

# Harnett County Schools

# HIGHLAND ELEMENTARY ADDITION & RENOVATION

VOLUME 1

1915 Buffalo Lake Road - Sanford NC 27332

...Becoming the  
Leading Designer of  
High Performance Facilities  
in the Nation with a  
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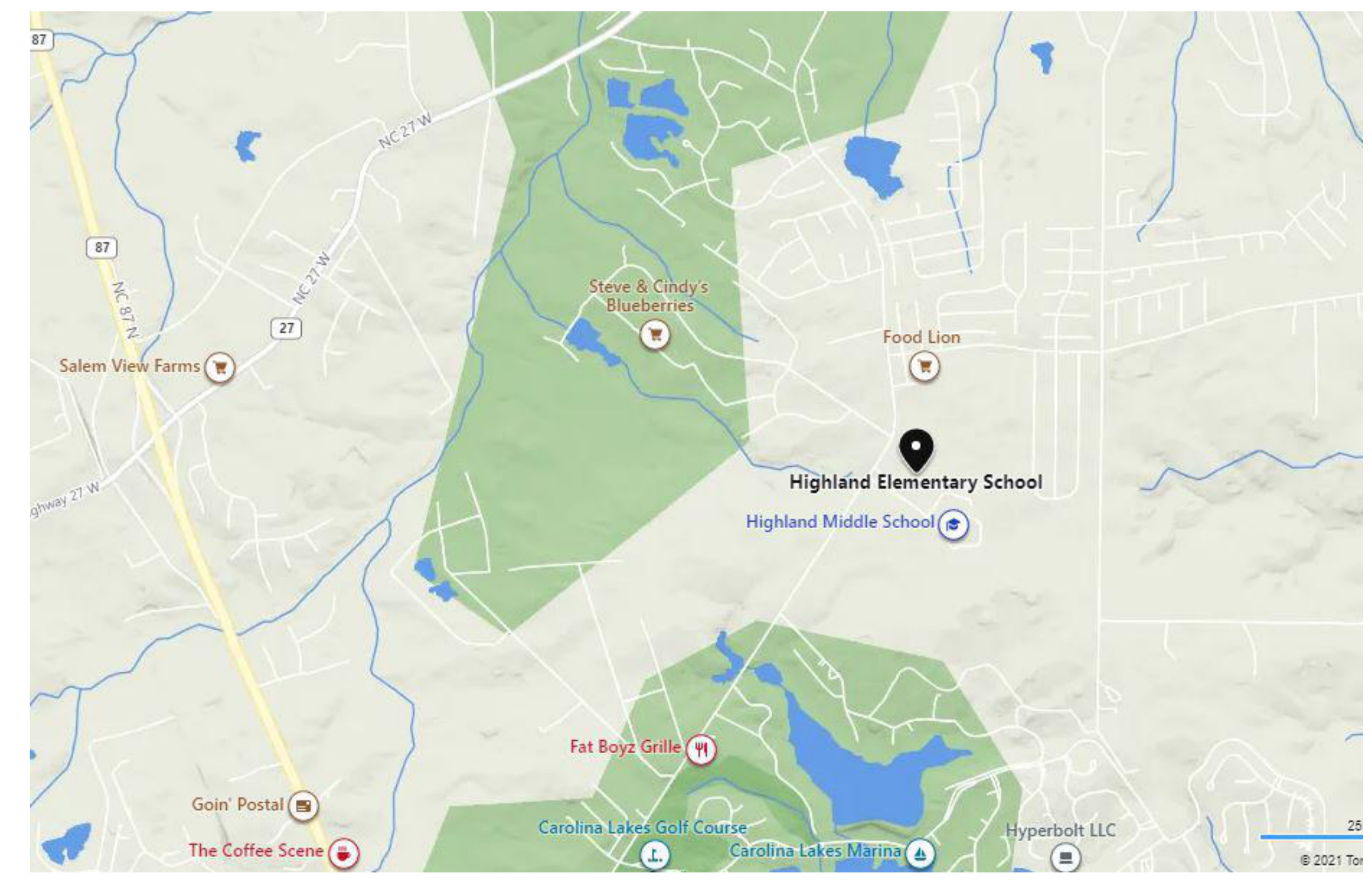


Harnett County Schools  
**HIGHLAND ELEMENTARY ADDITION & RENOVATION**  
 VOLUME 1  
 1915 Buffalo Lake Road - Sanford NC 27332  
 PROJECT NUMBER: 02110.100  
 SET NUMBER: 04/29/22  
 BID SET

## RENDERING



## VICINITY MAP



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\* DENOTES PAGES THAT SHOULD BE PRINTED IN COLOR

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Grand total: 40	

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DOMESTIC WATER PIPING

- 1. BELOW GRADE PIPING AND JOINTS: PROVIDE TYPE 'K' SOFT ANNEALED SEAMLESS COPPER TUBING (ASTM B 88) WITH NO JOINTS FOR PIPING 2-1/2" AND SMALLER. PROVIDE DUCTILE IRON PIPE AND FITTINGS (AWWA C151, AWWA C110) WITH RUBBER GASKET JOINTS AND RODS (AWWA C11) FOR PIPING 3" AND LARGER.
2. ABOVE GRADE PIPING AND JOINTS: PROVIDE TYPE 'L' HARD DRAWN SEAMLESS COPPER TUBING (ASTM B 88) AND CAST COPPER ALLOY FITTINGS (ASME B16.10). JOINTS 2" AND SMALLER SHALL BE LEAD FREE 95-5 TRUSILVER SOLDER JOINTS (ASTM B 32). JOINTS 2-1/2" AND LARGER SHALL BE SCUP SILVER / PHOSPHORUS / COPPER BRAZED JOINTS (AWS A5.8). ALTERNATELY PROVIDE COPPER PIPE AND FITTINGS AS SPECIFIED ABOVE EXCEPT WITH GROOVED ENDS (ASTM B 88, ASME B16.18) AND JOINTS UTILIZING GROOVED MECHANICAL COUPLINGS MEETING (ASTM F1476).
3. INSULATE PIPING ABOVE GRADE (EXCEPT EXPOSED CONNECTIONS TO PLUMBING FIXTURES) WITH GLASS FIBER INSULATION HAVING A VAPOR BARRIER AND JACKET. PIPE INSULATION SHALL HAVE A CONDUCTIVITY NOT EXCEEDING 0.27 BTU/H X SQ. FT., SEE LIST BELOW FOR INSULATION THICKNESS:
- PROVIDE 1" THICK INSULATION FOR HOT WATER & CIRCULATION PIPING SIZES 1/2" THRU 1-1/4".
- PROVIDE 1-1/2" THICK INSULATION FOR HOT WATER & CIRCULATION PIPING SIZES 1-1/2" THRU 4".
- PROVIDE 1/2" THICK INSULATION FOR COLD WATER PIPING SIZES 1/2" THRU 1-1/4".
- PROVIDE 1" THICK INSULATION FOR COLD WATER PIPING SIZES 1-1/2" THRU 4".
4. PIPING INSULATION, JACKETS, COVERINGS, SEALERS, MASTICS AND ADHESIVES SHALL MEET A FLAME-SPREAD RATING OF 25 OR LESS AND A SMOKE-DEVELOPED RATING OF 50 OR LESS AS TESTED BY ASTM E84 (NFPA 255) METHOD AND SHALL BE FLEUM RATED. PROVIDE PVC INSULATION JACKET FOR EXPOSED PIPING IN MECHANICAL ROOMS. INSTALL INSULATION CONTINUOUSLY THRU FIRE RATED WALLS AND PIPE HANGERS. PROVIDE GALVANIZED STEEL SHIELD BETWEEN PIPE HANGER AND INSULATION.
5. PROVIDE A CHROME FINISH ON EXPOSED PIPING IN REST ROOMS AND OTHER FINISHED AREAS.
6. PROTECT COPPER PIPING AGAINST CONTACT WITH DISSIMILAR METALS. ALL HANGERS, SUPPORTS, ANCHORS AND CLIPS SHALL BE COPPER OR COPPER PLATED. WHERE COPPER PIPING IS CARRIED ON TRAPEZE HANGERS WITH OTHER PIPING, PROVIDE A PERMANENT ELECTROLYTIC ISOLATION MATERIAL TO PREVENT CONTACT WITH DISSIMILAR OTHER METALS.
7. PROTECT COPPER PIPING AGAINST CONTACT WITH MASONRY. WHERE COPPER IS SLEEVED THROUGH MASONRY PARTITIONS, PROVIDE COPPER OR RED BRASS SLEEVES. WHERE COPPER MUST BE CONCEALED IN OR AGAINST MASONRY PARTITIONS, PROVIDE A HEAVY COATING OF ASPHALTIC ENAMEL ON THE COPPER PIPING AND 15# ASPHALT SATURATED FELT BETWEEN THE PIPING AND THE MASONRY PARTITION.
8. PERFORM A PRESSURE TEST ON ALL WATER PIPING. FILL PIPING WITH POTABLE WATER, CAP AND SUBJECT PIPING TO A STATIC WATER PRESSURE OF 50 PSIG ABOVE OPERATING PRESSURE. WITHOUT EXCEEDING PRESSURE RATING OF PIPING SYSTEM MATERIALS OR PRESSURIZE PIPING WITH AIR TO AT LEAST ONE-HUNDRED (100) PSI. ISOLATE TEST SOURCE AND ALLOW TO STAND FOR FOUR HOURS. LEAKS AND LOSS IN TEST PRESSURE CONSTITUTE DEFECTS THAT MUST BE REPAIRED. REPAIR LEAKS AND DEFECTS WITH NEW MATERIALS AND RETEST PIPING OR PORTION THEREOF UNTIL SATISFACTORY RESULTS ARE OBTAINED.
9. STERILIZE THE DOMESTIC WATER SYSTEM IN PER THE AMERICAN WATER WORKS ASSOCIATION'S INSTRUCTIONS/SPECIFICATIONS AND LOCAL HEALTH DEPARTMENT REGULATIONS.
10. BALANCE THE DOMESTIC HOT WATER CIRCULATION SYSTEM TO THE PERFORMANCE SPECIFICATIONS INDICATED ON THE PLANS AND PROVIDE THE ENGINEER WITH THREE COPIES OF A COMPLETE TEST AND BALANCE REPORT. THE REPORT IS TO BE ISSUED A MINIMUM OF TWO WEEKS PRIOR TO PROJECT COMPLETION. THE TEST AND BALANCE REPORT WILL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER. ANY ADDITIONAL TESTING, ADJUSTING AND BALANCING REQUIRED (AT ENGINEER'S REQUEST) AFTER REVIEW OF THE INITIAL REPORT SHALL BE PROVIDED AT NO ADDITIONAL COST. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR.

SANITARY WASTE AND VENT PIPING

- 1. BELOW GRADE PIPING AND JOINTS: PROVIDE SERVICE WEIGHT CAST IRON HUB AND SPIGOT PIPE (ASTM A 74) WITH COMPRESSION JOINTS (CISPI HSN) AND NEOPRENE GASKETS (ASTM C 364) OR NO-HUB PIPE AND FITTINGS (CISPI 301) WITH NEOPRENE GASKET / STAINLESS STEEL CLAMP JOINTS (CISPI 310) WITH NEOPRENE GASKET / STAINLESS STEEL CLAMP JOINTS (ASTM C1540-15) OR PROVIDE SCHEDULE 40 PVC PIPE AND SOCKET FITTINGS (ASTM D 2665) WITH SOLVENT WELD JOINTS (ASTM D2855). INSTALL PLASTIC PIPE BELOW GRADE PER ASTM D2321. FOAM CORE PVC PIPING IS NOT APPROVED. NOTE: PROVIDE CAST IRON PIPING SPECIFIED ABOVE FOR ALL KITCHEN GREASE WASTE PIPING UPSTREAM OF THE GREASE INTERCEPTOR AND FOR MECHANICAL ROOM DRAIN PIPING. PVC IS NOT ACCEPTABLE IN THESE AREAS.
2. ABOVE GRADE PIPING AND JOINTS: PROVIDE SERVICE WEIGHT CAST IRON NO-HUB PIPE AND FITTINGS (CISPI 301) WITH NEOPRENE GASKET AND STAINLESS STEEL CLAMP JOINTS (CISPI 310) WITH NEOPRENE GASKET / STAINLESS STEEL CLAMP JOINTS (ASTM C1540-15) OR PROVIDE SCHEDULE 40 PVC PIPE AND SOCKET FITTINGS (ASTM D 2665) WITH SOLVENT WELD JOINTS (ASTM D2855). FOAM CORE PIPE IS NOT APPROVED. DO NOT INSTALL PVC PIPING IN RETURN AIR PLENUMS.
3. SLOPE WASTE PIPING AT 1/4" PER FOOT MINIMUM FOR PIPING 2-1/2" AND SMALLER AND 1/8" PER FOOT MINIMUM FOR PIPING 3" AND LARGER UNLESS NOTED OTHERWISE. SLOPE ALL KITCHEN GREASE WASTE PIPING AT 1/4" PER FOOT MINIMUM.
4. PROVIDE CLEAN-OUTS AT THE BASE OF WASTE STACKS AND AT EVERY TURN IN PIPING IN EXCESS OF 45° AND SPACED WITH-IN 100'-0" APART IN A LOCATION THAT PERMITS ACCESS FOR SERVICE WITHOUT DAMAGE TO THE BUILDING OR FINISHED MATERIALS.
5. PROVIDE FLOOR CLEANOUTS WITH TOPS DESIGNED TO MATCH SPECIFIC FLOOR FINISHES SUCH AS CARPET, TILE, ETC. YARD CLEANOUTS SHALL BE PROVIDED IN AN 18"x18"x6" CONCRETE PAD.
6. WHERE WASTE PIPING IS EXPOSED IN REST ROOM AREAS, PROVIDE CHROME PLATED BRASS PIPING, REMOVABLE P-TRAPS, MATCHING STOPS AND ESCUTCHEONS FOR ALL LAVATORIES.
7. WASTE AND VENT SYSTEMS SHALL BE TESTED AND PROVED WATER TIGHT UNDER A HEAD PRESSURE OF NO LESS THAN 10 FT. THIS PRESSURE SHALL BE HELD FOR A PERIOD OF NO LESS THAN 15 MINUTES.
8. WHERE MECHANICAL ROOM FLOOR DRAINS ARE INSTALLED ABOVE GRADE, PROVIDE 1" THICK GLASS FIBER INSULATION WITH VAPOR BARRIER AND JACKET ON THE FLOOR DRAIN BODY, THE ASSOCIATED P-TRAP AND HORIZONTAL DRAIN PIPING ABOVE GRADE.
9. PIPING INSULATION, JACKETS, COVERINGS, SEALERS, MASTICS AND ADHESIVES SHALL MEET A FLAME-SPREAD RATING OF 25 OR LESS AND A SMOKE-DEVELOPED RATING OF 50 OR LESS AS TESTED BY ASTM E84 (NFPA 255) METHOD. INSTALL INSULATION CONTINUOUSLY THRU FIRE RATED WALLS AND PIPE HANGERS. PROVIDE GALVANIZED STEEL SHIELD BETWEEN PIPE HANGER AND INSULATION.

SEISMIC NOTES

- 1. PROVIDE DESIGN AND INSTALLATION OF SEISMIC RESTRAINT ELEMENTS FOR THE PLUMBING SYSTEM(S) IN COMPLIANCE WITH ALL APPLICABLE REQUIREMENTS OF THE 2018 NORTH CAROLINA BUILDING CODE AND ASCE 7-10, CHAPTER 13. REFER TO THE APPENDIX B ON THE ARCHITECTURAL DRAWINGS FOR THE SITE'S SEISMIC DESIGN CATEGORY.
2. PROVIDE CALCULATIONS AND PREPARE SHOP DRAWINGS FOR THE SPECIFIC METHODS OF SEISMIC RESTRAINT TO BE USED IN ACCORDANCE WITH ASCE 7-10. REQUIRED RESTRAINT DEVICES, MATERIALS, AND SUPPLEMENTARY FRAMING SHALL BE AN INTEGRAL PART OF THE DESIGN AND INCLUDED IN THE SHOP DRAWINGS. PROVIDE ISOLATORS, SEISMIC MOUNTS, RESTRAINTS, ETC. AS NECESSARY TO COMPLY WITH ALL APPLICABLE REQUIREMENTS.
3. CALCULATIONS SHALL BE PREPARED BY A PROFESSIONAL ENGINEER LICENSED IN THE STATE OF NORTH CAROLINA WITH A MINIMUM 5 YEARS OF EXPERIENCE IN THE DESIGN AND SPECIFICATION OF SEISMIC RESTRAINT SYSTEMS.
4. SUBMIT CALCULATIONS AND SHOP DRAWINGS TO THE ARCHITECT, ENGINEER, AND LOCAL AUTHORITY HAVING JURISDICTION FOR REVIEW AND APPROVAL.
5. COPIES OF THE APPROVED RESTRAINT SYSTEM(S) INSTALLATION MANUAL SHALL BE ON THE JOBSITE PRIOR TO INSTALLATION.
6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY REQUIRED SPECIAL INSPECTIONS AND ASSOCIATED DOCUMENTATION. THE CONTRACTOR SHALL PROVIDE VERIFICATION IN WRITING OF COMPLIANCE WITH THE APPROVED SHOP DRAWINGS.
7. REVIEW AND APPROVAL OF THE SHOP DRAWINGS AND CALCULATIONS BY THE ARCHITECT/ENGINEER/ SHALL NOT RELIEVE THE CONTRACTOR OF THEIR RESPONSIBILITY TO COMPLY WITH SEISMIC OR OTHER REQUIREMENTS OF THE 2018 NORTH CAROLINA BUILDING CODE AND ASCE 7-10.

COORDINATION DRAWINGS

PER DIVISION 01 SPECIFICATIONS, THE MECHANICAL CONTRACTOR SHALL ORGANIZE COORDINATION MEETINGS TO DEVELOP A SET OF COORDINATION DRAWINGS WITH ALL CONTRACTORS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, IT/DATA, AND GENERAL CONTRACTOR). THE MECHANICAL CONTRACTOR WILL HAVE THE LEAD RESPONSIBILITY FOR THE COORDINATION DRAWINGS. THE MECHANICAL CONTRACTOR SHALL PRODUCE THE ORIGINAL DRAWINGS AND FORWARD THE DRAWINGS TO EACH OF THE OTHER CONTRACTORS FOR THEM TO ADD THEIR SYSTEMS TO THIS SET OF COORDINATION DRAWINGS. THE CONTRACTORS WILL DEVELOP THE DRAWINGS IN THIS ORDER: MECHANICAL, FIRE PROTECTION, PLUMBING, ELECTRICAL, IT/DATA, AND GENERAL. THIS SHALL ALSO BE THE ORDER OF PRECEDENCE FOR INSTALLATION OF SYSTEMS. ANY RELOCATION OF SYSTEM ROUTINGS WILL BE FOUND IN THE COORDINATION PHASE AND NOTICED BY EACH OF THE CONTRACTORS. THESE DRAWINGS, WHEN COMPLETED, SHALL BE SIGNED OFF BY ALL OF THE ABOVE LISTED PARTIES. DRAWINGS SHALL BE COMPLETED PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK AND PIPING SYSTEMS, OR PURCHASE OF EQUIPMENT. THE FOLLOWING ITEMS REPRESENT THE MINIMUM REQUIREMENTS AND COORDINATION DRAWINGS:

- 1. ALL COORDINATION DRAWINGS WILL BE PRODUCED AT 1/4" = 1'-0" SCALE.
2. COORDINATION DRAWINGS WILL BE DISTRIBUTED ON REPRODUCIBLE MATERIAL 48"x36".
3. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND ARE REQUIRED IN ADDITION TO SHOP DRAWINGS.
4. ONCE THE COMPLETE COORDINATION DRAWINGS HAVE BEEN COMPILED, THE MECHANICAL CONTRACTOR WILL DISTRIBUTE ONE SIGNED SET TO EACH OF THE FOLLOWING CONTRACTORS: ELECTRICAL, PLUMBING, FIRE PROTECTION, AND GENERAL. ADDITIONAL SETS WILL BE SENT TO THE OWNER, ARCHITECT, AND ENGINEER.

CABLE TRAY COORDINATION

A MINIMUM OF 12" CLEARANCE ABOVE THE CABLE TRAY AND 36" CLEARANCE TO ACCESS THE TRAY IS REQUIRED AT ALL LOCATIONS. PLUMBING PIPING SHALL NOT BE INSTALLED IN THE CABLE TRAY, NOR BE SUPPORTED BY THE CABLE TRAY OR THE CABLE TRAY SUPPORTS. PLUMBING PIPING SHALL NOT OBSTRUCT THE TRAY AND MUST LEAVE THE TRAY ACCESSIBLE THROUGHOUT ITS ROUTING.

PLUMBING GENERAL NOTES

- 1. GENERAL AND SPECIAL CONDITIONS OF THE CONTRACT APPLY TO THE PLUMBING SCOPE OF WORK. THE PLUMBING DRAWINGS AND SPECIFICATIONS SHALL NOT BE INTERPRETED AS WAIVING OR OVERRULING ANY REQUIREMENTS EXPRESSED IN GENERAL CONDITIONS.
2. PLUMBING WORK SHALL BE INSTALLED IN ACCORDANCE WITH THE 2018 NORTH CAROLINA STATE PLUMBING CODE AND WITH THE REQUIREMENTS OF THE LOCAL AUTHORITY HAVING JURISDICTION.
3. SCOPE: PROVIDE ALL LABOR, MATERIAL AND EQUIPMENT REQUIRED FOR THE COMPLETION AND OPERATION OF ALL PLUMBING SYSTEMS IN ACCORDANCE WITH ALL APPLICABLE CODES.
4. PERMITS: APPLY AND PAY FOR ALL NECESSARY PERMITS, FEES AND INSPECTIONS REQUIRED BY ANY PUBLIC AUTHORITY HAVING JURISDICTION. ACREAGE CHARGES, FACILITIES CHARGES AND BOND PROPERTY ASSESSMENTS ARE NOT TO BE CONSTRUED TO BE A PART OF THIS CONTRACT.
5. WARRANT: THE SYSTEM LABOR, MATERIALS AND EQUIPMENT FOR A MINIMUM OF ONE YEAR AFTER COMPLETION AND ACCEPTANCE. PRIOR TO TURNING THE COMPLETED SYSTEM OVER TO THE OWNER, REVIEW THE INSTALLATION WITH THE ARCHITECT / ENGINEER AND REPLACE OR REPAIR ANY DEFECTIVE WORKMANSHIP, EQUIPMENT AND MATERIALS AT NO ADDITIONAL COST TO THE OWNER.
6. COORDINATE ALL PLUMBING PIPING LOCATIONS, ROUGH-IN LOCATIONS AND EQUIPMENT LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS AND INTERFERENCES. FINAL PIPING AND EQUIPMENT LOCATIONS SHALL BE A CODE COMPLIANT INSTALLATION FOR ALL TRADES.
7. PLUMBING PLANS SHALL NOT BE SCALED. REFERENCE THE ARCHITECTURAL PLANS FOR DIMENSIONS OF ALL LOCATIONS OF PLUMBING FIXTURES, FLOOR DRAINS, COLUMNS, WALLS, DOORS, ETC.
8. WHERE DISCREPANCIES ARE FOUND IN THE DRAWINGS AND SPECIFICATIONS THE MORE STRINGENT SHALL APPLY. CONTACT ENGINEER FOR CLARIFICATION.
9. ALL PIPING SHALL BE MANUFACTURED IN THE UNITED STATES OF AMERICA.
10. ALL VALVES, BACKFLOW PREVENTERS, BOOSTER PUMPS, ETC. SERVING THE DOMESTIC WATER SYSTEM SHALL MEET LEAD FREE STANDARDS PER ANS/NF 372 AND NSF 61, ANNEX G.
11. PROVIDE COMPLETE PLUMBING FIXTURES AND EQUIPMENT. INCLUDE SUPPLIES, STOPS, VALVES, FAUCETS, DRAINS, TRAPS, TAIL PIECES, ESCUTCHEONS, ETC. AND INSTALL PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
12. PIPING AND SPECIALTIES SHALL BE LOCATED CONCEALED IN WALLS, PARTITIONS OR ABOVE CEILINGS UNLESS NOTED OTHERWISE. PIPING IN EXPOSED AREAS SHALL BE RUN TIGHT TO UNDERSIDE OF STRUCTURE.
13. PIPE PENETRATIONS THRU WALLS, PARTITIONS AND FLOORS SHALL BE SLEEVED. CORE DRILLING THRU WALLS AND PARTITIONS IS PERMITTED IF PERFORMED IN A NEAT CRAFTSMAN LIKE MANNER. OPENINGS THRU WALLS, PARTITIONS, AND FLOORS SHALL BE LARGE ENOUGH FOR PIPE INSULATION TO REMAIN CONTINUOUS. PIPES PENETRATING THRU EXTERIOR WALLS SHALL BE SEALED WATER TIGHT. INSTALL ESCUTCHEONS IN ALL EXPOSED AREAS.
14. PROVIDE ACCESS DOORS FOR ALL SPECIALTIES, VALVES, WATER HAMMER ARRESTORS, TRAP PRIMERS, ETC., CONCEALED BEHIND WALLS OR CEILINGS THAT REQUIRE MAINTENANCE ACCESS.
15. DO NOT INSTALL PIPING IN AREAS SUBJECT TO FREEZING TEMPERATURES. INSTALL PIPING SHOWN IN EXTERIOR WALLS ON THE CONDITIONED SIDE OF THE WALL INSULATION.
16. PIPING, VENTS, ETC. EXTENDING THROUGH EXTERIOR WALLS AND/OR THE ROOF SHALL BE FLASHED AND COUNTER FLASHED IN A WATERPROOF MANNER. COORDINATE FLASHING WITH THE GENERAL CONTRACTOR.
17. PROVIDE A CHROME FINISH FOR ALL EXPOSED PIPING IN REST ROOMS AND OTHER FINISHED AREAS.
18. PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.
19. REFER TO THE STRUCTURAL PLANS AND DETAILS FOR ACCEPTABLE LOCATIONS TO ATTACH HANGERS AND SUPPORTS TO THE BUILDING STRUCTURE. HANGERS SHALL NOT ATTACH TO THE ROOF DECK.
20. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE.
21. VALVES AND OTHER PIPING ACCESSORIES REQUIRING ACCESS SHALL BE INSTALLED IN ACCESSIBLE LOCATION NO MORE THAN 18" ABOVE THE CEILING. PROVIDE OFFSETS IN PIPING AS NEEDED.

FIRE STOPPING:

- 1. FIRE STOP ALL PENETRATIONS, BY PIPING OR CONDUITS, OF FIRE RATED WALLS, FLOORS AND PARTITIONS. PROVIDE A DEVICE(S) OR SYSTEM(S) WHICH HAS BEEN TESTED AND LISTED AS COMPLYING WITH ASTM E-814 AND INSTALL IN ACCORDANCE WITH THE CONDITIONS OF THEIR LISTING. PROVIDE A DEVICE(S) OR SYSTEM(S) WITH AN 'F' RATING EQUAL TO THE RATING OF THE ASSEMBLY BEING PENETRATED. REFER TO ARCHITECTURAL PLANS FOR WALL AND FLOOR TYPES.

PIPE IDENTIFICATION:

- 1. PIPE IDENTIFICATION SHALL MATCH THE FACILITY'S EXISTING STANDARD. IF NO STANDARD EXISTS, THEN THE PIPE IDENTIFICATION SHALL BE IN ACCORDANCE WITH ANSI A13.1.
2. PROVIDE PIPING LABELS FOR ALL PLUMBING PIPING. PIPING LABELS SHALL BE ACRYLIC FACED, WRAP-AROUND TYPE. EACH LABEL SHALL INDICATE THE PIPING CONTENTS, DIRECTION OF FLOW AND SHALL BEAR THE MANUFACTURER'S STANDARD COLOR FOR THE SERVICE INDICATED.

SUBMITTALS:

- 1. PROVIDE SUBMITTALS BEARING THE CONTRACTORS REVIEW STAMP FOR ALL PLUMBING FIXTURES, PIPING, EQUIPMENT AND ACCESSORIES IN ELECTRONIC FORMAT (PDF).
2. NO PRIVATE LABELED MATERIALS WILL BE ACCEPTED AS EQUALS TO PRODUCTS SPECIFIED HEREIN.
3. THE PLUMBING CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH SUBSTITUTIONS TO SPECIFIED PLUMBING FIXTURES AND EQUIPMENT INCLUDING BUT NOT LIMITED TO: PROVIDING MAINTENANCE ACCESS CLEARANCE, PIPING, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC. AND ANY MODIFICATIONS TO ASSOCIATED MECHANICAL, ELECTRICAL OR PLUMBING SYSTEMS REQUIRED BY THE EQUIPMENT'S INSTALLATION INSTRUCTIONS. ALL COSTS ASSOCIATED WITH SUBSTITUTIONS SHALL BE INCLUDED IN THE ORIGINAL BASE BID.

PLUMBING LEGEND

Table with 3 columns: SYMBOL, ABBREVIATION, DESCRIPTION. Lists plumbing symbols for cold/hot water piping, return piping, tempered water, kitchen piping, return return piping, sanitary waste, grease waste, gas piping, condensate, storm drain, sump pump, natural gas, drain piping, elbow down/up, continuous, shut-off, check, balancing, pressure reducing, solenoid, reduced pressure backflow preventer, in-line pump, reducer, floor cleanout, yard cleanout, wall cleanout, plug cleanout, floor drain, floor sink, roof drain, hose bibb/wall hydrant, shock arrestor, kitchen equipment tag, sheet keynote, connect to existing.

ADDITIONAL ABBREVIATIONS

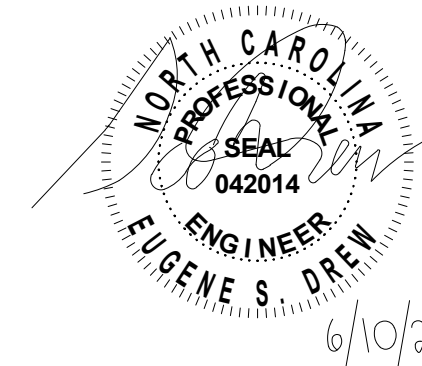
Table with 3 columns: ABBREVIATION, DESCRIPTION, UNIT. Lists abbreviations for finished floor, PSI, T&P, TYP, UG, VTR, WSV, WC, EC, FSC, GC, MC, PC, etc.

PLUMBING SHEET INDEX

Table with 2 columns: SHEET NUMBER, SHEET NAME. Lists sheet numbers P1-001 through P1-301 and their corresponding sheet names.

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Harnett County Schools HIGHLAND ELEMENTARY ADDITION & RENOVATION 1915 Buffalo Lake Road Sanford, NC 27332

Table with 3 columns: No., Date, Description. Empty table for change orders.

ISSUE DATE: 4/29/2022

PROJECT #: 02110.100

DRAWN BY: ESD

CHECKED BY: GPK

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PLUMBING LEGEND, DESIGN DATA, AND SPECIFICATIONS

P1-001

PLUMBING SPECIALTIES SCHEDULE

Table with columns: SYMBOL, DESCRIPTION, CONNECTION SIZE (W, V, CW, HW), SPECIFICATION, REMARKS. Includes items like CS-x, SA-x, HB1, HB2, CO, WCO, FCO, YCO, FD1, FD2.

WATER HEATER SCHEDULE

Table with columns: SYMBOL, DESCRIPTION, STORAGE (GAL), GPH AT 80°F RISE, ELECTRICAL (KW, V, PH), SPECIFICATION, NOTES. Includes item WH1.

THERMAL EXPANSION TANK SCHEDULE

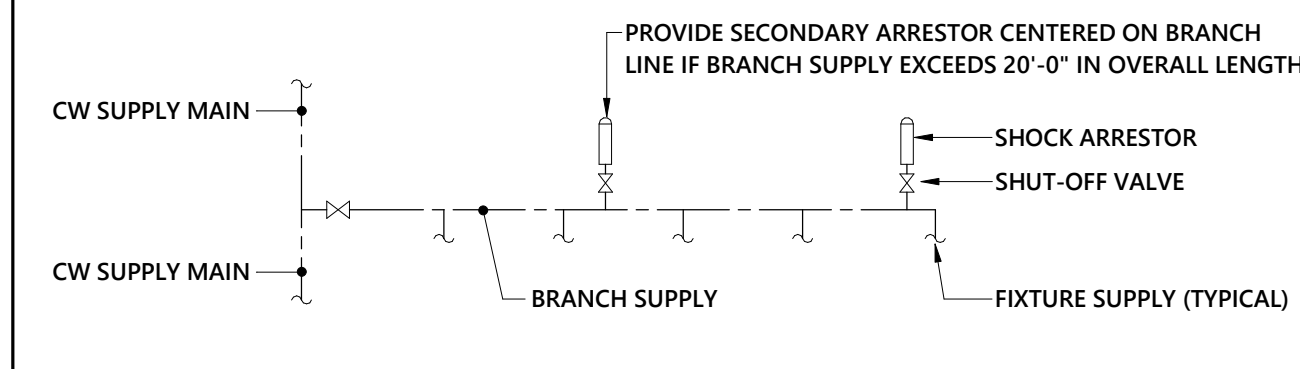
Table with columns: SYMBOL, DESCRIPTION, TOTAL VOLUME (GAL), ACCEPTANCE VOLUME (GAL), WEIGHT (LB), SPECIFICATION, NOTES. Includes item ET1.

PUMP SCHEDULE

Table with columns: SYMBOL, DESCRIPTION, CAPACITY (GPM, FT-HD), ELECTRICAL DATA (HP, V, PH, HZ), SPECIFICATION, NOTES. Includes item CP1.

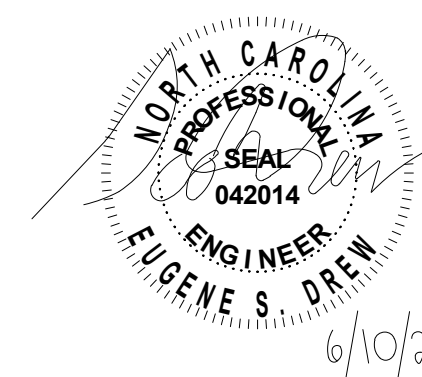
SHOCK ARRESTOR TABLE

Table with columns: DRAWING SYMBOL, FIXTURE UNITS, P.D.I. WH201 DESIGNATION, ARRESTOR SIZE, REMARKS. Includes items SA-A through SA-E.



PLUMBING FIXTURE SCHEDULE

Table with columns: SYMBOL, DESCRIPTION, CONNECTION SIZE (W, V, CW, HW), SPECIFICATION, REMARKS. Includes items P1A through P6.



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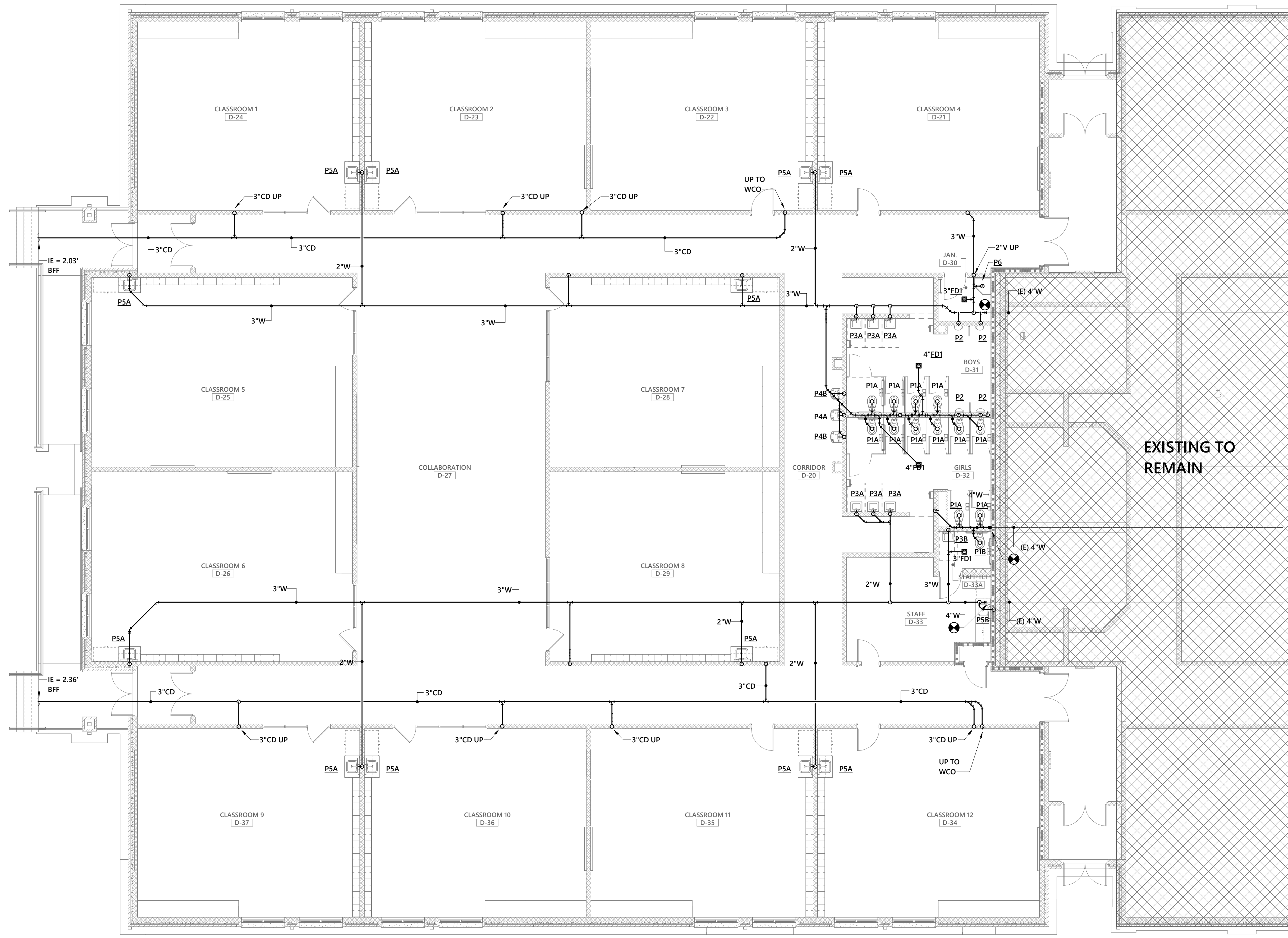
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PLUMBING SCHEDULES

P1-002

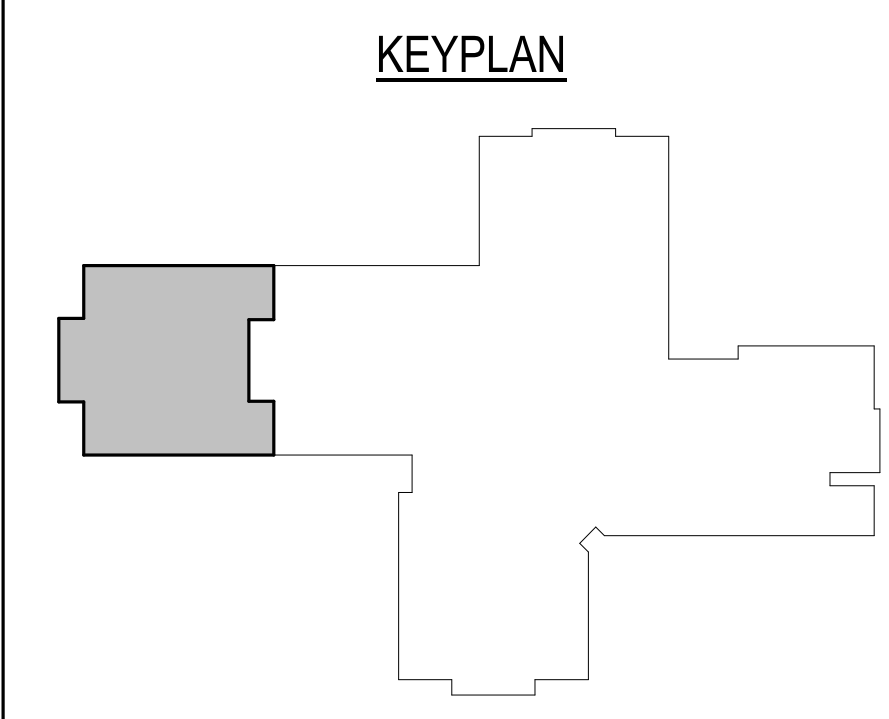


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1 CLASSROOM ADDITION PLUMBING UNDERSLAB WASTE PLAN  
1/8" = 1'-0"



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CLASSROOM  
ADDITION PLUMBING  
UNDERSLAB WASTE  
PLAN

**P1-101**

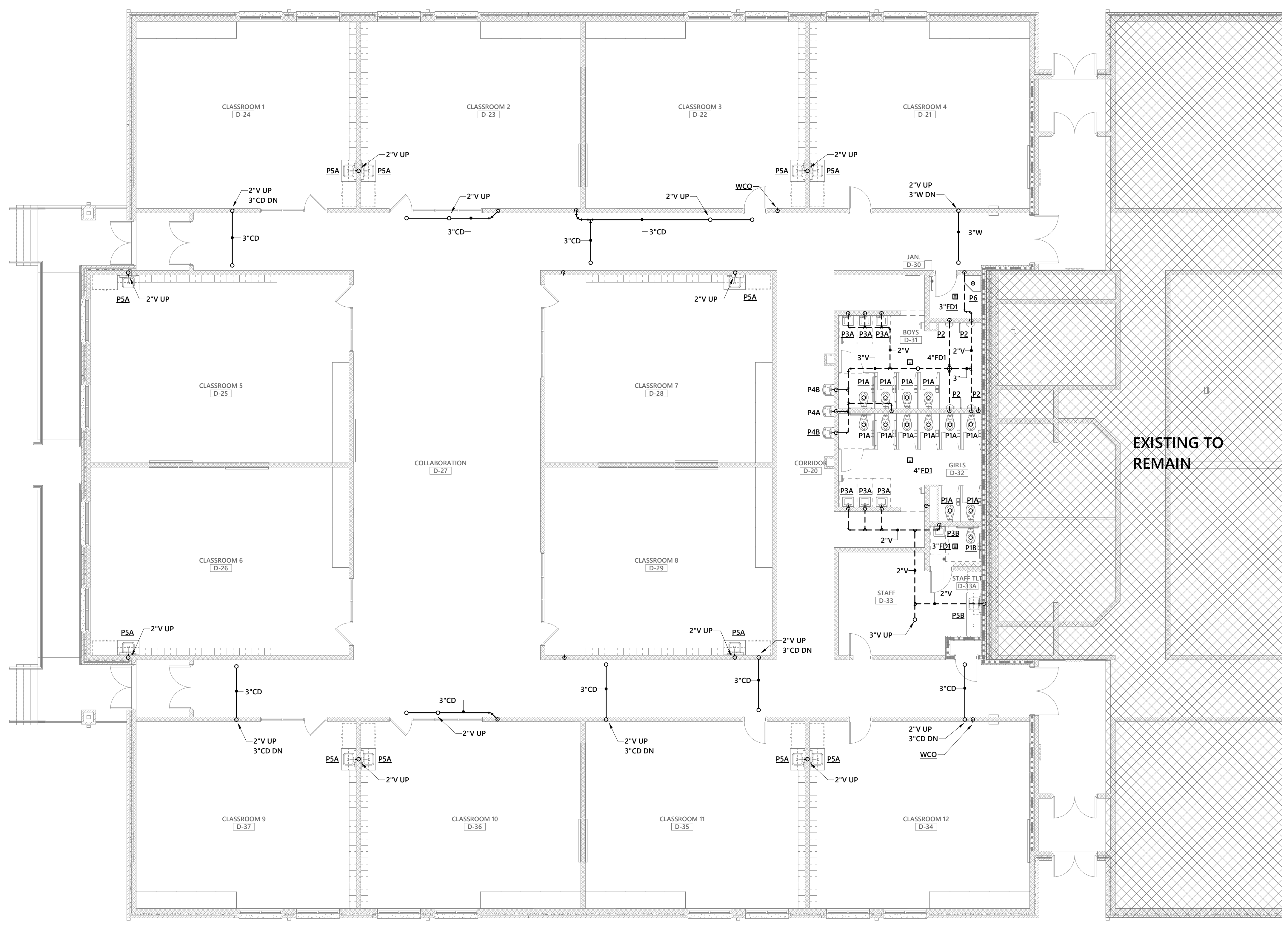
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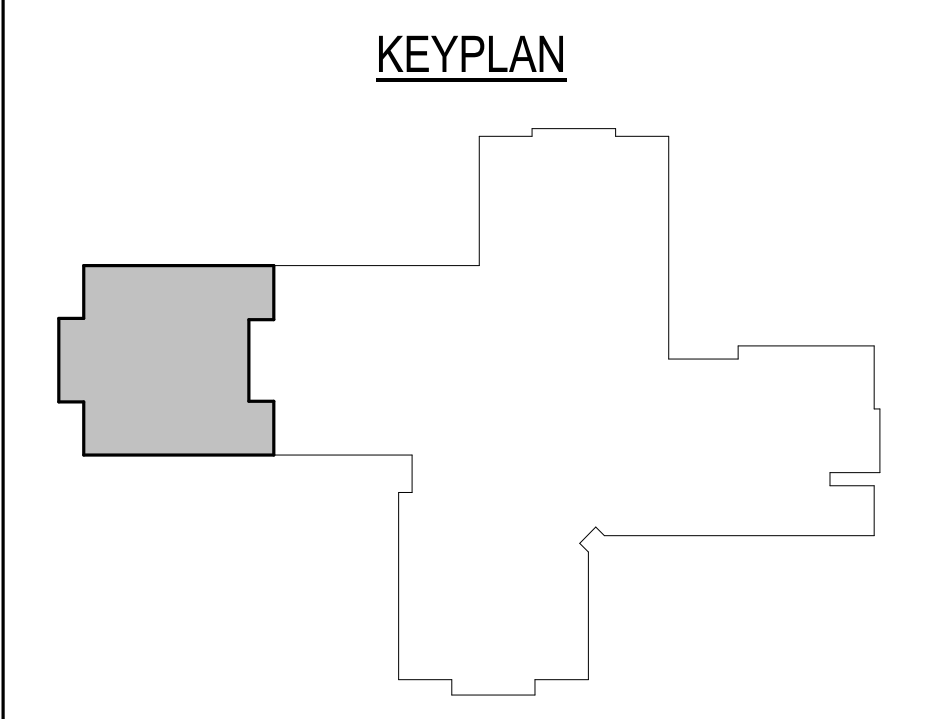


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1 CLASSROOM ADDITION PLUMBING ABOVE GRADE WASTE & VENT PLAN  
 1/8" = 1'-0"



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CLASSROOM  
 ADDITION PLUMBING  
 ABOVE GROUND  
 WASTE & VENT  
 PLAN

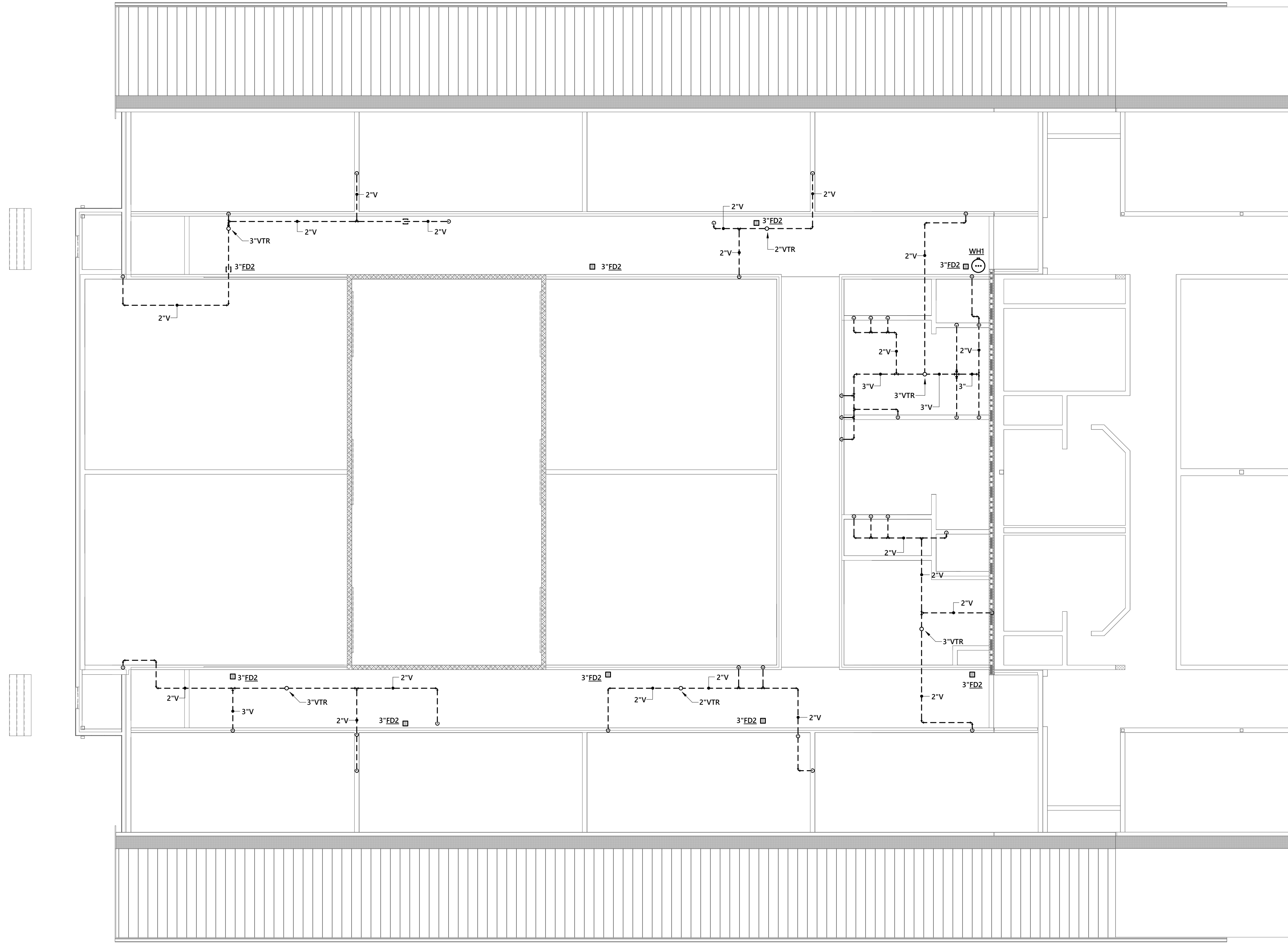
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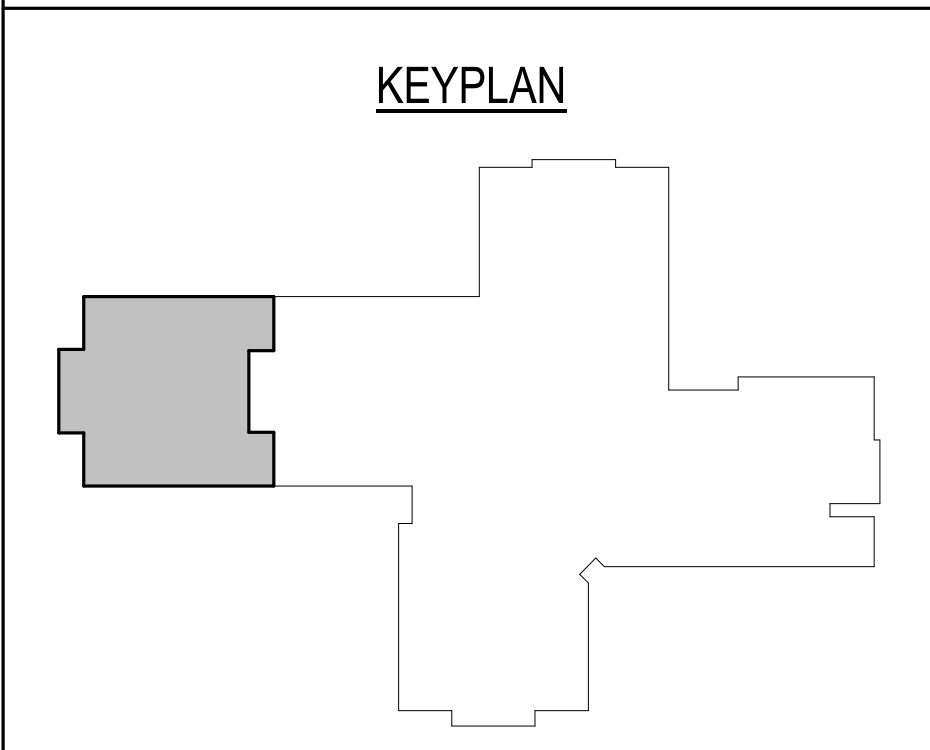


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**1 CLASSROOM ADDITION PLUMBING LOFT WASTE & VENT PLAN**  
1/8" = 1'-0"



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No.	Date	Description

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**CLASSROOM  
ADDITION PLUMBING  
LOFT WASTE AND  
VENT PLAN**

**P1-103**

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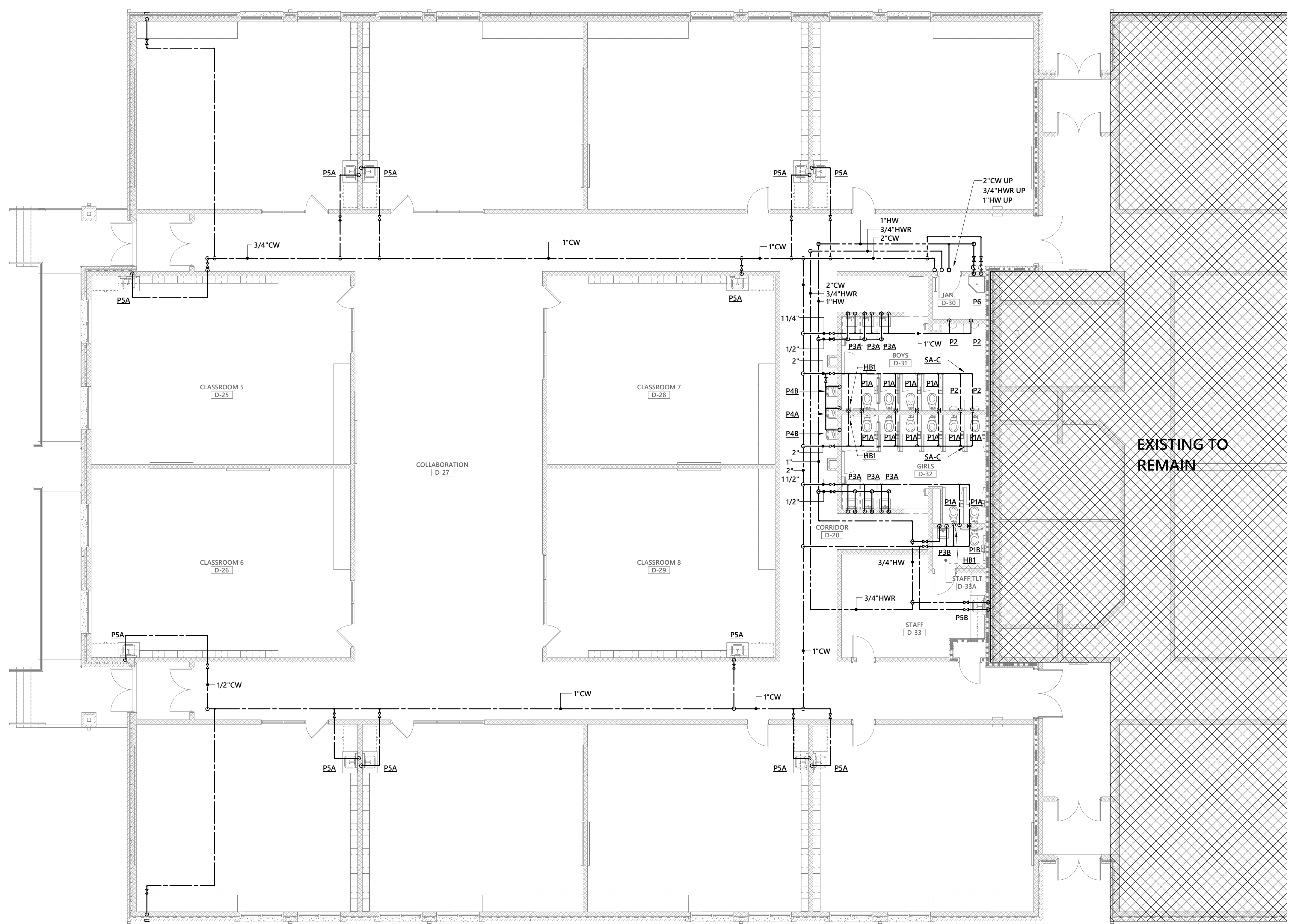
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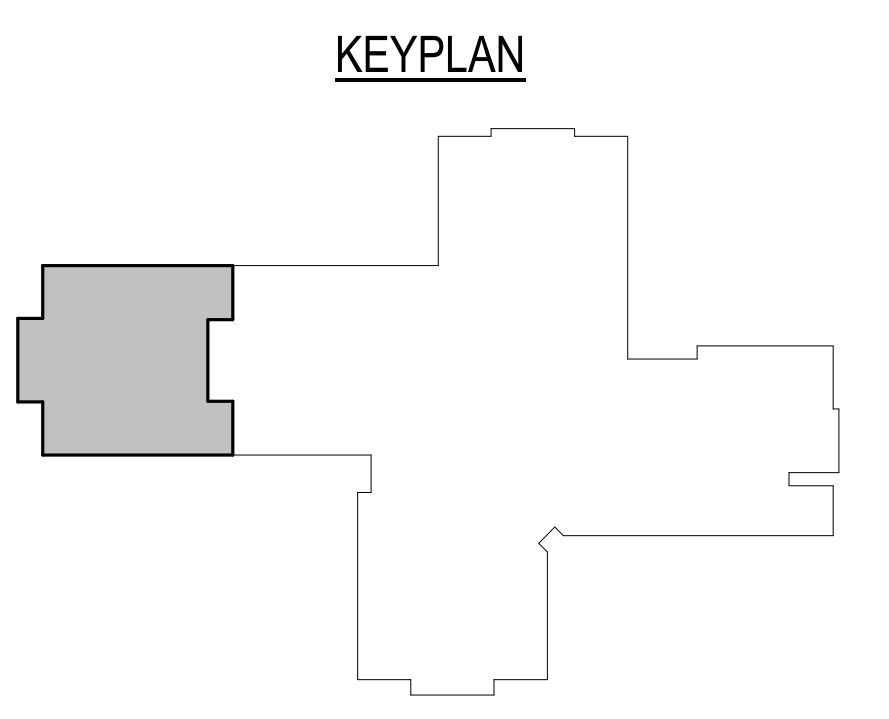
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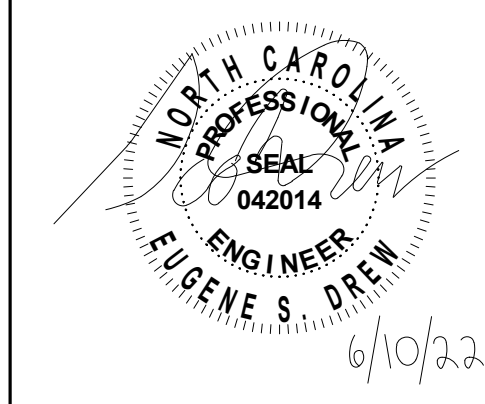
**1** CLASSROOM ADDITION PLUMBING SUPPLY PLAN  
1/8" = 1'-0"

EXISTING TO REMAIN



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CLASSROOM  
ADDITION PLUMBING  
WATER SUPPLY  
PLAN

**P1-201**

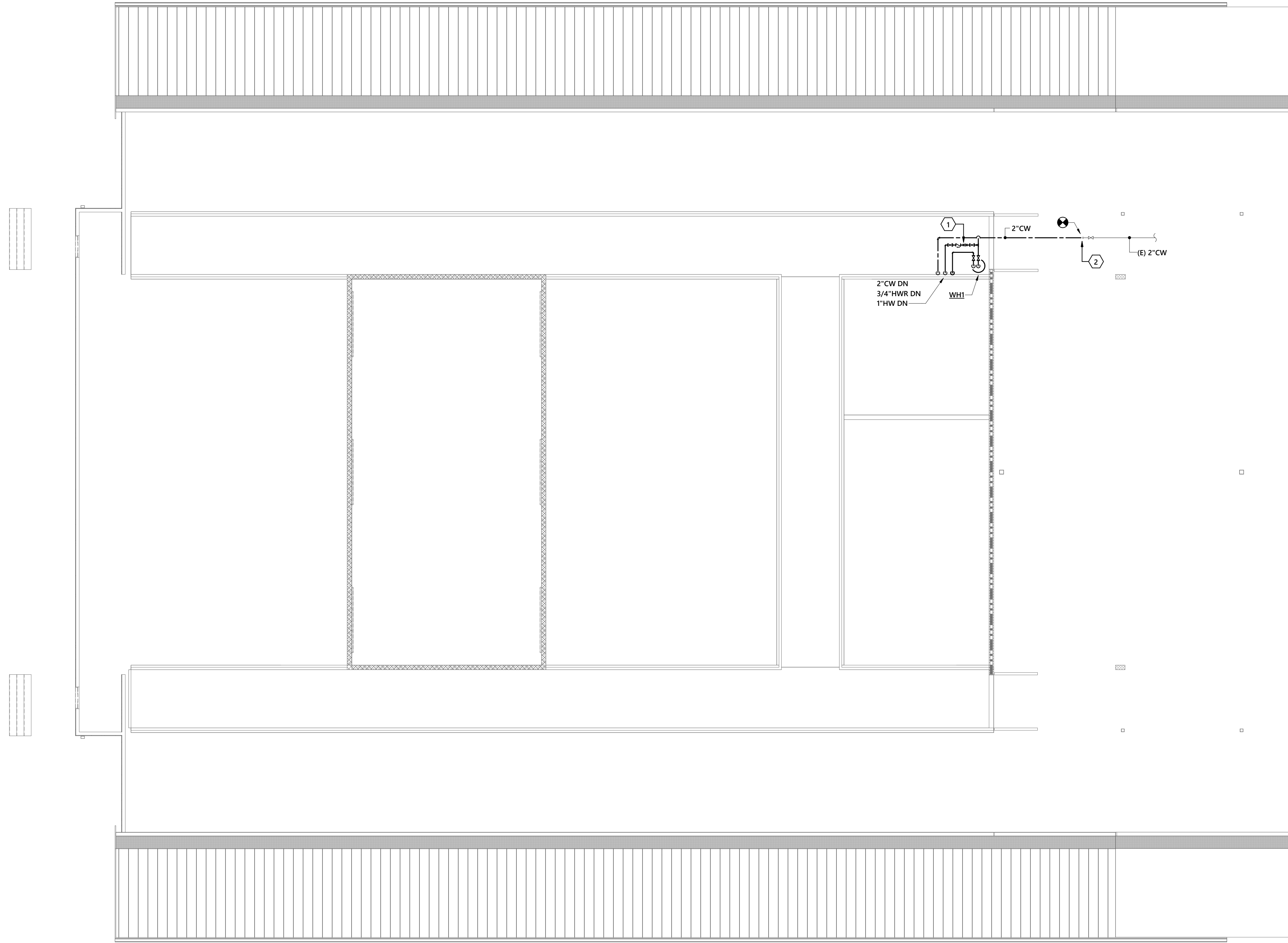
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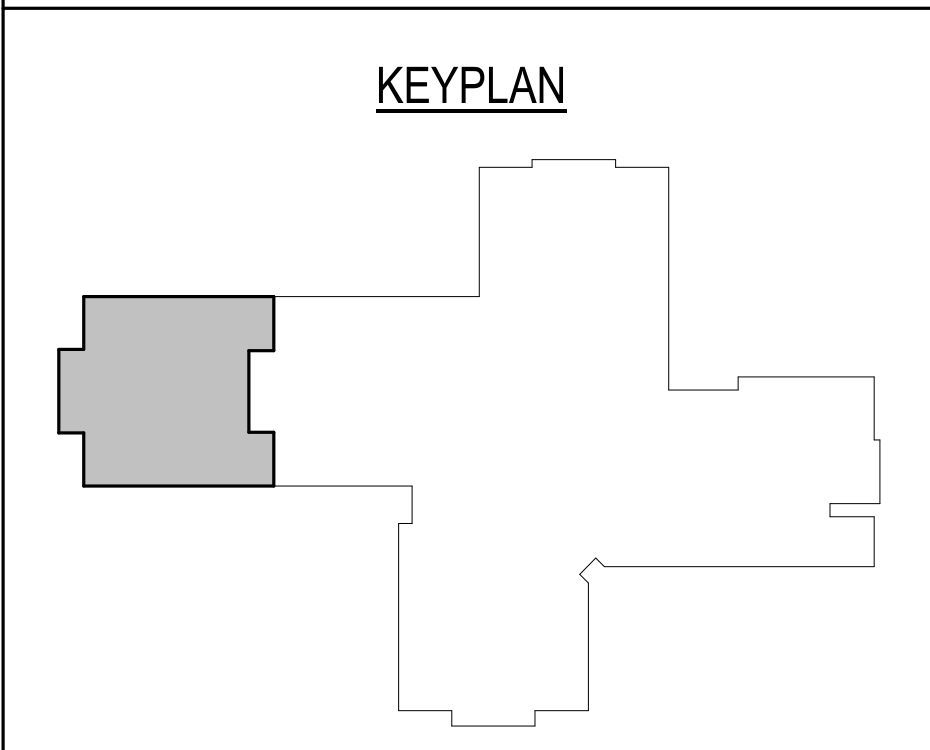
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1 CLASSROOM ADDITION LOFT PLUMBING SUPPLY PIPING PLAN  
1/8" = 1'-0"

**Keynote Legend**

1	PROVIDE HOT WATER RECIRCULATION ASSEMBLY AND SET TO 0.5 GPM.
2	CONNECT NEW 2" CW TO EXISTING 2" CW IN MECHANICAL LOFT.



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CLASSROOM  
ADDITION PLUMBING  
LOFT SUPPLY PLAN

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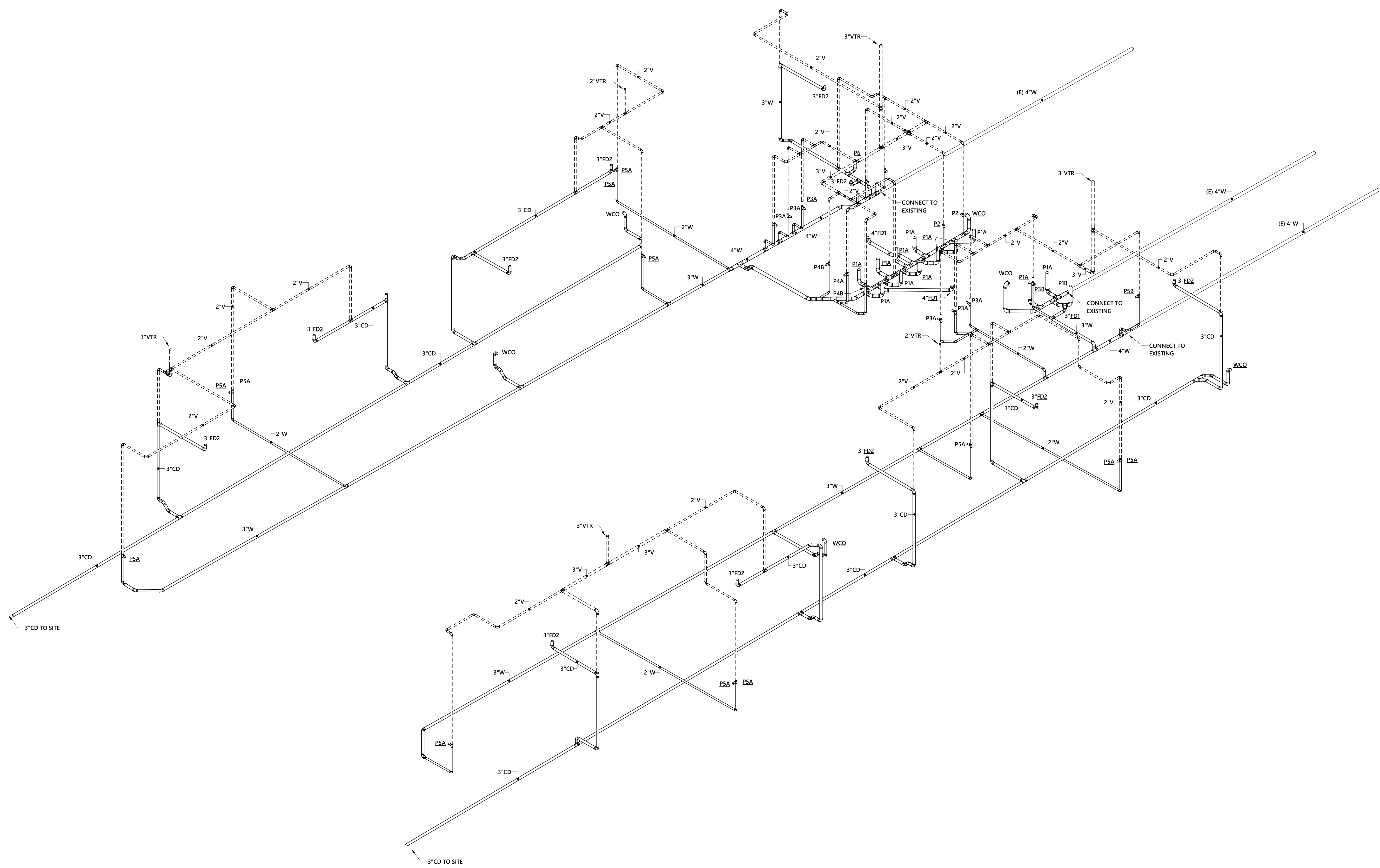
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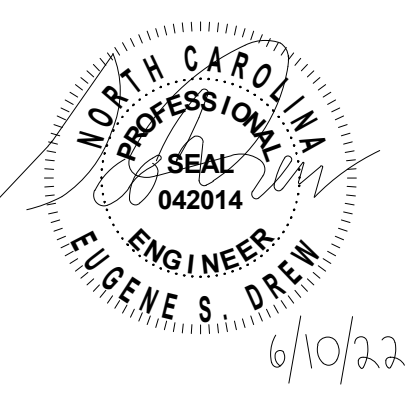
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1 OVERALL WASTE AND VENT RISER DIAGRAM

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PLUMBING RISER  
DIAGRAMS

P1-301

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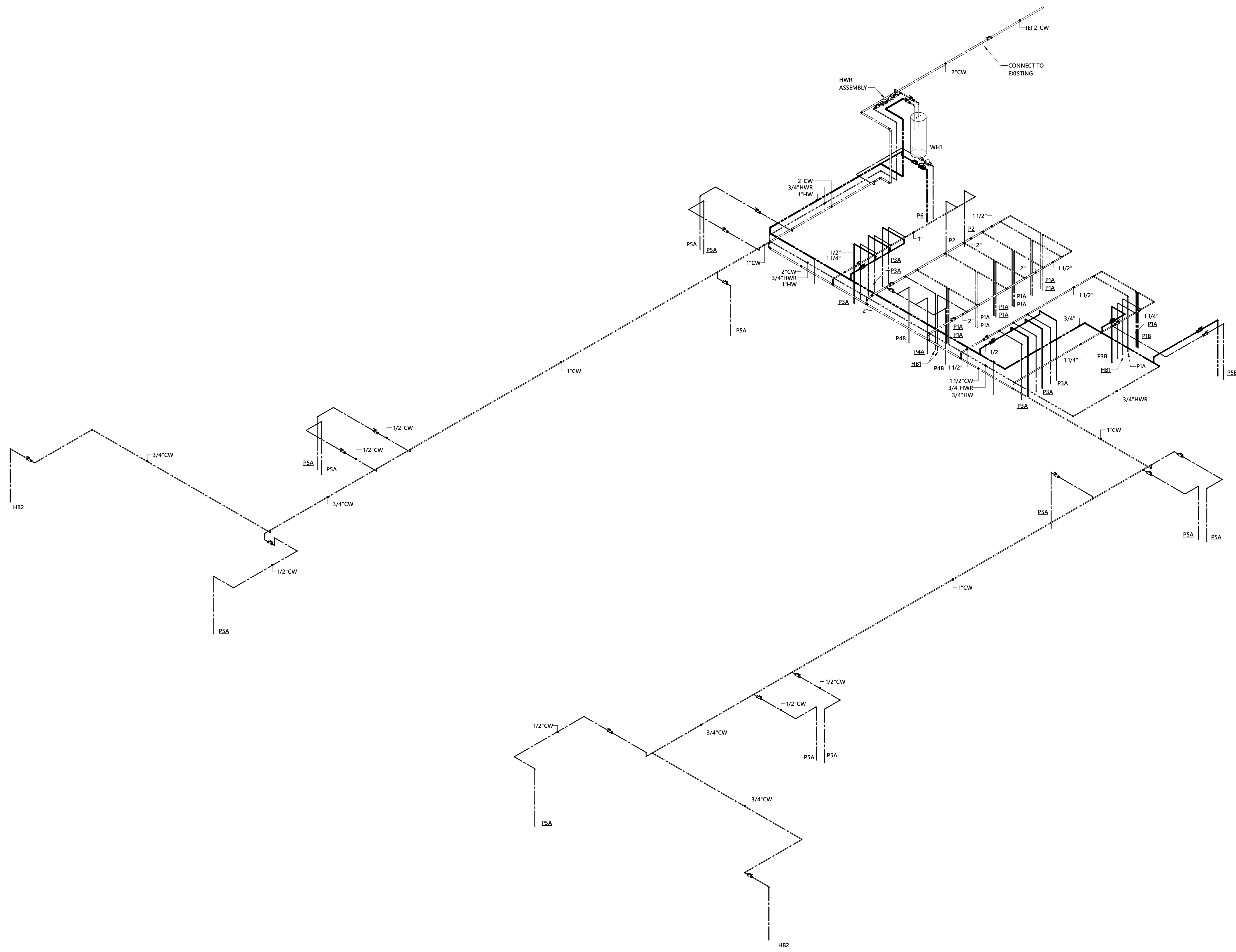
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1 OVERALL DOMESTIC WATER RISER DIAGRAM



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**PLUMBING RISER  
DIAGRAMS**

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MECHANICAL GENERAL NOTES	
SEE SPECIFICATIONS FOR ADDITIONAL PROJECT REQUIREMENTS. THESE GENERAL NOTES ARE INTENDED TO SUPPLEMENT THE SPECIFICATIONS. IN THE EVENT THAT THE VERBAGE IS IN CONFLICT OR CONTRADICTS THE REQUIREMENTS LISTED HERE, THE QUESTION SHALL BE ASKED PRIOR TO BIDDING OR THE MORE STRINGENT SHALL APPLY AT THE ENGINEER'S DISCRETION.	
1. DO NOT SCALE DRAWINGS. SEE ARCHITECTURAL DRAWINGS AND REFLECTED CEILING PLANS FOR EXACT LOCATION OF DOORS, WINDOWS, CEILING DIFFUSERS, ETC.	14. CONTRACTOR SHALL LOCATE EXHAUST FANS, OUTLETS, AND GAS FLUES A MINIMUM OF 10'-0" FROM ANY OUTSIDE AIR INTAKE.
2. ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT TO COMPLY WITH BASIS OF DESIGN, INCLUDING PROVIDING MAINTENANCE ACCESS, CLEARANCE, PIPING, SHEET METAL, ELECTRICAL, REPLACEMENT OF OTHER SYSTEM COMPONENTS, BUILDING ALTERATIONS, ETC., SHALL BE INCLUDED IN THE ORIGINAL BASE BID. NO ADDITIONAL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT WILL BE APPROVED DURING CONSTRUCTION AND ALL COST WILL BE THE RESPONSIBILITY OF THE MECHANICAL CONTRACTOR. THIS INCLUDES ANY MODIFICATIONS TO ANY ASSOCIATED MECHANICAL, PLUMBING, OR ELECTRICAL SYSTEMS REQUIRED BY THIS SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.	15. ALL CHILLED WATER, HOT WATER, AND CONDENSER WATER PIPING 2" AND LESS SHALL BE SCHEDULE 40 BLACK STEEL OR HARD-DRAWN TYPE L COPPER PIPE AND FITTINGS. ALL CHILLED WATER, HOT WATER PIPING PIPING GREATER THAN 2" SHALL BE (WELDED) SCHEDULE 40 BLACK STEEL. PROVIDE BRONZE VALVES AND FITTINGS WITH COPPER PIPING AND CAST IRON VALVES AND FITTINGS WITH SCHEDULE 40 BLACK STEEL.
3. ALL DUCTWORK SHALL BE GALVANIZED SHEET METAL CONSTRUCTED IN ACCORDANCE WITH THE LATEST SMACNA STANDARDS. ALL SUPPLY, RETURN AND OUTSIDE AIR DUCTWORK SHALL BE WRAPPED WITH 2" THICK DUCT WRAP WITH VAPOR BARRIER. INSULATION (INCLUDING FLEXIBLE DUCT INSULATION) SHALL HAVE A MINIMUM INSTALLED R-VALUE OF 6.0. ROOFTOP UNIT RETURN DUCTWORK AND TRANSFER DUCTS SHALL BE LINED WITH 1" THICK FIBERGLASS DUCT LINER FOR ACOUSTICAL PURPOSES. DUCT DIMENSIONS ON PLANS ARE FREE AREA SIZE.	16. CHILLED WATER PIPING SHALL BE INSULATED WITH 1/2" THICK PHENOLIC CLOSED CELL ASTM C1136 RIGID FOAM, 2.2 LBS. NOMINAL DENSITY, CFC FREE ASTM C518, K-VALUE OF 0.13 AT 75° F. HOT WATER PIPING (2" AND SMALLER) SHALL BE INSULATED WITH 1/2" THICK FIBERGLASS INSULATION. HOT WATER PIPING (2" AND LARGER) SHALL BE INSULATED WITH 2" THICK FIBERGLASS INSULATION. FIBERGLASS INSULATION SHALL HAVE A K-VALUE OF 0.27 (OR LESS) AT 75°. INSULATION SHALL HAVE A FACTORY APPLIED PRESSURIZED VAPOR BARRIER JACKET WITH PRESSURE SENSITIVE ADHESIVE SELF SEALING LAP. ALL FITTINGS SHALL HAVE PVC FITTING COVERS. ALL PIPING OUTSIDE SHALL HAVE A BITUMINOUS COATING ALUMINUM JACKET AND PVC FITTING COVERS.
4. ALL DUCTWORK SHALL BE SEALED PER THE REQUIREMENTS OF THE NORTH CAROLINA INTERNATIONAL MECHANICAL CODE. SEAL MEDIUM PRESSURE SUPPLY DUCTWORK FOR POSITIVE 3" PRESSURE CLASS, SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 4. SEAL LOW PRESSURE SUPPLY, RETURN, OUTSIDE AIR, AND EXHAUST DUCTWORK FOR POSITIVE/NEGATIVE 2" PRESSURE CLASS, SMACNA SEAL CLASS A, SMACNA LEAKAGE CLASS 4.	17. ALL CHILLED WATER AND HOT WATER PIPING SHALL PITCH DOWN IN DIRECTION OF FLOW WITH MANUAL AIR VENTS AT ALL HIGH POINTS AND 1/2" RAIN VALVES AT ALL LOW POINTS.
5. ALL PIPING, DUCTS, VENTS, ETC., EXTENDING THROUGH WALLS AND ROOF SHALL BE FLASHED AND COUNTERFLASHED IN A WATERPROOF MANNER.	18. PROVIDE UNIONS, FLANGES OR COUPLINGS AT CONNECTION TO ALL VALVES AND EQUIPMENT. DO NOT USE DIRECT WELDED OR THREADED CONNECTIONS TO VALVES, EQUIPMENT OR OTHER APPURTUS.
6. ALL PIPING AND DUCTWORK LOCATIONS SHALL BE COORDINATED WITH THE WORK UNDER OTHER DIVISIONS OF THE SPECIFICATIONS TO AVOID INTERFERENCE.	19. PROVIDE NON-CONDUCTING DIELECTRIC UNIONS WHENEVER CONNECTING DISSIMILAR METALS.
7. THE MECHANICAL CONTRACTOR SHALL BALANCE ALL MECHANICAL SYSTEMS TO THE PERFORMANCE SPECIFICATIONS INDICATED ON PLANS AND PROVIDE THE ENGINEER WITH THREE COPIES OF A COMPLETE TEST AND BALANCE REPORT. THE REPORT IS TO BE ISSUED A MINIMUM OF TWO WEEKS PRIOR TO PROJECT COMPLETION. THE TEST AND BALANCE REPORT WILL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER. ANY ADDITIONAL TESTING, ADJUSTING AND BALANCING REQUIRED (AT ENGINEER'S REQUEST) AFTER REVIEW OF THE INITIAL REPORT SHALL BE PROVIDED AT NO ADDITIONAL COST. TESTING AND BALANCING CONTRACTOR TO CONFIRM FILTERS ARE CLEAN, AND FREE OF DEBRIS PRIOR TO BEGINNING WORK. THE MECHANICAL CONTRACTOR SHALL REPLACE ANY DIRTY FILTERS, AS NEEDED. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR.	20. ALL ISOLATION VALVES, TERMINAL UNITS, CONTROLS, ETC. REQUIRING ACCESS AND SERVICE SHALL BE INSTALLED WITHIN 18" OF THE CEILING FOR SERVICE ACCESSIBILITY. LOCATIONS SHALL BE INDICATED ON THE CEILING GRID PER THE SPECIFICATIONS.
8. UPON PROJECT COMPLETION, THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE OWNER INSTALLATION INFORMATION INCLUDING RECORD SUBMITTALS (WITH ANY SUBMITTAL REVIEW COMMENTS ADDRESSED) AND O&M MANUALS FOR EACH PIECE OF EQUIPMENT INCLUDING ALL SELECTED OPTIONS, THE NAME AND ADDRESS OF AT LEAST ONE SERVICE AGENCY, FULL CONTROL SYSTEM O&M AND CALIBRATION INFORMATION INCLUDING WIRING DIAGRAMS, SCHEMATICS, FULL SEQUENCE OF OPERATION, AND PROGRAMMED SETPOINTS. IN ADDITION, THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE TO HIRE A REGISTERED DESIGN PROFESSIONAL TO COMMISSION THE INSTALLED SYSTEM AND PROVIDE THE OWNER AND CODE REVIEWER A SEALED STATEMENT OF COMMISSIONING (PER 2018 NCECC APPENDIX C).	21. ALL EQUIPMENT CONCRETE PAD SIZES FOR MECHANICAL EQUIPMENT SHALL BE CONFIRMED WITH APPROVED SHOP DRAWING SUBMITTALS AND ASSOCIATED UNIT MANUFACTURER ANCHOR LOCATIONS PRIOR TO FABRICATION/INSTALLATION. THE MECHANICAL AND PLUMBING CONTRACTORS SHALL COORDINATE THE EXACT LOCATION OF MECHANICAL EQUIPMENT HOUSING/KEEPING PADS WITH THE FLOOR DRAIN LOCATIONS PRIOR TO INSTALLATION OF DRAINS AT EQUIPMENT/PAD LOCATIONS.
9. PROVIDE A ONE YEAR WARRANTY FOR ALL WORK PERFORMED BEGINNING ON THE DAY THE SYSTEM IS COMPLETELY OPERATIONAL AND ACCEPTABLE BY THE OWNER.	22. DUCTWORK AND PIPING PASSING THROUGH/ABOVE ELECTRICAL ROOMS SHALL BE CLOSELY COORDINATED WITH THE ELECTRICAL CONTRACTOR. DUCTWORK OR PIPING SHALL NOT BE LOCATED ABOVE ELECTRICAL PANELS.
10. PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AROUND ALL EQUIPMENT FOR MAINTENANCE AND FILTER REMOVAL.	23. EQUIPMENT OPERATED DURING CONSTRUCTION SHALL USE FILTERED MEDIA TO PREVENT CONSTRUCTION DEBRIS FROM ENTERING COILS, DUCTWORK SYSTEMS, AIR TERMINALS ETC. AT COMPLETION OF CONSTRUCTION, MECHANICAL CONTRACTOR SHALL CLEAN ALL SYSTEMS WITH ALL CONTROL DEVICES WIDE OPEN AND REMOVE ANY REMAINING DEBRIS PRIOR TO TEST AND BALANCING. MECHANICAL CONTRACTOR SHALL REPLACE ALL FILTRATION WITH NEW FILTERS AT COMPLETION OF CONSTRUCTION. ANY DUCTWORK, AIR TERMINALS, AND/OR OTHER EQUIPMENT UPSTREAM OF FILTRATION SHALL BE CLEANED THOROUGHLY OF CONSTRUCTION DEBRIS BEFORE HANDING OVER TO OWNER.
11. CONDENSATE DRAIN PIPING SHALL BE SCHEDULE 40 PVC PIPE AND FITTINGS. DRAINS FROM AIR HANDLING UNITS SHALL BE TRAPPED. CONDENSATE DRAINS SHALL BE INSULATED WITH 1" THICK ARMAFLEX INSULATION. MINIMUM DRAIN SIZE SHALL BE 3/4". TERMINATE ROOFTOP UNIT DRAINS ON A CONCRETE SPLASHBLOCK.	24. PROVIDE COMBINATION FIRE/SMOKE DAMPERS WITH AN IONIZATION TYPE DUCT MOUNTED SMOKE DETECTOR IN DUCTED APPLICATIONS, OR SPOT DETECTORS IN OPENING APPLICATIONS (WITHIN 5'-0" OF THE DAMPER WITH NO AIR OUTLETS OR INLETS BETWEEN DETECTOR AND DAMPER), INSTALLED IN THE DUCT WIRED, TO CLOSE THE DAMPER UPON ACTIVATION. DUCT MOUNTED SMOKE DETECTORS AND SPOT DETECTORS SHALL BE SUPPLIED, WIRED FOR INTERFACE WITH FIRE ALARM SYSTEM AND UNIT SHUTDOWN BY THE ELECTRICAL CONTRACTOR. DETECTORS SHALL BE INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR.
12. ANY DEVICE REQUIRING A THERMOSTAT FOR CONTROL SHALL BE FURNISHED WITH A THERMOSTAT WHETHER INDICATED ON THE DRAWINGS OR NOT.	25. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING RESTRAINTS TO RESIST THE EARTHQUAKE EFFECTS ON THE MECHANICAL SYSTEMS. THE REQUIREMENTS FOR THOSE RESTRAINTS ARE FOUND IN THE LOCAL BUILDING CODE AND ASCE 7. THE ANCHORAGE OF THE MECHANICAL SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF THE LOCAL BUILDING CODE AND ASCE 7.
13. INSTALL THE TOP OF ALL THERMOSTATS, SENSORS, AND SWITCHES AT 4'-0" (MAXIMUM) ABOVE FINISH FLOOR. COORDINATE EXACT THERMOSTAT LOCATION WITH OWNER PRIOR TO INSTALLATION. ANY DEVICE ON A PERIMETER WALL SHALL BE MOUNTED ON A FOAM-FILLED ELECTRICAL BOX, WITH ALL GAPS BETWEEN BOX AND WALL SEALED TO PREVENT INFILTRATION.	26. MECHANICAL CONTRACTOR SHALL PROVIDE PRE-PRINTED COLOR-CODED PIPE LABELS WITH 1-1/2" HIGH LETTERING INDICATING SERVICE AND FLOW DIRECTION. PLASTIC PIPE LABELS UTILIZED IN A RETURN AIR PLENUM SHALL BE LISTED/APPROVED FOR USE IN A RETURN AIR PLENUM. ALL PIPING TO MATCH EXISTING FACILITIES STANDARD (IF APPLICABLE). OTHERWISE, PIPE LABELS SHALL MATCH THE FOLLOWING: CHILLED WATER: GREEN BACKGROUND, WHITE LETTERING. HOT WATER PIPING: YELLOW BACKGROUND, BLACK LETTERING. REFRIGERANT RING: YELLOW BACKGROUND, BLACK LETTERING.
	27. ALL MECHANICAL EQUIPMENT SHALL BE U.L. LISTED AND LABELED AS A COMPLETE PACKAGE, NOT THOUGH INDIVIDUAL COMPONENTS OR PARTS. PROVIDE REQUIRED 3RD PARTY FIELD UL LISTING SERVICES AS REQUIRED TO COMPLY.

COORDINATION DRAWINGS	
THE MECHANICAL CONTRACTOR SHALL ORGANIZE COORDINATION MEETINGS TO DEVELOP A SET OF DRAWINGS WITH ALL CONTRACTORS (ELECTRICAL, MECHANICAL, PLUMBING, FIRE PROTECTION, IT/DATA, AND GENERAL CONTRACTOR). THE MECHANICAL CONTRACTOR WILL HAVE THE LEAD RESPONSIBILITY FOR THE COORDINATION DRAWINGS. THE MECHANICAL CONTRACTOR SHALL PRODUCE THE ORIGINAL DRAWINGS AND FORWARD THE DRAWINGS TO EACH OF THE OTHER CONTRACTORS FOR THEM TO ADD THEIR SYSTEMS TO THIS SET OF COORDINATION DRAWINGS. THE CONTRACTORS WILL DEVELOP THE DRAWINGS IN THIS ORDER: MECHANICAL, FIRE PROTECTION, PLUMBING, ELECTRICAL, IT/DATA (INCLUDING CABLE TRAY) AND GENERAL. THIS SHALL ALSO BE THE ORDER OF PRECEDENCE FOR INSTALLATION OF SYSTEMS. ANY RELOCATION OF SYSTEM ROUTINGS WILL BE FOUND IN THE COORDINATION PHASE AND NOTICED BY EACH OF THE CONTRACTORS. THESE DRAWINGS, WHEN COMPLETED, SHALL BE SIGNED OFF BY ALL OF THE ABOVE LISTED PARTIES. DRAWINGS SHALL BE COMPLETED PRIOR TO FABRICATION AND INSTALLATION OF DUCTWORK AND PIPING SYSTEMS, OR PURCHASE OF EQUIPMENT. THE FOLLOWING ITEMS REPRESENT THE MINIMUM REQUIREMENTS FOR SHOP DRAWINGS AND COORDINATION DRAWINGS:	
1. ALL SHOP AND COORDINATION DRAWINGS WILL BE 1/4" = 1'-0" SCALE	2. DRAWINGS WILL BE ORIGINAL DRAWINGS AND NOT OVERLAYS OF THE CONTRACT/DESIGN
3. COORDINATION DRAWINGS WILL BE DRAWN ON REPRODUCIBLE MATERIAL 48"x36"	4. COORDINATION DRAWINGS ARE NOT SHOP DRAWINGS AND ARE REQUIRED IN ADDITION TO SHOP DRAWINGS.
5. ONCE THE COMPLETE COORDINATION DRAWINGS HAVE BEEN COMPLETED, THE MECHANICAL CONTRACTOR WILL DISTRIBUTE ONE SIGNED SET TO EACH OF THE FOLLOWING CONTRACTORS: ELECTRICAL, PLUMBING, FIRE PROTECTION, AND GENERAL. ADDITIONAL SETS WILL BE SENT TO THE OWNER, ARCHITECT, AND ENGINEER.	

MECHANICAL DUCT SYMBOLS	
[Symbol]	SQUARE DUCT SIZE TAG (WIDTH x HEIGHT)
[Symbol]	OVAL DUCT SIZE TAG (WIDTH / HEIGHT)
[Symbol]	ROUND DUCT SIZE TAG (DIAMETER)
[Symbol]	EXISTING DUCT TAG
[Symbol]	DUCT BEING DEMOLISHED
[Symbol]	SUPPLY AIR
[Symbol]	OUTDOOR AIR
[Symbol]	RETURN AIR
[Symbol]	EXHAUST AIR
[Symbol]	RELIEF AIR
[Symbol]	SUPPLY AIR DIFFUSER (4-WAY)
[Symbol]	RETURN AIR GRILLE
[Symbol]	RETURN AIR GRILLE WITH SOUND BOOT
[Symbol]	EXHAUST AIR GRILLE
[Symbol]	POINT OF EXISTING TO NEW CONNECTION
[Symbol]	POINT OF DISCONNECT TO EXISTING CONNECTION
M.C.	MECHANICAL CONTRACTOR
E.C.	ELECTRICAL CONTRACTOR
P.C.	PLUMBING CONTRACTOR
N.I.C.	NOT IN CONTRACT
(X)	EXISTING
(AFF)	ABOVE FINISHED FLOOR
(DN)	DOWN
(UP)	UP
[Symbol]	SECTION CUT
[Symbol]	REFERRING DETAIL NUMBER
[Symbol]	REFERRING SHEET NUMBER

MECHANICAL ACCESSORIES SYMBOL LEGEND	
[Symbol]	RECTANGULAR DUCT MOUNTED MOTOR OPERATED DAMPER, INTERLOCK WITH FAN AS INDICATED. (DAMPER BY M.C.)

MECHANICAL PIPING SYMBOLS	
[Symbol]	BUTTERFLY VALVE
[Symbol]	3-PIECE BALL VALVE
[Symbol]	CHECK VALVE
[Symbol]	STRAINER WITH BLOWDOWN VALVE WITH HOSE CONN.
[Symbol]	BALANCING VALVE
[Symbol]	B&G CIRCUIT SETTER
[Symbol]	UNION
[Symbol]	THERMOMETER
[Symbol]	PRESSURE GAGE & COCK
[Symbol]	GAGE COCK
[Symbol]	FLOW SWITCH
[Symbol]	ECCENTRIC REDUCER
[Symbol]	CONCENTRIC REDUCER
[Symbol]	STEAM TRAP, F&T
[Symbol]	STEAM TRAP, TB
[Symbol]	CONTROL VALVE
[Symbol]	GAS COCK
[Symbol]	PRESSURE REDUCING/REGULATING VALVE
[Symbol]	SOLENOID VALVE

MECHANICAL PIPING SYSTEMS LEGEND	
—CHR—	CHILLED WATER RETURN
—CHS—	CHILLED WATER SUPPLY
—HWR—	HOT WATER RETURN
—HWS—	HOT WATER SUPPLY

ABBREVIATIONS			
Ø	ROUND	LVR	LOUVER
ABV	ABOVE	LWT	LEAVING WATER TEMPERATURE
AC	AIR CONDITIONING	MIX	MIXED AIR
AD	AREA DRAIN	MAX	MAXIMUM
ADD	ADDENDUM	MBH	ONE THOUSAND BTU PER HOUR
AFF	ABOVE FINISHED FLOOR	MCF	ONE THOUSAND CUBIC FEET
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	MD	MOTORIZED DAMPER
ALT	ALTERNATE	MCH	MECHANICAL
AP	ACCESS PANEL	MFR	MANUFACTURER
ARCH	ARCHITECT/ARCHITECTURAL	MIN	MINIMUM
BEF	BELOW FINISHED FLOOR	MISC	MISCELLANEOUS
BLW	BELOW	MTR	MOTOR
BTU	BRITISH THERMAL UNITS	MU/A	MAKE-UP/AIR
BTUH	BRITISH THERMAL UNITS PER HOUR	NC	NOISE CRITERIA
CAP	CAPACITY	NC	NORMALLY CLOSED
CB	CATCH BASIN	NIC	NOT IN CONTRACT
CFM	CUBIC FEET PER MINUTE	NO	NUMBER
CLG	CEILING	NO	NORMALLY OPEN
CO	CLEAN OUT	NTS	NOT TO SCALE
CW	COLD WATER	O	OXYGEN
D	DEGREE	O/A	OUTSIDE AIR
DB	DRY BULB	O/RD	OVERFLOW ROOF DRAIN
DA	DIAMETER	PD	PRESSURE DROP
DN	DOWN	PIV	POST INDICATOR VALVE
EA	EACH	PLBG	PLUMBING
EAT	ENTERING AIR TEMPERATURE	PRS	PRESSURE
ELEC	ELECTRICAL	PRV	PRESSURE REDUCING VALVE
EQUIP	EQUIPMENT	PSI	POUNDS PER SQUARE INCH
EWC	ELECTRIC WATER COOLER	PSW	POUNDS PER SQUARE INCH GAUGE
EMT	ENTERING WATER TEMPERATURE	PSG	POWER
E/A	EXHAUST AIR	R	DUCT RISER
EX	EXISTING	R/A	RETURN AIR
EXIST	EXISTING	R/C	RADIANT CEILING PANEL
EXIST	EXISTING	RD	ROOF DRAIN
F	DEGREES FAHRENHEIT	REC	RECESSED
FD	FLOOR DRAIN	RED	REDUCER
FD	FIRE DAMPER	RH	RELATIVE HUMIDITY
FDV	FIRE DEPARTMENT VALVE	R/A	RELIEF AIR
FL	FLOOR	RM	ROOM
FO	FUEL OIL	RPM	REVOLUTIONS PER MINUTE
FOV	FUEL OIL VENT	RW	RAIN WATER
FOR	FUEL OIL RETURN	SF	SQUARE FOOT
FOS	FUEL OIL SUPPLY	S/A	SUPPLY AIR
FFM	FEET PER MINUTE	SAN	SANITARY
FS	FLOOR SINK	SF	SQUARE FOOT
FT	FOOT/FEET	SD	SMOKE DAMPER
FTR	FIN TUBE RADIATION	SM	SURFACE MOUNT
GAL	GALLON	SP	STANDPIPE
GC	GENERAL CONTRACTOR	SP	STATIC PRESSURE
GPM	GALLONS PER MINUTE	STM	STEAM
GW	GREASE WASTE	T	THERMOSTAT
HB	HOSE BIB	T	TEMPERATURE DROP
HP	HORSE POWER	TDR	TRENCH DRAIN
HT	HEATING	TMP	TEMPERATURE
HT	HEATING	TYP	TYPICAL
HW	HOT WATER	UG	UNDERGROUND
HYD	HYDRANT	VAC	VACUUM
ID	INDIRECT	V	VENT
IN	INCH	VAV	VARIABLE AIR VOLUME
INV	INVERT	VENT	VENTILATION
LB	POUND	VTR	VENT THROUGH ROOF
LB/HR	POUNDS PER HOUR	W	WASTE
LAT	LEAVING AIR TEMPERATURE	WB	WET BULB
LP	LOW PRESSURE	WCO	WALL CLEAN OUT
LPG	LIQUEFIED PETROLEUM GAS	WH	WALL HYDRANT

TESTING, ADJUSTING, AND BALANCING	
1.	THE MECHANICAL CONTRACTOR SHALL BALANCE ALL MECHANICAL SYSTEMS TO THE PERFORMANCE SPECIFICATIONS INDICATED ON PLANS AND PROVIDE THE ENGINEER WITH THREE COPIES OF A COMPLETE TEST AND BALANCE REPORT. THE REPORT IS TO BE ISSUED A MINIMUM OF TWO WEEKS PRIOR TO PROJECT COMPLETION. THE TEST AND BALANCE REPORT WILL BE SUBJECT TO REVIEW AND APPROVAL BY THE ENGINEER. ANY ADDITIONAL TESTING, ADJUSTING AND BALANCING REQUIRED (AT ENGINEER'S REQUEST) AFTER REVIEW OF THE INITIAL REPORT SHALL BE PROVIDED AT NO ADDITIONAL COST. TEST AND BALANCE REPORT TO BE COMPLETED BY AN INDEPENDENT, CERTIFIED TEST AND BALANCE CONTRACTOR.
2.	CONDUCT TESTING AND BALANCING IN ACCORDANCE WITH TECHNICAL PORTIONS OF THE AABC "NATIONAL STANDARDS FOR TESTING AND BALANCING HVAC SYSTEMS", LATEST EDITION.
3.	INSTRUMENTS USED FOR BALANCING MUST HAVE BEEN CALIBRATED WITHIN A PERIOD OF SIX (6) MONTHS PRIOR TO BALANCING. SUBMIT SERIAL NUMBERS, AND DATES OF CALIBRATION OF ALL INSTRUMENTS TO BE USED PRIOR TO THE START OF WORK.
4.	SET HVAC SYSTEM AIRFLOW AND WATER FLOW RATES WITHIN THE FOLLOWING TOLERANCES: <ul style="list-style-type: none"> <li>A. SUPPLY, RETURN, AND EXHAUST FANS AND EQUIPMENT WITH FANS: MINUS 5 TO PLUS 10 PERCENT.</li> <li>B. AIR OUTLETS AND INLETS: PLUS/MINUS 10 PERCENT.</li> <li>C. HEATING-WATER FLOW RATE: 0 TO MINUS 10 PERCENT.</li> <li>D. COOLING-WATER FLOW RATE: 0 TO MINUS 5 PERCENT.</li> </ul>
5.	REFER TO SPECIFICATION SECTION 230593 AND CONTRACT DRAWINGS IN THEIR ENTIRETY FOR ADDITIONAL REQUIREMENTS.

MECHANICAL DEMOLITION NOTES	
1.	THE MECHANICAL CONTRACTOR SHALL VISIT SITE PRIOR TO BEGINNING WORK TO DETERMINE THE LEVEL OF DEMOLITION REQUIRED AND INCLUDE ALL NECESSARY PRICING IN THEIR BID.
2.	IT IS THE MECHANICAL CONTRACTORS RESPONSIBILITY TO FIELD VERIFY ALL EXISTING DUCTWORK AND PIPING. ANY DISCREPANCIES BETWEEN EXISTING CONDITIONS AND MECHANICAL PLANS SHOULD BE BROUGHT TO THE ATTENTION OF THE MECHANICAL ENGINEER.
3.	M.C. SHALL VERIFY ALL EXISTING PIPING SYSTEMS TO REMAIN ARE INSULATED WITH VAPOR BARRIER INTACT. IF ANY PORTION OF THE PIPING SYSTEM IS MISSING INSULATION OR DETERMINED DURING ANY PHASE OF THE PROJECT AS DEFECTIVE, THAT PORTION SHALL BE PROVIDED WITH NEW INSULATION. MINOR TEARS ON EXISTING PIPING MAY BE REPAIRED WITH TAPES, ADHESIVE, OR SEALANT. EXISTING PIPING SYSTEMS SHALL INCLUDE CHILLED WATER, CONDENSER WATER, HOT WATER, STEAM & STEAM CONDENSATE, REFRIGERANT, AND A/C CONDENSATE DRAIN PIPING. THE MECHANICAL CONTRACTOR SHALL MAKE PROVISIONS IN THEIR BASE BID TO COVER ALL COSTS NECESSARY TO ACHIEVE A CONTINUOUS VAPOR BARRIER THROUGHOUT THESE EXISTING SYSTEMS. REFER TO SPECIFICATIONS SECTION 230700/MECHANICAL GENERAL NOTES FOR INSULATION MATERIAL REQUIREMENTS.
4.	FOR ALL EXISTING HVAC EQUIPMENT AND DUCTWORK NOTED TO REMAIN AND SERVING AREA OF RENOVATION, MECHANICAL CONTRACTOR SHALL INSPECT EQUIPMENT (AND ANY ASSOCIATED CONTROLS, VALVES, DAMPERS, ETC.) TO VERIFY PROPER WORKING ORDER. MECHANICAL CONTRACTOR TO SERVICE AND CLEAN EXISTING HVAC UNITS TO ENSURE DESIGN AIRFLOW AND COOLING/HEATING CAPACITIES ARE OBTAINED. ANY EQUIPMENT FOUND TO BE INOPERABLE OR SHORT OF DESIGN CAPACITIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO PROJECT COMPLETION. PROVIDE CLEAN FILTERS IN ALL UNITS AT COMPLETION OF PROJECT. DAMAGED DUCTWORK SHALL BE REPAIRED.

2018 NORTH CAROLINA ENERGY CONSERVATION CODE COMMERCIAL ENERGY EFFICIENCY - MECHANICAL SUMMARY					
C401 METHOD OF COMPLIANCE	<input type="checkbox"/> 2018 NCECC CHAPTER 4 <input type="checkbox"/> COMCHECK PROVIDED (2018 NCECC)				
<input type="checkbox"/> ASHRAE 90.1-2013 PRESCRIPTIVE	<input type="checkbox"/> COMCHECK PROVIDED (90.1-2013)				
<input type="checkbox"/> ASHRAE 90.1-2013 PERFORMANCE	<input type="checkbox"/> ENERGY MODELING DATA PROVIDED				
<input type="checkbox"/> N/A (EXISTING LIGHTING, HVAC, AND DOM. WATER HEATING SYSTEMS TO REMAIN)					
C406 ADDITIONAL EFFICIENCY PACKAGE OPTIONS	<input type="checkbox"/> C406.2 EFFICIENT MECH EQUIPMENT <input type="checkbox"/> C406.5 ON-SITE RENEWABLE ENERGY				
<input type="checkbox"/> C406.3 REDUCED LTG DENSITY	<input type="checkbox"/> C406.6 DEDICATED OA SYSTEM				
<input type="checkbox"/> C406.4 ENHANCED LTG CONTROLS	<input type="checkbox"/> C406.7 SERVICE WATER HEATING				
C301 CLIMATE ZONE					
4A - HARNETT COUNTY, NORTH CAROLINA DESIGN CONDITIONS					
DESIGN CONDITIONS (ASHRAE 90.1-2013 TABLE D-1)					
winter dry bulb	22° F.				
summer dry bulb	94° F.				
summer wet bulb	76° F.				
INTERIOR (2018 NCECC SECTION C302.1)					
winter dry bulb	72° F.				
summer dry bulb	75° F.				
C403.2 HEATING & COOLING LOADS AND EQUIPMENT & SYSTEM SIZING					
BUILDING HEATING LOAD	324.105 BTUH (peak)				
BUILDING COOLING LOAD	444.486 BTUH (peak)				
INSTALLED HEATING CAPACITY N/A - EXISTING TO REMAIN					
INSTALLED COOLING CAPACITY N/A - EXISTING TO REMAIN					
C403.2.3 & C406.2 - REQUIRED & INCREASED HVAC EQUIPMENT PERFORMANCE					
SYSTEM DESCRIPTION - 4-PIPE BLOWER COILS WITH HOT WATER REHEAT AND CHILLED WATER COOLING					
<input checked="" type="checkbox"/> MINIMUM HVAC EQUIP EFFICIENCY COMPLIANCE - TABLE C403.2.3					
<input type="checkbox"/> INCREASED HVAC EQUIP EFFICIENCY COMPLIANCE - 10% OVER TABLE C403.2.3					
EQUIP TYPE	SIZE CATEGORY	SUBCATEGORY	C403.2.3 MINIMUM EFFICIENCY (η)	10% INCREASED EFF. (η)	DESIGN EFFIC.
TABLE C403.2.3(1) - UNITARY AIR CONDITIONERS AND CONDENSING UNITS					
AIR COND.	< 65,000	SPLIT SYSTEM & SINGLE PACKAGE	12.1 EER	13.3 EER	SEE SCHEDULE
WATER COOL.			12.3 EER	13.3 EER	
C403.2.4 THRU C403.2.11					
HVAC SYSTEMS ARE FULLY COMPLIANT WITH THE REQUIREMENTS FOR HVAC SYSTEM CONTROL, VENTILATION, ENERGY RECOVERY, DUCT AND PLenum INSULATION AND SEALING, PIPING INSULATION, AND SYSTEM COMPLETION.					
C403.2.12 - AIR SYSTEM DESIGN AND CONTROL					
<input checked="" type="checkbox"/> ALL FANS INSTALLED ON THE PROJECT ARE 5 HP OR LESS AND ARE EXEMPT FROM THESE REQUIREMENTS.					
<input type="checkbox"/> FANS ABOVE 5 HP MEET THE CFM LIMITATIONS SHOWN BELOW:					
OPTION 1 - FAN SYSTEM MOTOR NAMEPLATE HP - TABLE C403.2.12(1)					
ALLOWABLE NAMEPLATE MOTOR HP	CONSTANT VOLUME MINIMUM CFM	VARIABLE VOLUME MINIMUM CFM	DESIGN CFM		
7.5	6,818 CFM	5,000 CFM	SEE SCHEDULE		
10	9,091 CFM	6,667 CFM	SEE SCHEDULE		
15	13,636 CFM	10,000 CFM	SEE SCHEDULE		
20	18,182 CFM	13,333 CFM	SEE SCHEDULE		
25	22,727 CFM	16,667 CFM	SEE SCHEDULE		
30	27,272 CFM	20,000 CFM	SEE SCHEDULE		
40	36,364 CFM	26,667 CFM	SEE SCHEDULE		
50	45,455 CFM	33,333 CFM	SEE SCHEDULE		
C405.8 - ELECTRICAL MOTORS (MANDATORY REQUIREMENTS).					
<input checked="" type="checkbox"/> ELECTRICAL MOTORS HAVE BEEN SPECIFIED TO MEET MINIMUM EFFICIENCY REQUIREMENTS PER C405.8, EXCEPT WHERE EXEMPT.					
<input type="checkbox"/> NOT APPLICABLE.					
C408 - SYSTEM COMMISSIONING					
<input type="checkbox"/> PROJECT AREA IS LESS THAN 10,000 SQUARE FEET AND IS EXEMPT FROM THE SYSTEM COMMISSIONING REQUIREMENTS OF SECTION C408.					
<input checked="" type="checkbox"/> PROJECT AREA IS GREATER THAN 10,000 SQUARE FEET AND REQUIRES SYSTEM COMMISSIONING PER SECTION C408.					

EQUIPMENT ABBREVIATIONS			
AC	AIR CONDITIONING UNIT	EWPH	ELECTRIC WATER HEATER
ACC	AIR COOLED CONDENSER	FCU	FAN COIL UNIT
ACCU	AIR COOLING CONDENSING UNIT	FP	FIRE PUMP
AHU	AIR HANDLING UNIT	GI	GREASE INTERCEPTOR
AS	AIR SEPARATOR	GRV	GRAVITY ROOF VENTILATOR
B	BOILER	HWP	HEATING WATER PUMP
CH	CHILLER	HX	HEAT EXCHANGER
CT	COOLING TOWER	HRU	HEAT RECOVERY UNIT
CUH	CABINET UNIT HEATER	PRV	POWER ROOF VENTILATOR
CWP	CONDENSER WATER PUMP	RE	RETURN/EXHAUST FAN
CHWP	CHILLED WATER PUMP	RTU	ROOFTOP UNIT
DBP	DOMESTIC WATER BOOSTER PUMP	SEP	SEWAGE EJECTOR PUMP
DC	DUCT MOUNTED COIL	SF	SUPPLY FAN
DCP	DOMESTIC WATER CIRCULATING PUMP	SP	SUMP PUMP
EF	EXHAUST FAN	UH	UNIT HEATER
EDC	ELECTRIC DUCT COIL	WH	WATER HEATER
ET	EXPANSION TANK		

COMMISSIONING NOTE - 2018 NCECC C408	
THE ME	



**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-59**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			188	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-60**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			188	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-61**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	832	21	156	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			195	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-62**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	545	14	105	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			130	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			150	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-63**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			185	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-64**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			185	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-65**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	946	24	180	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			225	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			225	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-66**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	946	24	180	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			225	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			225	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-67**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			185	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-68**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			185	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-69**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	545	14	105	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			130	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			150	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-70**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	832	21	158	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			198	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-71**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			185	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-72**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)
CLASSROOMS (AGES 5-8)	7.5	0	25	-	800	20	150	-
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			185	
				TOTAL OUTSIDE AIR PROVIDED (CFM)			200	

**VENTILATION CALCULATIONS (NCMC 2018, SECT 403): AHU-73**

OCCUPANCY CLASSIFICATION	PEOPLE O/A RATE IN BREATHING ZONE (CFM/PERSON)	AREA O/A RATE IN BREATHING ZONE (CFM/SQ. FT.)	DEFAULT OCCUPANCY DENSITY (PEOPLE/1000 SQ. FT.)	EXHAUST AIRFLOW RATE (CFM/SQ. FT.)	AREA (SQ. FT.)	CALCULATED OCCUPANCY (PEOPLE)	CALCULATED PEOPLE O/A (CFM)	CALCULATED AREA O/A (CFM)	CALCULATED AREA E/A (CFM)
OFFICE	5	0.06	5	-	235	2	10	15	-
TOILET	-	-	-	-	70 PER FIXTURE	16 FIXTURES	0	0	1120
				TOTAL OUTSIDE AIR REQUIRED (PEOPLE + AREA, CFM)			170		
				TOTAL OUTSIDE AIR PROVIDED (CFM)			175		
				TOTAL EXHAUST AIR REQUIRED (CFM)			1120		
				TOTAL EXHAUST AIR PROVIDED (CFM)			1300		

**FAN COIL UNIT SCHEDULE**

SYMBOL	TOTAL AIRFLOW (CFM)	OUTSIDE AIRFLOW (CFM)	ESP	COOLING COIL										HEATING COIL										ELECTRICAL DATA		
				TOTAL CAPACITY (MBH)	SENSIBLE CAPACITY (MBH)	GPM	EWT (°F)	LWT (°F)	# ROWS	MAX. PD (FT.)	RUNOUT	TOTAL CAPACITY (MBH)	GPM	EWT (°F)	LWT (°F)	# ROWS	MAX. PD (FT.)	RUNOUT	FAN HP	VOLTAGE	PH	MANUFACTURER	MODEL	CONFIGURATION		
AHU-59	900	180	0.50	42950	28850	8.1	44	56	6	10.0	11/4"	77380	4.5	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-60	1100	180	0.50	51370	34460	9.4	44	56	6	10.0	11/4"	86040	5.2	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-61	800	190	0.50	39950	26240	7.4	44	56	6	10.0	11/4"	76720	4.2	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-62	900	150	0.50	43950	28850	8.1	44	56	6	10.0	11/4"	77380	4.5	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-63	900	180	0.50	43950	28850	8.1	44	56	6	10.0	11/4"	77380	4.5	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-64	1150	180	0.50	53110	35750	9.7	44	56	6	10.0	11/4"	84190	5.4	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-65	1000	215	0.50	47790	31820	8.8	44	56	6	10.0	11/4"	80190	4.9	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-66	1000	215	0.50	47790	31820	8.8	44	56	6	10.0	11/4"	80190	4.9	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-67	1200	215	0.50	54820	37040	10.0	44	56	6	10.0	11/4"	86990	5.5	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-68	950	180	0.50	45830	30210	8.4	44	56	6	10.0	11/4"	77960	4.7	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-69	900	150	0.50	43950	28850	8.1	44	56	6	10.0	11/4"	77380	4.5	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-70	800	190	0.50	39950	26240	7.4	44	56	6	10.0	11/4"	76720	4.2	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-71	1100	180	0.50	51370	34460	9.4	44	56	6	10.0	11/4"	86040	5.2	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-72	900	180	0.50	43950	28850	8.1	44	56	6	10.0	11/4"	77380	4.5	160	140	2	5.0	1"	100 hp	480	3	TRANE	BCHD036	HORIZONTAL		
AHU-73	475	50	0.50	20870	14320	4.1	44	56	6	10.0	1"	33920	2.0	160	140	2	5.0	3/4"	0.50 hp	480	3	TRANE	BCHD018	HORIZONTAL		

- NOTES:**
- COOLING COIL CAPACITY IS BASED ON 80° F. D.B. AND 67° F. W.B. E.A.T.
  - HEATING COIL CAPACITY IS BASED ON 65° F. E.A.T. ALL HEATING COILS SHALL BE LOCATED IN THE REHEAT POSITION.
  - FURNISH ALL UNITS WITH: DDC THERMOSTAT, INSULATED RETURN AIR PLENUM, SECONDARY DRAIN PAN, FILTERS (SEE NOTE 7), DISCHARGE DUCT COLLAR, VIBRATION ISOLATORS.
  - MECHANICAL CONTRACTOR SHALL PROVIDE TWO SPARE FAN COIL UNIT MOTORS FOR EACH SIZE MOTOR PROVIDED. MOTORS SHALL BE DELIVERED TO OWNER AT PROJECT COMPLETION.
  - CONTROLS CONTRACTOR SHALL PROVIDE INDIVIDUAL CONTROL POWER TRANSFORMER (120V) FOR EACH UNIT. POWER WILL BE FROM FAN COIL UNIT CIRCUIT.
  - PROVIDE ECL-xx WITH AN IONIZATION TYPE SMOKE DETECTOR MOUNTED IN THE RETURN DUCT. THE SMOKE DETECTOR SHALL BE FURNISHED AND WIRED FOR UNIT SHUT DOWN AND FIRE ALARM INTERFACE BY THE ELECTRICAL CONTRACTOR AND SHALL BE INSTALLED IN THE DUCT BY THE MECHANICAL CONTRACTOR.
  - FAN COIL UNITS SHALL BE PROVIDED WITH TEMPORARY CONSTRUCTION FILTERS, REPLACED WITH DISPOSABLE FILTERS AT PROJECT COMPLETION.

**EXHAUST FAN SCHEDULE**

SYMBOL	LOCATION	MANUFACTURER	MODEL NO.	TYPE	CFM	APPROX. ESP	DRIVE TYPE	FAN RPM	WATTS	H.P.	VOLTAGE-PHASED	ACCESSORIES	CONTROL TYPE
F-29	MECHANICAL LOFT	GREENHECK	SG-120-A	INLINE	1350	0.50	DIRECT	1511	1189	0.50	120 V-1Ø	A.B.T.G	5

**ACCESSORIES:**

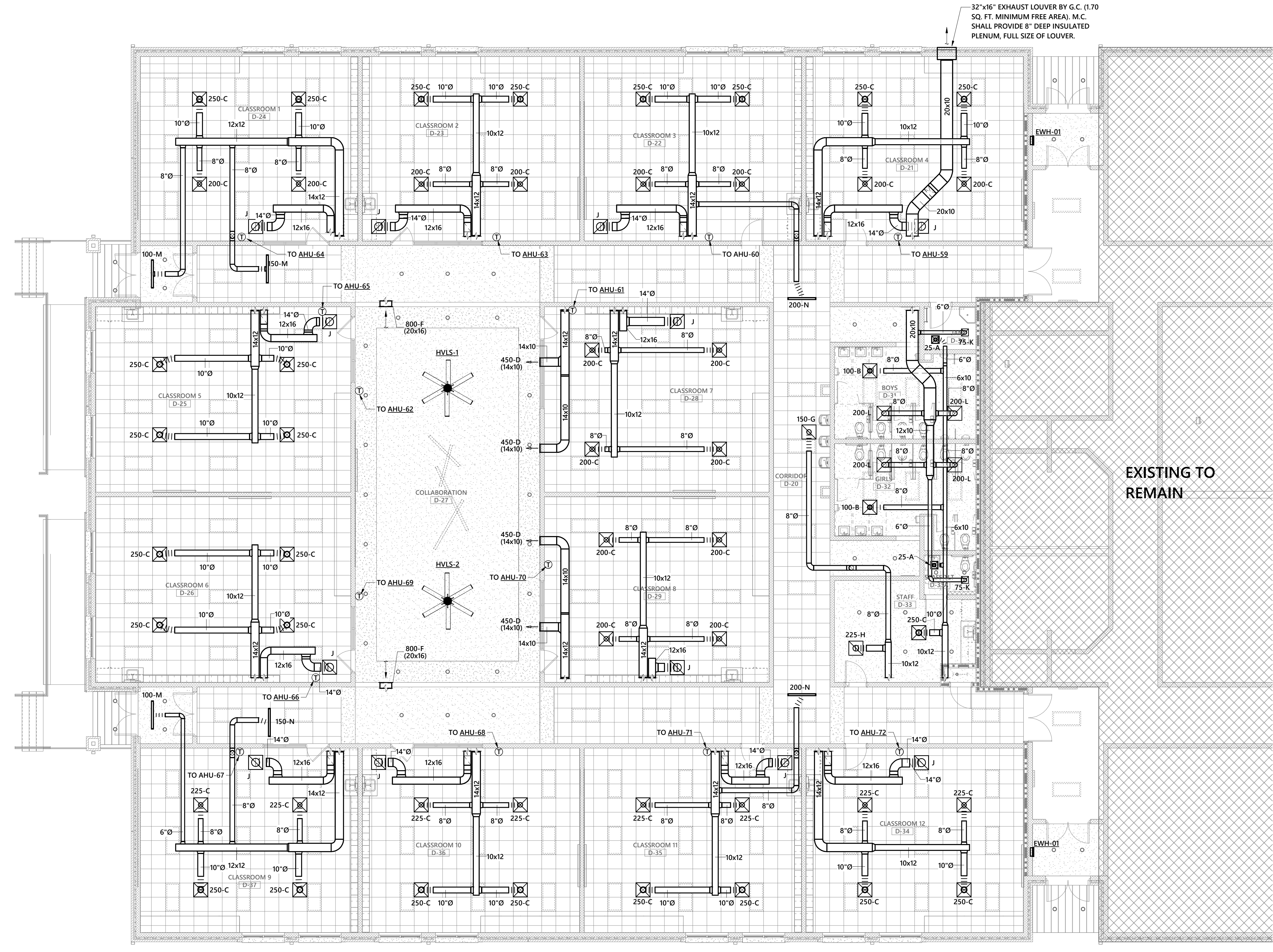
- A. DISCONNECT SWITCH
- B. GRAVITY BACKDRAFT DAMPER
- C. MOTORIZED BACKDRAFT DAMPER
- D. PREFAB. ROOF CURB
- E. BIRDSCREEN
- F. ACOUSTICAL LINING
- G. HANGING BRACKETS WITH VIBRATION ISOLATION
- H. W/L WALL LOUVER DISCHARGE
- I. RCC OR GRS ROOF



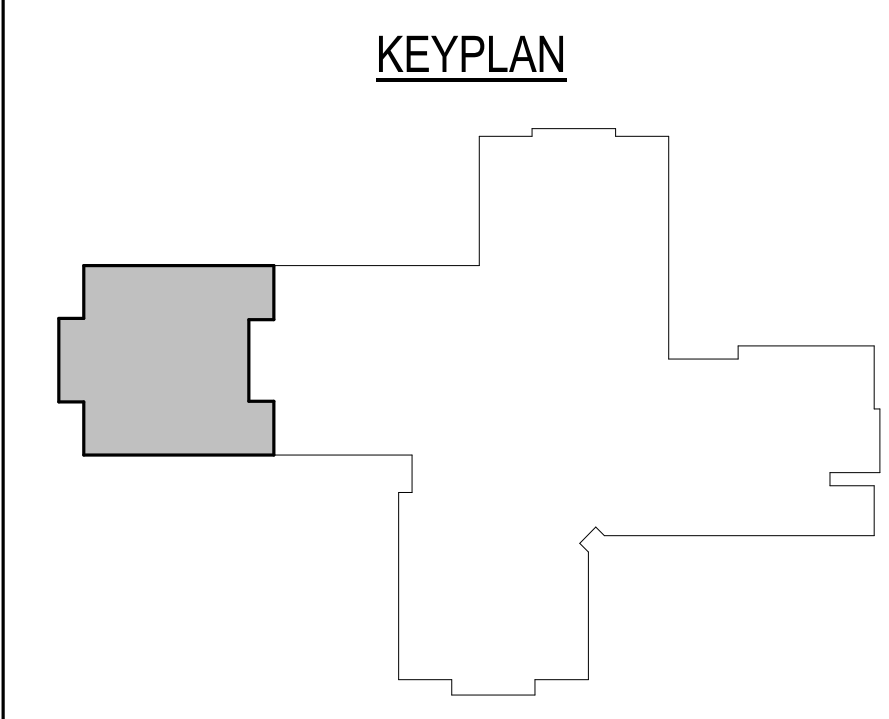


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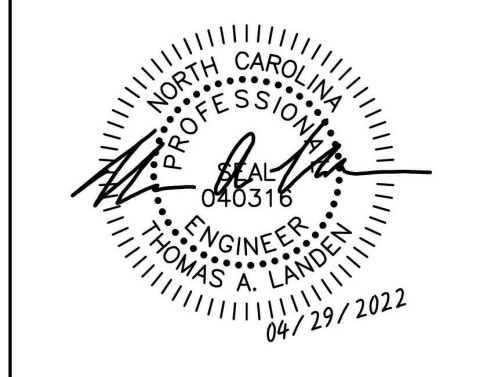
1 CLASSROOM ADDITION MECHANICAL PLAN - NEW WORK  
1/8" = 1'-0"



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Harnett County Schools  
**HIGHLAND ELEMENTARY ADDITION & RENOVATION**  
1915 Buffalo Lake Road  
Sanford, NC 27332

No.	Date	Description

ISSUE DATE: 4/29/2022  
PROJECT #: 02110.100  
DRAWN BY: TAL  
CHECKED BY: GPK  
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CLASSROOM  
ADDITION  
MECHANICAL PLAN -  
NEW WORK

M1-102

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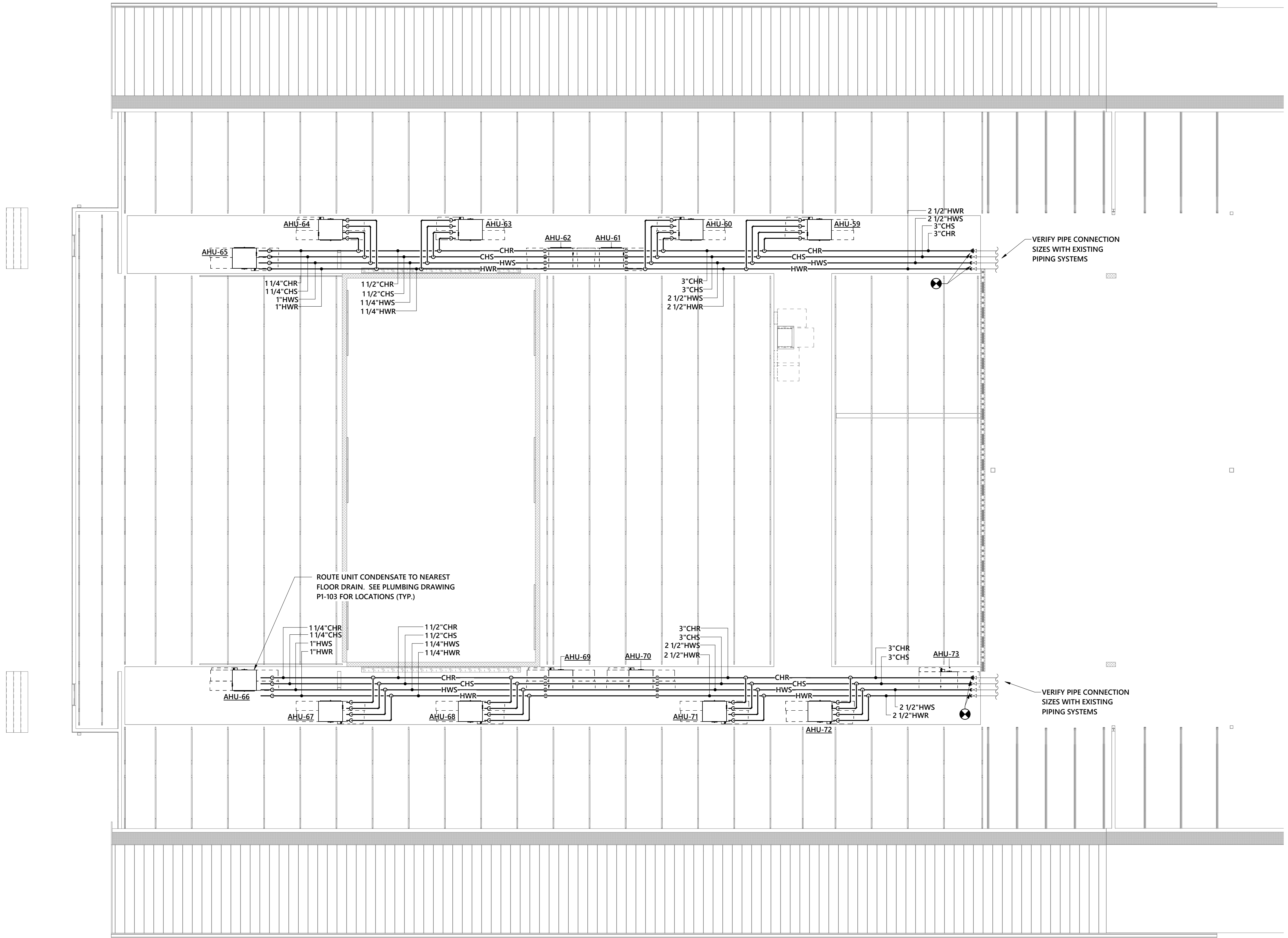
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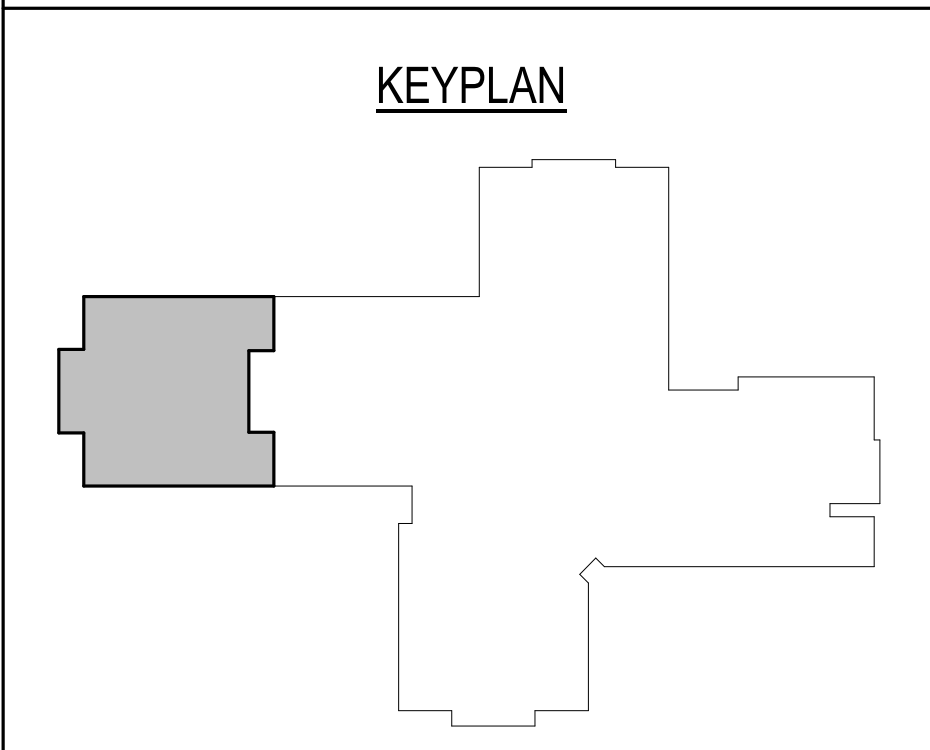
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**1 MECHANICAL LOFT MECHANICAL PIPING PLAN**  
1/8" = 1'-0"



BID SET

Harnett County Schools  
**HIGHLAND ELEMENTARY ADDITION & RENOVATION**  
1915 Buffalo Lake Road  
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**MECHANICAL LOFT  
MECHANICAL PIPING  
PLAN**

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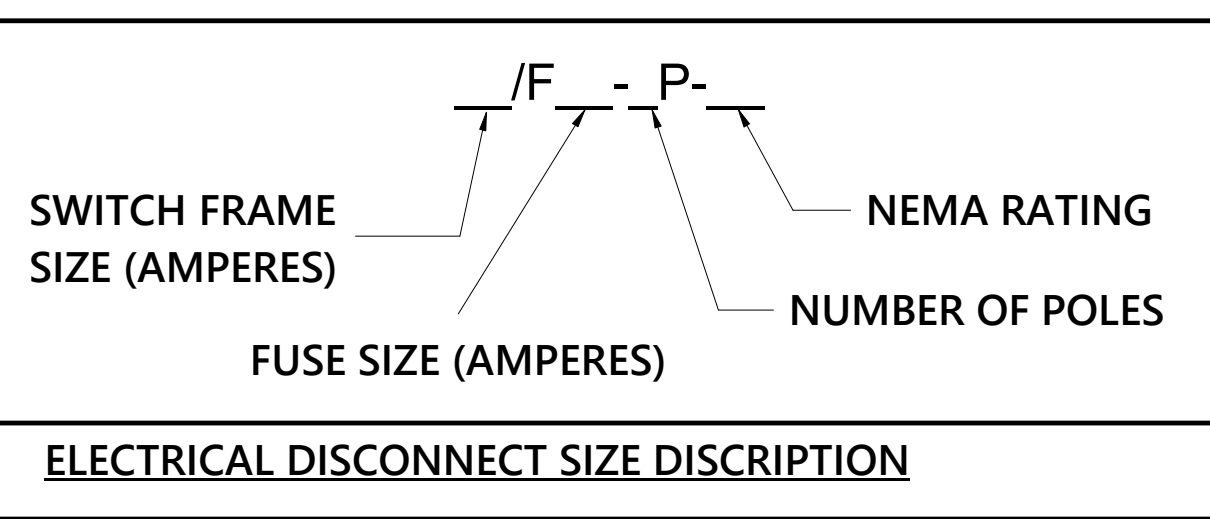
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2018 NORTH CAROLINA ENERGY CONSERVATION CODE

Table containing energy conservation code details, including C401 Method of Compliance, C405.2 Lighting Controls, C405.3 Exit Signs, C405.4 Interior Lighting Power Requirements, C405.6 Electrical Energy Consumption, C405.7 Electrical Transformers, C405.8 Electrical Motors, and C408 System Commissioning.



SYMBOL SCHEDULE POWER

Table mapping symbols to descriptions for power systems, such as wiring systems concealed in walls or ceilings, and conduit types.

SYMBOL SCHEDULE POWER LEGEND

Table mapping symbols to descriptions for power equipment, including junction boxes, panelboards, transformers, and motor starters.

ELECTRICAL FIXTURES LEGEND - COMMERCIAL

Table mapping symbols to descriptions for commercial electrical fixtures, such as duplex receptacles, tamper-resistant receptacles, and quad receptacles.

SPECIAL SYSTEMS LEGEND

Table mapping symbols to descriptions for special systems, including flush-mounted ceiling speakers, wall-mounted speakers, and exterior weatherproof speakers.

FLOOR BOX SYMBOL LEGEND

Table mapping symbols to descriptions for floor boxes, including six-gang flush-mounted floor boxes and communication plates.

EM./LS LIGHTING FIXTURE SYMBOLS AND DEVICES

Table mapping symbols to descriptions for emergency and low-voltage lighting fixtures.

LIGHTING FIXTURES SYMBOLS AND DEVICES...

Table mapping symbols to descriptions for various lighting fixtures and devices, including recessed LEDs, exit lights, switches, and dimmers.

TELECOM LEGEND - ELECTRICAL

Table mapping symbols to descriptions for telecommunications equipment, including backboards, outlets, and cable trays.

SECURITY DEVICES SYMBOL LEGEND - ELECTRICAL

Table mapping symbols to descriptions for security devices, including cameras, motion detectors, and door contacts.

EXISTING/DEMOLITION LEGEND

Table mapping symbols to descriptions for existing and demolition items, such as half-tone and dashed symbols.

ELECTRICAL SHEET INDEX

Table listing sheet numbers and names for the electrical drawings, including legends, specifications, and various power and lighting plans.

Large table of electrical abbreviations and symbols, organized by category (IP, A, AC, ACLG, etc.) and including descriptions for various components and systems.

COMMISSIONING NOTE - 2018 NCECC C408

Text block providing the mechanical contractor's responsibility for system commissioning per 2018 NCECC Section 408.

COORDINATION DRAWINGS

Text block detailing the coordination process between contractors, including meeting requirements and drawing responsibilities.

- List of requirements for coordination drawings, including scale, drawing overlays, and completion criteria.

Professional seal and contact information for SFI+ Architects, including address, phone, and website.

Logo and contact information for Optima Engineering, including address and phone number.

Vertical banner for Harnett County Schools, Highland Elementary Addition & Renovation, including address and project details.

Project information section including issue date, project number, drawing number, and electrical legend notes.







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**GENERAL NOTES**

- A. REFER TO DRAWING E-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES.
- B. REFER TO ARCHITECTURAL DRAWINGS INCLUDING BUT NOT LIMITED TO, MOUNTING NOTES, MOUNTING DETAILS AND EXACT LOCATIONS OF ALL DEVICES.
- C. ALL DEVICES SHALL BE FLUSH MOUNTED, UNLESS NOTED OTHERWISE, WITH NO EXPOSED CONDUIT.
- D. BACK TO BACK BOX INSTALLATION SHALL NOT BE ALLOWED. WHERE DEVICES ARE SHOWN BACK TO BACK, DEVICE SHALL BE OFFSET 3".
- E. TYPICAL CLASSROOM IS SHOWN AND SHALL BE ROTATED, MIRRORRED, ETC. TO FIT EACH RESPECTIVE CLASSROOM IN A SIMILAR MANNER.
- F. TAMPER-RESISTANT RECEPTACLES SHALL BE PROVIDED FOR ALL AREAS PER NEC 406.12, INCLUDING ELEMENTARY EDUCATION FACILITIES, BUSINESS OFFICES/CORRIDORS/WAITING ROOMS AND THE LIKE, ASSEMBLY OCCUPANCIES INCLUDING PLACES OF AWAITING TRANSPORTATION/GYMNASIUM/AUDITORIUMS.
- G. RECEPTACLE AND DATA OUTLETS SHALL NOT BE MOUNTED IN TRIM OF WINDOWS. LOCATE WHERE FULL WALL IS AVAILABLE.

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**HIGHLAND ELEMENTARY ADDITION & RENOVATION**

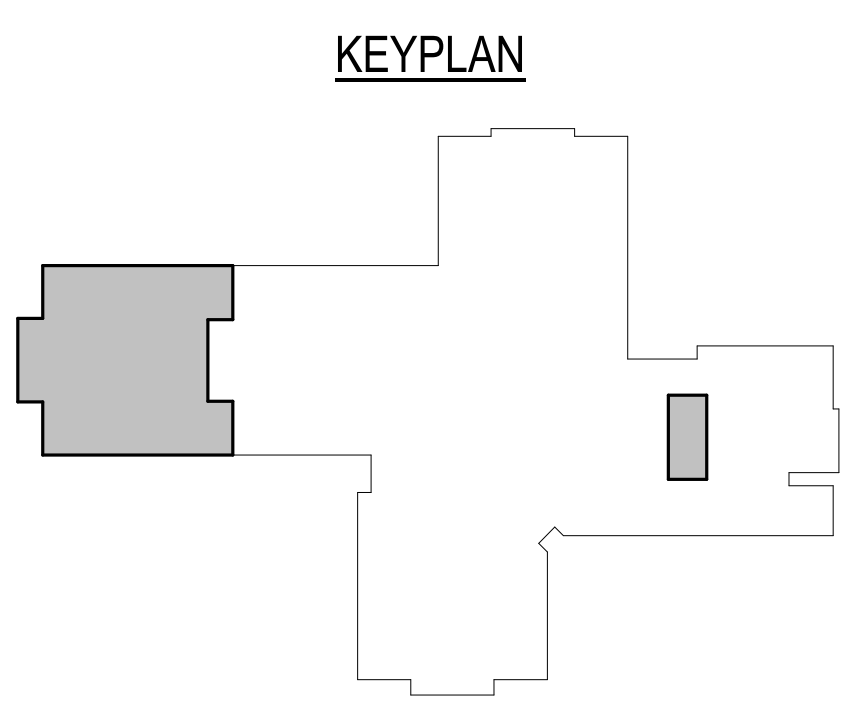
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OVERALL FIRST FLOOR POWER PLAN - NEW WORK



**1 OVERALL FIRST FLOOR POWER PLAN - NEW WORK**  
1/16" = 1'-0"

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GENERAL NOTES

- A. REFER TO DRAWING E-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES.
- B. REFER TO ARCHITECTURAL DRAWINGS INCLUDING BUT NOT LIMITED TO, MOUNTING NOTES, MOUNTING DETAILS AND EXACT LOCATIONS OF ALL DEVICES.
- C. DASHED ARCHITECTURAL LINES INDICATE DEMOLITION. DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES IN WALLS AND CEILINGS. TYPICAL IN ALL AREAS UNLESS OTHERWISE NOTED. COORDINATE WITH OTHER TRADES AS REQUIRED TO FACILITATE COMPLETE DEMOLITION.
- D. CONTRACTOR SHALL MAKE SURE TO MAINTAIN CONTINUITY OF ELECTRICAL DEVICES THAT ARE OUTSIDE AREA OF WORK THAT ARE INTENDED TO REMAIN ENERGIZED.
- E. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING LIGHT FIXTURES TO REMAIN.
- F. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
- G. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING POWER DEVICES TO REMAIN.
- H. ALL DEVICES SHALL BE FLUSH MOUNTED, UNLESS NOTED OTHERWISE, WITH NO EXPOSED CONDUIT.
- I. BACK TO BACK BOX INSTALLATION SHALL NOT BE ALLOWED. WHERE DEVICES ARE SHOWN BACK TO BACK, DEVICE SHALL BE OFFSET 3".
- J. TYPICAL CLASSROOM IS SHOWN AND SHALL BE ROTATED, MIRRORRED, ETC. TO FIT EACH RESPECTIVE CLASSROOM IN A SIMILAR MANNER.
- K. TAMPER-RESISTANT RECEPTACLES SHALL BE PROVIDED FOR ALL AREAS PER NEC 408.12, INCLUDING ELEMENTARY EDUCATION FACILITIES, BUSINESS OFFICES, CORRIDORS, WAITING ROOMS AND THE LIKE, ASSEMBLY OCCUPANCIES INCLUDING PLACES OF AWAITING TRANSPORTATION/GYMNASIUM/AUDITORIUMS.
- L. RECEPTACLE AND DATA OUTLETS SHALL NOT BE MOUNTED IN TRIM OF WINDOWS. LOCATE WHERE FULL WALL IS AVAILABLE.

KEYNOTES

- 1. EXISTING WALL TO BE REMOVED. DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES IN WALL. COORDINATE WITH OTHER TRADES AS REQUIRED TO FACILITATE COMPLETE DEMOLITION.
- 2. WALL SWITCH CONTROL PROVIDED BY M.C. COORDINATE PRIOR TO ROUGH-IN.

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Sanford, NC 27332

No.	Date	Description

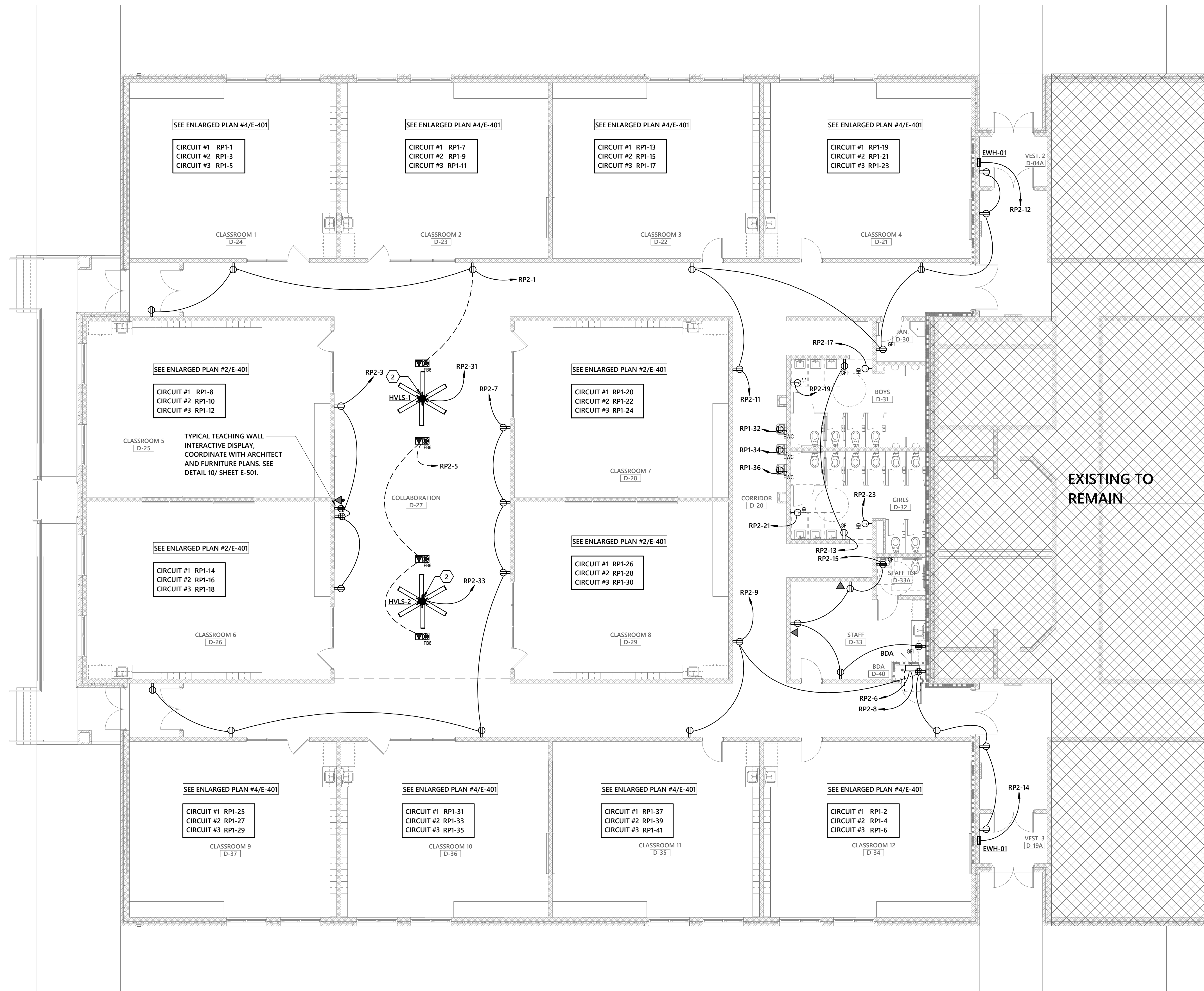
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CLASSROOM ADDITION POWER PLANS

E-112

OPTIMA# 21-0305R

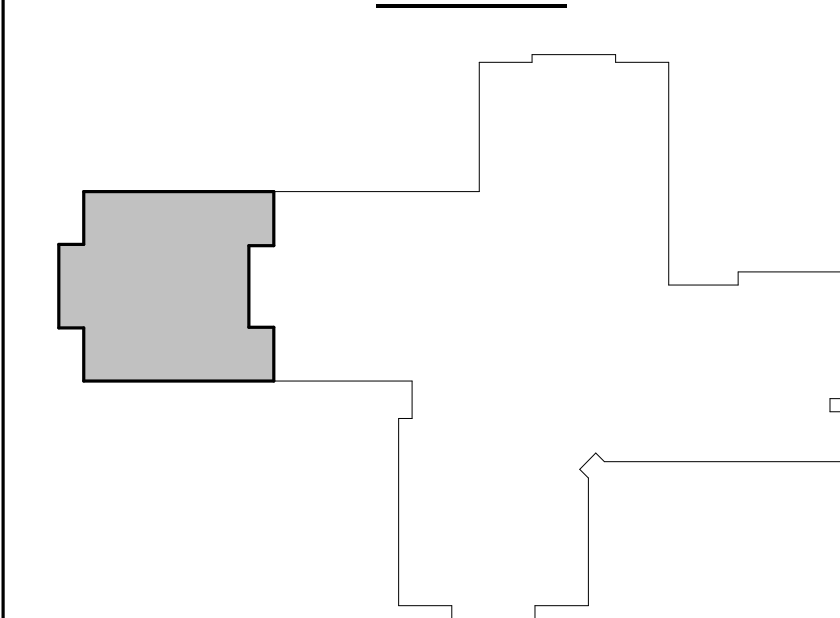
Sheet No. 5 of 13



**2 CLASSROOM ADDITION POWER PLAN - NEW WORK**  
1/8" = 1'-0"

**1 CLASSROOM ADDITION POWER PLAN - DEMOLITION**  
1/8" = 1'-0"

KEYPLAN





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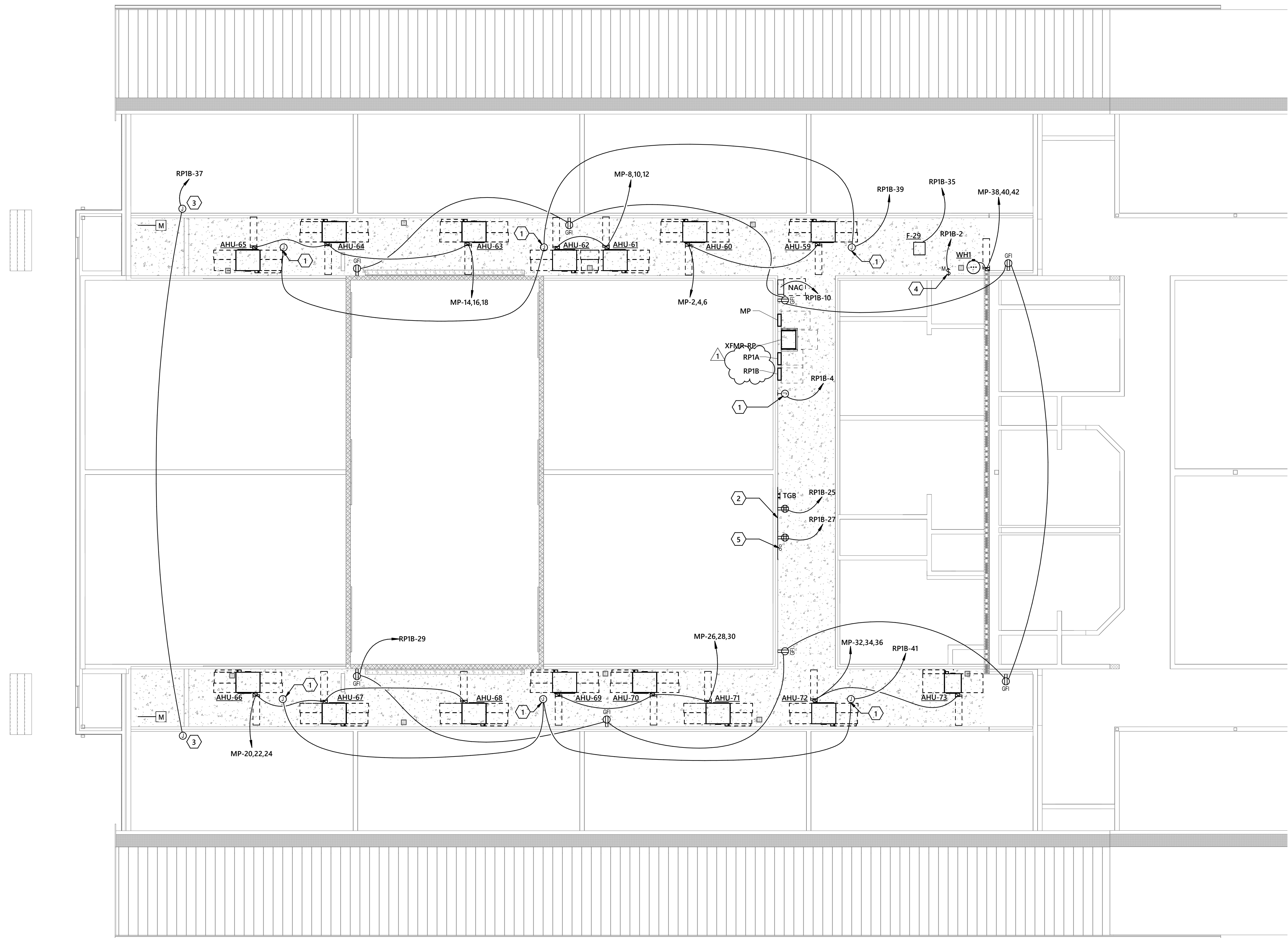
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**1** MECHANICAL LOFT POWER PLAN  
1/8" = 1'-0"

**GENERAL NOTES**

- A. REFER TO DRAWING E-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES.
- B. REFER TO ARCHITECTURAL DRAWINGS INCLUDING BUT NOT LIMITED TO, MOUNTING NOTES, MOUNTING DETAILS AND EXACT LOCATIONS OF ALL DEVICES.
- C. ALL DEVICES SHALL BE FLUSH MOUNTED, UNLESS NOTED OTHERWISE, WITH NO EXPOSED CONDUIT.
- D. BACK TO BACK BOX INSTALLATION SHALL NOT BE ALLOWED. WHERE DEVICES ARE SHOWN BACK TO BACK, DEVICE SHALL BE OFFSET 3".
- E. TYPICAL CLASSROOM IS SHOWN AND SHALL BE ROTATED, MIRRORRED, ETC. TO FIT EACH RESPECTIVE CLASSROOM IN A SIMILAR MANNER.
- F. TAMPER-RESISTANT RECEPTACLES SHALL BE PROVIDED FOR ALL AREAS PER NEC 406.12, INCLUDING ELEMENTARY EDUCATION FACILITIES, BUSINESS OFFICES/CORRIDORS/WAITING ROOMS AND THE LIKE, ASSEMBLY OCCUPANCIES INCLUDING PLACES OF AWAITING TRANSPORTATION/GYMNASIUM/AUDITORIUMS.
- G. RECEPTACLE AND DATA OUTLETS SHALL NOT BE MOUNTED IN TRIM OF WINDOWS. LOCATE WHERE FULL WALL IS AVAILABLE.

**KEYNOTES**

- 1. PROVIDE 120V CONNECTION FOR MECHANICAL CONTROLS. COORDINATE WITH MECHANICAL CONTROLS CONTRACTOR PRIOR TO ROUGH-IN.
- 2. PROVIDE 3/4" FIRE RETARDANT PLYWOOD BACKBOARD FROM FLOOR TO CEILING INSTALLED VERTICALLY STARTING AT 8" AFF. PAINT WITH TWO COATS OF COLOR WHITE FIRE RETARDANT PAINT.
- 3. PROVIDE 120V CONNECTION FOR MOTORIZED DAMPER. COORDINATE EXACT REQUIREMENTS WITH MC.
- 4. PROVIDE 120V CONNECTION WITH MOTOR RATED SWITCH FOR CIRCULATION PUMP C/P. COORDINATE EXACT LOCATION AND REQUIREMENTS WITH PLUMBING CONTRACTOR.
- 5. ROUTE (2) 4" TO CABLE TRAY BELOW. STUB 6" ABOVE SLAB AT MECHANICAL PLATFORM.

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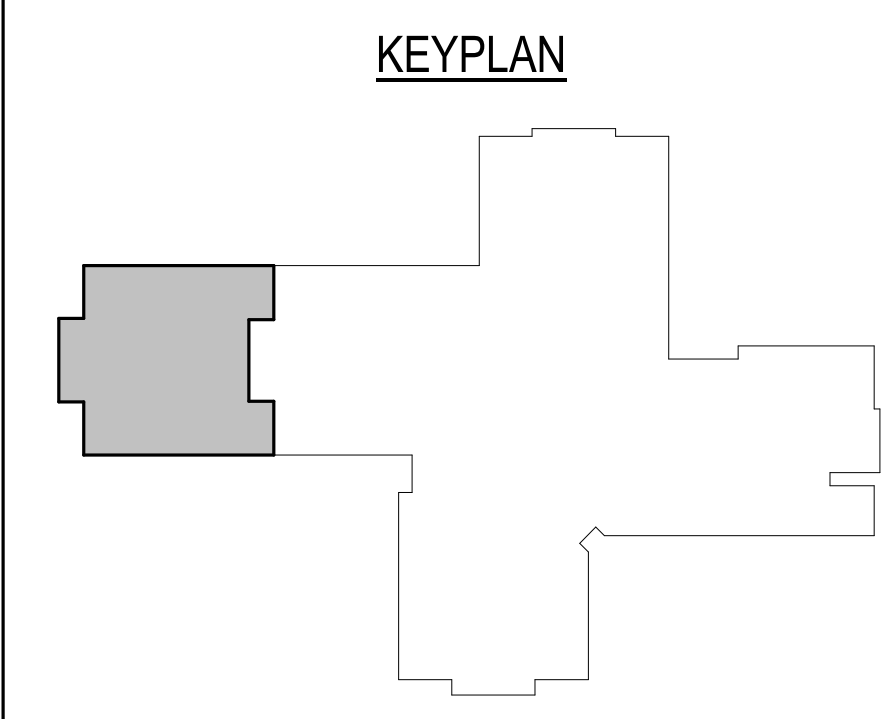
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**MECHANICAL LOFT POWER PLAN**



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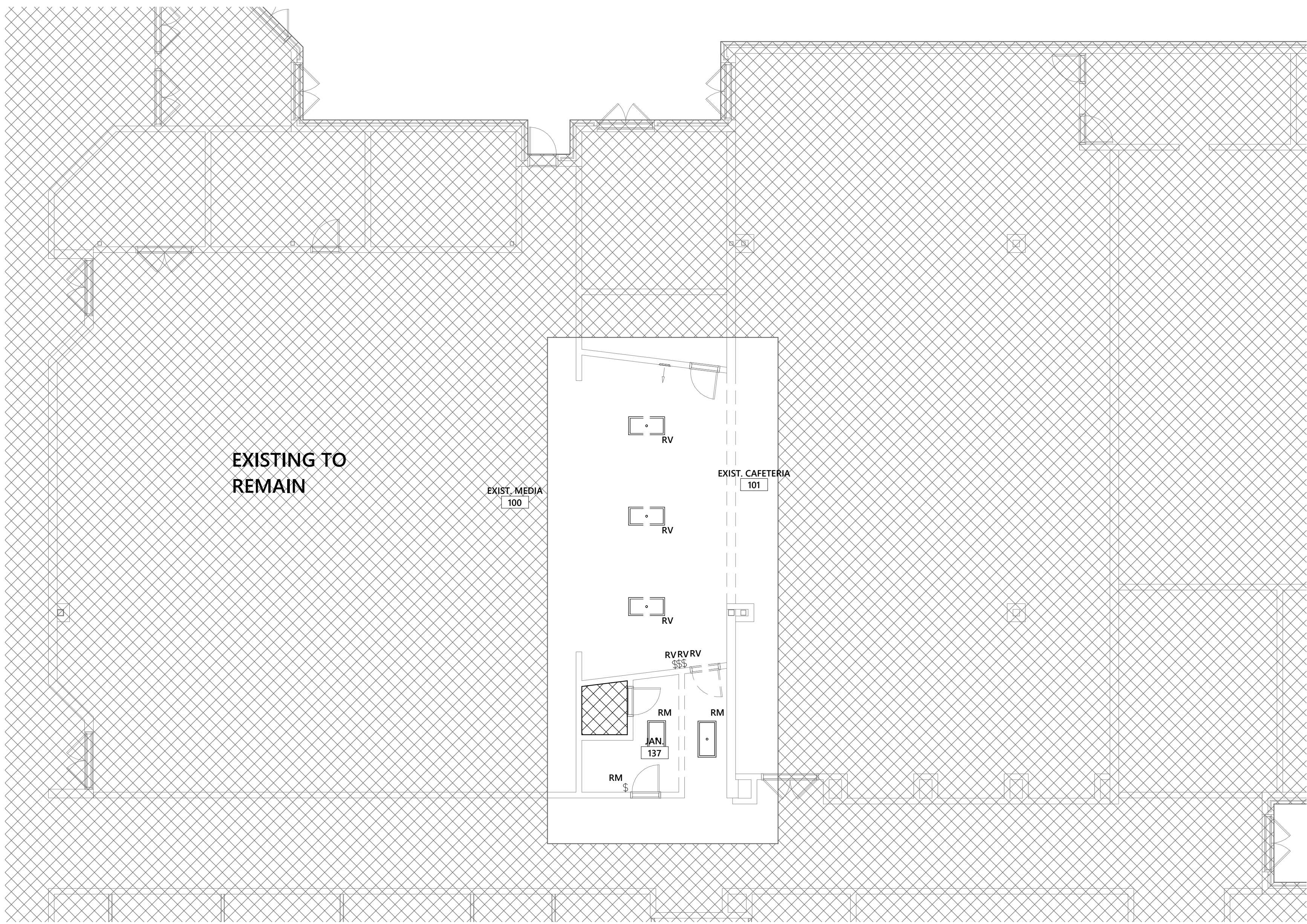
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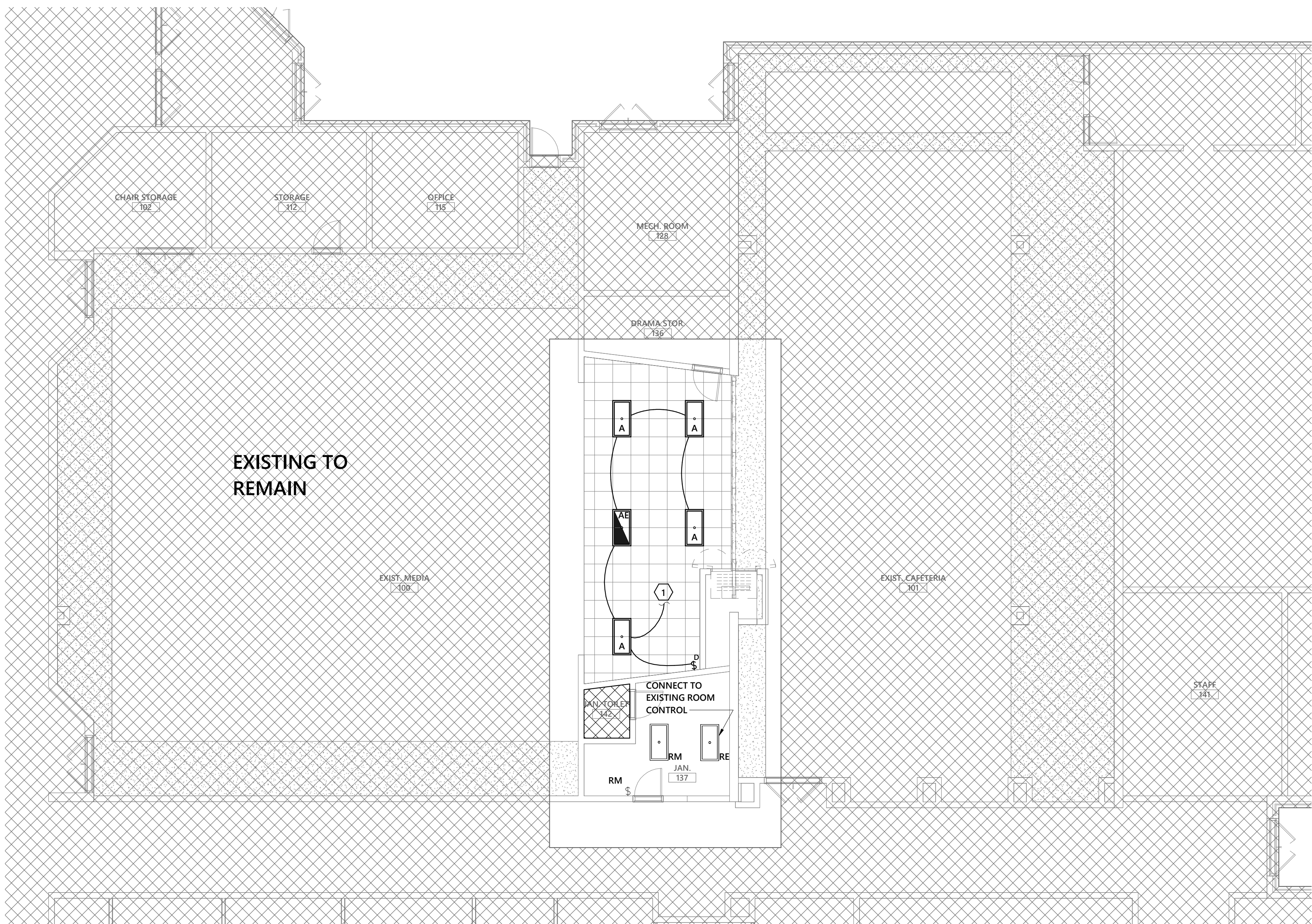
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1 CAFETERIA EXPANSION LIGHTING PLAN - DEMOLITION  
1/8" = 1'-0"



2 CAFETERIA EXPANSION LIGHTING PLAN - NEW WORK  
1/8" = 1'-0"

**GENERAL NOTES**

- A. ALL RECESSED LIGHTING FIXTURES IN LAY-IN CEILING SHALL BE INSTALLED WITH 6'-0" LONG FLEXIBLE METAL CONDUIT.
- B. SEE ARCHITECTURAL EXTERIOR ELEVATIONS FOR MOUNTING HEIGHTS OF EXTERIOR LIGHTING FIXTURES.
- C. CONNECT EMERGENCY EXIT SIGNS AND THE UNSWITCHED INPUT OF BATTERY PACKS TO LOCAL LIGHTING CIRCUIT, AHEAD OF SWITCHING.
- D. DASHED ARCHITECTURAL LINES INDICATE DEMOLITION. DISCONNECT AND REMOVE EXISTING ELECTRICAL DEVICES IN WALLS AND CEILINGS. TYPICAL IN ALL AREAS UNLESS OTHERWISE NOTED. COORDINATE WITH OTHER TRADES AS REQUIRED TO FACILITATE COMPLETE DEMOLITION.
- E. CONTRACTOR SHALL MAKE SURE TO MAINTAIN CONTINUITY OF ELECTRICAL DEVICES THAT ARE OUTSIDE AREA OF WORK THAT ARE INTENDED TO REMAIN ENERGIZED.
- F. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING LIGHT FIXTURES TO REMAIN.
- G. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
- H. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING POWER DEVICES TO REMAIN.
- I. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

**KEYNOTES**

- 1. CONNECT TO EXISTING 277V LIGHTING CIRCUIT AND CONTROLS SERVING THIS AREA. TOTAL LOAD ON EXISTING CIRCUIT SHALL NOT EXCEED 4400 WATTS.

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CAFETERIA  
EXPANSION  
LIGHTING PLANS

E-211

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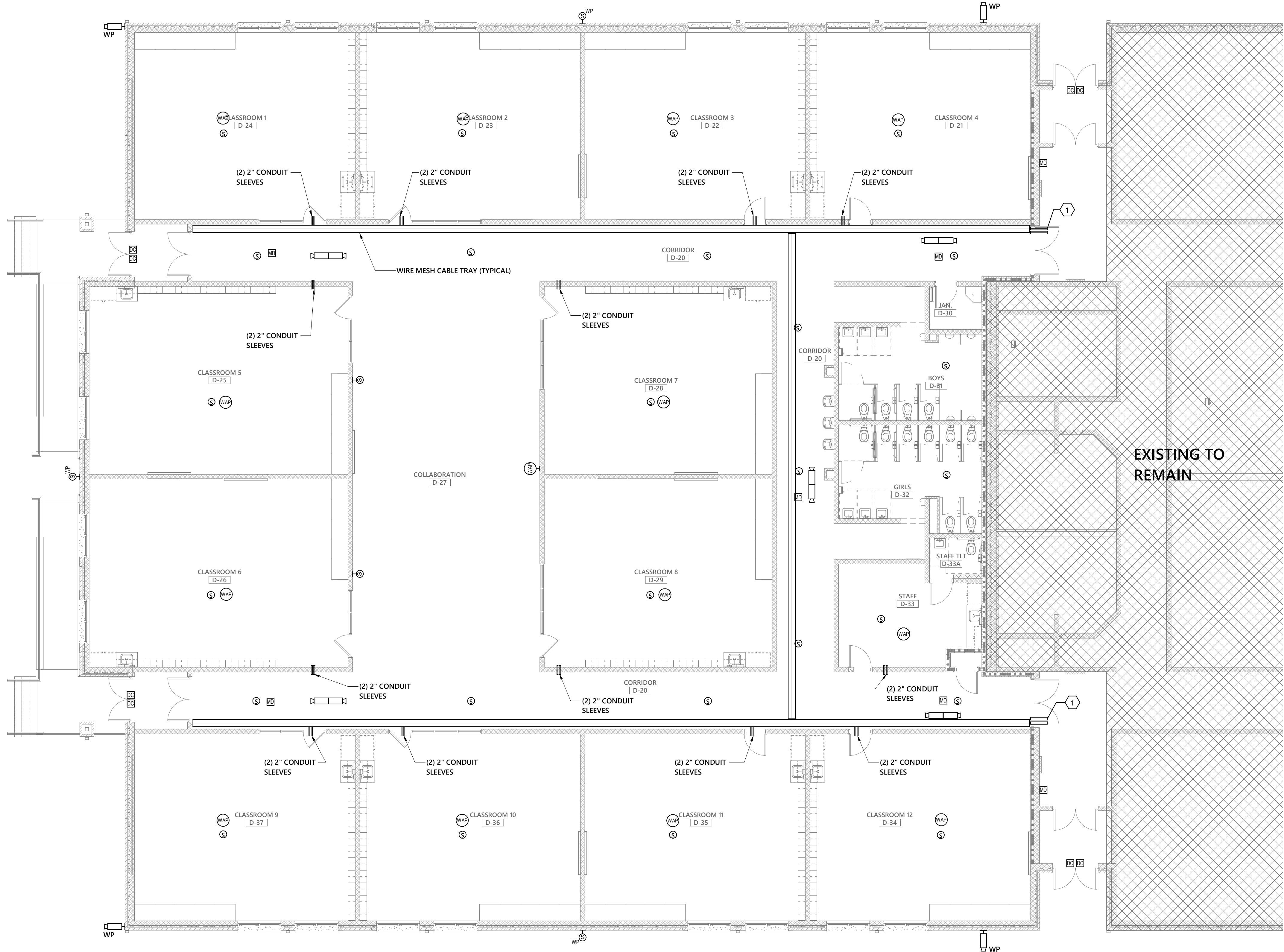
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**1** CLASSROOM ADDITION SPECIAL SYSTEMS PLAN - NEW WORK  
1/8" = 1'-0"

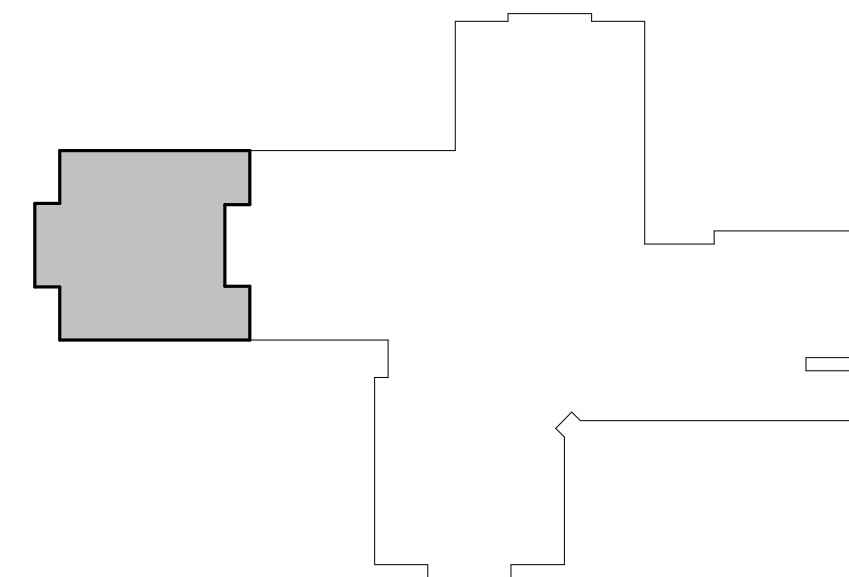
**GENERAL NOTES**

- A. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
- B. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

**KEYNOTES**

PROVIDE (2) 4" X 4" EZ-PATH FIRE RATED PATHWAYS THROUGH FIRE WALL. PROVIDE GROUNDING BUSHING FOR ALL PATHWAYS AND CONNECT TO GROUND BUS BAR WITH #6 AWG CONDUCTOR.

**KEYPLAN**



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HIGHLAND ELEMENTARY ADDITION & RENOVATION**

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**CLASSROOM  
ADDITION SPECIAL  
SYSTEMS PLAN -  
NEW WORK**

**E-312**

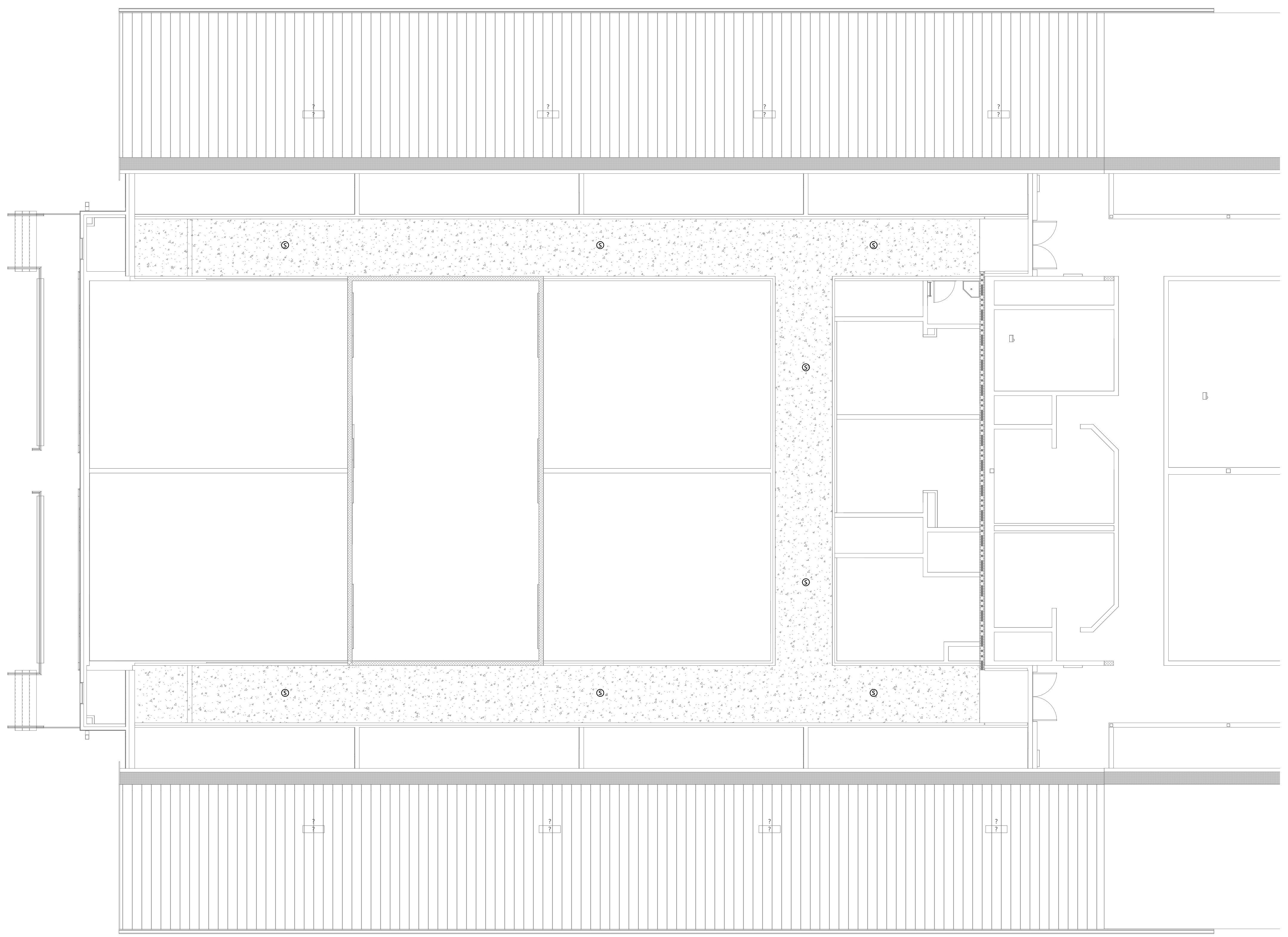
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**2 MECHANICAL LOFT SPECIAL SYSTEMS PLAN**  
1/8" = 1'-0"

**GENERAL NOTES**

- A. MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL FIRE ALARM DEVICES TO REMAIN.
- B. HATCHED AREAS ARE NOT IN SCOPE OF WORK.

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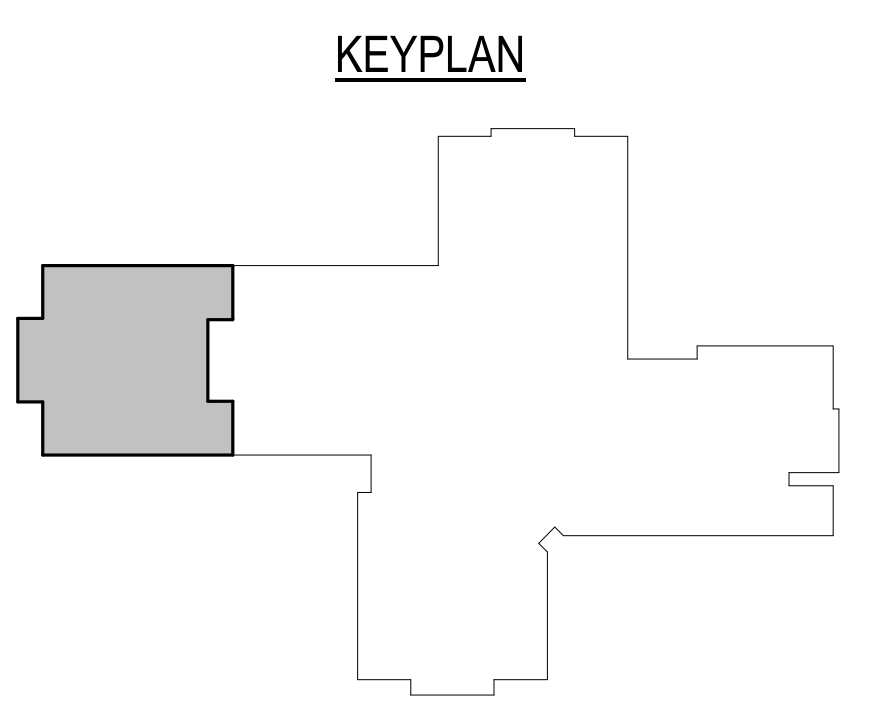
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**MECHANICAL LOFT  
SPECIAL SYSTEMS  
PLAN**



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- E. TYPICAL CLASSROOM IS SHOWN AND SHALL BE ROTATED, MIRRORRED, ETC. TO FIT EACH RESPECTIVE CLASSROOM IN A SIMILAR MANNER.
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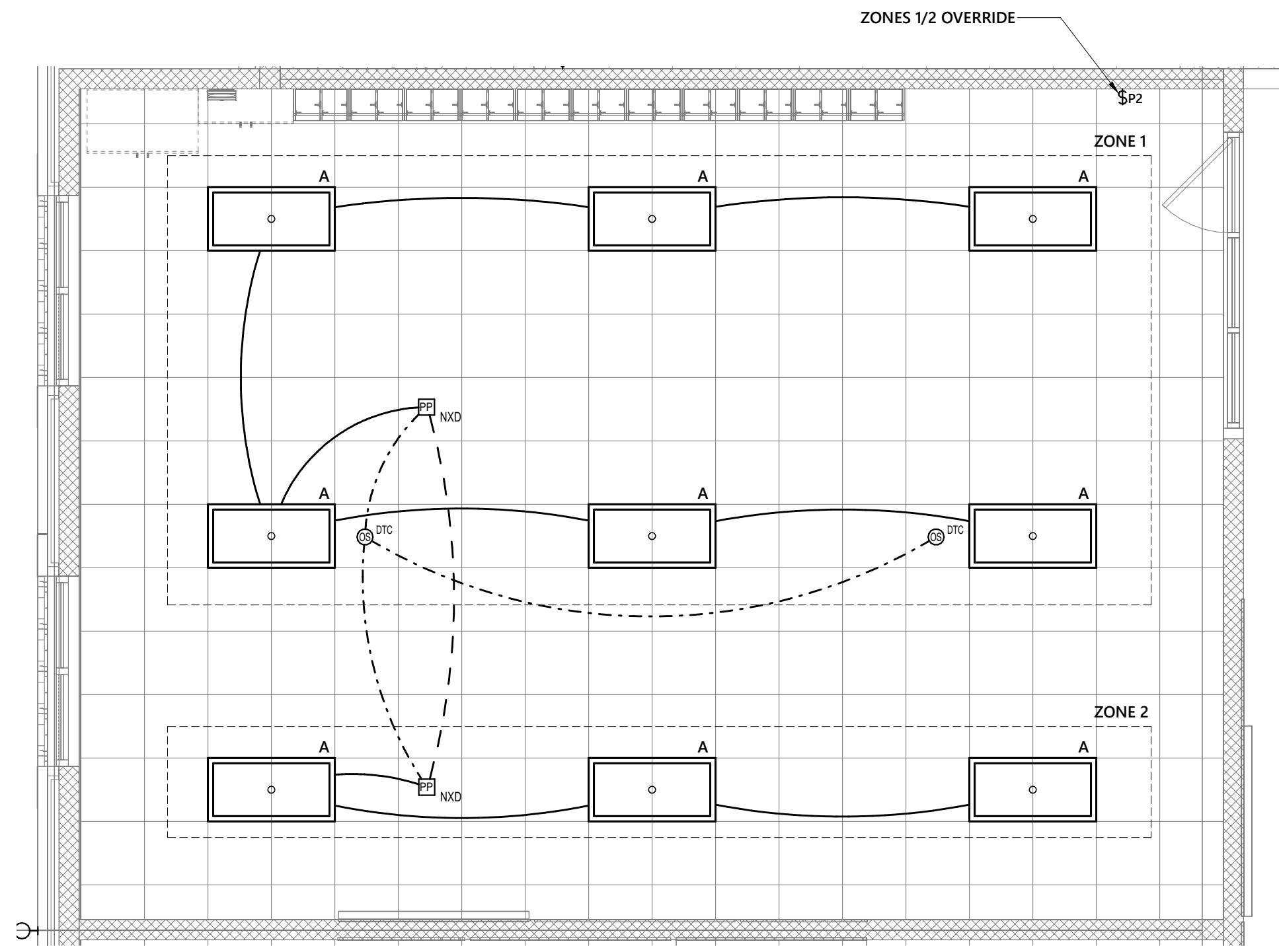


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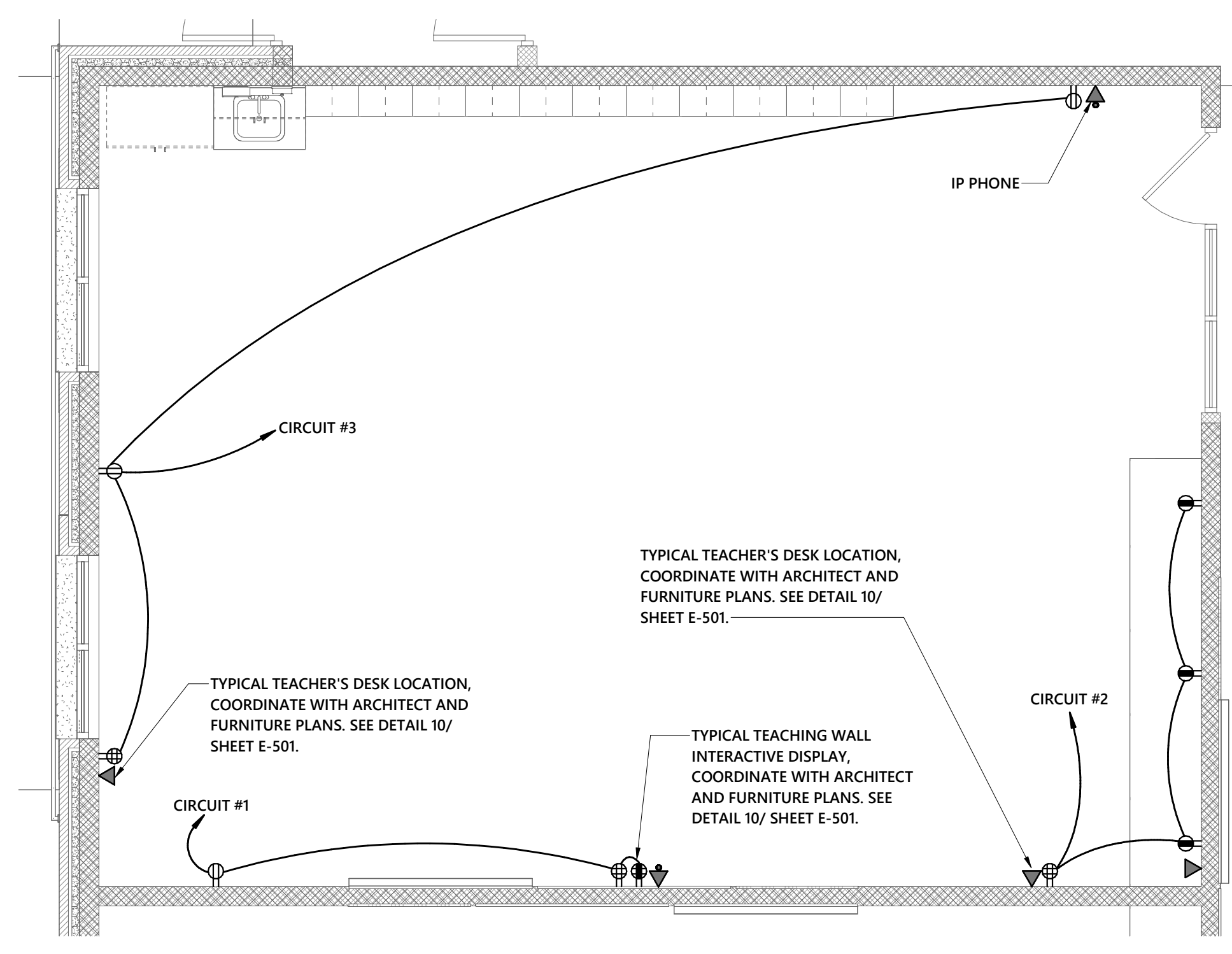
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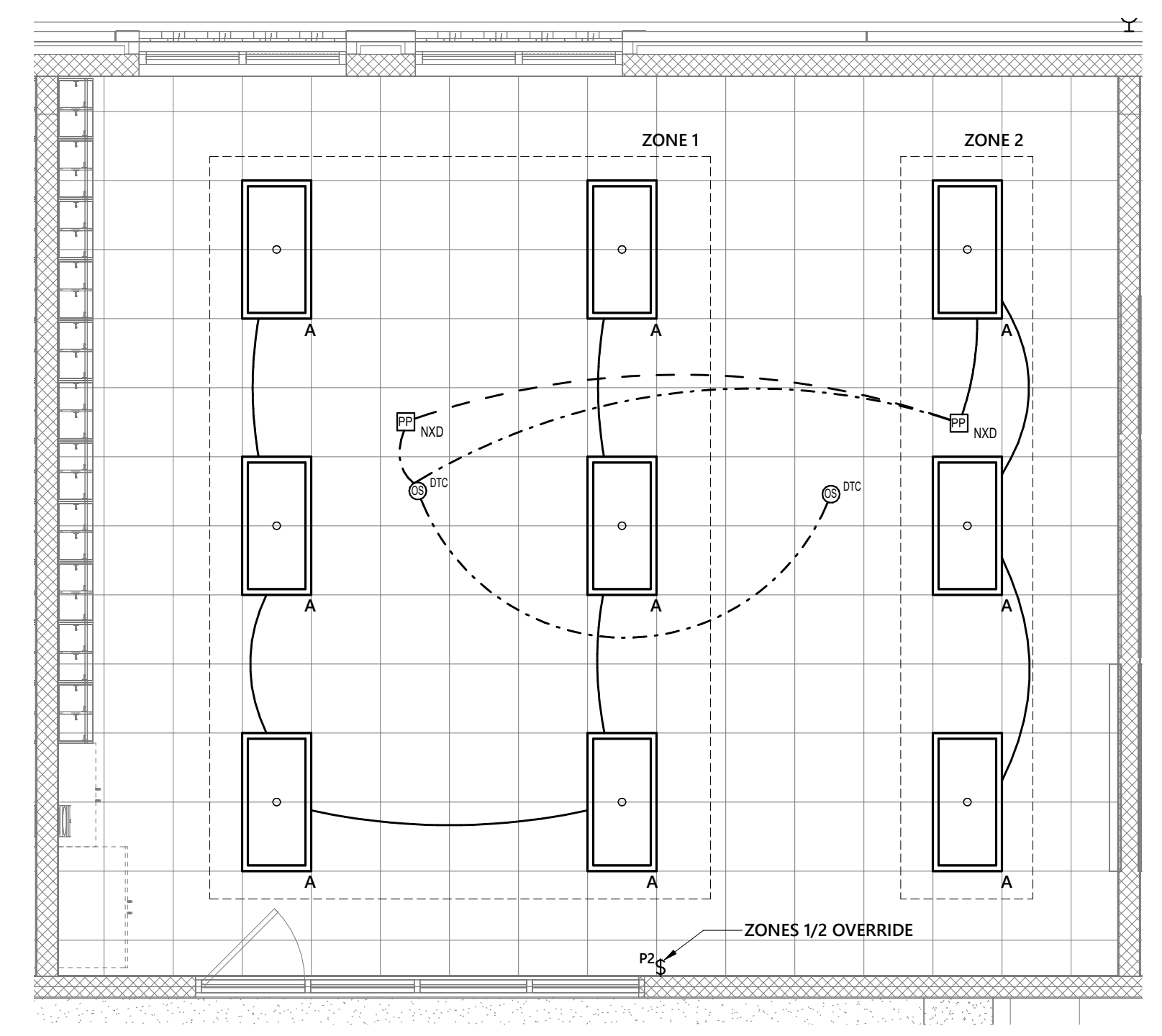
- GENERAL NOTES:**
1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS.
  2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.

**1 ENLARGED TYPICAL CLASSROOM PLAN 1 - LIGHTING**  
1/4" = 1'-0"



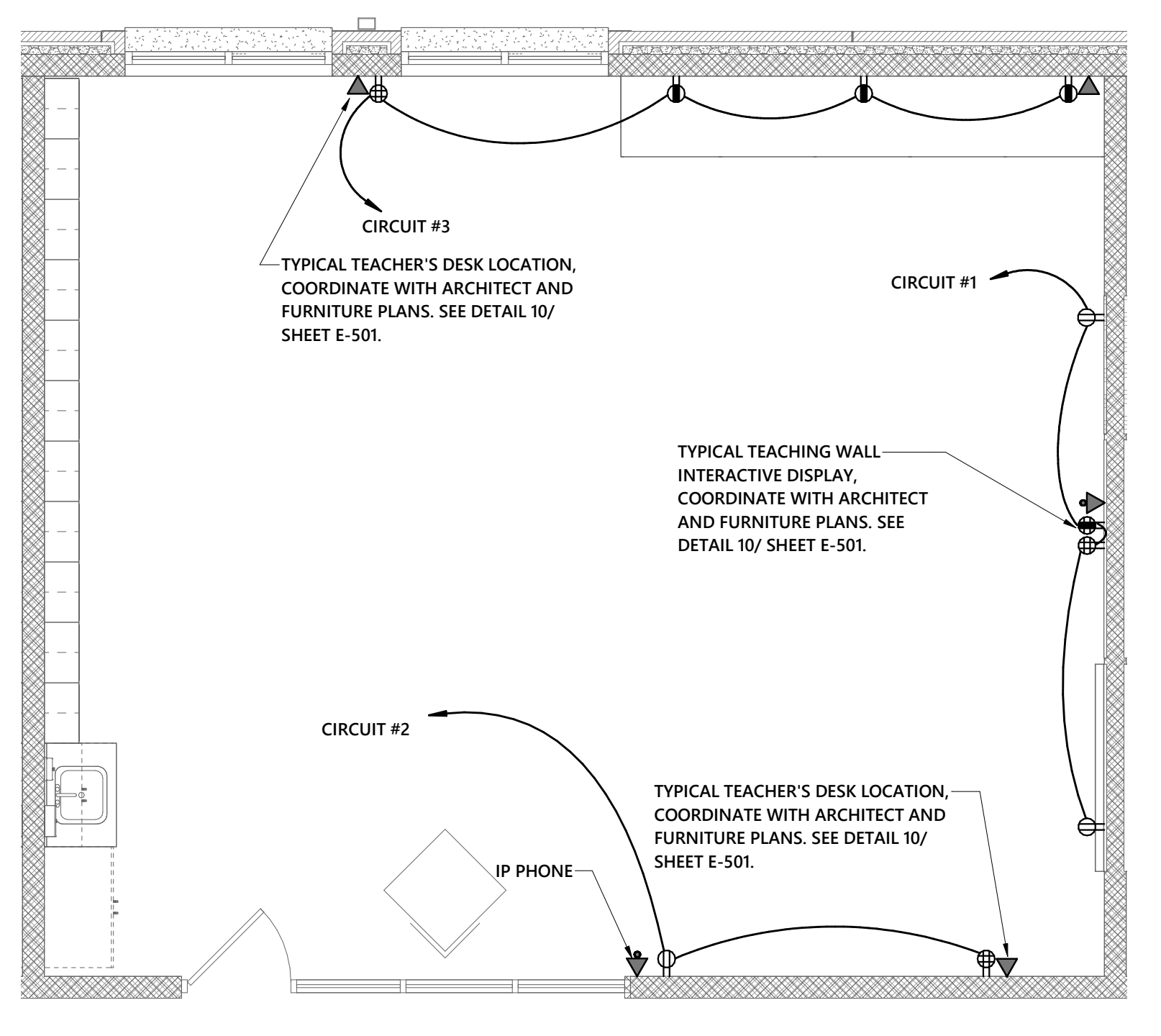
- GENERAL NOTES:**
1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS.
  2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.

**2 ENLARGED TYPICAL CLASSROOM PLAN 1 - POWER**  
1/4" = 1'-0"



- GENERAL NOTES:**
1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS.
  2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.

**3 ENLARGED TYPICAL CLASSROOM PLAN 2 - LIGHTING**  
1/4" = 1'-0"



- GENERAL NOTES:**
1. SEE FLOOR PLANS FOR CIRCUIT DESIGNATIONS.
  2. SEE MANUFACTURER SUBMITTED DRAWINGS FOR EXACT DEVICE AND CABLING LAYOUTS.

**4 ENLARGED TYPICAL CLASSROOM PLAN 2 - POWER**  
1/4" = 1'-0"

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**ENLARGED ELECTRICAL PLANS**

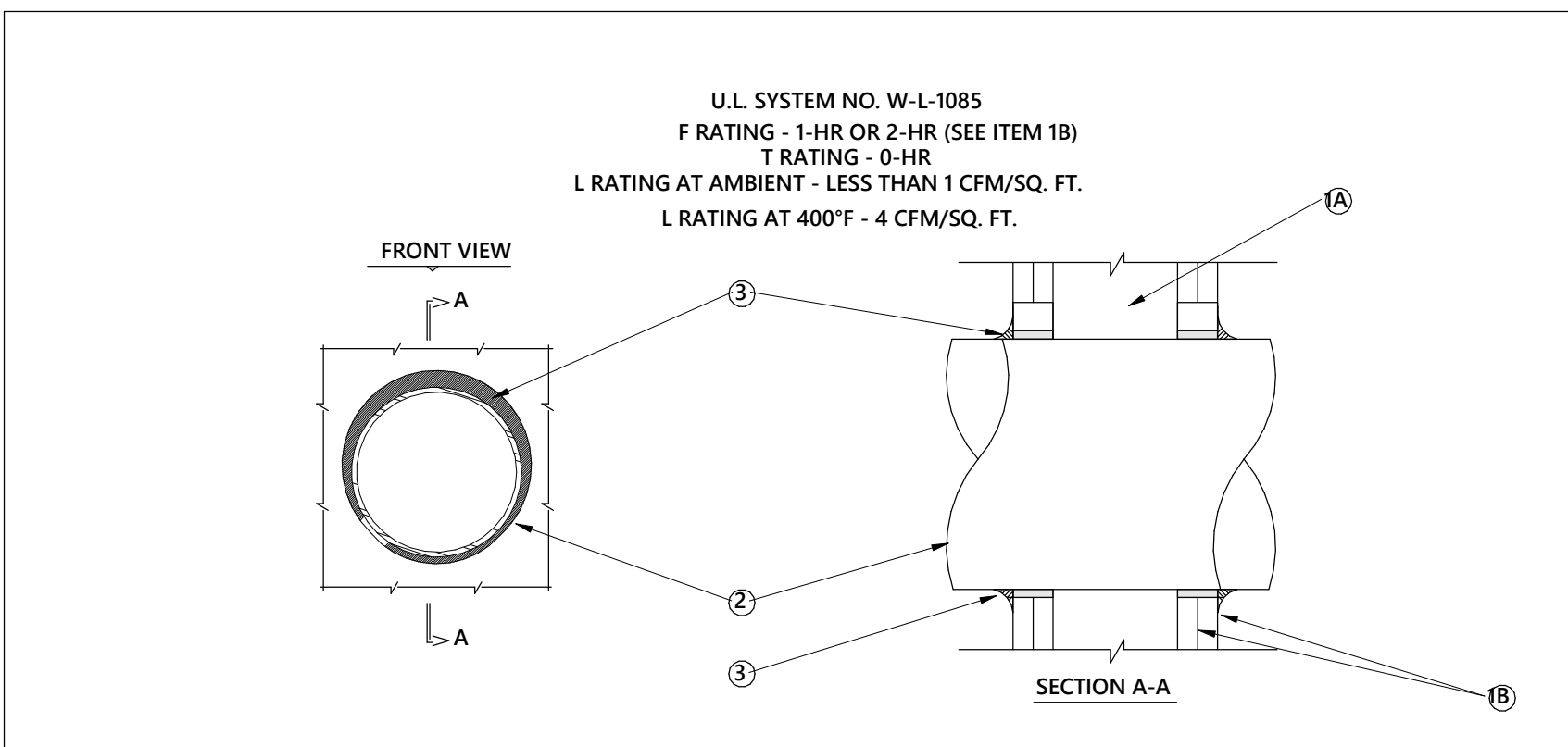
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1. WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

- A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2-1/2 IN. IN. WIDE AND SPACED MAX 24 IN. OC.
B. GYPSUM BOARD - 5/8 IN. THICK, 4 FT WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM WALLBOARD TYPE, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX DIA OF OPENING IS 13-1/4 IN.

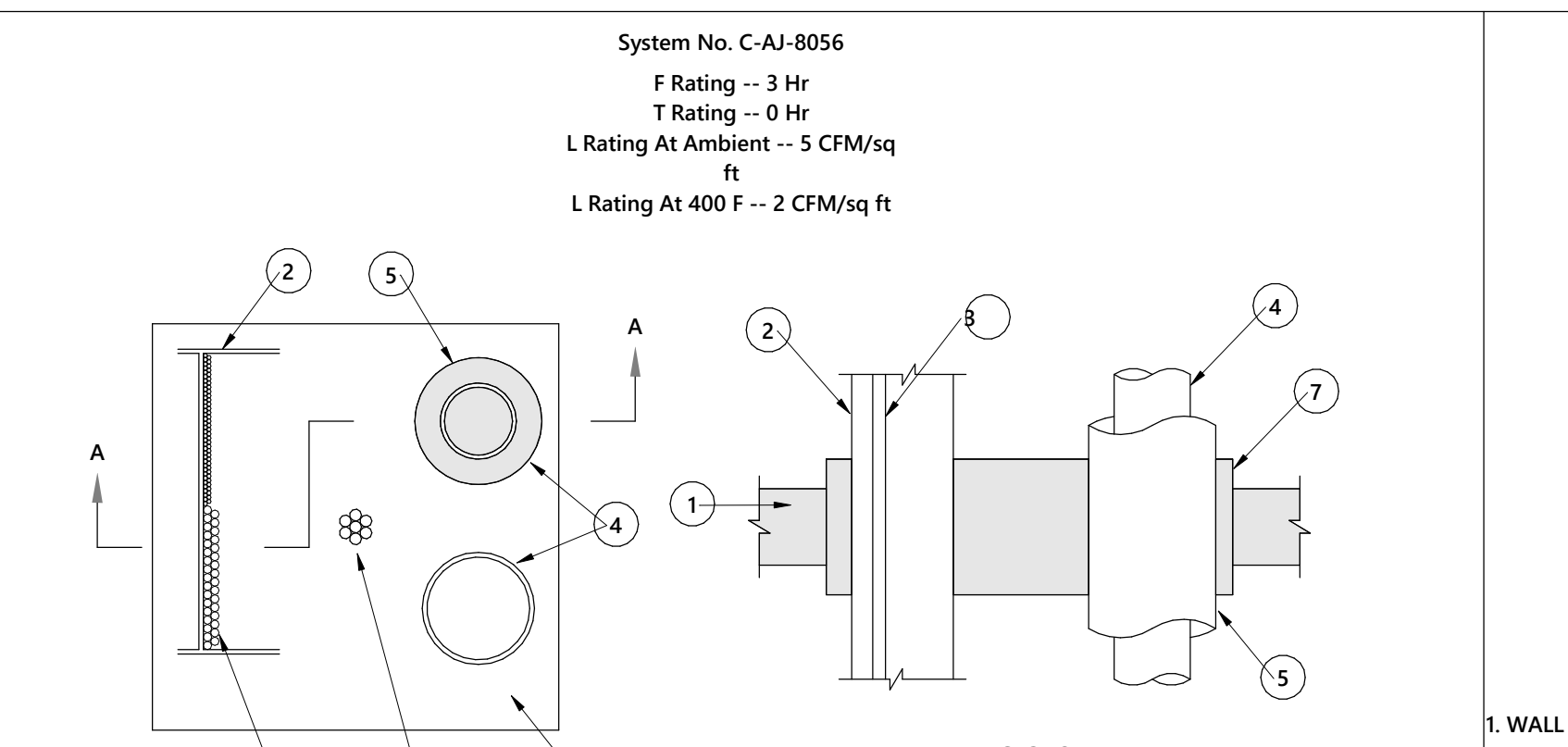
DIA OF CIRCULAR OPENING CUT THROUGH GYPSUM WALLBOARD OF EACH SIDE OF WALL ASSEMBLY TO BE MIN 1/4 IN. TO MAX 1/2 IN. LARGER THAN OUTSIDE DIA OF THROUGH PENETRANT (ITEM 2). THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY F RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.

2. THROUGH PENETRANTS - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE ANNUAL SPACE BETWEEN THE THROUGH PENETRANT AND THE PERIPHERY OF THE OPENING SHALL BE MIN 0 IN. TO MAX 1/4 IN. IN THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

- A. STEEL PIPE - NOM 12 IN. DIA. (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE - NOM 12 IN. DIA. (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT - NOM 6 IN. DIA. (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR STEEL CONDUIT.
D. COPPER TUBING - NOM 5 IN. DIA. (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
E. COPPER TUBING - NOM 6 IN. DIA. (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

3. FILL, VOID, OR CAVITY MATERIAL - SEALANT - FILL MATERIAL TO BE FORCED INTO THE ANNULUS TO MAXIMUM EXTENT POSSIBLE. ADDITIONAL FILL MATERIAL TO BE INSTALLED SUCH THAT A MIN 1/2 IN. CROWN IS FORMED AROUND THE PENETRATING ITEM AND LAPPING 1/4 IN. BEYOND THE PERIPHERY OF THE OPENING.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT \*BEARING THE UL CLASSIFICATION MARK



1. FLOOR OR WALL ASSEMBLY - 4-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS. MAX AREA OF OPENING IS 296 IN. SQ WITH MAX DIMENSION OF 36 IN. SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

- 2. CABLE TRAY - MAX 18 IN. WIDE BY MAX 6 IN. DEEP OPEN-LADDER OR SOLID-BACK CABLE TRAY WITH CHANNEL-SHAPED SIDE RAILS FORMED OF 0.60 IN. THICK ALUMINUM OR STEEL AND WITH 1-1/2 IN. WIDE BY 1 IN. CHANNEL SHAPE RUNGS SPACED 9 IN. OC OR A 0.029 IN. THICK STEEL SOLID BACK, RESPECTIVELY. ONE CABLE TRAY TO BE INSTALLED IN THE OPENING. THE MAX ANNUAL SPACE BETWEEN THE CABLE TRAYS IS 9 IN. AND BETWEEN THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. TO MAX 4-1/2 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

3. CABLES - AGGREGATE CROSS-SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 30 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CABLE TRAY BASED ON A MAX 3 IN. CABLE LOADING DEPTH WITHIN THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR OR FIBER OPTIC CABLES MAY BE USED:

- A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 300 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 1/C, 500 KCMIL WITH THERMO PLASTIC INSULATION AND POLYVINYL CHLORIDE (PVC) JACKET.
E. TWENTY FOUR FIBER OPTIC CABLE WITH PVC SUB UNIT AND JACKET.

4. THROUGH-PENETRANTS - ONE OR MORE PIPE, CONDUIT OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNUAL SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN PIPES, CONDUITS OR TUBING AND BETWEEN THE PERIPHERY OF THE OPENING AND THE PIPES OR CONDUITS SHALL BE MIN 1 IN. TO MAX 4-1/2 IN. PIPE, CONDUIT OR TUBE TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

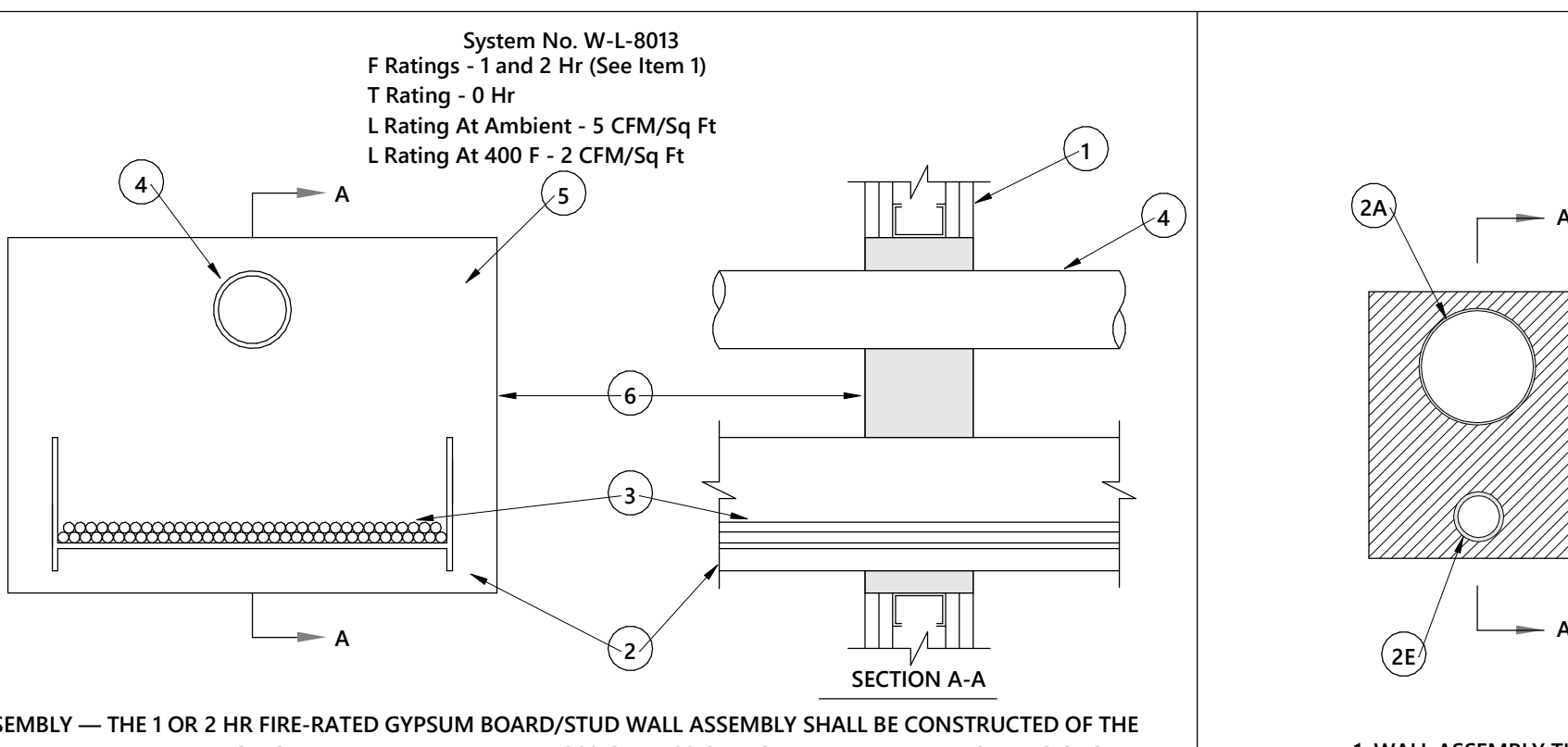
- A. NOM 6 IN. DIA. (OR SMALLER) RIGID GALV STEEL CONDUIT.
B. NOM 4 IN. DIA. (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING.
C. NOM 4 IN. DIA. (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
D. NOM 4 IN. DIA. (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.
E. NOM 6 IN. DIA. (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
F. NOM 8 IN. DIA. (OR SMALLER) CAST OR DUCTILE IRON PIPE.

5. PIPE COVERING - NOM 1-1/2 IN. THICK HOLLOW CYLINDRICAL HEAVY DENSITY (MIN 3.5 PCF) GLASS FIBER UNITS JACKETED ON THE OUTSIDE WITH AN ALL SERVICE JACKET. LONGITUDINAL JOINTS SEALED WITH METAL FASTENERS OR FACTORY APPLIED SELF-SEALING LAP TAPE. TRANSVERSE JOINTS SEALED WITH METAL FASTENERS OR BUTT TAPE SUPPLIED WITH THE PRODUCT.

6. CABLES - MAX 2 IN. DIA TIGHT BUNDLE OF CABLES CENTERED IN OPENING AND RIGIDLY SUPPORTED ON BOTH SURFACES OF FLOOR AND WALL. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF CABLES MAY BE USED:

- A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 25 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 2/C NO. 10 AWG WITH PVC INSULATION AND JACKET.
D. 3/C NO. 8 AWG ALUMINUM CLAD CABLE WITH CROSS-LINKED POLYETHYLENE (XLPE) INSULATION AND PVC JACKET.
E. TYPE RC - 62 A/U COAXIAL CABLE WITH AIR CORE AND PVC JACKET.
F. 24 FIBER OPTIC CABLE WITH PVC SUB UNIT AND OUTER JACKET.

7. FIRESTOP SYSTEM - THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. FILL, VOID OR CAVITY MATERIAL - FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES AND BETWEEN CABLES AND CABLE TRAYS TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT
C. WIRE MESH (NOT SHOWN) - WHEN THE ANNUAL SPACE EXCEEDS 4-1/2 IN. TO THE PERIPHERY, A NOM 2 IN. SQ WIRE FENCING SHALL BE USED TO KEEP THE FIRE BLOCKS IN PLACE. THE WIRE FENCING IS FABRICATED FROM MIN NO. 16 SWG (0.060 IN.) GALV STEEL WIRE. THE WIRE IS CUT TO FIT THE CONTOUR OF THE PENETRATING ITEM WITH A MIN 3 IN. LAP BEYOND THE PERIPHERY OF THE OPENING. WIRE FENCING SECURED TO TOP SURFACE OF FLOOR AND BOTH SURFACES OF WALL ASSEMBLY BY MEANS OF 1/4 IN. DIA BY 1 IN. LONG CONCRETE ANCHORS AND 1/4 IN. BY 1-1/2 IN. DIA FENDER WASHERS SPACED MAX 8 IN. OC.
\*BEARING THE UL CLASSIFICATION MARK



1. WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM BOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

- A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 IN. (51 MM) BY 4 IN. (102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2-1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC. ADDITIONAL STUDS INSTALLED TO COMPLETELY FRAME THE OPENING.
B. GYPSUM BOARD - 5/8 IN. (16 MM) THICK, 4 FT (1219 MM) WIDE WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 352 SQ CM. (2271 SQ CM) WITH MAX DIMENSION OF 22 IN. (559 MM) WIDE. THE HOURLY F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE HOURLY FIRE RATING OF THE WALL ASSEMBLY IN WHICH IT IS INSTALLED.

2. CABLE TRAY - MAX 18 IN. (457 MM) WIDE BY MAX 6 IN. (152 MM) DEEP OPEN-LADDER OR SOLID-BACK CABLE TRAY WITH CHANNEL-SHAPED SIDE RAILS FORMED OF 0.605 IN. (15.2 MM) THICK ALUMINUM OR 0.660 IN. (1.52 MM) THICK STEEL AND WITH 1-1/2 IN. (38 MM) WIDE BY 1 IN. (25 MM) CHANNEL SHAPE RUNGS SPACED 9 IN. (229 MM) OC OR A 0.029 IN. (0.74 MM) THICK STEEL SOLID BACK, RESPECTIVELY. ONE CABLE TRAY TO BE INSTALLED IN THE OPENING. THE MAX ANNUAL SPACE BETWEEN THE CABLE TRAY AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1 IN. (25 MM) TO MAX 4-1/2 IN. (117 MM) CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

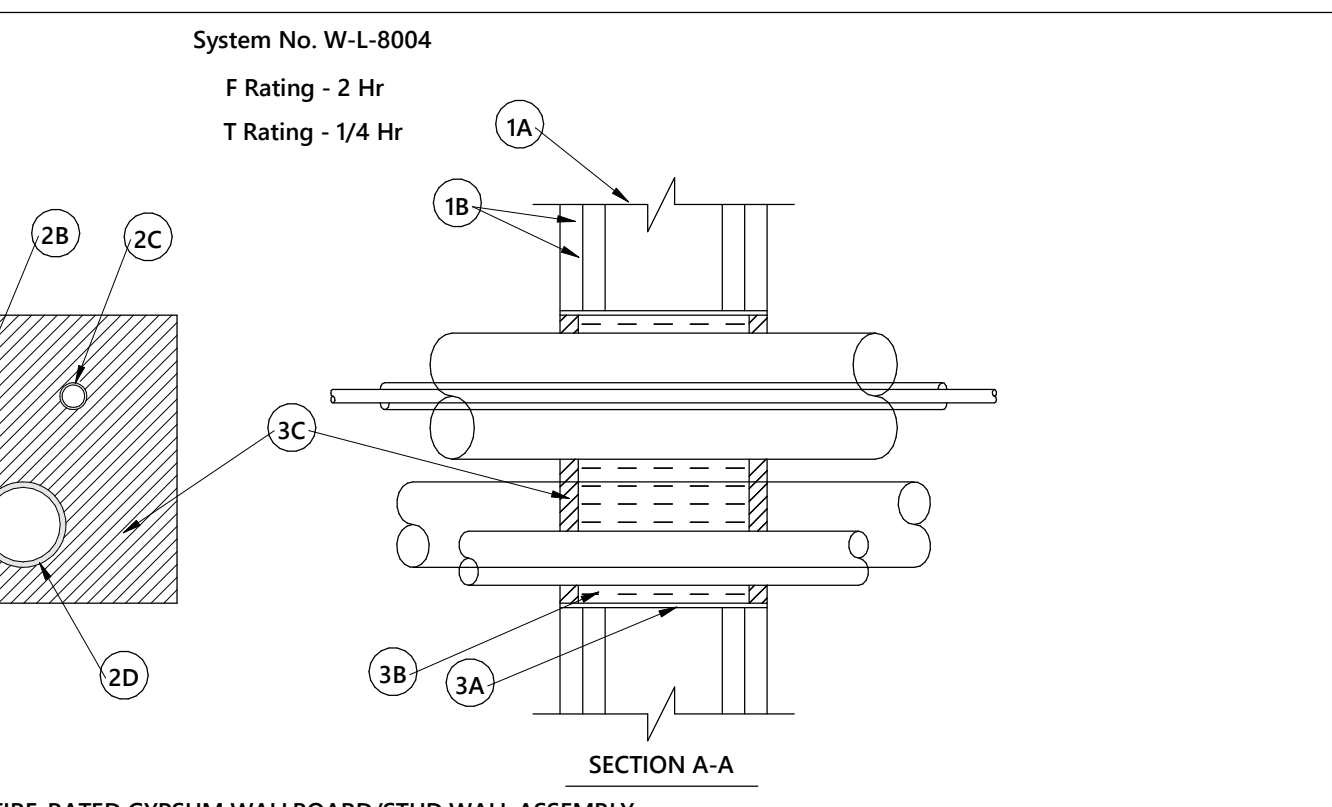
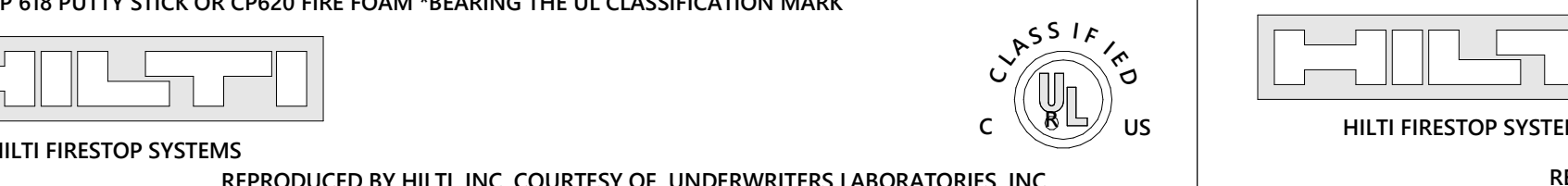
3. CABLES - AGGREGATE CROSS-SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 30 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR CABLES MAY BE USED:

- A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 100 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 1/C, 750 KCMIL (OR SMALLER) WITH PVC INSULATION AND JACKET.
4. THROUGH-PENETRANTS - ONE OR MORE PIPE OR TUBE TO BE INSTALLED WITHIN THE OPENING. THE TOTAL NUMBER OF THROUGH-PENETRANTS IS DEPENDENT ON THE SIZE OF THE OPENING AND TYPES AND SIZES OF THE PENETRANTS. ANY COMBINATION OF THE PENETRANTS DESCRIBED BELOW MAY BE USED PROVIDED THAT THE FOLLOWING PARAMETERS RELATIVE TO THE ANNUAL SPACES AND THE SPACING BETWEEN THE PIPES ARE MAINTAINED. THE SPACE BETWEEN THE PIPE OR TUBE AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1-1/2 IN. (38 MM) TO MAX 9-1/4 IN. (235 MM). PIPE OR TUBE TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF NON-METALLIC OR METALLIC PIPES, OR TUBES MAY BE USED:

- A. POLYVINYL CHLORIDE (PVC) PIPE - MAX 3 IN. (76 MM) DIA SCHEDULE 40 SOLID CORE PVC PIPE (OR SMALLER) FOR USE IN CLOSED (PROCESS OR SUPPLY) OR VENTED (DRAIN, WASTE OR VENT) PIPING SYSTEM.
B. STEEL PIPE - NOM 6 IN. (152 MM) DIA (OR SMALLER) SCHEDULE 40 (OR HEAVIER) STEEL PIPE.
C. CONDUIT - NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING OR 6 IN. (152 MM) DIA STEEL CONDUIT.
D. COPPER PIPE - NOM 4 IN. (102 MM) DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.
E. COPPER TUBE - NOM 4 IN. (102 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBE.

5. CABLES - MAX 1-1/2 IN. (38 MM) DIA TIGHT BUNDLE OF CABLES INSTALLED WITHIN THE OPENING AND RIGIDLY SUPPORTED ON BOTH SURFACES OF WALL. THE SPACE BETWEEN THE CABLES AND PERIPHERY OF THE OPENING SHALL RANGE FROM 1-3/16 IN. (30.2 MM) MIN TO A MAX OF 1-1/2 IN. (38 MM). ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF CABLES MAY BE USED:

- A. 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND PVC JACKET.
B. 25 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. TYPE R GLU/59 COAXIAL CABLE WITH PVC OUTER JACKET.
D. 24 FIBER OPTIC CABLE WITH PVC SUB UNIT AND OUTER JACKET.
6. FIRESTOP SYSTEM - THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. FILL, VOID OR CAVITY MATERIAL - FILL MATERIAL FOR WALLS INCORPORATING MAX 3-5/8 IN. (92 MM) STEEL STUDS OR MAX 2 (51 MM) BY 4 IN. (102 MM) WOOD STUDS. FIRE BLOCK INSTALLED WITH 5 IN. (127 MM) DIMENSION PROJECTING THROUGH AND CENTERED IN OPENING. FOR WALLS CONSTRUCTED OF LARGER STEEL OR WOOD STUDS, FIRE BLOCK INSTALLED WITH LONG DIMENSION PASSING THROUGH AND CENTERED IN OPENING. BLOCKS MAY OR MAY NOT BE CUT FLUSH WITH BOTH SURFACES OF WALL. WHEN MULTIPLE LAYERS OF GYPSUM BOARD ARE USED, BLOCKS MAY BE RECESSED 1/2 IN. (13 MM) FROM SURFACE OF WALL. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-657 FIRE BLOCK
B. FILL, VOID OR CAVITY MATERIAL - SEALANT OR PUTTY - FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES, BETWEEN CABLES AND CABLE TRAYS, AROUND EACH PENETRANT AND WHERE OBVIOUS VOIDS ARE OBSERVED TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT, CP 618 PUTTY STICK OR CP620 FIRE FOAM \*BEARING THE UL CLASSIFICATION MARK



1. WALL ASSEMBLY THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

- A. STUDS WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2-1/2 IN. IN. WIDE AND SPACED MAX 24 IN. OC.
B. GYPSUM BOARD - TWO LAYERS OF NOM 5/8 IN. THICK GYPSUM WALLBOARD, AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 86 SQ IN. WITH MAX DIMENSION OF 12 IN. MAX WIDTH OF OPENING IN WOOD STUD WALLS IS LIMITED TO 12 IN.
2. THROUGH PENETRANTS THE FOLLOWING TYPES AND SIZES OF PIPES, CONDUITS, TUBING OR CABLES MAY BE USED:

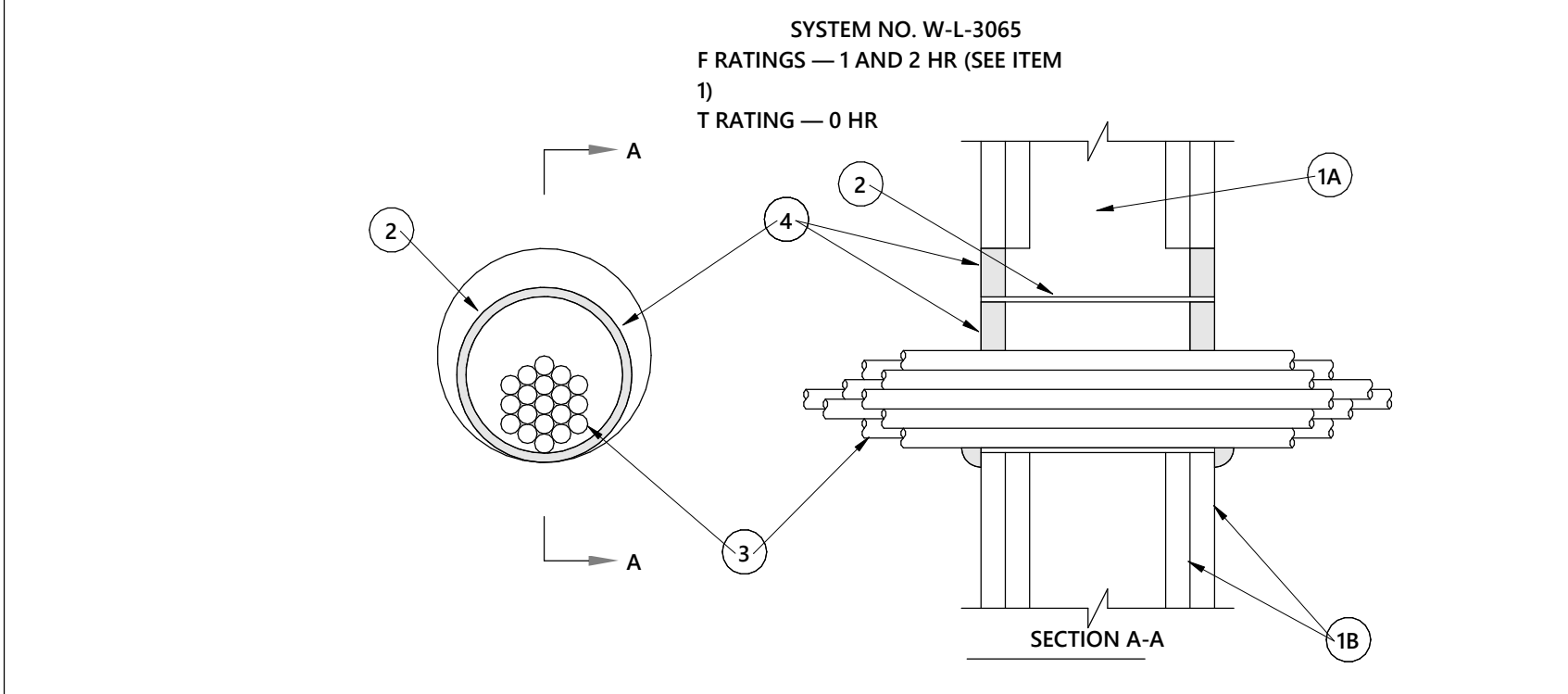
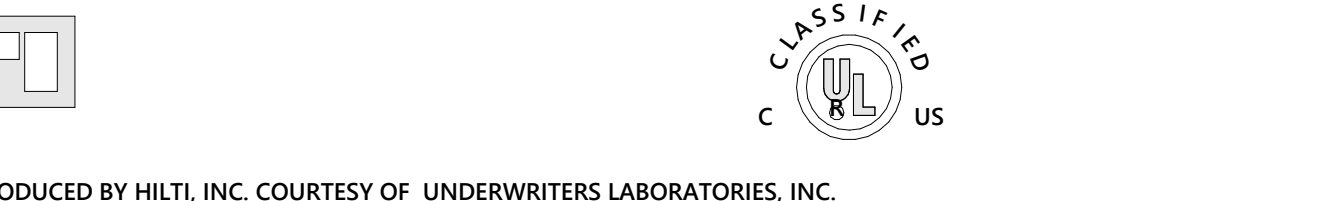
- A. NOM 3 IN. DIA. (OR SMALLER) ELECTRICAL METALLIC TUBING (EMT).
B. MAX 25 PAIR - NO. 24 AWG (OR SMALLER) TELEPHONE CABLE WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
C. MAX 3/C WITH GROUND - NO. 10 AWG (OR SMALLER) TYPE NM CABLE WITH PVC INSULATION AND JACKET.
D. NOM 2 IN. DIA. (OR SMALLER) SCHEDULE 40 PVC PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) PIPING SYSTEMS ONLY.

E. MAX 300 KCMIL (OR SMALLER) POWER CABLE WITH PVC INSULATION AND NYLON JACKET. THE THROUGH PENETRATING ITEMS TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY AND LOCATED AS SHOWN IN THE TABLE BELOW:

Table with columns: ITEM NO., PEN. ITEM IN., PEN. ITEM IN., OPENING IN., OPENING IN. Rows include items 2A, 2B, 2C, 2D, 2E.

3. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. STEEL WIRE MESH NO. 8 STEEL WIRE MESH HAVING A MIN 1 IN. LAP ALONG THE LONGITUDINAL SEAM. LENGTH OF STEEL WIRE MESH TO BE 4-3/4 IN. CENTERED AND FORMED TO FIT PERIPHERY OF THROUGH OPENING. STEEL WIRE MESH IS NOT REQUIRED WHEN ADDITIONAL FRAMING MEMBERS (ITEM NO. 1A) ARE USED.
B. PACKING MATERIAL MIN 4.0 IN. THICKNESS OF MIN 3.5 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.

C. FILL, VOID OR CAVITY MATERIAL - SEALANT MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT \*BEARING THE UL CLASSIFICATION MARK



1. WALL ASSEMBLY - THE 1 OR 2 HR FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300, U400 OR V400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

- A. STUDS - WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. (51 BY 102 MM) LUMBER SPACED 16 IN. (406 MM) OC. STEEL STUDS TO BE MIN 2-1/2 IN. (64 MM) WIDE AND SPACED MAX 24 IN. (610 MM) OC.
B. GYPSUM BOARD - NOM 5/8 IN. (16 MM) THICK GYPSUM BOARD, WITH SQUARE OR TAPERED EDGES. THE GYPSUM BOARD TYPE, THICKNESS, NUMBER OF LAYERS, FASTENER TYPE AND SHEET ORIENTATION SHALL BE AS SPECIFIED IN THE INDIVIDUAL U300, U400 OR V400 SERIES DESIGN IN THE UL FIRE RESISTANCE DIRECTORY. MAX DIA OF OPENING IS 5-1/2 IN. (138 MM) WHEN SLEEVE (ITEM 2) IS EMPLOYED. MAX DIA OF OPENING IS 4 IN. (102 MM) WHEN SLEEVE (ITEM 2) IS NOT EMPLOYED. THE F RATING OF THE FIRESTOP SYSTEM IS EQUAL TO THE FIRE RATING OF THE WALL ASSEMBLY.

2. METALLIC SLEEVE - (OPTIONAL) - NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT) OR SCHEDULE 5 (OR HEAVIER) STEEL PIPE OR MIN 0.016 IN. THICK (0.41 MM), NO. 28 GA. GALV STEEL SLEEVE INSTALLED FLUSH WITH WALL SURFACES. THE ANNUAL SPACE BETWEEN STEEL SLEEVE AND PERIPHERY OF OPENING SHALL BE MIN 0 IN. (0 MM, POINT CONTACT) TO MAX 1 IN. (25 MM), WHEN SCHEDULE 5 STEEL PIPE OR EMT IS USED, SLEEVE MAY EXTEND UP TO 18 IN. (457 MM) BEYOND THE WALL SURFACES.

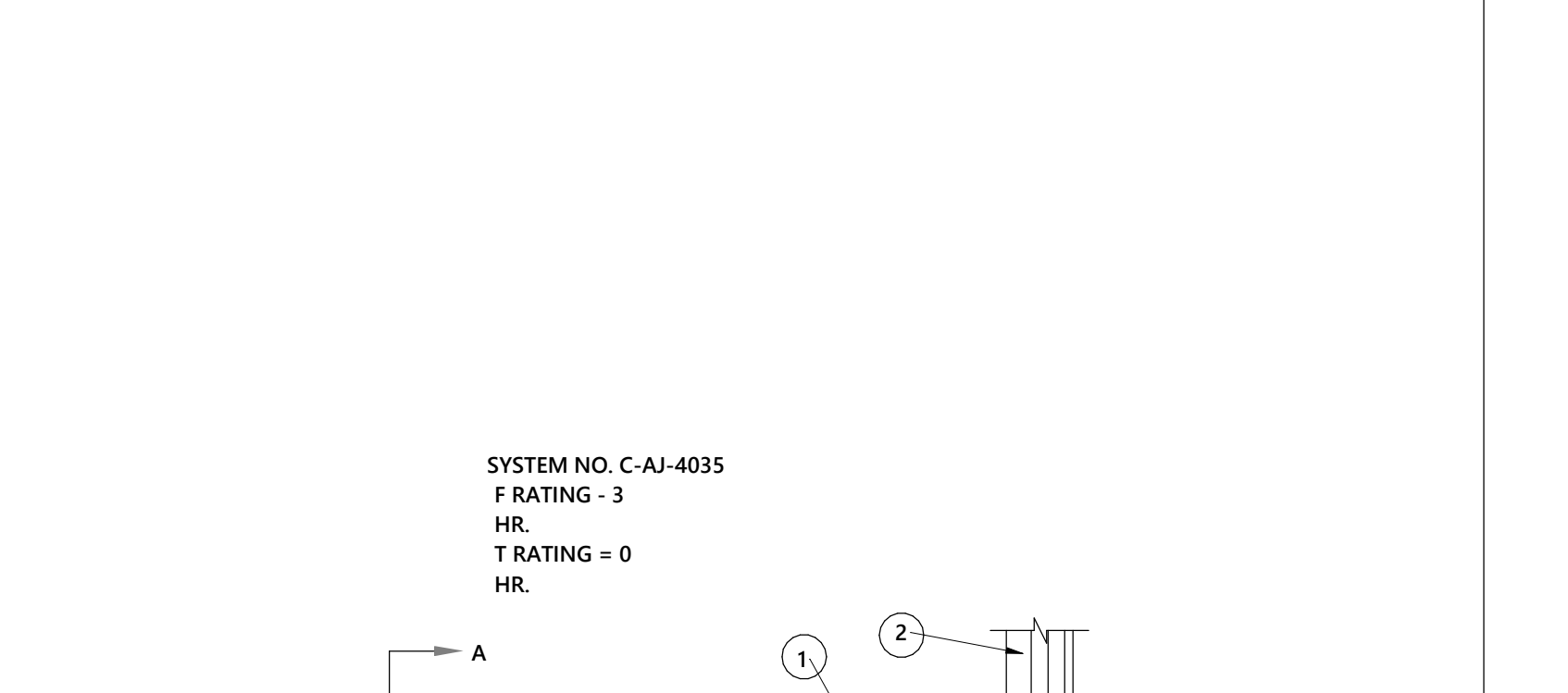
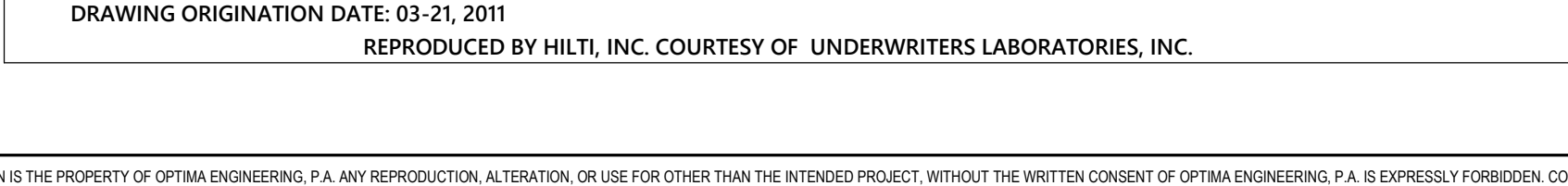
3. CABLES - AGGREGATE CROSS-SECTIONAL AREA OF CABLE IN OPENING TO BE MAX 45 PERCENT OF THE CROSS-SECTIONAL AREA OF THE OPENING. THE ANNUAL SPACE BETWEEN THE CABLE BUNDLE AND THE PERIPHERY OF THE OPENING TO BE MIN 0 IN. (0 MM, POINT CONTACT) TO MAX 1 IN. (25 MM). CABLES TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF THE WALL ASSEMBLY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR CABLES MAY BE USED:

- A. MAX 7/C NO. 12 AWG WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
B. MAX 25 PAIR NO. 24 AWG TELEPHONE CABLE WITH PVC INSULATION AND JACKET.
C. MAX 4 PR NO. 22 AWG CAT 5 OR CAT 6 COMPUTER CABLES.
C. TYPE RG/U COAXIAL CABLE WITH POLYETHYLENE (PE) INSULATION AND PVC JACKET HAVING A MAX OUTSIDE DIAMETER OF 1/2 IN. (13 MM).
D. MAX RG 6/U COAXIAL CABLE WITH FLUORINATED ETHYLENE INSULATION AND JACKETING.
E. MULTIPLE FIBER OPTICAL COMMUNICATION CABLE JACKETS WITH PVC AND HAVING A MAX OD OF 5/8 IN. (16 MM).
E. THROUGH PENETRATING PRODUCTS - MAX THREE COPPER CONDUCTOR NO. 8 AWG. METAL-CLAD CABLE - AFC CABLE SYSTEMS INC.
F. MAX 3/C (WITH GROUND) (OR SMALLER) NO. 8 AWG COPPER CONDUCTOR CABLE WITH PVC INSULATION AND JACKETING.
G. MAX 3/4 IN. (19 MM) DIA COPPER GROUND CABLE WITH OR WITHOUT A PVC JACKET.

H. FIRE RESISTIVE CABLES - MAX 1-1/4 IN. (32 MM) DIA SINGLE CONDUCTOR OR MULTI-CONDUCTOR TYPE MI CABLE. A MIN 1/8 IN. (3 MM) SEPARATION SHALL BE MAINTAINED BETWEEN MI CABLES AND ANY OTHER TYPES OF CABLE.
I. MAX 4/C WITH GROUND 300KCMIL (OR SMALLER) ALUMINUM SER CABLE WITH PVC INSULATION AND JACKET.

J. THROUGH PENETRATING PRODUCT - ANY CABLES, METAL-CLAD CABLE OR ARMORED CABLE - CURRENTLY CLASSIFIED UNDER THE THROUGH PENETRATING PRODUCTS CATEGORY. SEE THROUGH PENETRATING PRODUCT (DHLV) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

4. FILL, VOID OR CAVITY MATERIAL - SEALANT OR PUTTY - FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH EACH END OF THE STEEL SLEEVE OR WALL SURFACE. FILL MATERIAL INSTALLED SYMMETRICALLY ON BOTH SIDES OF THE WALL. A MIN 5/8 IN. (16 MM) THICKNESS OF SEALANT IS REQUIRED FOR THE 1 OR 2 HR F RATING. AN ADDITIONAL 1/2 IN. (13 MM) DIA BEAD OF FILL MATERIAL SHALL BE APPLIED AROUND THE PERIMETER OF SLEEVE ON BOTH SIDES OF THE WALL WHEN SLEEVE EXTENDS BEYOND SURFACE OF WALL. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - CP605, CP606, FS-ONE SEALANTS OR CP618 PUTTY \*BEARING THE UL CLASSIFICATION MARK \*BEARING THE UL LISTING MARK



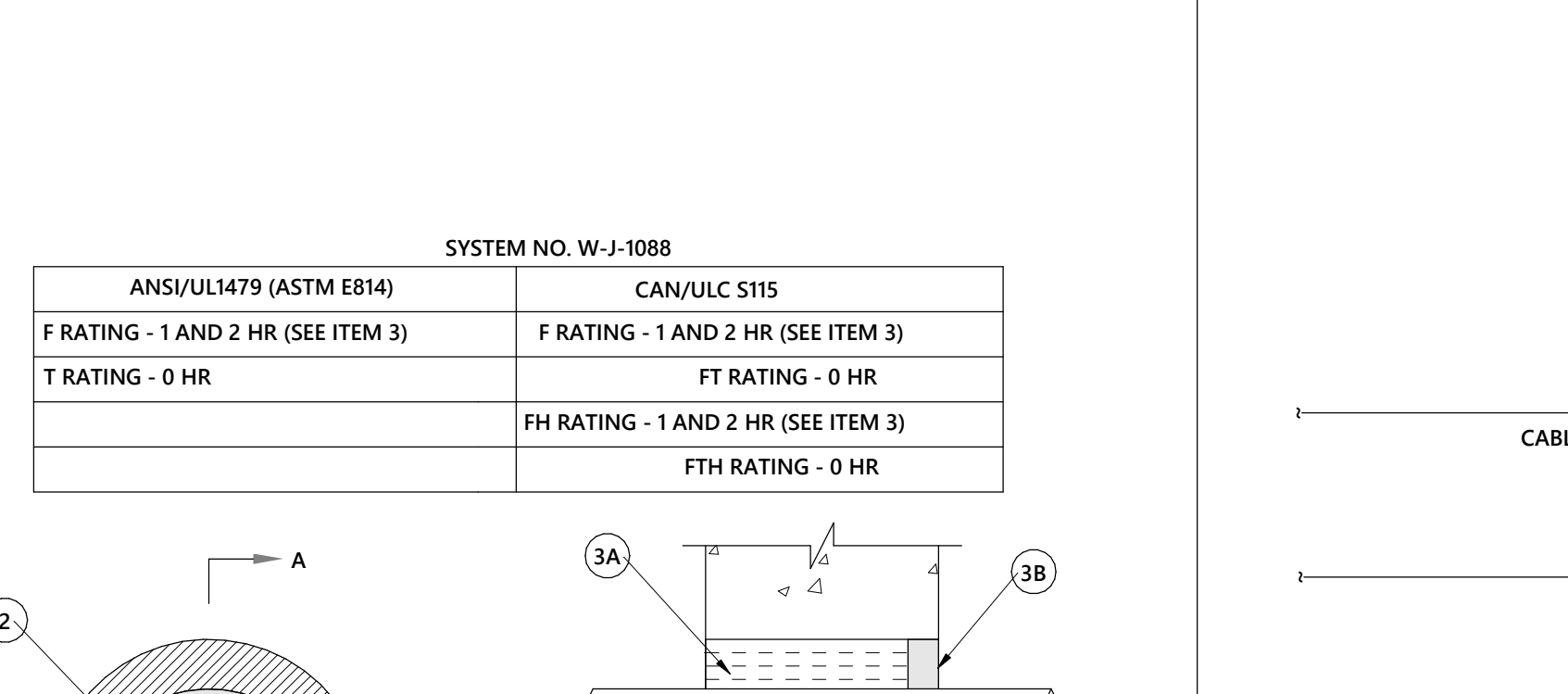
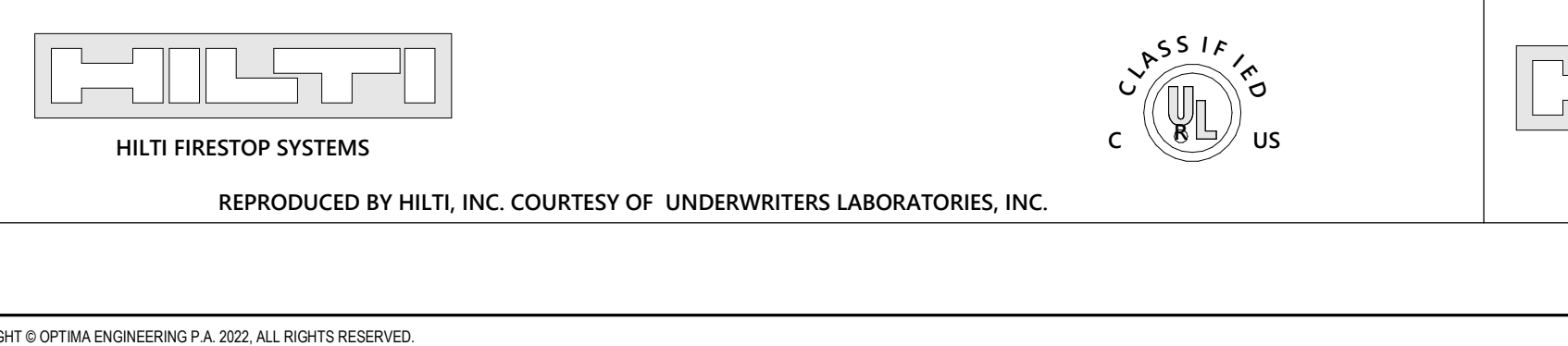
1. FLOOR OR WALL ASSEMBLY MIN 4-1/2 IN. THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS. MAX AREA OF OPENING IS 270 SQ IN WITH MAX DIMENSION OF 30 IN.

2. CABLE TRAY - MAX 24 IN. WIDE BY MAX 4 IN. DEEP OPEN-LADDER OR SOLID-BACK CABLE TRAY WITH CHANNEL-SHAPED SIDE RAILS FORMED OF 0.10 IN. THICK ALUMINUM OR 0.660 IN. THICK GALV STEEL AND WITH 1-1/2 IN. WIDE BY 1 IN. CHANNEL SHAPE RUNGS SPACED 9 IN. OC OR A 0.029 IN. THICK STEEL SOLID BACK, RESPECTIVELY. THE ANNUAL SPACE BETWEEN THE CABLE TRAYS AND THE PERIPHERY OF THE OPENING SHALL BE MIN 1 IN. TO MAX 4-1/2 IN. CABLE TRAY TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF FLOOR OR WALL ASSEMBLY.

3. CABLES AGGREGATE CROSS-SECTIONAL AREA OF CABLES IN CABLE TRAY TO BE MAX 40 PERCENT OF THE CROSS-SECTIONAL AREA OF THE CABLE TRAY. ANY COMBINATION OF THE FOLLOWING TYPES AND SIZES OF COPPER CONDUCTOR OR FIBER OPTIC CABLES MAY BE USED:

- A. 1/C, 500 KCMIL WITH THERMOPLASTIC INSULATION AND PVC JACKET.
B. 300 PAIR - NO. 24 AWG CABLE WITH PVC INSULATION AND JACKET.
C. 24 FIBER OPTIC CABLE WITH PVC SUBUNIT AND JACKET.
D. THREE 1/2 IN. (12 AWG) WIRE, INSULATED WITH POLYVINYL CHLORIDE, IN A NOMINAL 3/4 IN. FLEXIBLE METAL CONDUIT.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT OR CP618 FIRESTOP PUTTY STICK (NOTE L RATING ONLY WHEN FS-ONE SEALANT IS USED).
\*BEARING THE UL CLASSIFICATION MARK

4. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. FILL, VOID OR CAVITY MATERIAL - FIRE BLOCKS INSTALLED WITH THE LONG DIMENSION PLACED HORIZONTALLY WITHIN THE OPENING. FLUSH WITH BOTTOM OF FLOOR ASSEMBLIES. BLOCKS TO COMPLETELY FILL THE ENTIRE WIDTH OF OPENING OF WALL ASSEMBLY.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-FIRE BLOCK
B. FILL, VOID OR CAVITY MATERIAL - SEALANT ON PUTTY - NOT SHOWN FILL MATERIAL TO BE FORCED INTO INTERSTICES OF CABLES AND BETWEEN CABLES AND CABLE TRAYS TO MAX EXTENT POSSIBLE ON BOTH SURFACES OF THE PENETRATION.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT OR CP618 FIRESTOP PUTTY STICK (NOTE L RATING ONLY WHEN FS-ONE SEALANT IS USED).
\*BEARING THE UL CLASSIFICATION MARK

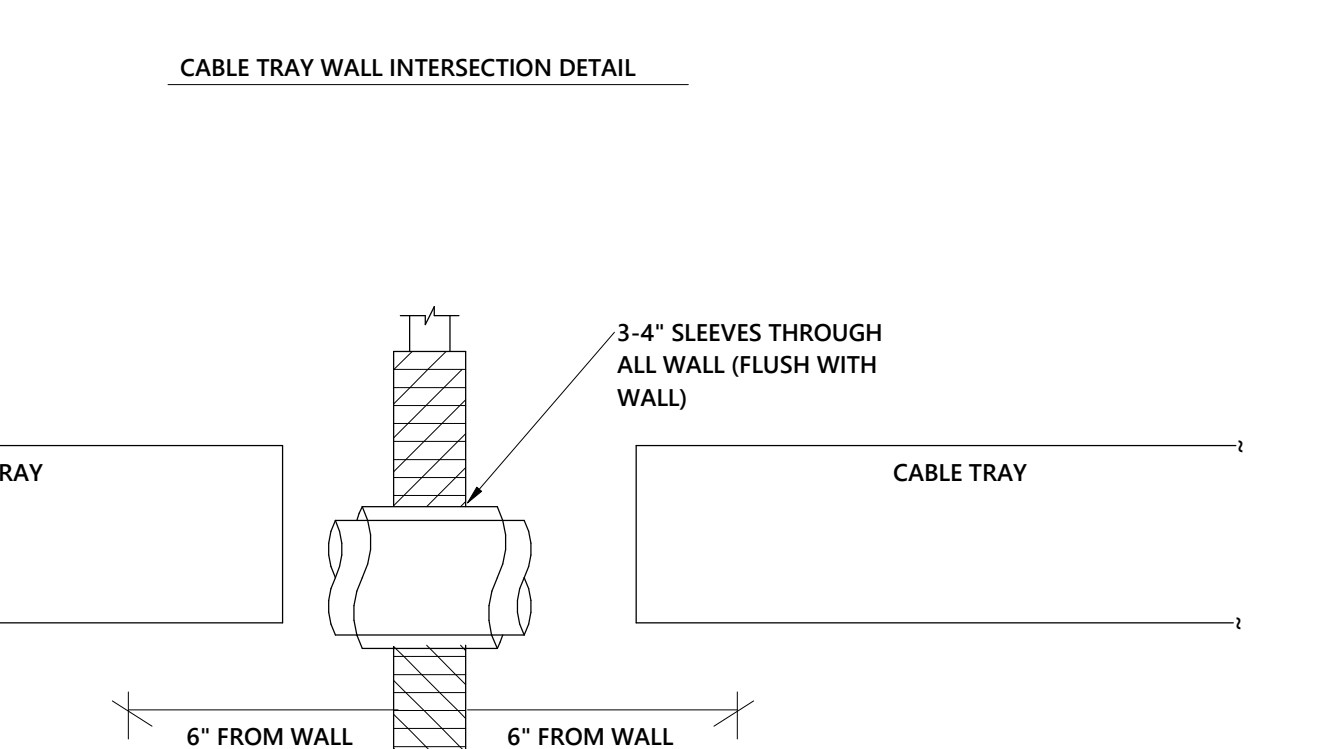
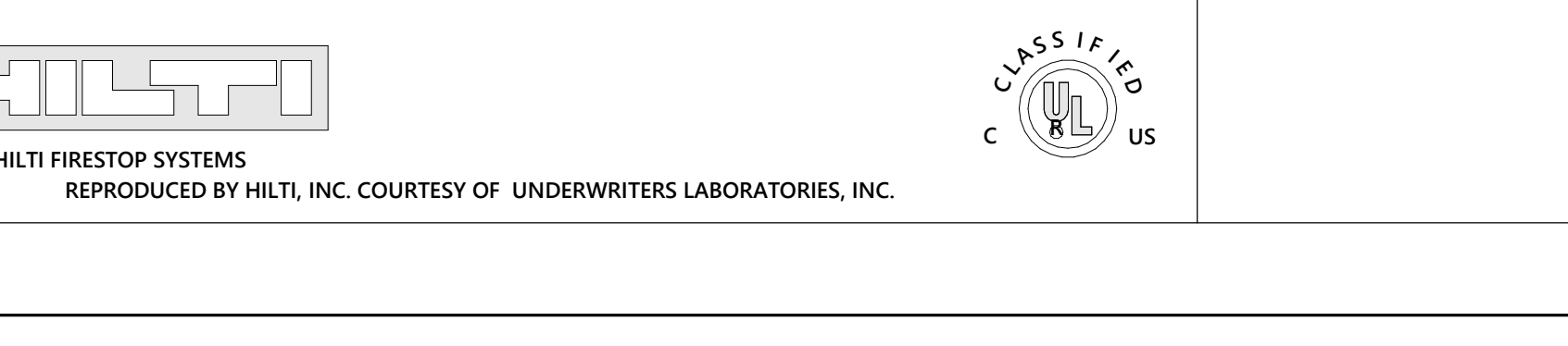


1. WALL ASSEMBLY - MIN 3-3/4 IN. (95 MM) THICK REINFORCED LIGHTWEIGHT OR NORMAL WEIGHT (100-150 PCF OR 1600-2400 KG/M3) CONCRETE. WALL MAY ALSO BE CONSTRUCTED OF ANY UL CLASSIFIED CONCRETE BLOCKS. MAX DIAMETER OF OPENING 10-1/2 IN. (267 MM). SEE CONCRETE BLOCKS (CAZT) CATEGORY IN THE FIRE RESISTANCE DIRECTORY FOR NAMES OF MANUFACTURERS.

2. THROUGH-PENETRANTS - ONE METALLIC PIPE, CONDUIT OR TUBING TO BE INSTALLED EITHER CONCENTRICALLY OR ECCENTRICALLY WITHIN THE FIRESTOP SYSTEM. AN ANNUAL SPACE OF MIN 1/4 IN. TO MAX 1-5/8 IN. (41 MM) IS REQUIRED WITHIN FIRESTOP SYSTEM. PIPE, CONDUIT OR TUBING TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY. THE FOLLOWING TYPES AND SIZES OF METALLIC PIPES, CONDUITS OR TUBING MAY BE USED:

- A. STEEL PIPE - NOM 8 IN. (203 MM) DIA (OR SMALLER) SCHEDULE 10 (OR HEAVIER) STEEL PIPE.
B. IRON PIPE - NOM 8 IN. (203 MM) DIA (OR SMALLER) CAST OR DUCTILE IRON PIPE.
C. CONDUIT - NOM 4 IN. (102 MM) DIA (OR SMALLER) STEEL ELECTRICAL METALLIC TUBING (EMT) OR 6 IN. DIA STEEL CONDUIT.
D. COPPER TUBING - NOM 4 IN. (102 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) COPPER TUBING.
E. COPPER PIPE - NOM 4 IN. (102 MM) DIA (OR SMALLER) REGULAR (OR HEAVIER) COPPER PIPE.

F. FLEXIBLE STEEL CONDUIT - NOM 2 IN. (51 MM) DIA (OR SMALLER) TYPE L (OR HEAVIER) STEEL CONDUIT. SEE FLEXIBLE METAL CONDUIT (DKUZ) CATEGORY IN THE ELECTRICAL CONSTRUCTION EQUIPMENT DIRECTORY FOR NAMES OF MANUFACTURERS.



1. WALL ASSEMBLY THE FIRE-RATED GYPSUM WALLBOARD/STUD WALL ASSEMBLY SHALL BE CONSTRUCTED OF THE MATERIALS AND IN THE MANNER SPECIFIED IN THE INDIVIDUAL U300 OR U400 SERIES WALL AND PARTITION DESIGNS IN THE UL FIRE RESISTANCE DIRECTORY AND SHALL INCLUDE THE FOLLOWING CONSTRUCTION FEATURES:

- A. STUDS WALL FRAMING MAY CONSIST OF EITHER WOOD STUDS OR STEEL CHANNEL STUDS. WOOD STUDS TO CONSIST OF NOM 2 BY 4 IN. LUMBER SPACED 16 IN. OC. STEEL STUDS TO BE MIN 2-1/2 IN. IN. WIDE AND SPACED MAX 24 IN. OC.
B. GYPSUM BOARD - TWO LAYERS OF NOM 5/8 IN. THICK GYPSUM WALLBOARD, AS SPECIFIED IN THE INDIVIDUAL WALL AND PARTITION DESIGN. MAX AREA OF OPENING IS 86 SQ IN. WITH MAX DIMENSION OF 12 IN. MAX WIDTH OF OPENING IN WOOD STUD WALLS IS LIMITED TO 12 IN.
2. THROUGH PENETRANTS THE FOLLOWING TYPES AND SIZES OF PIPES, CONDUITS, TUBING OR CABLES MAY BE USED:

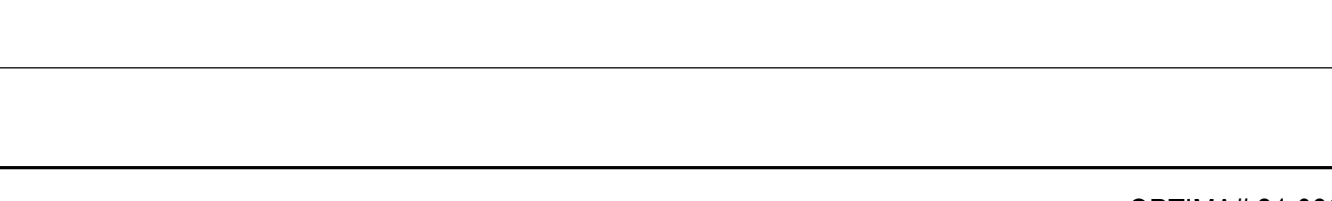
- A. NOM 3 IN. DIA. (OR SMALLER) ELECTRICAL METALLIC TUBING (EMT).
B. MAX 25 PAIR - NO. 24 AWG (OR SMALLER) TELEPHONE CABLE WITH POLYVINYL CHLORIDE (PVC) INSULATION AND JACKET.
C. MAX 3/C WITH GROUND - NO. 10 AWG (OR SMALLER) TYPE NM CABLE WITH PVC INSULATION AND JACKET.
D. NOM 2 IN. DIA. (OR SMALLER) SCHEDULE 40 PVC PIPE FOR USE IN CLOSED (PROCESS OR SUPPLY) PIPING SYSTEMS ONLY.

E. MAX 300 KCMIL (OR SMALLER) POWER CABLE WITH PVC INSULATION AND NYLON JACKET. THE THROUGH PENETRATING ITEMS TO BE RIGIDLY SUPPORTED ON BOTH SIDES OF WALL ASSEMBLY AND LOCATED AS SHOWN IN THE TABLE BELOW:

Table with columns: ITEM NO., PEN. ITEM IN., PEN. ITEM IN., OPENING IN., OPENING IN. Rows include items 2A, 2B, 2C, 2D, 2E.

3. FIRESTOP SYSTEM THE FIRESTOP SYSTEM SHALL CONSIST OF THE FOLLOWING:
A. STEEL WIRE MESH NO. 8 STEEL WIRE MESH HAVING A MIN 1 IN. LAP ALONG THE LONGITUDINAL SEAM. LENGTH OF STEEL WIRE MESH TO BE 4-3/4 IN. CENTERED AND FORMED TO FIT PERIPHERY OF THROUGH OPENING. STEEL WIRE MESH IS NOT REQUIRED WHEN ADDITIONAL FRAMING MEMBERS (ITEM NO. 1A) ARE USED.
B. PACKING MATERIAL MIN 4.0 IN. THICKNESS OF MIN 3.5 PCF MINERAL WOOL BATT INSULATION FIRMLY PACKED INTO OPENING AS A PERMANENT FORM. PACKING MATERIAL TO BE RECESSED FROM BOTH SURFACES OF WALL AS REQUIRED TO ACCOMMODATE THE REQUIRED THICKNESS OF FILL MATERIAL.

C. FILL, VOID OR CAVITY MATERIAL - SEALANT MIN 1/2 IN. THICKNESS OF FILL MATERIAL APPLIED WITHIN THE ANNULUS, FLUSH WITH BOTH SURFACES OF WALL. HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC. - FS-ONE SEALANT \*BEARING THE UL CLASSIFICATION MARK



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BID SET. HILTI FIRESTOP SYSTEMS. REPRODUCED BY HILTI, INC. COURTESY OF UNDERWRITERS LABORATORIES, INC.

Harnett County Schools. HIGHLAND ELEMENTARY ADDITION & RENOVATION. 1915 Buffalo Lake Road Sanford, NC 27332. No. Date Description table. ISSUE DATE: 4/29/2022. PROJECT #: 02110.100. DRAWN BY: JSD. CHECKED BY: MKG. © 2021 Sfi+a Architects, PA. All Rights Reserved. ELECTRICAL DETAILS. E-502. Sheet No. 15 of 19.



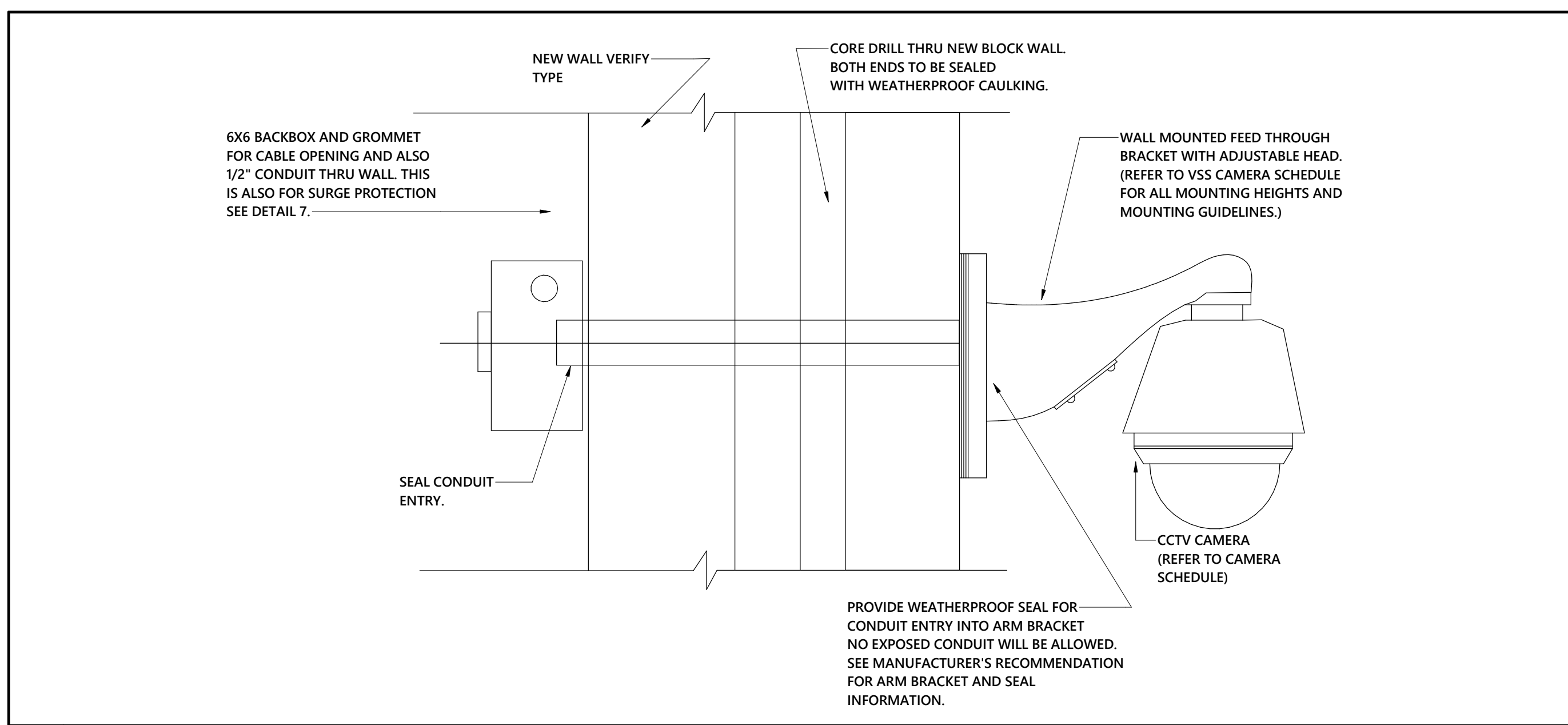
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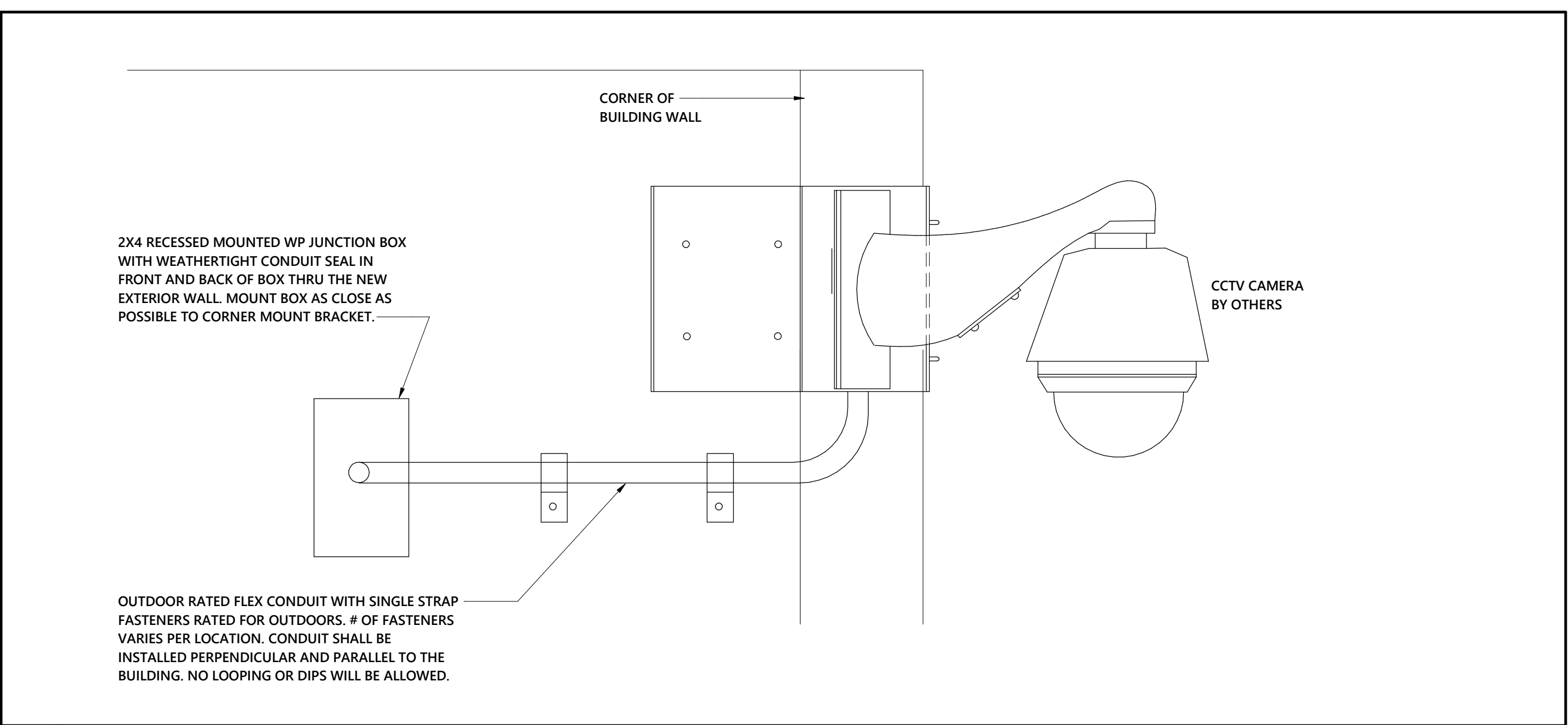
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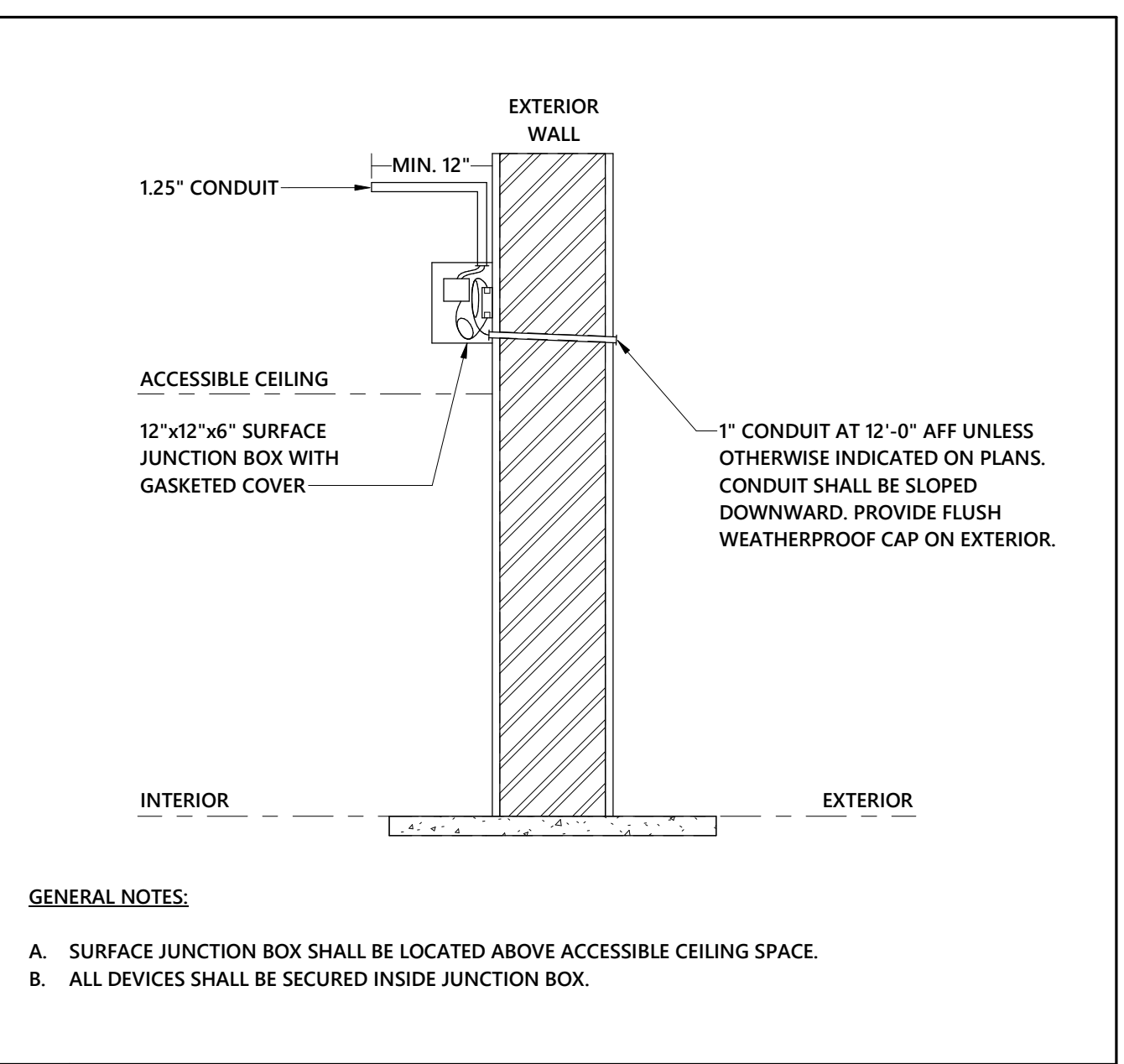
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**3** CAMERA MOUNT EXTERIOR WALL  
NO SCALE



**2** CAMERA MOUNTING FOR EXTERIOR CORNER MOUNT  
NO SCALE



**1** EXTERIOR NETWORK DEVICE DETAIL (ACCESSIBLE CEILING)  
NOT TO SCALE

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**HIGHLAND ELEMENTARY ADDITION & RENOVATION**  
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Sanford, NC 27332

No.	Date	Description

ISSUE DATE: 4/29/2022  
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ELECTRICAL  
DETAILS

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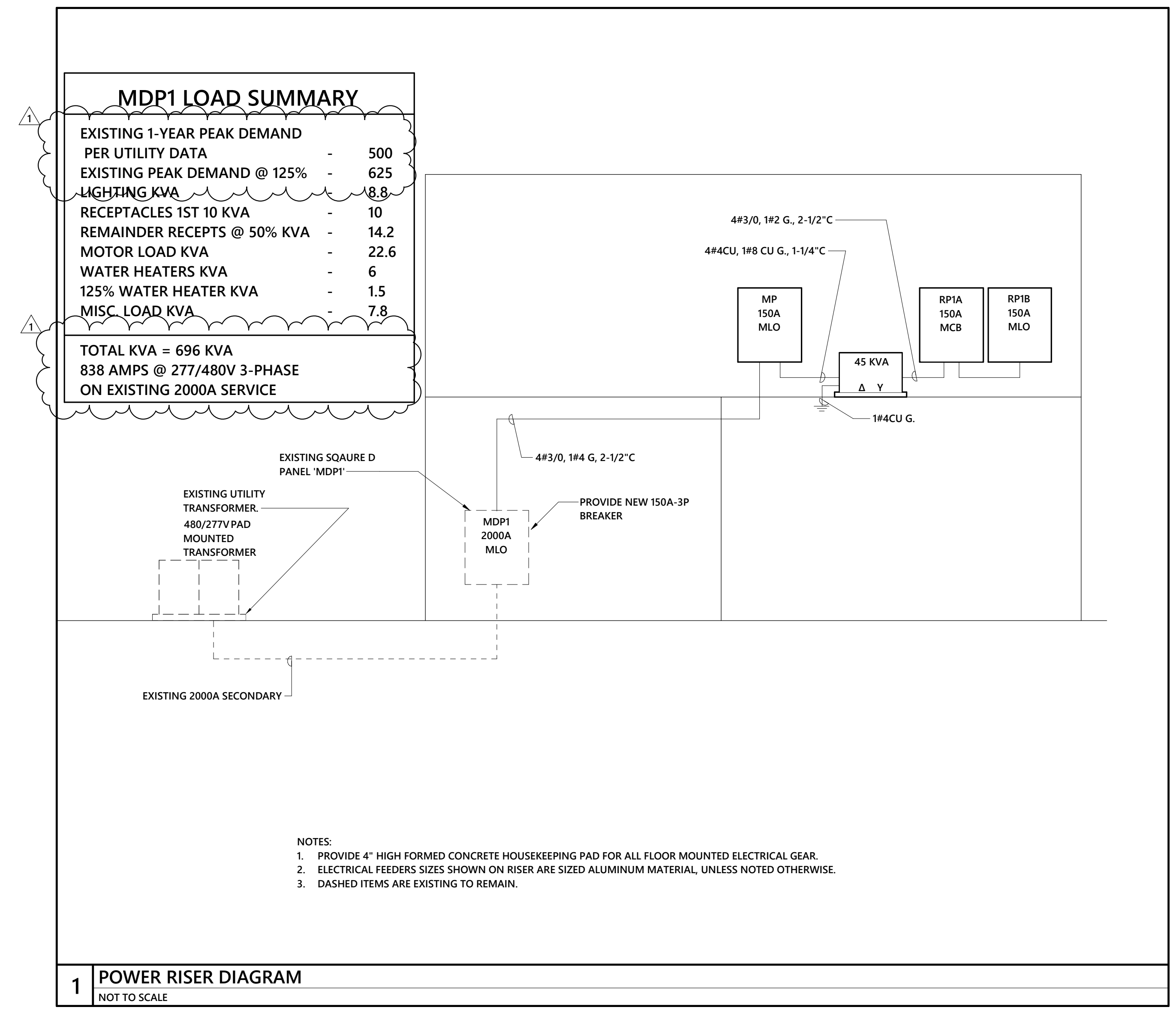
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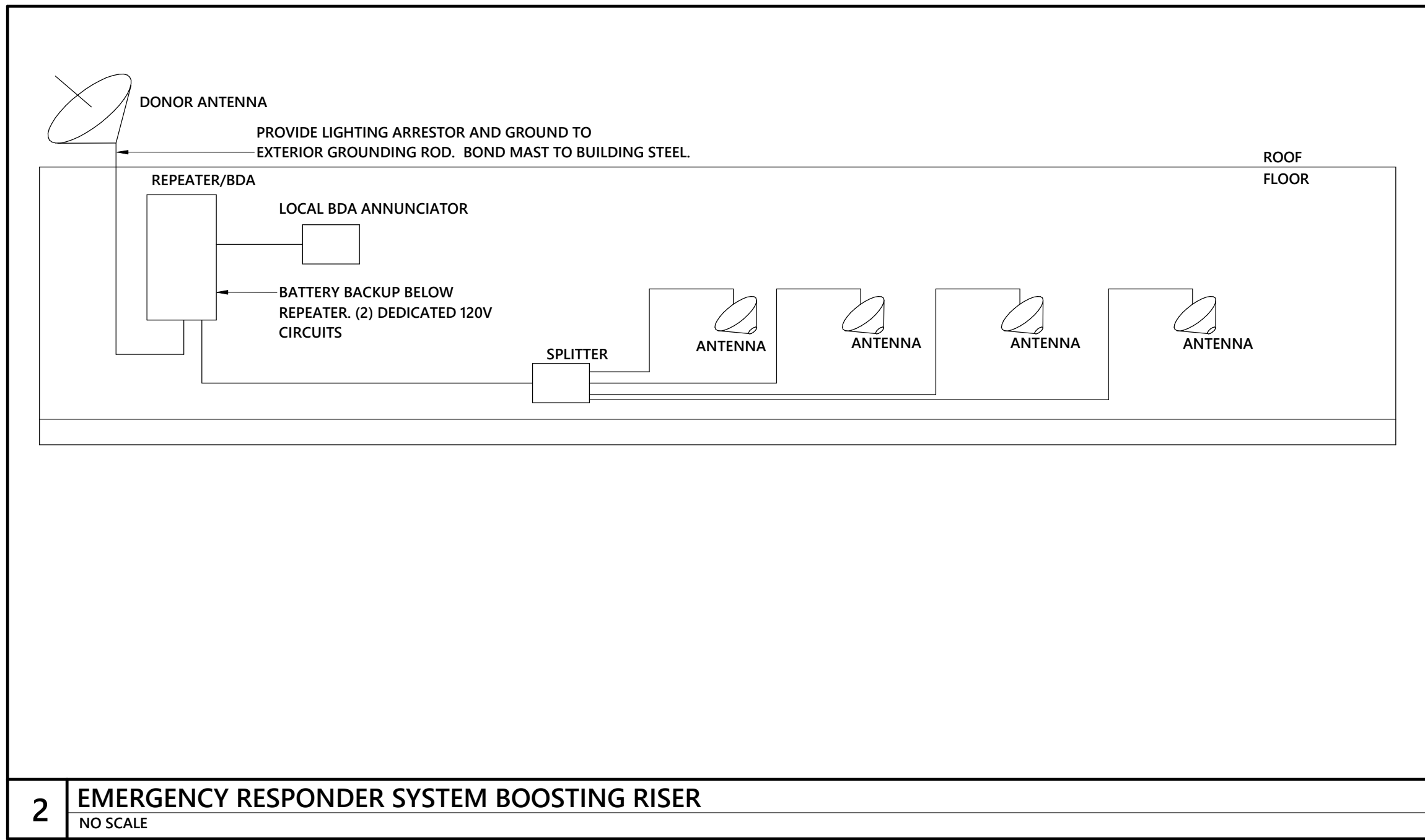
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**1 POWER RISER DIAGRAM**  
NOT TO SCALE



**2 EMERGENCY RESPONDER SYSTEM BOOSTING RISER**  
NO SCALE

**SYSTEM NOTES**

1. SYSTEM IS BASED ON 800MHz. COORDINATE WITH LOCAL EMERGENCY RESPONDERS FOR NECESSARY FREQUENCY REQUIRED.
2. SEE SPECIFICATIONS FOR ALL EQUIPMENT AND CABLING REQUIREMENTS.
3. ALL CABLING TO BE INSTALLED IN 1 1/2" CONDUIT.
4. SYSTEM BASED ON DESIGN FROM HARRIS COMMUNICATIONS. SEE SPECIFICATIONS FOR REQUIREMENTS AND EQUALS.
5. PROVIDE BATTERY BACK UP (5 MINS) FOR MOMENTARY LOSS OF POWER. MAIN SYSTEM IS GENERATOR BACKED UP. NON GENERATOR BACKED UP SYSTEMS SHALL HAVE A MINIMUM BATTERY BACKUP OF 24 HOURS.
6. SEE SPECIFICATIONS FOR CABLING REQUIREMENTS.
7. SYSTEM SUPPLIER SHALL PROVIDE A SYSTEM SURVEY REPORT PRIOR TO PROVIDING THE SYSTEM. THIS SHALL BE CONSIDERED BASE BID FOR THE PROJECT. SIGNAL SURVEY REPORT SHALL BE TAKEN TO THE LOCAL FIRE CODE OFFICIAL AND THE LOCAL FIRE CODE OFFICIAL SHALL DETERMINE IF THE SYSTEM NEEDS TO BE INSTALLED. SIGNAL STRENGTH MEASUREMENTS SHALL BE MEASURED IN 95% OF ALL AREAS ON EACH FLOOR (100% OF ALL EGRESS AND CRITICAL AREAS). A MINIMUM SIGNAL STRENGTH OF -95dBm IS REQUIRED.
8. PROVIDE A DEDUCTIVE ALTERNATE FOR THE EMERGENCY RESPONDER SYSTEM INCLUDING ALL DEVICES, CABLING, CONDUIT, AND EQUIPMENT. SUBMITTAL AND SURVEY REPORT SHALL BE CONSIDERED BASE BID.
9. SEE PLANS FOR MINIMUM LOCATIONS. BASED ON SURVEY REPORT, DEVICES SHALL BE LOCATED TO MAXIMIZE BOOSTING SIGNAL. LOCATIONS SHALL BE COORDINATED WITH GENERAL CONTRACTOR.
10. LOCAL ANNUNCIATOR SHALL PROVIDE VISUAL AND LABELED IDENTIFICATION OF:
  - A. NORMAL AC POWER.
  - B. SIGNAL BOOSTER TROUBLE.
  - C. LOSS OF NORMAL AC POWER.
  - D. FAILURE OF BATTERY CHARGER.
  - E. LOW-BATTERY CAPACITY.
  - F. ANTENNA FAILURE.
11. PROVIDE FIRE ALARM PANEL CONNECTION (SUPERVISORY SIGNALS). COORDINATE REQUIRED CONNECTIONS WITH FIRE ALARM CONTRACTOR:
  - A. DONOR ANTENNA MALFUNCTION.
  - B. BDA FAILURE.
  - C. LOW BATTERY CAPACITY.
  - D. LOSS OF NORMAL AC POWER.
  - E. FAILURE OF BATTERY CHARGER.

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ELECTRICAL  
DIAGRAMS

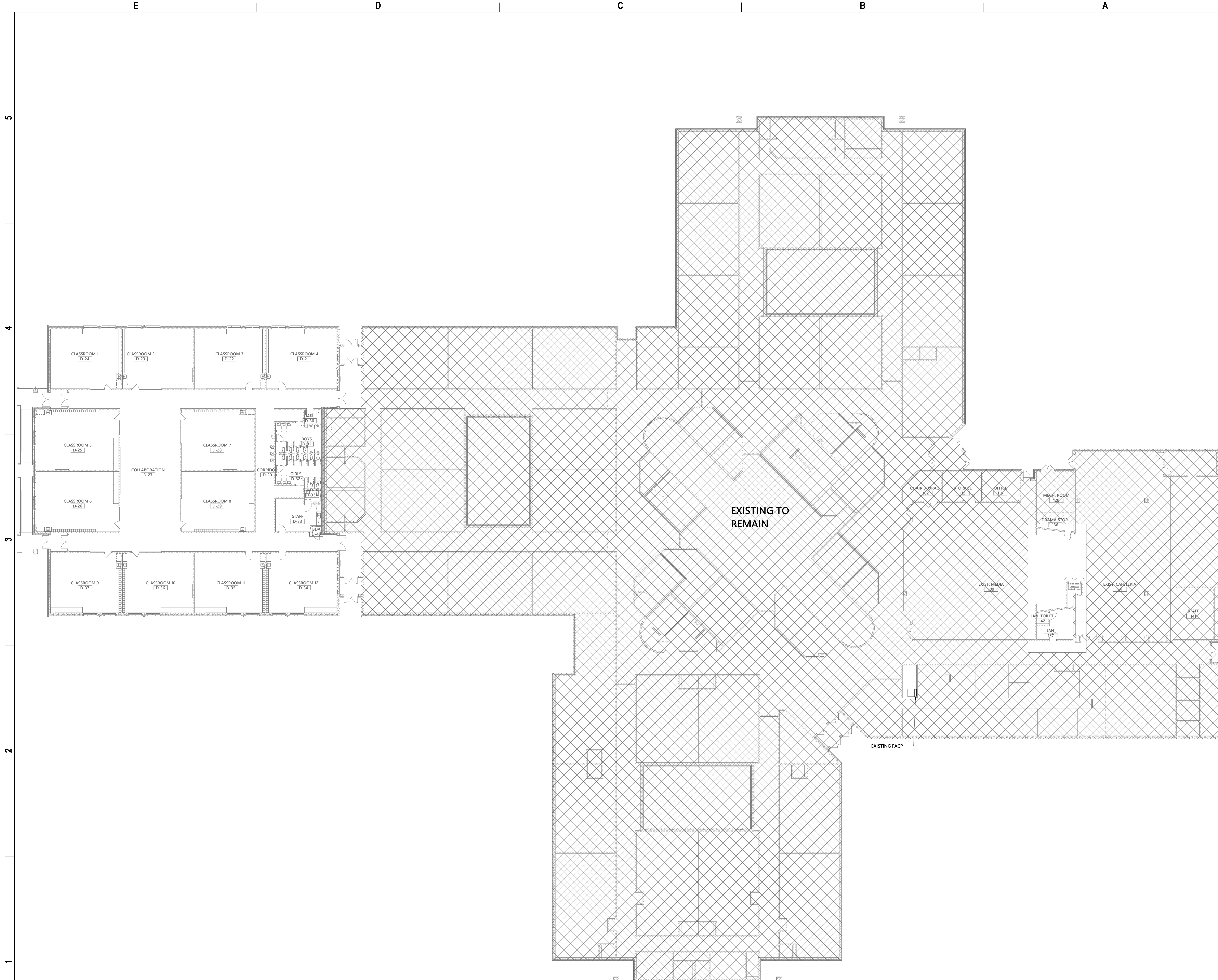
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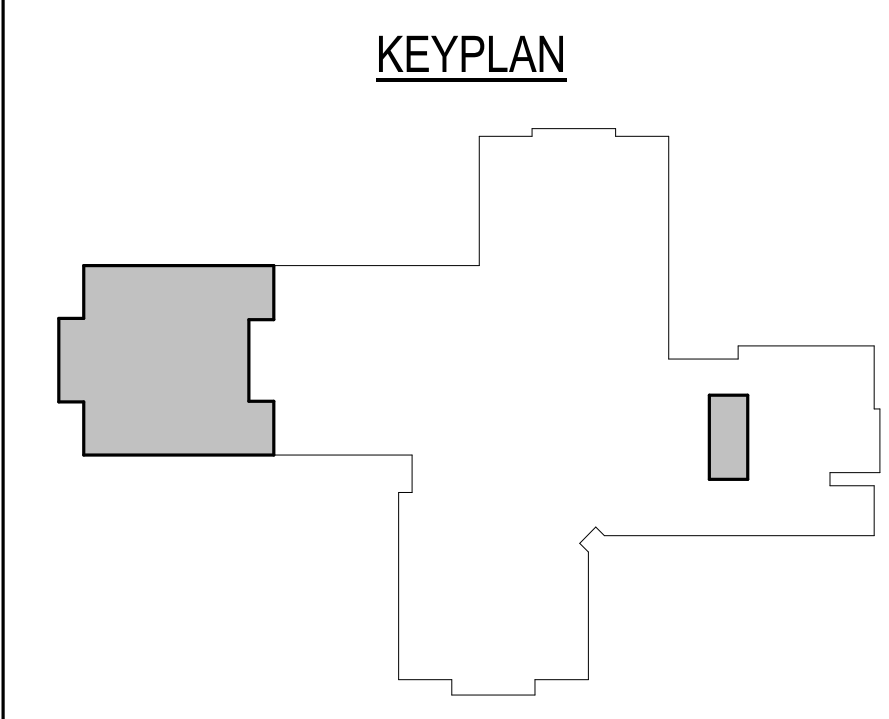




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**1** OVERALL FIRST FLOOR FIRE ALARM PLAN - NEW WORK  
1/16" = 1'-0"



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OVERALL FIRE  
ALARM PLAN - NEW  
WORK

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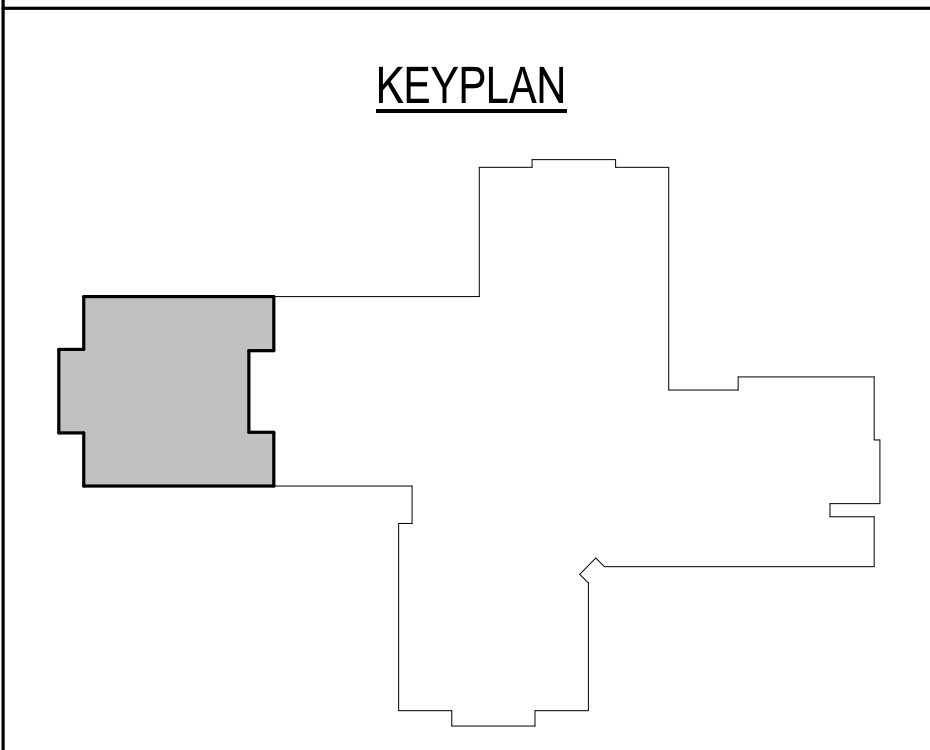
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**1 CLASSROOM ADDITION FIRE ALARM PLAN - NEW WORK**  
 1/8" = 1'-0"



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**CLASSROOM  
 ADDITION FIRE  
 ALARM PLAN - NEW  
 WORK**

**FA1-112**

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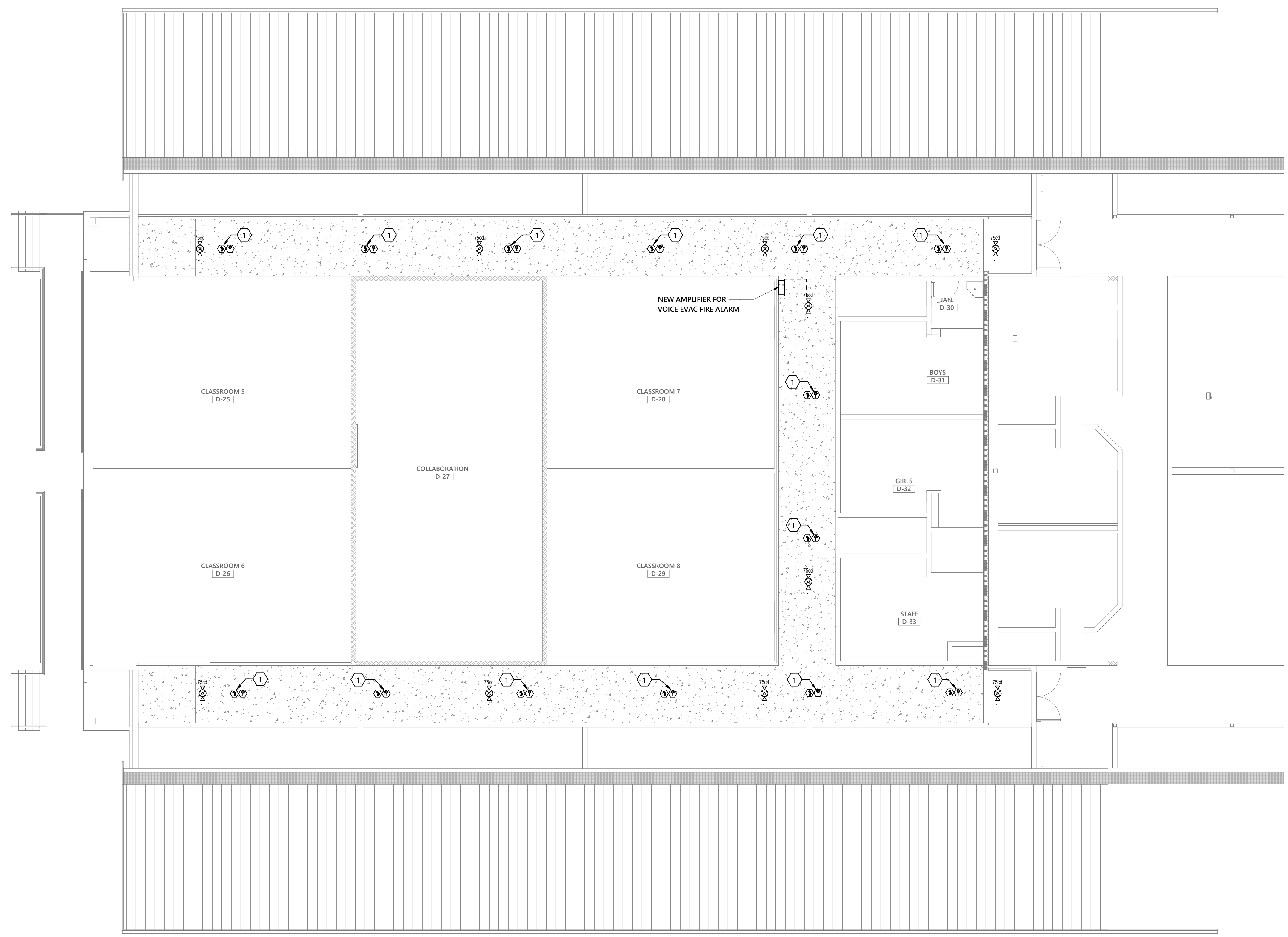
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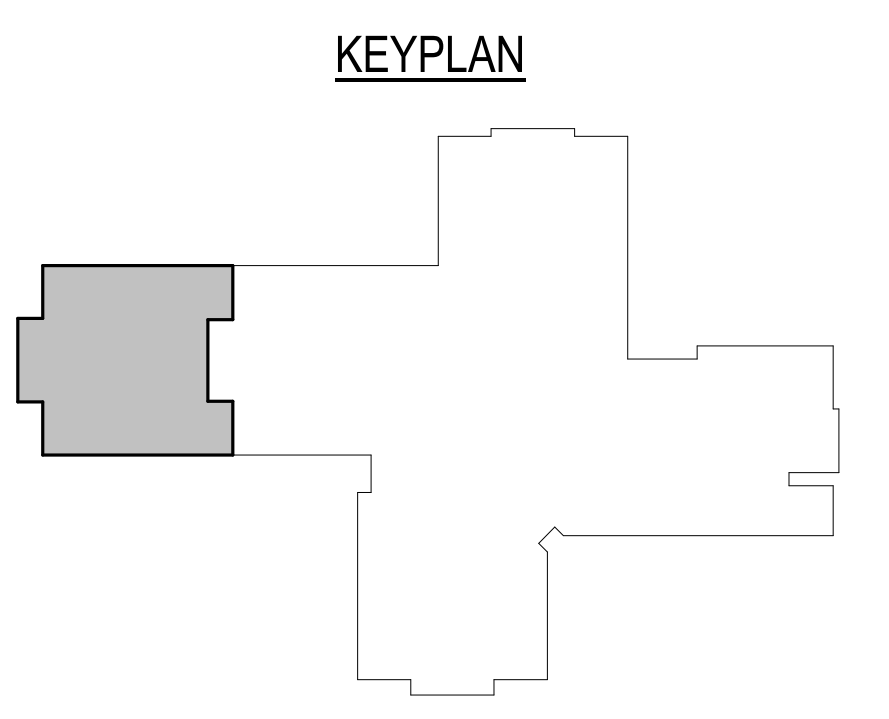
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**1** MECHANICAL LOFT FIRE ALARM PLAN  
 1/8" = 1'-0"

**KEYNOTES**

- 1 PROVIDE COMBINATION SMOKE AND HEAT DETECTOR.



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MECHANICAL LOFT  
 FIRE ALARM PLAN

**FA1-113**

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