILLUSTRATED RESULTING IN ENGINEER'S VISUAL OBSERVATION OF THE FACILITY. CONTRACTOR SHALL REVIEW, INSPECT, AND TRACE OUT ALL EXISTING ELECTRICAL SYSTEMS IN ORDER TO COMPLETE A SAFE AND ORDERLY DISCONNECT/REMOVAL OF EACH SYSTEM MODIFIED UNDER THIS CONTRACT.
- B. CONTRACTOR SHALL SAFE GUARD EXISTING WIRING AND DEVICES IN WALLS OR CEILINGS TO REMAIN. REFER TO ARCHITECTURAL PLAN FOR EXACT DESCRIPTION OF DEMOLITION.
- C. ALL DASHED WALLS ON THE ELECTRICAL DEMOLITION PLAN INDICATE WALLS WHICH SHALL BE DEMOLISHED COMPLETELY. REFER TO ARCHITECTURAL DEMOLITION PLANS AND DETAILS.
- D. CONTRACTOR SHALL PROPERLY DISPOSE OF, OR RECYCLE, LAMPS AND BALLASTS REMOVED BY THIS CONTRACT.
- E. REMOVE ALL EXISTING DEVICES SHOWN (LIGHT FIXTURES, RECEPTACLES, SWITCHES, COMMUNICATION OUTLETS, JUNCTION BOXES) ON ELECTRICAL DEMOLITION PLAN UNLESS NOTED OTHERWISE.
- F. REMOVE ALL CONDUIT AND WIRE TO DEVICES SHOWN TO BE REMOVED. REMOVE ALL EXPOSED OR ACCESSIBLE CONDUIT RUNS. ABANDONED CONCEALED, INACCESSIBLE CONDUIT (REMOVE WIRING). CONDUIT AND WIRING SHALL BE REMOVED BACK TO PANELBOARD OR NEAREST DEVICE WHICH IS TO REMAIN.
- G. CONTRACTOR SHALL MAINTAIN ALL CIRCUIT AND CONDUIT CONTINUITY TO ALL EXISTING DEVICES WHICH ARE TO REMAIN. PROVIDE ALL FIELD CIRCUIT VERIFICATION AS REQUIRED TO ENSURE CONTINUITY IS MAINTAINED.
- H. EXISTING CONDUIT, WIRING, WIRE-WAYS, MC CABLE MAY REMAIN IN PLACE AND UTILIZED WHERE PRACTICAL PROVIDED IT IS PROPERLY INSTALLED AND IN GOOD CONDITION. DAMAGED EXISTING CIRCUITRY SHALL BE REPLACE.

**ELECTRICAL KEYED NOTES:**

- 1. CONTRACTOR SHALL SAFEGUARD EXISTING WIRING AND DEVICES IN WALLS SCHEDULED TO REMAIN.
- 2. EXTERIOR LIGHTING CIRCUIT INCLUDING TIME CONTROL TO REMAIN. NEW LIGHT FIXTURES TO BE INSTALLED; REFER TO NEW WORK PLAN(S) FOR ADDITIONAL REQUIREMENTS.



**FIRST FLOOR DEMOLITION LIGHTING PLAN**

1/8" = 1'-0"

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RENOVATION**



1 | 08/29/22 | ADDENDUM

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**SECOND FLOOR  
DEMOLITION  
LIGHTING PLAN**

**ED-102**  
SHEET OF



**DEMOLITION GENERAL NOTES**

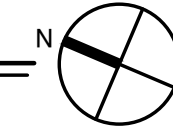
- A. AS-BUILT CONDITIONS ARE ILLUSTRATED RESULTING IN ENGINEER'S VISUAL OBSERVATION OF THE FACILITY. CONTRACTOR SHALL REVIEW, INSPECT, AND TRACE OUT ALL EXISTING ELECTRICAL SYSTEMS IN ORDER TO COMPLETE A SAFE AND ORDERLY DISCONNECT/REMOVAL OF EACH SYSTEM MODIFIED UNDER THIS CONTRACT.
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- F. REMOVE ALL CONDUIT AND WIRE TO DEVICES SHOWN TO BE REMOVED. REMOVE ALL EXPOSED OR ACCESSIBLE CONDUIT RUNS, ABANDONED, CONCEALED, INACCESSIBLE CONDUIT (REMOVE WIRING). CONDUIT AND WIRING SHALL BE REMOVED BACK TO PANELBOARD OR NEAREST DEVICE WHICH IS TO REMAIN.
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**ELECTRICAL KEYED NOTES:** ○

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**SECOND FLOOR DEMOLITION LIGHTING PLAN**

1/8" = 1'-0"



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**SINGER HALL  
RENOVATION**



1 08/29/22 ADDENDUM

B\_AD PROJECT # 2104

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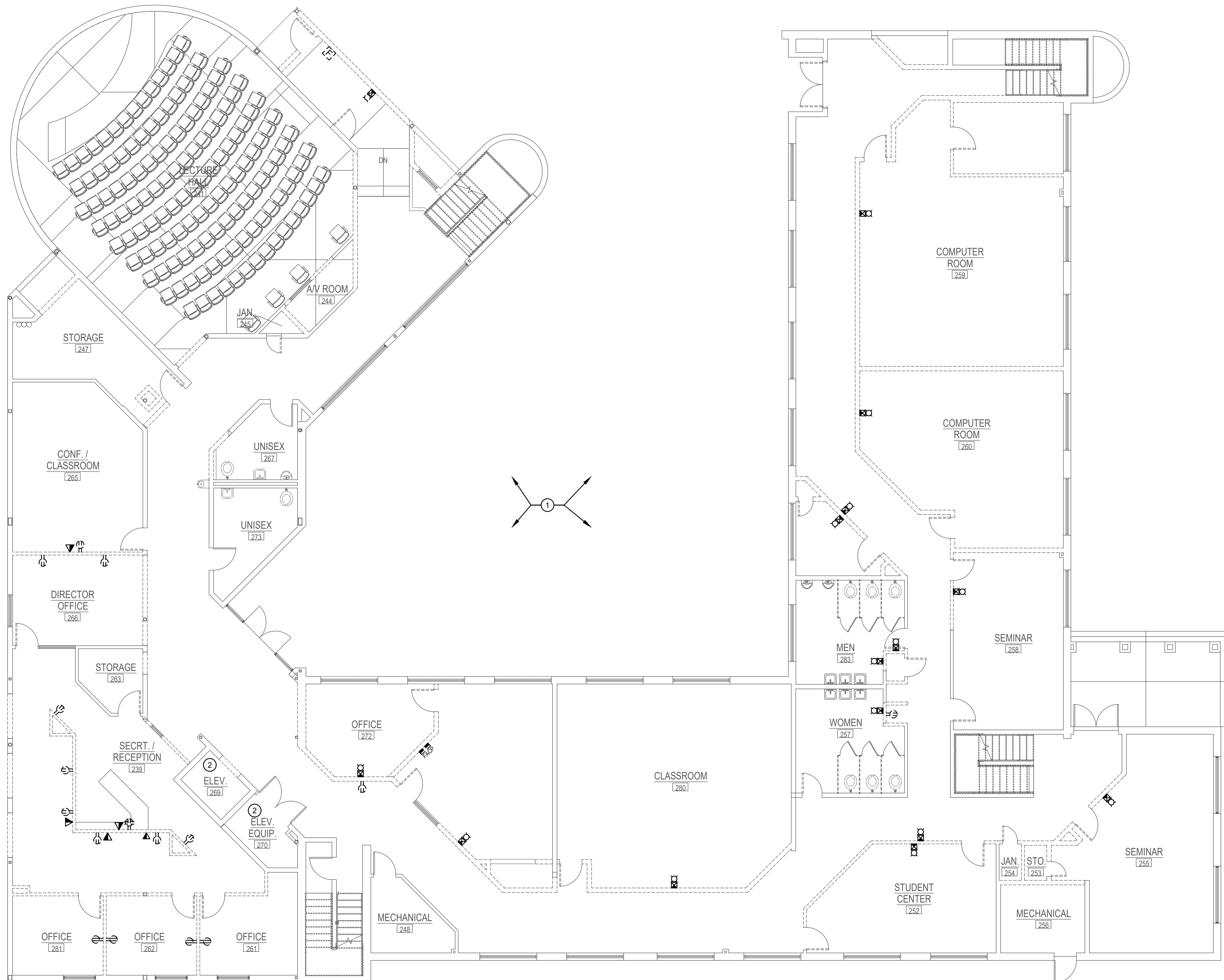
DATE: 8/29/2022

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CHECKED BY: FS

FIRST FLOOR DEMOLITION  
POWER AND SPECIAL  
SYSTEMS PLAN

**ED-201**  
SHEET OF



**DEMOLITION GENERAL NOTES**

- A. AS-BUILT CONDITIONS ARE ILLUSTRATED RESULTING IN ENGINEER'S VISUAL OBSERVATION OF THE FACILITY. CONTRACTOR SHALL REVIEW, INSPECT, AND TRACE OUT ALL EXISTING ELECTRICAL SYSTEMS IN ORDER TO COMPLETE A SAFE AND ORDERLY DISCONNECT/REMOVAL OF EACH SYSTEM MODIFIED UNDER THIS CONTRACT.
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- F. REMOVE ALL CONDUIT AND WIRE TO DEVICES SHOWN TO BE REMOVED. REMOVE ALL EXPOSED OR ACCESSIBLE CONDUIT RUNS. ABANDONED, CONCEALED, INACCESSIBLE CONDUIT (REMOVE WIRING). CONDUIT AND WIRING SHALL BE REMOVED BACK TO PANELBOARD OR NEAREST DEVICE WHICH IS TO REMAIN.
- G. CONTRACTOR SHALL MAINTAIN ALL CIRCUIT AND CONDUIT CONTINUITY TO ALL EXISTING DEVICES WHICH ARE TO REMAIN. PROVIDE ALL FIELD CIRCUIT VERIFICATION AS REQUIRED TO ENSURE CONTINUITY IS MAINTAINED.
- H. EXISTING CONDUIT, WIRING, WIRE-WAYS, MC CABLE MAY REMAIN IN PLACE AND UTILIZED WHERE PRACTICAL PROVIDED IT IS PROPERLY INSTALLED AND IN GOOD CONDITION. DAMAGED EXISTING CIRCUITRY SHALL BE REPLACE.

**ELECTRICAL KEYED NOTES:** ○

- 1. CONTRACTOR SHALL SAFEGUARD EXISTING WIRING AND DEVICES IN WALLS SCHEDULED TO REMAIN.
- 2. ALL EXISTING DISCONNECTS, SWITCHES, RECEPTACLES, AND ASSOCIATED WIRING SERVING ELEVATOR EQUIPMENT ROOM AND ELEVATOR SHAFT TO REMAIN.

**WARNING:**

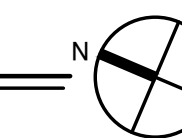
EXISTING FIRE ALARM SHALL REMAIN AND BE MODIFIED OR REPLACED BY A FACTORY RECOGNIZED NICET III, OR HIGHER, FIRE ALARM TECHNICIAN.

FIRE ALARM SHALL REMAIN ACTIVE AT ALL TIMES. CONTRACTOR SHALL DISABLE OR SAFE-GUARD EXISTING DEVICES TO AVOID FALSE ALARMS DURING CONSTRUCTION. IN THE EVENT THE FIRE ALARM SYSTEM MUST BE DISABLED, THE CONTRACTOR SHALL DEVELOP AND EXERCISE A MANUAL FIRE WATCH PROGRAM ACCEPTABLE TO THE OWNER AND AHJ.

ALL DEVICES WITHIN THE LIMITS OF CONSTRUCTION SHALL BE REPLACED WITH NEW DEVICES AT THE COMPLETION OF THE PROJECT.

**FIRST FLOOR DEMOLITION POWER AND SPECIAL SYSTEMS PLAN**

1/8" = 1'-0"



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**SINGER HALL  
RENOVATION**



1	08/29/22	ADDENDUM
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B_AD PROJECT #	2104
FILE:	21092_ED202_8-29-22.dwg
DATE:	8/29/2022
DRAWN BY:	JT
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SECOND FLOOR  
DEMOLITION POWER AND  
SPECIAL SYSTEMS PLAN



**DEMOLITION GENERAL NOTES**

- A. AS-BUILT CONDITIONS ARE ILLUSTRATED RESULTING IN ENGINEER'S VISUAL OBSERVATION OF THE FACILITY. CONTRACTOR SHALL REVIEW, INSPECT, AND TRACE OUT ALL EXISTING ELECTRICAL SYSTEMS IN ORDER TO COMPLETE A SAFE AND ORDERLY DISCONNECT/REMOVAL OF EACH SYSTEM MODIFIED UNDER THIS CONTRACT.
- B. CONTRACTOR SHALL SAFE GUARD EXISTING WIRING AND DEVICES IN WALLS OR CEILINGS TO REMAIN. REFER TO ARCHITECTURAL PLAN FOR EXACT DESCRIPTION OF DEMOLITION.
- C. ALL DASHED WALLS ON THE ELECTRICAL DEMOLITION PLAN INDICATE WALLS WHICH SHALL BE DEMOLISHED COMPLETELY. REFER TO ARCHITECTURAL DEMOLITION PLANS AND DETAILS.
- D. CONTRACTOR SHALL PROPERLY DISPOSE OF, OR RECYCLE, LAMPS AND BALLASTS REMOVED BY THIS CONTRACT.
- E. REMOVE ALL EXISTING DEVICES SHOWN (LIGHT FIXTURES, RECEPTACLES, SWITCHES, COMMUNICATION OUTLETS, JUNCTION BOXES) ON ELECTRICAL DEMOLITION PLAN UNLESS NOTED OTHERWISE.
- F. REMOVE ALL CONDUIT AND WIRE TO DEVICES SHOWN TO BE REMOVED. REMOVE ALL EXPOSED OR ACCESSIBLE CONDUIT RUNS, ABANDONED, CONCEALED, INACCESSIBLE CONDUIT (REMOVE WIRING). CONDUIT AND WIRING SHALL BE REMOVED BACK TO PANELBOARD OR NEAREST DEVICE WHICH IS TO REMAIN.
- G. CONTRACTOR SHALL MAINTAIN ALL CIRCUIT AND CONDUIT CONTINUITY TO ALL EXISTING DEVICES WHICH ARE TO REMAIN. PROVIDE ALL FIELD CIRCUIT VERIFICATION AS REQUIRED TO ENSURE CONTINUITY IS MAINTAINED.
- H. EXISTING CONDUIT, WIRING, WIRE-WAYS, MC CABLE MAY REMAIN IN PLACE AND UTILIZED WHERE PRACTICAL PROVIDED IT IS PROPERLY INSTALLED AND IN GOOD CONDITION. DAMAGED EXISTING CIRCUITRY SHALL BE REPLACE.

**ELECTRICAL KEYED NOTES:** ○

- 1. CONTRACTOR SHALL SAFEGUARD EXISTING WIRING AND DEVICES IN WALLS SCHEDULED TO REMAIN.

**WARNING:**

EXISTING FIRE ALARM SHALL REMAIN AND BE MODIFIED OR REPLACED BY A FACTORY RECOGNIZED NICET III, OR HIGHER, FIRE ALARM TECHNICIAN.

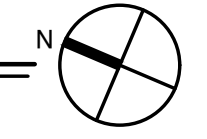
FIRE ALARM SHALL REMAIN ACTIVE AT ALL TIMES. CONTRACTOR SHALL DISABLE OR SAFE-GUARD EXISTING DEVICES TO AVOID FALSE ALARMS DURING CONSTRUCTION. IN THE EVENT THE FIRE ALARM SYSTEM MUST BE DISABLED, THE CONTRACTOR SHALL DEVELOP AND EXERCISE A MANUAL FIRE WATCH PROGRAM ACCEPTABLE TO THE OWNER AND AHJ.

ALL DEVICES WITHIN THE LIMITS OF CONSTRUCTION SHALL BE REPLACED WITH NEW DEVICES AT THE COMPLETION OF THE PROJECT.



**SECOND FLOOR DEMOLITION POWER AND SPECIAL SYSTEMS PLAN**

1/8" = 1'-0"



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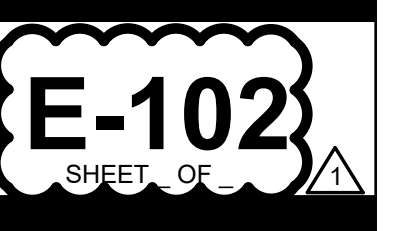
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1	08/29/22	ADDENDUM
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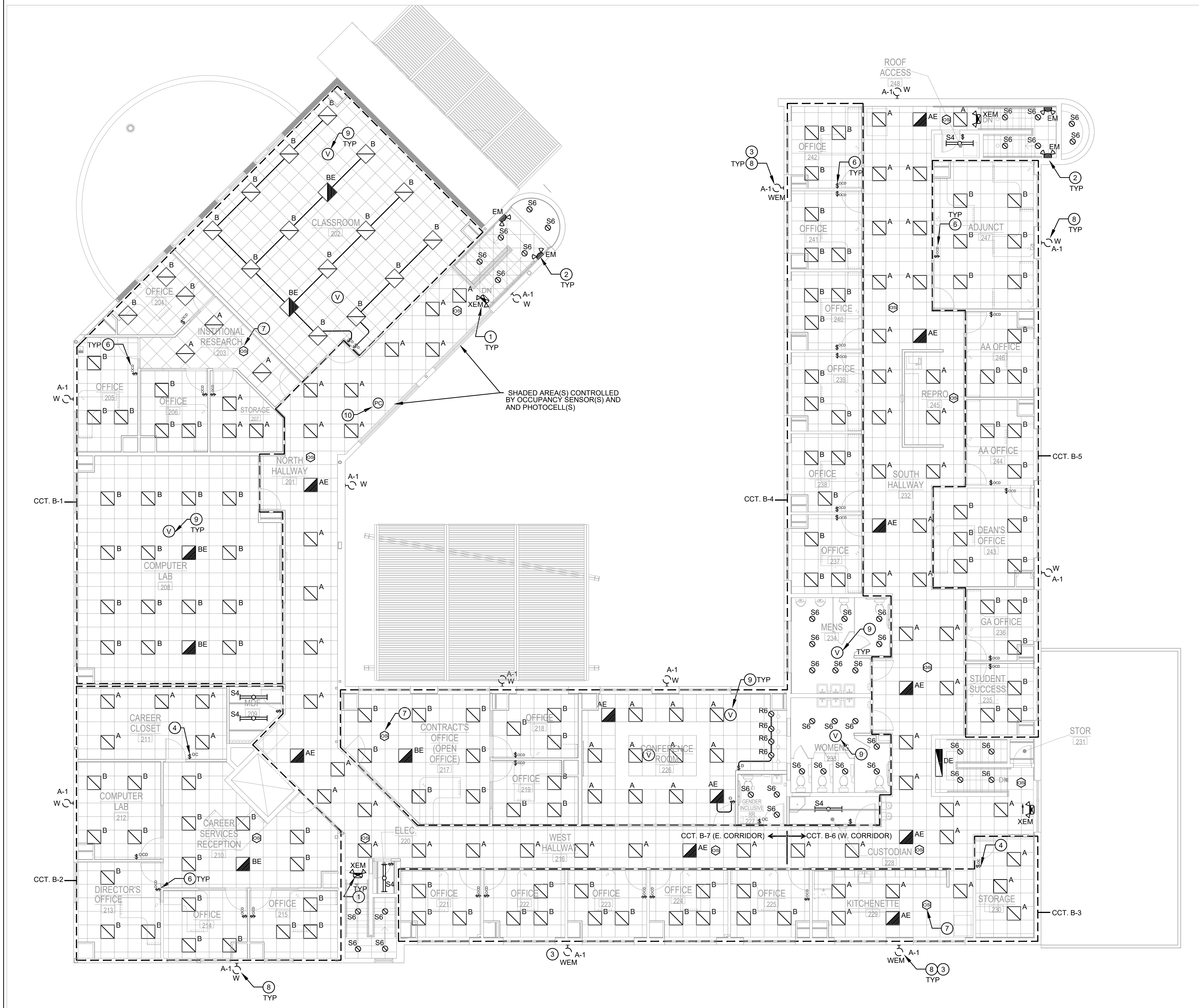
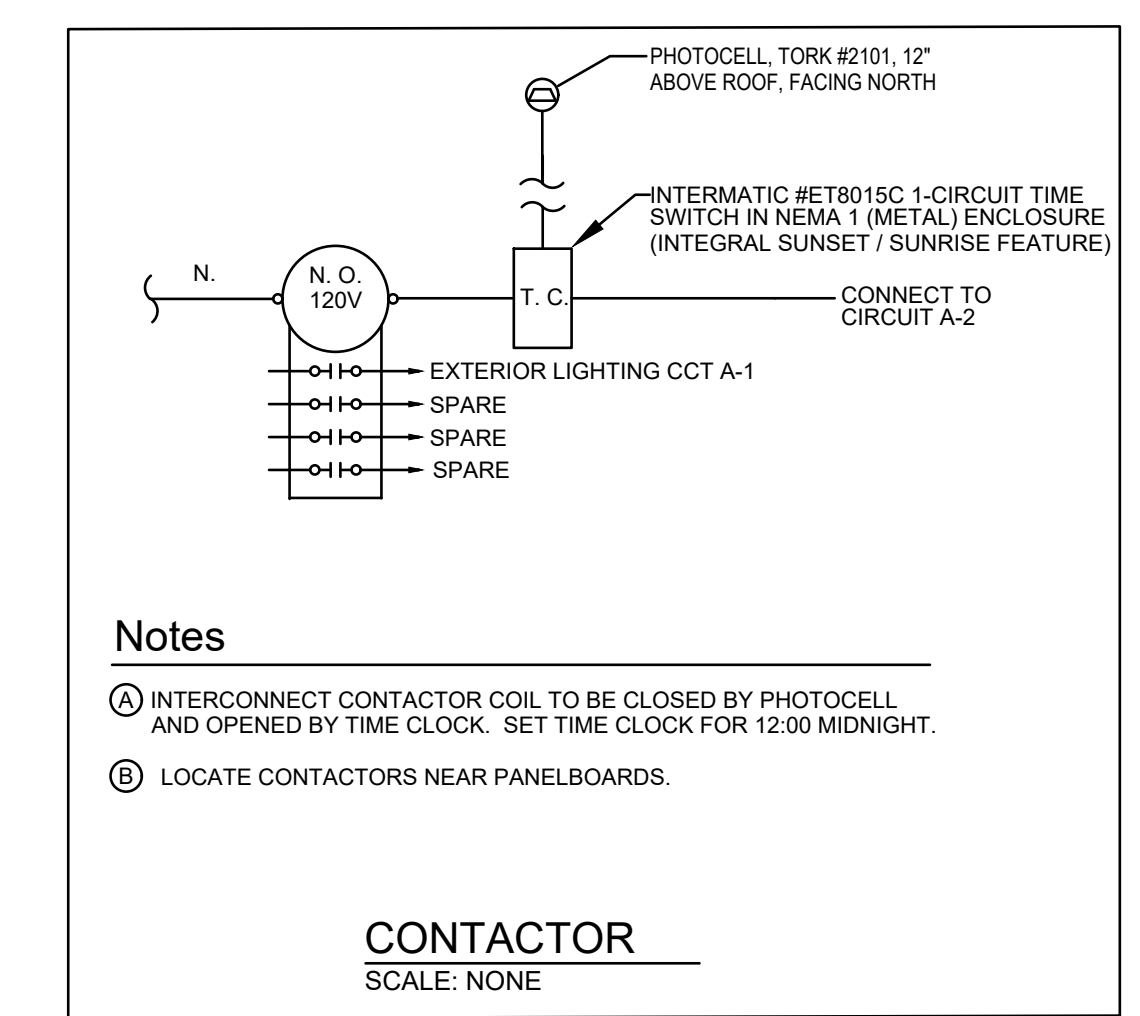
B_AD PROJECT #	2104
FILE:	21092_E102_8-29-22.dwg
DATE:	8/29/2022
DRAWN BY:	JT
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**SECOND FLOOR  
LIGHTING PLAN**



**ELECTRICAL KEYED NOTES:**

- COMBO EXIT SIGN / EMERGENCY TWIN-EYE UNIT, TYPE "XEM", WITH EMERGENCY BATTERY PACK. REFER TO LUMINAIRE SCHEDULE. CONNECT TO UNSWITCHED (120V OR 277V) LIGHTING CIRCUIT SERVING THIS ROOM.
- EMERGENCY TWIN-EYE EGRESS LIGHTING UNIT, TYPE "EM", WITH EMERGENCY BATTERY PACK. REFER TO LUMINAIRE SCHEDULE. CONNECT TO UNSWITCHED (120V OR 277V) LIGHTING CIRCUIT SERVING THIS ROOM.
- EXTERIOR EMERGENCY EGRESS LIGHTING UNIT, TYPE "WEM", WITH EMERGENCY BATTERY PACK. REFER TO LUMINAIRE SCHEDULE. CONNECT TO UNSWITCHED (120V OR 277V) LIGHTING CIRCUIT SERVING ADJACENT INTERIOR ROOM.
- WALL MOUNT OCCUPANCY SENSOR, WATT-STOPPER #DW-100 OR EQUAL. SENSOR SHALL AUTOMATICALLY TURN OFF LIGHTING WITHIN 20 MINUTES WITHOUT OCCUPANCY.
- NOT USED.
- DUAL-TECHNOLOGY OCCUPANCY DIMMER SWITCH, WATT-STOPPER #DW-311-WH. SENSOR SHALL AUTOMATICALLY TURN OFF LIGHTS WITHIN 20 MINUTES WITHOUT OCCUPANCY.
- CEILING MOUNTED 360-DEGREE OCCUPANCY SENSOR SYNCHRONIZED PER ZONE (DO NOT INSTALL WITHIN 5'-0" OF ANY SUPPLY OR RETURN HVAC REGISTER). DEVICE(S) SHALL EXTINGUISH LIGHT FIXTURES IN ASSOCIATED CONTROLLED ZONE WITHIN 20 MINUTES WITHOUT OCCUPANCY.
- EXTEND CIRCUIT THROUGH TIME CLOCK. REFER TO DETAIL ON SHEET E-102. UTILIZE #10 CU WIRING THROUGH-OUT ENTIRE CIRCUIT.
- VACANCY SENSOR.



**SECOND FLOOR LIGHTING PLAN**  
SCALE: 1/8"=1'-0"

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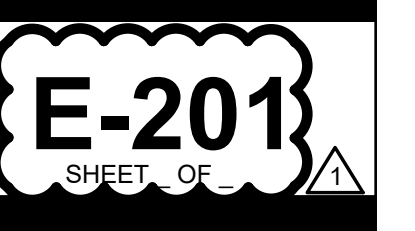
**SINGER HALL  
RENOVATION**



1	08/29/22	ADDENDUM
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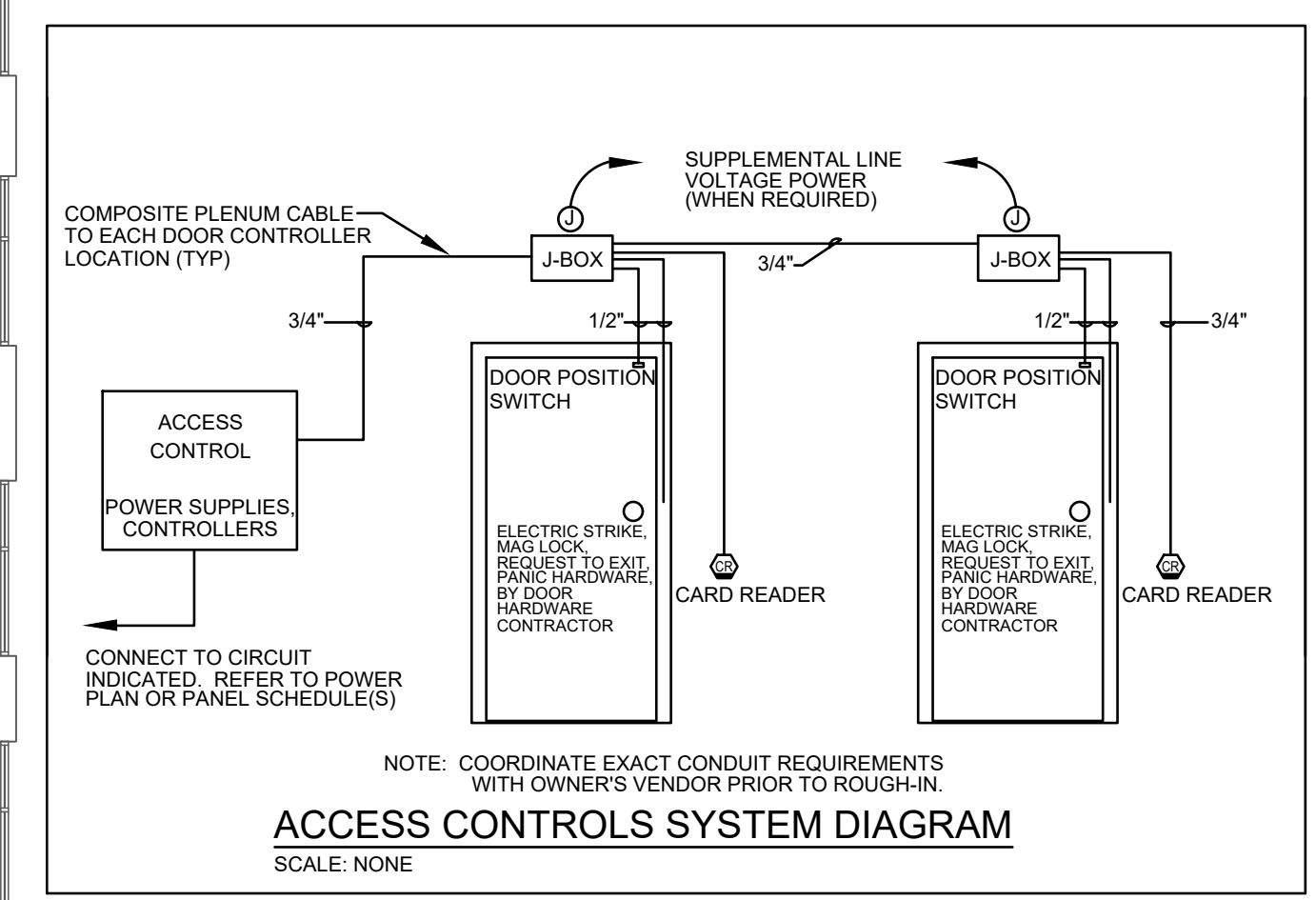
B_AD PROJECT #	2104
FILE:	21092_E201_8-29-22.dwg
DATE:	8/29/2022
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**FIRST FLOOR POWER & SPECIAL SYSTEMS PLAN**



**ELECTRICAL KEYED NOTES:**

- NUMBER ADJACENT TO RECEPTACLE INDICATES CIRCUIT NUMBER. EXTEND 3 #12 TO CIRCUIT BREAKER INDICATED AND MAKE ALL FINAL POWER CONNECTIONS.
  - MAIN SERVICE ENTRANCE EQUIPMENT, REFER TO POWER RISER DIAGRAM.
  - RECEPTACLE LOCATED BEHIND WATER COOLER. VERIFY EXACT LOCATION WITH MECHANICAL PRIOR TO ROUGH-IN (ADJUST AS NECESSARY IF EXISTING). CONNECT TO GFCI BREAKER RATED FOR PERSONNEL PROTECTION IN COMPLIANCE WITH NEC 422.5(A) AND (B).
  - EXTERIOR WEATHER-RESISTANT (WR), GFCI-TYPE DUPLEX RECEPTACLE. REFER TO ELECTRICAL SYMBOL LEGEND.
  - TELEPHONE TERMINAL CABINET (TTB) WITH DEDICATED QUADPLEX RECEPTACLE. REFER TO VOICE/DATA RISER DIAGRAM.
  - HANDICAPPED DOOR OPERATOR KEY-PAD. COORDINATE EXACT LOCATION WITH DOOR INSTALLER PRIOR TO ROUGH-IN. PROVIDE .50" CONDUIT WITH PULL STRING TO DOOR OPERATOR CONTROL CABINET.
  - J-BOX IN CEILING SERVING MOTORIZED SCREEN (FBO). COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN AND EXTEND .75" CONDUIT TO WALL MOUNTED CONTROL SWITCH AS SHOWN. ELECTRICAL CONTRACTOR SHALL INSTALL LINE VOLTAGE INTERCONNECTION WIRING BETWEEN THE SCREEN AND CONTROLLER IN COMPLIANCE WITH THE MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
  - CEILING MOUNTED RECEPTACLE SERVING PROJECTOR (FBO). COORDINATE EXACT DIMENSION/LOCATION WITH OWNER'S AV PROVIDER PRIOR TO ROUGH-IN.
  - J-BOX SERVING MOTORIZED WINDOW SHADES (FBO). COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN AND EXTEND CONDUIT/WIRING TO WALL MOUNTED CONTROL SWITCH IN COMPLIANCE WITH THE MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
  - TWO 2" CONDUITS EXTENDED TO ROOM 209 IDF WITH PULL STRING. BUSH BOTH ENDS OF EACH CONDUIT. CONFIRM EXACT ROUTING AND LOCATIONS WITH OWNER'S I.T. DEPARTMENT.
  - DEDICATED RECEPTACLE SERVING FACP. COORDINATE EXACT LOCATION WITH FIRE ALARM VENDOR PRIOR TO ROUGH-IN.
  - APPROXIMATE LOCATION OF NEW CISTERN SUBMERSIBLE PUMP. COORDINATE EXACT LOCATION WITH MECHANICAL PRIOR TO ROUGH-IN. EXTEND .75" CONDUIT WITH 2 #10 CU AND 1 #10 CU EGR TO CIRCUIT INDICATED. PROVIDE SINGLE POINT LINE VOLTAGE CONNECTION IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.
  - J-BOX FOR POWER ASSISTED AND/OR ACCESS CONTROLLED DOOR. REFER TO DETAIL FOR ADDITIONAL WORK AND COORDINATE EXACT ROUGH-IN REQUIREMENTS WITH DOOR HARDWARE SCHEDULE.
  - J-BOX SERVING WAP (FBO) IF REQUIRED. EXTEND WIRING TO ADJACENT GENERAL POWER CIRCUIT. COORDINATE EXACT REQUIREMENTS WITH OWNER'S I.T. MANAGER PRIOR TO ROUGH-IN.
- IF BID LOT #2 IS APPROVED, CONNECT WAP TO IT PANEL(S). REFER TO SCHEDULE.**
- IF BID LOT #2 IS APPROVED, ALL I.T. EQUIPMENT SHALL BE RE-ROUTED TO I.T. PANEL(S). REFER TO SCHEDULE.
  - FLOOR BOX, HUBBELL #CFB2G25 SERIES OR EQUAL WITH ACCESSORIES AND COMPATIBLE BRASS COVER. PROVIDE A COMPLETE ASSEMBLY.
  - PROVIDE LINE VOLTAGE CONNECTION TO HOT WATER HEATER. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH MECHANICAL PRIOR TO ROUGH-IN.
  - APPROXIMATE LOCATION OF LIFT STATION. REFER TO PLUMBING PLAN FOR ADDITIONAL DETAIL. PROVIDE SINGLE POINT LINE VOLTAGE CONNECTION AND EXTEND 1" CONDUIT WITH 3 #10 CU AND 1 #10 CU EGR TO CIRCUIT INDICATED.
  - APPROXIMATE LOCATION OF 20HP FIRE PUMP AND 1/2HP JOCKEY PUMP. PROVIDE SINGLE POINT LINE VOLTAGE CONNECTION(S) IN COMPLIANCE WITH NEC 695, AND REFER TO RISER DIAGRAM FOR ADDITIONAL REQUIREMENTS.



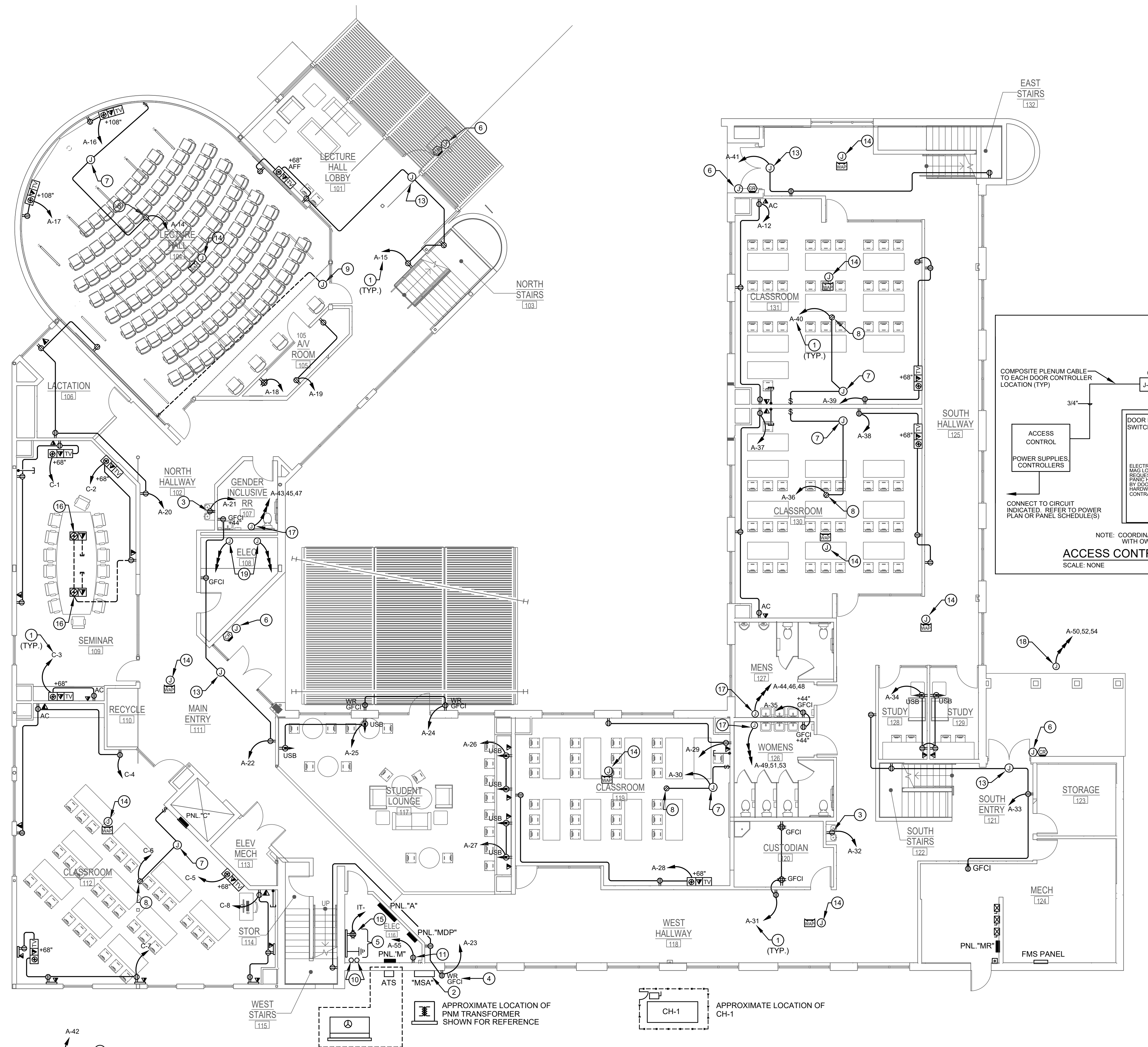
**WARNING:**  
IF ANY UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES ARE SHOWN ON THESE DRAWINGS, THEY ARE SHOWN IN APPROXIMATE MANNER ONLY, AND SUCH LINES MAY EXIST WHERE NONE ARE SHOWN. IF ANY SUCH EXISTING LINES ARE SHOWN, THE LOCATION IS BASED UPON INFORMATION PROVIDED BY THE UTILITY OR PIPELINE COMPANY. THE OWNER OR BY OTHERS, AND THE INFORMATION MAY BE INCOMPLETE, OR MAY BE OBSOLETE BY THE TIME CONSTRUCTION COMMENCES.

THE ENGINEER HAS UNDERTAKEN NO FIELD VERIFICATION OF THE LOCATION, DEPTH, SIZE OR TYPE OF EXISTING UTILITY LINES, PIPELINES, OR UNDERGROUND UTILITY LINES. THE CONTRACTOR SHALL INQUIRE OF THE LOCATION OF ANY UTILITY LINE, PIPELINE OR UNDERGROUND UTILITY LINE IN OR NEAR THE AREA OF THE WORK IN ADVANCE OF AND DURING EXCAVATION WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY AND ALL DAMAGE CAUSED BY ITS FAILURE TO LOCATE, IDENTIFY AND PRESERVE ANY AND ALL EXISTING UTILITIES, LINES, PIPELINES, OR UNDERGROUND UTILITY LINES. THE CONTRACTOR SHALL COMPLY WITH STATE STATUTES, MUNICIPAL AND LOCAL ORDINANCES, RULES, AND REGULATIONS, IF ANY, PERTAINING TO THE LOCATION OF THESE LINES AND FACILITIES IN PLANNING AND CONDUCTING EXCAVATION, WHETHER BY CALLING OR NOTIFYING THE UTILITIES, COMPLYING WITH "NM ONE CALL" PROCEDURES, OR OTHERWISE.

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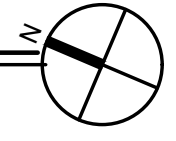


**FIRST FLOOR POWER & SPECIAL SYSTEMS PLAN**

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

BID LOT #2  
REFER TO RISER DIAGRAM  
FOR ADDITIONAL REQUIREMENTS

APPROXIMATE LOCATION OF  
PNM TRANSFORMER  
SHOWN FOR REFERENCE





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RENOVATION**



1 08/29/22 ADDENDUM

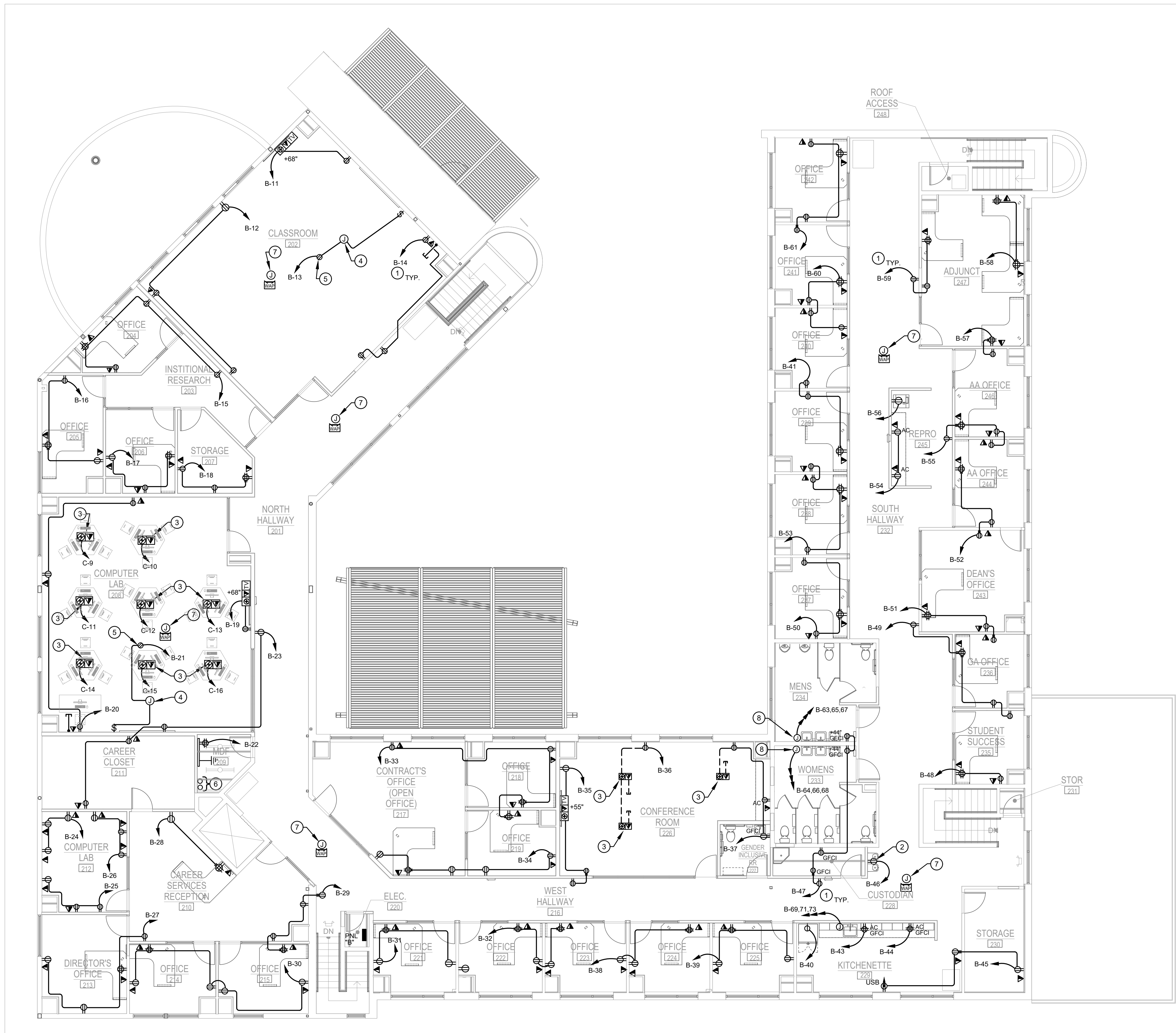
B\_AD PROJECT # 2104  
FILE: 21092\_E202\_8-29-22.dwg  
DATE: 8/29/2022  
DRAWN BY: JT  
CHECKED BY: FS

**SECOND FLOOR  
POWER &  
SPECIAL  
SYSTEMS PLAN**

**E-202**  
SHEET OF

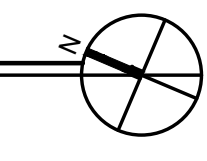
**ELECTRICAL KEYED NOTES:**

- NUMBER ADJACENT TO RECEPTACLE INDICATES CIRCUIT NUMBER. EXTEND 3 #12 TO CIRCUIT BREAKER INDICATED AND MAKE ALL FINAL POWER CONNECTIONS.
  - RECEPTACLE LOCATED BEHIND WATER COOLER. VERIFY EXACT LOCATION WITH MECHANICAL PRIOR TO ROUGH-IN (ADJUST AS NECESSARY IF EXISTING). CONNECT TO GFCI BREAKER RATED FOR PERSONNEL PROTECTION IN COMPLIANCE WITH NEC 422.5(A) AND (B).
  - DUAL COMPARTMENT FIRE RATED FLOOR BOX, HUBBELL S1PT4X4FIT SERIES OR EQUAL WITH BRASS COVER.
  - J-BOX IN CEILING SERVING MOTORIZED SCREEN (FBO). COORDINATE EXACT LOCATION WITH ARCHITECT PRIOR TO ROUGH-IN AND EXTEND .75" CONDUIT TO WALL MOUNTED CONTROL SWITCH AS SHOWN. ELECTRICAL CONTRACTOR SHALL INSTALL LINE VOLTAGE INTERCONNECTION WIRING BETWEEN THE SCREEN AND CONTROLLER IN COMPLIANCE WITH THE MANUFACTURER'S INSTALLATION RECOMMENDATIONS.
  - CEILING MOUNTED RECEPTACLE SERVING PROJECTOR (FBO). COORDINATE EXACT DIMENSION/LOCATION WITH OWNER'S AV PROVIDER PRIOR TO ROUGH-IN.
  - TWO 2" CONDUITS ORIGINATING IN MDF ROOM ON THE FIRST FLOOR. REFER TO KEYED NOTE #10 ON SHEET E-201.
  - J-BOX SERVING WAP (FBO) IF REQUIRED. EXTEND WIRING TO ADJACENT GENERAL POWER CIRCUIT. COORDINATE EXACT REQUIREMENTS WITH OWNER'S I.T. MANAGER PRIOR TO ROUGH-IN.
- IF BID LOT #2 IS APPROVED, CONNECT WAP TO IT PANEL(S). REFER TO SCHEDULE.
- PROVIDE LINE VOLTAGE CONNECTION TO HOT WATER HEATER. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH MECHANICAL PRIOR TO ROUGH-IN.



**SECOND FLOOR POWER & SPECIAL SYSTEMS PLAN**

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



NOTE:  
50% OF RECEPTACLES IN PRIVATE OFFICES, OPEN OFFICES, COMPUTER LABS SHALL BE CONTROLLED BY AUTOMATIC DEVICE. COORDINATE EXACT CONTROLLER DEVICE LOCATIONS WITH OWNER PRIOR TO ROUGH-IN.

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RENOVATION**

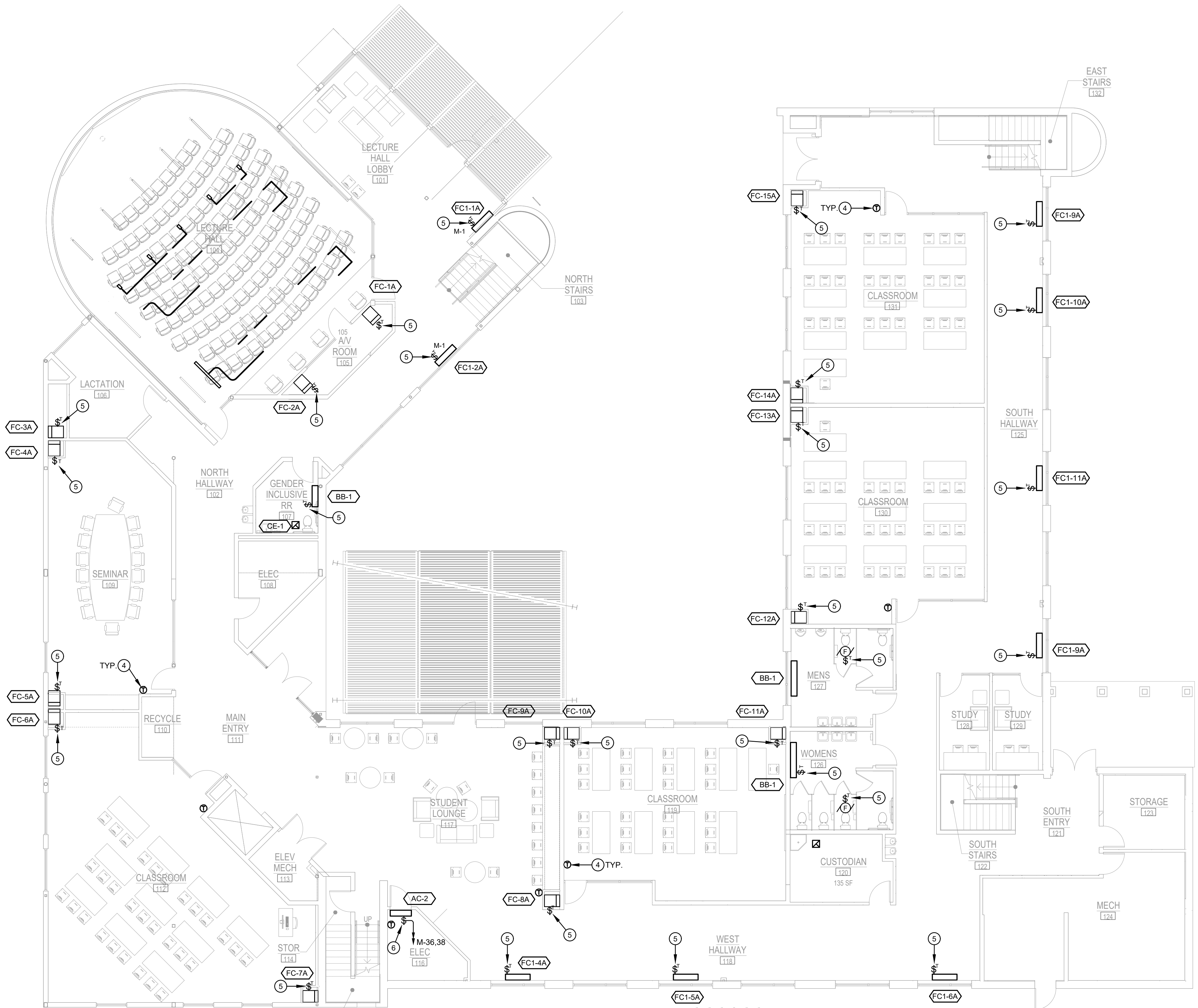


1	08/29/22	ADDENDUM
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B_AD PROJECT #	2104
FILE:	21092_E301_8-29-22.dwg
DATE:	8/29/2022
DRAWN BY:	JT
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**FIRST FLOOR  
MECHANICAL  
EQUIPMENT  
CONNECTIONS**

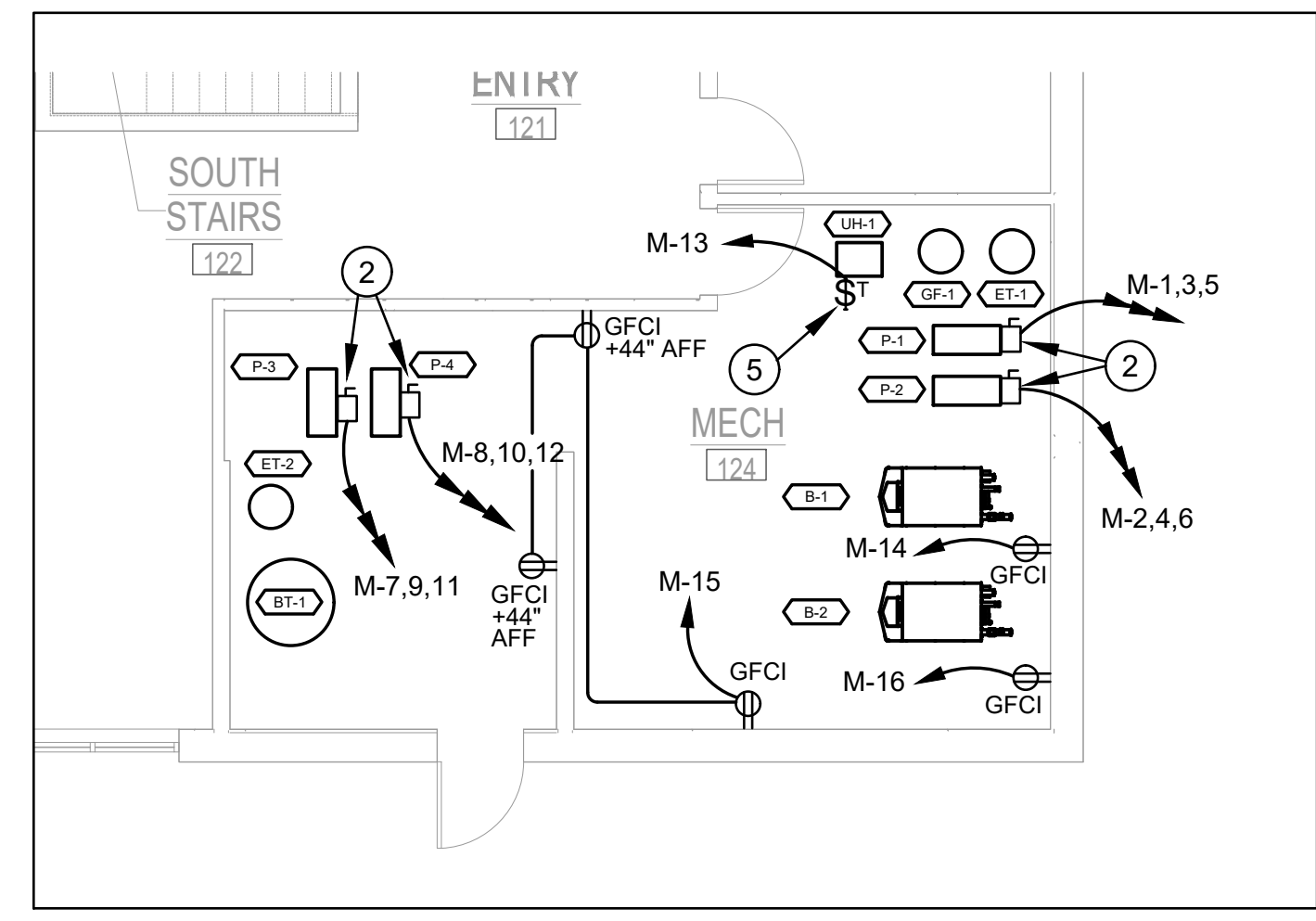
**E-301**  
SHEET OF



APPROXIMATE LOCATION OF CH-1. SALVAGE 600 AMP DISCONNECT AND DISCONNECT/RECONNECT NEW 80 TON CHILLER. PROVIDE 400 AMP RK1 FUSES IN ACCORDANCE WITH MANUFACTURER NAMEPLATE.

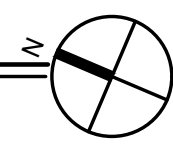
**ELECTRICAL KEYED NOTES: ○**

- NOT USED.
- 30-AMP, 250-VOLT, 3-PHASE, FSS, DISCONNECT IN NEMA-3R ENCLOSURE MOUNTED ON, OR ADJACENT TO, MECHANICAL UNIT IN A MANNER THAT DOES NOT IMPEDE ACCESS REQUIRED FOR ROUTINE MECHANICAL MAINTENANCE. EXTEND .75" CONDUIT WITH 2 #10 CU AND 1 #10 CU EGR TO CIRCUIT INDICATED AND PROVIDE FUSES IN ACCORDANCE WITH MANUFACTURER'S NAMEPLATE.
- NOT USED.
- .75" BUSHED CONDUIT STUBBED INTO ACCESSIBLE CEILING SPACE FOR T-STAT CONTROL WIRING INSTALLED BY MECHANICAL.
- SINGLE POLE 20-AMP THERMAL SWITCH INSTALLED ON, OR ADJACENT TO, MECHANICAL UNIT. EXTEND #12 CU CONDUCTORS TO CIRCUIT INDICATED.
- TWO POLE, 20-AMP THERMAL SWITCH INSTALLED ON, OR ADJACENT TO, A/C INDOOR UNIT. EXTEND #12 CU CONDUCTORS TO CIRCUIT INDICATED.



**FIRST FLOOR MECHANICAL EQUIPMENT CONNECTIONS**

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



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B\_AD PROJECT # 2104

FILE: 21092\_E302\_8-29-22.dwg

DATE: 8/29/2022

DRAWN BY: JT

CHECKED BY: FS

SECOND FLOOR  
MECHANICAL  
EQUIPMENT  
CONNECTIONS

**E-302**  
SHEET OF

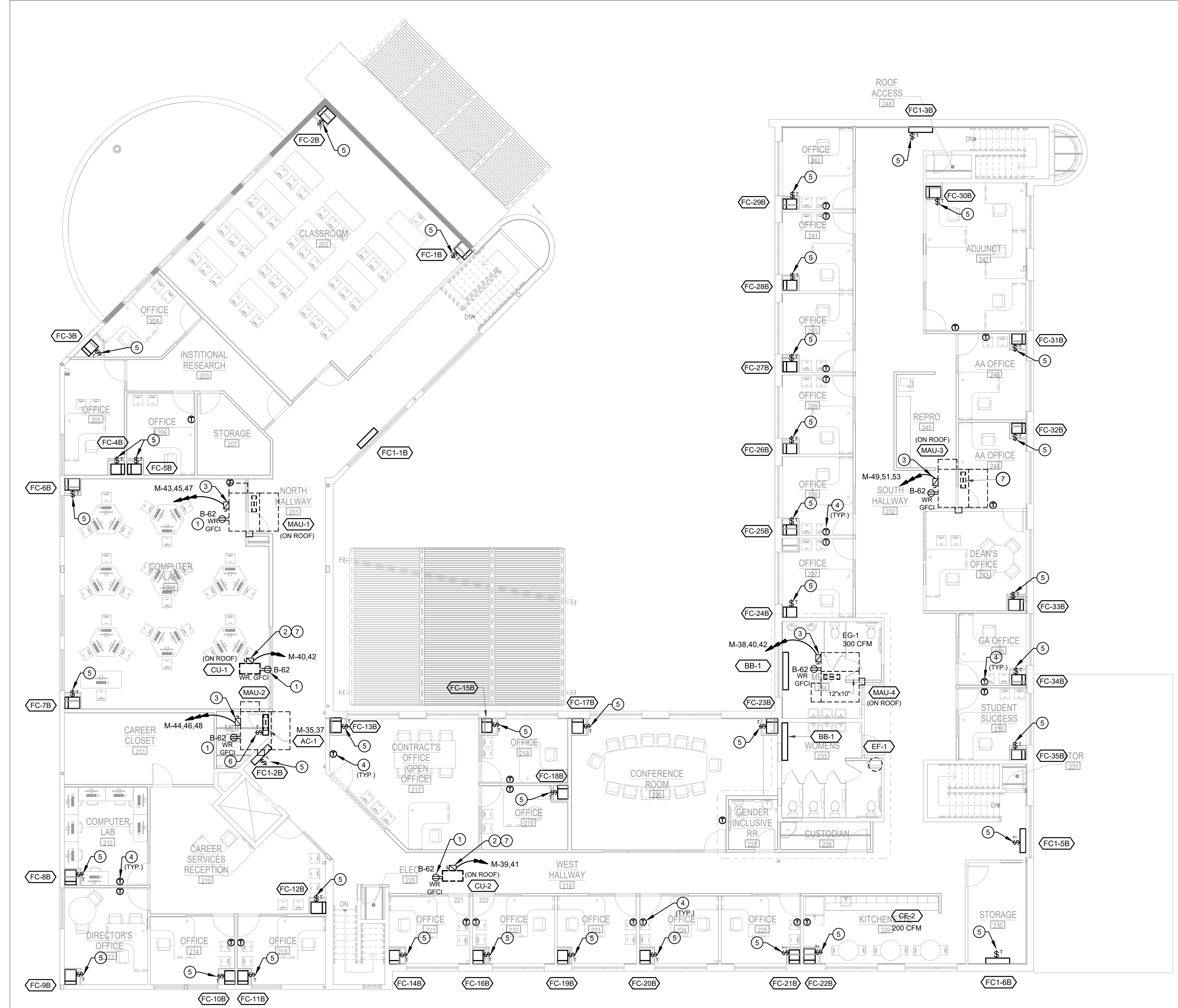
**ELECTRICAL KEYED NOTES:**

- WEATHER RESISTANT GFCI RECEPTACLE MOUNTED ON, OR ADJACENT TO, MECHANICAL UNIT INSTALLED IN A MANNER THAT DOES NOT IMPEDE ACCESS REQUIRED FOR ROUTINE MECHANICAL MAINTENANCE. COMPLY WITH NEC 210.63.
- 30-AMP, 250-VOLT, 3-PHASE, FSS, DISCONNECT IN NEMA-3R ENCLOSURE MOUNTED ON, OR ADJACENT TO, MECHANICAL UNIT IN A MANNER THAT DOES NOT IMPEDE ACCESS REQUIRED FOR ROUTINE MECHANICAL MAINTENANCE. EXTEND .75" CONDUIT WITH 3 #10 CU AND 1 #10 CU EGR TO CIRCUIT INDICATED AND PROVIDE FUSES IN ACCORDANCE WITH MANUFACTURER'S NAMEPLATE.
- 60-AMP, 250-VOLT, 3-PHASE, FSS DISCONNECT IN NEMA-3R ENCLOSURE MOUNTED ON, OR ADJACENT TO, MECHANICAL UNIT IN A MANNER THAT DOES NOT IMPEDE ACCESS REQUIRED FOR ROUTINE MECHANICAL MAINTENANCE. EXTEND .75" CONDUIT WITH 3 #6 CU AND 1 #10 CU EGR TO CIRCUIT INDICATED AND PROVIDE FUSES IN ACCORDANCE WITH MANUFACTURER'S NAMEPLATE.
- .75" BUSHED CONDUIT STUBBED INTO ACCESSIBLE CEILING SPACE FOR T-STAT CONTROL WIRING INSTALLED BY MECHANICAL.
- SINGLE POLE 20-AMP THERMAL SWITCH INSTALLED ON, OR ADJACENT TO, MECHANICAL UNIT. EXTEND #12 CU CONDUCTORS TO CIRCUIT INDICATED.
- TWO POLE, 20-AMP THERMAL SWITCH INSTALLED ON, OR ADJACENT TO, A/C INDOOR UNIT. EXTEND #12 CU CONDUCTORS TO CIRCUIT INDICATED.
- EXTEND .50" CONDUIT WITH 4 #14 CU CONDUCTORS FOR LINE-VOLTAGE INTERLOCK CONTROL WIRING BETWEEN SPLIT SYSTEM OUT-DOOR UNIT AND SPLIT-SYSTEM INDOOR UNIT. COORDINATE WITH MECHANICAL PRIOR TO ROUGH-IN. ALL WIRING SHALL COMPLY WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS.

**MECHANICAL EQUIPMENT CONNECTION SCHEDULE**

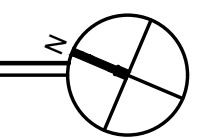
ITEM	DESCRIPTION	LOAD				Termination	Notes
		Volts	Phase	Watts	FLA		
AC-1, AC-2	Air Conditioning Unit	208	1		20.0		4
CU-1, CU-2	Condenser Unit	208	1		7.8	20.0	4
MAU-1 thru 4	Make-Up Air Unit	208	3		35.7	45.0	2,3
CH-1	80 Ton Chiller	208	3		354.0	400.0	1
FC1-1A, 2A	Vertical Concealed Fan Coil Unit	115	1	5,000	6.1	20.0	4
FC-3A	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-4A, 5A	Vertical Concealed Fan Coil Unit	115	1	0.850	1.1	20.0	4
FC-6A thru 9A	Vertical Concealed Fan Coil Unit	115	1	2.700	3.4	20.0	4
FC-10A thru 15A	Vertical Concealed Fan Coil Unit	115	1	2.600	3.3	20.0	4
FC-1B, FC-2B	Vertical Concealed Fan Coil Unit	115	1	2.700	3.4	20.0	4
FC-3B thru 5B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-6B, 7B	Vertical Concealed Fan Coil Unit	115	1	2.700	3.4	20.0	4
FC-8B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-9B	Vertical Concealed Fan Coil Unit	115	1	0.850	1.1	20.0	4
FC-10B, 11B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-12B	Vertical Concealed Fan Coil Unit	115	1	1.300	1.6	20.0	4
FC-13B	Vertical Concealed Fan Coil Unit	115	1	0.640	1.6	20.0	4
FC-14B thru 16B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-17B	Vertical Concealed Fan Coil Unit	115	1	0.800	1.6	20.0	4
FC-18B thru 21B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-22B, 23B	Vertical Concealed Fan Coil Unit	115	1	1.300	1.6	20.0	4
FC-24B thru 29B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-30B	Vertical Concealed Fan Coil Unit	115	1	2.600	3.3	20.0	4
FC-31B, 32B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.8	20.0	4
FC-33B	Vertical Concealed Fan Coil Unit	115	1	1.300	1.6	20.0	4
FC-34B, 35B	Vertical Concealed Fan Coil Unit	115	1	0.640	0.1	20.0	4
FC1-1A	Floor Mounted Fan Coil Unit	115	1	3,400			
FC1-2A thru 5A	Floor Mounted Fan Coil Unit	115	1	3,600			
FC1-6A thru 9A	Floor Mounted Fan Coil Unit	115	1	2,300			
FC1-1B, 2B	Floor Mounted Fan Coil Unit	115	1	3,600			
FC1-3B	Floor Mounted Fan Coil Unit	115	1	2,300			
B-1, B-2	Boiler	120	1		5.4	20.0	
IWH-1	Tankless Water Heater	208	1	18kw	75.0	80.0	2X40 amp req'd
IWH-2	Tankless Water Heater	208	1	6kw	25.0	25.0	
UH-1	Unit Heater	115	1	1,900		15.0	4
EF-1	Exhaust Fan	115	1	6,400		20.0	4
CE-1	Exhaust Fan	115	1	25		20.0	4
CE-2	Exhaust Fan	115	1	83		20.0	4
GF-1	Glycol Fill System					20.0	2
<b>TOTAL KVA</b>							

NOTES: (Verify all equipment voltages and amp ratings with mechanical contractor prior to rough-in.) 06-2022  
 1. NEMA 3R fused disconnect switch provided with unit. Refer to Mechanical Equipment Schedule.  
 2. Provide fused disconnect switch, NEMA 3R if outside.  
 3. Provide 120V GFCI, WP duplex receptacle adjacent to unit.  
 4. Provide thermal switch.  
 5. Provide NEMA 3R combination starter / disconnect switch.



**SECOND FLOOR MECHANICAL EQUIPMENT CONNECTIONS**

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



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