CREEKSIDE VILLAGE APARTMENTS

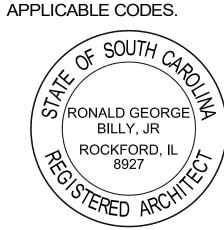
OWNER: HA OF FLORENCE 400 E PINE ST, FLORENCE, SC 29506 p: (843) 669-4163	
ARCHITECT: 1919 ARCHITECTS 4000 MORSAY DRIVE ROCKFORD, ILLINOIS 61107 p: (815) 229-8222 RONALD G. BILLY JR., LEED AP	
MECHANICAL: BOWMAN 12355 SUNRISE VALLEY DRIVE SUITE 520 RESTON, VIRGINIA 20191, US P: (609) 268 - 0500	
PLUMBING/FIRE PROTECTION: BOWMAN 12355 SUNRISE VALLEY DRIVE SUITE 520 RESTON, VIRGINIA 20191, US P: (609) 268 - 0500	
ELECTRICAL: BOWMAN 12355 SUNRISE VALLEY DRIVE SUITE 520 RESTON, VIRGINIA 20191, US P: (609) 268 - 0500	

Current Revision Date G-001 COVER SHEET G-002 GENERAL NOTES MOLD UNITS FIRST FLOOR PLAN MOLD UNITS SECOND FLOOR PLAN DEMOLITION FIRST FLOOR PLAN DEMOLITION SECOND FLOOR PLAN DEMOLITION THIRD FLOOR FIRST FLOOR PLAN - NEW WORK SECOND FLOOR PLAN - NEW WORK THIRD FLOOR PLAN - NEW WORK ENLARGED PLANS - DEMOLITION ENLARGED PLANS - NEW WORK A-109 A-111 A-200 A-201 A-300 1ST FLOOR REFLECTED CEILING PLAN SCHEDULES ELEVATIONS FI EVATIONS DETAILS PLUMBING FIRST FLOOR PLAN - DEMOLITION PLUMBING SECOND FLOOR PLAN - DEMOLITION PLUMBING THIRD FLOOR PLAN - DEMOLITION PLUMBING FIRST FLOOR PLAN - WEST PLUMBING FIRST FLOOR PLAN - EAS PLUMBING FIRST FLOOR PLAN - SOUTHEAS PLUMBING SECOND FLOOR PLAN - WEST PLUMBING SECOND FLOOR PLAN - EAST PLUMBING SECOND FLOOR PLAN - SOUTHEAST PLUMBING THIRD FLOOR PLAN - WEST PLUMBING THIRD FLOOR PLAN - EAST PLUMBING THIRD FLOOR PLAN - SOUTHEAST PLUMBING UNIT PLANS PLUMBING RISER DIAGRAMS PLUMBING SCHEDULES AND DETAILS PLUMBING SPECIFICATIONS MECHANICAL COVERSHEET MECHANICAL FIRST FLOOR PLAN - DEMOLITION MECHANICAL SECOND FLOOR PLAN - DEMOLITION MECHANICAL THIRD FLOOR PLAN - DEMOLITION MECHANICAL ROOF PLAN - DEMOLITION MECHANICAL FIRST FLOOR PLAN - WEST MECHANICAL FIRST FLOOR PLAN - EAS MECHANICAL FIRST FLOOR PLAN - SOUTHEAST MECHANICAL SECOND FLOOR PLAN - WEST MECHANICAL SECOND FLOOR PLAN - EAST MECHANICAL SECOND FLOOR PLAN - SOUTHEAS MECHANICAL THIRD FLOOR PLAN - WEST MECHANICAL THIRD FLOOR PLAN - EAST MECHANICAL THIRD FLOOR PLAN - SOUTHEAST MECHANICAL ROOF PLAN - WEST MECHANICAL ROOF PLAN - EAST MECHANICAL ROOF PLAN - SOUTHEAS MECHANICAL UNIT PLANS MECHANICAL SCHEDULES MECHANICAL DETAILS MECHANICAL SPECIFICATIONS MECHANICAL SPECIFICATIONS ELECTRICAL FIRST FLOOR PLAN - DEMOLITION ELECTRICAL SECOND FLOOR PLAN - DEMOLITION ELECTRICAL THIRD FLOOR PLAN - DEMOLITION ELECTRICAL ROOF PLAN - DEMOLITION ELECTRICAL FIRST FLOOR PLAN - WEST ELECTRICAL FIRST FLOOR PLAN - EAST ELECTRICAL SECOND FLOOR PLAN - WEST ELECTRICAL SECOND FLOOR PLAN - EAST ELECTRICAL SECOND FLOOR PLAN - SOUTHEAS ELECTRICAL THIRD FLOOR PLAN - WEST ELECTRICAL THIRD FLOOR PLAN - EAST ELECTRICAL THIRD FLOOR PLAN - SOUTHEAST ELECTRICAL ROOF PLAN - WEST ELECTRICAL ROOF PLAN - EAST ELECTRICAL ROOF PLAN - SOUTHEAS ELECTRICAL UNIT PLANS ELECTRICAL SPECIFICATIONS ELECTRICAL SPECIFICATIONS

STATEMENT OF COMPLIANCE

I HAVE PREPARED, OR CAUSED TO BE PREPARED UNDER MY DIRECT SUPERVISION, THE ATTACHED PLANS AND SPECIFICATIONS AND STATE THAT, TO THE BEST OF MY KNOWLEDGE AND BELIEF AND TO THE EXTENT OF MY CONTRACTURAL OBLIGATION, THEY ARE IN COMPLIANCE WITH THE ENVIRONMENTAL BARRIERS ACT (410 ILCS 25) AND THE ILLINOIS ACCESSIBILITY CODE (71 111. ADM. CODE 400)

I HEREBY CERTIFY THAT THESE PLANS WERE PREPARED BY ME OR UNDER MY SUPERVISION, AND TO THE BEST OF MY KNOWLEDGE, COMPLY WITH ALL

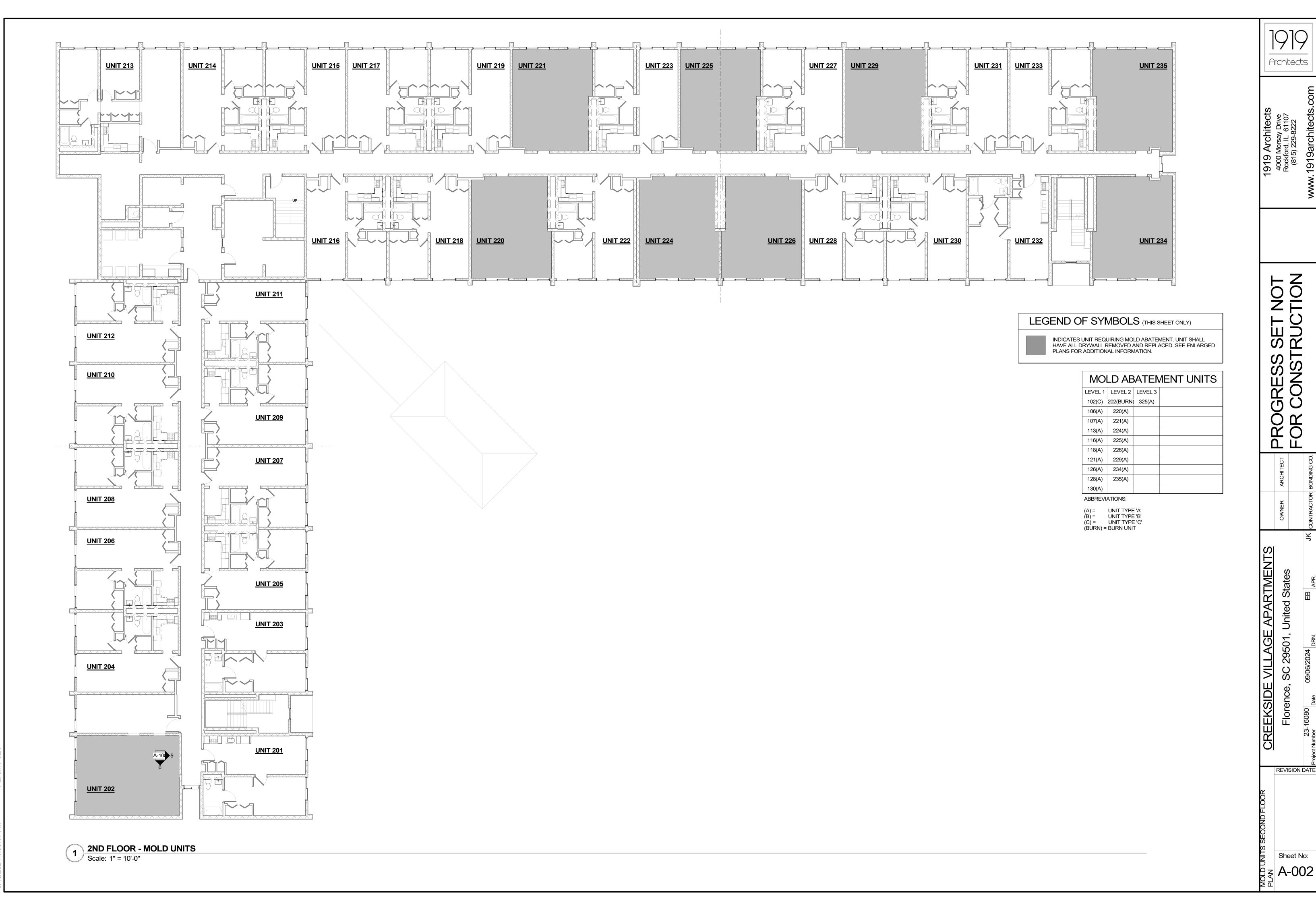


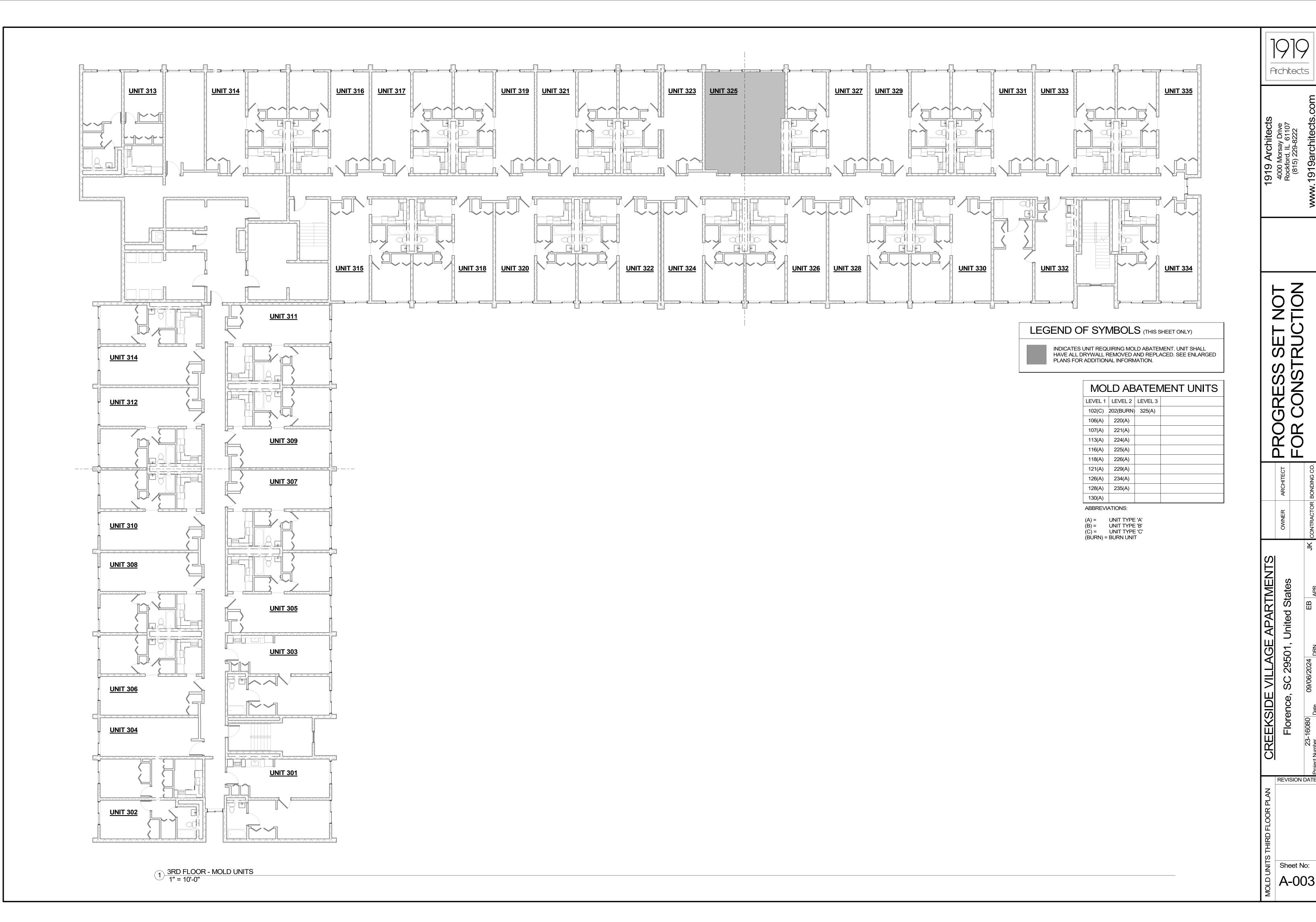
SOUTH CAROLINA REGISTRATION NO.: 8927 Exp. Date: 08/31/2025

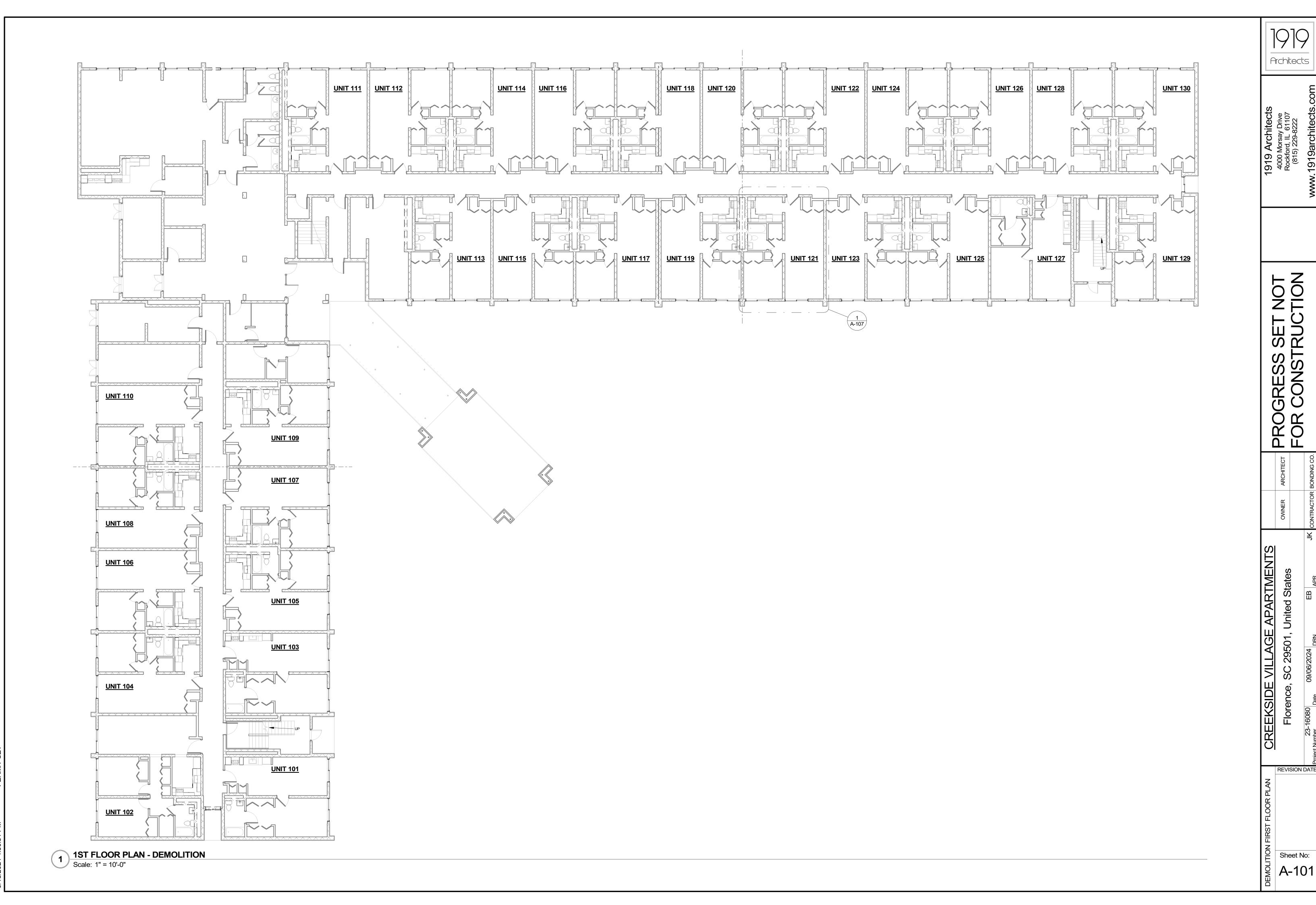
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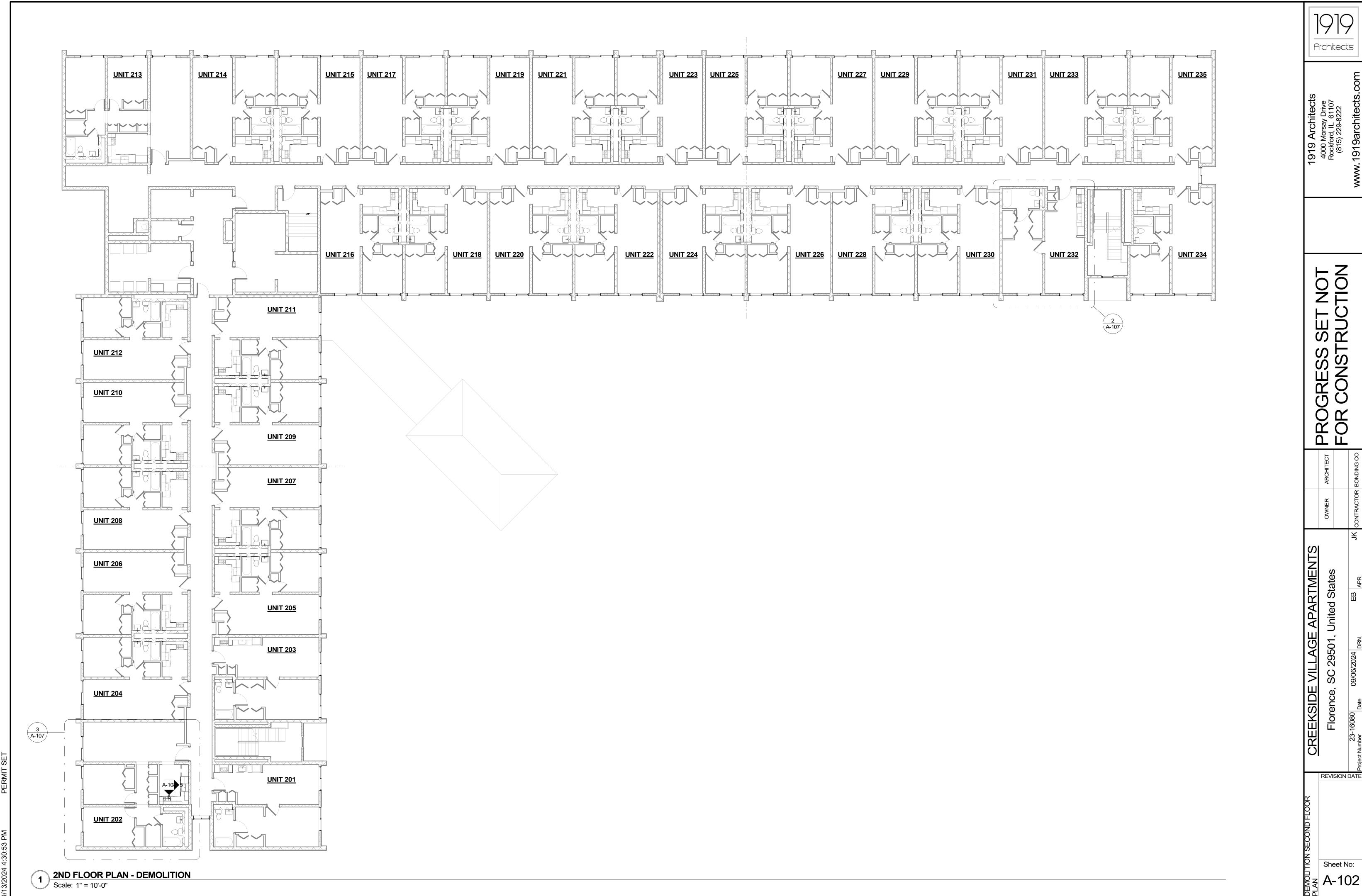
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Architects

PROGRESS SET NOT FOR CONSTRUCTION

REVISION DATE

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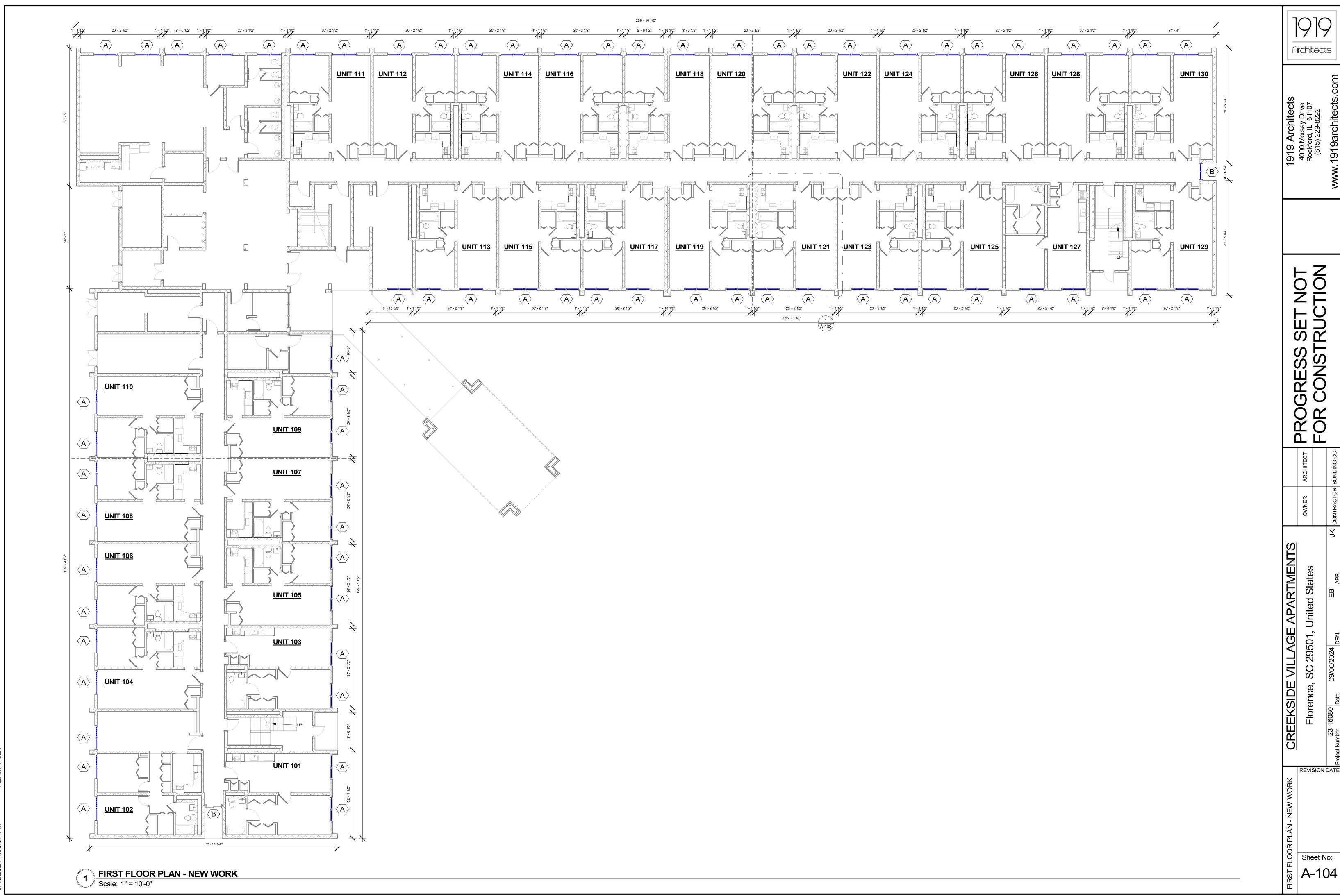
Architects

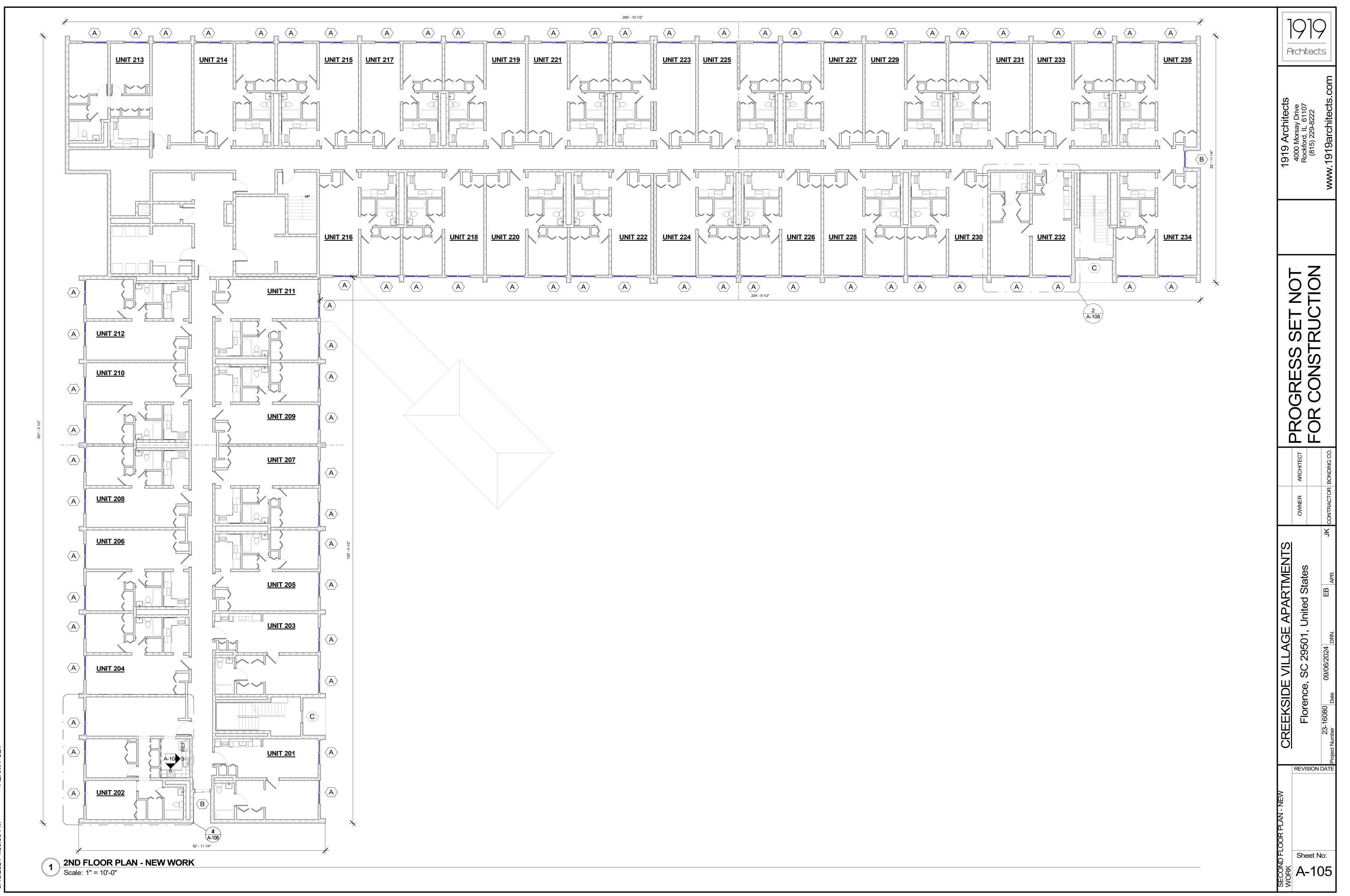
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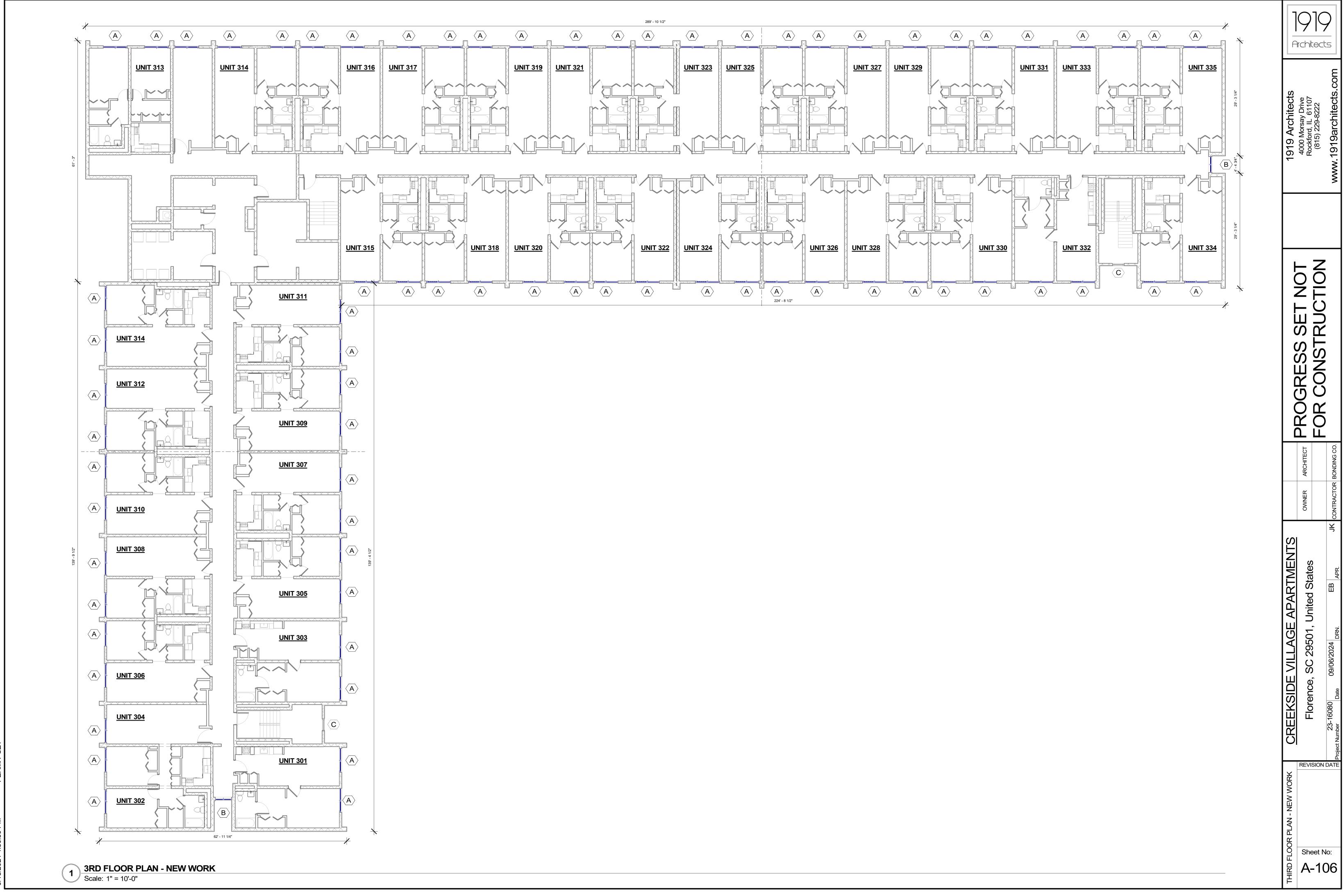
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A-103

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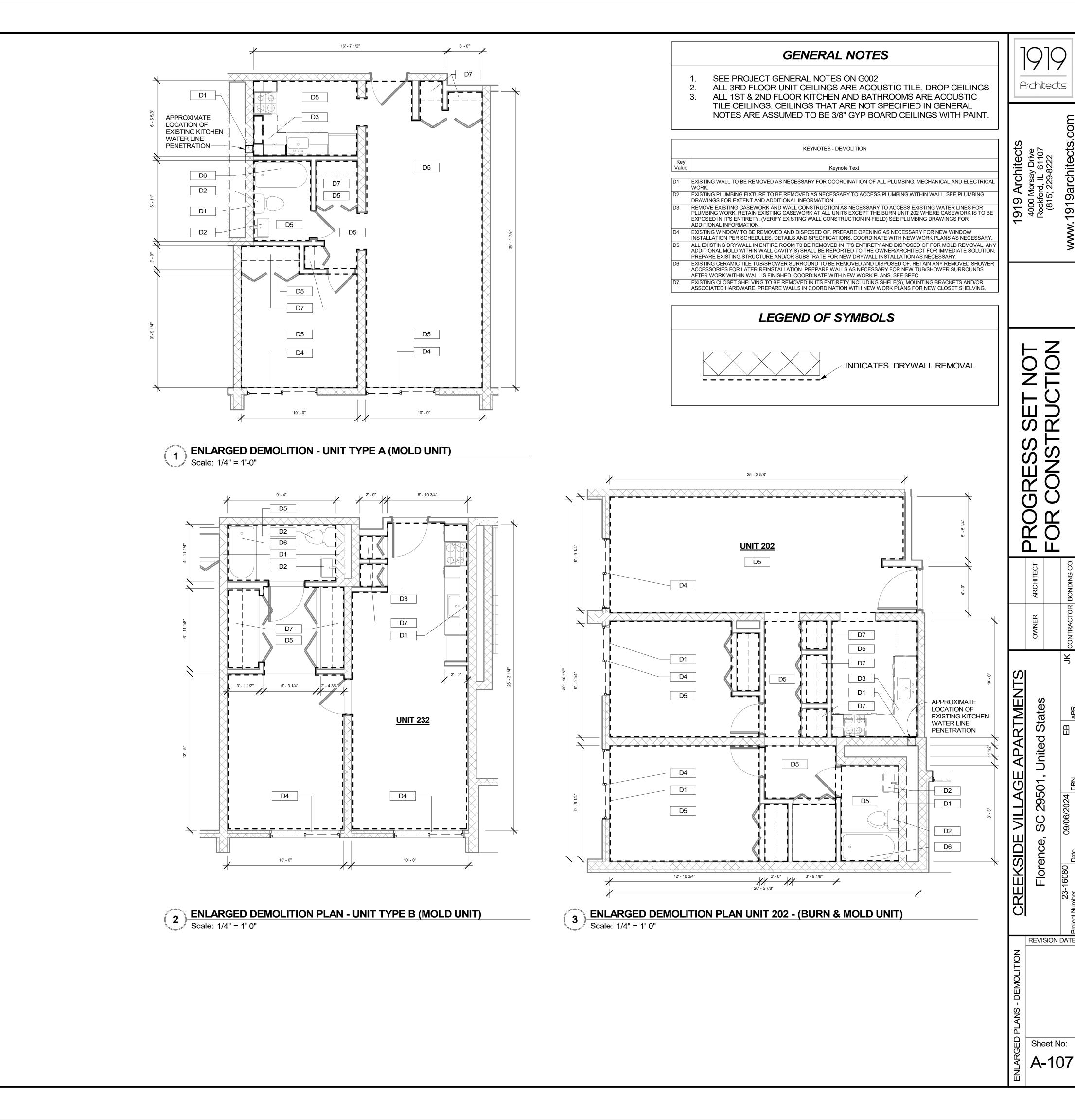


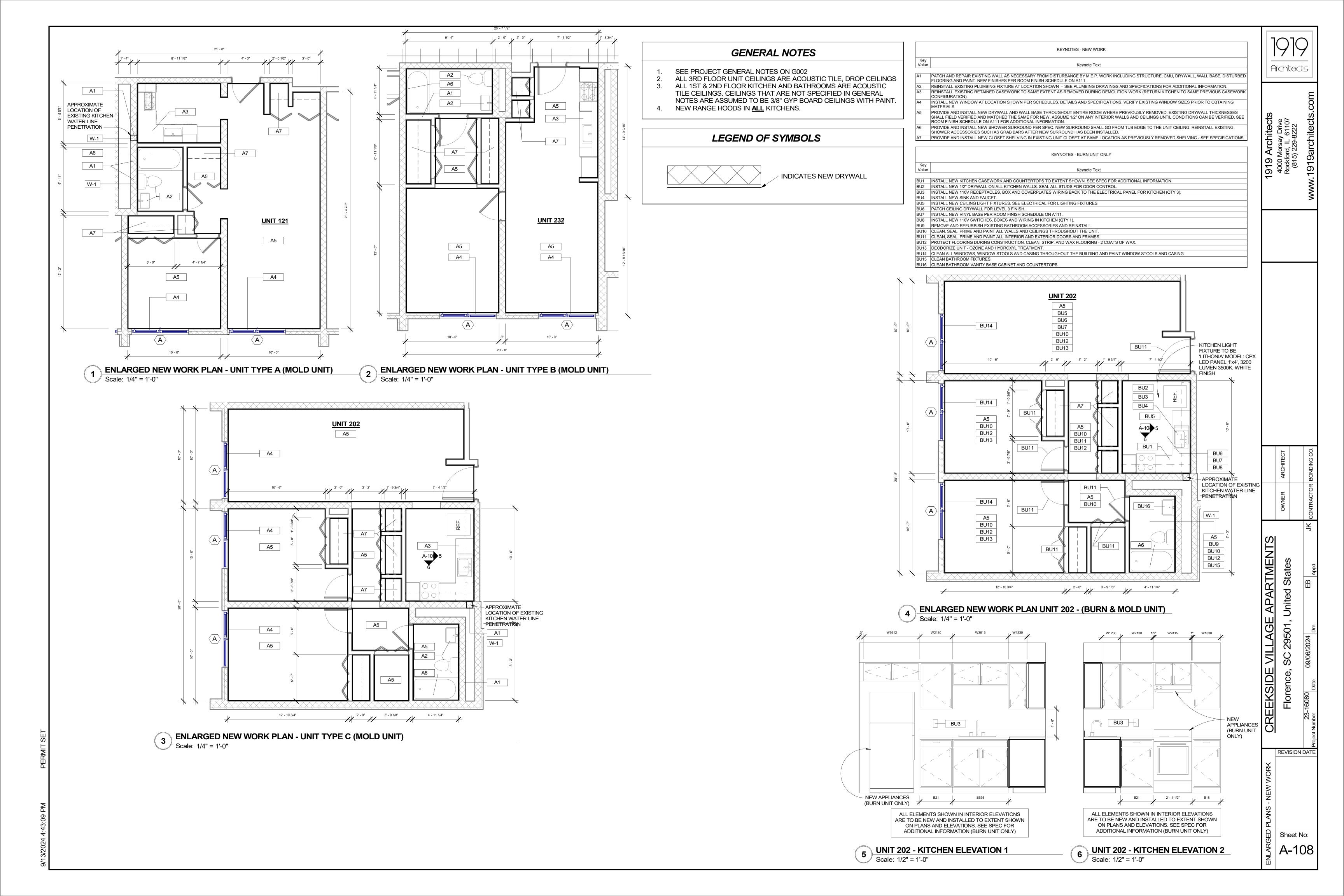


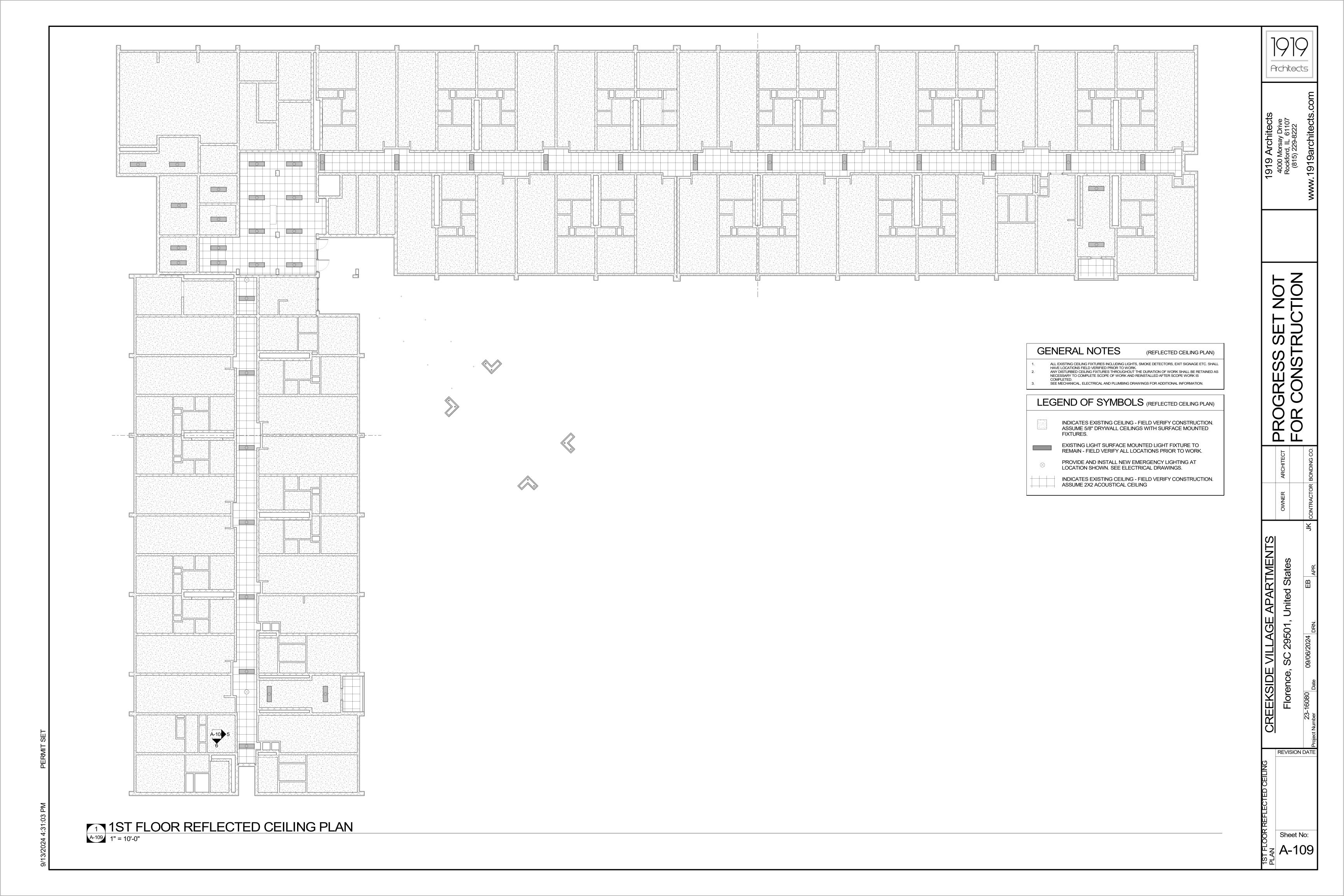


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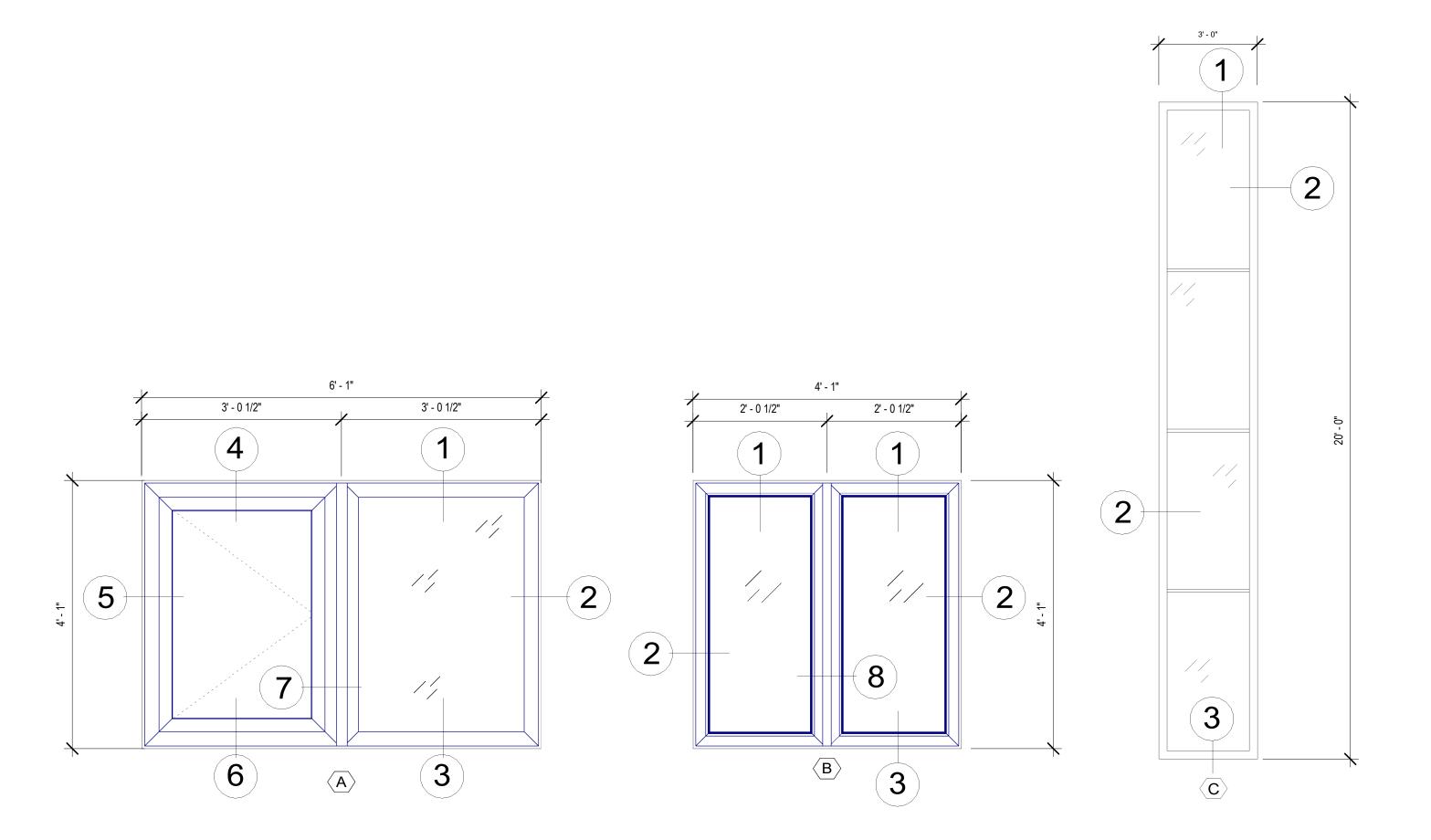
WALL TYPE SCHEDULE
Scale: 1 1/2" = 1'-0"

ROOM FINISH SCHEDULE

UNIT TYPE	ROOM	FLOOR	WALLS	BASE	NOTES
	KITCHEN	EXIST.	PR-1	VINYL	3
	LIVING	EXIST.	PR-1	VINYL	1,3
Α	HALL	EXIST.	PR-1	VINYL	1,3
	BATH	EXIST.	PR-1	VINYL	3
	BEDROOM	EXIST.	PR-1	VINYL	1,3
	KITCHEN	EXIST.	PR-1	VINYL	1,3
В	LIVING	EXIST.	PR-1	VINYL	1,3
D	BEDROOM	EXIST.	PR-1	VINYL	1,3
	BATH	EXIST.	PR-1	VINYL	1,3
	KITCHEN	EXIST.	PR-1	VINYL	1,2,3
	LIVING	EXIST.	PR-1	VINYL	3
	HALL	EXIST.	PR-1	VINYL	1,3
C	BEDROOM	EXIST.	PR-1	VINYL	1,3
	BEDROOM	EXIST.	PR-1	VINYL	1,3
	BATH	EXIST.	PR-1	VINYL	3

1. ALL CLOSETS SHALL RECIEVE SAME FINISHES AS THE NEXT ADJECENT ROOM (TYPICAL).
2. PATCH CEILING DRYWALL FOR LEVEL 3 FINISH.
3. SEE GENERAL NOTES ON A108

ABBREVIATIONS: PT-1 = PAINT 1 EXIST. = EXISTING TO REMAIN

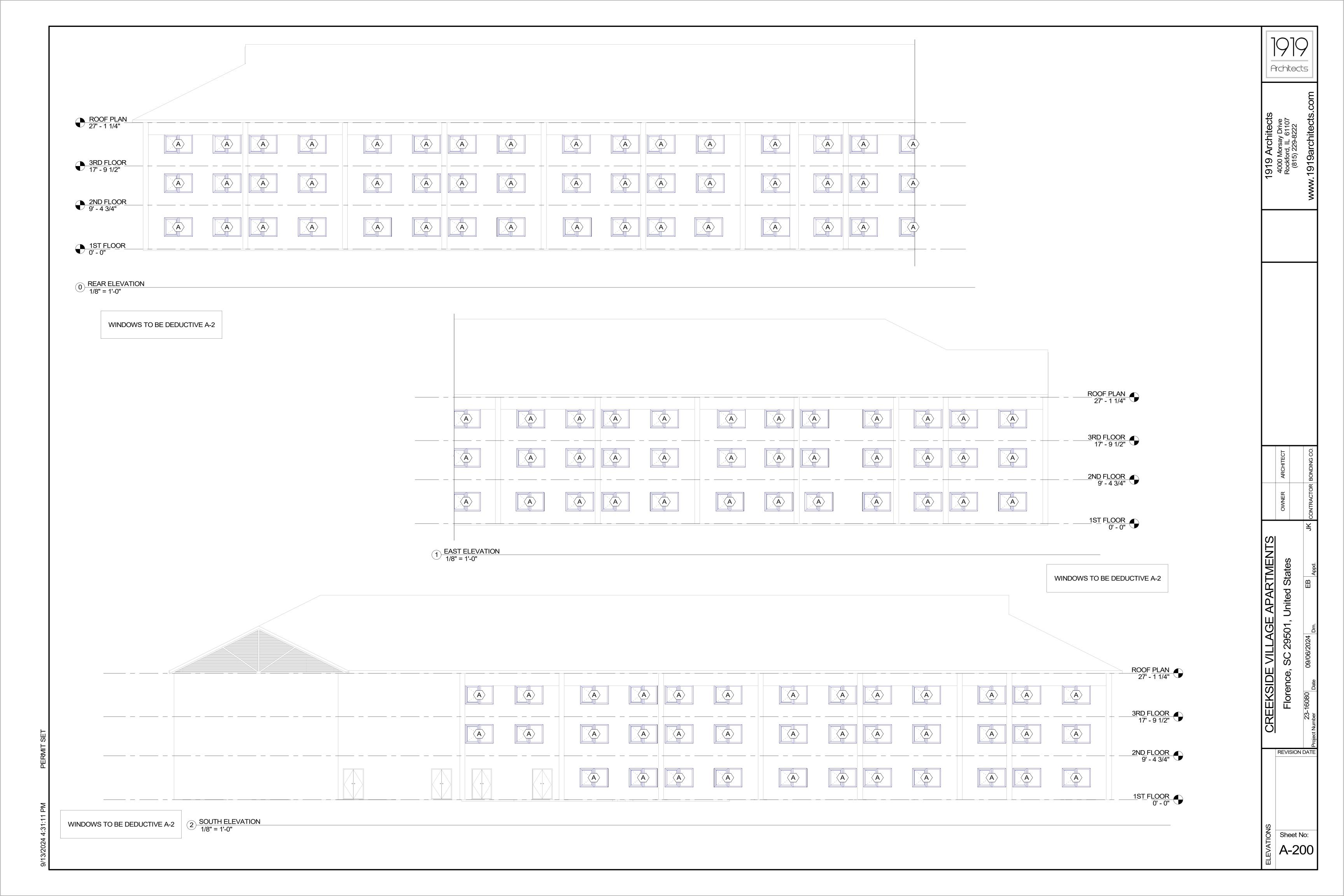


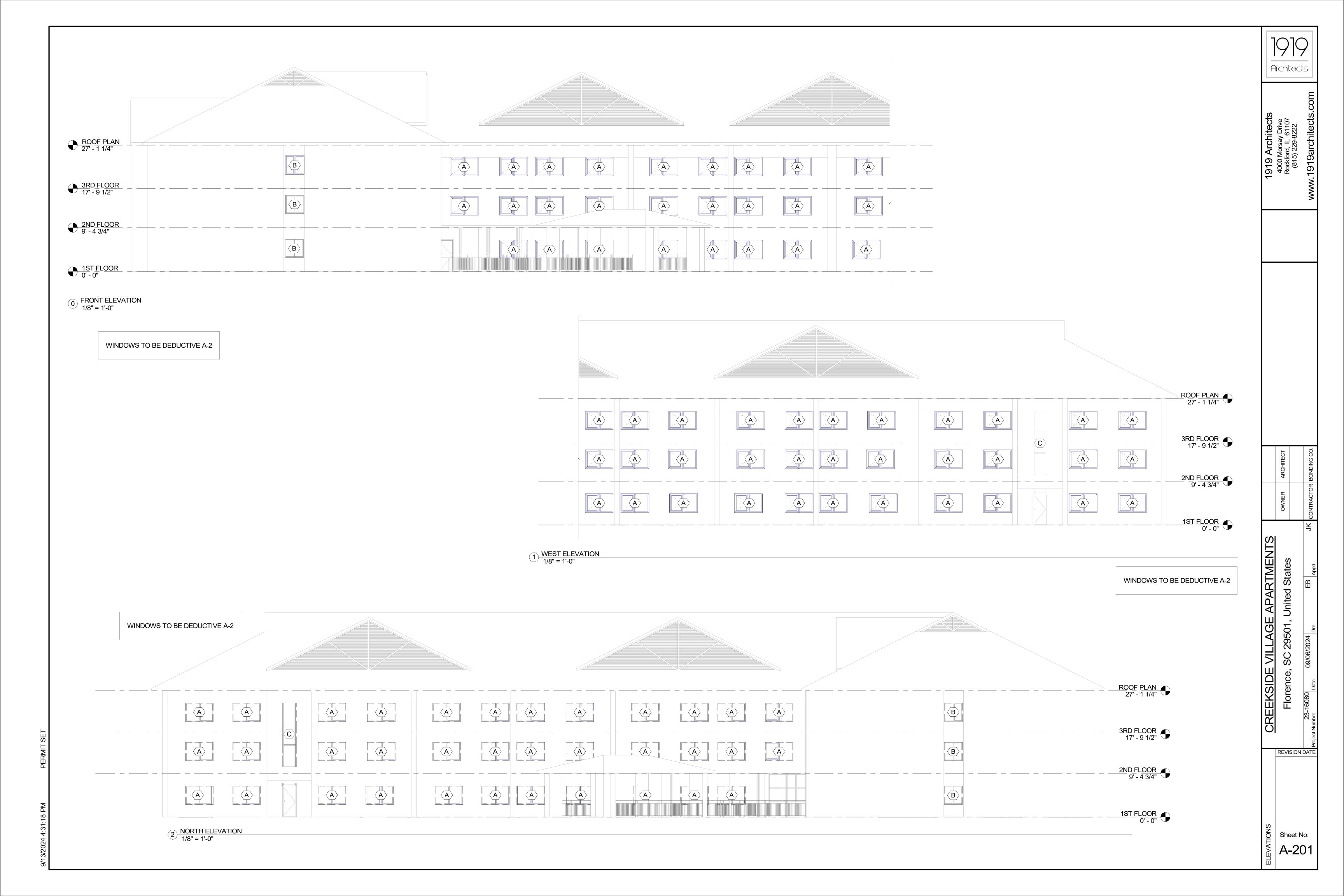
WINDOW TYPE SCHEDULE
SCALE: NOT TO SCALE

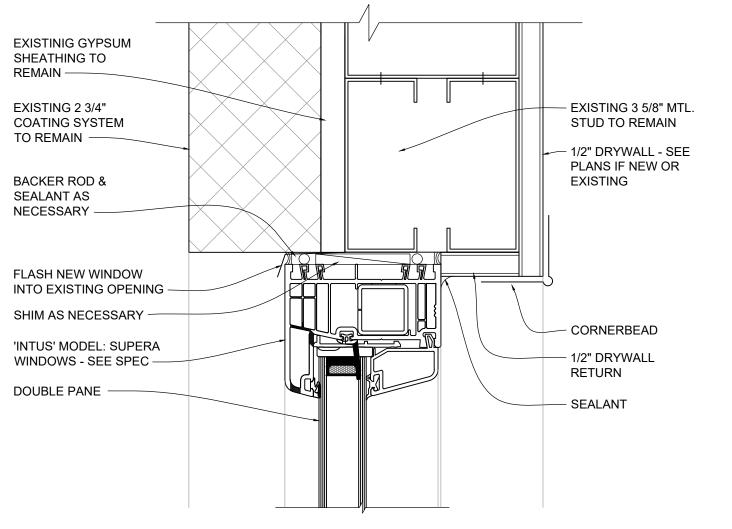
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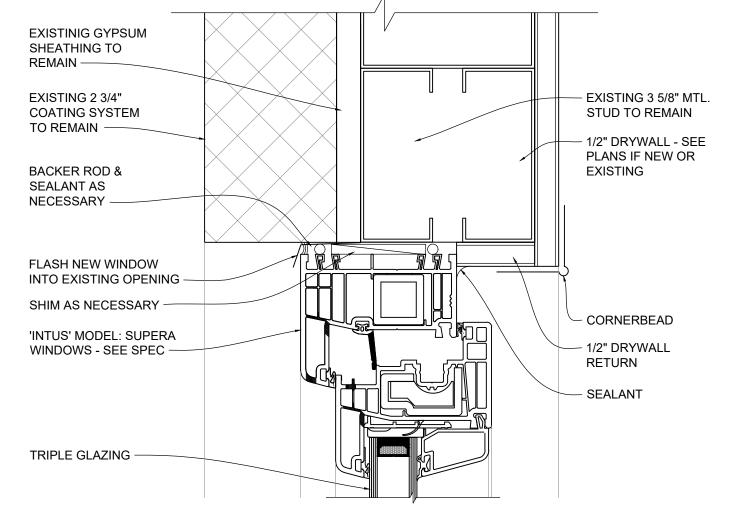
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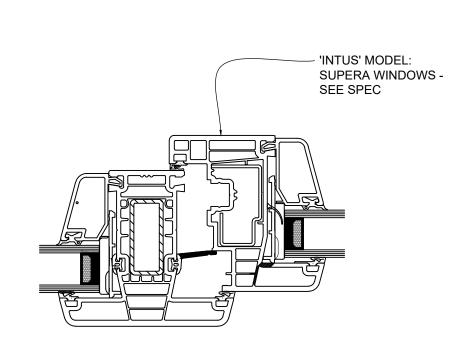
Architects









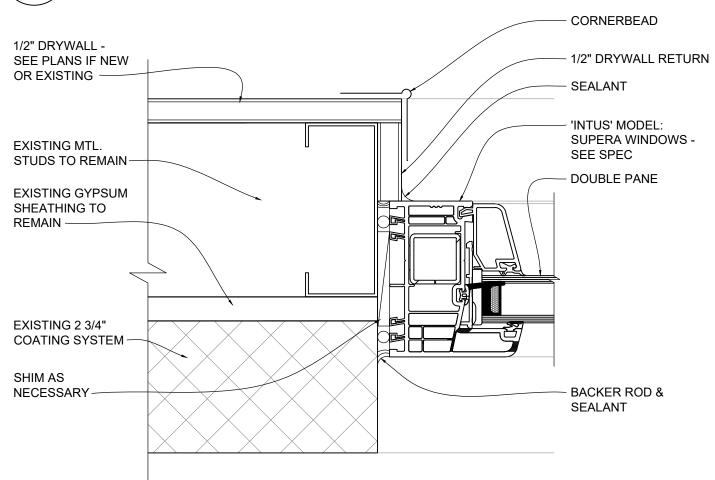


1919 Architects

Architects

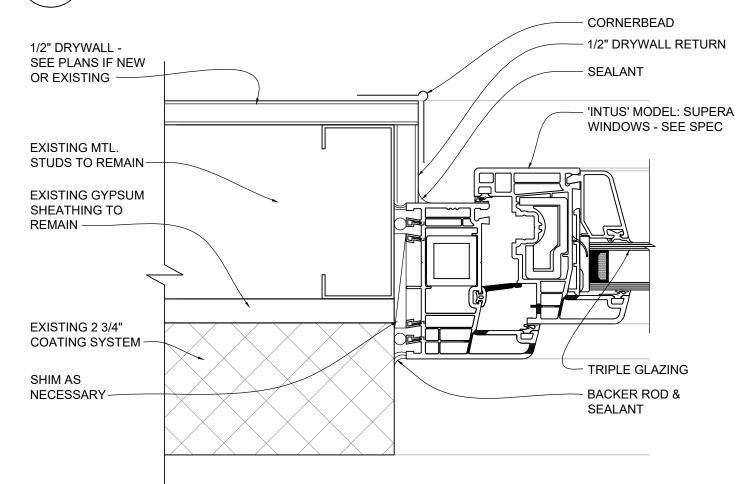
WINDOW DETAIL @ HEAD

\ A300 ∫ SCALE: 6" = 1'-0"



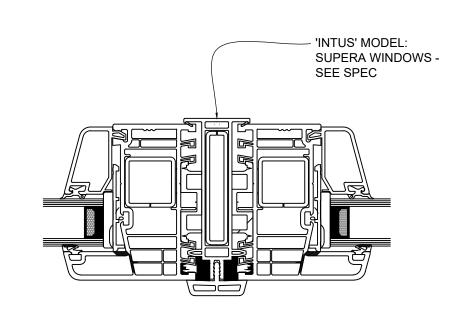
WINDOW DETAIL @ HEAD

∖A300*∫* SCALE: 6" = 1'-0"



FIXED/CASEMENT VERTICAL MULLION

A300 / SCALE: 6" = 1'-0"

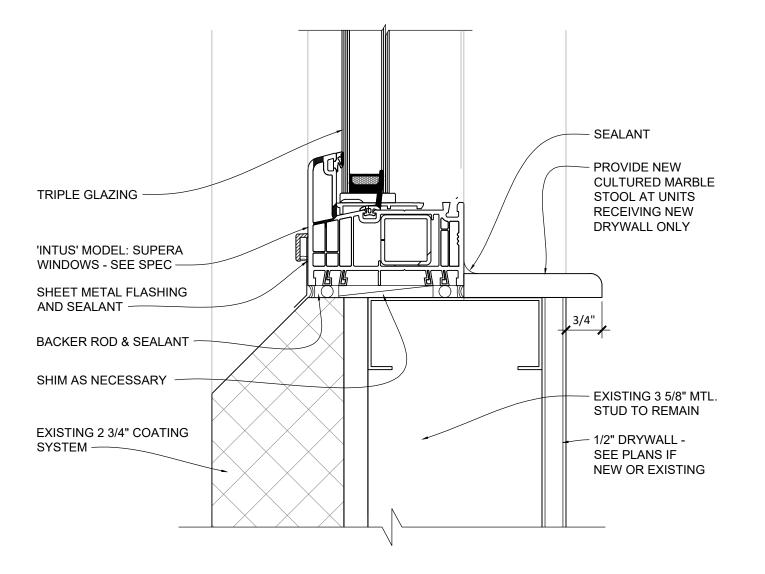


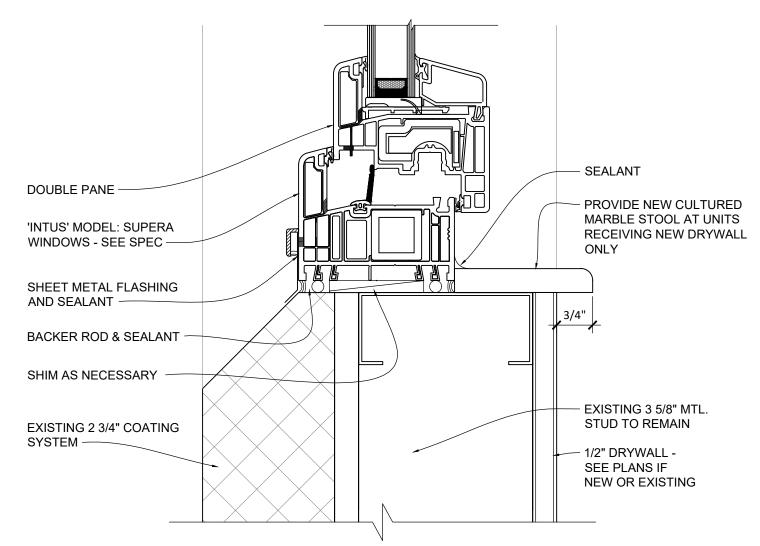
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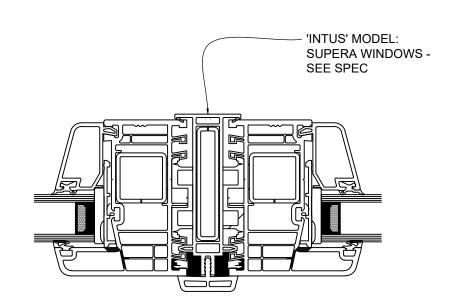


 $\frac{5}{A300} \frac{\text{WINDOW DETAIL @ JAMB}}{\text{SCALE: 6" = 1'-0"}}$

8 A300 | SCALE: 6" = 1'-0"







WINDOW DETAIL @ SILL

SCALE: 6" = 1'-0" A300



A300 SCALE: 6" = 1'-0"



SCALE: 6" = 1'-0"

WINDOWS TO BE DEDUCTIVE A-2

Sheet No: 2 A-300

BALANCING VALVE ASSEMBLY

RISER DESIGNATION

RISER SERVICE RISER NUMBER

PLUMBING ABBREVIATIONS

BUILDING

CLEANOUT DECK PLATE

CAPPED AND VALVED OUTLET

DOWN (PENETRATES FLOOR SLAB)

EXISTING TO BE REMOVED & RELOCATED

EXISTING TO BE REMOVED

ELECTRIC WATER COOLER

EJECTOR DISCHARGE

COFFEE MAKER

CHECK VALVE

COLD WATER

CONTINUATION

CEILING

CONNECT

DIAMETER

DRAWING

EXISTING

ELEVATION

FRESH AIR INLET

FLOOR HYDRANT

GENERAL CONTRACTOR

GALLONS PER MINUTE

HOT WATER RETURN

INSIDE DIAMETER

INDIRECT WASTE

JANITOR'S SINK

MOP RECEPTOR

NORMALLY CLOSED

NORMALLY OPEN

OUTSIDE DIAMETER

PUMP DISCHARGE

PLUGGED OUTLET

RELOCATED EXISTING

SHOCK ARRESTOR

ROOF DRAIN

SANITARY

SHOWER

SINK

SLEEVE

STORM

TYPICAL

VENT

STORM DRAIN

SQUARE FOOT

UNLESS OTHERWISE NOTED

(PENETRATES FLOOR SLAB)

VACUUM BREAKER

WATER CLOSET

WALL CLEANOUT

WALL HYDRANT

ZONE CONTROL VALVE BOX

VENT THROUGH ROOF

PLUMBING CONTRACTOR

PRESSURE REDUCING VALVE

POUNDS PER SQUARE INCH (GAUGE

EXISTING TO BE REMOVED & RETURNED TO OWNER

OUTSIDE SCREW & YOKE GATE VALVE

NOT TO SCALE

NOT IN THIS CONTRACT

MEDICAL GAS ALARM PANEL

LAVATORY

MAXIMUM

MINIMUM

GREASE WASTE

HUNG CEILING

FLOOR DRAIN

FIXTURE UNIT

FLOOR

GALLONS

HOSE BIBB

HOT WATER

FEET

BOP

CODP

CVC

PLUMBING GENERAL NOTES (NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT) 1. CONTRACTOR SHALL PROVIDE AND PAY ALL FEES AND PERMITS. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH ALL APPLICABLE AREA DRAIN CODES AND REGULATIONS INCLUDING BUT NOT LIMITED TO ABOVE FINISHED FLOOR INTERNATIONAL, NATIONAL, CITY, STATE, LOCAL CODES AND ORDINANCES WHICH MAY BE IN EFFECT. ALL PLUMBING MATERIALS **AUTHORITY HAVING JURISDICTION** INSTALLATION PROCEDURES AND SYSTEM LAYOUTS SHALL BE APPROVED BY ALL APPLICABLE CODE ENFORCEMENT AUTHORITIES BOTTOM OF PIPE HAVING JURISDICTION, AND IT SHALL BE THE PLUMBING CLEANOUT CONTRACTOR'S RESPONSIBILITY TO OBTAIN AND PAY FOR ALL

> 2. WHERE THERE IS A DISCREPANCY BETWEEN MATERIAL OR EQUIPMENT IN THE DRAWINGS AND/OR SPECIFICATIONS, THE PLUMBING CONTRACTOR SHALL ASSUME THE MORE STRINGENT, HIGHER QUALITY AND MORE EXPENSIVE OPTION FOR BIDDING.

NECESSARY PERMITS AND APPROVALS FOR THIS INSTALLATION.

3. DRAWINGS ARE DIAGRAMMATIC AND INTENDED TO SHOW APPROXIMATE LOCATIONS, CONTRACTOR SHALL INSTALL ALL WORK WITHOUT CONFLICT WITH OTHER TRADES AND MAKE ALTERATIONS AS REQUIRED WITHOUT ADDITIONAL COST TO OWNER. CONTRACTOR SHALL INCLUDE ALL NEEDED OFFSETS, CHANGES IN DIRECTION, TRANSITIONS, COLLARS, FITTINGS, ETC. NEEDED FOR COMPLETE AND OPERATIONAL

4. ALL COMPONENTS OF THE DOMESTIC WATER SYSTEM SHALL CONFORM TO THE FEDERAL "REDUCTION OF LEAD IN DRINKING WATER ACT" AS DEFINED PER SDWA IN SECTION 1417(D). THE WETTED AREA EXPOSED TO DRINKING WATER SHALL BE LEAD FREE.

5. COORDINATE WORK WITH OTHER TRADES SO THAT ALL COMPONENTS SHALL BE INSTALLED IN THE PROPER PLACE AT THE PROPER TIME. COORDINATE WITH ELECTRICAL CONTRACTOR TO ASSURE DOMESTIC WATER AND ELECTRICAL WIRING ARE NOT INSTALLED IN SAME STUD BAY IN WALLS AND CEILINGS.

6. SANITARY PIPING SHALL BE SLOPED ON A DOWNWARD PITCH AT A MINIMUM OF 1/4" PER FOOT FOR 2" SIZES AND LESS. PIPING 3" AND LARGER SHALL BE SLOPED AT 1/8" PER FOOT, AND IN ALL CASES CONFORMING TO JURISDICTIONAL CODE REQUIREMENTS.

7. PROVIDE ACCESSIBLE DRAINAGE SYSTEM CLEANOUTS, EFFECTIVELY PLACED FOR EACH TRAP. STACK, BASE, AND AT CHANGE IN DIRECTION AND SPACING AS REQUIRED BY CODE, WHETHER INDICATED ON PLANS OR NOT. PROVIDE ALL ADDITIONAL SYSTEM CLEANOUTS REQUIRED FOR THOROUGH CLEANING.

8. FOR SOLDERED JOINTS, CLEAN THE ENDS OF ALL COPPER TUBING BEFORE ASSEMBLY. APPLY FLUX AND TIN THE ENDS OF TUBING 2 INCHES AND LARGER.

9. BALL TYPE CONTROL SHUTOFF VALVES SHALL BE INSTALLED ON EACH BRANCH FROM THE DOMESTIC WATER SUPPLY MAINS AND ON EACH ISOLATED FIXTURE BRANCH, INSTALLED IN AN EASILY ACCESSIBLE AND CONVENIENT LOCATION.

10. FLUSH CONTROLS FOR WATER CLOSETS MUST BE LOCATED ON THE "APPROACH" OR OPEN SIDE OF THE TANK, TO COMPLY WITH UFAS SECTION 4.16.5.

11. ALL PIPING ON EXTERIOR WALLS SHALL BE PROTECTED FROM FREEZING.

12. PROVIDE DIELECTRIC FITTINGS WHEN JOINING DISSIMILAR METALS.

13. EXPOSED PIPING AND FITTINGS AT FIXTURES SHALL BE CHROME PLATED I.P.S. BRASS. ESCUTCHEON PLATES SHALL BE PROVIDED ON ALL PIPE WHICH PASS THROUGH WALLS, PARTITIONS, FLOORS OR CEILINGS AND SHALL BE THE SPLIT RING TYPE, STEEL CONSTRUCTION.

14. SLEEVES SHALL BE SCHEDULE 40 STEEL AND SHALL BE TWO PIPE SIZES LARGER THAN THE SYSTEM PIPE. SLEEVES SHALL BE LOCATED WHERE PIPE PASSES THROUGH WALLS, FLOORS OR PARTITIONS. ANNULAR SPACE BETWEEN SLEEVE AND PIPE SHALL BE SEALED WATER TIGHT AND FIRE STOPPED (IF APPLICABLE) TO ACHIEVE AN HOURLY RATING EQUAL OR GREATER TO THAT OF THE ASSEMBLY

15. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND BE INSTALLED IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS AND DETAILS.

BEING PENETRATED.

CUTTING.

16. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE BEST PRACTICES OF THE TRADE AND THE LATEST CODE REQUIREMENTS AND THE AUTHORITY HAVING JURISDICTION. SYSTEM MATERIALS SHALL BE UNIFORM THROUGHOUT THE BUILDING.

17. ALL EQUIPMENT AND MATERIALS SHALL, AS A MINIMUM, HAVE A WORKING PRESSURE AS DETERMINED BY CODES, ASME (OR SIMILAR OTHER BODY) AND OF NOT LESS THAN 125 PSI.

18. CLEAN ALL PIPE BEFORE ERECTION. REAM ALL PIPE ENDS AFTER

19. FOR SCREWED JOINTS APPLY NON-CORROSIVE, NON-HARDENING TEFLON PIPE TAPE OR SUITABLE COMPOUND TO MALE THREADS ONLY. CAULKING AND PACKING OF THREADS IS PROHIBITED.

20. INSTALL EXPOSED PIPE LINES PARALLEL WITH BUILDING WALLS OR STRUCTURE. DO NOT EMBED PIPING IN CINDER FILL, NOR INSTALL WHERE THERE IS A POSSIBILITY OF FREEZING.

21. PITCH PIPING TO PERMIT AIR VENTING THROUGH THE FIXTURES. ALLOW FOR EXPANSION AND COMPLETE LOW POINT DRAINAGE.

22. IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO REVIEW THESE PLANS AND SPECIFICATIONS, AS WELL AS THE RELATED HVAC, FIRE PROTECTION, ELECTRICAL, STRUCTURAL, ARCHITECTURAL, INTERIOR DECOR AND SITE ENGINEERING DRAWINGS TO BECOME FAMILIAR WITH THE FULL PROJECT SCOPE. IN ADDITION, THIS CONTRACTOR MUST COORDINATE WITH AN OWNER REPRESENTATIVE TO FULLY UNDERSTAND ALL REQUIREMENTS WHICH MAY NOT BE SPECIFIED HEREIN AND WHICH THE OWNER MAY CONSIDER PART OF THIS CONTRACT. DURING THE COURSE OF CONSTRUCTION COORDINATION AND ACTUAL CONSTRUCTION, IT IS THE RESPONSIBILITY OF THE PLUMBING CONTRACTOR TO WORK CLOSELY WITH ALL ACCOMPANYING CONTRACTORS AND TRADESMEN IN ORDER TO ENSURE

23. THE PLUMBING CONTRACTOR SHALL VISIT THE SITE AND NOTE ALL EXISTING CONDITIONS AS WELL AS ALL CONDITIONS TO BE MET. PRIOR TO BID SUBMISSION. LACK OF A THOROUGH UNDERSTANDING OF THE PROJECT SCOPE AND CONDITIONS SHALL NOT CONSTITUTE AN EXCUSE FOR ERRORS OR OMISSIONS, NOR FOR A REQUEST FOR EXTRA COMPENSATION

A SMOOTH RUNNING AND CAREFULLY COORDINATED INSTALLATION.

24. IT IS CRITICAL THAT THE PLUMBING CONTRACTOR FIELD VERIFIES ALL INVERTS PRIOR TO BID SUBMISSION. IF ANY CONFLICTS EXIST BETWEEN THE NEW PLUMBING SYSTEMS AND THE EXISTING SITE LEVEL SYSTEMS, THEY SHOULD BE BROUGHT TO THE ATTENTION OF AN OWNER'S REPRESENTATIVE AND THE ENGINEER PRIOR TO BID SUBMISSION. EXTRA COMPENSATION SHALL NOT BE ALLOWED FOR

25. THE PLUMBING CONTRACTOR SHALL PROVIDE A COMPLETE SET OF RECORD "AS-BUILT" DRAWINGS INDICATING THE PRECISE LOCATION OF ALL SYSTEMS, EQUIPMENT CONCEALED OR EMBEDDED PIPING, PIPING CONNECTIONS AND ACCESS DOORS. THESE DRAWINGS SHALL ALSO INCLUDE ALL CHANGES AND DEVIATIONS FROM BID DOCUMENTS.

INVERTS OF THE EXISTING SITE LEVEL PIPING SYSTEMS.

ANY EXTRA WORK WHICH RESULTS FROM AN INABILITY TO MEET THE

26. RUN ALL DOMESTIC, WASTE, VENT AND GAS PIPING AS HIGH AS POSSIBLE THROUGHOUT ENTIRE BUILDING. INSTALL LONG RUNS OF PIPING WITHIN STEEL (JOIST) SPACE AND OTHER PIPING TIGHT TO BOTTOM OF STEEL. COORDINATE AND VERIFY WITH OTHER CONTRACTORS AS NOT TO INTERFERE WITH DUCTWORK, FIRE PROTECTION PIPING, LIGHTING SYSTEMS, ETC.

27. ALL EXPOSED HORIZONTAL AND VERTICAL PIPING SHALL BE INSTALLED IN A NEAT ARRANGEMENT IN LOCATIONS WHICH ARE THE MOST INCONSPICUOUS. VERTICAL DROP FINAL LOCATIONS SHALL BE COORDINATED AND RUN WITHIN CHASES, WALLS, SOFFITS WITH OTHER MECHANICAL / ELECTRICAL FEEDS. ALL SUCH LOCATIONS ARE TO BE REVIEWED WITH AN OWNER REPRESENTATIVE AND ARCHITECT PRIOR TO INSTALLATION.

28. FINAL CONNECTIONS TO ALL GAS FIRED APPLIANCES TO BE BY THE PLUMBING CONTRACTOR, REGARDLESS OF WHO PROVIDES APPLIANCE. THIS SHALL INCLUDE BUT NOT BE LIMITED TO HVAC EQUIPMENT. COOKING EQUIPMENT, EMERGENCY GENERATORS AND DOMESTIC HOT WATER HEATERS. EACH PIECE OF EQUIPMENT SHALL BE PROVIDED WITH A DIRT LEG, LUBRICATED PLUG VALVE, UNION, GAS SHUT-OFF VALVE AND A FLEXIBLE STAINLESS STEEL CONNECTION.

29. DOMESTIC WATER HEATER TEMPERATURE / PRESSURE RELIEF VALVES SHALL BE PIPED FULL SIZE TO THE NEAREST APPROVED STANDPIPE OR FLOOR DRAIN. THIS REQUIREMENT SHALL BE APPLICABLE TO ALL DOMESTIC WATER HEATERS.

30. ALL HAND SINKS SHALL HAVE IN-LINE WATER TEMPERING VALVES INSTALLED SO AS TO BE EASILY ACCESSIBLE. THESE TEMPERING VALVES SHALL BE SET TO DELIVER HOT WATER AT 105°F.

31. WHERE APPLICABLE, DO NOT RUN VENTS THROUGH ROOF AT PRE-FINISH METAL ROOFING SYSTEMS, INSTEAD DIVERT VENT PIPING TO RUN UP THROUGH FLAT MEMBRANE ROOF. VENTS THROUGH ROOF SHALL NOT BE VISIBLE TO THE PUBLIC AND NOT LOCATED CLOSER THEN 10'-0" OF ROOFTOP EQUIPMENT.

32. THE PLUMBING CONTRACTOR SHALL FIELD VERIFY THE EXACT LOCATIONS AND CONNECTIONS OF THE HOSE BIBB. PLUMBER TO FURNISH AND INSTALL ALL PIPING AND EQUIPMENT AS PER MANUFACTURER'S INSTRUCTIONS. FURNISH AND INSTALL AN ACCESSIBLE SHUT-OFF VALVE FOR THE HOSE BIBB BRANCH SUPPLY. FINAL CONNECTION & INSTALLATION BY PLUMBING CONTRACTOR.

33. PRIOR TO INSTALLING SYSTEMS, THE PLUMBING CONTRACTOR SHALL MEET WITH AN OWNER'S REPRESENTATIVE TO FIELD VERIFY THE EXACT LOCATION OF ALL PROPOSED EQUIPMENT WHICH MAY NOT BE CLEARLY INDICATED ON THE DRAWINGS.

34. THE PLUMBING CONTRACTOR SHALL COORDINATE THE ENTIRE UNDERGROUND PLUMBING PIPING SYSTEM LOCATIONS AND INVERTS WITH THE GRADE BEAMS. INCLUDING TRENCH DRAINS AS WELL AS ALL OTHER UNDERGROUND SYSTEMS.

35. PROVIDE TRAP PRIMERS TO ALL DRAINS ONLY WHEN REQUIRED BY CODE. VERIFY PRIOR TO SUBMITTING BID.

36. REFER TO ARCHITECTURAL PLANS FOR LOCATIONS OF FIRE WALLS AND WALLS WHICH REQUIRE SEALING. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE FOR SEALING ALL FLOOR AND WALL PENETRATIONS WITH FIRE RATED SEALANT BEFORE FINAL PAYMENT.

37. PLUMBING CONTRACTOR SHALL PROVIDE AND INSTALL ALL INDIRECT WASTE PIPING - SHALL BE COPPER WITH SOLDER JOINTS.

38. PLUMBING CONTRACTOR SHALL RUN ALL PIPING TO AVOID REINFORCING AT ALL COLUMN LINES.

39. FOR MOUNTING HEIGHTS OF ALL PLUMBING FIXTURES, SEE ARCHITECTURAL DRAWINGS.

HAVING JURISDICTION.

OR BENDS.

40. ALL WORK SHALL BE INSTALLED IN A NEAT AND WORKMAN-LIKE MANNER IN ACCORDANCE WITH LOCAL CODES AND ALL AUTHORITIES

41. VALVES SHALL NOT BE INSTALLED WITH THE OPERATING HANDLE POINTING DOWNWARD. RUN PIPING GENERALLY PARALLEL TO THE AXIS OF THE BUILDING, ARRANGED TO CONFORM TO THE BUILDING REQUIREMENTS AND TO SUIT THE NECESSITIES OF CLEARANCE OF DUCTS, FLUES, CONDUITS AND WORK OF OTHER TRADES AND CLOSE

TO CEILING OR OTHER CONSTRUCTION AS PRACTICAL, FREE OF TRAPS

42. PLUMBING CONTRACTOR SHALL MAKE ALL FINAL CONNECTIONS TO WATER, STORM AND SANITARY LATERALS INSTALLED BY SITE CONTRACTOR.

43. ALL PIPES, DUCT, CONDUIT AND OTHER PENETRATIONS OF RETURN AIR PLENUM, INCLUDING HANGERS AND SUPPORT SYSTEM PENETRATIONS OF TOP HORIZONTAL SHALL BE SEALED AIRTIGHT. ALL PIPING IN RETURN AIR PLENUMS SHALL BE CAST IRON, COPPER OR CPVC. PVC PIPING IS PROHIBITED IN RETURN AIR PLENUMS.

44. PLUMBING CONTRACTOR SHALL REPLACE ANY PIPING SYSTEM AND COMPONENTS WHICH DO NOT PASS TESTING PROCEDURES SPECIFIED AND RETEST REPAIRED PORTIONS OF THE SYSTEM.

45. PLUMBING CONTRACTOR SHALL MAKE FINAL CONNECTIONS TO ALL PLUMBING EQUIPMENT, EQUIPMENT SUPPLIED BY OTHERS, INCLUDING REQUIRED FAUCETS, STOPS, VALVES, FITTINGS, TRAPS, ETC.

46. PLUMBING CONTRACTOR SHALL INSTALL PIPING SO AS NOT TO ENCROACH ON REQUIRED CLEARANCES ABOVE ANY ELECTRIC PANEL NO PIPING SHALL BE INSTALLED DIRECTLY OVER ELECTRICAL PANELS AND NO PIPING SHALL BE INSTALLED WITH THE BOTTOM AT LESS THAN 66" ABOVE THE 4'-0" SPACE DIRECTLY IN FRONT OF ANY ELECTRIC PANELS.

47. PLUMBING CONTRACTOR SHALL FURNISH AND INSTALL AIR CHAMBERS PER NATIONAL STANDARD PLUMBING CODE ON ALL WATER SUPPLIES TO PLUMBING FIXTURES WITH QUICK CLOSING VALVES.

48. PIPING HANGERS SHALL BE SPACED SO AS TO PREVENT SAG AND PERMIT PROPER DRAINAGE AND SHALL NOT BE SPACED MORE THAN EIGHT FEET APART UNLESS A GREATER SPACE IS DEFINITELY INDICATED ON THE DRAWINGS. A HANGER SHALL BE PLACED WITHIN (1) FOOT OF EACH HORIZONTAL ELBOW. HANGERS SHALL BE SIZED TO FIT OVER INSULATION AND BE PROVIDED WITH AN INSULATION SHIELDS.

49. THE INSTALLATION OF ALL INSULATION SHALL BE PERFORMED BY AN EXPERIENCED CRAFTSMAN IN A NEAT WORKMAN-LIKE MANNER AND SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S PUBLISHED RECOMMENDATIONS FOR SERVICE INTENDED.

50. ALL MATERIALS OF INSULATION SHALL BE OF THE TYPE AND QUALITY AS MANUFACTURED BY ARMSTRONG, CERTAINTEED, OWENS-CORNING OR SCHULLER.

51. ALL MATERIAL AND EQUIPMENT SPECIFIED TO BE INSULATED SHALL BE THOROUGHLY TESTED AND APPROVED PRIOR TO APPLYING THE INSULATION.

52. DRAINAGE SYSTEM TEST

A. WATER TEST: THE ENTIRE DRAINAGE AND VENTING SYSTEM SHALL HAVE ALL NECESSARY OPENINGS PLUGGED TO PERMIT THE ENTIRE SYSTEM TO BE FILLED WITH WATER TO THE LEVEL OF THE HIGHEST VENT STACK ABOVE THE ROOF. THE SYSTEM SHALL HOLD THIS WATER FOR 30 MINUTES WITHOUT LEAKAGE. WHERE A "PORTION" OF THE SYSTEM IS TO BE TESTED, THE TEST SHALL BE CONDUCTED IN THI SAME MANNER, EXCEPT THAT A VERTICAL STACK 10 FEET ABOVE THE HIGHEST HORIZONTAL LINE TO BE TESTED SHALL BE INSTALLED AND FILLED WITH WATER TO MAINTAIN SUFFICIENT PRESSURE, OR A PUMP MAY BE USED TO SUPPLY THE PRESSURE. THE PRESSURE SHALL BE MAINTAINED FOR 30 MINUTES.

B. AIR TEST: IF TEST IS DONE WITH AIR, A PRESSURE OF 5 PSIG SHALL BE APPLIED WITH A FORCE PUMP AND MAINTAINED AT LEAST 15 MINUTES WITHOUT LEAKAGE. A MERCURY-COLUMN GAGE REGISTERING 10" IN HEIGHT SHALL BE USED IN THE AIR TEST. AIR TESTS SHALL NOT BE USED EXCEPT WHERE PERMITTED BY CODES AND WHEN AMBIENT TEMPERATURES ARE LESS THAN 32 DEGREES FAHRENHEIT FOR 30 MINUTES.

53. DOMESTIC WATER PIPING SYSTEM

UPON COMPLETION OF THE ROUGH-IN AND BEFORE INSULATION OR SETTING OF FIXTURES, DOMESTIC HOT AND COLD WATER PIPING SYSTEMS SHALL BE TESTED AT A HYDROSTATIC PRESSURE OF 1-1/2 TIMES THE ACTUAL WATER PRESSURE BUT NOT LESS THAN 100 PSIG AND PROVEN TIGHT AT THIS PRESSURE FOR NOT LESS THAN 3

54. CLEANING OF PIPING SYSTEMS

FOLLOWING THE COMPLETION OF SYSTEM TESTS, ALL PIPING SYSTEMS SHALL BE THOROUGHLY CLEANED BY THE CONTRACTOR BY FLUSHING WITH WATER OR AS OTHERWISE SPECIFIED. ALL DIRT, SCALE, OIL, GREASE AND FOREIGN SUBSTANCES WHICH MAY HAVE ACCUMULATED IN THE SYSTEMS DURING INSTALLATION SHALL BE COMPLETELY REMOVED.

55. STERILIZATION OF POTABLE WATER SYSTEMS

A. BEFORE BEING PLACED IN SERVICE, THE COMPLETE DOMESTIC HOT AND COLD WATER PIPING WITHIN THE BUILDING SHALL BE STERILIZED IN ACCORDANCE WITH THE LATEST ISSUE OF AWWA SPECIFICATION C-651 AND PER NATIONAL STANDARD PLUMBING CODE SECTION 10.9. THE PIPING SHALL BE FILLED WITH A WATER-CHLORINE SOLUTION CONTAINING AT LEAST 50 PARTS PER MILLION OF CHLORINE AND SHALL BE VALVED OFF FOR 24 HOURS OR FILLED WITH A WATER-CHLORINE SOLUTION CONTAINING AT LEAST 200 PARTS PER MILLION OF CHLORINE AND ALLOWED TO STAND FOR AT LEAST 3 HOURS. FOLLOWING THE ALLOWED STANDING TIME, THE SYSTEM SHALL BE FLUSHED WITH POTABLE WATER UNTIL NO CHLORINE REMAINS IN THE SYSTEM.

B. PRIOR TO STERILIZATION, SYSTEMS SHALL BE LEAK TESTED AND ALL DIRT AND FOREIGN MATTER SHALL BE REMOVED BY A THOROUGH FLUSHING WITH WATER.

56. ENGAGE A FACTORY-AUTHORIZED SERVICE REPRESENTATIVE TO PERFORM STARTUP SERVICES. COMPLETE INSTALLATION AND STARTUP CHECKS SHALL BE ACCORDING TO MANUFACTURER'S WRITTEN INSTRUCTIONS AND STARTUP REPORTS SHALL BE PROVIDED TO ARCHITECT/ENGINEER FOLLOWING COMPLETION. STARTUP SHALL BE PROVIDED FOR ALL EQUIPMENT SUPPLIED OR INSTALLED, INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

A. WATER HEATERS B. PUMPS C. COMPRESSORS D. CONTROLS

PLUMBING DEMOLITION GENERAL NOTES

1. THE CONTRACTOR SHALL INCLUDE IN HIS PRICE ALL COSTS ASSOCIATED WITH REMOVALS AND RELOCATIONS OF PLUMBING WORK AS DESCRIBED ON THE DRAWINGS AND IN THE SPECIFICATIONS WITH ALLOWANCES FOR EXPECTED OR UNFORESEEN DIFFICULTIES WHEN CONCEALED WORK HAS BEEN OPENED. NO CLAIMS FOR ADDITIONAL WORK ASSOCIATED WITH DEMOLITION SHALL BE ACCEPTED, EXCEPT IN CERTAIN CASES CONSIDERED JUSTIFIABLE BY THE OWNER/ENGINEER.

2. ALL DEMOLITION WORK SHALL BE COORDINATED WITH THE OWNER'S REPRESENTATIVE AND ALSO MUST BE COORDINATED WITH ALL ARCHITECTURAL, PLUMBING, MECHANICAL, FIRE PROTECTION, ELECTRICAL AND STRUCTURAL SYSTEMS.

3. EXISTING CONDITIONS, EQUIPMENT, MATERIALS & SIZES ARE SHOWN FOR REFERENCE ONLY. VERIFY EXISTING CONDITIONS & BRING ANY DISCREPANCIES TO THE ENGINEER'S ATTENTION IN WRITING PRIOR TO BID SUBMISSION.

4. THE CONTRACTOR SHALL VISIT THE SITE TO CAREFULLY EXAMINE AND FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS PRIOR TO BIDDING. SUBMISSION OF A PROPOSAL SHALL BE CONSIDERED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN PERFORMED. LATER CLAIMS FOR EXTRA LABOR OR MATERIALS REQUIRED DUE TO DIFFICULTIES ENCOUNTERED SHALL NOT BE RECOGNIZED.

5. ALL SYSTEMS TO BE REMOVED ARE NOT SHOWN. THE CONTRACTOR SHALL BECOME FAMILIAR WITH TOTAL SCOPE OF DEMOLITION WORK PRIOR TO SUBMITTING BID.

6. ALL PIPING BEING ABANDONED SHALL BE CUT BACK AND CAPPED BELOW FINISHED FLOOR, IN WALLS AND ABOVE CEILINGS SO NO PIPING SHALL BE EXPOSED.

THE BUILDING OWNER.

7. CONTRACTOR TO PROVIDE DUST PROTECTION TO SATISFACTION OF

8. CONTRACTOR SHALL PATCH AND REPAIR ALL FLOOR, CEILING, WALL, AND ROOF PENETRATIONS, CREATED BY THE INSTALLATION OF NEW. TO MATCH THE EXISTING ADJACENT CONSTRUCTION AND FINISH.

9. ALL EXPOSED OBSOLETE PIPING NOT REQUIRED FOR THIS PROJECT SHALL BE REMOVED.

10. DISPOSE OF ALL MATERIALS AS DIRECTED BY OWNER'S REPRESENTATIVE.

11. ALL RELOCATED PIPING SHALL MATCH EXISTING MATERIALS

12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING THE DEMOLITION WORK AND NEW WORK WITH THE PHASING REQUIREMENTS OF THIS PROJECT.

13. INDICATED EXISTING PLUMBING, MECHANICAL AND ELECTRICAL SYSTEMS AND COMPONENTS ARE TO BE REMOVED AND RELOCATED AS INDICATED. ENSURE ALL ITEMS HAVE BEEN MADE SAFE PRIOR TO CUTTING OR DISCONNECTING; ELECTRICAL POWER HAS BEEN REMOVED, PRESSURE RELIEVED, TEMPORARY SUPPORTS AND BRACES ARE IN PLACE. ALL REMOVALS ARE TO BE MADE IN A SAFE AND LEGAL MANNER, DISPOSED OF IN APPROPRIATE, LEGAL LOCATIONS

14. THE CONTRACTOR SHALL PERFORM DEMOLITION AND REMOVAL WORK WITH MINIMUM INTERFERENCE WITH FUNCTIONING SYSTEMS. ALL AFFECTED SYSTEMS SHALL BE RECONNECTED AND RESTORED.

15. DEMOLITION AND REMOVAL WORK SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER. THE CONTRACTOR SHALL PATCH. REPAIR OR OTHERWISE RESTORE ANY DAMAGED INTERIOR OR EXTERIOR BUILDING SURFACE TO ITS ORIGINAL CONDITION. PATCH ALL EXISTING INTERIOR AND EXTERIOR WALLS, LEFT BY DEMOLITION, TO MATCH EXISTING

16. THE CONTRACTOR SHALL REMOVE ALL PIPING SUPPORTS, ETC. FROM PARTITIONS THAT ARE TO BE REMOVED. WHERE THE REMOVAL OF THESE ITEMS DISRUPTS EXISTING PIPING THAT IS TO REMAIN, THE CONTRACTOR SHALL INSTALL AND PROVIDE BYPASS CONNECTIONS NECESSARY.

17. ALL PIPING WHICH BECOMES EXPOSED DURING THE ALTERATION WORK SHALL BE REMOVED AND REROUTED CONCEALED BEHIND FINISHED SURFACES.

18. ALL PIPING INSULATION THAT IS UNCOVERED AND/OR EXPOSED IN THE AREAS OF WORK THAT IS FOUND TO BE DAMAGED OR MISSING SHALL BE REPAIRED AND REPLACE WITH LIKE INSULATION MATERIALS AND HAVE A SEALED CONTINUOUS VAPOR BARRIER.

19. PORTIONS OF PIPING TO BE REMOVED OR ABANDONED AS A RESULT OF DEMOLITION WORK, BUT WHICH ARE REQUIRED TO REMAIN ACTIVE, SHALL BE CUT AT CONVENIENT LOCATIONS, REROUTED AND RECONNECTED.

20. ARRANGE TO WORK CONTINUOUSLY, INCLUDING OVER TIME, IF REQUIRED, TO ASSURE THAT SYSTEMS SHALL BE SHUT DOWN ONLY DURING THE TIME ACTUALLY REQUIRED TO MAKE THE NECESSARY CONNECTIONS TO THE EXISTING SYSTEMS.

COORDINATED WITH THE OWNER. MAKE ARRANGEMENTS AT LEAST 5 BUSINESS DAYS PRIOR TO A SHUTDOWN. 22. CONTRACTOR SHALL COMPLY WITH ALL FEDERAL STATE & LOCAL

REQUIREMENTS REGARDING DISPOSAL OF REFRIGERANTS.

21. THE SHUTDOWN OF EXISTING BUILDING SERVICES SHALL BE

23. CONTRACTOR SHALL FIELD VERIFY EXACT LOCATIONS AND CONFIRM EXACT MODIFICATIONS NECESSARY IN THE FIELD.

24. THESE DRAWINGS HAVE BEEN MADE BASED ON A VISUAL INSPECTION OF THE EXISTING SURFACES. SOME ASSUMPTIONS HAVE BEEN MADE AS TO ACTUAL CONSTRUCTION, MATERIALS, AND METHODS. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL ACTUAL FIELD CONDITIONS AND SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES, CONFLICTS, AND UNFORESEEN CONDITIONS.

25. PLUMBING CONTRACTOR SHALL BE RESPONSIBLE TO DEMO ANY AND ALL WALLS AND/OR CEILINGS AS REQUIRED FOR THE INSTALLATION OF PROPOSED PLUMBING LINES FROM SECOND FLOOR ABOVE, ONCE INSTALLATION IS COMPLETE. THE PLUMBING CONTRACTOR SHALL PATCH AND REPAIR ANY WALLS AND CEILINGS TOUCHED BY THE INSTALLATION. TAPE, SPACKLE AND PREPARE SURFACES TO MATCH EXISTING FINISH. REPLACE ANY CEILING TILES AND/OR PAINT AS REQUIRED TO MATCH EXISTING. COORDINATE ALL PLUMBING WITH ALL TRADES PRIOR TO START OF WORK.

GENERAL FIRESTOPPING NOTE

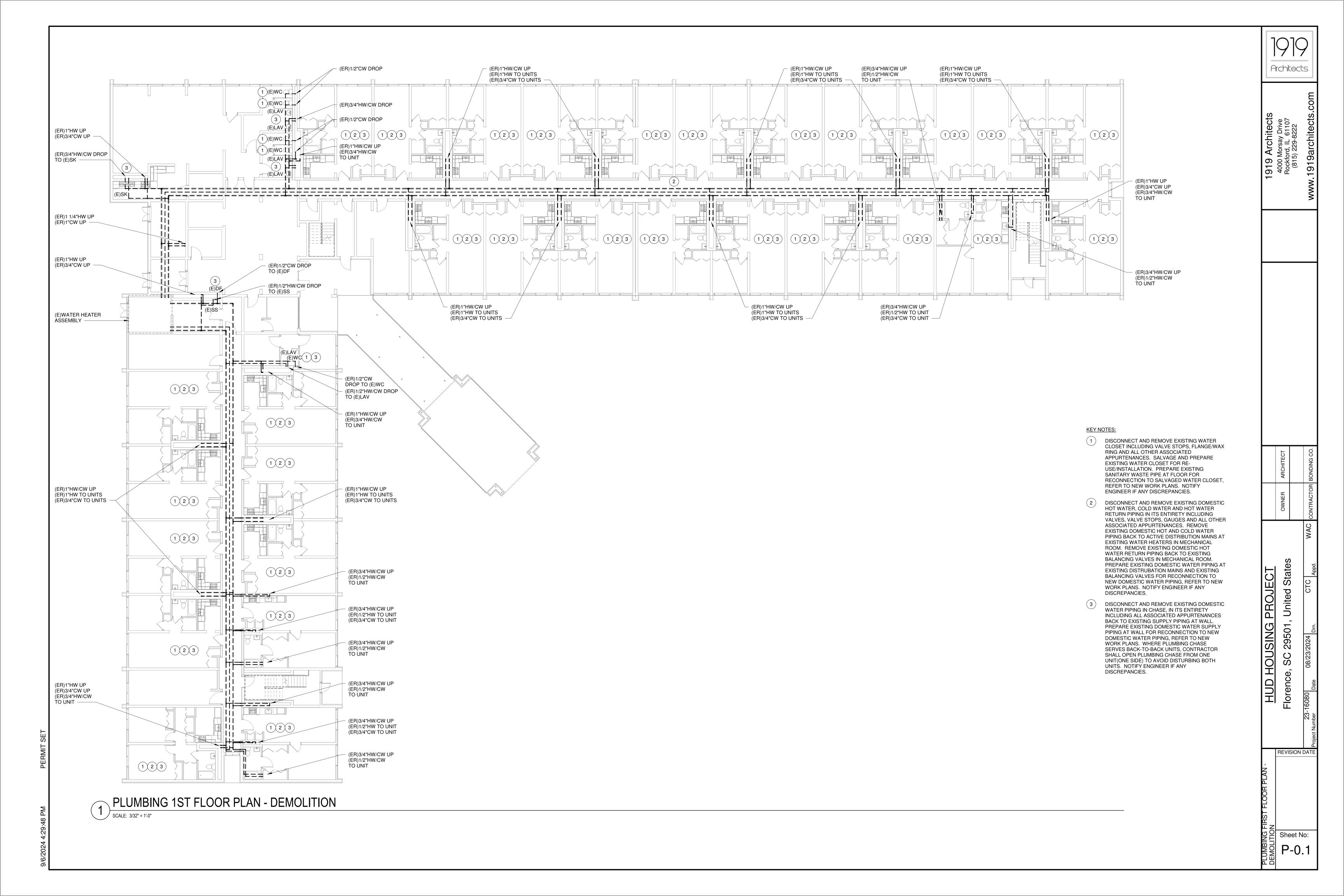
CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING OR EXCEEDING WALL/CEILING/FLOOR ASSEMBLY RATINGS FOR ALL PENETRATIONS. CONTRACTOR SHALL VERIFY LOCATION AND RATING OF ALL FIRE ASSEMBLIES AND PROVIDE INTUMESCENT COLLARS AT ALL PENETRATIONS AND FIRE RATED CAULKING AS

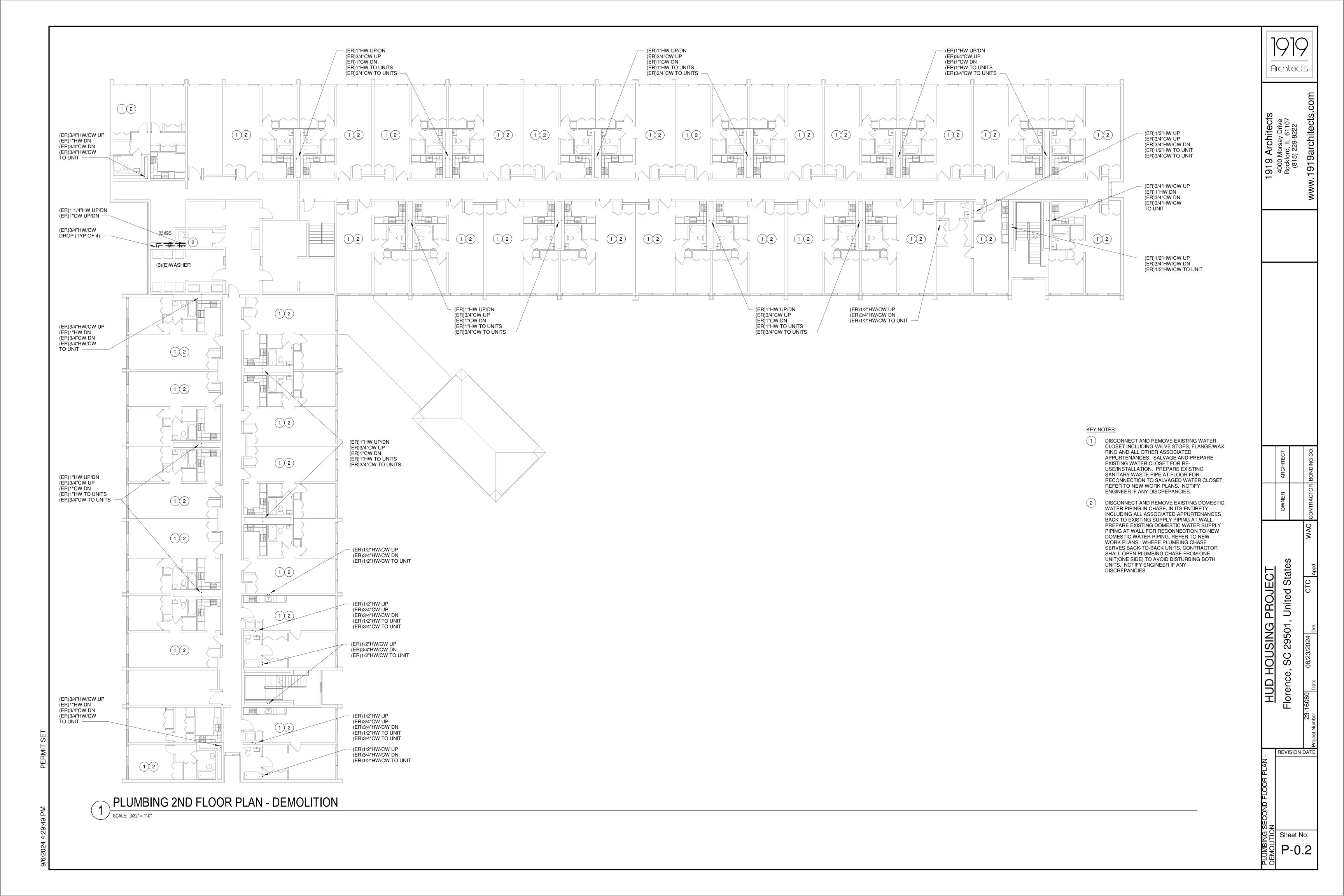


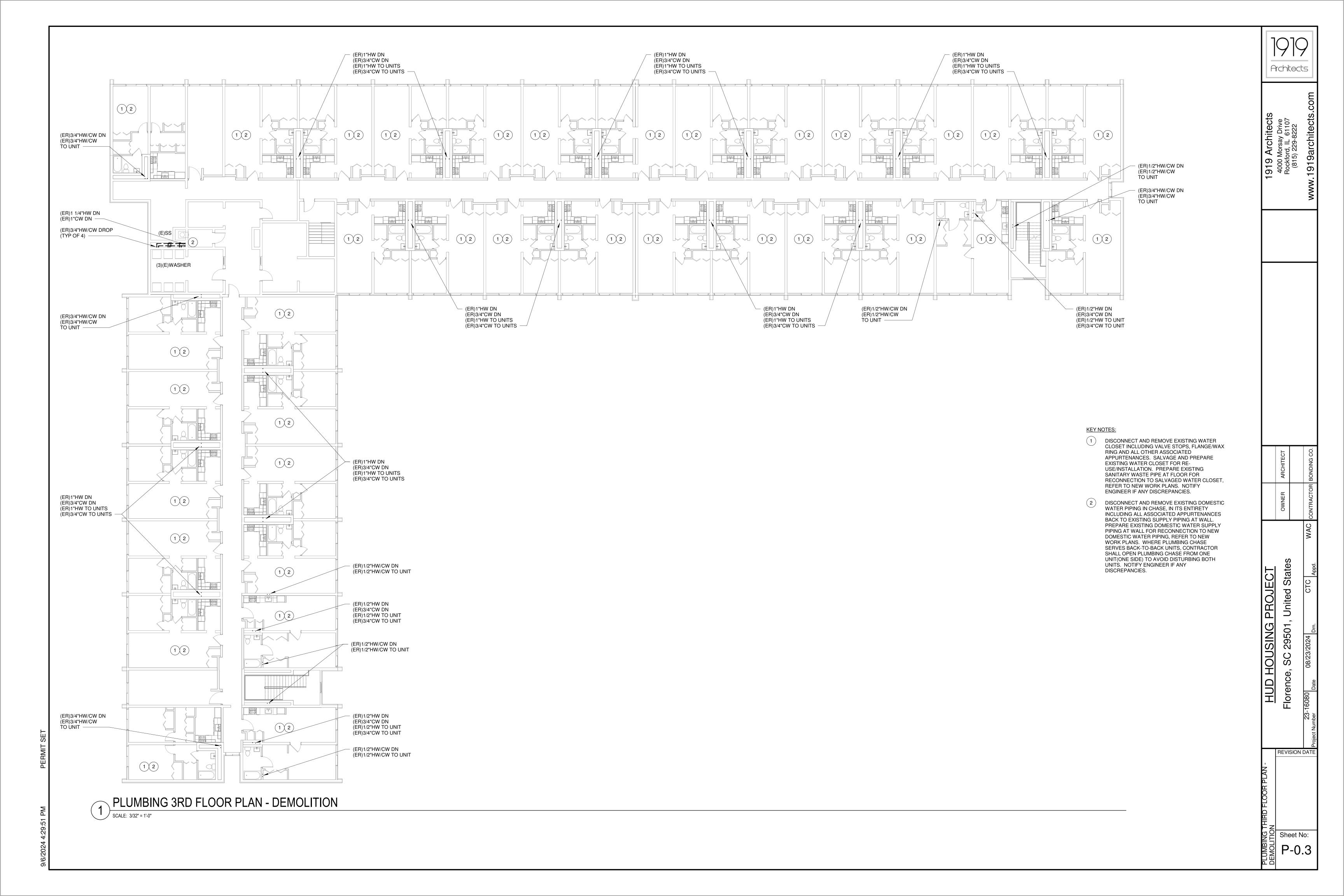
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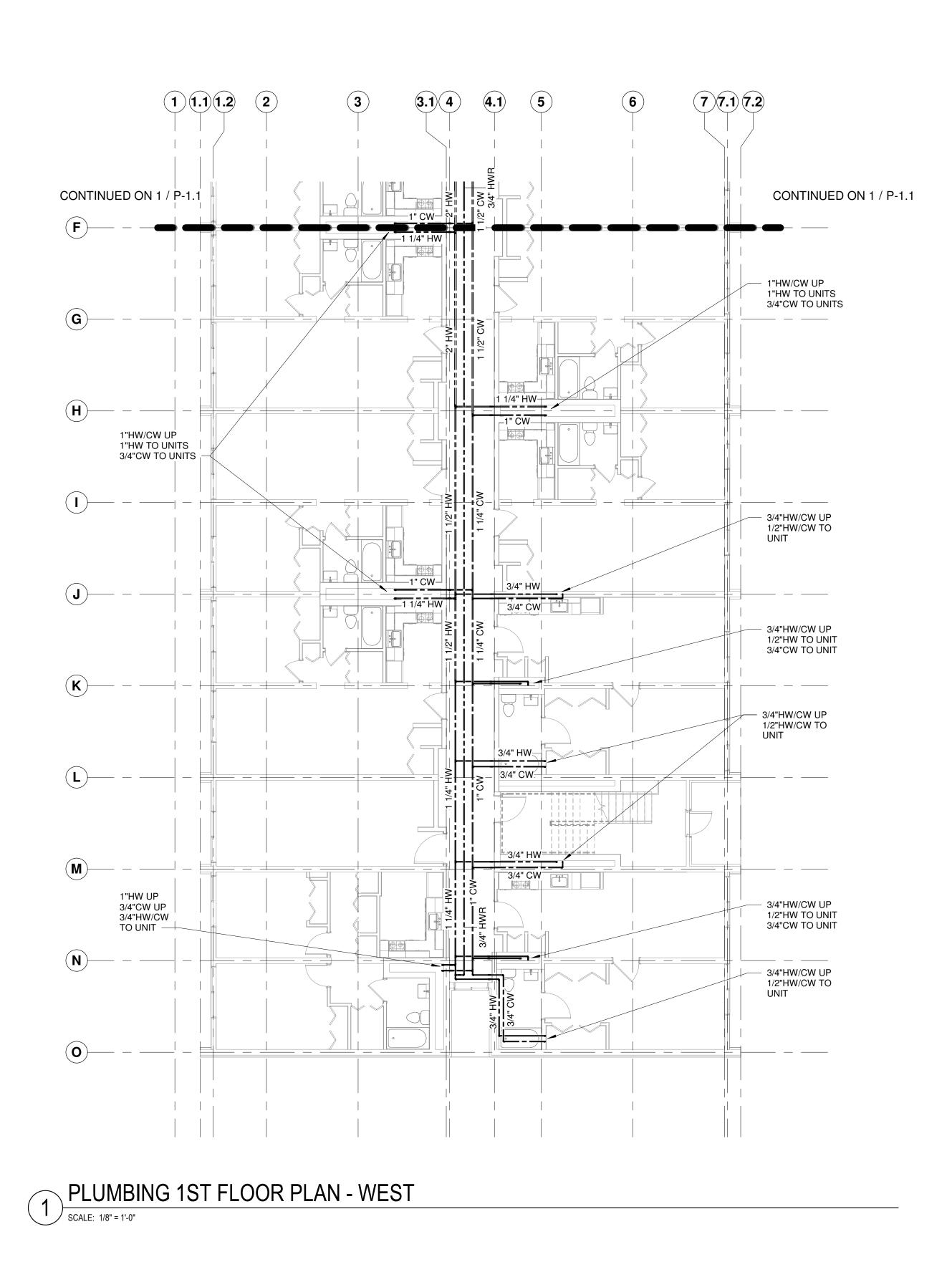
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DRAWING NOTES:

- DRAWINGS ARE DIAGRAMMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOID INTERFERENCES ENCOUNTERED.
- 2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.
- 3. SEE PLUMBING FIXTURE SCHEDULE FOR INDIVIDUAL PLUMBING FIXTURE CONNECTION SIZES.

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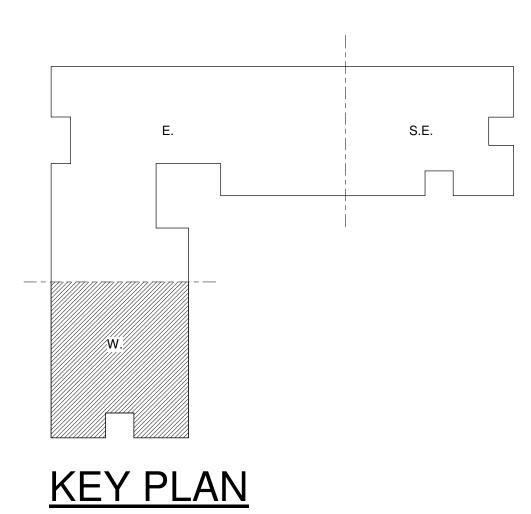
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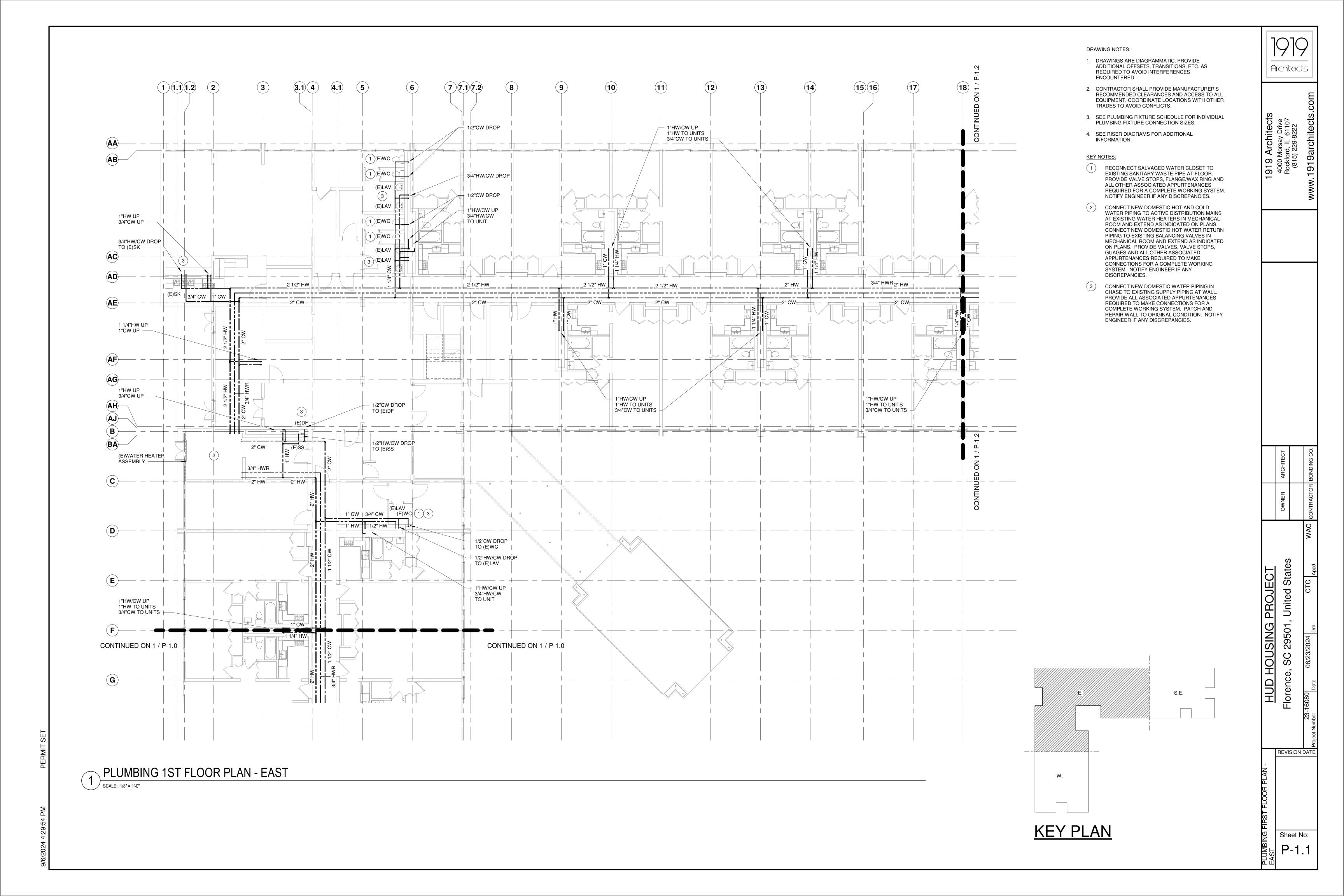
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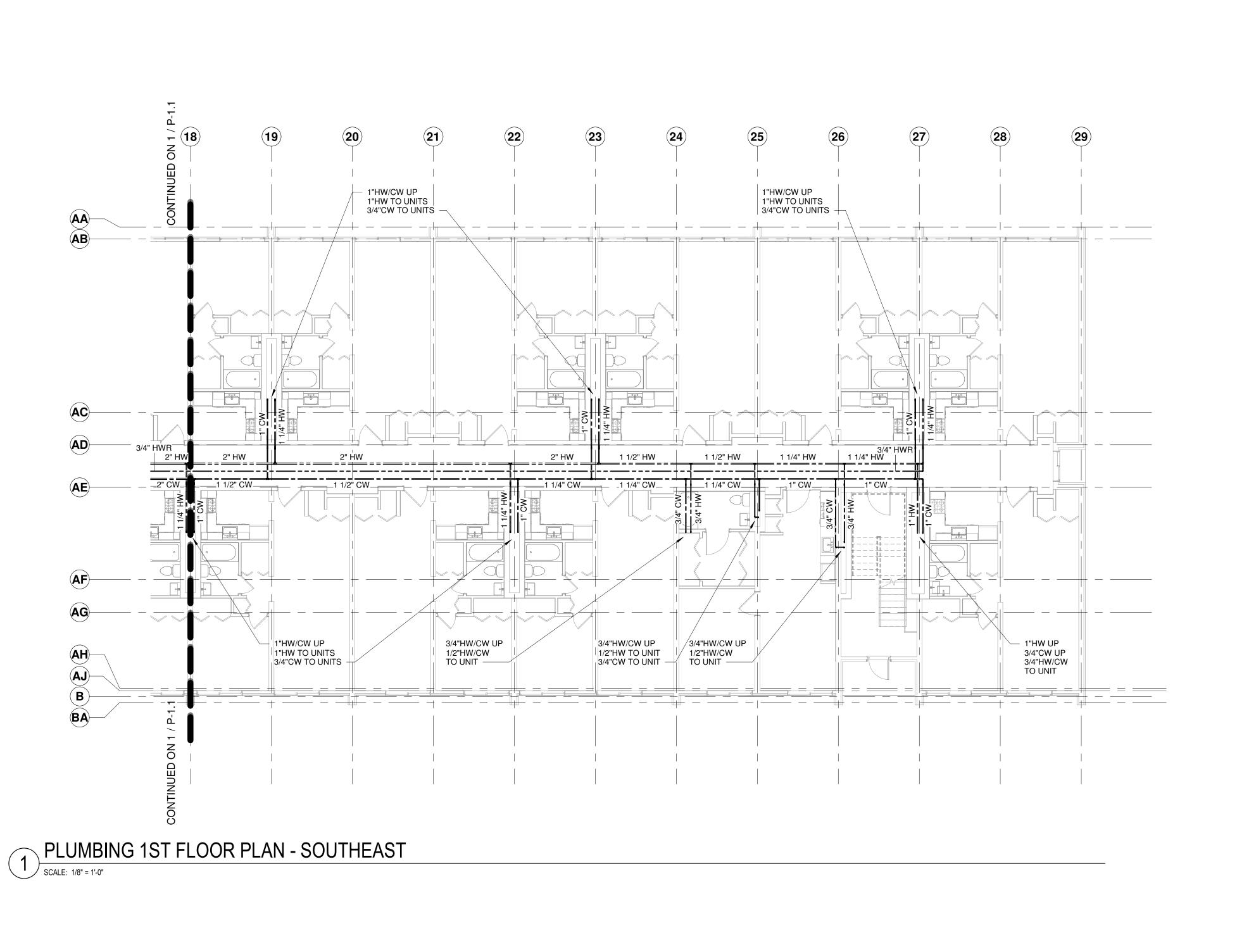
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4. SEE RISER DIAGRAMS FOR ADDITIONAL INFORMATION.



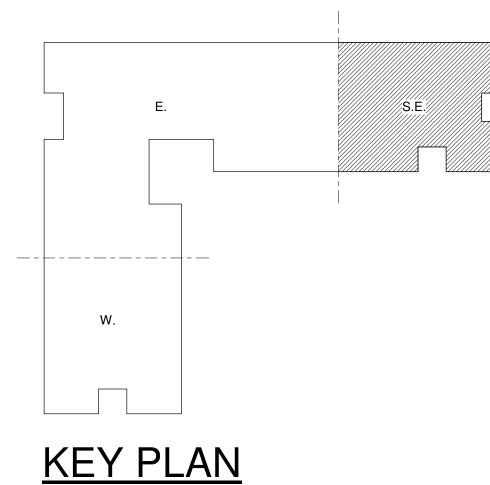




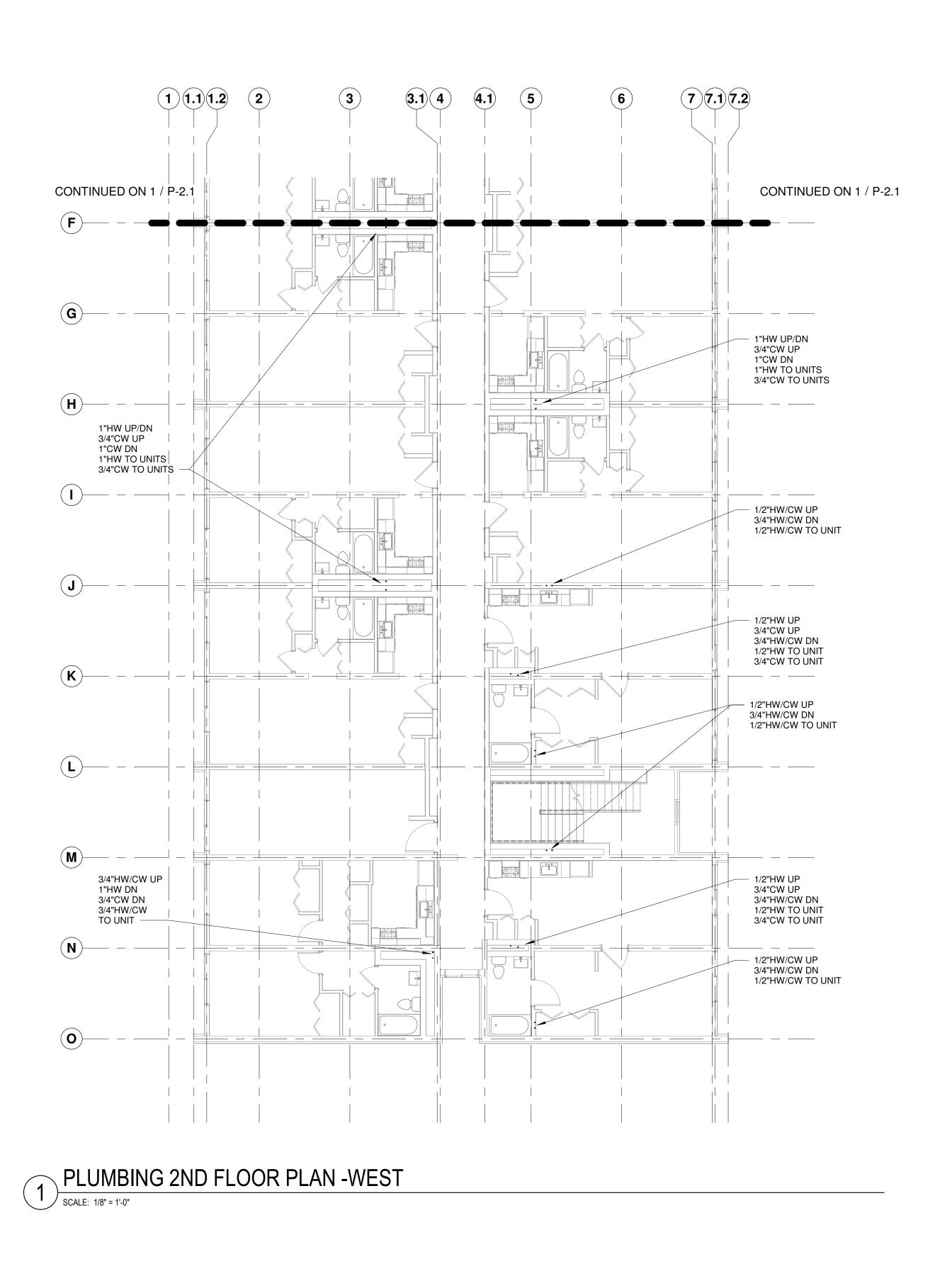
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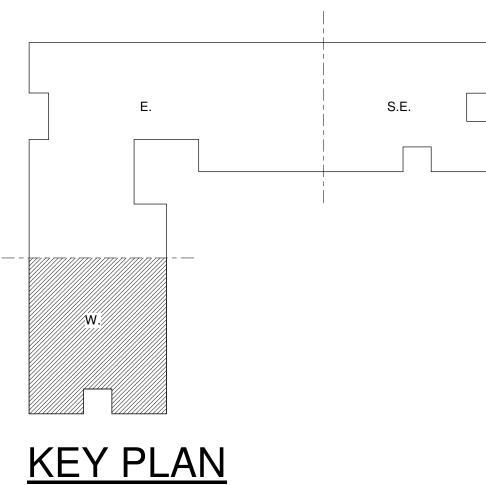


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Architects

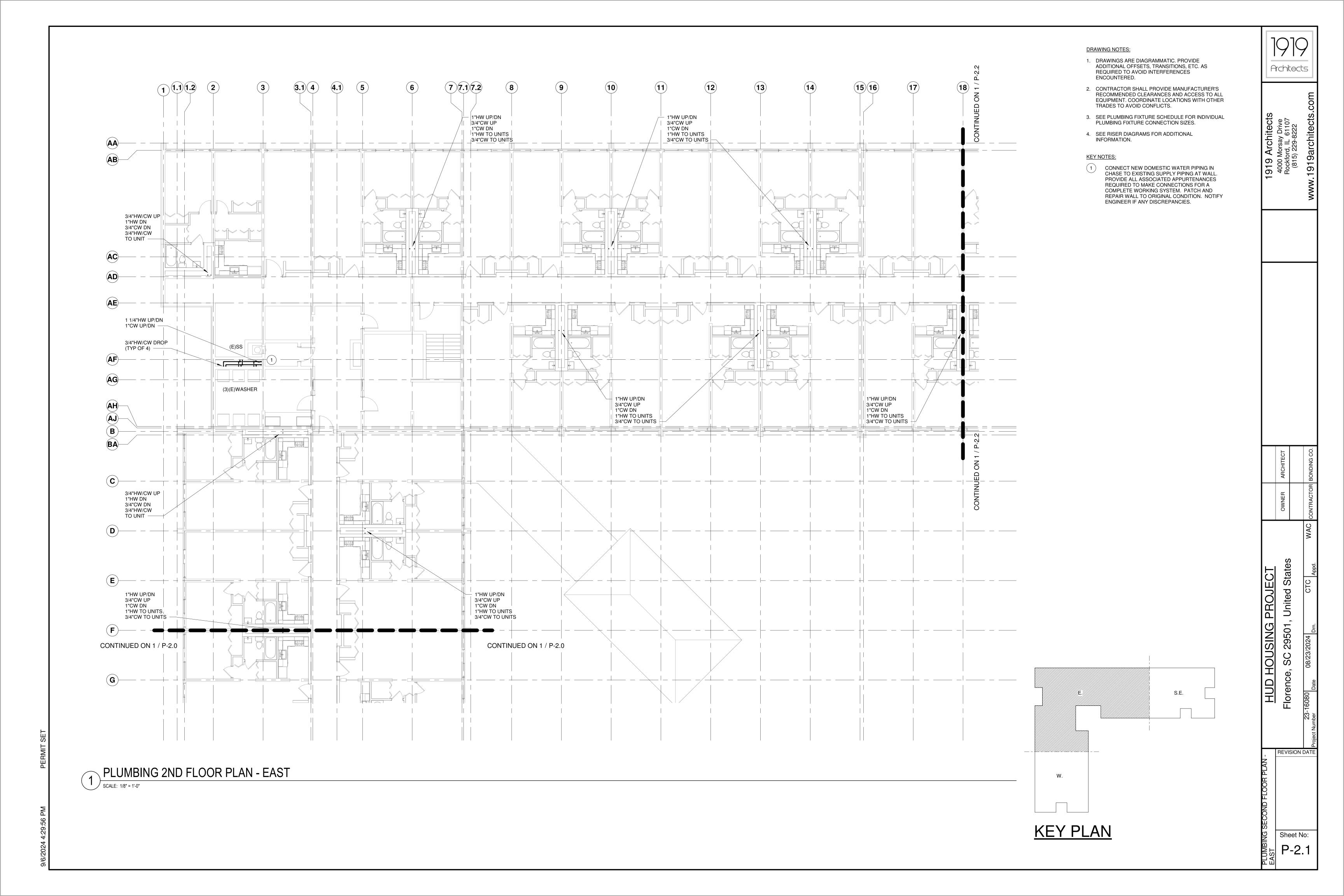
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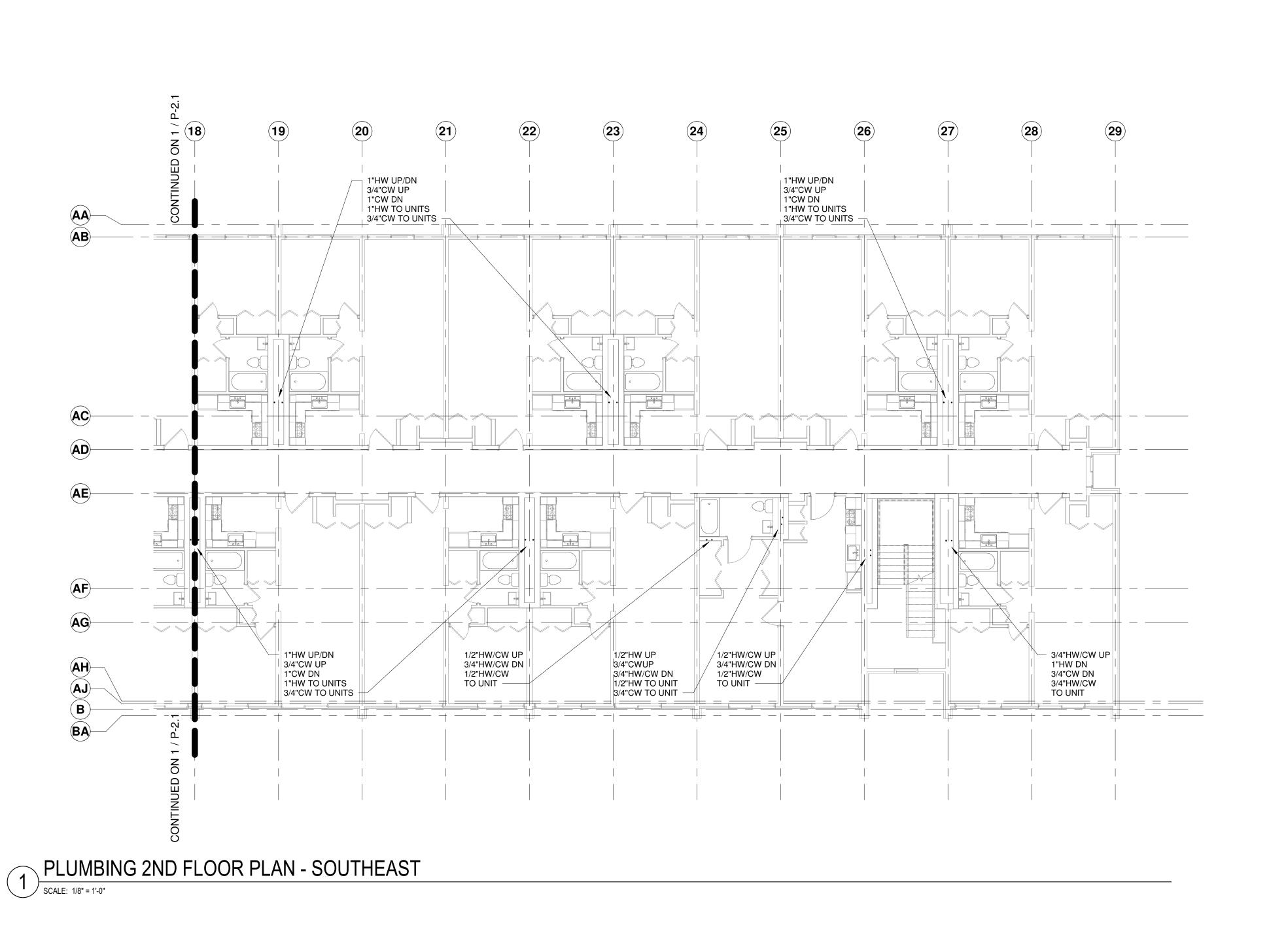
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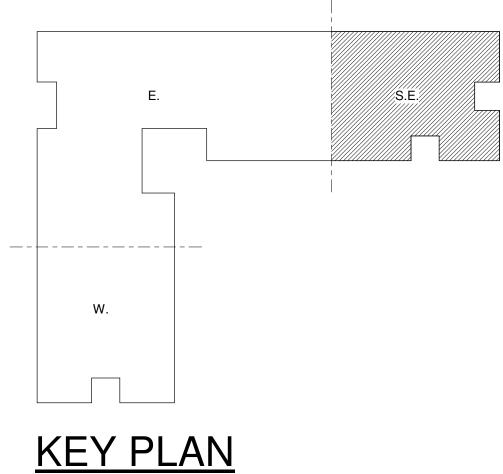




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Architects

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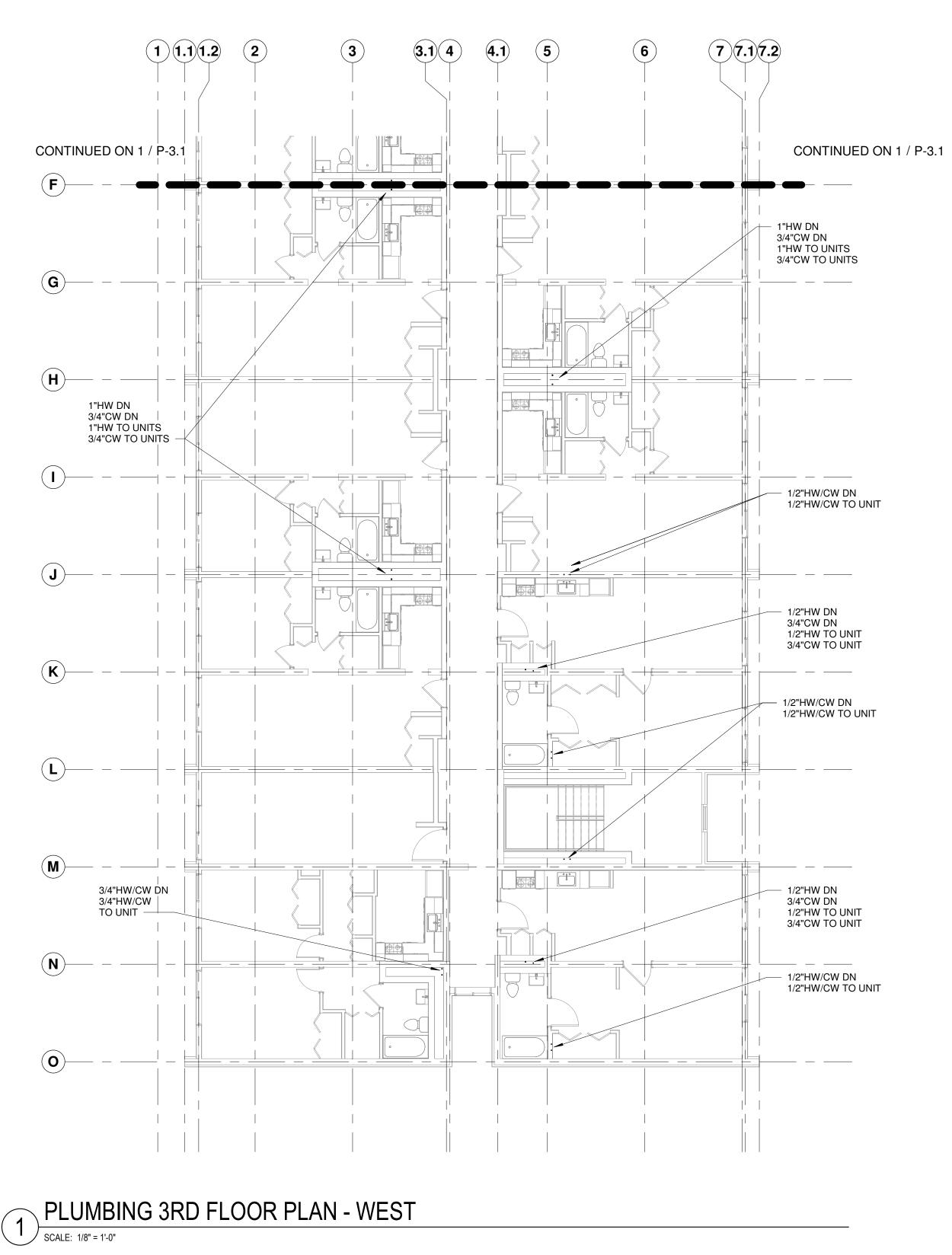


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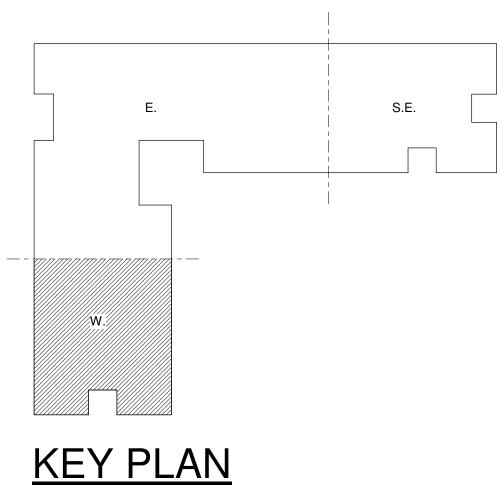
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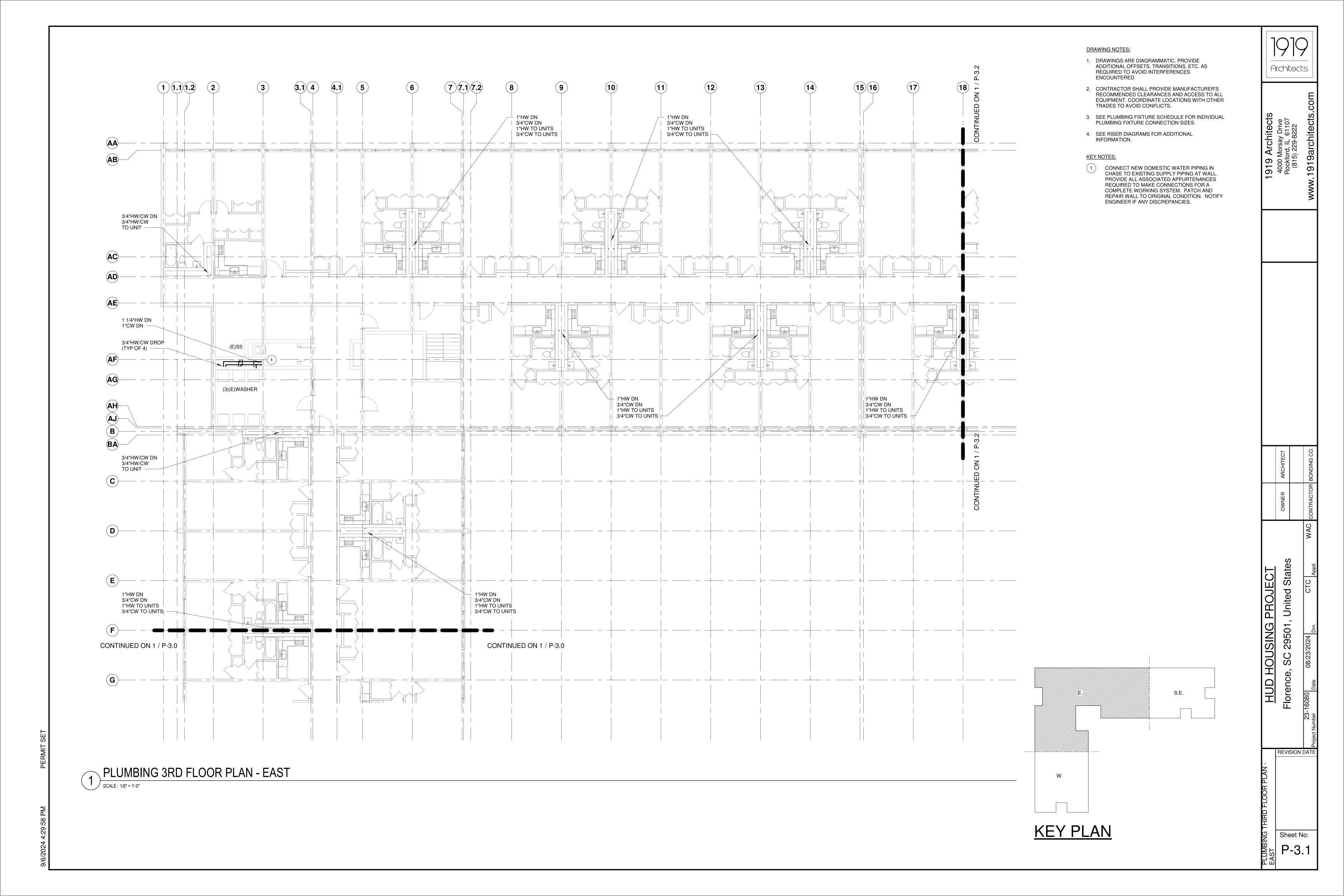
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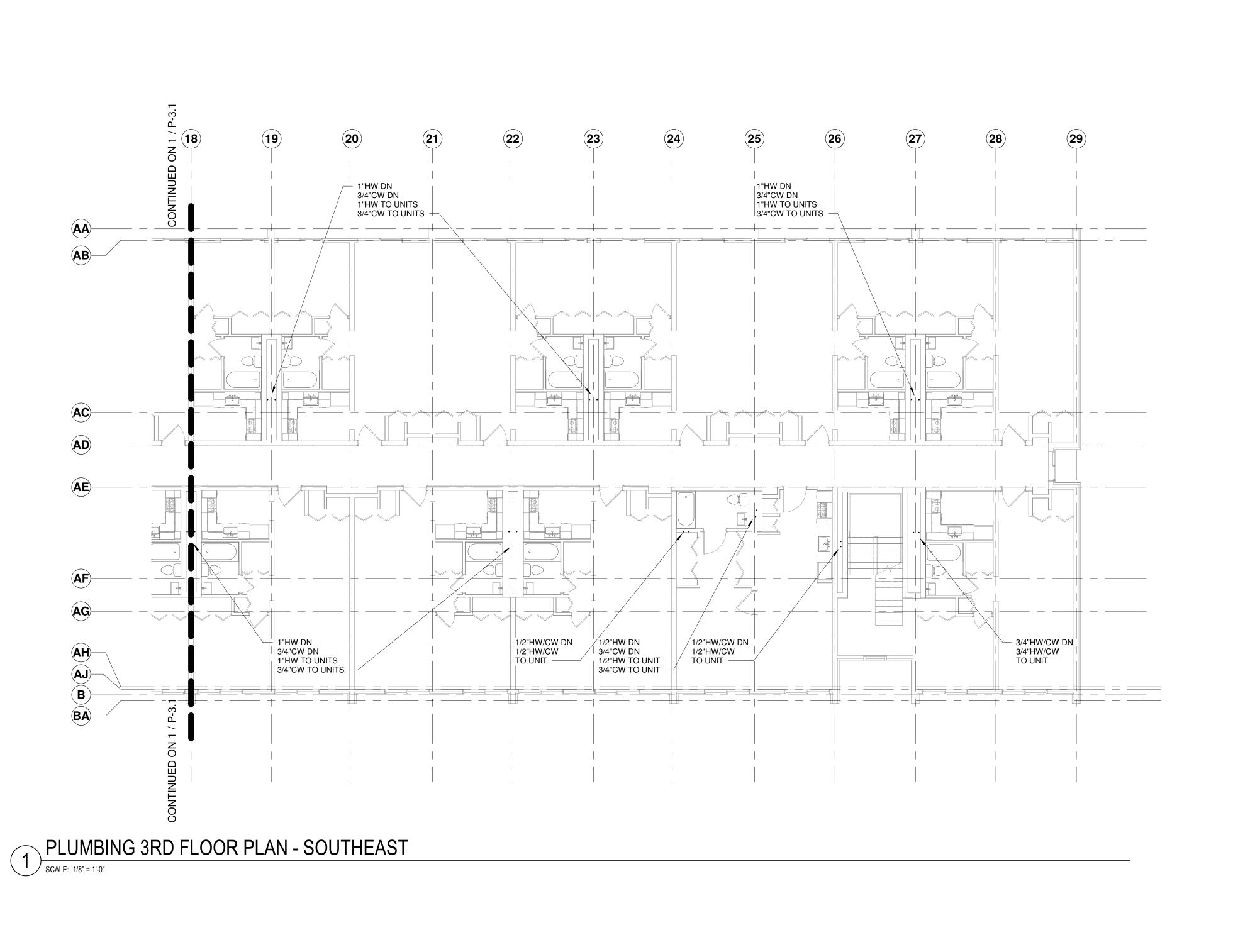
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SEE RISER DIAGRAMS FOR ADDITIONAL INFORMATION.



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<u>PLAN</u>	PLUMBING THIRD FLOOR PLAN - WEST	Sheet N	





- 1. DRAWINGS ARE DIAGRAMMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOID INTERFERENCES ENCOUNTERED.
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Architects

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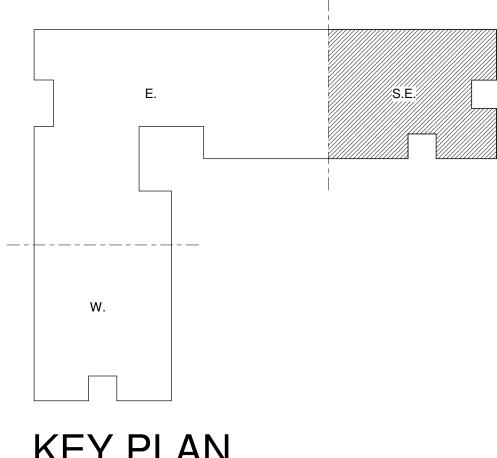
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HUD HOUSING PROJECT

4. SEE RISER DIAGRAMS FOR ADDITIONAL INFORMATION.



KEY PLAN

ENCOUNTERED.

INFORMATION.

KEY NOTES:

REQUIRED TO AVOID INTERFERENCES

4. SEE RISER DIAGRAMS FOR ADDITIONAL

2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

3. SEE PLUMBING FIXTURE SCHEDULE FOR INDIVIDUAL PLUMBING FIXTURE CONNECTION SIZES.

RECONNECT SALVAGED WATER CLOSET TO EXISTING SANITARY WASTE PIPE AT FLOOR. PROVIDE VALVE STOPS, FLANGE/WAX RING AND ALL OTHER ASSOCIATED APPURTENANCES REQUIRED FOR A COMPLETE WORKING SYSTEM. NOTIFY ENGINEER IF ANY DISCREPANCIES.

CONNECT NEW DOMESTIC WATER PIPING IN CHASE TO EXISTING SUPPLY PIPING AT WALL. PROVIDE ALL ASSOCIATED APPURTENANCES REQUIRED TO MAKE CONNECTIONS FOR A COMPLETE WORKING SYSTEM. PATCH AND REPAIR WALL TO ORIGINAL CONDITION. NOTIFY

ENGINEER IF ANY DISCREPANCIES.

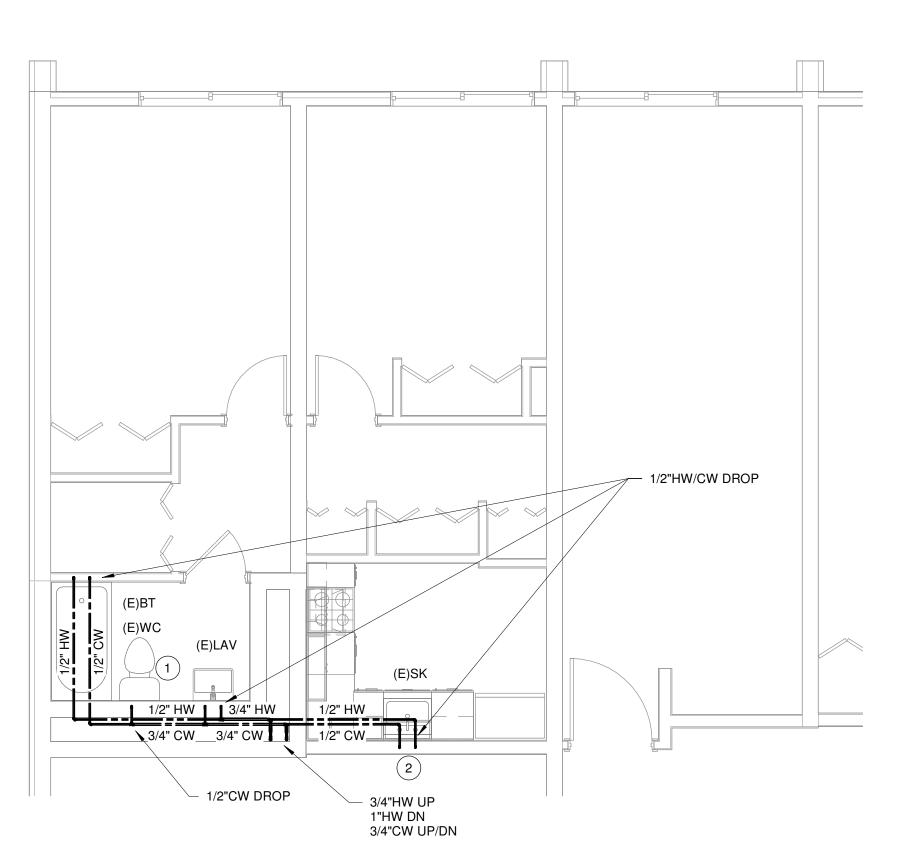
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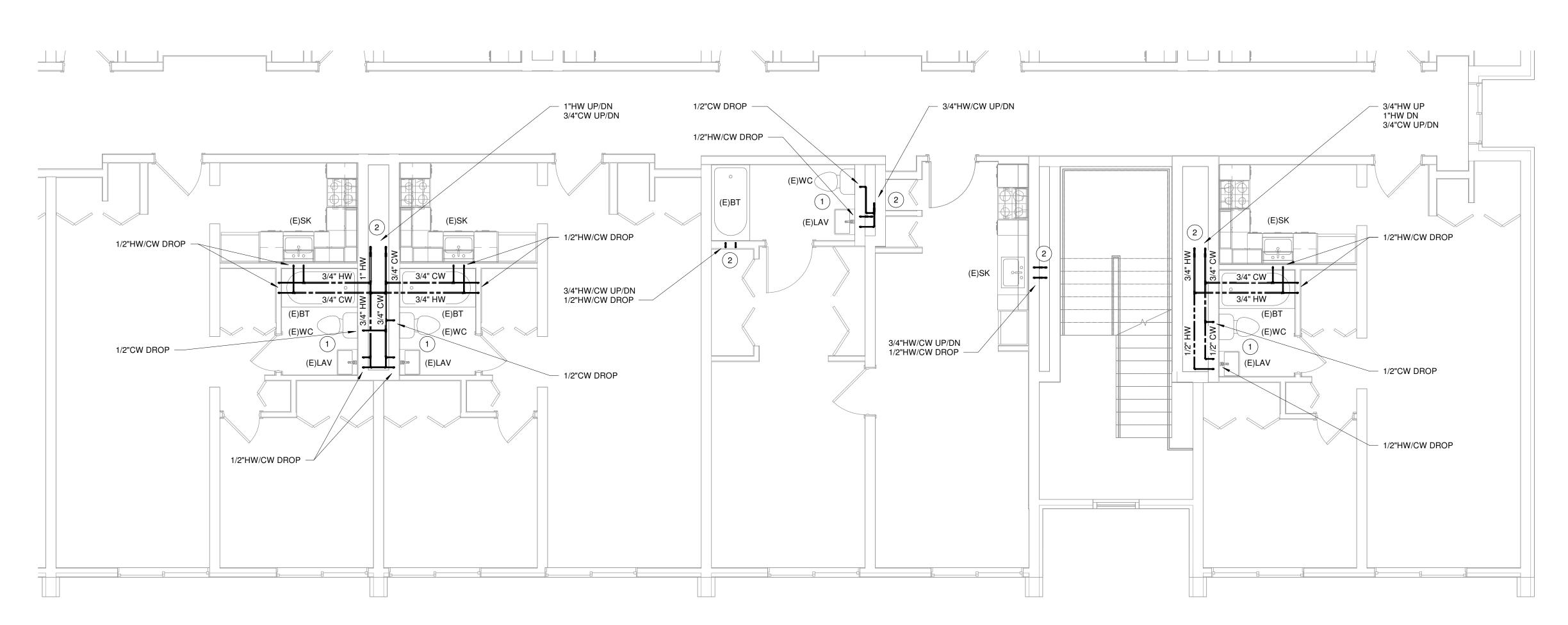
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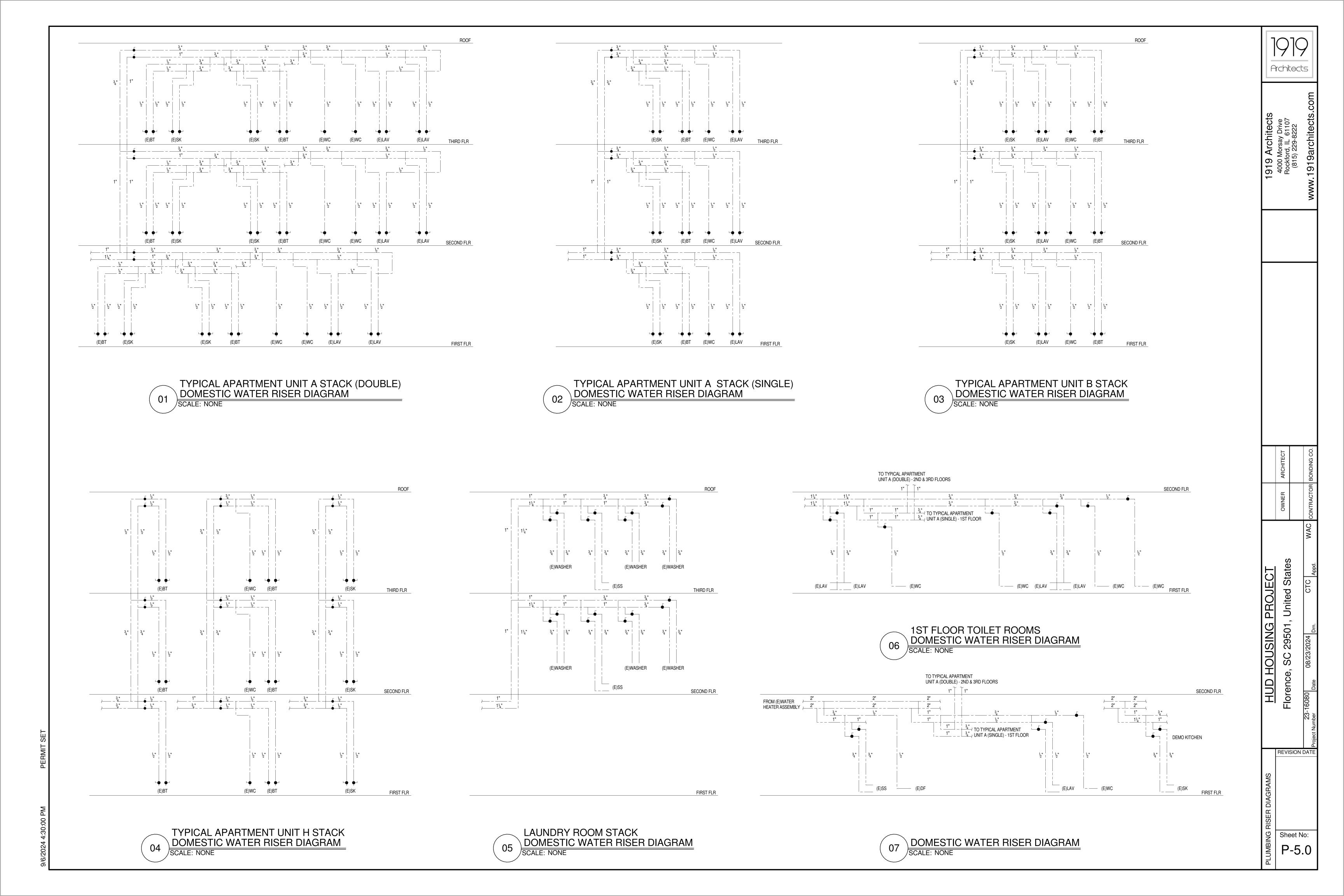


PLUMBING TYPICAL APARTMENT UNIT B FLOOR PLAN

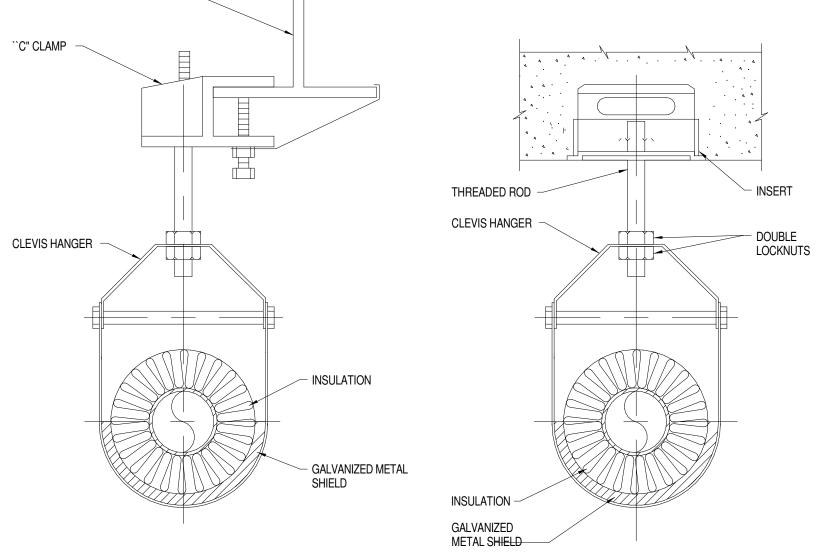


PLUMBING TYPICAL APARTMENT UNIT A & H FLOOR PLAN

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

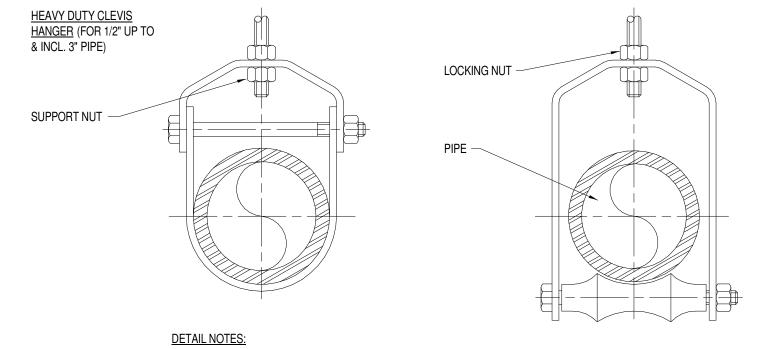




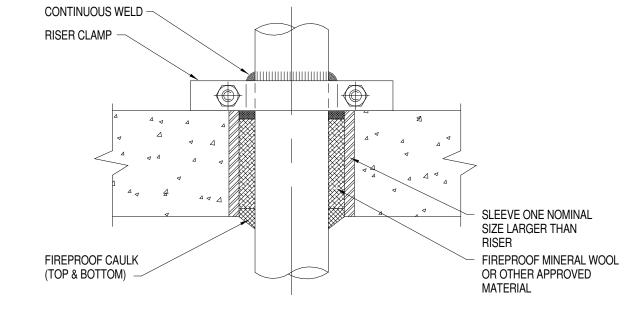


	ESSIBLE INSULATIN AT HANGER	IG
PIPE DIAMETER	SHIELD LENGTH	SHIELD THICKNESS USSG
UP TO 3"	6"	18
4" TO 6"	8"	16
8" & LARGER	12"	16

WITHOUT INCOMPRESSIBLE INSULATING BLOCK AT HANGER			
PIPE DIAMETER	SHIELD LENGTH	SHIELD THICKNESS USSG	
UP TO 3"	12"	18	
4"	15"	16	
5"	18"	16	
6"	21"	16	
8" & LARGER	24"	14	



SEE SPECIFICATION FOR HANGER SIZES.
 PIPE 8" AND LARGER SHALL HAVE ROLLER SUPPORTED WITH DUAL RODS.



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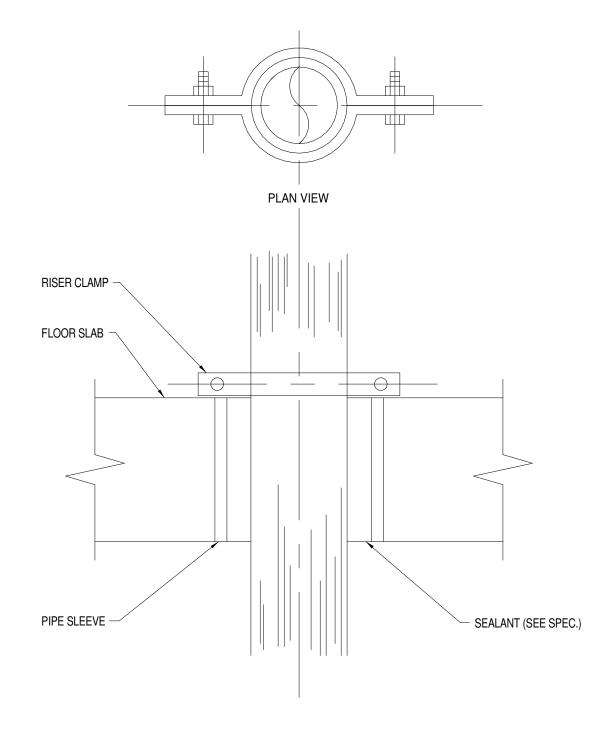
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PIPE HANGER SUPPORT DETAIL



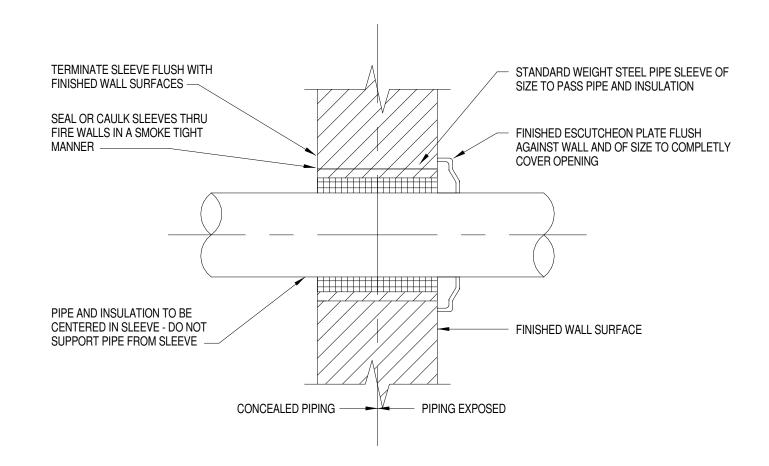
TYPICAL INSULATED PIPING SUPPORT DETAIL SCALE: N.T.S

<u>DETAIL NOTE:</u> HANGER, ROD & INSERT SHALL BE DIPPED IN ZINC CHROMATE PRIMER PRIOR TO INSTALLATION



PIPE SLEEVE THRU FLOOR SLAB DETAIL

SCALE: N.T.S



O5 PIPE SLEEVE THRU WALL DETAIL SCALE: N.T.S

NOTES:

1. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS.

2. FOAM CORE PVC IS NOT AN APPROVED MATERIAL TO MCE STANDARDS

PIPE	SCHEDULE				
1 11 1	OOTILDOLL				
TAG	TYPE	MATERIAL/FITTINGS	SIZES	INSULATION	NOTES
CW	DOMESTIC COLD WATER	TYPE L COPPER HARD DRAWN / WROUGHT COPPER FITTINGS	1-1/4" OR SMALLER	1" FIBERGLASS	
CW	DOMESTIC COLD WATER	TYPE L COPPER HARD DRAWN / WROUGHT COPPER FITTINGS	1-1/2" OR LARGER	1" FIBERGLASS	
HW	DOMESTIC HOT WATER	TYPE L COPPER HARD DRAWN / WROUGHT COPPER FITTINGS	1-1/4" OR SMALLER	1" FIBERGLASS	
HW	DOMESTIC HOT WATER	TYPE L COPPER HARD DRAWN / WROUGHT COPPER FITTINGS	1-1/2" OR LARGER	1.5" FIBERGLASS	
HWR	DOMESTIC HOT WATER RETURN	TYPE L COPPER HARD DRAWN / WROUGHT COPPER FITTINGS	1-1/4" OR SMALLER	1" FIBERGLASS	
HWR	DOMESTIC HOT WATER RETURN	TYPE L COPPER HARD DRAWN / WROUGHT COPPER FITTINGS	1-1/2" OR LARGER	1.5" FIBERGLASS	
NOTES:					

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LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.

- C. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
- D. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. PIPE ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF PIPE TO AVOID OBSTRUCTIONS. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED. MAINTAIN HEADROOM AND SPACE CONDITIONS.
- E. INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES, WHICH INVOLVE EXTRA COST, SHALL NOT BE MADE WITHOUT APPROVAL.
- F. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL.
- G. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES, AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION.
- H. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
- I. THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.
- J. THE LOCATIONS OF THE EXISTING SERVICES ARE BELIEVED TO BE AS INDICATED ON THE DRAWINGS. THE CONTRACTOR SHALL VERIFY THE ACTUAL LOCATION OF THESE SERVICES AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES PRIOR TO COMMENCING ANY WORK.
- K. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH AN APPROVED NON-SHRINKING FIRE PROOF CAULKING OR OTHER APPROVED NONCOMBUSTIBLE MATERIAL.
- L. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPING AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AS REQUIRED.
- M. ALL PRESENT MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.
- N. MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- O. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
- P. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- Q. UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.
- R. ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- S. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INDICATE ANY DISCREPANCIES BETWEEN THE CONTRACT DRAWINGS AND ACTUAL FIELD CONDITIONS PRIOR TO SUBMITTAL OF BID. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. LATER CLAIMS SHALL NOT BE MADE FOR LABOR, EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING PIPE SIZES, CLEARANCES, ETC. AND CONDITIONS.
- T. INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- U. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.
- V. PROVIDE ALL REQUIRED CUTTING, PATCHING, EXCAVATING AND BACKFILL.

2. SCOPE OF WORK

- A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMITY WITH THE INTERNATIONAL PLUMBING CODE AND ALL OTHER APPLICABLE INDUSTRY, NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.
- B. THE BASE BUILDING DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLEMENTED OR SPECIFIED HEREIN.
- C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.
- D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH

THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.

3. SHOP DRAWINGS

- A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT PROVIDE COMPLETE SET OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INDICATING CAPACITY DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.
- B. INDICATE ON EACH SHOP DRAWINGS SUBMITTED
- 1) PROJECT NAME AND LOCATION
- 2) NAME OF ARCHITECT AND ENGINEER
- 3) ITEM IDENTIFICATION
- 4) APPROVAL STAMP OF PRIME CONTRACTOR

C. SUBMISSIONS

- 1) SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.
- 2) SUBMISSIONS LARGER THAT 11 IN. X 17 IN.: SUBMIT TWO PRINTS AND ONE PAPER SEPIA TO THE ARCHITECT. THE ARCHITECT WILL FORWARD ONE PRINT AND THE PAPER SEPIA TO THE ENGINEER
- D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:
- 1) PIPE AND FITTINGS
- 2) VALVES
- 3) PLUMBING FIXTURES AND TRIM
- 4) PIPING LAYOUTS
- 5) SUPPORTS, HANGERS AND GUIDES
- 6) INSULATION

E. COORDINATION

- 1) THE CONTRACTOR SHALL ASSURE FULL COOPERATION OF ALL TRADES AND SHALL FURNISH IN WRITING ALL INFORMATION NECESSARY TO PERMIT THE WORK OF ALL TRADES TO BE INSTALLED SATISFACTORILY AND WITH LEAST POSSIBLE INTERFERENCE OR DELAY.
- 2) PREPARE COORDINATED COMPOSITE DRAWINGS AT A SUITABLE SCALE NOT LESS THAN 1/4-INCH EQUALS ONE FOOT, ZERO INCHES, CLEARLY SHOWING HOW THE WORK OF THIS DIVISION IS TO BE INSTALLED IN RELATION TO THE WORK OF ALL TRADES. ANY WORK INSTALLED IN CONFLICT WITH THE WORK OF OTHER TRADES SHALL BE CORRECTED AT NO ADDITIONAL COST TO THE OWNER.
- 3) THE CONTRACTOR MAY, SUBJECT TO THE ACCEPTANCE OF THE ARCHITECT AND WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF ALL TRADES OR FOR THE PROPER EXECUTION OF THE WORK.
- PLUMBING DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT. COORDINATE WITH THE ARCHITECTURAL DRAWINGS AND DETAILS FOR EXACT LOCATION OF DUCTWORK, PIPING AND EQUIPMENT.

 THE CONTRACTOR SHALL FOLLOW PRAMINES IN LAYOUT WORK AND SHALL COORDINATE.

 THE CONTRACTOR SHALL FOLLOW PRAMINES IN LAYOUT WORK AND SHALL COORDINATE.
- THE CONTRACTOR SHALL FOLLOW DRAWINGS IN LAYOUT WORK AND SHALL COORDINATE
 ALL TRADES TO VERIFY SPACES IN WHICH WORK SHALL BE INSTALLED. MAINTAIN
 MAXIMUM HEADROOM OR SPACE CONDITIONS. WHERE SPACE CONDITIONS APPEAR
 INADEQUATE, THE ARCHITECT SHALL BE NOTIFIED BEFORE INSTALLATION. DO NOT
 PROCEED WITH THE INSTALLATION UNTIL RECEIVING CLARIFYING INSTRUCTIONS.

4. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.

THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING

- BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.
- C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.
- D. REPRODUCIBLE "AS-BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.

5. GENERAL PROVISIONS FOR PLUMBING WORK

- A. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.
- B. DEFINITIONS
- "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
- 2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- 3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.
- 4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
- 5) "WIRING": RACEWAY, FITTINGS, WIRE, BOXES AND RELATED ITEMS.
- 6) "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.
- 7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.
- 8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT.

C. QUALITY ASSURANCE

1) QUALITY AND GAUGE OF MATERIALS: NEW, BEST OF THEIR RESPECTIVE KINDS, FREE FROM DEFECTS AND LISTED BY UNDERWRITERS LABORATORIES, INC., OR BEARING THEIR LABEL. MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME

MANUFACTURER, EXCEPT AS NOTED.

- 2) GUARANTEE: ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE OF WORK.
- D. PRODUCT DELIVERY, STORAGE AND HANDLING
- 1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE SPACES.
- 2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS SHALL BE PERMITTED. CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.
- E. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AFTER FABRICATION. UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC CHROMATE FOR OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. RED LEAD OR ZINC CHROMATE WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD-APPLIED ZINC CHROMATE PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.
- F. BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED. CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.
- G. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL PLUMBING FIXTURES SHALL BE VERIFIED BY ARCHITECT.
- H. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.

6. PIPE AND FITTINGS

- A. DOMESTIC WATER
- 1) TYPE L HARD COPPER TUBING WITH CAST BRONZE OR WROUGHT COPPER FITTINGS AND 95/5 TIN ANTIMONY SOLDER JOINTS.
- 2) STANDARD WEIGHT RED BRASS PIPE WITH STANDARD WEIGHT CAST BRONZE THREADED FITTINGS
- B. ALL EXPOSED PIPE AND FITTINGS SHALL BE CHROME-PLATED BRASS.
- C. ALL EXPOSED PIPING PASSING THROUGH WALLS, FLOORS, CEILINGS, AND PARTITIONS SHALL BE PROVIDED WITH CHROME PLATED CAST BRASS ESCUTCHEONS HELD IN PLACE WITH SET SCREWS
- D. INSTALL MECHANICAL SLEEVE SEAL AT EACH PENETRATION THROUGH FOUNDATION. SELECT NUMBER OF INTERLOCKING RUBBER LINKS REQUIRED TO MAKE INSTALLATION WATER TIGHT.

7. VALVES

- A. GATE VALVES
- 1) BRONZE RISING STEM, CLASS 150 RISING STEM, UNION BONNET, SOLID WEDGE AND MANUFACTURED IN ACCORDANCE WITH MSS-SP80. MODEL NO. T134 AS MANUFACTURED BY NIBCO.
- B. BALL VALVES
- 1) TWO-PIECE, BRONZE, END ENTRY, 600 PSI WWP; SIMILAR TO NIBCO #T585-70.
- THREE-PIECE, STAINLESS STEEL, BUTT WELD, 2,000 PSI WWP; SIMILAR TO NIBCO #BM-590-S6-R-66-FS-LL.
- C. CHECK VALVES
- 1) BRONZE, THREADED CAP, TEFLON DISC; SIMILAR TO NIBCO #T433-Y.
- D. APPLIANCE CONNECTOR VALVES: ANSI Z21.15 AND IAS LISTED

8. INSULATION

- A. ALL INSULATION (INCLUDING JACKET, FACING AND ADHESIVE) SHALL HAVE COMPOSITE FIRE AND SMOKE HAZARD RATINGS AS TESTED BY PROCEDURES LISTED IN ASTM E-84, NFPA 255 AND UL 273; NOT EXCEEDING A FLAME SPREAD OF 25 AND A SMOKE DEVELOPED OF 50.
- B. PIPING SHALL HAVE A MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.23 K-FACTOR AT 75 DEGREES F MEAN TEMPERATURE WITH FACTORY -APPLIED FIRE-RETARDANT FOIL-SKRIM-KRAFT FACING. ALL SERVICE JACKET SIMILAR TO JOHNS MANVILLE MICRO-LOK HP
- C. FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON
- D. ON VALVES AND FITTINGS PROVIDE PRE-MOLDED FIBERGLASS FITTINGS. VAPOR SEAL INSULATION ON "CW".
- E. "CW" PIPING: PROVIDE 1/2 IN. THICK FIBERGLASS SECTION PIPE COVERING WITH VAPOR BARRIER JACKET
- F. "HW" PIPING: PROVIDE 1 IN. THICK FIBERGLASS SECTIONAL PIPE COVERING.

9. PIPING SUPPORTS

- A. SUPPORT ALL PIPING FROM BUILDING CONSTRUCTION BY PROVIDING INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY), AND ACCEPTABLE BRACKETS. SUBMIT ALL
- B. PROVIDE TRAPEZE HANGERS OF BOLTED ANGLES OR CHANNELS FOR GROUPED LINES AND
- C. PROVIDE ADDITIONAL FRAMING WHERE BUILDING CONSTRUCTION IS INADEQUATE. SUBMIT FOR
- D. SUSPENDED HORIZONTAL PIPING

FOR FLOOR-MOUNTED PIPING.

METHODS FOR REVIEW.

- 1) SUPPORT ALL PIPING IN PROCESS AREAS INDEPENDENTLY FROM STRUCTURE USING FRP TYPE HANGERS, SIMILAR TO CENTURY COMPOSITES CC-HANGERS.
- 2) SUPPORT ALL PIPING INDEPENDENTLY FROM STRUCTURE USING HEAVY IRON-HINGED TYPE HANGERS, SIMILAR TO GRINNELL CLEVIS NO. 260.
- AND SMALLER PIPE.

 4) PROVIDE WALL BRACKETS FOR WALL-SUPPORTED PIPING, AND PROVIDE PIPE SADDLES

3) PROVIDE ELECTROPLATED SOLID-BAND HANGERS SIMILAR TO AUTO-GRIP, FOR TWO-INCH

5) PROVIDE SUPPORTS WITH COPPER LINING FOR UNINSULATED COPPER PIPING.

- 6) SUSPEND PIPING FROM INSERTS, USING BEAM CLAMPS WITH RETAINING CLAMP OR LOCKNUT, STEEL FISH PLATES, CANTILEVER BRACKETS OR OTHER ACCEPTED MEANS. BEAM CLAMPS SHALL BE SIMILAR TO GRINNELL FIGURES 61, 87, 131, OR 225.
- 7) SUSPEND PIPING BY RODS WITH DOUBLE NUTS.
- 8) PROVIDE ADDITIONAL STEEL FRAMING AS REQUIRED AND ACCEPTED WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING HANGER RODS IN REQUIRED LOCATIONS.
- 9) SUPPORT BRANCH FIXTURE WATER PIPING IN CHASES WITH COPPER-PLATED METAL BRACKETS, SECURED TO STUDS, SIMILAR TO HOLDRITE NOS. 102-18, 107-18, 102-26, OR 101-26.
- E. PROVIDE 180-DEGREE ARC GALVANIZED METAL COVERING SHIELDS ON HANGERS FOR INSULATED PIPING WITHOUT INCOMPRESSIBLE INSULATING BLOCK IN INSULATION AT HANGERS.
- F. MAXIMUM HANGER SPACING AS INDICATED
- 1) PIPE 1 INCH AND SMALLER SHALL BE EVERY 8 FEET.
- 2) PIPE 1-1/4 INCH AND LARGER SHALL BE EVERY 10 FEET.
- 3) COPPER TUBING 1-1/4 INCH AND SMALLER SHALL BE EVERY 6 FEET.
 4) COPPER TUBING 1-1/2 INCH AND LARGER SHALL BE EVERY 10 FEET.
- 5) CAST IRON: EVERY 5 FEET AND AT EVERY FITTING OR JOINT.
- 1) PROVIDE EXTENSION PIPE CLAMPS BOLTED TO BARE PIPE ON EACH SIDE AND BEARING EQUALLY ON STRUCTURE OR WELDED TO BEAM.
- 2) PROVIDE SPACING AS INDICATED
- a. THREADED PIPING SHALL BE EVERY OTHER FLOOR LEVEL, AT A MAXIMUM OF 25 FEET
- CAST IRON PIPING SHALL BE EVERY FLOOR LEVEL, MAXIMUM 20 FEET ON CENTERS;
 HUBBLESS PIPE IS THE EXCEPTION, REQUIRING A MAXIMUM OF 10 FEET ON CENTERS.
- c. TUBING SHALL BE EVERY FLOOR LEVEL MAXIMUM 10 FEET ON CENTERS

Δ PIPING:

10. SYSTEM IDENTIFICATION

- 1) ALL PIPING, EXPOSED OR CONCEALED SHALL BE IDENTIFIED AS TO ITS SERVICE IN ACCORDANCE WITH OSHA AND ANSI STANDARDS BY ONE OF THE FOLLOWING METHODS:
 - INSTALLATION OF MANUFACTURED ADHESIVE BAND TYPE INDENTIFICATION
- 2) PIPING IDENTIFICATION MARKINGS SHALL BE INSTALLED AS FOLLOWS:
- a. IN EACH ROOM.
- b. ALL VALVE LOCATIONS.

FLOAT SWITCHES, AND ALARMS.

- c. AT SHAFT WALLS.
- d. EVERY 40 FEET ON CONTINUOUS RUNS.

B. VALVES:

 VALVES SHALL BE IDENTIFIED BY A TAG SYSTEM UTILIZING BRASS TAGS AT 2 INCH MINIMUM DIAMETER AND ATTACHED TO THE VALVES USING BRASS CHAIN.

ALL EXISTNG VALVE TAG CHARTS WITHIN THE BUILDING.

- a. THE NEW VALVE TAG IDENTIFICATION NUMBERS SHALL BE PERMANENTLY ADDED TO
- C. EQUIPMENT:
- 1) IDENTIFY ALL CONTROLS SUCH AS MOTOR STARTERS NOT IN MOTOR CONTROL CENTERS,

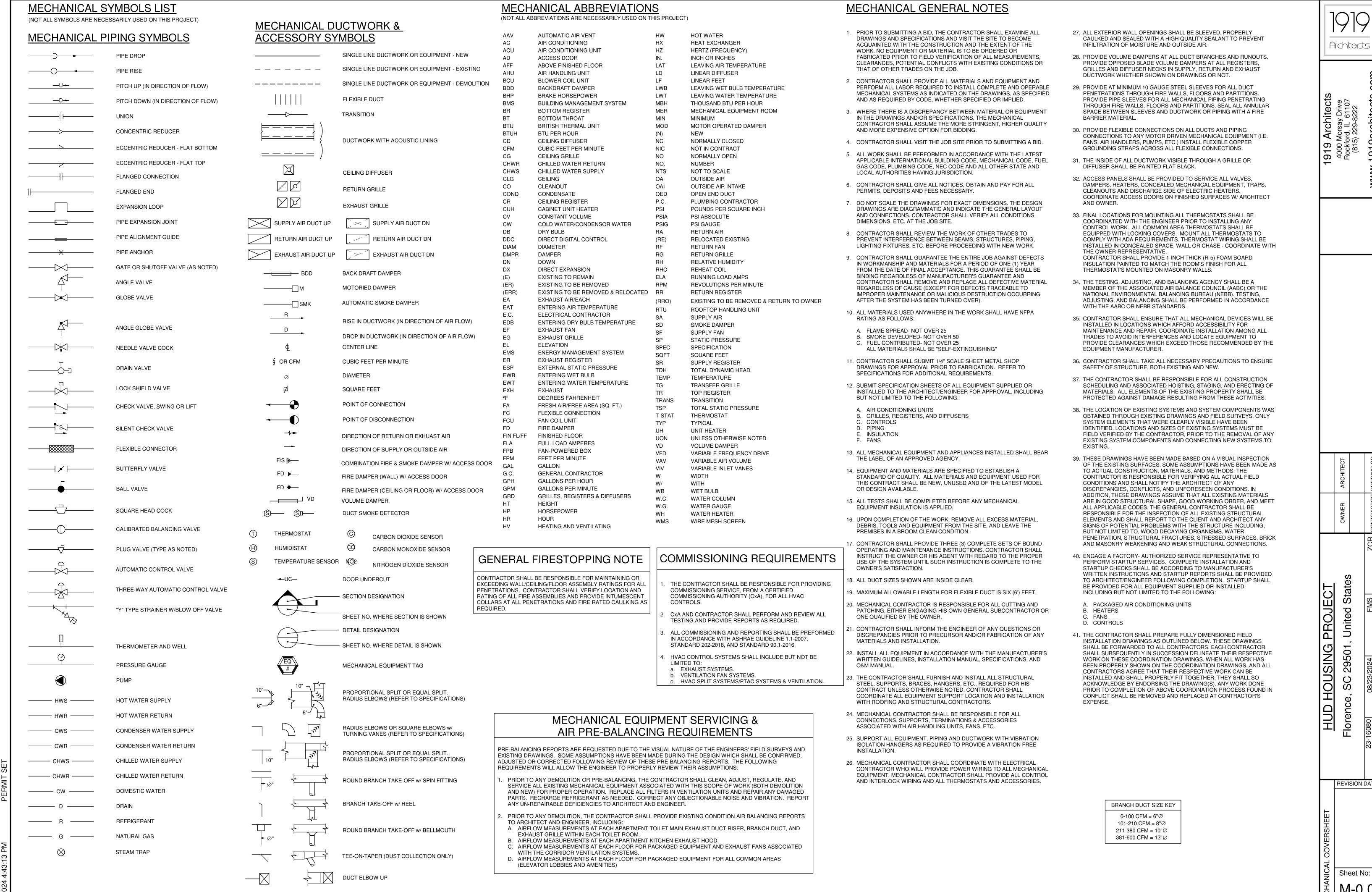
11. TESTS

- A. DOMESTIC WATER PIPING
- TEST PIPING HYDROSTATICALLY AT A PRESSURE OF 125 PSI.
- 2) DURATION OF TEST SHALL BE 2 HOURS WITHOUT A LOSS IN PRESSURE.
- B. ARRANGE AND COORDINATE TESTS WITH OWNER 48 HOURS IN ADVANCE. NOTIFY ENGINEER AND ARCHITECT OF TEST DATE AND TIME.
- D. TAKE ALL PRECAUTIONS NECESSARY TO PREVENT DAMAGE TO THE BUILDING AND ITS

CONTENTS AS A RESULT OF SUCH TESTS. REPAIR ANY DAMAGE CAUSED.

C. DEFECTS DISCLOSED BY THE TESTS SHALL BE REPAIRED OR REPLACED. TESTS SHALL BE

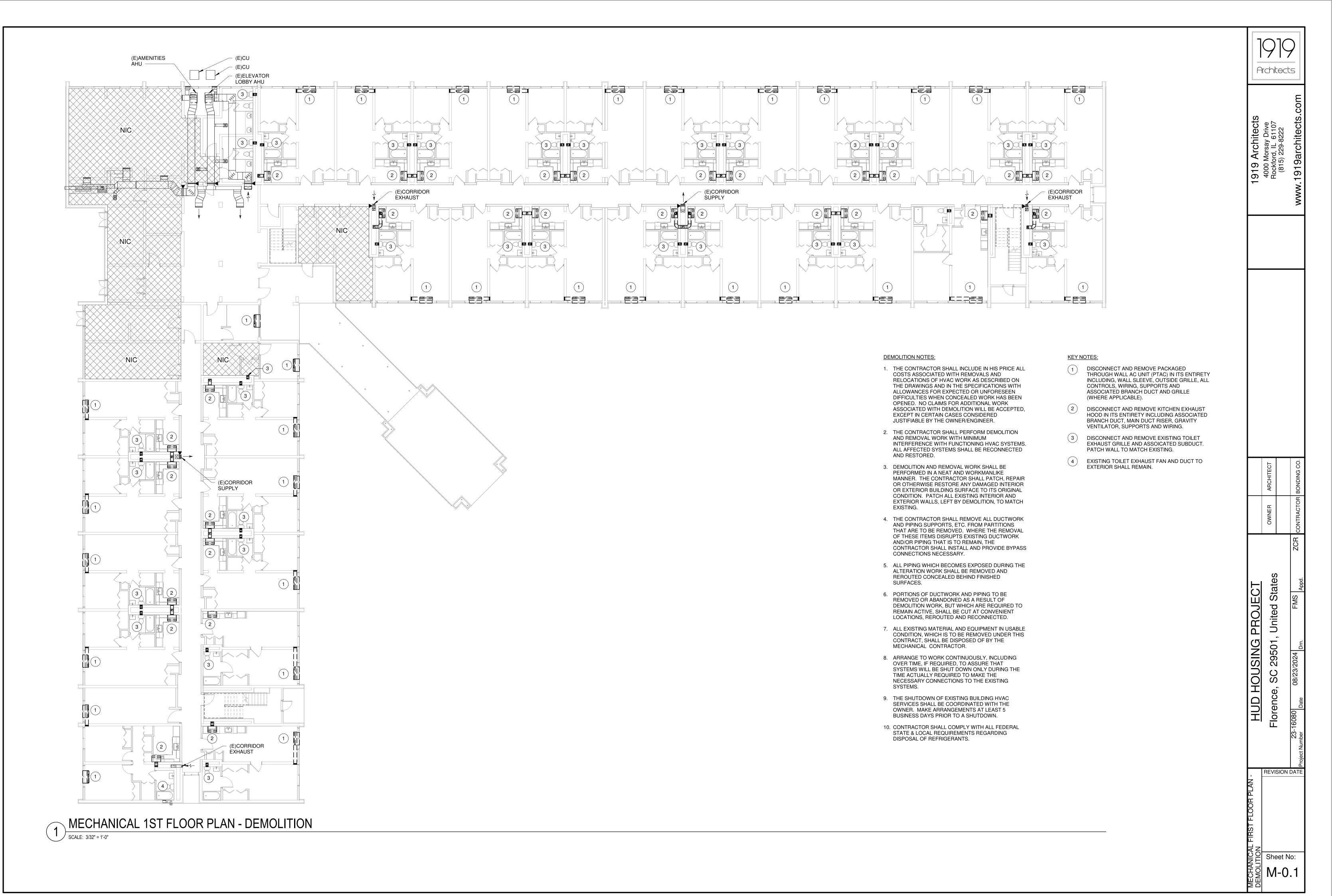
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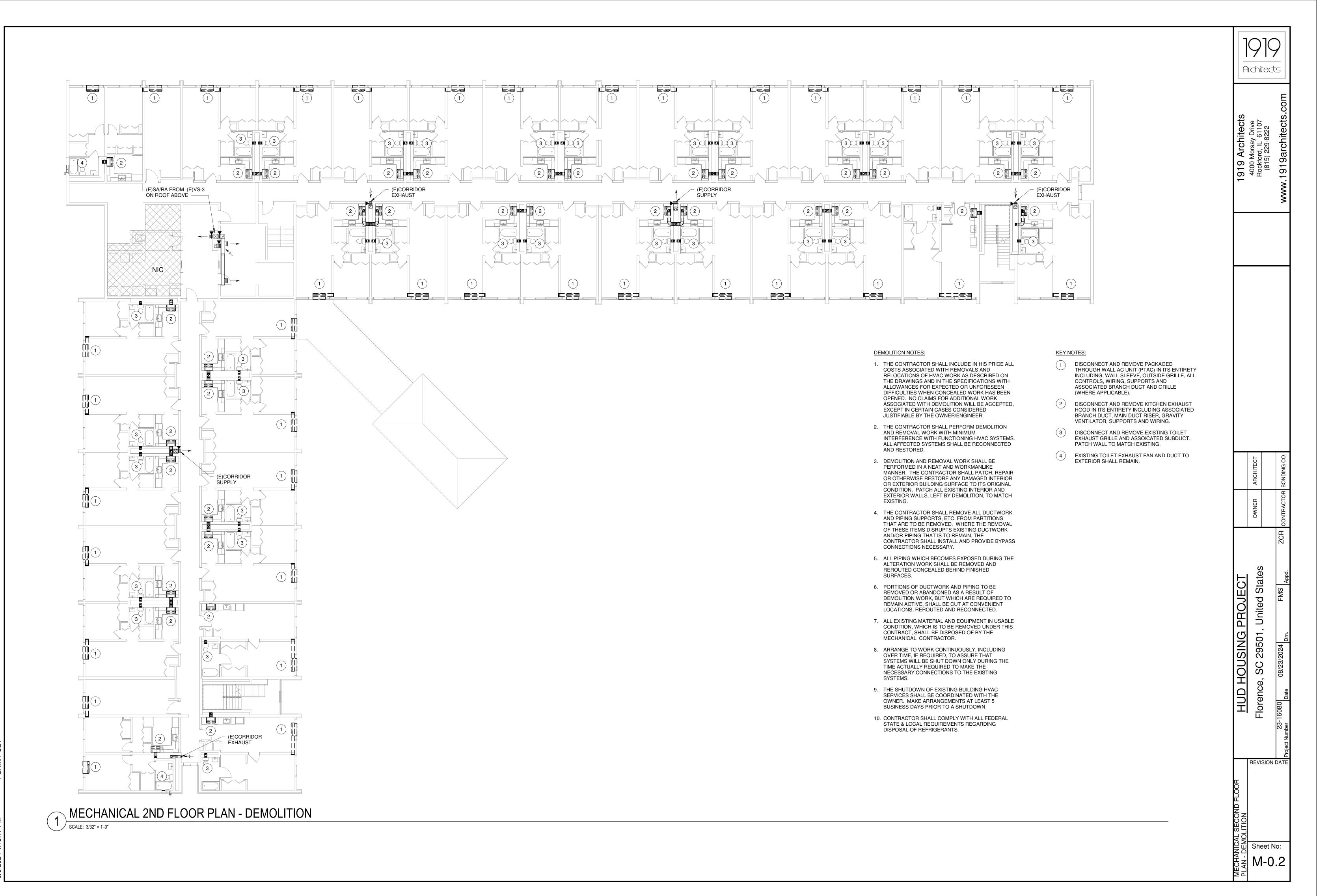


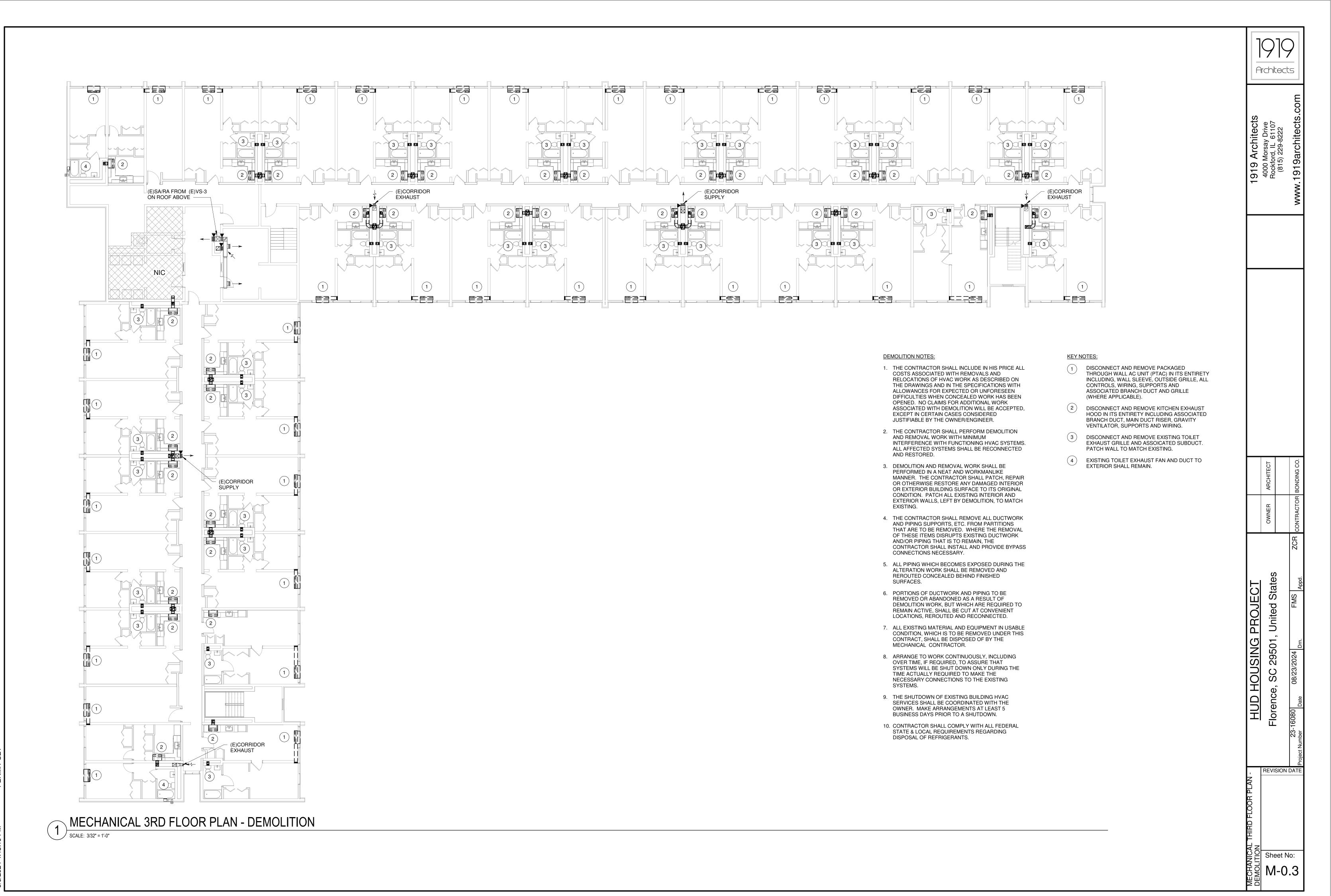
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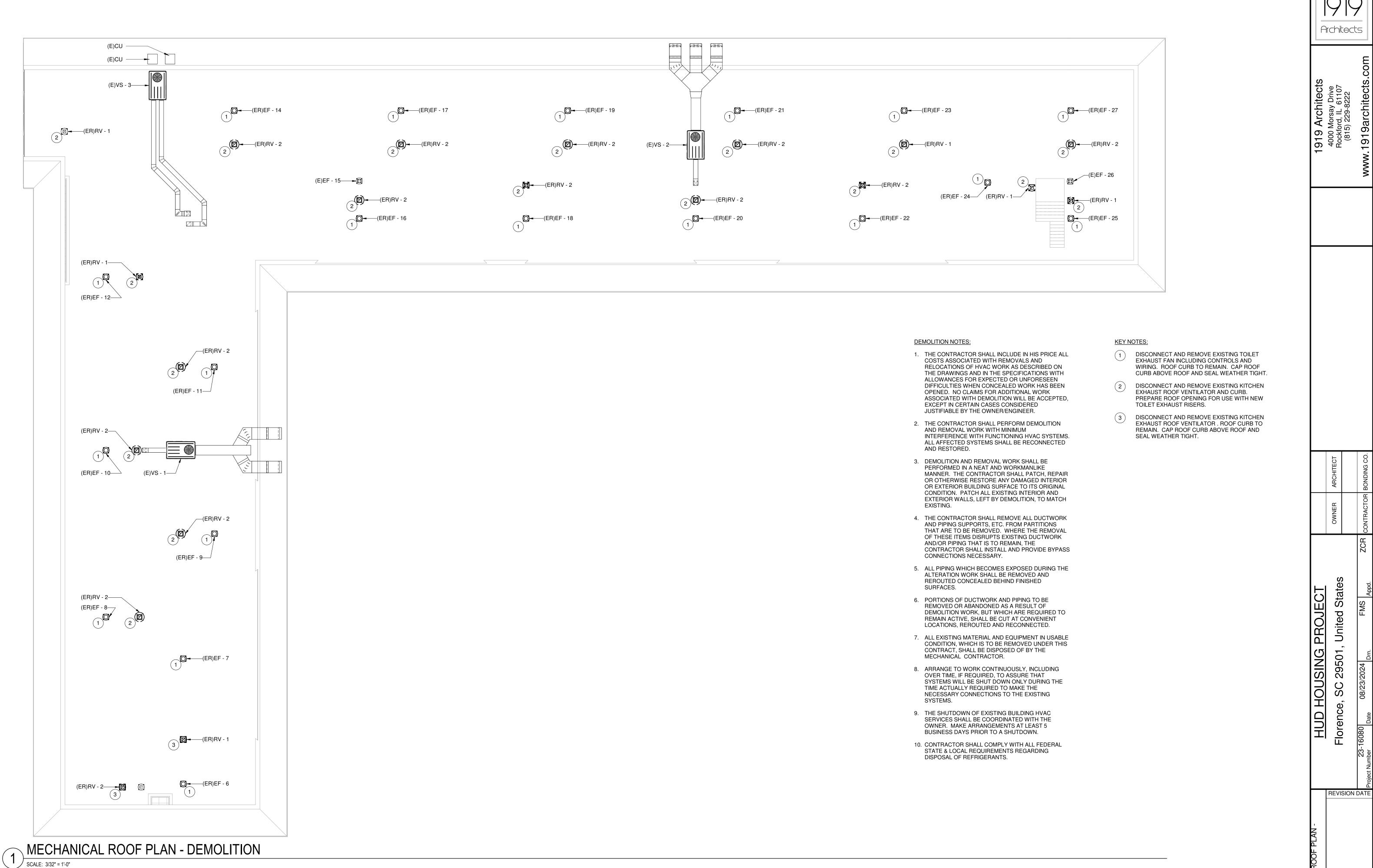
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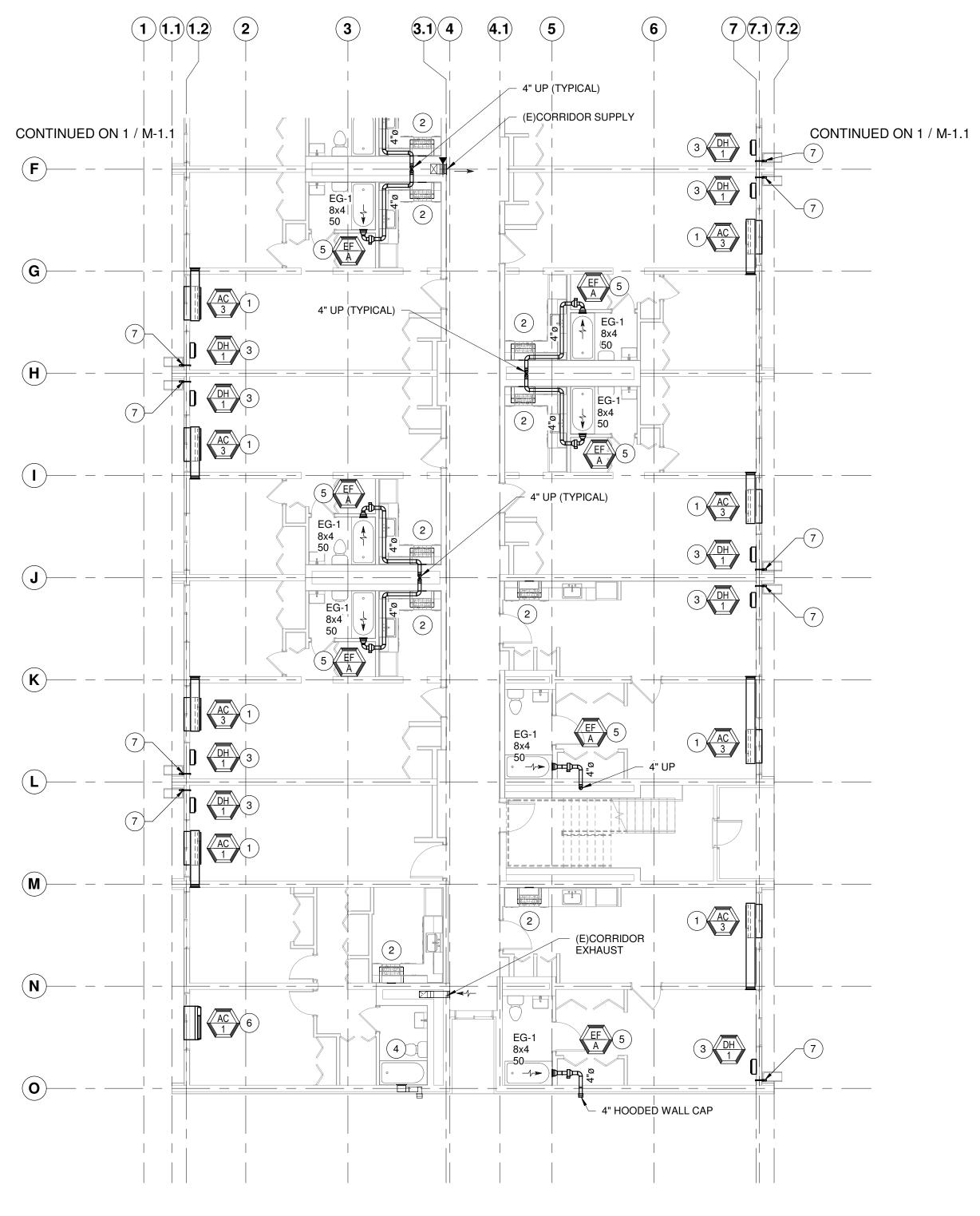
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2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

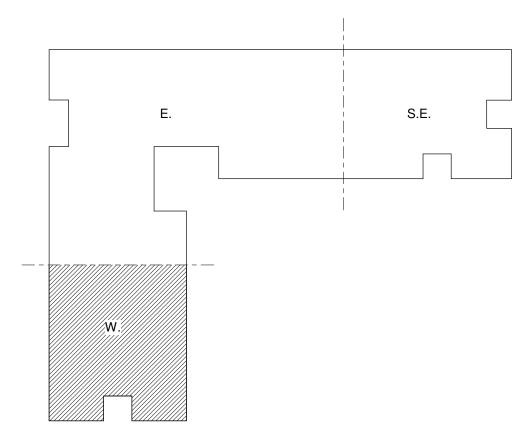
KEY NOTES:

DRAWING NOTES:

- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING IN LIVING ROOM. SEAL AROUND WALL SLEEVE WEATHER TIGHT. COORDINATE EXTENSION DUCT INSTALLATION WITH EXISTING WALL OPENING INTO ADJOINING ROOM. SUPPORT EXTENSION DUCT AS REQUIRED.
- NEW RECIRCULATING KITCHEN HOOD BY OTHERS.
- INSTALL DEHUMIDIFER PER UNIT MAFUACTURER'S INSTRUCTIONS. CONNECT CONDENSATE DRAIN TO BRANCH PIPE FROM CONDENSATE DRAIN RISER.
- EXISTING TOILET EXHAUST FAN AND DUCT TO EXTERIOR SHALL REMAIN.
- INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN DISCHARGE DUCT ABOVE KITCHEN CABINETS. COORDINATE INSTALLATION WITH ARCHITECT. SEAL DUCT PENETRATION AT SHAFT TO MAINTAIN RATING INTEGRITY.
- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING IN BEDROOM. SEAL AROUND WALL SLEEVE WEATHER TIGHT.
- 1-1/2" CONDENSATE DRAIN RISER WITH 3/4" BRANCH CONNECTION TO EACH DH-1. SUPPORT PIPING FROM WALL AND TERMINATE WITH SPLASH BLOCK. SEAL WALL PENETRATIONS WEATHER TIGHT. COORDINATE HEIGHT AND LOCATION OF DRAIN PIPE SERVING DH-1 WITH INSTALLATION OF DH-1.

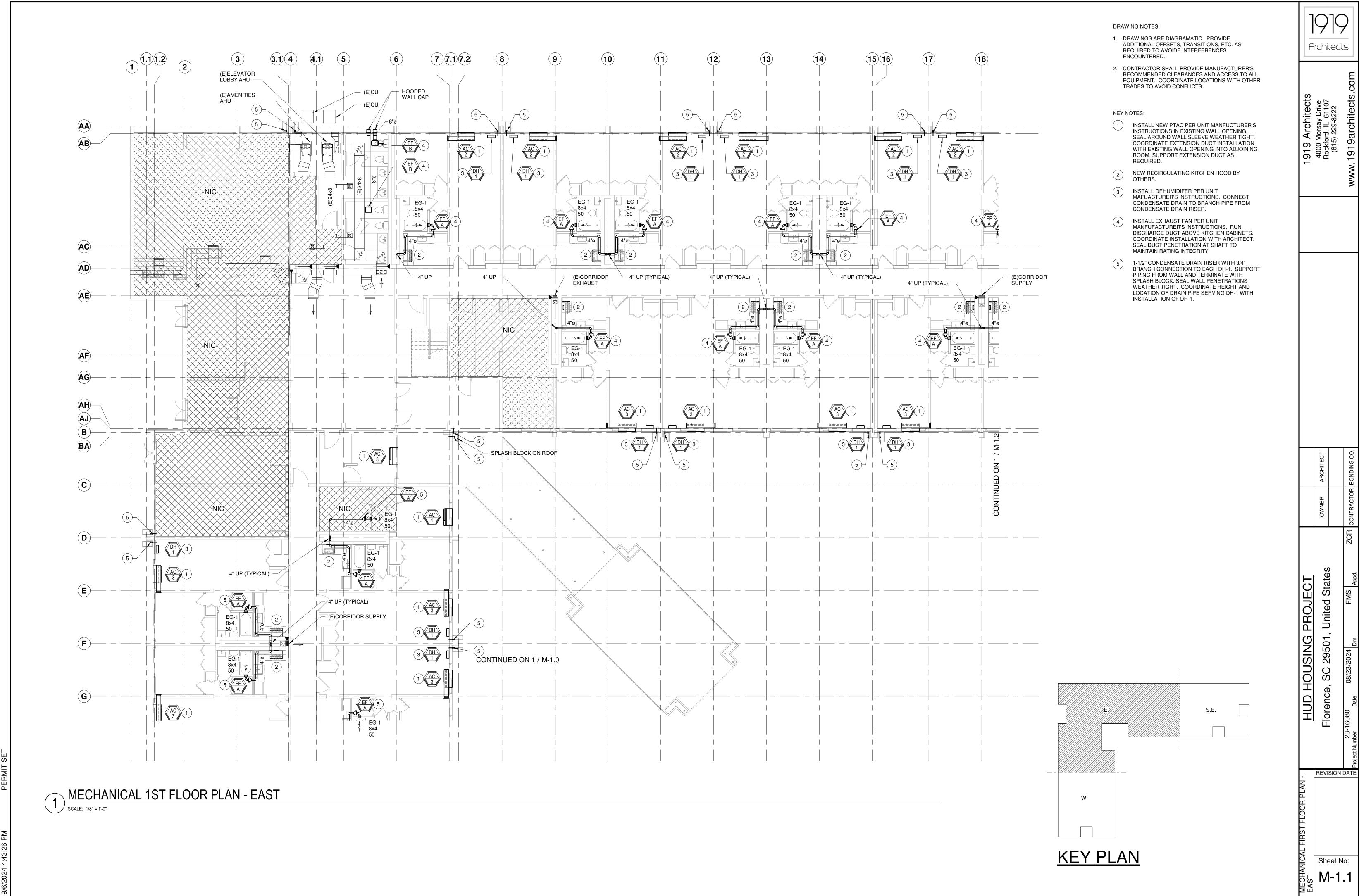


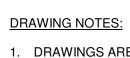
MECHANICAL 1ST FLOOR PLAN - WEST



KEY PLAN

Florence, REVISION DATE Sheet No: M-1.0





- 1. DRAWINGS ARE DIAGRAMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOIDE INTERFERENCES ENCOUNTERED.
- 2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

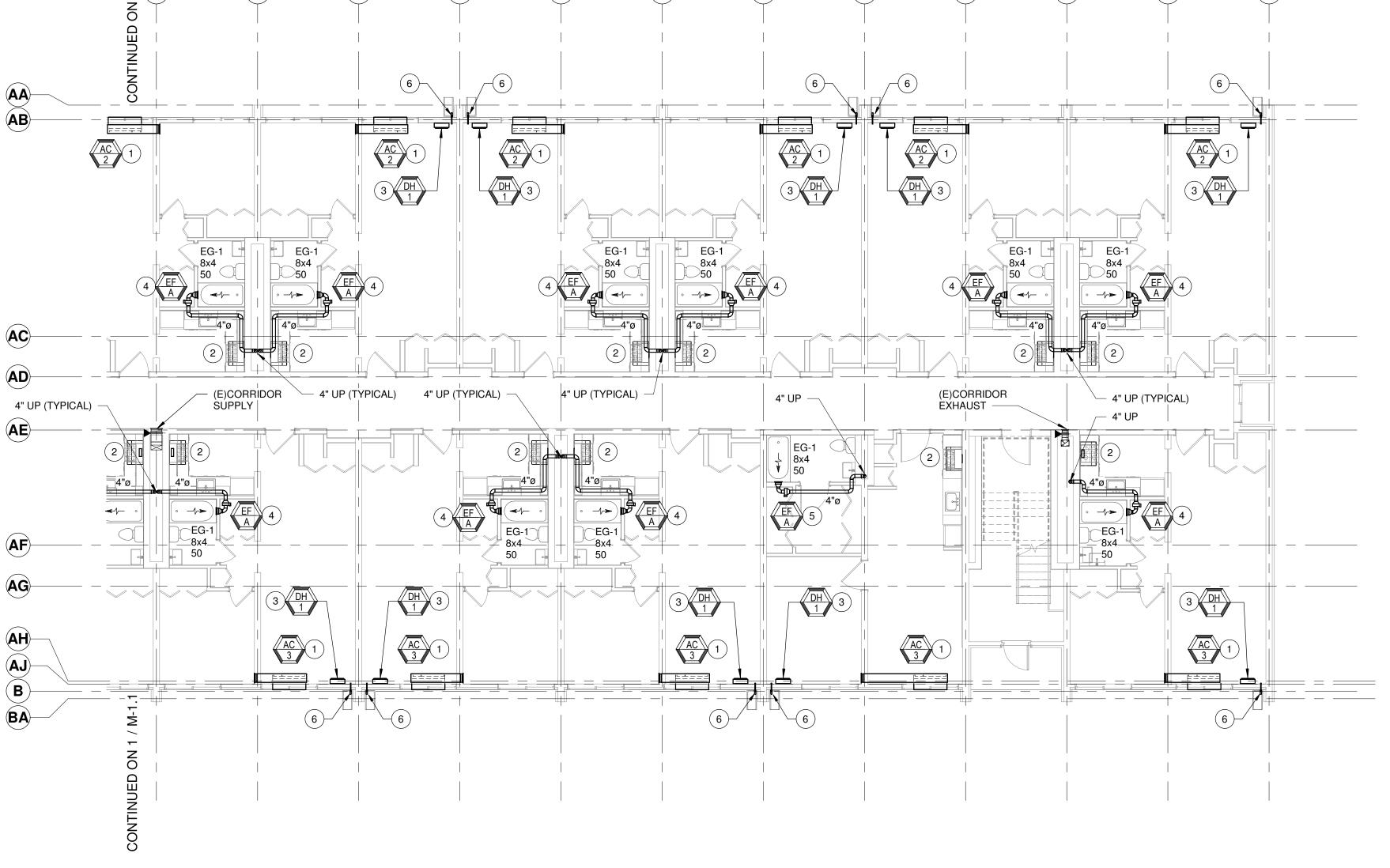
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KEY NOTES:

- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING. SEAL AROUND WALL SLEEVE WEATHER TIGHT. COORDINATE EXTENSION DUCT INSTALLATION WITH EXISTING WALL OPENING INTO ADJOINING ROOM. SUPPORT EXTENSION DUCT AS REQUIRED.
- NEW RECIRCULATING KITCHEN HOOD BY OTHERS.
- INSTALL DEHUMIDIFER PER UNIT MAFUACTURER'S INSTRUCTIONS. CONNECT CONDENSATE DRAIN TO BRANCH PIPE FROM CONDENSATE DRAIN RISER.
- INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN DISCHARGE DUCT ABOVE KITCHEN CABINETS. COORDINATE INSTALLATION WITH ARCHITECT.
 SEAL DUCT PENETRATION AT SHAFT TO
 MAINTAIN RATING INTEGRITY.
- INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN DISCHARGE DUCT AS HIGH AS POSSIBLE. COORDINATE INSTALLATION WITH ARCHITECT.
 SEAL DUCT PENETRATION AT SHAFT TO
 MAINTAIN RATING INTEGRITY.
- 1-1/2" CONDENSATE DRAIN RISER WITH 3/4" BRANCH CONNECTION TO EACH DH-1. SUPPORT PIPING FROM WALL AND TERMINATE WITH SPLASH BLOCK. SEAL WALL PENETRATIONS WEATHER TIGHT. COORDINATE HEIGHT AND LOCATION OF DRAIN PIPE SERVING DH-1 WITH INSTALLATION OF DH-1.



MECHANICAL 1ST FLOOR PLAN - SOUTHEAST SCALE: 1/8" = 1'-0"

> ///S.E./ **KEY PLAN**

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2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL

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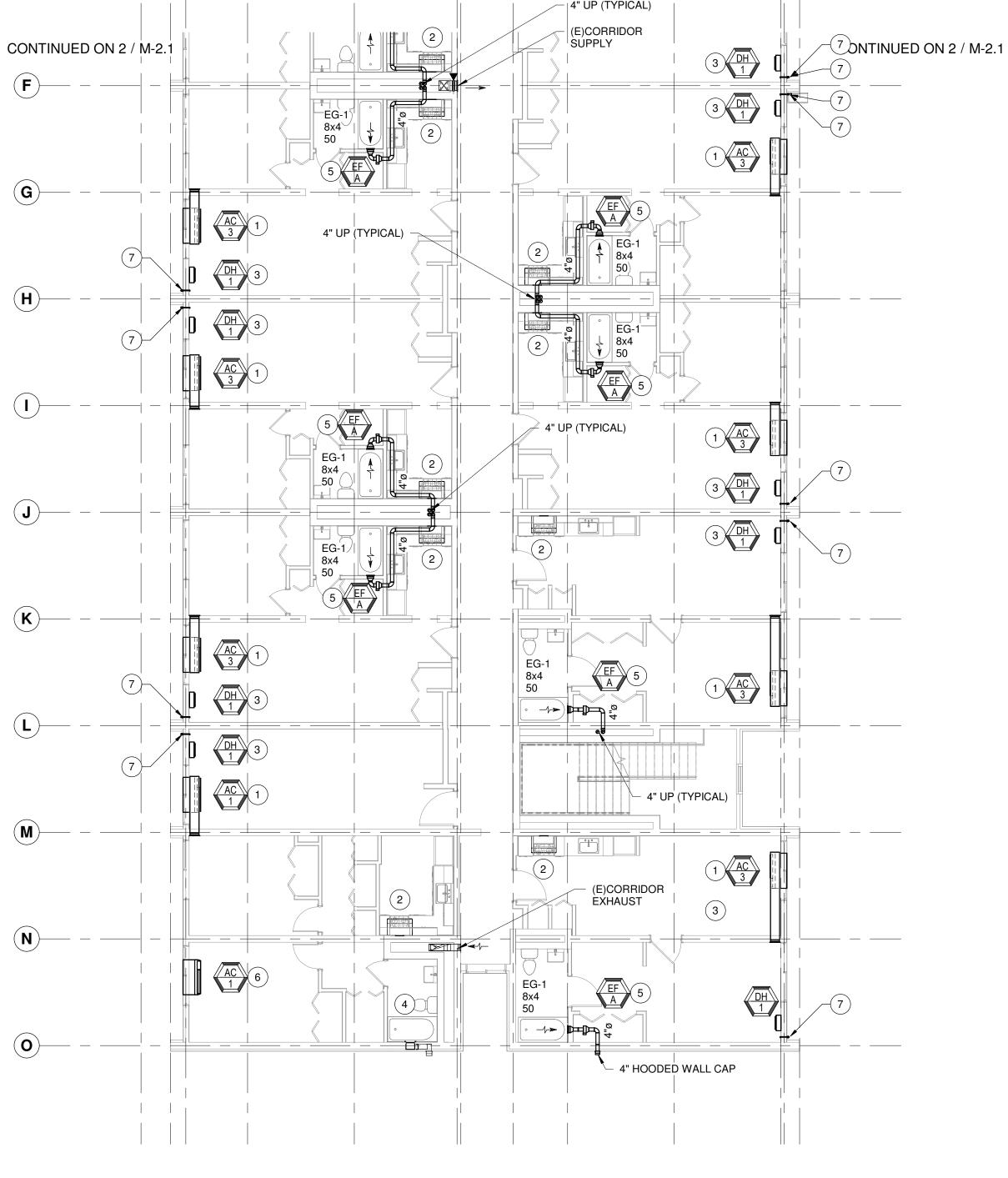
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EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING. SEAL AROUND WALL SLEEVE WEATHER TIGHT. COORDINATE EXTENSION DUCT INSTALLATION WITH EXISTING WALL OPENING INTO ADJOINING ROOM. SUPPORT EXTENSION DUCT AS REQUIRED.
 - NEW RECIRCULATING KITCHEN HOOD BY OTHERS.
- 3 IINSTALL DEHUMIDIFER PER UNIT MAFUACTURER'S INSTRUCTIONS. CONNECT CONDENSATE DRAIN TO BRANCH PIPE FROM CONDENSATE DRAIN RISER.
- 4 EXISTING TOILET EXHAUST FAN AND DUCT TO EXTERIOR SHALL REMAIN.
- INSTALL EXHAUST FAN PER UNIT
 MANFUFACTURER'S INSTRUCTIONS. RUN
 DISCHARGE DUCT ABOVE KITCHEN CABINETS.
 COORDINATE INSTALLATION WITH ARCHITECT.
 SEAL DUCT PENETRATION AT SHAFT TO
 MAINTAIN RATING INTEGRITY.
- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING IN BEDROOM. SEAL AROUND WALL SLEEVE WEATHER TIGHT.
- 1-1/2" CONDENSATE DRAIN RISER WITH 3/4"
 BRANCH CONNECTION TO EACH DH-1. SUPPORT
 PIPING FROM WALL AND TERMINATE WITH
 SPLASH BLOCK. SEAL WALL PENETRATIONS
 WEATHER TIGHT. COORDINATE HEIGHT AND
 LOCATION OF DRAIN PIPE SERVING DH-1 WITH
 INSTALLATION OF DH-1.



(5)

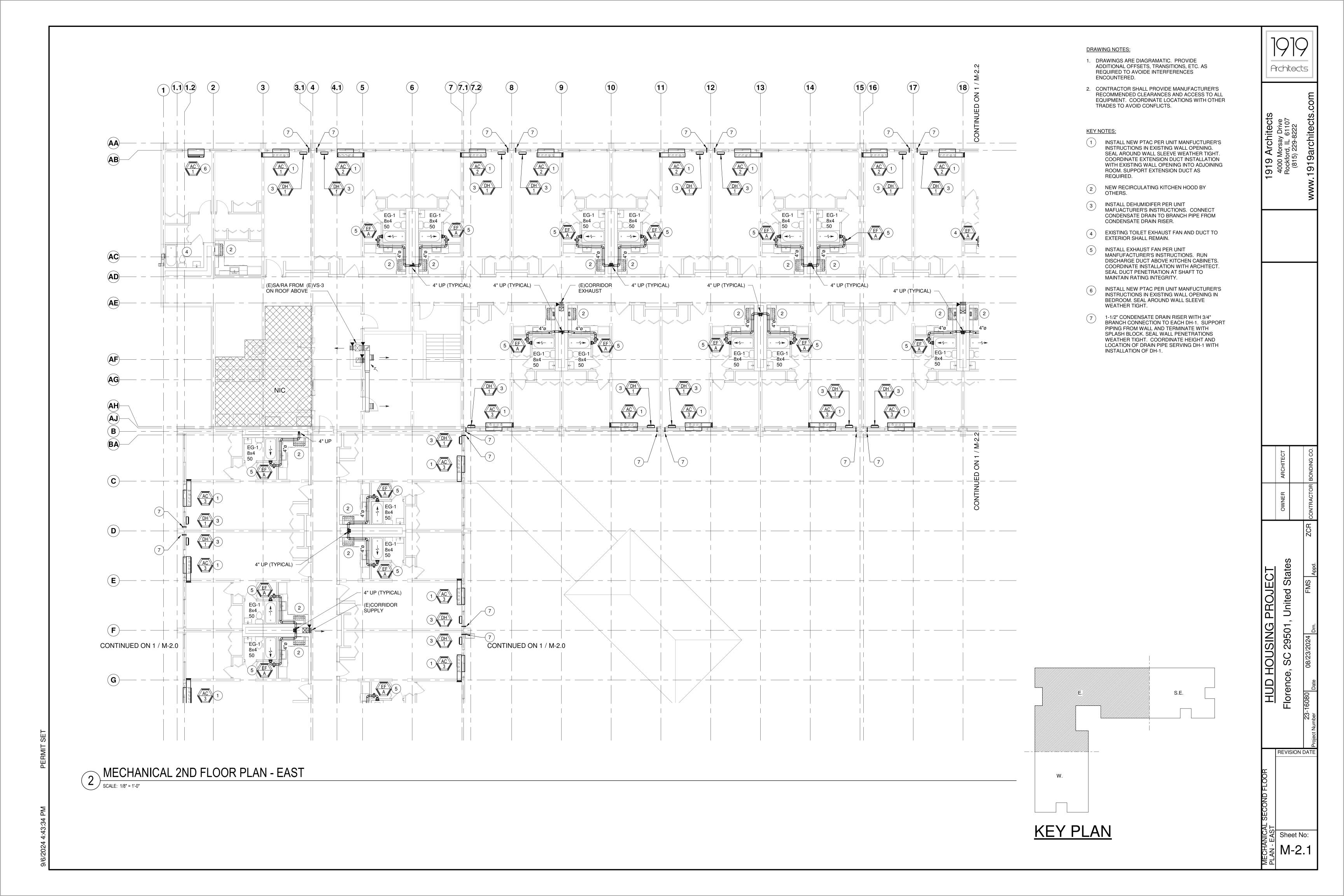
(7)(**7.1)**(**7.2**)

MECHANICAL 2ND FLOOR PLAN -WEST

(1)(1.1)(1.2) (2)

E. S.E.

KEY PLAN



ENCOUNTERED.

REQUIRED.

OTHERS.

KEY NOTES:

ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS

2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

> INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING. SEAL AROUND WALL SLEEVE WEATHER TIGHT. COORDINATE EXTENSION DUCT INSTALLATION WITH EXISTING WALL OPENING INTO ADJOINING

ROOM. SUPPORT EXTENSION DUCT AS

NEW RECIRCULATING KITCHEN HOOD BY

CONDENSATE DRAIN RISER.

INSTALL DEHUMIDIFER PER UNIT MAFUACTURER'S INSTRUCTIONS. CONNECT CONDENSATE DRAIN TO BRANCH PIPE FROM

INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN

REQUIRED TO AVOIDE INTERFERENCES

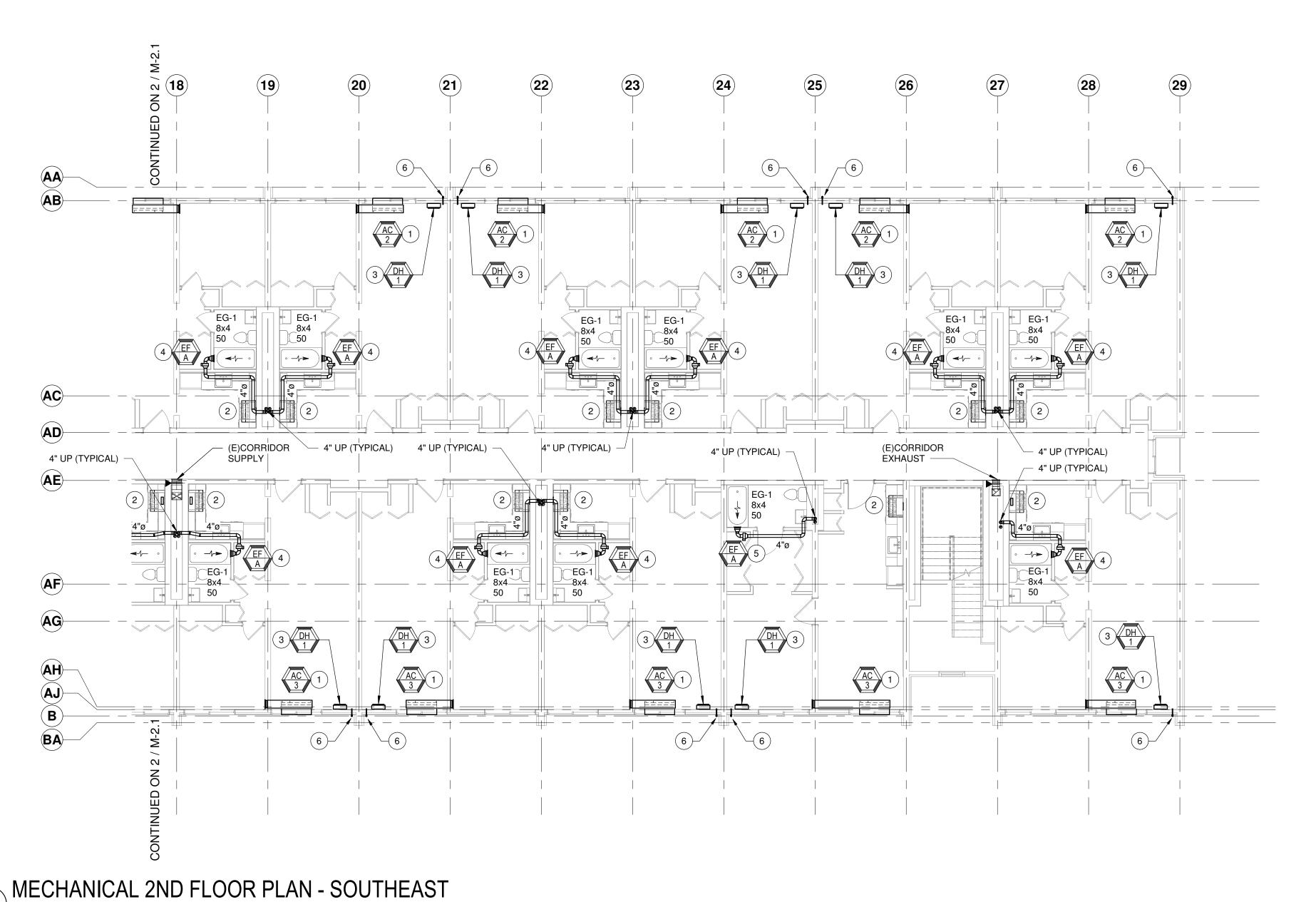
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DISCHARGE DUCT ABOVE KITCHEN CABINETS. COORDINATE INSTALLATION WITH ARCHITECT.
SEAL DUCT PENETRATION AT SHAFT TO
MAINTAIN RATING INTEGRITY. INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN DISCHARGE DUCT AAS HIGH AS POSSIBLE. COORDINATE INSTALLATION WITH ARCHITECT. SEAL DUCT PENETRATION AT SHAFT TO MAINTAIN RATING INTEGRITY.

1-1/2" CONDENSATE DRAIN RISER WITH 3/4" BRANCH CONNECTION TO EACH DH-1. SUPPORT PIPING FROM WALL AND TERMINATE WITH SPLASH BLOCK. SEAL WALL PENETRATIONS WEATHER TIGHT. COORDINATE HEIGHT AND LOCATION OF DRAIN PIPE SERVING DH-1 WITH INSTALLATION OF DH-1.

///S.E./

KEY PLAN

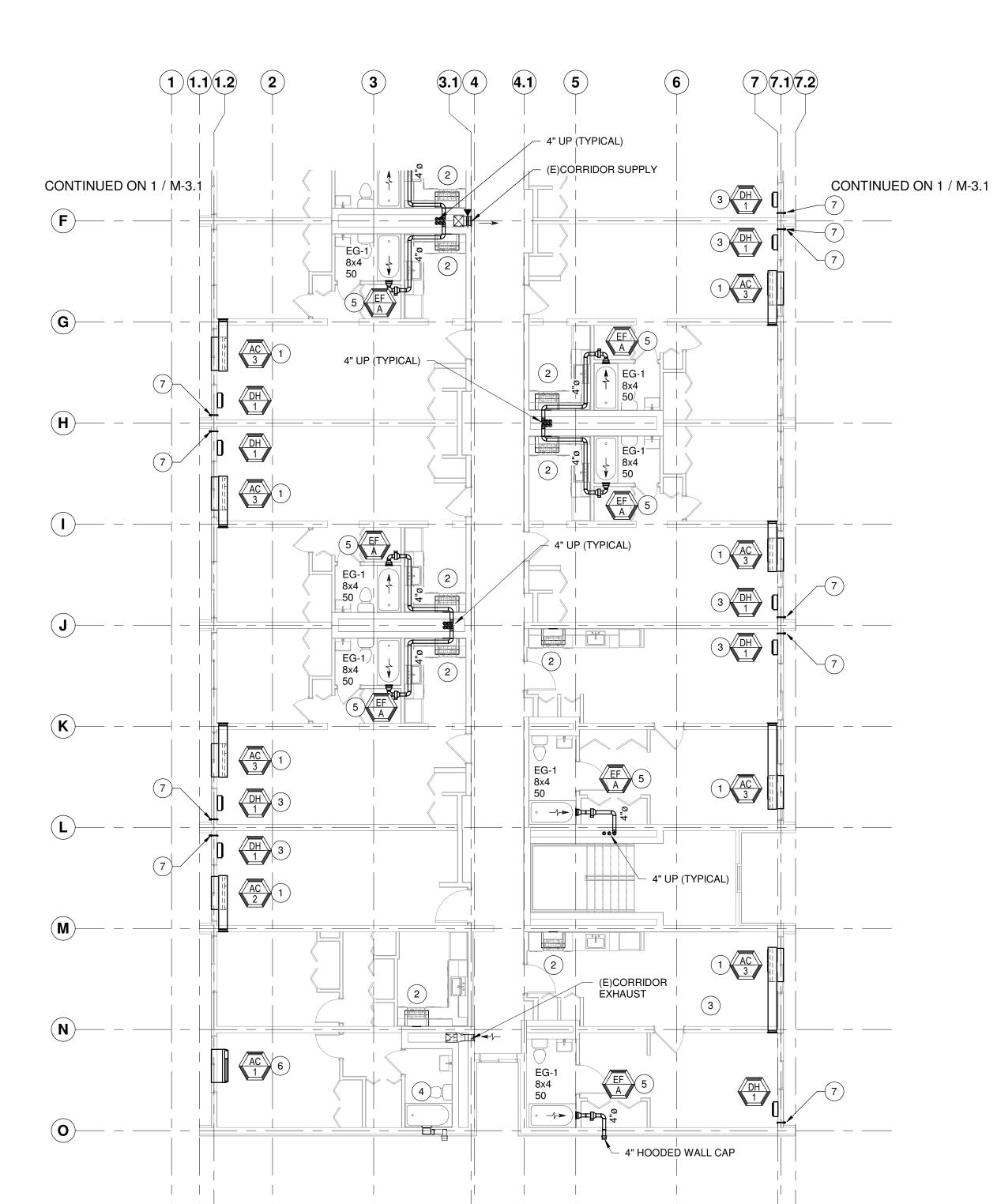


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SC 29501, United States

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HUD HOUSING PROJECT



MECHANICAL 3RD FLOOR PLAN - WEST

DRAWING NOTES:

- 1. DRAWINGS ARE DIAGRAMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOIDE INTERFERENCES ENCOUNTERED.
- 2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

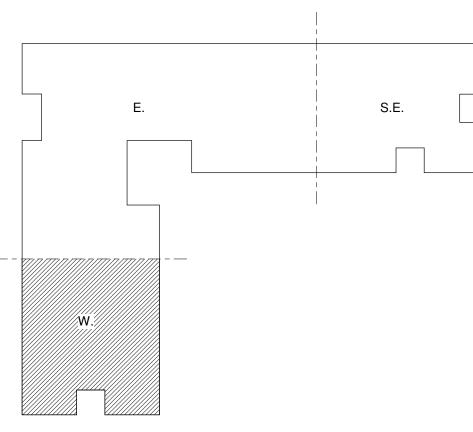
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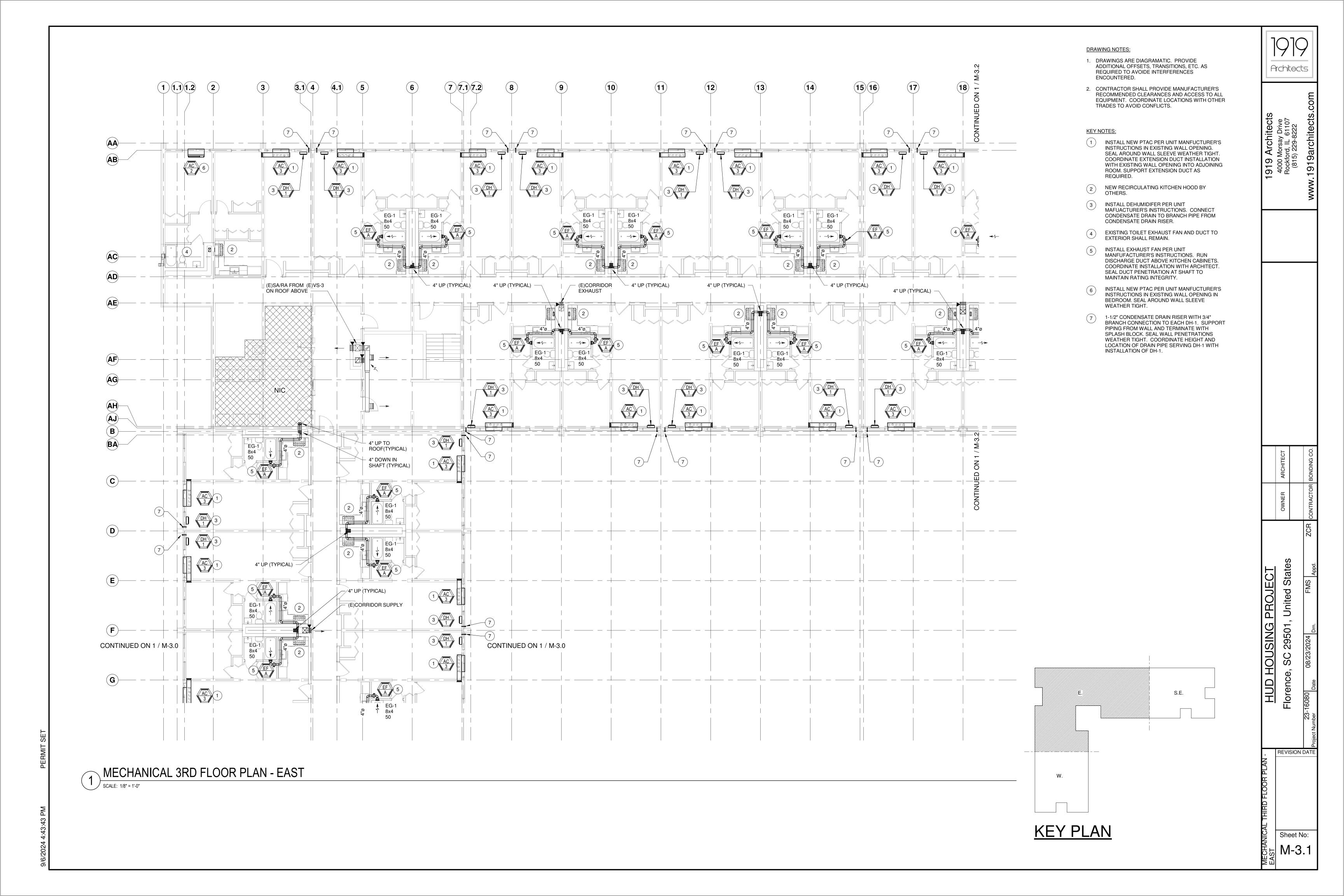
KEY NOTES:

- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING. SEAL AROUND WALL SLEEVE WEATHER TIGHT. COORDINATE EXTENSION DUCT INSTALLATION WITH EXISTING WALL OPENING INTO ADJOINING ROOM. SUPPORT EXTENSION DUCT AS REQUIRED.
- NEW RECIRCULATING KITCHEN HOOD BY OTHERS.
- INSTALL DEHUMIDIFER PER UNIT MAFUACTURER'S INSTRUCTIONS. RUN CONDENSATE DRAIN TO HUB DRAIN PROVIDED BY P.C.. REFER TO PLUMBING DRAWINGS FOR ADDITINIONAL INFORMATION.
- 4 EXISTING TOILET EXHAUST FAN AND DUCT TO EXTERIOR SHALL REMAIN.
- INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN DISCHARGE DUCT ABOVE KITCHEN CABINETS. COORDINATE INSTALLATION WITH ARCHITECT. SEAL DUCT PENETRATION AT SHAFT TO MAINTAIN RATING INTEGRITY.
- INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING IN BEDROOM. SEAL AROUND WALL SLEEVE WEATHER TIGHT.
- 7 1-1/2" CONDENSATE DRAIN RISER WITH 3/4" BRANCH CONNECTION TO EACH DH-1. SUPPORT PIPING FROM WALL AND TERMINATE WITH SPLASH BLOCK. SEAL WALL PENETRATIONS
 WEATHER TIGHT. COORDINATE HEIGHT AND
 LOCATION OF DRAIN PIPE SERVING DH-1 WITH INSTALLATION OF DH-1.



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INSTALL DEHUMIDIFER PER UNIT MAFUACTURER'S INSTRUCTIONS. CONNECT

INSTALL NEW PTAC PER UNIT MANFUCTURER'S INSTRUCTIONS IN EXISTING WALL OPENING. SEAL AROUND WALL SLEEVE WEATHER TIGHT. COORDINATE EXTENSION DUCT INSTALLATION WITH EXISTING WALL OPENING INTO ADJOINING

DISCHARGE DUCT ABOVE KITCHEN CABINETS. COORDINATE INSTALLATION WITH ARCHITECT.
SEAL DUCT PENETRATION AT SHAFT TO
MAINTAIN RATING INTEGRITY.

PIPING FROM WALL AND TERMINATE WITH SPLASH BLOCK. SEAL WALL PENETRATIONS

KEY NOTES:

ROOM. SUPPORT EXTENSION DUCT AS REQUIRED. NEW RECIRCULATING KITCHEN HOOD BY OTHERS.

ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS

2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

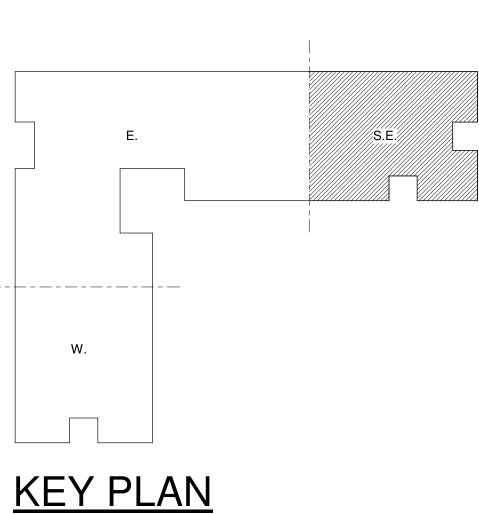
REQUIRED TO AVOIDE INTERFERENCES

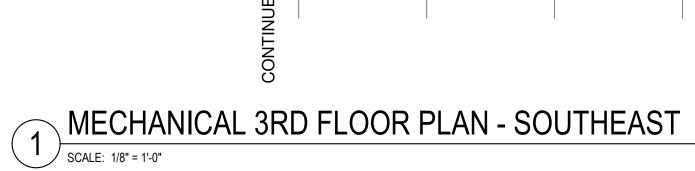
CONDENSATE DRAIN TO BRANCH PIPE FROM CONDENSATE DRAIN RISER. INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN

INSTALL EXHAUST FAN PER UNIT MANFUFACTURER'S INSTRUCTIONS. RUN DISCHARGE DUCT AS HIGH AS POSSIBLE. COORDINATE INSTALLATION WITH ARCHITECT.
SEAL DUCT PENETRATION AT SHAFT TO
MAINTAIN RATING INTEGRITY.

1-1/2" CONDENSATE DRAIN RISER WITH 3/4" BRANCH CONNECTION TO EACH DH-1. SUPPORT WEATHER TIGHT. COORDINATE HEIGHT AND LOCATION OF DRAIN PIPE SERVING DH-1 WITH INSTALLATION OF DH-1.

///S.E./





(E)CORRIDOR

4" UP (TYPICAL) 4" UP (TYPICAL)

4" UP (TYPICAL) -

4" UP (TYPICAL)

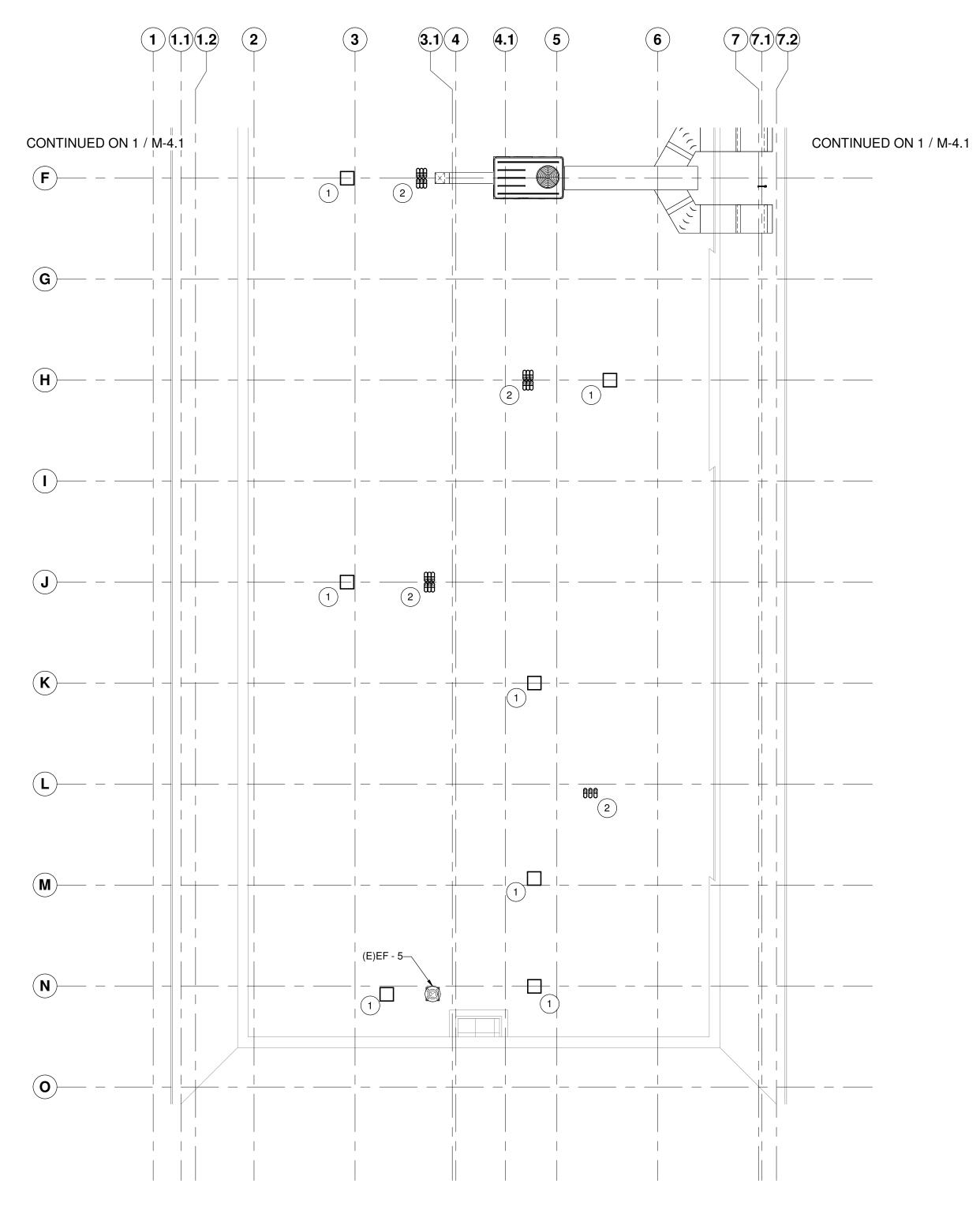
DH 3

(E)CORRIDOR

EXHAUST

- 4" UP (TYPICAL)

- 4" UP (TYPICAL)



MECHANICAL ROOF PLAN - WEST

DRAWING NOTES:

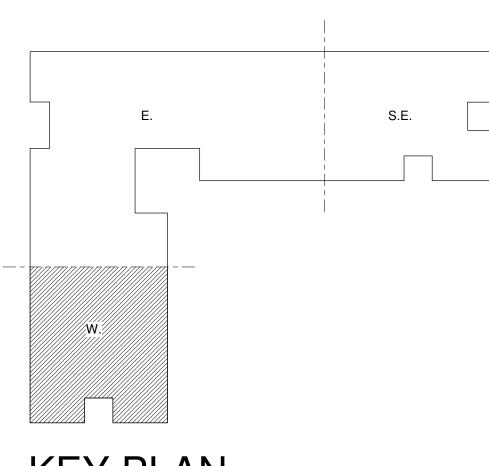
- 1. DRAWINGS ARE DIAGRAMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOIDE INTERFERENCES ENCOUNTERED.
- 2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

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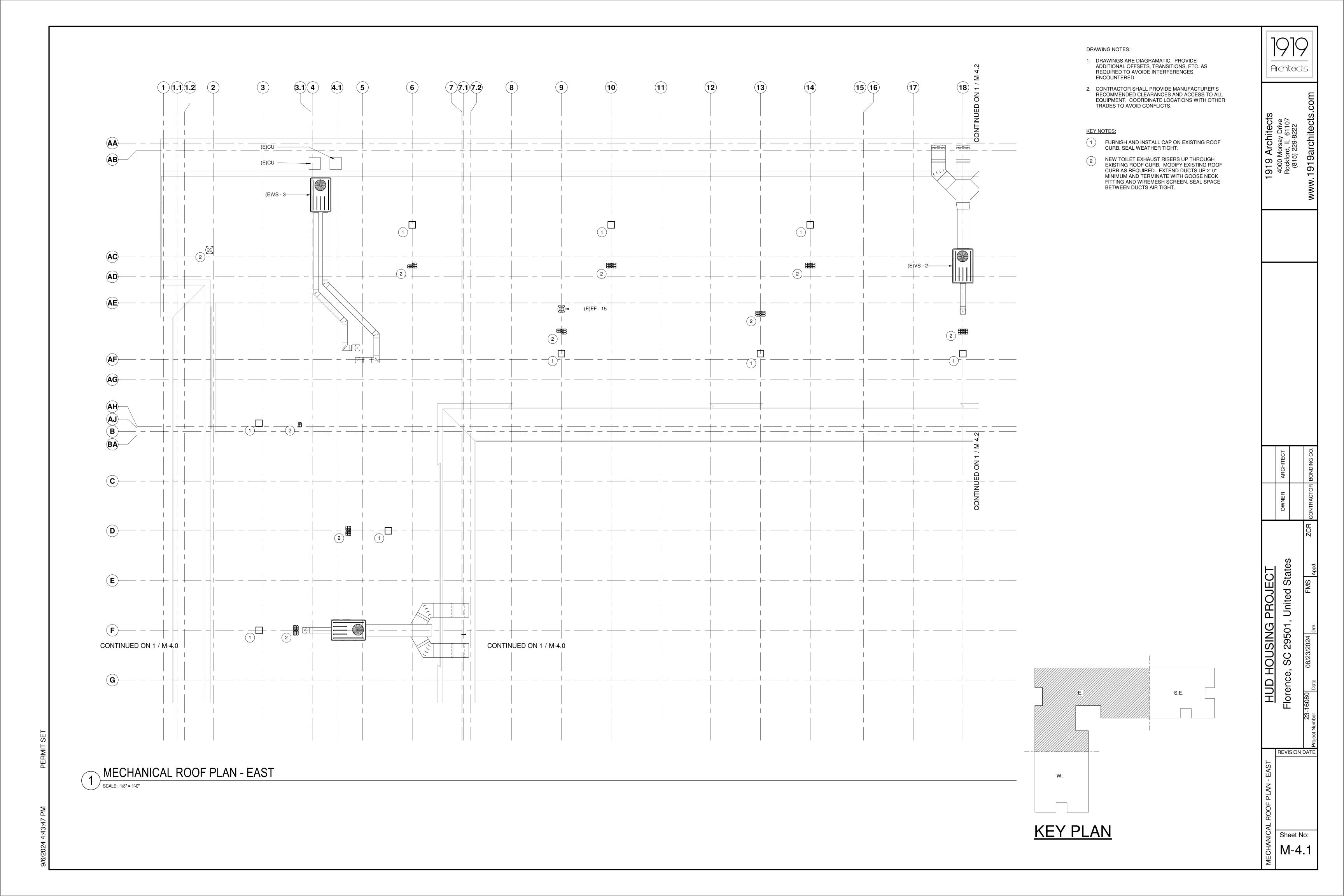
KEY NOTES:

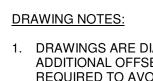
- 1 FURNISH AND INSTALL CAP ON EXISTING ROOF CURB. SEAL WEATHER TIGHT.
 - NEW TOILET EXHAUST RISERS UP THROUGH EXISTING ROOF CURB. MODIFY EXISTING ROOF CURB AS REQUIRED. EXTEND DUCTS UP 2'-0" MINIMUM AND TERMINATE WITH GOOSE NECK FITTING AND WIREMESH SCREEN. SEAL SPACE BETWEEN DUCTS AIR TIGHT.



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- 1. DRAWINGS ARE DIAGRAMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOIDE INTERFERENCES ENCOUNTERED.
- 2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS.

KEY NOTES:

1 FURNISH AND INSTALL CAP ON EXISTING ROOF CURB. SEAL WEATHER TIGHT.

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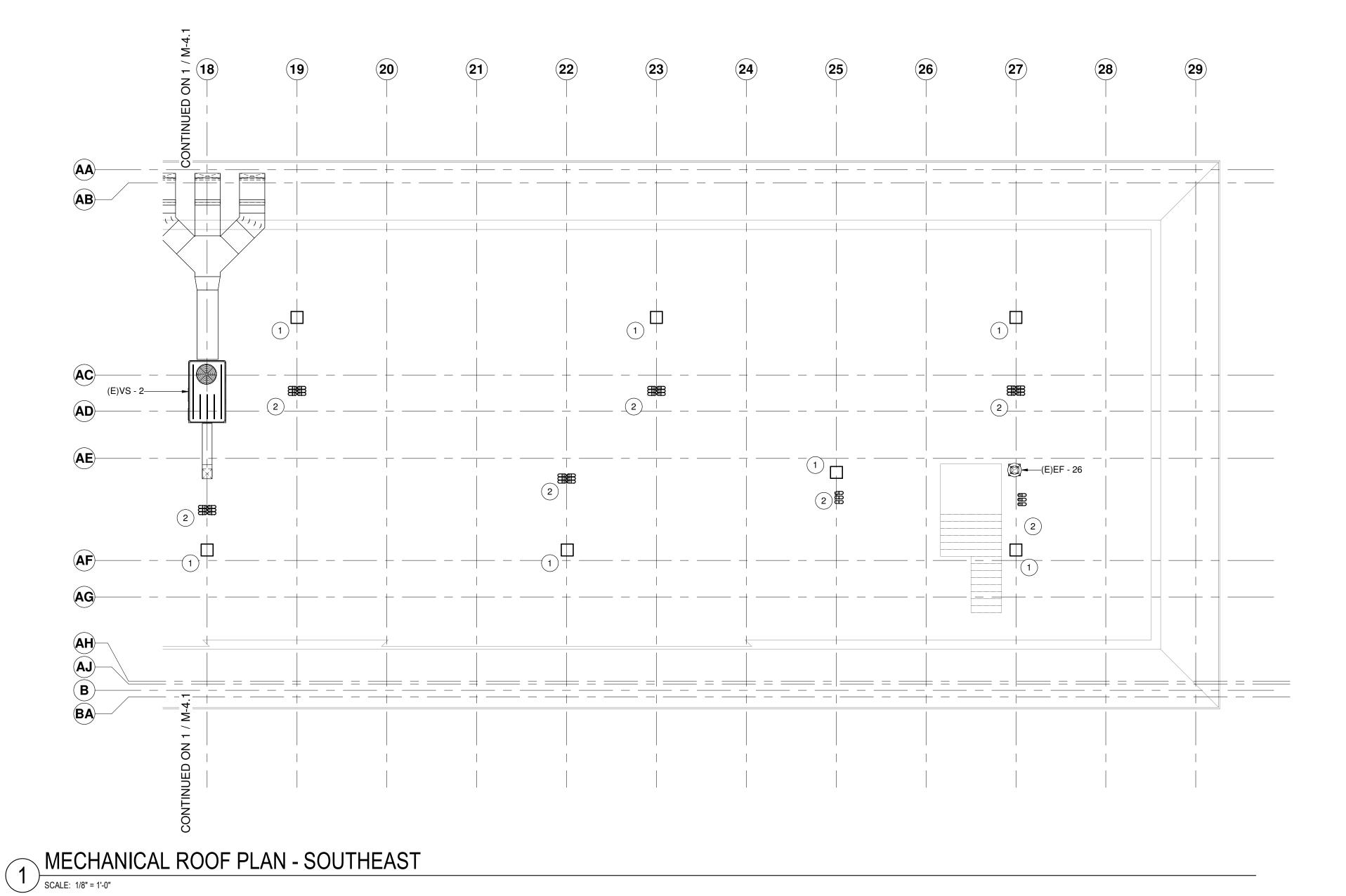
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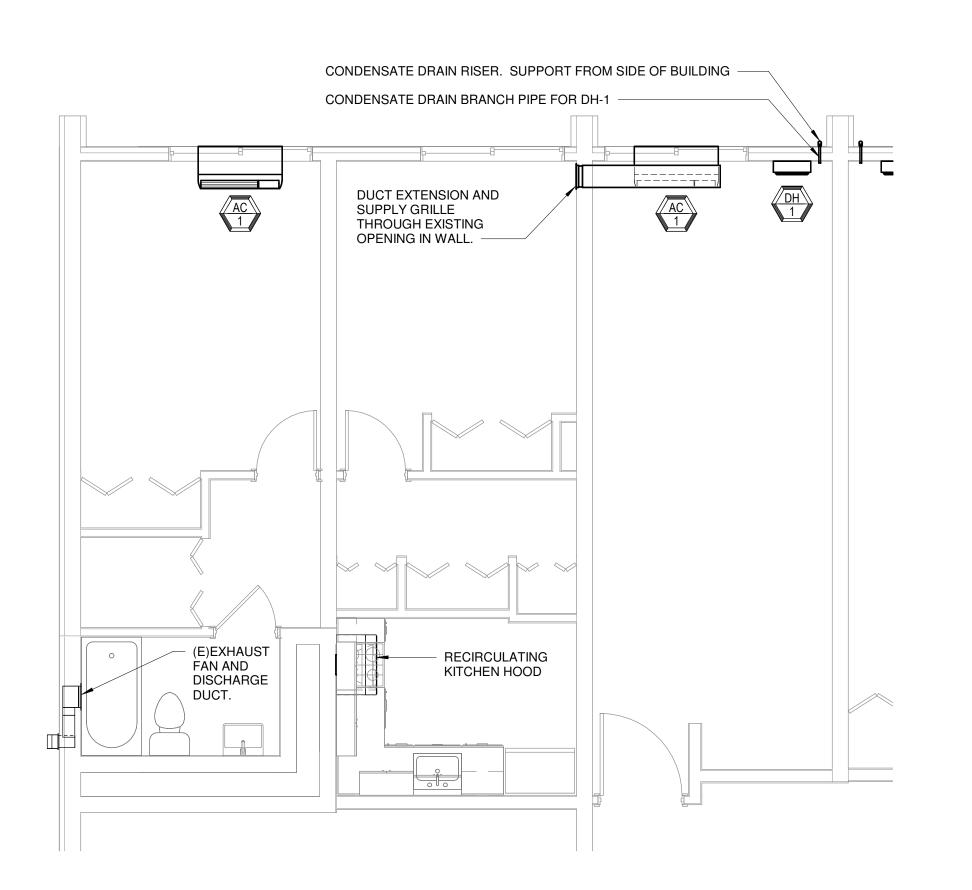
55 M-4.2

NEW TOILET EXHAUST RISERS UP THROUGH EXISTING ROOF CURB. MODIFY EXISTING ROOF CURB AS REQUIRED. EXTEND DUCTS UP 2'-0" MINIMUM AND TERMINATE WITH GOOSE NECK FITTING AND WIREMESH SCREEN. SEAL SPACE BETWEEN DUCTS AIR TIGHT.

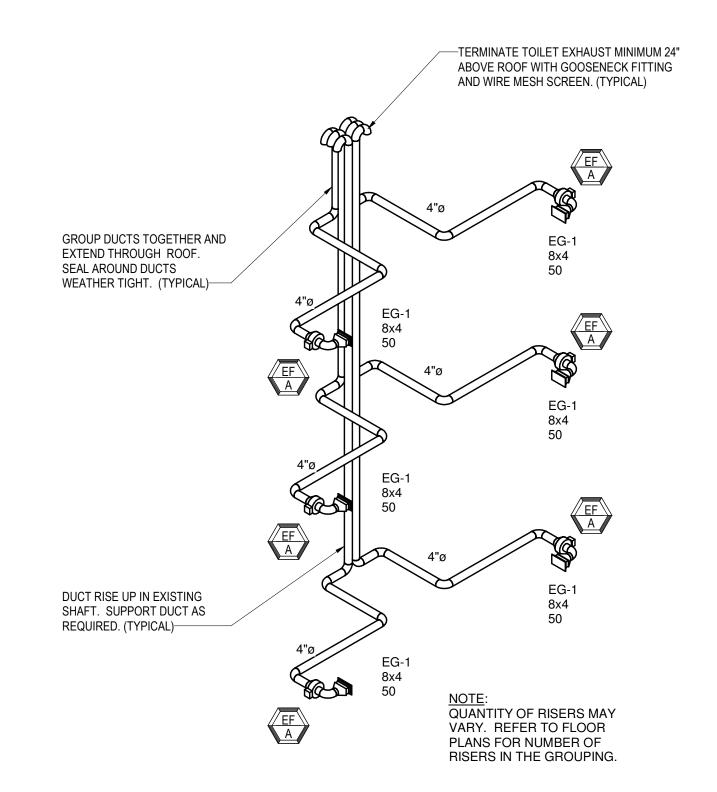


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KEY PLAN



MECHANICAL TYPICAL APARTMENT UNIT B FLOOR PLAN



TYPICAL TOILET EXHAUST RISER DIAGRAM

SCALE:

DRAWING NOTES:

1. DRAWINGS ARE DIAGRAMATIC. PROVIDE ADDITIONAL OFFSETS, TRANSITIONS, ETC. AS REQUIRED TO AVOIDE INTERFERENCES ENCOUNTERED.

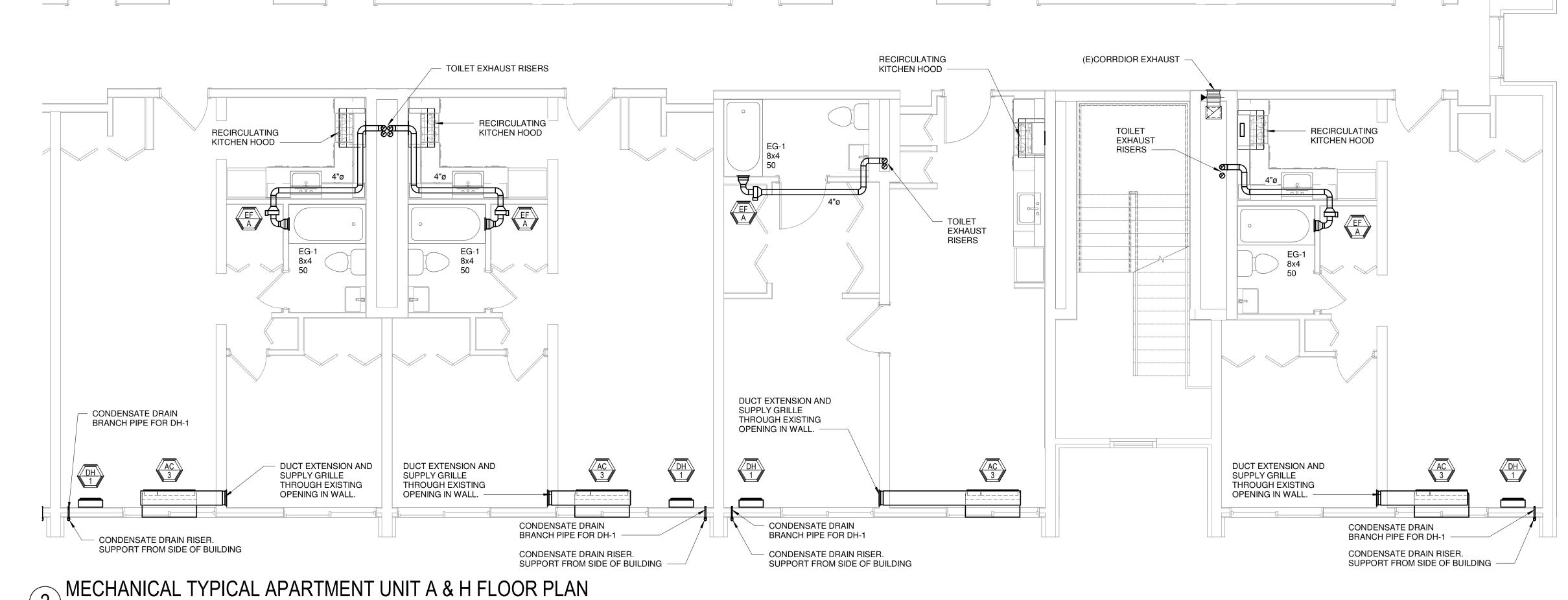
2. CONTRACTOR SHALL PROVIDE MANUFACTURER'S RECOMMENDED CLEARANCES AND ACCESS TO ALL EQUIPMENT. COORDINATE LOCATIONS WITH OTHER TRADES TO AVOID CONFLICTS. Architects

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FAN	SCHEDULE											EF _
TAG	SERVICE	BASIS OF DESIGN MANUF.	MODEL NO.	TYPE	CFM	SP. IN. W.G.	FRPM	HP/WATTS	VOLTAGE	NOISE LEVEL (SONES)	CONTROL	REMARKS
EF-A	RESIDENT BATHROOMS	FANTECH	PB110	INLINE	50	0.5	2,886	25 WATTS	120/1¢/60	N/A	LIGHT SWITCH	1, 2, 3, 4
EF-B	TOILET EXHAUST (AMENITIES ROOM)	GREENHECK	SP-A390-VG	CEILING	150	0.5	1,221	29 WATTS	120/1¢/60	N/A	LIGHT SWITCH	2, 3, 4, 5

NOTES/ACCESSORIES:

1. PROVIDE WITH INTEGRAL BACKDRAFT DAMPER, DISCONNECT AND HANGER KIT.

 ENERGY STAR COMPLIANT.
 WIRING SHALL BE PROVIDED BY ELECTRICAL CONTRACTOR. 4. LIGHT SWITCH AND WIRING PROVIDED BY ELECTRICAL CONTRACTOR.

5. PROVIDE WITH INTEGRAL BACKDRAFT DAMPER, DISCONNECT, GRILLE AND HANGER KIT.

PAC	KAGE TERM	IINAL AIR	CONDITIO	ONING UN	IT (HEAT PUMF	P W/ ELECTRIC I	HEAT) S	SCHEDUL	.E				PTAC
	BASIS	MODEL		COOLING	OLING HEATING CAPACITY AIR FLOW ELECTRICAL DATA	ГА							
TAG	OF DESIGN	NO.	REFRIGERANT	CAPACITY (BTUH)	HEAT PUMP MODE (BTUH)	ELECTRIC HEATER	EER	CFM (HIGH/LOW)	VOLTAGE	FLA	MOCP	WEIGHT	REMARKS
PTAC-1	AMANA	PTH073	R32	7,000	6,100	2.1 KW	12.8	330/245	208/1/60	-	-	106	SEE ACCESSORIES BELOW
PTAC-2	AMANA	PTH093	R32	9,000	8,000	2.1 KW	12.5	290/265	208/1/60	-	-	102	SEE ACCESSORIES BELOW
PTAC-3	AMANA	PTH123	R32	11,600	10,800	2.1 KW	11.5	330/245	208/1/60	-	=	108	SEE ACCESSORIES BELOW

NOTES/ACCESSORIES:

1. PROVIDE WALL SLEEVE AND TRIM.

PROVIDE FACTORY ARCHITECTURAL ALUMINUM EXTERIOR WALL GRILLE. COLOR SHALL BE BY ARCHITECT.
 PROVIDE WITH SUB-BASE KIT (FULLY SKIRTED WITH LEVELING LEGS) TO CONCEAL ELECTRICAL CONNECTIONS. VERIFY HEIGHT PRIOR TO PURCHASING.

4. FURNISH AND INSTALL WITH CONDENSATE DRAIN KIT.

PROVIDE WITH REMOTE WHITE-RODGERS 1F97-1277 EASY READ PROGRAMMABLE THERMOSTAT OR APPROVED EQUAL.
 PROVIDE DUCT EXTENSION KIT TO EXTEND AIR INTO ADJOINING ROOM WHERE SHOWN ON PLAN. PROVIDE MAIN DUCT (KIT) INCLUDING MAIN DUCT, MAIN DISCHARGE GRILLE, AIR-FLOW BAFFLES, TRANSITION, SUPPORTS, EXTENSION DUCT, AND EXTENSION TERMINAL KIT INCLUDING GRILLE.

7. PROVIDE WITH WASHABLE FILTERS.

	DEH	HUMIDIFIER L	JNIT SCHE	DULE								DH -
	TAG	BASIS OF DESIGN	MODEL NO.	AIRFLOW (CFM)	WATER REMOVAL @80°F/60% RH (PINTS)	SOUND (dBA)	REFRIGERANT	VOLTAGE	CTRICAL DAT	MOCP	WEIGHT	REMARKS
Ī	DH-1	SANTA-FE	ULTRAMD33	155	33	46	R410A	120/1/60	2.8	15	40	SEE ACCESSORIES BELOW

NOTES/ACCESSORIES:

1. PROVIDE WASHABLE FILTER.

2. PROVIDE WITH FACTORY MOUNTED INTERNAL DEHUMIDISTAT.

3. PROVIDE WITH 2x4 WALL MOUNT BEZEL KIT.

4. PROVIDE WITH SURFACE MOUNT KIT. 5. PROVIDE WITH REAR PANEL KIT.

AIR DEVICE SCHEDULE NOTE: NOT ALL DEVICES MAY BE USED ON PROJECT.						
<u>TAG</u>	FLOW PATTERN	SUPPLY				
SR-1	N/A	WALL/CEILING SUPPLY GRILLE EQUAL TO TITUS MODEL 300RS, STEEL CONSTRUCTION, DOUBLE DEFLECTION, ROLL-FORMED STEEL BORDER AND BLADES, OPPOSED BLADE DAMPER. COLOR BY ARCHITECT.				
SR-2	N/A	WALL/CEILING SUPPLY GRILLE EQUAL TO TITUS MODEL 300FS, ALUMINUM CONSTRUCTION, DOUBLE DEFLECTION, ROLL-FORMED ALUMINUM BORDER, BLADES AND OPPOSED BLADE DAMPER. COLOR BY ARCHITECT.				
SR-3	N/A	FLOOR SUPPLY REGISTER EQUAL TO HART & COOLEY MODEL 421, HEAVY GAUGE STEEL CONSTRUCTION, MULTI-ANGLED FIN SETTING, FOOT OPERATED OPPOSED BLADE DAMPER. COLOR BY ARCHITECT.				
SR-4	N/A	FLOOR SUPPLY REGISTER EQUAL TO HART & COOLEY MODEL 531, HIGH STRENGTH EXTRUDED ALUMINUM CONSTRUCTION, DUAL MULTI-SHUTTER VALVES. COLOR BY ARCHITECT.				
CD-1	4-WAY (UNLESS NOTED OTHERWISE)	24X24 FACE CEILING DIFFUSER EQUAL TO TITUS MODEL OMNI, STEEL CONSTRUCTION, FIXED DISCHARGE, PATTERN OPTION A4, 4-WAY (UNLESS NOTED ON PLANS), BORDER TYPE 1 (SURFACE MOUNT) OR BORDER TYPE 3 (LAY-IN) AS REQUIRED, OPPOSED BLADE DAMPER, IB MOLDED INSULATION BLANKET, NECK SIZE AS INDICATED ON DRAWINGS. COLOR BY ARCHITECT.				
RETURN						
EG-1	SEE PLANS	RETURN GRILLE EQUAL TO TITUS MODEL 355RS, ALUMINUM CONSTRUCTION, 1/2" BLADE SPACING, 35 DEG. DEFLECTION, ROLL-FRAMED ALUMINUM BORDER AND BLADES, NECK SIZE AS INDICATED ON DRAWINGS. COLOR BY ARCHITECT.				
RG-2	SEE PLANS	RETURN GRILLE EQUAL TO TITUS MODEL 355FS, ALUMINUM CONSTRUCTION, 1/2" BLADE SPACING, 35 DEG. DEFLECTION, ROLL-FORMED ALUMINUM BORDER AND BLADES, NECK SIZE AS INDICATED ON DRAWINGS. COLOR BY ARCHITECT.				
RG-3	SEE PLANS	RETURN GRILLE EQUAL TO TITUS MODEL 355FF1, ALUMINUM CONSTRUCTION, 1/2" BLADE SPACING, 35 DEG. DEFLECTION, ROLL-FORMED ALUMINUM BORDER AND BLADES, 1" FILTER, NECK SIZE AS INDICATED ON DRAWINGS. COLOR BY ARCHITECT.				

NOTES/ACCESSORIES:

1. FINISH/COLOR OF ALL DIFFUSERS SHALL BE DETERMINED BY OWNER/ARCHITECT.

2. PROVIDE 4-WAY THROW UNLESS NOTED (ARROWS) ON PLANS.

MAXIMUM PRESSURE DROP FOR SUPPLY AIR DIFFUSERS SHALL BE 0.10" W.G.
 MECHANICAL CONTRACTOR TO COORDINATE BORDER TYPES WITH CEILING AND WALL CONSTRUCTION. REFER TO ARCH. REFLECTED CEILING PLAN.

COORDINATE WITH GENERAL CONTRACTOR.

OPPOSED BLADE DAMPERS MAY BE OMITTED WHERE VOLUME DAMPERS ARE PROVIDED AT BRANCH RUNOUTS.
 PROVIDE ROUND TO RECTANGULAR BOOTS TO CONNECT ROUND BRANCH TAKE-OFFS TO SUPPLY AIR RECTANGULAR REGISTERS AND DIFFUSERS.

6. PROVIDE RADIATION CEILING DAMPERS ON ALL DIFFUSERS, REGISTERS AND GRILLES WHERE RATED CEILING OR FLOOR RATED ASSEMBLIES ARE

PENETRATED TO MAINTAIN RATINGS. COORDINATE WITH ARCHITECTURAL PLANS AND G.C. FOR LOCATIONS.

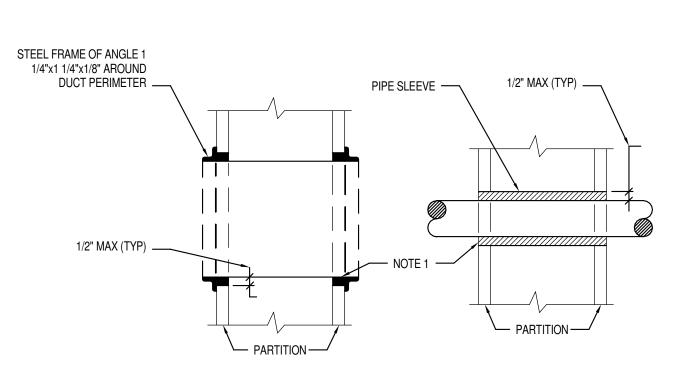
7. DRAWING SYMBOL INFORMATION:



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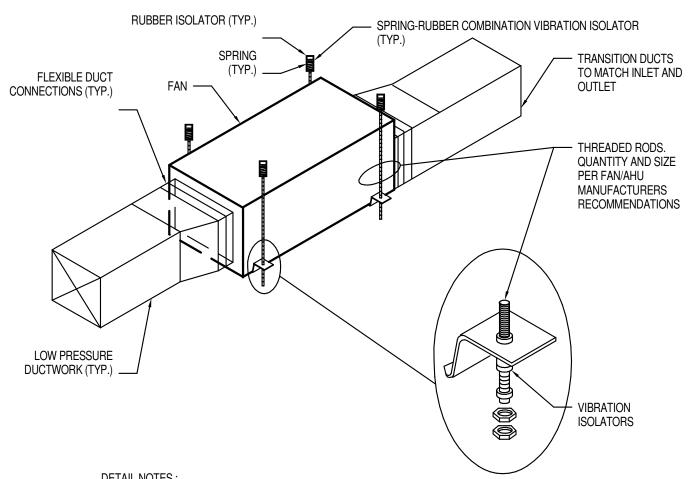
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- DETAIL NOTES:

 1. AT FIRE RATED PARTITIONS, ADD ADDITIONAL LAYER OF FIRE SAFING INSULATION AROUND PENETRATION SO AS TO FILL ANNULAR SPACE.
- 2. DUCT AND PIPE PENETRATIONS THRU CORRIDOR WALLS ABOVE THE CEILING SHALL BE FIRE STOPPED AROUND THE PENETRATION.
- 3. DUCT PENETRATION IS SHOWN WHERE FIRE DAMPER IS NOT REQUIRED BY CODE.

1 DUCT AND PIPE PENETRATIONS DETAIL
SCALE: NOT TO SCALE



- <u>DETAIL NOTES</u>:

 1. PROVIDE SUPPORT STEEL CHANNELS FOR UNITS SUPPORTED FROM OVER-HEAD JOISTS. COORDINATE
- SUPPORTS WITH ARCHITECT AND STRUCTURAL ENGINEER.
- REFER TO MANUFACTURER'S INSTALLATION INSTRUCTIONS AND OPERATING WEIGHTS.
 PROVIDE SIZE OF THREADED RODS, QUANTITY OF RODS, AND VIBRATION ISOLATORS AS RECOMMENDED BY EQUIPMENT MANUFACTURER.

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Architects

- THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201, LATEST EDITION, AND THESE SPECIFICATIONS AS APPLICABLE ARE PART OF THIS CONTRACT.
- ALL APPLICABLE CODES, LAWS AND REGULATIONS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIALS WHICH VIOLATE ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.
- INVESTIGATE EACH SPACE THOROUGHLY WHERE EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
- DUCTWORK AND PIPING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF DUCTWORK AND PIPING TO AVOID OBSTRUCTIONS. EXACT LOCATIONS ARE SUBJECT TO APPROVAL OF ARCHITECT. COORDINATION WITH THE EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES IS REQUIRED.
- SUPPORT ALL DUCTWORK AND PIPING FROM BUILDING STRUCTURE AND/OR FRAMING IN AN APPROVED MANNER. WHERE OVERHEAD CONSTRUCTION DOES NOT PERMIT FASTENING OR SUPPORTS FOR EQUIPMENT, FURNISH ADDITIONAL FRAMING. INSERTS SHALL BE STEEL, SLOTTED TYPE AND FACTORY PAINTED. SINGLE ROD SHALL BE SIMILAR TO GRINNELL FIG. 281. MULTI-ROD SHALL BE SIMILAR TO FEE & MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS. MAXIMUM LOADING INCLUDING PIPES, DUCTWORK CONTENTS AND COVERING SHALL NOT EXCEED 75 PERCENT OF RATED INSERT CAPABILITY. WHEN SUPPORTING FROM BUILDING USE BEAM CLAMPS IN APPROVED MANNER. PROVIDE SEISMIC RESTRAINTS AS REQUIRED BY CODE.
- INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES, WHICH INVOLVE EXTRA COST, SHALL NOT BE MADE WITHOUT
- REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES IN MAKING UP THE WORK PROPOSAL
- CONNECT NEW WORK TO EXISTING WORK IN NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY ARCHITECT.
- THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.
- SEAL OPENINGS AROUND DUCTS AND PIPING THROUGH PARTITIONS, WALLS AND FLOORS (NOT IN SHAFTS) WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL.
- PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THIS BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF PIPES, DUCTS, LOUVERS, CONDUIT, AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AND DUNNAGE STEEL AS REQUIRED.
- ALL PRESENT MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS TO BE REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.
- MATERIALS AND WORKMANSHIP, UNLESS OTHERWISE NOTED, SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED, AND IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
- THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK IN OVERTIME AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.

- UNLESS OTHERWISE SPECIFICALLY SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.
- Q. REMOVABLE ACCESS TILE AND/OR ACCESS DOOR ARE REQUIRED IN HUNG CEILINGS, SHAFTS AND WALLS FOR ALL VOLUME AND FIRE DAMPERS, AUTOMATIC DAMPERS AND ALL OTHER MECHANICAL EOUIPMENT AND DEVICES. HVAC CONTRACTOR TO FURNISH ACCESS LOCATION REQUIREMENTS TO GENERAL CONTRACTOR.
- ALL MATERIAL AND EQUIPMENT TO BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. LATER CLAIMS SHALL NOT BE MADE FOR LABOR; EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING DUCTWORK, PIPING (SIZES, CLEARANCES, ETC) AND CONDITIONS.
- INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND ENGINEER.
- U. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT. BALANCED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.
- SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.
- W. DEFINITIONS
 - "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
 - "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
 - "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.
 - "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
 - "CONCEALED": EMBEDDED IN MASONRY OR OTHER CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.
 - "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.
 - "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT AS DETERMINED BY THE ENGINEER AND ARCHITECT.

2. SCOPE OF WORK

- THE WORK UNDER CONTRACT INCLUDES ALL LABOR, MATERIALS AND APPLIANCES NECESSARY FOR THE FURNISHING, INSTALLING AND TESTING, COMPLETE AND READY FOR SAFE OPERATION OF THE SYSTEMS. WORK SHALL BE INSTALLED IN A NEAT, WORKMANLIKE MANNER.
- THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH THE DEPARTMENT HAVING JURISDICTION, OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REOUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.
- THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN TWO YEARS FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES, BY OWNER, INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.

PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT PROVIDE COMPLETE SET OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, DUCTWORK, PIPING AND CONTROL SYSTEMS INDICATING CAPACITY DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

SHOP DRAWINGS

- INDICATE ON EACH SUBMISSION: PROJECT NAME AND LOCATION, ARCHITECT AND ENGINEER, ITEM IDENTIFICATION AND APPROVAL STAMP OF PRIME CONTRACTOR.
- SUBMISSIONS
 - SUBMISSIONS 11 IN. X 17 IN. OR SMALLER: IF THE SUBMISSION IS A CATALOG CUT, THEN THE CONTRACTOR SHALL SUBMIT ONE ORIGINAL AND TWO COPIES. OTHERWISE, HE SHALL SUBMIT THREE COPIES. THE ARCHITECT WILL FORWARD THE ORIGINAL AND ONE COPY (TWO COPIES WHEN NO ORIGINAL IS RECEIVED) TO THE ENGINEER. ALL CATALOG CUTS SHALL BE COMPLETE.
 - SUBMISSIONS LARGER THAN 11 IN. X 17 IN.: SUBMIT THREE PRINTS TO THE ARCHITECT. THE ARCHITECT WILL FORWARD TWO PRINTS TO THE ENGINEER.
- SUBMIT SHOP DRAWINGS FOR THE FOLLOWING:
- DUCTWORK LAYOUT DRAWINGS AND SHEET METAL DESIGNS.
- SHEETMETAL CONSTRUCTION STANDARDS.
- AIR OUTLETS.
- AIR BALANCE REPORT
- AC UNITS AND FANS.
- PIPING LAYOUT.
- OPERATING SEQUENCES.
- VIBRATION ISOLATION AND SEISMIC RESTRAINTS.

D. COORDINATION

- THE CONTRACTOR SHALL ASSURE FULL COOPERATION OF ALL TRADES AND SHALL FURNISH IN WRITING ALL INFORMATION NECESSARY TO PERMIT THE WORK OF ALL TRADES TO BE INSTALLED SATISFACTORILY AND WITH LEAST POSSIBLE INTERFERENCE OR DELAY.
- PREPARE COORDINATED COMPOSITE DRAWINGS AT A SUITABLE SCALE NOT LESS THAN 1/4-INCH EQUALS ONE FOOT, ZERO INCHES, CLEARLY SHOWING HOW THE WORK OF THIS DIVISION IS TO BE INSTALLED IN RELATION TO THE WORK OF ALL TRADES ANY WORK INSTALLED IN CONFLICT WITH THE WORK OF OTHER TRADES SHALL BE CORRECTED AT NO ADDITIONAL COST TO THE
- THE CONTRACTOR MAY, SUBJECT TO THE ACCEPTANCE OF THE ARCHITECT AND WITHOUT EXTRA CHARGE, MAKE REASONABLE MODIFICATIONS IN THE LAYOUT AS NEEDED TO PREVENT CONFLICT WITH WORK OF ALL TRADES OR FOR THE PROPER EXECUTION OF THE WORK.
- MECHANICAL DRAWINGS ARE DIAGRAMMATIC AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND WORK INCLUDED IN THE CONTRACT. COORDINATE WITH THE ARCHITECTURAL DRAWINGS AND DETAILS FOR EXACT LOCATION OF DUCTWORK, PIPING AND EQUIPMENT.
- THE CONTRACTOR SHALL FOLLOW DRAWINGS IN LAYOUT WORK AND SHALL COORDINATE ALL TRADES TO VERIFY SPACES IN WHICH WORK SHALL BE INSTALLED. MAINTAIN MAXIMUM HEADROOM OR SPACE CONDITIONS. WHERE SPACE CONDITIONS APPEAR INADEQUATE, THE ARCHITECT SHALI BE NOTIFIED BEFORE INSTALLATION. DO NOT PROCEED WITH THE INSTALLATION UNTIL RECEIVING CLARIFYING INSTRUCTIONS.

AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS

- UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH IN ELECTRONIC FORMAT ALL SUBMITTED SHOP DRAWINGS AND THE INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED UNDER THIS CONTRACT.
- THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.
- THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.
- REPRODUCIBLE "AS-BUILT" DRAWINGS SHALL BE PROVIDED INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. "AS-BUILT" DRAWINGS SHALL BE PROVIDED TO THE ARCHITECT AFTER COMPLETION OF THE INSTALLATION.

5. SHEET METAL WORK

EXCEPT AS OTHERWISE SHOWN OR NOTED, ALL DUCTWORK AND OTHER SHEET METAL WORK SHALL BE GALVANIZED SHEET STEEL AND SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF SHEET METAL AND AIR CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC. DUCT CONSTRUCTION STANDARDS, PRESSURE CLASSIFICATION 2 IN. W.G.

AND 54".

- 1) FOR RECTANGULAR DUCTS, THE MINIMUM **GAUGES SHALL BE:** 24 GAUGE FOR DUCTS 30" (MAXIMUM
 - DIMENSION) AND SMALLER. 22 GAUGE FOR DUCTS WITH A **MAXIMUM DIMENSION BETWEEN 31"**
 - 20 GAUGE FOR DUCTS WITH A **MAXIMUM DIMENSION BETWEEN 55"**

18 GAUGE FOR DUCTS WITH A

MAXIMUM DIMENSION LARGER THAN

- 2) MAXIMUM REINFORCING DISTANCES SHALL
 - 7'-10" FOR DUCTS WITH A MAXIMUM DIMENSION OF 30" OR SMALLER.
 - 3'-9" FOR DUCTS WITH A MAXIMUM DIMENSION LARGER THAN 30".
- 3) PROVIDE MILL PHOSPHATIZED FINISH WHERE DUCTS ARE EXPOSED.
- B. ALL DUCT DIMENSIONS INDICATED ON PLANS ARE
- INSIDE CLEAR DIMENSIONS.
- C. ALL DUCTWORK SHALL BE FREE FROM PULSATION, CHATTER AND VIBRATION. IF ANY OF THESE DEFECTS APPEAR AFTER A SYSTEM IS IN OPERATION, CORRECT BY REMOVING AND REPLACING, OR REINFORCING THE DUCTWORK AT NO ADDITIONAL COST TO THE OWNER.
- ROUND SINGLE AND DOUBLE-WALL DUCTWORK: APPROVED MANUFACTURERS: MCGILL AIRFLOW, SEMCO, LINDAB, AND EASTERN SHEET METAL.
 - PROVIDE FACTORY-FABRICATED ROUND DUCTS. GAUGES AND CONSTRUCTION DETAILS SHALL COMPLY WITH THE REFERENCED SMACNA HVAC DUCT CONSTRUCTION STANDARDS AND SMACNA ROUND INDUSTRIAL DUCT CONSTRUCTION STANDARDS.
 - FOR DUCTWORK DIAMETERS UP TO AND INCLUDING 60 INCHES, PROVIDE SPIRAL LOCK-SEAM CONSTRUCTION. FOR DUCTWORK DIAMETERS OVER 60 INCHES, PROVIDE WELDED LONGITUDINAL SEAMS.
 - PROVIDE DUCTS OF SPIRAL LOCK-SEAM CONSTRUCTION.
- USE SLIP JOINTS, JOINTS WITH A DOUBLE-LIPPED EPDM JACKET, OR THE FOLLOWING JOINING SYSTEM FOR TRANSVERSE DUCT JOINTS AND FITTINGS.
 - a. UP TO 20" DIAMETER: INTERIOR SLIP COUPLING BEADED AT CENTER AND FASTENED TO DUCT WITH SCREWS SHALL BE USED TO JOIN DUCTS. SEAL JOINT WITH A SEALING COMPOUND, CONTINUOUSLY APPLIED AROUND JOINT PRIOR TO ASSEMBLING AND AFTER FASTENING, MAKING CERTAIN THAT MAJORITY OF SEALANT RESIDES
 - ON INTERIOR OF THE JOINT. 21" DIAMETER & ABOVE: INSTALL USING A THREE-PIECE, GASKETED FLANGED-JOINT CONSISTING OF TWO INTERNAL FLANGES, WITH INTEGRAL MASTIC SEALANT, AND ONE EXTERNAL CLOSURE BAND TO COMPRESS THE GASKET BETWEEN THE INTERNAL FLANGES. APPROVED SYSTEMS: DUCTMATE SPIRALMATE.
- 5) ELBOWS FOR 3 THROUGH 12 INCH DIAMETER AND 90° BENDS SHALL BE TWO-SECTION STAMPED WITH WELDED SEAMS. ALL OTHER ELBOWS SHALL BE CONSTRUCTED OF MITERED SECTIONS WITH ALL SEAMS AND JOINTS WELDED IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:
 - THRU 35 DEGREES/2 GORES 36 THRU 71 DEGREES/3 GORES OVER 71 DEGREES/5 GORES
- 6) ELBOWS SHALL BE TWO-SECTION STAMPED WITH WELDED SEAMS.
- CONSTRUCT ALL ELBOWS WITH A CENTERLINE RADIUS EQUAL TO 1.5 TIMES THE DIAMETER.
- MAKE ALL TAKE-OFF CONNECTIONS TO DUCT HEADERS USING TEE (90°), LATERAL (45°), TEE CROSS, LATERAL CROSS AND "Y" BRANCH FITTINGS OF THE CONICAL TYPE. ALL FITTINGS FABRICATED AS SEPARATE FITTINGS SHALL HAVE CONTINUOUS WELDS ALONG ALL SEAMS AND JOINTS.
- 9) THE USE OF TWO-PIECE, MITERED, VANED ELBOWS SHALL NOT BE PERMITTED.
- 10) THE USE OF BULLHEAD TEE FITTINGS IS NOT PERMITTED.
- 11) THE USE OF SQUARE THROAT RADIUS HEEL ELBOWS IS NOT PERMITTED.
- SHOP-FABRICATED AND CONTRACTOR-DESIGNED FITTINGS ARE NOT PERMITTED.

- DUCTWORK SCHEDULE:
- SUPPLY/OUTSIDE AIR: +2", 3% LEAKAGE -2", 3% LEAKAGE RETURN AIR: EXHAUST AIR: -2", 3% LEAKAGE
- F. DUCT LEAKAGE TESTING
 - DISASSEMBLE, REASSEMBLE, AND SEAL SEGMENTS OF SYSTEMS TO ACCOMMODATE LEAKAGE TESTING AND FOR COMPLIANCE WITH TEST REQUIREMENTS. SEAL ALL DUCTWORK WITH UL181 MASTIC OR APPROVED EQUAL.
 - CONDUCT LEAKAGE TESTS, ON ALL DUCTWORK, AT STATIC PRESSURES EQUAL TO MAXIMUM DESIGN PRESSURE OF SYSTEM BEING TESTED. IF PRESSURE CLASSES ARE NOT INDICATED, TEST ENTIRE SYSTEM AT MAXIMUM SYSTEM DESIGN PRESSURE. DO NOT PRESSURIZE SYSTEMS ABOVE MAXIMUM DESIGN OPERATING PRESSURE. GIVE SEVEN DAYS' ADVANCE NOTICE FOR TESTING.
 - MAXIMUM ALLOWABLE LEAKAGE: DUCTWORK LEAKAGE SHALL NOT EXCEED 4 PERCENT OF TOTAL SUPPLY AIRFLOW.
 - REMAKE LEAKING JOINTS; APPLY ADDITIONAL SEALANT AND RETEST UNTIL LEAKAGE IS EQUAL TO OR LESS THAN MAXIMUM ALLOWABLE. ALL TESTS MUST BE WITNESSED AND RESULTS VERIFIED BY THE OWNER'S REPRESENTATIVE. SUBMIT FIELD TEST REPORT CERTIFYING THAT THE DUCTWORK DOES NOT EXCEED THE MAXIMUM ALLOWABLE LEAKAGE.
- VOLUME DAMPERS: GALVANIZED STEEL, PER SMACNA "LOW VELOCITY MANUAL," EXCEPT PROVIDE BEARING AT ONE END OF DAMPER ROD AND QUADRANT, WITH LEVER AND LOCKSCREW AT THE OTHER END. FOR INSULATED DUCTS, QUADRANTS MOUNTED ON COLLAR TO CLEAR INSULATION. INSTALL WITH LEVERS ACCESSIBLE.
- ACCESS DOORS: INSULATED OR UNINSULATED, SAME AS DUCT
 - PROVIDE MINIMUM 20 IN. X 14 IN. ON MAIN DUCTS, AND 12 IN. X 6 IN. ON BRANCH DUCTS, UNLESS OTHERWISE APPROVED, AT FIRE DAMPERS, AND AT ALL DUCT ACCESSORIES SUCH AS HUMIDIFIERS, DUCT SMOKE DETECTORS, AUTO DAMPERS, AND LOUVERS.
- 2) ALL ACCESS DOORS TO BE HINGED, WITH LATCH SIMILAR TO VENTLOCK NO. 100.
- FLEXIBLE CONNECTIONS: NEOPRENE-COATED GLASS FABRIC, 30 OUNCES PER SQ. YD. WITH SEWED AND CEMENTED SEAMS, SIMILAR TO VENT FABRICS. PROVIDE WITH METAL COLLARS. ALLOW MINIMUM MOVEMENT OF 1 IN.
- TURNING VANES: GALVANIZED STEEL SMALL DOUBLE-THICKNESS VANES WITH 2 IN. INSIDE RADIUS.
- WIRE MESH SCREEN (WMS): NO. 16 USSG, 3/4 SQUARE MESH, IN 1 IN. WIDE GALVANIZED STEEL ENCLOSING FRAME. FLANGED DUCT OPENING TO RECEIVE
- LOW-PRESSURE FLEXIBLE DUCT: SHALL BE CONSTRUCTED WITH A CPE INNER FILM LINER LOCKED TO GALVANIZED STEEL HELIX WITH 1" THICK FIBERGLASS ENCLOSED WITH A REINFORCED FOIL/MYLAR SLEEVE. UL 181 LISTED AS CLASS 1 AIR DUCT COMPLYING WITH NFPA STANDARD 90A. SIMILAR TO FLEXMASTER TYPE 1M.
- AUTOMATIC DAMPERS: COMPLETE WITH LINKAGE AND ELECTRIC OPERATOR. OPPOSED BLADE DAMPER OR GALVANIZED STEEL 4 IN., MAX. 8 IN. WIDE WITH COMPRESSIBLE EDGE SEALS TO PREVENT LEAKAGE FACTORY-ASSEMBLE STEEL LINKAGE AND SHAFT WITH NYLON OR OIL-IMPREGNATED BRONZE BEARINGS. MOTOR WITH SUFFICIENT POWER TO LIMIT LEAKAGE TO 10 CFM PER SQ. FT. LINKAGE TO WITHSTAND LOAD EQUAL TO TWICE-MAXIMUM OPERATING FORCE WITHOUT DEFLECTION. DAMPER MOUNTED IN WELDED STEEL CHANNEL FRAME.
- ALUMINUM DUCTWORK: ALL OUTSIDE AIR, EXHAUST, AND RELIEF DUCTWORK WITHIN 5 FT. OF LOUVERS SHALL BE ALUMINUM WITH SEAMS SEALED WATERTIGHT WITH ALCOA ALUMINASTIC TYPE C SEAM SEALER OR SOLDER. PITCH DUCTWORK TOWARDS LOUVER.
- FIRE DAMPERS: UL LISTED, GALVANIZED STEEL CONSTRUCTION, DYNAMIC CURTAIN TYPE, SPRING LOADED, EQUIPPED WITH FUSIBLE LINK AND SLEEVE CONFORMING TO NFPA STANDARD 90A. SIMILAR TO RUSKIN DIBD2 OR DIBD23, RATED AS REQUIRED. SEE INSTALLATION ON DRAWING.
- COMBINATION FIRE AND SMOKE DAMPERS: UL LISTED, GALVANIZED STEEL CONSTRUCTION MULTI-BLADED TYPE WITH SLEEVE. EQUIPPED WITH FUSIBLE LINK CONFORMING TO NFPA STANDARD 90A. SIMILAR TO RUSKIN MODEL FSD 60.
- SMOKE DAMPERS: UNLISTED GALVANIZED STEEL CONSTRUCTION MULTI-BLADED TYPE WITH SLEEVE. EQUIPPED WITH PNEUMATIC OPERATOR AND E/P SWITCH. SIMILAR TO RUSKIN MODEL SD50.
- R. CLEANING NEW & EXISTING SYSTEMS
 - MARK POSITION OF DAMPERS AND AIR-DIRECTIONAL MECHANICAL DEVICES BEFORE CLEANING, AND PERFORM CLEANING BEFORE AIR BALANCING.
 - USE SERVICE OPENINGS, AS REQUIRED, FOR PHYSICAL AND MECHANICAL ENTRY AND FOR INSPECTION.

- CREATE OTHER OPENINGS TO COMPLY
- WITH DUCT STANDARDS. DISCONNECT FLEXIBLE DUCTS AS NEEDED FOR CLEANING AND
- INSPECTION. REMOVE AND REINSTALL CEILING SECTIONS TO GAIN ACCESS DURING THE CLEANING PROCESS.
- VENT VACUUMING SYSTEM TO THE OUTSIDE. INCLUDE FILTRATION TO CONTAIN DEBRIS REMOVED FROM HVAC SYSTEMS, AND LOCATE EXHAUST DOWN WIND AND AWAY FROM AIR INTAKES AND OTHER POINTS OF ENTRY INTO BUILDING.
- CLEAN THE FOLLOWING METAL DUCT SYSTEMS BY REMOVING SURFACE CONTAMINANTS AND DEPOSITS:
- AIR OUTLETS AND INLETS (REGISTERS, GRILLES, AND DIFFUSERS). SUPPLY, RETURN, AND EXHAUST FANS INCLUDING FAN HOUSINGS, PLENUMS
- (EXCEPT CEILING SUPPLY AND RETURN PLENUMS), SCROLLS, BLADES OR VANES, SHAFTS, BAFFLES, DAMPERS, AND DRIVE ASSEMBLIES. AIR-HANDLING UNIT INTERNAL SURFACES AND COMPONENTS INCLUDING MIXING BOX, COIL
- SECTION, AIR WASH SYSTEMS, SPRAY ELIMINATORS, CONDENSATE DRAIN PANS, HUMIDIFIERS AND DEHUMIDIFIERS, FILTERS AND FILTER SECTIONS, AND CONDENSATE COLLECTORS AND DRAINS.
- COILS AND RELATED COMPONENTS. RETURN-AIR DUCTS, DAMPERS, AND ACTUATORS EXCEPT IN CEILING PLENUMS AND MECHANICAL
- EQUIPMENT ROOMS. SUPPLY-AIR DUCTS, DAMPERS, ACTUATORS, AND TURNING VANES.
- MECHANICAL CLEANING METHODOLOGY: CLEAN METAL DUCT SYSTEMS USING MECHANICAL CLEANING METHODS THAT EXTRACT CONTAMINANTS FROM WITHIN DUCT SYSTEMS AND REMOVE CONTAMINANTS FROM BUILDING.
- USE VACUUM-COLLECTION DEVICES THAT ARE OPERATED CONTINUOUSLY DURING CLEANING. CONNECT VACUUM DEVICE TO DOWNSTREAM END OF DUCT SECTIONS SO AREAS BEING CLEANED ARE UNDER NEGATIVE PRESSURE.
- USE MECHANICAL AGITATION TO DISLODGE DEBRIS ADHERED TO INTERIOR DUCT SURFACES WITHOUT DAMAGING INTEGRITY OF METAL DUCTS, DUCT LINER, OR DUCT ACCESSORIES.
- CLEAN FIBROUS-GLASS DUCT LINER WITH HEPA VACUUMING EQUIPMENT; DO NOT PERMIT DUCT LINER TO GET CLEAN COILS AND COIL DRAIN PANS
- ACCORDING TO NADCA 2013. KEEP DRAIN PAN OPERATIONAL. RINSI COILS WITH CLEAN WATER TO REMOVE LATENT RESIDUES AND CLEANING MATERIALS; COMB AND STRAIGHTEN FINS.
 - CLEANLINESS VERIFICATION: VISUALLY INSPECT METAL DUCTS FOR CONTAMINANTS WHERE CONTAMINANTS ARE DISCOVERED, RE-CLEAN AND

REINSPECT DUCTS.

AIR OUTLETS

- A. GENERAL MARGIN TYPES, COLORS, FINISH AND METHODS OF ATTACHMENT FOR ALL DIFFUSERS, GRILLES AND REGISTERS SHALL BE COORDINATED WITH ARCHITECTURAL
- FRAME TYPE SUITABLE FOR MOUNTING IN CEILING OR WALL CONSTRUCTION AS INDICATED ON ARCHITECTURAL PLANS.

SPECIFICATIONS.

CEILING AND WALL DETAILS AND

- EXACT LOCATION OF ALL AIR OUTLETS AS PER ARCHITECTURAL PLANS.
- SUITABLE FOR OPERATION AT 20 PERCENT EXCESS AND 20 PERCENT LESS THAN NOTED CAPACITY FOR CONSTANT VOLUME SYSTEMS AND AT 20 PERCENT EXCESS AND 60 PERCENT LESS THAN NOTED CAPACITY FOR VARIABLE VOLUME SYSTEMS. MANUFACTURER RESPONSIBLE FOR EXAMINING APPLICATION OF EACH OUTLET AND GUARANTEE THAT EACH WILL PROVIDE REQUIRED NC LEVELS AND COMFORT SPACE CONDITIONS WITHOUT DRAFTS THROUGHOUT OPERATING RANGE.
- DIFFUSERS, GRILLES AND REGISTERS SHALL BE SELECTED TO ACHIEVE NC 30 OR LESS WHEN INSTALLED.
- ALL REGISTERS AND DIFFUSERS SHALL BE PROVIDED WITH OPPOSED BLADE VOLUME DAMPERS. DAMPER OPERATING LEVERS SHALL BE ACCESSIBLE AT THE FACE OF AIR
- REFER TO DRAWING SCHEDULES FOR SPECIFIC MODELS AND REQUIREMENTS. PROVIDE SCHEDULED MANUFACTURER AND MODELS OR COMPARABLE MODELS BY MANUFACTURER APPROVED BY ENGINEER.

NOISE CONTROL

A. ALL ROOM NC LEVELS SHALL BE 35 OR LESS.

OUTLETS.



REVISION DATE

Sheet No:

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- 2) AIR TRANSFER DUCTS.
- ALSO, WHERE NOTED ON A DRAWING.
- C. SOUNDLINING IN DUCTWORK: FIBROUS GLASS, MINIMUM 3 LB DENSITY, 1 1/2 IN. THICKNESS, MAXIMUM 0.25 K FACTOR AT 75 DEGREES F MEAN TEMPERATURE WITH ACRYLIC COATED FINISH FACTORY APPLIED EDGE COATING AND STENCILED IN ACCORDANCE WITH NFPA 90. FLAMESPREAD SHALL BE A MAXIMUM OF 25. LINING SHALL NOT SUPPORT MICROBIAL GROWTH AND SHALL BE TESTED IN ACCORDANCE WITH ASTM C 1071, ASTM C 423 AND ASTM G21/G22. SIMILAR TO JOHNS MANVILLE LINACOUSTIC RC HP.
- D. ALL SOUNDLINING, ADHESIVES, FACES AND ACCESSORIES TO BE APPLIED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, EXCEPT AS OTHERWISE NOTED.

8. TESTING AND BALANCING

- A. ALL AIR AND WATER BALANCING SHALL BE IN ACCORDANCE WITH AABC AND NEBB STANDARDS.
- AIR BALANCING SHALL BE ACCOMPLISHED BY ADJUSTMENT OF FANS AND BRANCH DAMPERS FOR MAJOR ADJUSTMENTS. ADJUSTMENT OF TERMINAL DAMPERS AND DEVICES SHALL BE FOR TRIM OR MINOR ADJUSTMENT ONLY. THIS SHALL BE DONE TO PERMIT THE LEAST NOISE GENERATION IN THE TERMINAL AREAS AND UTILIZE MINIMUM FAN ENERGY.
- C. UPON COMPLETION OF THE INSTALLATION, THE CONTRACTOR SHALL REBALANCE ANY EXISTING PORTIONS OF AIR DISTRIBUTION SYSTEM AND WATER DISTRIBUTION SYSTEM AFFECTED BY THE RENOVATION AND ALSO BALANCE ALL NEW WORK.
- D. THE CONTRACTOR SHALL PROVIDE ALL LABOR, PRESSURE GAUGES, FLOW METERS, SHEAVES, AND BELTS REQUIRED TO BALANCE SYSTEMS.
- E. BALANCING REPORT SHALL BE PROVIDED ON AABC-TYPE FORMS.
 - a. ALL MECHANICAL EQUIPMENT SHALL BE BALANCED TO WITHIN +5 PERCENT OF THEIR DESIGN CAPACITIES. ALL OTHER AIR AND WATER QUANTITIES SHALL BE BALANCED TO WITHIN +10 PERCENT OF THE DESIGN QUANTITIES.
 - b. BALANCING AND TESTING SHALL BE PERFORMED AND SUPERVISED BY A CERTIFIED NEBB OR AABC TECHNICIAN.
 - c. THE PERFORMANCE AND CAPACITY OF ALL SYSTEMS AND EQUIPMENT TO BE DEMONSTRATED BY THE CONTRACTOR.

1. INSULATION - GENERAL REQUIREMENTS

1. ALL INSULATION MATERIALS, INCLUDING JACKETS, FACING, ADHESIVE, COATINGS, AND ACCESSORIES ARE TO BE FIRE HAZARD RATED AND LISTED BY UNDERWRITERS LABORATORIES, INC. USING STEINER TUNNEL TEST METHOD FOR FIRE HAZARD CLASSIFICATION OF BUILDING MATERIALS, STANDARD UL 723 (ASTM E-84), (ASA A2.5-1963). FLAMESPREAD MAXIMUM IS 25 AND FUEL CONTRIBUTED AND SMOKE DEVELOPED MAXIMUM IS 50. FLAMEPROOFING TREATMENTS SUBJECT TO DETERIORATION FROM MOISTURE OR HUMIDITY ARE NOT ACCEPTABLE

2. DEFINITIONS

- 1. EXPOSED: INDOOR DUCTS, PIPING OR EQUIPMENT LOCATED IN MECHANICAL EOUIPMENT ROOMS AND IN AREAS, WHICH WILL BE VISIBLE WITHOUT REMOVING CEILINGS OR OPENING ACCESS PANELS.
- 2. CONCEALED: INDOOR DUCTS, PIPING OR EQUIPMENT, WHICH IS NOT EXPOSED.
- 3. OUTDOOR: DUCTS, PIPING OR EQUIPMENT, WHICH IS EXPOSED TO THE WEATHER.

2. DUCTWORK INSULATION

1. INSULATE ALL NEW DUCTWORK IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE

1. DUCTWORK INSULATION SCHEDULE

- 1. CONDITIONED SPACES: CONCEALED SUPPLY/ OUTSIDE AIR SHALL BE 1.5 IN., TYPE D-1 WITH VAPORSEAL.
- 2. UNCONDITIONED SPACES: CONCEALED SUPPLY/ RETURN/ OUTSIDE AIR SHALL BE 2.5 IN., TYPE D-1 WITH VAPORSEAL. MINIMUM R-VALUE OF 6.
 - 3. EXPOSED AND UNCONDITIONED SPACES (INCLUDING MECHANICAL **EQUIPMENT ROOMS):** SUPPLY/RETURN/OUTSIDE AIR SHALL BE 1.5 IN., TYPE D-2 WITH VAPORSEAL. MINIMUM R-VALUE OF 6.
 - 4. OUTSIDE THE BUILDING ENVELOPE: SUPPLY/RETURN/OUTSIDE AIR SHALL BE 2 IN., TYPE D-2 WITH VAPORSEAL. MINIMUM R-VALUE OF 8.

- 5. INSTALLED OUTDOORS: SUPPLY/RETURN/OUTSIDE AIR SHALL BE 2 IN., TYPE D-3 WITH VAPORSEAL. MINIMUM R-VALUE OF 8.
- 2. BUBBLE TYPE-WRAP INSULATION SHALL NOT BE ACCEPTED AS AN APPROVED EQUAL.
- 2. REINSULATE ALL DUCTWORK AND PIPING, WHICH IS EXISTING AND DAMAGED DURING CONSTRUCTION OR SHOWN OR REQUIRED TO BE RELOCATED. INSULATE WITH SAME MATERIAL AND THICKNESS.

3. NON-INSULATED DUCTWORK

- 1. WHERE SOUNDLINING IS OF MINIMUM THICKNESS AND R-VALUE SPECIFIED FOR INSULATION.
- 2. AIR CONDITIONING RETURN AIR DUCTWORK EXPOSED IN AIR-CONDITIONED SPACES AND INSTALLED IN HUNG CEILINGS WHERE SPACE IMMEDIATELY ABOVE AND BELOW ARE BOTH AIR CONDITIONED.

4. MATERIAL

- 1. TYPE D-1: MINIMUM 0.75-LB DENSITY FIBERGLASS BLANKET WITH FACTORY-APPLIED FOIL SKRIM-KRAFT FACING SIMILAR TO JOHNS MANVILLE MICROLITE FSK.
- 2. TYPE D-2: MINIMUM 3.0-LB DENSITY FIBERGLASS BOARD. THE INSULATION SHALL BE PROVIDED WITH A FACTORY-APPLIED ALL-PURPOSE OR ALL SERVICE FACING SIMILAR TO JOHNS MANVILLE JOHNS MANVILLE TYPE 814 SPIN-GLAS AP.
- 3. TYPE D-3: MINIMUM 6 LB FIBERGLASS BOARD WITH FACTORY APPLIED ALL-PURPOSE OR ALL SERVICE FACING. SIMILAR TO JOHNS MANVILLE 817 SPIN-GLAS AP. EXTERIOR/OUTDOOR DUCTWORK WITH FACTORY PAINTED ALUMINUM CORRUGATED JACKET WITH 0.75-IN. STAINLESS STEEL BANDS AND 1-MIL THICK POLYETHYLENE AND KRAFT PAPER MOISTURE BARRIER. PROVIDE ADHESIVE AND VAPOR RETARDER MASTIC PER MANUFACTURER'S RECOMMENDATIONS.

5. INSTALLATION

- 1. FIBERGLASS BLANKET: 2 IN. LAP STRIPS AT ALL SEAMS. SECURE BOTTOM OF ALL DUCTS OVER 24 IN. WIDE WITH MIN. 2 ROWS OF WELD PINS 12 IN. ON CENTER. SECURE ALL SEAMS WITH FOIL VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE.
- 2. FIBERGLASS BOARD: SEAL JOINTS AND BREAKS IN FACING WITH 3 IN. WIDE TAPE TO MATCH FACING AND ADHERE WITH VAPOR SEAL ADHESIVE. APPLY 5 IN. WIDE TAPE AT CORNERS; WELD PINS ON TOP, SIDES AND BOTTOM.

3. PIPING INSULATION

1. INSULATE ALL NEW PIPING IN ACCORDANCE WITH INSULATION SCHEDULE EXCEPT AS OTHERWISE

1. PIPING INSULATION SCHEDULE

- 1. LOW TEMP 40 TO 100 DEGREES F, UP TO 4 IN., SHALL BE 1-IN. THICK, TYPE P-1 WITH VAPORSEAL.
- 2. LOW TEMP FITTINGS & VALVES 40 TO 100 DEGREES F, UP TO 4-IN., SHALL BE 1-IN. THICK, TYPE P-4 WITH VAPORSEAL AND F-1 FINISH.
- 3. ALL REFRIGERANT LIQUID & SUCTION LINES SHALL BE ½-IN. THICK, TYPE P-6 WITH VAPORSEAL.

4. PIPING, VALVES AND FITTINGS TO BE INSULATED

- 1. LOW TEMPERATURE PIPING SYSTEMS 40 TO 100 F INCLUDING:
 - CONDENSATE DRAIN PIPING.

2. MATERIAL

- 1. TYPE P-1: MINIMUM 4 LB DENSITY MOLDED FIBERGLASS, MAXIMUM 0.23 K-FACTOR AT 75 DEGREES F MEAN TEMPERATURE WITH FACTORY-APPLIED FIRE-RETARDANT FOIL-SKRIM-KRAFT FACING. ALL SERVICE JACKET. SIMILAR TO JOHNS MANVILLE MICRO-LOK HP.
- 2. TYPE P-4: MINIMUM 1 LB DENSITY FIBERGLASS FITTING INSERTS, MAXIMUM 0.28 K-FACTOR AT 75 DEGREES F MEAN TEMPERATURE SIMILAR TO MANVILLE HI-LO TEMP INSULATION INSERTS
- 3. TYPE P-6: MINIMUM 6 LB MOLDED FOAMED PLASTIC. MAXIMUM 0.27 K-FACTOR AT 75 DEGREES F MEAN TEMPERATURE. MAXIMUM 0.17 PERMEANCE. SIMILAR TO ARMSTRONG ARMAFLEX II FOR INTERIOR SEALED BEHIND FINISHED SURFACES AND ARMSTRONG ARMAFLEX SHIELD FOR EXTERIOR (OUTSIDE) AND EXPOSED WITHIN BUILDING AND SPACES.

3. FINISH

1. TYPE F-1: FITTING COVER, MOLDED WHITE PVC JACKET, UL CLASS 1, MAXIMUM PERMEANCE 0.05 SIMILAR TO MANVILLE ZESTRON

- 2. TYPE F-2: WHITE VAPOR BARRIER COATING WITH 10X10 OR 20X20 MESH WHITE GLASS, POLYESTER OR NYLON CLOTH REINFORCING MEMBRANE, MINIMUM 31 MIL DRY FILM THICKNESS, SIMILAR TO FOSTER TITE-FIT, UL
- 3. TYPE F-4: ALUMINUM JACKETING WITH MINIMUM 0.016 IN. WALL THICKNESS AND LONGITUDINAL JOINTS WITH LOCK SEAMS.

4. OUTDOOR PIPING

1. FOR ALL PIPING, FITTINGS AND VALVES LOCATED OUTDOORS INCREASE SCHEDULED INSULATION THICKNESS BY A MINIMUM OF 1 IN. AND PROVIDE F-4 FINISH. PROVIDE VAPORSEAL ON ALL OUTDOOR PIPES, VALVES AND FITTINGS SUBJECT TO CONDENSATION.

5. INSTALLATION

- BEFORE APPLYING INSULATION, ALL PRESSURE AND LEAK TESTS SHALL BE COMPLETED AND APPROVED.
- 2. ALL INSULATION SHALL BE BUTTED FIRMLY TOGETHER. PROVIDE 2 IN. LAP STRIPS AT ALL SEAMS SECURED WITH ADHESIVE. USE VAPOR BARRIER TAPE AND VAPORSEAL ADHESIVE WHERE REQUIRED. STAPLES NOT PERMITTED. REFRIGERANT PIPING INSULATION SHALL HAVE MITERED FITTINGS.
- 3. ALL INSULATION AND VAPOR BARRIERS SHALL BE CONTINUOUS PASSING THROUGH SLEEVES, HANGERS, ETC., OR OTHER OPENINGS. PROVIDE SADDLES OR SHIELDS FOR PROTECTION.
- 4. INSULATION FOR STRAINERS OR OTHER FITTINGS OR ACCESSORIES REQUIRING SERVICING OR INSPECTION SHALL HAVE INSULATION REMOVABLE AND REPLACEABLE WITHOUT DAMAGE.

5. VIBRATION ISOLATION, WIND AND SEISMIC RESTRAINTS

1. GENERAL

- 1. PROVIDE ISOLATION FOR EQUIPMENT, PIPING AND DUCTWORK.
- 2. INSTALL IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
- 3. PROVIDE LEVELING DEVICES AND APPROVED RESILIENT RESTRAINING DEVICES AS REQUIRED TO LIMIT EQUIPMENT AND PIPING MOTION IN EXCESS OF 1/4 IN.
- 4. ACCEPTABLE MANUFACTURERS
 - 1. MASON INDUSTRIES, INC.
 - 2. VIBRATION ELIMINATOR CO.

3. KORFUND DYNAMICS CORP.

2. CEILING-HUNG FANS AND EQUIPMENT

- PROVIDE SPRING HANGER ROD ISOLATORS. STEEL COMPRESSION SPRING AND NEOPRENE SOUND PAD WITHIN A STEEL RETAINER BOX. SIMILAR TO MASON TYPE PCHS.
- 2. 1 IN. MINIMUM STATIC DEFLECTION. 1/2 IN. MINIMUM RESERVE DEFLECTION. FACTORY-PRELOADED TO 75 PERCENT OF RATED LOAD.
- 3. PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE EQUIPMENT OR STRUCTURE CANNOT SUPPORT POINT LOADS.

3. SEISMIC RESTRAINTS

PROVIDE SEISMIC RESTRAINTS FOR ALL MECHANICAL EQUIPMENT AS REQUIRED BY CODE. SEISMIC RESTRAINTS SHALL BE CAPABLE OF SAFELY ACCEPTING EXTERNAL FORCES AS REOUIRED BY CODE WITHOUT FAILURE, AND SHALL MAINTAIN EQUIPMENT, PIPING, CONDUIT, DUCT AND PRESSURE REDUCING BOXES IN A CAPTIVE POSITION. SEISMIC RESTRAINTS SHALL NOT SHORT CIRCUIT ISOLATION SYSTEMS OR TRANSMIT OBJECTIONABLE VIBRATION OR NOISE AND SHALL BE PROVIDED ON ALL EQUIPMENT SCHEDULES ON DRAWINGS.

4. WIND RESTRAINTS

1. ALL ROOF AND GROUND MOUNTED EQUIPMENT SHALL BE FASTENED TO STRUCTURE OR BASE PER MANUFACTURERS MOUNTING RECOMMENDATIONS. PROVIDE INSTALLATION DETAILS SIGNED BY LICENSED PROFESSIONAL STRUCTURAL ENGINEER TO MEET ASCE-7 MPH WIND LOADING.

6. PIPING - GENERAL REQUIREMENTS

- COMPLETE WITH PIPE, FITTINGS, VALVES, STRAINERS, MOTORIZED VALVE OPERATORS, STRAINERS, HANGERS, SUPPORTS, GUIDE, SLEEVES, AND ACCESSORIES.
- 2. ALL ITEMS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE FOLLOWING CODES AND STANDARDS.
 - 1. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME).
 - 2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM).
 - 3. AMERICAN NATIONAL STANDARDS INSTITUTE

- 4. MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTING INDUSTRY (MSS).
- 3. ALL PRESSURIZED PIPING TO BE TESTED HYDROSTATICALLY TO 150 PSI OR 150 PERCENT OF OPERATING PRESSURE, WHICHEVER IS GREATER, BUT NEVER EXCEED TEST PRESSURE ANSI B16.1 BASIS. TEST DURATION TO BE 2 HOURS WITH NO PRESSURE CHANGE CORRECTED FOR TEMPERATURE CHANGE. REPAIR OR REPLACE LEAKS OR DEFECTS WITHOUT ADDITIONAL COST.
- 4. PROVIDE DIELECTRIC FITTINGS WHERE DISSIMILAR METALS ARE TO BE JOINED.

5. PIPE SUPPORTS.

- 1. PROVIDE ADEQUATE SUPPORT FOR PIPE AND CONTENTS TO PREVENT SAGGING, VIBRATION, OR SWAYING AND ALLOW FOR EXPANSION AND CONTRACTION. PROVIDE SUPPLEMENTAL STEEL AS REQUIRED WHERE STRUCTURE CANNOT SUPPORT POINT LOADS.
- 2. HORIZONTAL PIPING TO BE SUPPORTED BY FORGED STEEL ADJUSTABLE CLEVIS TYPE HANGER. MAXIMUM SPACING AS FOLLOWS:
- a. STEEL 1 IN. AND SMALLER: 7 FT.
- STEEL 1-1/4 IN. AND LARGER: 10 FT.
- COPPER 3 IN. AND SMALLER: 7 FT.
- ADDITIONAL SUPPORTS AT CHANGES IN DIRECTION, RUNOUTS, AND CONCENTRATED LOADS DUE TO VALVES, ETC.
- ADDITIONAL SUPPORTS AT CHANGES IN DIRECTION, RUNOUTS, AND CONCENTRATED LOADS DUE TO VALVES, ETC.

3. VERTICAL PIPING.

- 1. BASE ELBOW SUPPORT WITH BEARING PLATE ON STRUCTURAL SUPPORT.
- 2. GUIDES AT EVERY SECOND FLOOR
- (SPACING NOT TO EXCEED 25 FT.). 3. TOP SUPPORT HANGER OR SADDLE IN

HORIZONTAL CONNECTION WITH

4. INTERMEDIATE STEEL RISER CLAMP SUPPORT BOLTED AND WELDED TO PIPE BEARING ON STRUCTURAL STEEL

OR BEARING PLATE AT FLOOR.

PROVISIONS FOR EXPANSION.

7. CONDENSATE DRAIN PIPING

- 1. PIPE: ASTM B88, HARD DRAWN COPPER TUBING TYPE
- 2. FITTINGS: SOLDERED JOINT FITTINGS, 95/5 SOLDER.
- 3. PITCH, EXCEPT AS NOTED.
 - 1. 1 IN. IN 4 FT. PREFERRED.
 - 2. 1 IN. IN 8 FT. MINIMUM.
- 4. SWING CHECK VALVES: AT CONDENSATE PUMP DISCHARGE. 300 LB WOG, BRONZE BODY SOLDER ENDS, REGRIND BRONZE DISC TO BE USED WITH COPPER TUBING. JENKINS FIG. 1222.

8. MOTORS

- 1. MOTORS (UNDER HVAC WORK): IN ACCORDANCE WITH NEMA, IEEE AND ANSI C 50 STANDARDS.
 - 1. STANDARD EFFICIENCY UNLESS OTHERWISE

2. 1.15 SERVICE FACTOR.

3. SQUIRREL CAGE INDUCTION; OPEN DRIP-PROOF TYPE, 1750 RPM, NEMA TYPE B INSULATION CLASS AND CONTINUOUS DUTY, EXCEPT AS NOTED.

9. MOTOR CONTROLLERS

- 1. PROVIDED BY HVAC CONTRACTOR AND INSTALLED AND WIRED BY ELECTRICAL CONTRACTOR.
- 2. NEMA ENCLOSURE, WEATHERPROOF WHERE MOUNTED OUTDOORS.
- 3. WITH OVERLOAD PROTECTION. COORDINATE ALL MOTOR CONTROLLER TYPES AND SIZES WITH MOTOR TYPES AND SIZES.
- 4. 1/3 HP AND SMALLER: PROVIDE MANUAL STARTER EXCEPT USE MAGNETIC TYPE WHERE AUTOMATICALLY CONTROLLED.
- 1. MANUAL TYPE: 2-POLE TOGGLE SWITCH WITH OVERLOAD PROTECTION AND PILOT LIGHT.
- 5. 1/2 HP AND LARGER: PROVIDE MAGNETIC STARTER. 1. COMBINATION UNFUSED DISCONNECT
- SWITCH AND MAGNETIC STARTER EXCEPT AS

2. OVERLOAD PROTECTION IN EACH PHASE LEG

3. HOA SELECTOR SWITCH FOR AUTOMATICALLY OPERATED MOTORS. SAFETY CONTROLS COMMON TO BOTH

WITH RESET IN ENCLOSURE.

4. RED, GREEN AND AMBER PILOT LIGHTS.

CONTROLS.

- 5. SWITCHES: HORSE-POWER-RATED, EXTERNAL PADLOCKING TYPE.
- 6. HOLDING COILS: 10 WATT, 120 VOLT.
- 7. CONTACTS: MAIN LINE AND MINIMUM (2) NORMALLY OPEN, (2) - NORMALLY CLOSED 10 AMP AUXILIARIES, IN ADDITION TO CONTACTS REQUIRED FOR CONTROLS SPECIFIED.
- 8. CONTROL TRANSFORMER: FOR MOTORS OVER 120 VOLTS, TO STEP DOWN CONTROL VOLTAGE TO 120 VOLTS; OF THE REQUIRED CAPACITY, WITH FUSE AND GROUND CONNECTION ON VOLTAGE SIDE.
- 9. FUSES: SIMILAR TO BUSSMAN.
- 10. RELAYS TO SUPPLEMENT AUXILIARY CONTACTS IN CONTROLLER. MINIMUM 10-WATT COIL AND TWO 10 AMP CONTACTS.
- 11. TERMINALS: SUITABLE FOR CONDUCTORS NOTED AND AS APPROVED.

6. ACCEPTABLE MANUFACTURERS

- 1. CUTLER-HAMMER.
- 2. SQUARE D.
- 3. ALLEN BRADLEY.

10. EQUIPMENT

1. FANS

1. GENERAL (APPLIES TO ALL FAN TYPES

EXCEPT AS NOTED).

- 1. PROVIDE CENTRIFUGAL TYPE, NON-OVERLOADING DESIGN EXCEPT AS NOTED WITH MINIMUM CAPACITIES AS NOTED AND WITH CERTIFIED RATINGS BY AMCA. WHEEL SHALL BE FACTORY BALANCED STATICALLY AND DYNAMICALLY. BRAKE HORSEPOWER RATINGS SHALL NOT BE MORE THAN 5 PERCENT ABOVE WHAT IS NOTED ON DRAWINGS. DRIVES SHALL BE MATCHED, MULTIPLE V-BELT DRIVE UNLESS OTHERWISE NOTED WITH MINIMUM CAPACITY OF 1.4 TIMES RATED MOTOR HP. PULLEYS SHALL BE CAST IRON.
- 2. MOTOR PULLEY SHALL BE VARIABLE PITCH DIAMETER EXCEPT FANS WITH VARIABLE INLET VANES. SUPPLY AND INSTALL ONE FIXED PITCH PULLEY CHARGE AS REQUIRED PER FAN TO BALANCE SYSTEMS. COMPANION SHEAVES SHALL MAINTAIN BELTS PARALLEL. BELT GUARDS SHALL BE IN COMPLIANCE WITH OSHA REGULATIONS AND WITH TACHOMETER OPENING FOR FAN SPEED MEASUREMENTS MANUFACTURER SHALL PROVIDE REPLACEMENT FIXED PITCHED SHEAVES WHERE NEEDED TO BALANCE SYSTEM.
- 3. PROVIDE REMOVABLE FLANGED SCREENS AT INLETS OR OUTLETS WHERE NO CONNECTING DUCTWORK IS INDICATED.
- 4. BEARINGS BALL ROLLER OR TAPER. PROVIDE PRESSURE TYPE LUBRICATING FITTINGS WITH PRESSURE RELIEF FITTINGS EXTENDED TO ACCESSIBLE LOCATIONS. MINIMUM L-10 LIFE RATING; 50,000 HOURS PER AFBMA STANDARD B-10 OR 250,000 HOURS AVERAGE (B-50) LIFE AT

MAXIMUM CATALOG RATING.

- 2. CABINET FANS SHALL HAVE ACOUSTICALLY INSULATED GALVANIZED STEEL FAN HOUSING, DIRECT DRIVEN CENTRIFUGAL FAN (S), INTERNAL VIBRATION ISOLATION, INTEGRAL LOUVERED FACE GRILLE WITH LIGHT, AND OUTLET DUCT CONNECTION WITH SELF-ACTING BACKDRAFT DAMPER. PROVIDE WALL VENTS OR ROOF CAPS AS REQUIRED ON
- 2. PACKAGED TERMINAL AIR CONDITIONING UNITS
 - WALL MOUNTED HEAT PUMP PTAC UNIT. REFER TO EQUIPMENT SCHEDULE FOR OPTIONS AND ACCESSORIES.

11. AUTOMATIC CONTROLS - GENERAL REQUIREMENTS

DESCRIPTION OF OPERATION.

- 1. FURNISH AND INSTALL A COMPLETE ELECTRIC OR ELECTRONIC CONTROL SYSTEM TO PROVIDE TEMPERATURE CONTROL AS SPECIFIED UNDER
- 2. WORK SHALL INCLUDE ALL WIRING, CONTROL EQUIPMENT, AND ACCESSORIES NECESSARY TO MAKE THIS SYSTEM COMPLETE. ALL WIRING SHALL BE 24 VOLT. COORDINATE WITH MANUFACTURER FOR INTERCONNECTION WITH CONTROLS INCLUDED IN EQUIPMENT. ALL CONTROL WORK SHALL BE

4. OPERATION OF TYPICAL CONTROL SAFETY DEVICES.

INSTALLED BY THE HVAC CONTRACTOR.

- 3. ACCEPTABLE MANUFACTURERS
 - 1. JOHNSON CONTROLS
 - 2. HONEYWELL, INC.
- 3. OR APPROVED EQUAL

- 1. EXHAUST FANS, SUCH AS GENERAL OR TOILET (OPERATING INDEPENDENTLY): ALL SAFETY DEVICES SHALL BE INTERLOCKED WITH "HAND" AND "AUTOMATIC" POSITIONS IN SERIES WITH MOTOR CONTROLLER HOLDING COIL CIRCUIT. REMOTE STARTING SHALL BE THROUGH AUTOMATIC POSITION ONLY. "HAND" POSITION SHALL BE FOR
- 2. SAFETY DEVICES FOR ALL SYSTEMS, EXCEPT AS OTHERWISE NOTED BELOW.

MAINTENANCE OPERATION ONLY.

- 1. ONE FREEZE PROTECTION THERMOSTAT PER COIL SECTION, WIRED TO STOP SUPPLY FAN. THERMOSTAT SHALL BE AUTOMATIC RESET TYPE.
- 2. FOR SYSTEMS OVER 2,000 CFM, A DUCT MOUNTED SMOKE DETECTOR OF THE IONIZATION TYPE LOCATED IN THE RETURN DUCT SHALL STOP THE SUPPLY FAN AND ASSOCIATED INTERLOCKED EQUIPMENT SHOULD PRODUCTS OF COMBUSTION BE

5. SEQUENCE

1. CONSTANT VOLUME SYSTEM

1. SINGLE TOILET FANS SHALL ENERGIZE VIA A WALL SWITCH (BY OTHERS). COORDINATE WITH ELECTRICAL CONTRACTOR TO PROVIDE COMPLETE WORKING SYSTEM.

Architects

REVISION DAT Sheet No: M-8.

ELECTRICAL SYMBOLS LIST

(NOT ALL SYMBOLS ARE NECESSARILY USED ON THIS PROJECT)

POWER SYMBOLS

SINGLE POLE SWITCH 2 = DOUBLE POLE 3 = THREE-WAY 4 = FOUR-WAY a = CONTROLS SWITCH LEG 'a' D = DIMMER DR = DOOR K = KEY OPERATED MO = MOMENTARY CONTACT T = TIMER SWITCH P = PILOT LIGHT
P = PILOT LIGHT LV = LOW VOLTAGE

\$T DISCONNECT SWITCH - TOGGLE TYPE WITH THERMAL OVERLOAD -

\$M DISCONNECT SWITCH - TOGGLE TYPE MOTOR RATED, 20A, 1P, UON

VS VACANCY SENSOR, WALL MOUNTED

OCCUPANCY SENSOR, CEILING MOUNTED

VACANCY SENSOR, CEILING MOUNTED

OCCUPANCY SENSOR, WALL MOUNTED

PC PHOTOCELL SENSOR, WALL MOUNTED

RC ROOM CONTROLLER

20A, 125V DUPLEX RECEPTACLE - FLUSH WALL MOUNTED CONTROLLED FROM WALL SWITCH "a"

TR 20A, 125V DUPLEX RECEPTACLE - FLUSH WALL MOUNTED, TAMPER RESISTANT

20A, 125V DUPLEX RECEPTACLE WITH DUAL USB CHARGING
OUTLETS FLUSH WALL MOUNTED

20A, 125V DUPLEX RECEPTACLE - FLUSH WALL MOUNTED, CONTROLLED

20A, 125V QUADRUPLEX RECEPTACLE - FLUSH WALL MOUNTED

20A, 125V ISOLATED GROUND, DUPLEX RECEPTACLE, FLUSH WALL

20A, 125V DUPLEX RECEPTACLE, FLUSH WALL MOUNTED, GFI TYPE

20A, 125V EMERGENCY DUPLEX RECEPTACLE, FLUSH WALL MOUNTED

SINGLE RECEPTACLE, FLUSH WALL MOUNTED

20A, 125V DUPLEX RECEPTACLE, FLUSH FLOOR MOUNTED

SPECIAL PURPOSE RECEPTACLE, FLUSH FLOOR MOUNTED, A = TYPE

20A, 125V QUADRAPLEX RECEPTACLE, FLUSH FLOOR MOUNTED

SPECIAL PURPOSE RECEPTACLE, FLUSH WALL MOUNTED, A = TYPE

WALL MOUNTED CLOCK
D = DOUBLE FACE

MOTOR CONTROLLER

100/3 COMBINATION MOTOR CONTROLLER AND DISCONNECT SWITCH

AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED

UNFUSED DISCONNECT SWITCH
SWITCH AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED

FUSED DISCONNECT SWITCH
SWITCH AMPS/FUSE AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED

ENCLOSED CIRCUIT BREAKER
TRIP AMPS/# OF POLES, VOLTAGE RATING AS REQUIRED

POWER POLE

SURFACE MOUNTED PANELBOARD

FLUSH MOUNTED PANELBOARD

(J) CEILING MOUNTED JUNCTION BOX

J)-H FLUSH WALL MOUNTED JUNCTION BOX

FLUSH FLOOR MOUNTED JUNCTION BOX

] CAP

PUSH BUTTON
K = KEY OPERATED
H = HOLD UP
P = PANIC
EPO = EM. POWER OFF

------ EXISTING CONDUIT/EQUIPMENT TO BE REMOVED

----- UNDERGROUND CONDUIT/WIRING

POINT OF CONNECTION

POINT OF CONNECTION

ABBREVIATIONS

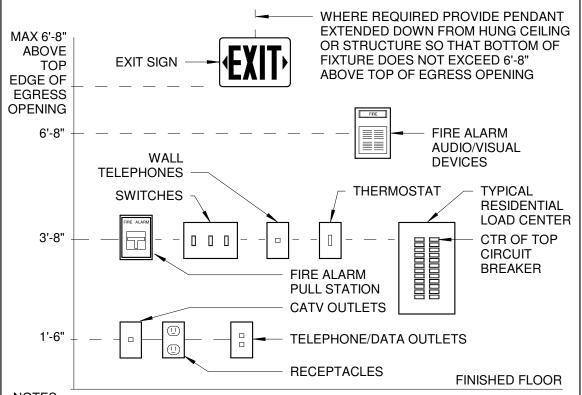
(NOT ALL ABBREVIATIONS ARE NECESSARILY USED ON THIS PROJECT)

1P 2P	SINGLE POLE	IPX	ISOLATED POWER CENTER-X-RAY
2P 3P	TWO POLE THREE POLE	JB KCMIL	JUNCTION BOX THOUSAND CIRCULAR MILS
Α	AMPERE	KV	KILOVOLT
AC	ABOVE COUNTER	KVA	KILOVOLT AMPERE
ACB	AIR CIRCUIT BREAKER	KW KWH	KILOWATT
AFF AFG	ABOVE FINISHED FLOOR ABOVE FINISHED GRADE	LFMC	KILOWATT HOUR LIQUIDTIGHT FLEXIBLE
.HJ	AUTHORITY HAVING JURISDICTION	LI WO	METALLIC CONDUIT
IC	AMPERE INTERRUPTING CAPACITY	LFNC	LIQUIDTIGHT FLEXIBLE
L	ALUMINUM		NON-METALLIC CONDUIT
LM MM	ALARM AMMETER	LIM LTG	LINE ISOLATION MONITOR LIGHTING
RF	ABOVE RAISED FLOOR	MAP	MEDICAL GAS ALARM PANEL
TS	AUTOMATIC TRANSFER SWITCH	MAX	MAXIMUM
UTO	AUTOMATIC	MC	METAL CLAD, MECH. CONTRACTOR
V WG	AUDIO VISUAL AMERICAN WIRE GAUGE	MCA MCB	MIN. CIRCUIT AMPERES MAIN CIRCUIT BREAKER
FC	BELOW FINISHED CEILING	MCC	MOTOR CONTROL CENTER
3	BREAK GLASS SWITCH	MDP	MAIN DISTRIBUTION PANEL
L	BASIC IMPULSE LEVEL	MECH	MECHANICAL
LDG AB	BUILDING CABINET	MER MFR	MECHANICAL ROOM MANUFACTURER
AD AT	CATALOG	MFS	MAIN FUSED SWITCH
	CONDUIT	MH	MANHOLE, METAL HALIDE
3	CIRCUIT BREAKER	MIC	MICROPHONE
CTV	CLOSED CIRCUIT TELEVISION	MIN	MINIMUM
< Τ -	CIRCUIT CENTER LINE	MLO MOCP	MAIN LUG ONLY MAX. OVERCURRENT PROTECTION
L LG	CEILING	MOPD	MAX. OVERCURRENT PROTECTION
TL	CONTROL	MTD	MOUNTED
)	CONDUIT ONLY	MTG	MOUNTING
MC NNC	COMMUNICATION CONNECTED	MTS N	MANUAL TRANSFER SWITCH NEUTRAL
ONT	CONTINUATION	(N)	NEW
Т	CURRENT TRANSFORMER	ŇĆ	NORMALLY CLOSED
U	COPPER	NIC	NOT IN CONTRACT
UH B	CABINET UNIT HEATER DECIBEL	NO NTS	NORMALLY OPEN NOT TO SCALE
E	DUAL ELEMENT FUSE(S)	OC	ON CENTER
EG	DEGREE	OCB	OIL CIRCUIT BREAKER
2	DEGREE CELSIUS	OD	OUTSIDE DIAMETER
= IA	DEGREE FAHRENHEIT DIAMETER	OH P	OVERHEAD POLE
ISC	DISCONNECT	PA	PUBLIC ADDRESS
VIV	DIVISION	PB	PULL BOX
N	DOWN	PBS	PUSH BUTTON SWITCH
)P)S	DISTRIBUTION PANEL BOARD DISCONNECT SWITCH	РНС ф, РН	PIPE HEATING CABLE PHASE
WG	DRAWING	PNL	PANEL
A	EACH	PRI	PRIMARY
C L	ELECTRICAL CONTRACTOR ELEVATION	PT PWR	POTENTIAL TRANSFORMER POWER
L LEC	ELECTRICAL	RCS	REMOTE CONTROL SWITCH
LEV	ELEVATOR	(RE)	RELOCATED EXISTING
M	EMERGENCY	REC	RECEPTACLE
MT NCL	ELECTRICAL METALLIC TUBING ENCLOSURE	REF REQ	REFRIGERATOR REQUIRED
Q	EQUIPMENT	RM	ROOM
<u>.</u>	EXISTING TO REMAIN	RGS	RIGID GALVANIZED STEEL CONDUI
R)	EXISTING SHALL BE REMOVED	(RRO)	EXISTING SHALL BE REMOVED
ERR) RC	EXISTING SHALL BE REMOVED & RELOCATED	SAP	AND RETURN TO OWNER SPRINKLER ALARM PANEL
	ELECTRIC REHEAT COIL ELECTRIC WATER COOLER	SCH	SCHEDULE
XIST,EX	EXISTING	SE	SERVICE ENTRANCE
XT	EXTERIOR	SEC	
4	FIRE ALARM FIRE ALARM ANNUNCIATOR PANEL	SECT SN	SECTION SOLID NEUTRAL
AA ACP		SPEC	SPECIFICATION
ACP BO		SP	SPEAKER
CU	FAN COIL UNIT	SPKR	SPRINKLER
DR DS	FEEDER FUSED DISCONNECT SWITCH	SPD SW	SURGE PROTECTION DEVICE SWITCH
IXT	FIXTURE	SWBD	SWITCHBOARD
L	FLOOR	SYS	SYSTEMS
LA	FULL LOAD AMPERES	SUBST	
	FLEXIBLE FLUORESCENT	SWGR TBD	SWITCHGEAR TO BE DETERMINED
		TEL	TELEPHONE
LUOR			
LUOR P	FIRE PROTECTION FREEZER	TEMP	TEMPERATURE
LUOR P RZ T	FIRE PROTECTION FREEZER FEET OR FOOT	THERM	THERMOSTAT
LUOR P RZ T	FIRE PROTECTION FREEZER FEET OR FOOT GROUND	THERM TP	THERMOSTAT TAMPER PROOF
LUOR P RZ T	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR	THERM	THERMOSTAT TAMPER PROOF TAMPER SWITCH
LUOR P RZ T C EN FI	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER	THERM TP TS TV TYP	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL
LUOR P RZ T is is is is is is is is is is is is is	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE	THERM TP TS TV TYP UH	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER
LUOR P RZ T ic C IEN IFI ID P	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE HORSE POWER	THERM TP TS TV TYP UH UG	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER UNDERGROUND
LUOR P RZ T C EN FI ID P PCS	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE HORSE POWER HIGH PRESSURE CONTACT SWITCH	THERM TP TS TV TYP UH	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER UNDERGROUND UNLESS OTHERWISE NOTED
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T GC GEN GFI IID IP IPCS IT IV IZ	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE HORSE POWER HIGH PRESSURE CONTACT SWITCH HEIGHT HIGH VOLTAGE HERTZ INSIDE DIAMETER	THERM TP TS TV TYP UH UG UON V VA VFD VM	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER UNDERGROUND UNLESS OTHERWISE NOTED VOLT OR VOLTAGE VOLT AMPERE VARIABLE FREQUENCY DRIVE VOLTMETER
LUOR P RZ T G GEN GFI IID IIP IIP IIV IZ D G	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE HORSE POWER HIGH PRESSURE CONTACT SWITCH HEIGHT HIGH VOLTAGE HERTZ INSIDE DIAMETER ISOLATED GROUND	THERM TP TS TV TYP UH UG UON V VA VFD VM VP	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER UNDERGROUND UNLESS OTHERWISE NOTED VOLT OR VOLTAGE VOLT AMPERE VARIABLE FREQUENCY DRIVE VOLTMETER VAPORPROOF
LUOR P RZ T i iC iEN iFI ID P PCS T V Z	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE HORSE POWER HIGH PRESSURE CONTACT SWITCH HEIGHT HIGH VOLTAGE HERTZ INSIDE DIAMETER	THERM TP TS TV TYP UH UG UON V VA VFD VM	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER UNDERGROUND UNLESS OTHERWISE NOTED VOLT OR VOLTAGE VOLT AMPERE VARIABLE FREQUENCY DRIVE VOLTMETER
LUOR P RZ T icC EEN iFI ID P CS T V Z O G NC	FIRE PROTECTION FREEZER FEET OR FOOT GROUND GENERAL CONTRACTOR GENERATOR GROUND FAULT INTERRUPTER HIGH INTENSITY DISCHARGE HORSE POWER HIGH PRESSURE CONTACT SWITCH HEIGHT HIGH VOLTAGE HERTZ INSIDE DIAMETER ISOLATED GROUND INCANDESCENT	THERM TP TS TV TYP UH UG UON V VA VFD VM VP W	THERMOSTAT TAMPER PROOF TAMPER SWITCH TELEVISION TYPICAL UNIT HEATER UNDERGROUND UNLESS OTHERWISE NOTED VOLT OR VOLTAGE VOLT AMPERE VARIABLE FREQUENCY DRIVE VOLTMETER VAPORPROOF WATT

COMMISSIONING REQUIREMENTS

- 1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING COMMISSIONING SERVICE, FROM A CERTIFIED COMMISSIONING AUTHORITY (CxA), FOR ALL LIGHTING CONTROLS.
- 2. CxA AND CONTRACTOR SHALL PERFORM AND REVIEW ALL TESTING AND PROVIDE REPORTS AS REQUIRED
- 3. ALL COMMISSIONING AND REPORTING SHALL BE PREFORMED IN ACCORDANCE WITH ASHRAE GUIDELINE 90.1-2016 AND IECC-2018.

TYPICAL DEVICE MOUNTING HEIGHTS DETAIL



I. ALL MOUNTING HEIGHTS SHALL BE MEASURED FROM FINISHED FLOOR TO CENTERLINE OF DEVICE EXCEPT EXIT SIGNS. EXIT SIGNS SHALL COMPLY WITH NFPA 101, 7.10.1.9.

DEVICS SHALL BE INSTALLED ON A COMMON VERTICAL CENTERLINE WHEREVER POSSIBLE.
 ALL DEVICES SHALL BE INSTALLED AT MOUNTING HEIGHTS AS INDICATED ON THIS DETAIL LINE ESS OTHERWISE NOTED OR REQUIRED BY CODE (INCLUDING).

ALL DEVICES SHALL BE INSTALLED AT MOUNTING HEIGHTS AS INDICATED ON
THIS DETAIL UNLESS OTHERWISE NOTED OR REQUIRED BY CODE (INCLUDING
ADA REQUIREMENTS). FOR DEVICES INDICATED WITH AN ADJACENT "+" SYMBOL,
COORDINATE MOUNTING HEIGHT WITH ARCHITECT.
 COORDINATE ALL LOCATIONS WITH ARCHITECTURAL PLANS.

COORDINATE ALL LOCATIONS WITH ARCHITECTURAL PLANS.
 OPERABLE DEVICES INSTALLED IN ALL ACCESSIBLE COMMON AREAS AND ACCESSIBLE RESIDENTIAL UNITS SHALL BE MOUNTED BETWEEN 15" & 44" AFF AND/OR IN ACCORDANCE WITH ANSI A117.1 REQUIREMENTS - CONFIRM EXACT MTG HT AND LOCATION WITH ARCHITECT.

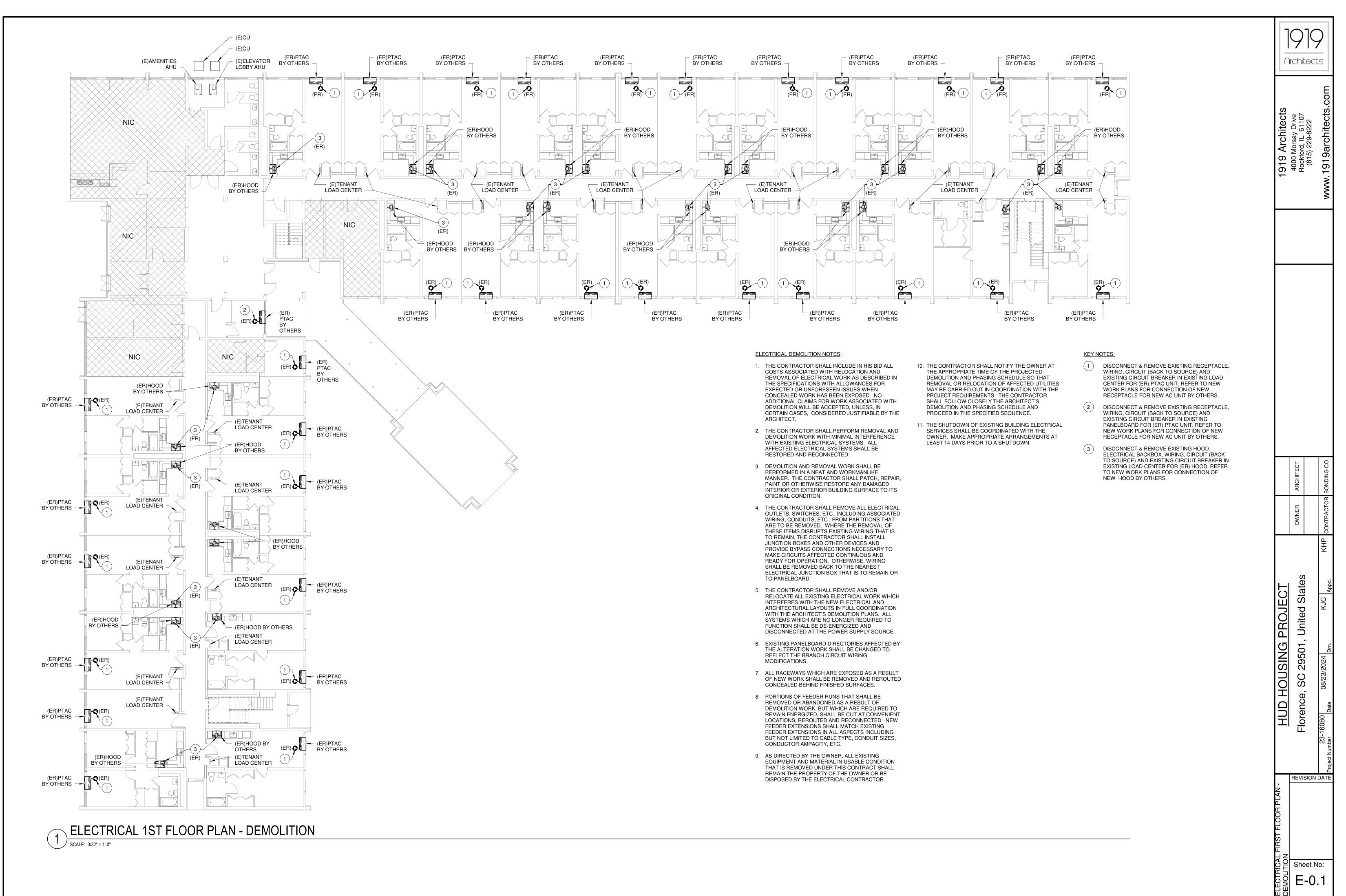
GENERAL ELECTRICAL NOTES

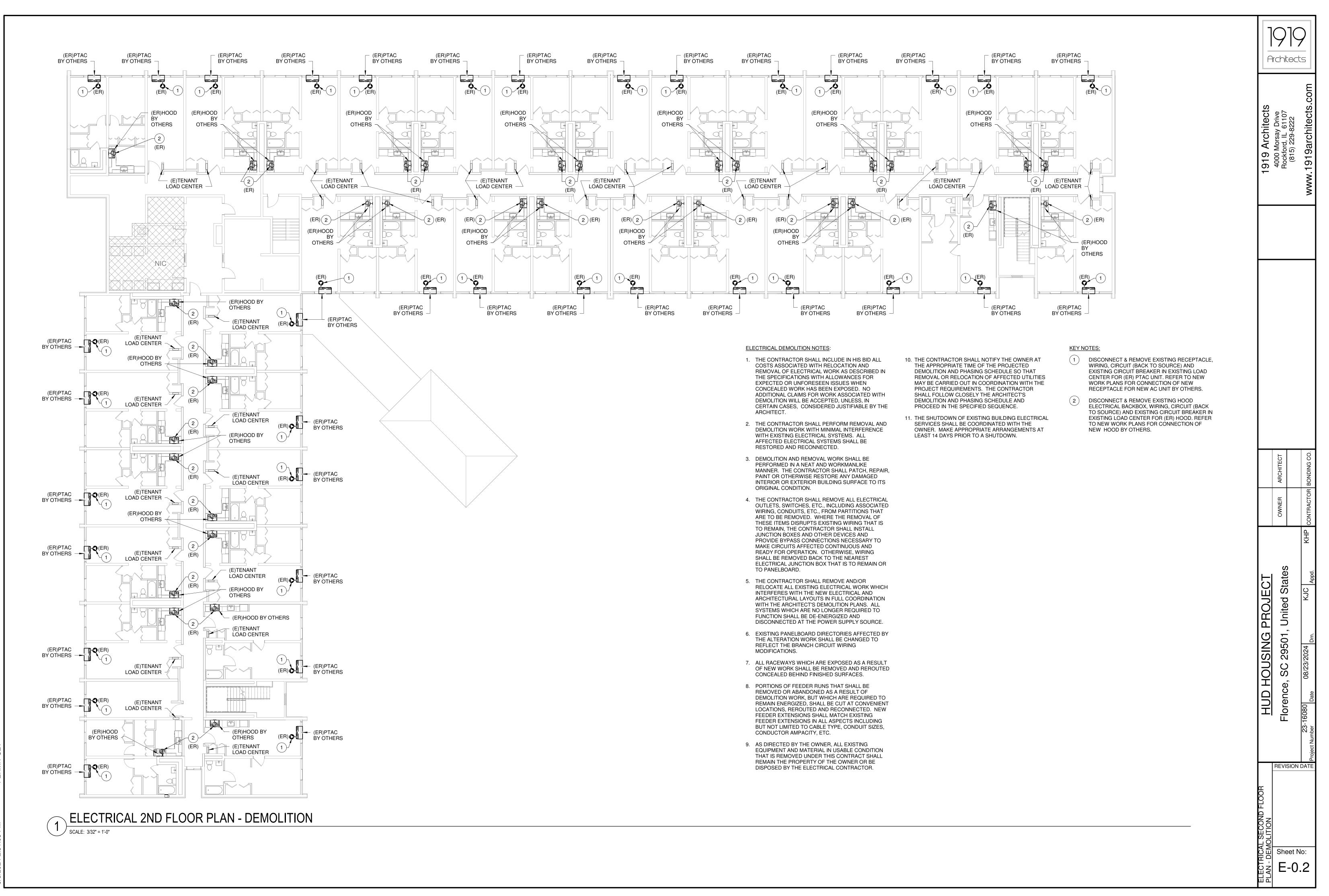
- 1. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. FOLLOW DRAWINGS IN LAYING OUT WORK AND CHECK DRAWINGS AND FIELD DIMENSIONS OF OTHER TRADES TO VERIFY SPACE CONDITIONS. MAINTAIN HEADROOM AND SPACE REQUIREMENTS.
- 2. PERFORM ALL WORK IN STRICT ACCORDANCE WITH NATIONAL ELECTRICAL CODE (N.E.C.-2020) AS ADOPTED BY THE STATE OF SOUTH CAROLINA, OSHA REQUIREMENTS, ALL FEDERAL, STATE, AND LOCAL CODES AND ALL OWNER
- 3. WHERE THERE IS A DISCREPANCY BETWEEN MATERIAL OR EQUIPMENT IN THE DRAWINGS AND/OR SPECIFICATIONS, THE CONTRACTOR SHALL ASSUME THE MORE STRINGENT, HIGHER QUALITY AND MORE EXPENSIVE OPTION FOR BIDDING
- 4. INCLUDE ALL TEMPORARY POWER AND LIGHTING, PERMIT, LICENSE, AND INSPECTION COSTS IN BID.
- 5. CONTRACTOR SHALL ISSUE IN WRITING TO ARCHITECT/ENGINEER ANY SCOPE OF WORK DISCREPANCIES AND/OR QUESTIONS PRIOR TO SUBMISSION OF BID.
- 6. CONTRACTOR SHALL EXAMINE ALL DRAWINGS AND SPECIFICATIONS AND VISIT THE SITE TO BECOME ACQUAINTED WITH THE CONSTRUCTION, SITE AND THE EXTENT OF THE WORK PRIOR TO SUBMISSION OF BID.
- 7. COORDINATE ALL REQUIRED SHUTDOWNS WITH THE OWNER (AND UTILITY COMPANY WHERE APPLICABLE) A MINIMUM OF FOURTEEN (14) DAYS IN ADVANCE. INCLUDE OVERTIME COSTS IN BID TO PERFORM ALL SHUTDOWNS (INCLUDING SHUTDOWNS FOR AREAS WHICH MAY BE UNOCCUPIED DURING CONSTRUCTION) AFTER NORMAL WORKING HOURS AS COORDINATED WITH THE OWNER. NO EXTRA CLAIMS OR COMPENSATION SHALL BE GRANTED FOR OVERTIME COSTS ASSOCIATED WITH PERFORMING SHUTDOWNS.
- 8. SECURE ALL SUPPORTS TO BUILDING STRUCTURE BY STEEL FOR VERTICAL SUPPORT AND BY MEANS OF TOGGLE BOLTS ON HOLLOW MASONRY UNITS, EXPANSION SHIELDS IN CONCRETE OR BRICK. MACHINE SCREWS ON METAL SURFACE, AND WOOD SCREWS ON WOOD CONSTRUCTION. NAILS, RAWL OR WOOD PLUGS NOT PERMITTED. SUPPORT HORIZONTAL RUNS OR METALLIC CONDUITS NOT MORE THAN 10 FT. APART. SUPPORT RACEWAY RISERS AT EACH FLOOR LEVEL. RUN EXPOSED RACEWAYS PARALLEL WITH OR AT RIGHT ANGLES TO WALLS.
- 9. PASS RACEWAYS OVER WATER, STEAM, OR OTHER PIPING WHEN PULL BOXES ARE NOT REQUIRED. NO RACEWAY WITHIN 3 IN. OF STEAM OR HOT WATERS PIPES, OR APPLIANCES, EXCEPT CROSSINGS WHERE RACEWAY SHALL BE AT LEAST 1 IN. FROM PIPE COVER.
- 10. FURNISH FISH WIRE IN EACH RACEWAY RUN OVER 10 FT IN WHICH WIRING IS NOT INSTALLED.
- 11. CUT STEEL CONDUIT ENDS SQUARE, REAM SMOOTH, PAINT MALE THREADS OF FIELD THREADED CONDUIT WITH GRAPHITE BASE PIPE COMPOUND. DRAW UP TIGHT WITH CONDUIT COUPLINGS.
- 12. HORIZONTAL OR CROSS RUNS IN PARTITIONS AND WALLS NOT PERMITTED.
- 13. ROUTE ALL CONDUITS AND CABLES PARALLEL OR PERPENDICULAR TO BUILDING LINES WHERE POSSIBLE
- 14. CONNECT CONDUIT TO MOTOR CONDUIT TERMINAL BOXES WITH FLEXIBLE CONDUIT (MINIMUM 18 IN. LENGTH AND 50% SLACK). DO NOT TERMINATE IN OR FASTEN RACEWAYS TO MOTOR FOUNDATION.
- 15. PROVIDE SEPARATE RACEWAYS FOR CONDUCTORS OF NORMAL AND EMERGENCY CIRCUITS. COMMON BOXES: PROVIDE BARRIERS BETWEEN EMERGENCY AND NORMAL WIRING.
- 16. LEAVE WIRE SUFFICIENTLY LONG TO PERMIT MAKING FINAL CONNECTIONS.
- 17. WIRE COLOR CODING: PER CODE. WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION FOR OVERLAP COLOR TAPING OF CONDUCTORS (MINIMUM LENGTH 6") IN ACCESSIBLE LOCATIONS. COLOR CODING, ONCE SELECTED, MUST BE USED CONSISTENTLY FOR THE ENTIRE PROJECT.
- 18. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32°F (O°C). PROVIDE CABLE SUPPORTS FOR WIRE IN RISER CONDUITS AS REQUIRED BY CODE.
- 19. SET BOXES SQUARE AND TRUE WITH BUILDING FINISH. ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRONS.
- 20. VERIFY EXACT LOCATIONS AND MOUNTING HEIGHT OF ALL LIGHT FIXTURES, SWITCHES, RECEPTACLES, OUTLETS, FIRE ALARM DEVICES, VOICE/DATA DEVICES AND OTHER EQUIPMENT WITH ARCHITECTURAL DRAWINGS AND IN THE FIELD PRIOR TO ROUGH-IN. IN CENTERING OUTLETS AND LOCATION BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS AND MECHANICAL EQUIPMENT VARIATIONS IN FIREPROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILINGS AND THE LIKE, AND CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSE TO OWNER.
- 21. A "+" SYMBOL NEXT TO A DEVICE INDICATES A NON-STANDARD DEVICE MOUNTING HEIGHT CONTRACTOR SHALL COORDINATE EXACT MOUNTING HEIGHT PRIOR TO ROUGH-IN.
- 22. LOCATIONS INDICATED FOR LOCAL WALL SWITCHES ARE SUBJECT TO MODIFICATIONS AT OR NEAR DOORS. COORDINATE WITH ARCHITECT AND INSTALL SWITCH ON SIDE OPPOSITE HINGE. VERIFY FINAL HINGE LOCATIONS IN FIELD PRIOR TO SWITCH OUTLET INSTALLATION.
- 23. PROVIDE PULL BOXES AS INDICATED AND WHEREVER NECESSARY TO FACILITATE PULLING OF WIRE AND COORDINATE LOCATIONS WITH OTHER TRADES.
- 24. FOR EMPTY RACEWAY RUNS, PROVIDE PULL BOXES EVERY 100FT AND AS INDICATED. COORDINATE LOCATIONS WITH OTHER TRADES.
- 25. JUNCTION AND PULL BOXES: LOCATE GENERALLY NOT EXPOSED IN FINISHED SPACES. WHERE NECESSARY, REROUTE CONDUITS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. COVERS OF JUNCTION AND PULL BOXES SHALL BE ACCESSIBLE.
- 26. SUPPORT JUNCTION AND PULL BOXES INDEPENDENTLY TO BUILDING STRUCTURE WITH NO WEIGHT BEARING ON CONDUITS.
- 27. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT PRIOR TO INSTALLATION.
- 28. FIRESTOPPING SHALL BE INSTALLED WHENEVER WIRING OR RACEWAYS CROSS FIRE RATED CONSTRUCTION.
- 29. THE FINAL ACCEPTANCE WILL BE MADE AFTER THE CONTRACTOR HAS ADJUSTED HIS EQUIPMENT, BALANCES THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS, AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION, SHOP AND RECORD DRAWINGS AND APPROVALS.
- 30. DEMONSTRATE PERFORMANCE AND CAPACITY OF ALL SYSTEMS AND EQUIPMENT.
- 31. AT COMPLETION OF PROJECT, PROVIDE NEW UPDATED TYPE WRITTEN PANELBOARD DIRECTORIES FOR ALL NEW PANELBOARDS AND ANY EXISTING PANELBOARDS THAT HAVE BEEN MODIFIED.
- 32. PROVIDE REPRODUCIBLE "AS BUILT" DRAWINGS INDICATING AS-INSTALLED CONDITIONS AFTER COMPLETION OF THE INSTALLATION.
- 33. THE CONTRACTOR SHALL GUARANTEE AND SERVICE THE ENTIRE INSTALLATION FOR A PERIOD OF ONE YEAR FROM THE DATE OF THE FINAL ACCEPTANCE OF THE INSTALLATION.
- 34. THE CONTRACTOR SHALL, DURING THE PERIOD OF THE GUARANTEE, REPLACE OR REPAIR AT HIS OWN EXPENSE ANY PIECE OF EQUIPMENT AND/OR MATERIAL WHICH IS FOUND TO BE DEFECTIVE. THE REPLACEMENT OR REPAIR SHALL BE DONE AS SOON AS NOTIFIED BY THE ENGINEER OR AUTHORIZED REPRESENTATIVE. THE CONTRACTOR SHALL ALSO REPAIR ALL DAMAGE TO SURROUNDING WORK CAUSED BY THE FAILURE, REPAIR OR REPLACEMENT OF DEFECTIVE EQUIPMENT.
- 35. THE CONTRACTOR SHALL COORDINATE ALL PLENUM RATED LOCATION(S) WITH MC. EC SHALL PROVIDE METAL CONDUIT OR MC CABLE WITHIN PLENUM RATED SPACE(S).

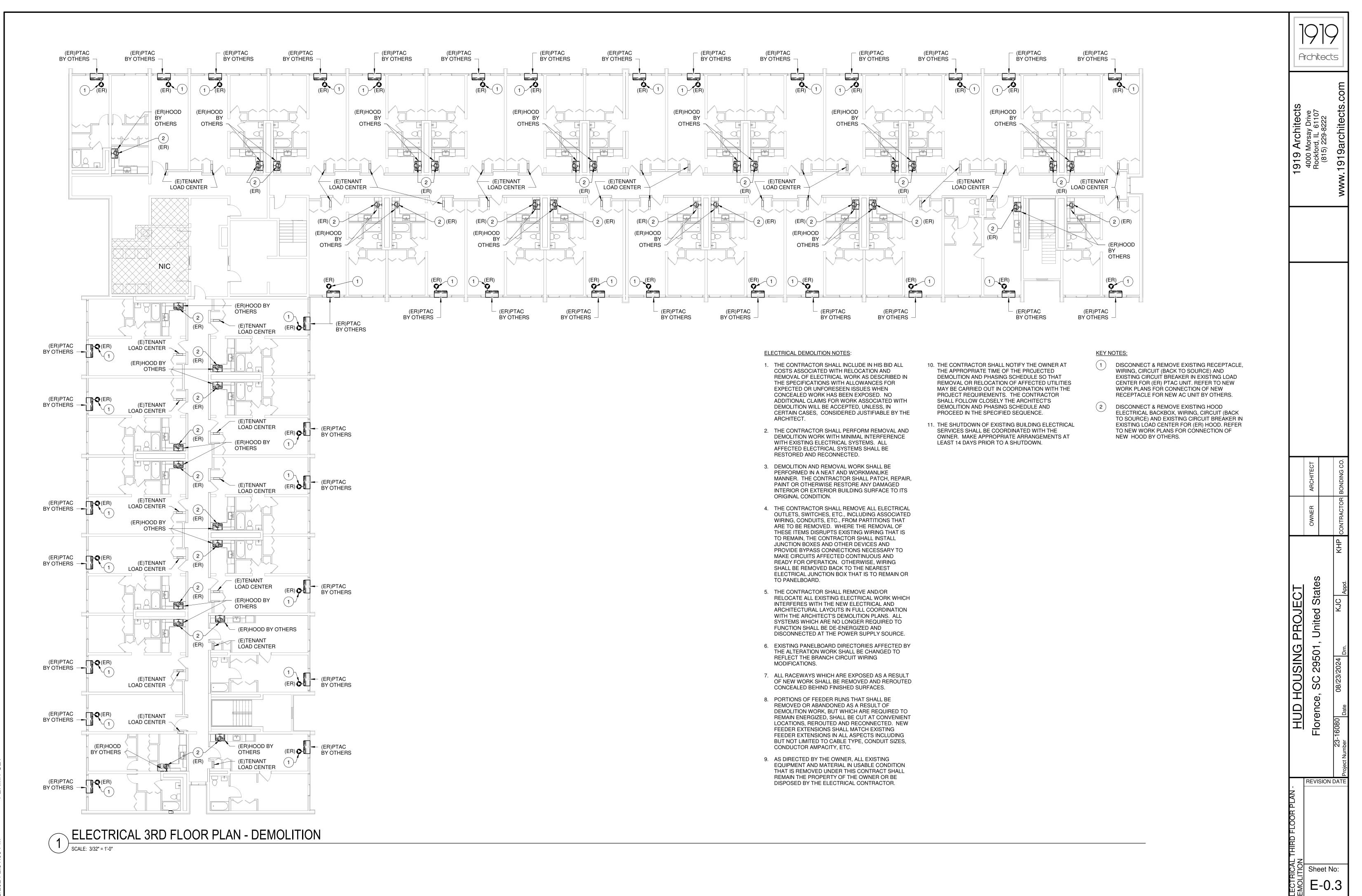
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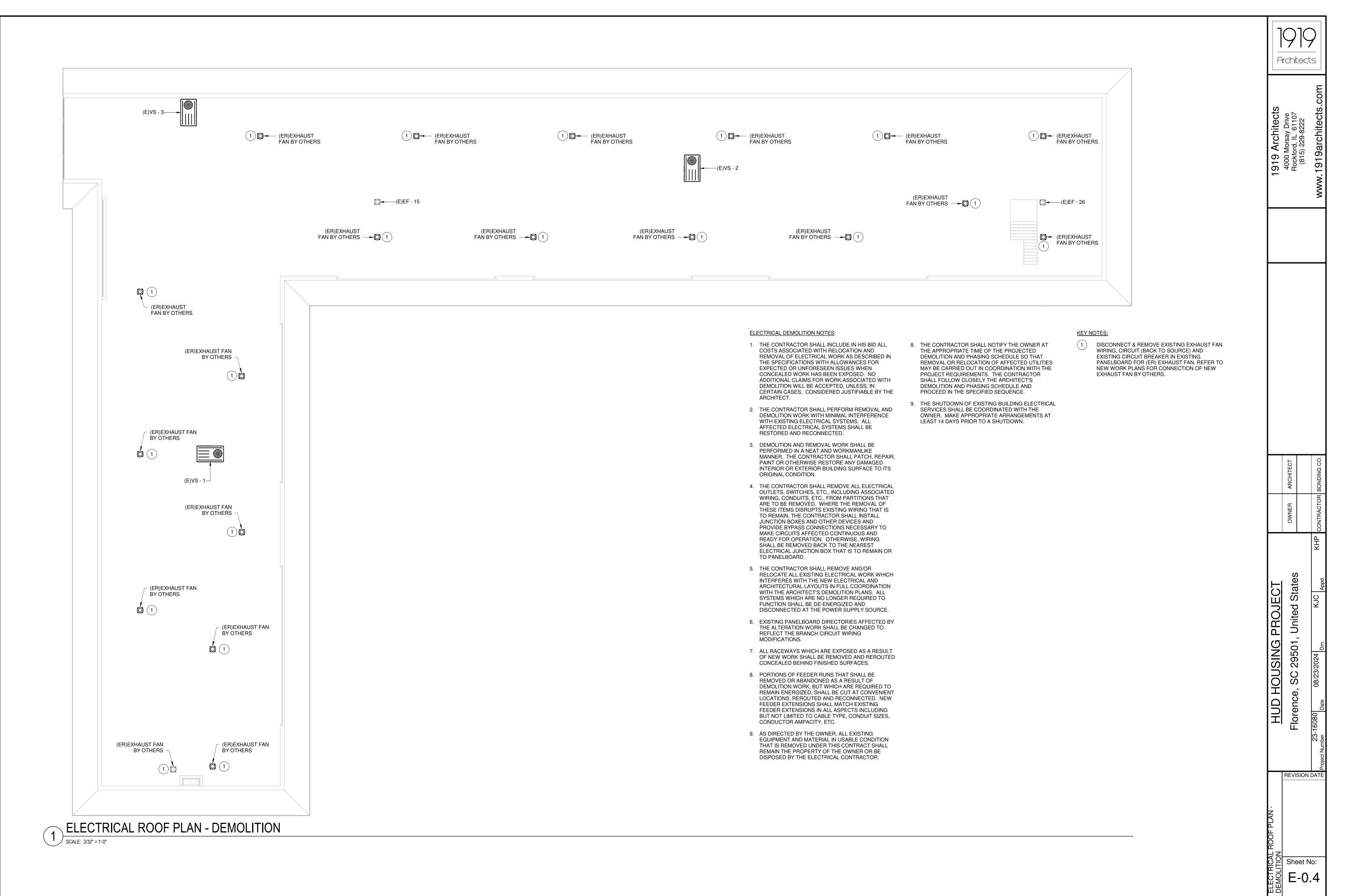
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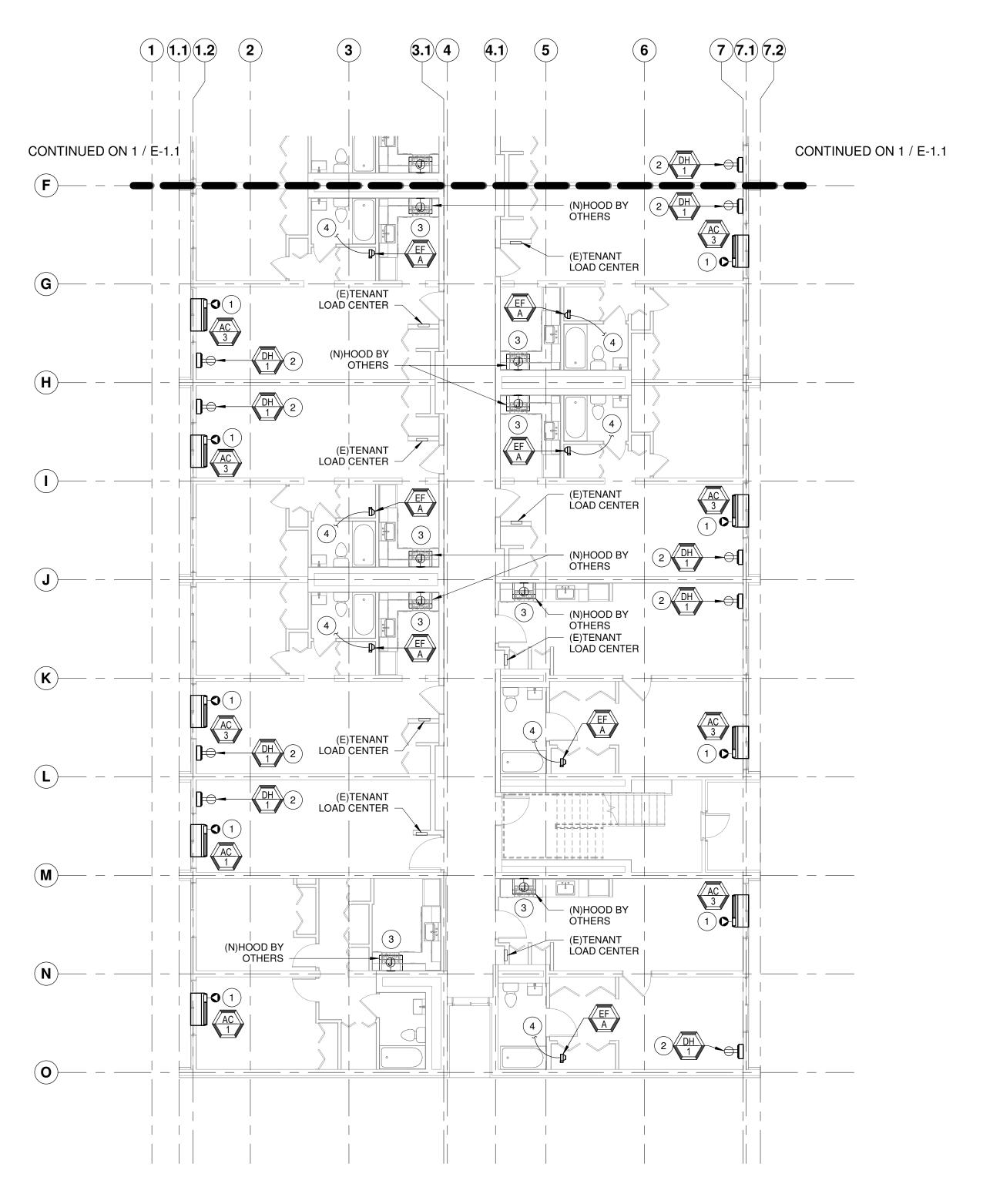






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ELECTRICAL 1ST FLOOR PLAN - WEST

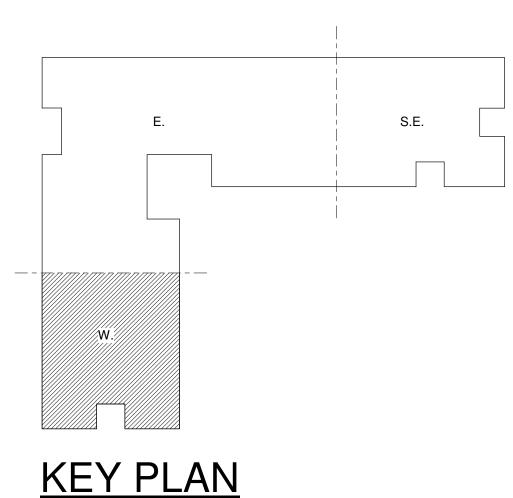
SCALE: 1/8" = 1'-0"

DRAWING NOTES:

- 1. A 24" MINIMUM SEPARATION SHALL BE MAINTAINED BETWEEN SINGLE AND TWO-GANG OUTLET AND SWITCH BOXES INSTALLED ON OPPOSITE SIDES OF ANY 2-HOUR (MAXIMUM) FIRE-RATED WALL/PARTITION. PROVIDE FIREPROOFING PUTTY PACKS OR OTHER FIREPROOFING LISTED FOR THIS PURPOSE WHERE REQUIRED BY SECTION 714.4.2 OF THE INTERNATIONAL BUILDING CODE. DO NOT INSTALL PANELBOARD BACK BOXES IN FIRE RATED WALLS. ALL EQUIPMENT AND DEVICES ARE NEW UNLESS OTHERWISE NOTED.
- 2. CONFIRM ALL DEVICE AND EQUIPMENT LOCATIONS WITH THE ARCHITECT AND OWNER PRIOR TO ANY PURCHASE OR ROUGH-IN.
- 3. CONFIRM ALL POWER OVERCURRENT PROTECTION, WIRING AND DEVICE/DISCONNECT REQUIREMENTS FOR ALL EQUIPMENT PRIOR TO ROUGH-IN AND REPORT ANY DISCREPANCY WITH THE DESIGN TO THE ARCHITECT AND OWNER FOR RESOLUTION.
- 4. PROVIDE ALL DISCONNECT SWITCHES AS HEAVY-DUTY TYPE RATED WITH VOLTAGE AS REQUIRED AND AMPS, FUSING AND POLES AS INDICATED. DISCONNECT SWITCHES FOR INTERIOR EQUIPMENT SHALL BE NEMA 1 RATED UON. DISCONNECT SWITCHES FOR EXTERIOR EQUIPMENT SHALL BE WEATHERPROOF LOCKABLE HEAVY DUTY TYPE, NEMA 3R UON.
- 5. COORDINATE ALL MECHANICAL AND PLUMBING EQUIPMENT LOCATIONS AND CONNECTIONS PRIOR TO ANY PURCHASE OR ROUGH-IN.
- 6. CONTRACTOR SHALL CLOSELY COORDINATE AND ADJUST ALL HVAC EQUIPMENT LOCATIONS WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGHIN SUCH THAT LIGHTING LAYOUT REMAINS AS INDICATED.
- 7. PRE-MANUFACTURED METAL-CLAD CABLE (MC)
 SHALL BE UTILIZED FOR ALL NORMAL BRANCH
 CIRCUITS IN DRY HOLLOW STUD WALL LOCATIONS,
 ABOVE ACCESSIBLE CEILINGS AND WHERE
 PERMITTED BY ARTICLE #330 OF THE NATIONAL
 ELECTRICAL CODE ONLY. MINIMUM CONDUCTOR
 SIZE SHALL BE NO. 12 AWG COPPER WITH INTEGRAL
 GREEN INSULATED CONTINUOUS GROUND
 CONDUCTOR AND BARE BONDING CONDUCTOR IN
 DIRECT CONTACT WITH OUTER METAL JACKET.
- 8. COORDINATE ROUTING OF ALL CONDUIT, CABLING, ETC. THROUGH CASEWORK W/CASEWORK INSTALLER PRIOR TO ANY PURCHASE OR ROUGH-IN.
- 9. THESE DRAWINGS HAVE BEEN MADE BASED ON A VISUAL INSPECTION OF THE EXISTING SURFACES. SOME ASSUMPTIONS HAVE BEEN MADE AS TO ACTUAL CONSTRUCTION, MATERIALS, AND METHODS. THE INSTALLER SHALL BE RESPONSIBLE FOR VERIFYING ALL ACTUAL FIELD CONDITIONS AND SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES, CONFLICTS, AND UNFORESEEN CONDITIONS.
- 10. EC SHALL FIRE CAULK ALL EXISTING AND NEW CONDUIT PENETRATIONS IN FIRE WALLS WITHIN CONTRACT AREA TO MAINTAIN FIRE WALL RATING.
- 11. ALL CONDUITS TRAVELING FROM OUTDOORS TO INDOORS AND FROM A WARM ENVIRONMENT TO COLD SHALL BE VAPOR SEALED TO PREVENT CONDENSATION BUILDUP. THE SEAL SHALL BE A CONDUIT BODY OR JUNCTION BOX LOCATED ON THE HIGH TEMPERATURE SIDE OF THE TRANSITION SEALED WITH ELECTRICAL DUCT SEAL OR A NON-LATEX, CLOSED CELL, EXPANDING FOAM SEALANT LISTED FOR THE PURPOSE, INSTALLED IN THE CONDUIT ENTERING THE COLDER SPACE.

KEY NOTES:

- 1 EC SHALL FEED NEW RECEPTACLE FOR NEW AC UNIT (BY OTHERS) FROM A (N)15A/2P CIRCUIT BREAKER IN (E)TENANT LOAD CENTER VIA 3#12 + 1#12 GROUND WIRING.
- EC SHALL FEED DH-1 RECEPTACLE FROM A
 (N)15A/1P CIRCUIT BREAKER IN (E)TENANT LOAD
 CENTER VIA 2#12 + 1#12 GROUND WIRING.
 COORDINATE FINAL LOCATION OF RECEPTACLE
 WITH MC PRIOR TO ROUGH-IN.
- 3 EC SHALL FEED FOR NEW HOOD (BY OTHERS) FROM A (N)20A/1P CIRCUIT BREAKER IN (E) TENANT LOAD CENTER VIA 2#12 + 1#12 GROUND WIRING.
- EF-A SHALL BE FED UPSTREAM FROM LOCAL LIGHTING CIRCUIT SWITCH CURRENTLY SERVING THIS AREA FOR SIMALTANIOUS OPERATION.



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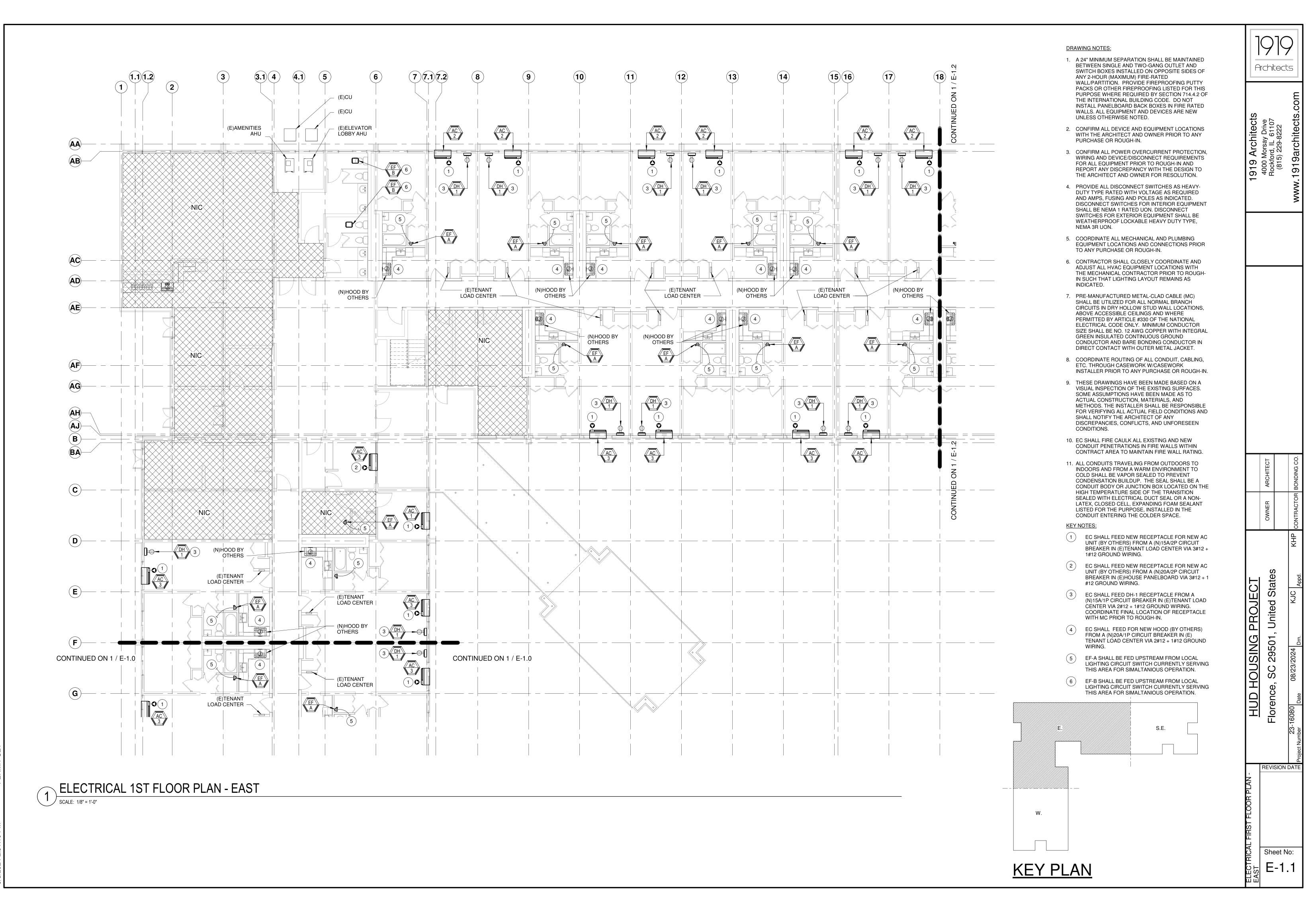
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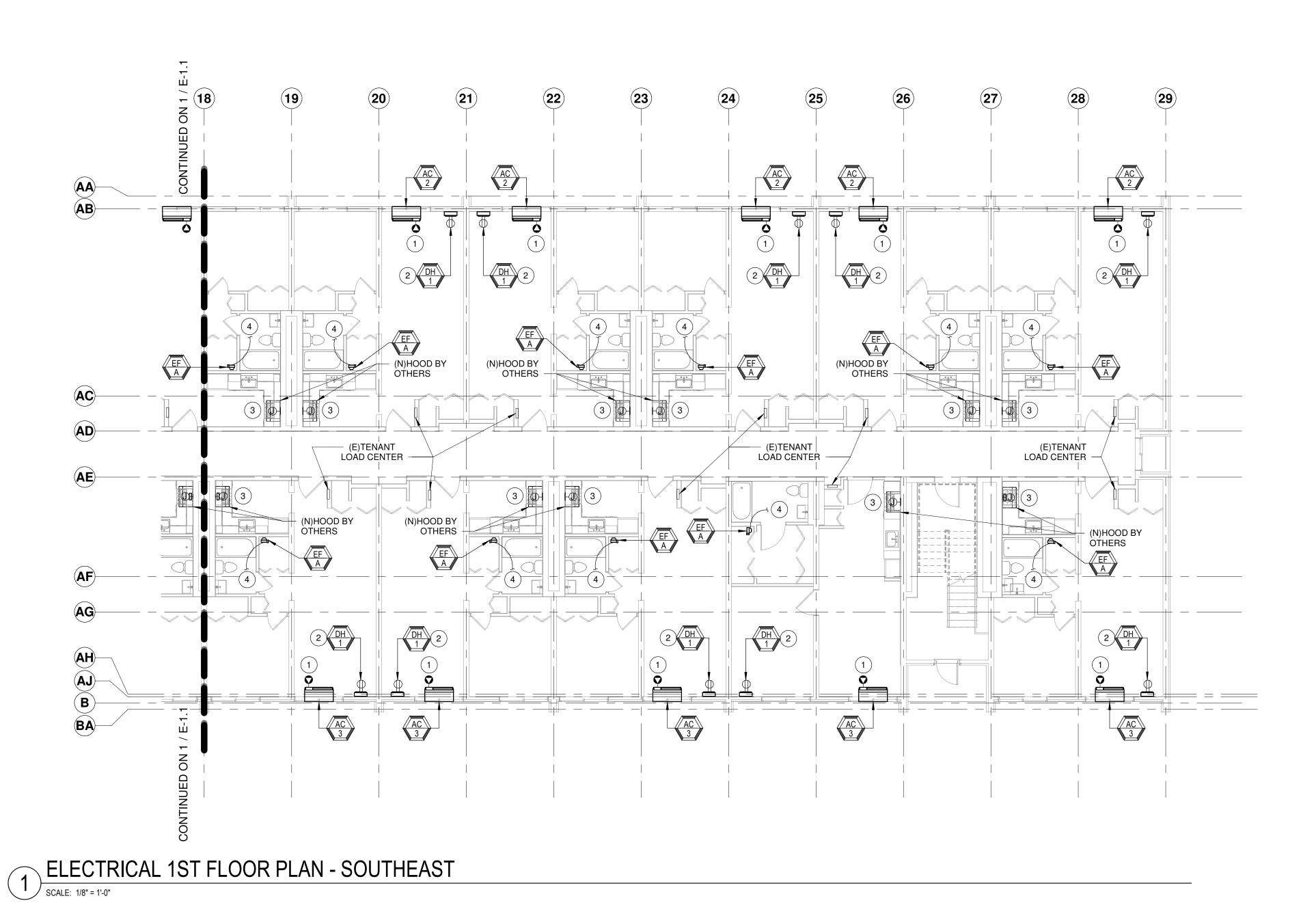
KJC Appd. KHP CONTRACTOR BON

Florence, SC 29501, United

Florence Project Number Date

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Architects

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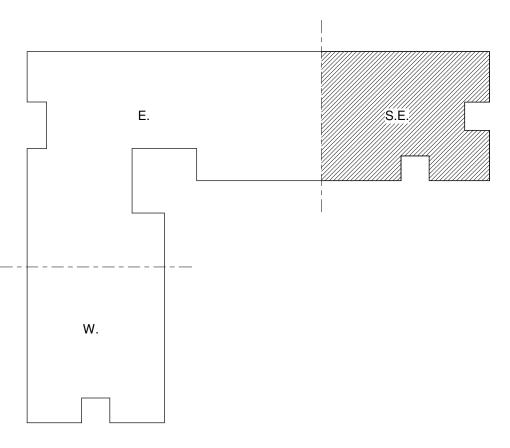
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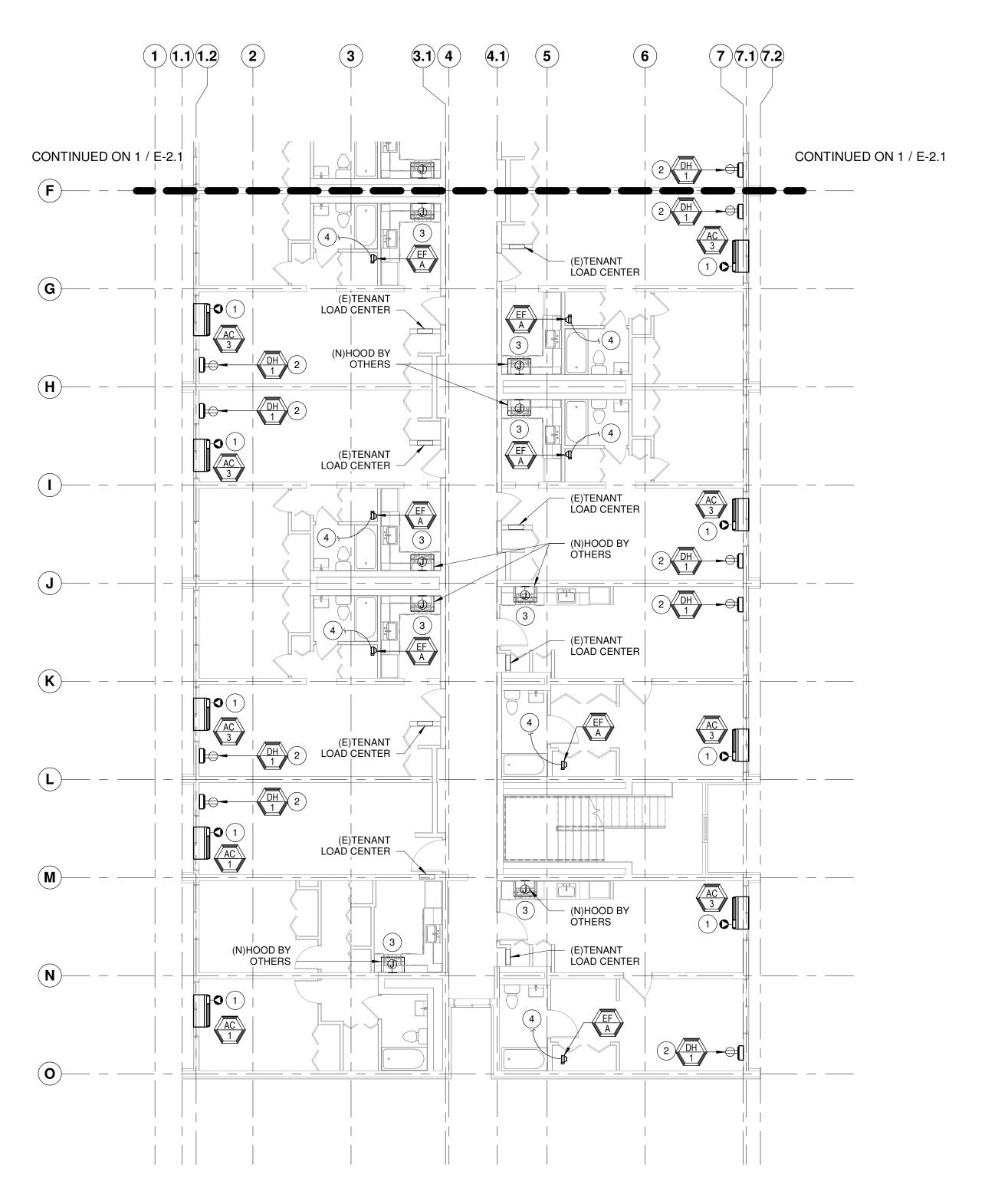
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- 9. THESE DRAWINGS HAVE BEEN MADE BASED ON A VISUAL INSPECTION OF THE EXISTING SURFACES. SOME ASSUMPTIONS HAVE BEEN MADE AS TO ACTUAL CONSTRUCTION, MATERIALS, AND METHODS. THE INSTALLER SHALL BE RESPONSIBLE FOR VERIFYING ALL ACTUAL FIELD CONDITIONS AND SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES, CONFLICTS, AND UNFORESEEN CONDITIONS.
- 10. EC SHALL FIRE CAULK ALL EXISTING AND NEW CONDUIT PENETRATIONS IN FIRE WALLS WITHIN CONTRACT AREA TO MAINTAIN FIRE WALL RATING.
- 11. ALL CONDUITS TRAVELING FROM OUTDOORS TO INDOORS AND FROM A WARM ENVIRONMENT TO COLD SHALL BE VAPOR SEALED TO PREVENT CONDENSATION BUILDUP. THE SEAL SHALL BE A CONDUIT BODY OR JUNCTION BOX LOCATED ON THE HIGH TEMPERATURE SIDE OF THE TRANSITION SEALED WITH ELECTRICAL DUCT SEAL OR A NON-LATEX, CLOSED CELL, EXPANDING FOAM SEALANT LISTED FOR THE PURPOSE, INSTALLED IN THE CONDUIT ENTERING THE COLDER SPACE.

KEY NOTES:

- EC SHALL FEED NEW RECEPTACLE FOR NEW AC UNIT (BY OTHERS) FROM A (N)15A/2P CIRCUIT BREAKER IN (E)TENANT LOAD CENTER VIA 3#12 + 1#12 GROUND WIRING.
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- EF-A SHALL BE FED UPSTREAM FROM LOCAL LIGHTING CIRCUIT SWITCH CURRENTLY SERVING THIS AREA FOR SIMALTANIOUS OPERATION.



KEY PLAN



ELECTRICAL 2ND FLOOR PLAN -WEST

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

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Architects

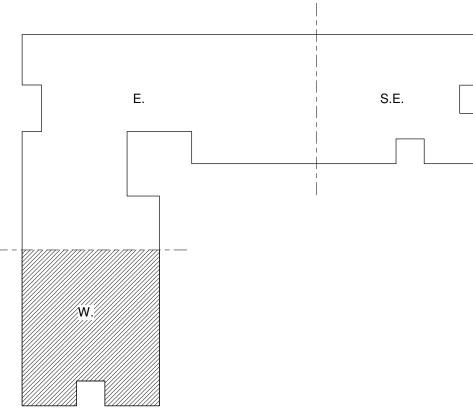
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- 2. CONFIRM ALL DEVICE AND EQUIPMENT LOCATIONS WITH THE ARCHITECT AND OWNER PRIOR TO ANY PURCHASE OR ROUGH-IN.
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- 4. PROVIDE ALL DISCONNECT SWITCHES AS HEAVY-DUTY TYPE RATED WITH VOLTAGE AS REQUIRED AND AMPS, FUSING AND POLES AS INDICATED. DISCONNECT SWITCHES FOR INTERIOR EQUIPMENT SHALL BE NEMA 1 RATED UON. DISCONNECT SWITCHES FOR EXTERIOR EQUIPMENT SHALL BE WEATHERPROOF LOCKABLE HEAVY DUTY TYPE, NEMA 3R UON.
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REVISION DATE **KEY PLAN**

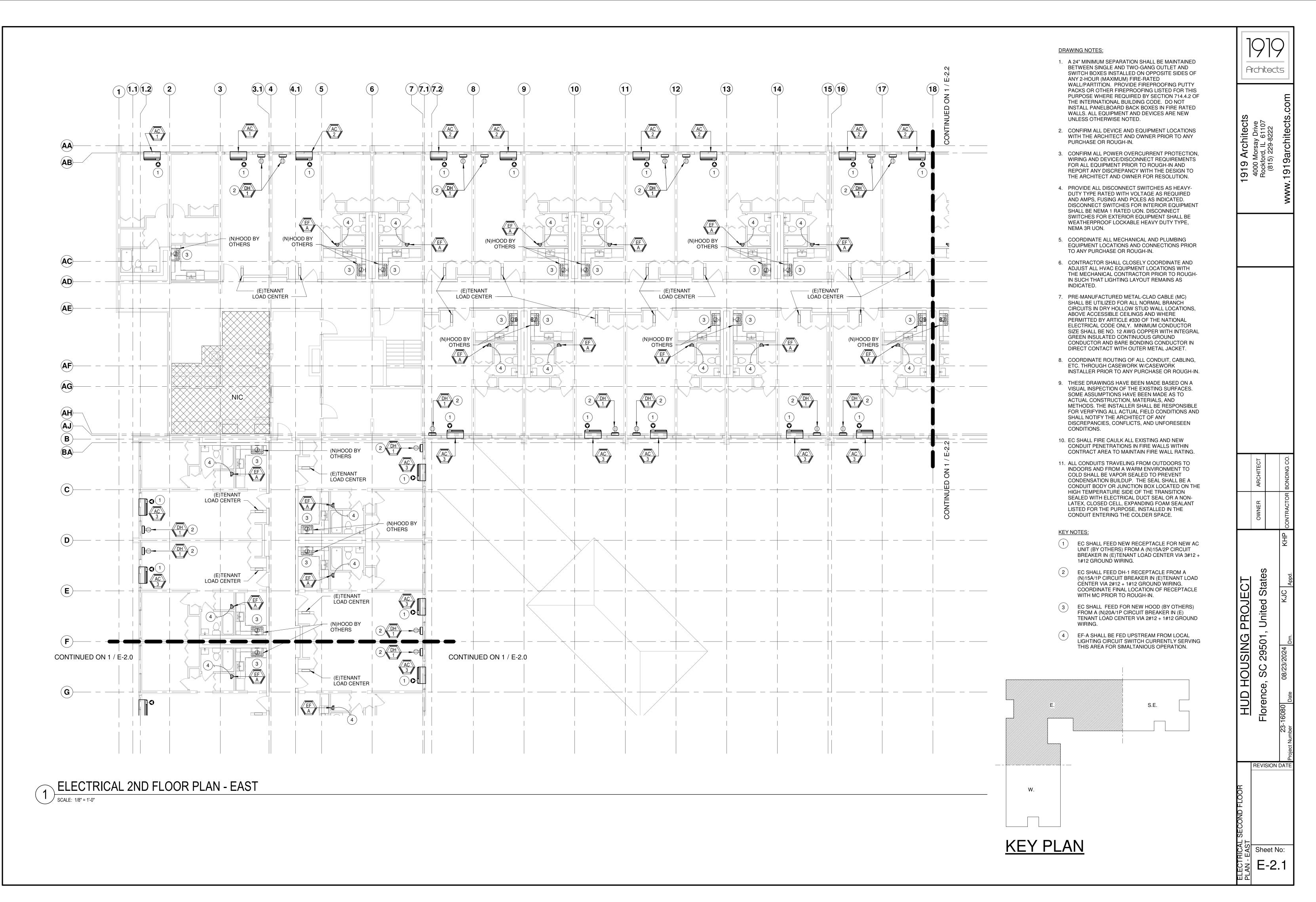
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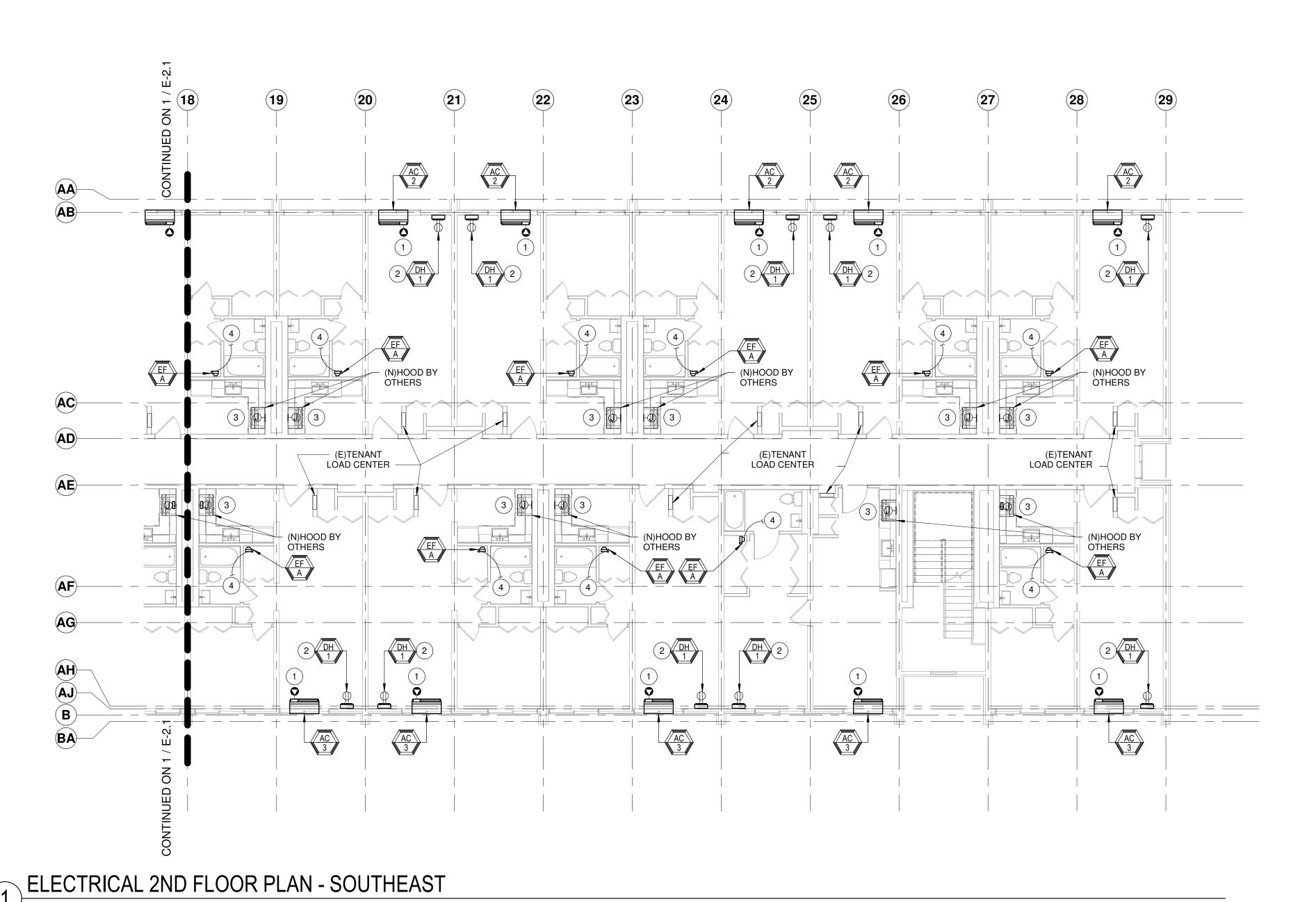
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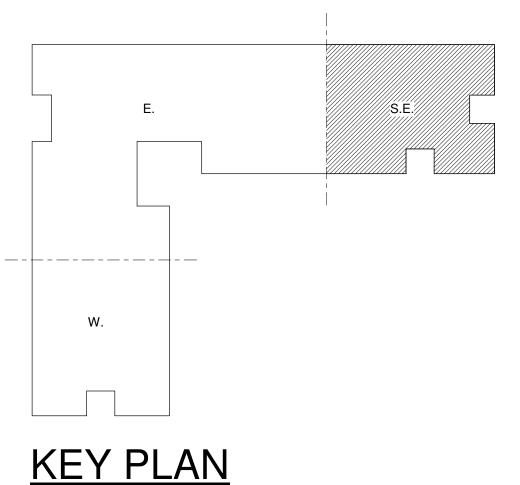
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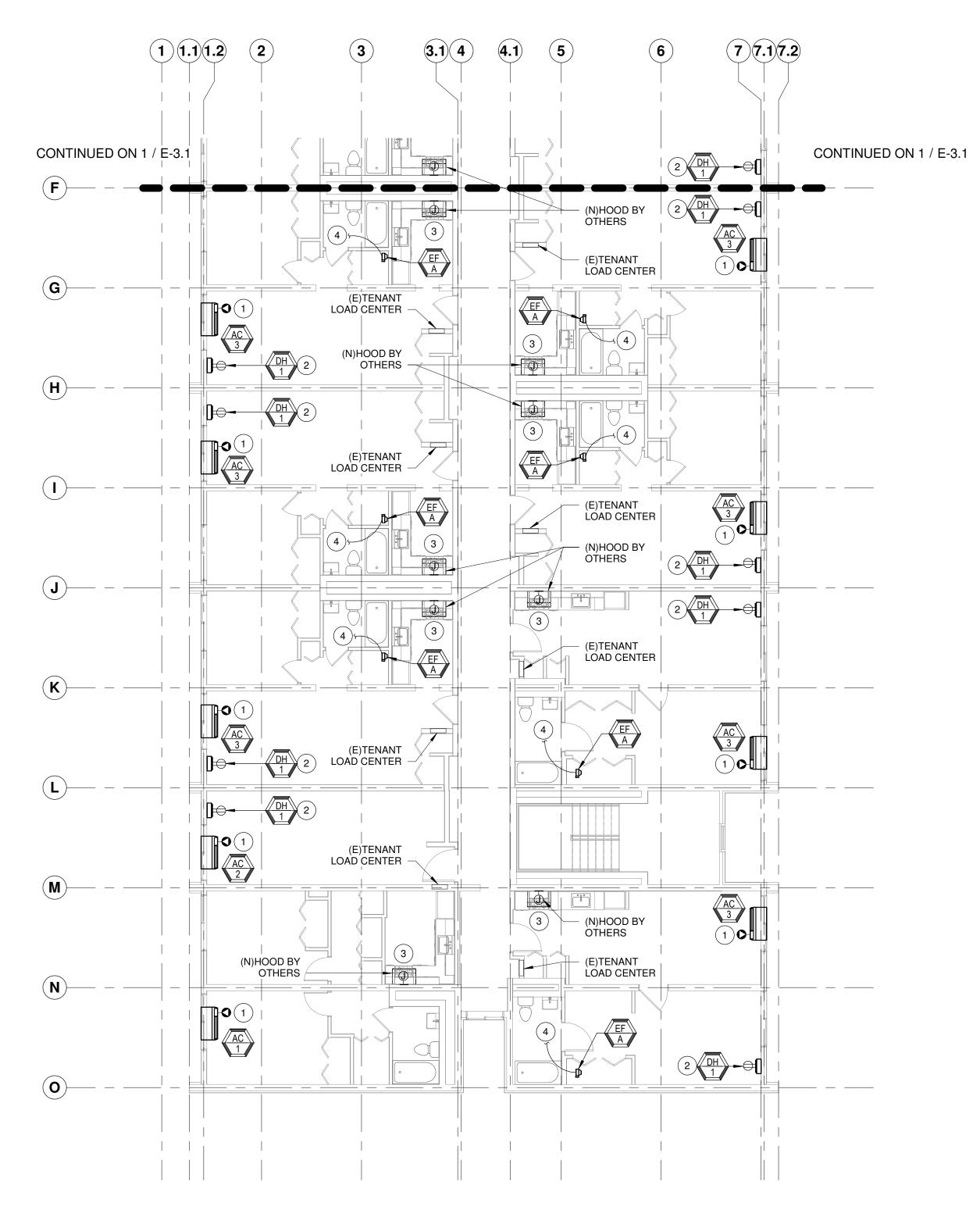
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HUD REVISION DATE

Sheet No: E-2.2



ELECTRICAL 3RD FLOOR PLAN - WEST

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

DRAWING NOTES:

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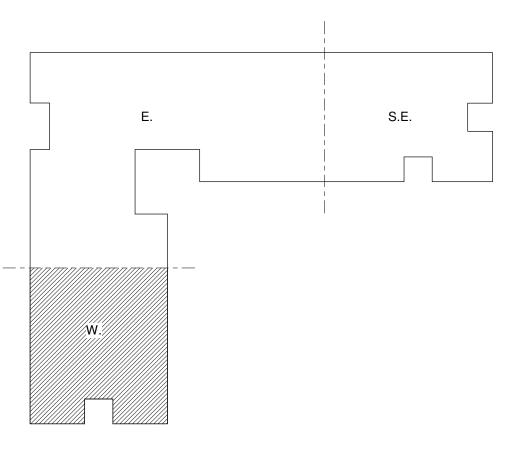
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KEY PLAN

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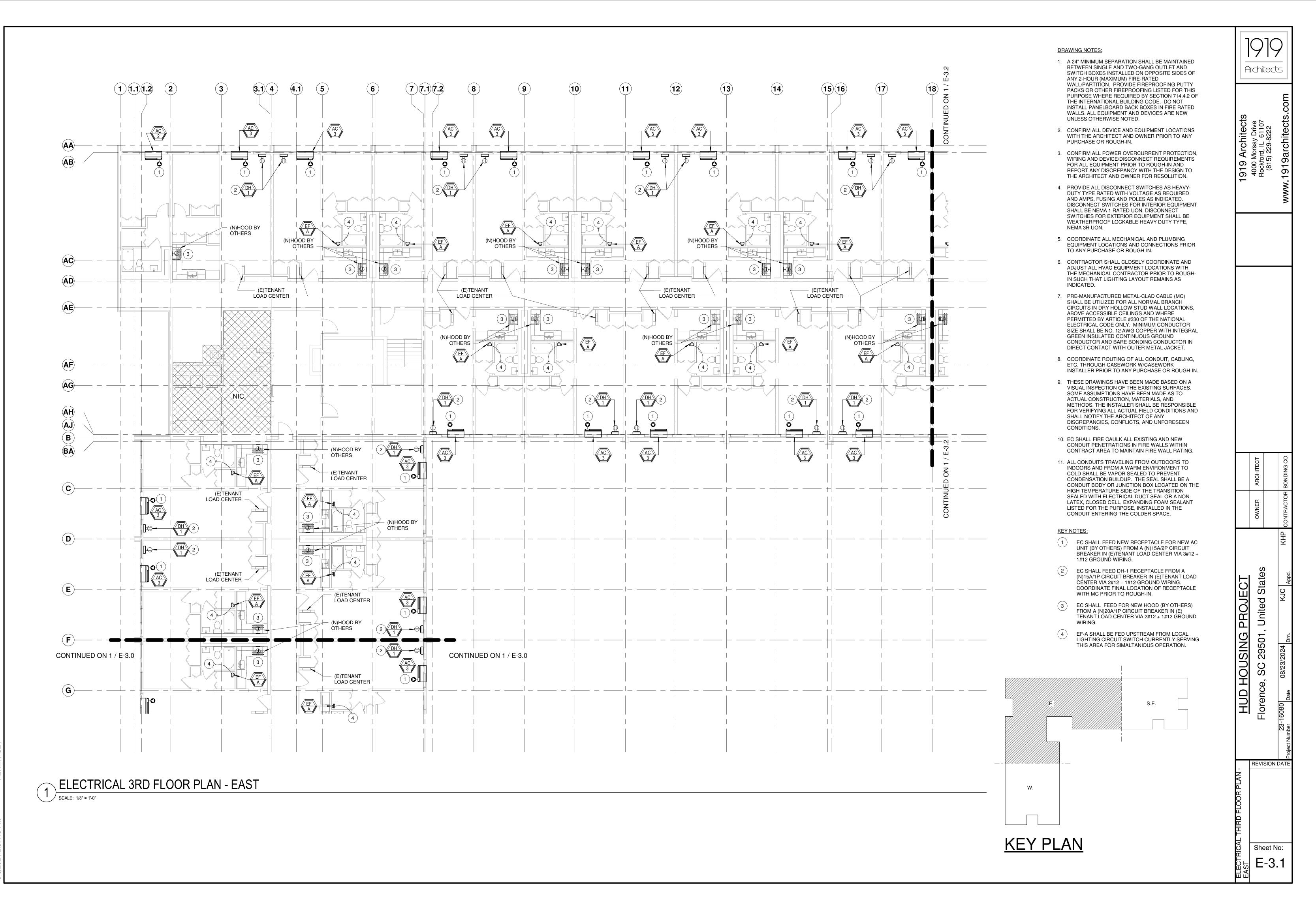
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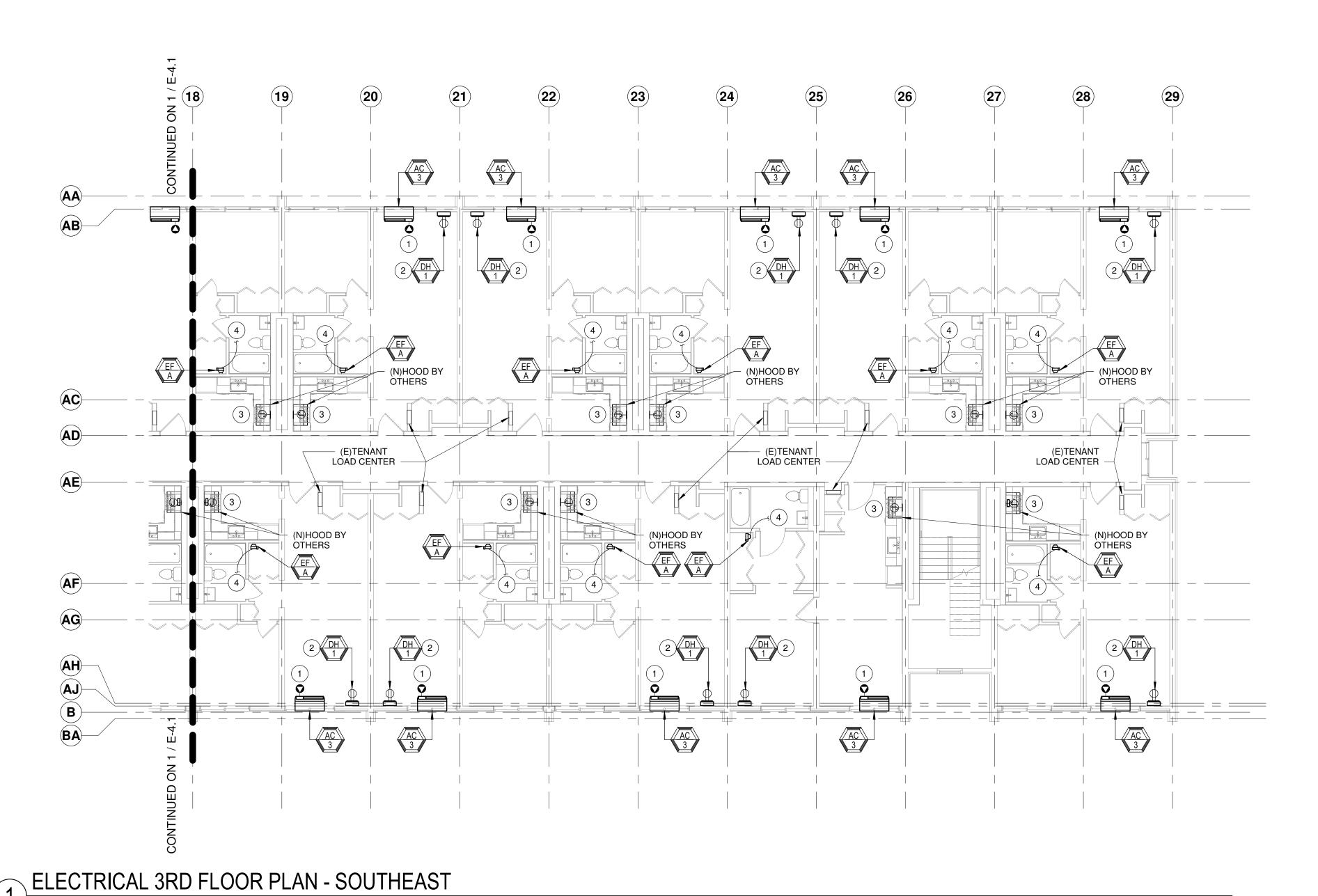
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Florence,





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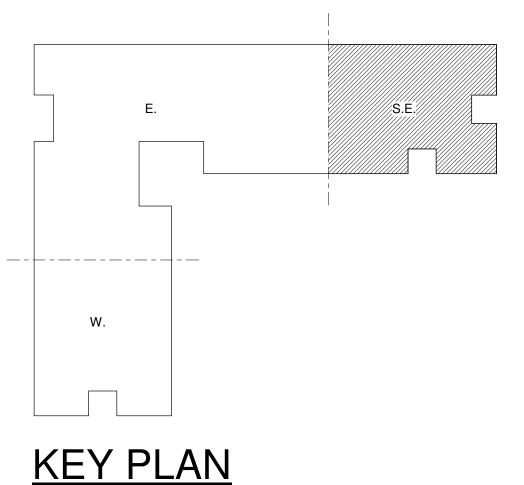
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ELECTRICAL ROOF PLAN - WEST

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

DRAWING NOTES:

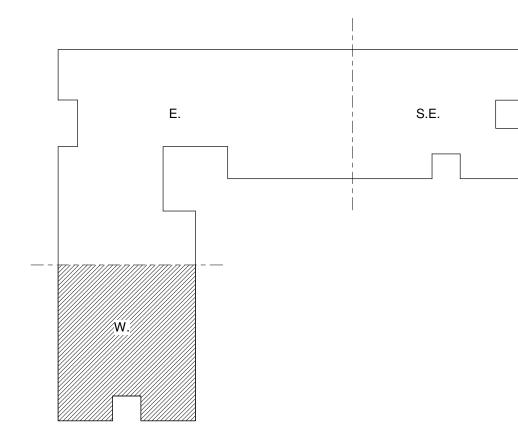
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- PROVIDE LOCKABLE IN-USE WEATHERPROOF (WP) EXTRA DUTY COVER FOR ALL EXTERIOR RECEPTACLES.



KEY PLAN

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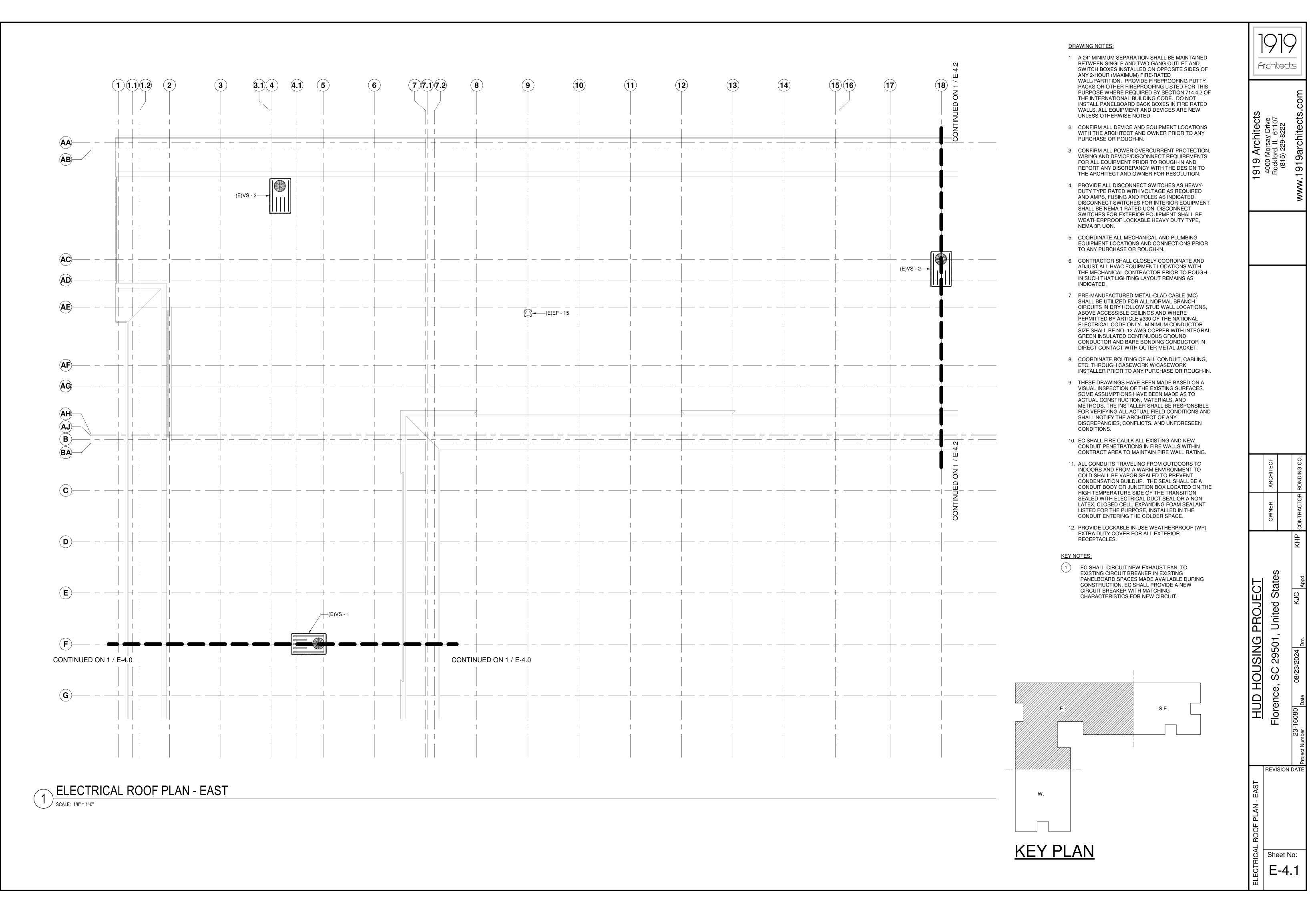
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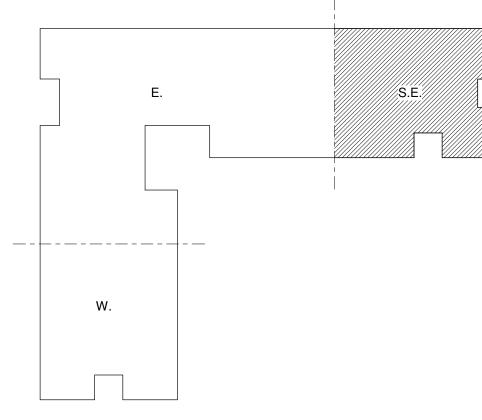


ELECTRICAL ROOF PLAN - SOUTHEAST

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

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- 2. CONFIRM ALL DEVICE AND EQUIPMENT LOCATIONS WITH THE ARCHITECT AND OWNER PRIOR TO ANY PURCHASE OR ROUGH-IN.
- 3. CONFIRM ALL POWER OVERCURRENT PROTECTION, WIRING AND DEVICE/DISCONNECT REQUIREMENTS FOR ALL EQUIPMENT PRIOR TO ROUGH-IN AND REPORT ANY DISCREPANCY WITH THE DESIGN TO THE ARCHITECT AND OWNER FOR RESOLUTION.
- 4. PROVIDE ALL DISCONNECT SWITCHES AS HEAVY-DUTY TYPE RATED WITH VOLTAGE AS REQUIRED AND AMPS, FUSING AND POLES AS INDICATED. DISCONNECT SWITCHES FOR INTERIOR EQUIPMENT SHALL BE NEMA 1 RATED UON. DISCONNECT SWITCHES FOR EXTERIOR EQUIPMENT SHALL BE WEATHERPROOF LOCKABLE HEAVY DUTY TYPE, NEMA 3R UON.
- 5. COORDINATE ALL MECHANICAL AND PLUMBING EQUIPMENT LOCATIONS AND CONNECTIONS PRIOR TO ANY PURCHASE OR ROUGH-IN.
- 6. CONTRACTOR SHALL CLOSELY COORDINATE AND ADJUST ALL HVAC EQUIPMENT LOCATIONS WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGHIN SUCH THAT LIGHTING LAYOUT REMAINS AS INDICATED.
- 7. PRE-MANUFACTURED METAL-CLAD CABLE (MC)
 SHALL BE UTILIZED FOR ALL NORMAL BRANCH
 CIRCUITS IN DRY HOLLOW STUD WALL LOCATIONS,
 ABOVE ACCESSIBLE CEILINGS AND WHERE
 PERMITTED BY ARTICLE #330 OF THE NATIONAL
 ELECTRICAL CODE ONLY. MINIMUM CONDUCTOR
 SIZE SHALL BE NO. 12 AWG COPPER WITH INTEGRAL
 GREEN INSULATED CONTINUOUS GROUND
 CONDUCTOR AND BARE BONDING CONDUCTOR IN
 DIRECT CONTACT WITH OUTER METAL JACKET.
- 8. COORDINATE ROUTING OF ALL CONDUIT, CABLING, ETC. THROUGH CASEWORK W/CASEWORK INSTALLER PRIOR TO ANY PURCHASE OR ROUGH-IN.
- 9. THESE DRAWINGS HAVE BEEN MADE BASED ON A VISUAL INSPECTION OF THE EXISTING SURFACES. SOME ASSUMPTIONS HAVE BEEN MADE AS TO ACTUAL CONSTRUCTION, MATERIALS, AND METHODS. THE INSTALLER SHALL BE RESPONSIBLE FOR VERIFYING ALL ACTUAL FIELD CONDITIONS AND SHALL NOTIFY THE ARCHITECT OF ANY DISCREPANCIES, CONFLICTS, AND UNFORESEEN CONDITIONS.
- 10. EC SHALL FIRE CAULK ALL EXISTING AND NEW CONDUIT PENETRATIONS IN FIRE WALLS WITHIN CONTRACT AREA TO MAINTAIN FIRE WALL RATING.
- 11. ALL CONDUITS TRAVELING FROM OUTDOORS TO INDOORS AND FROM A WARM ENVIRONMENT TO COLD SHALL BE VAPOR SEALED TO PREVENT CONDENSATION BUILDUP. THE SEAL SHALL BE A CONDUIT BODY OR JUNCTION BOX LOCATED ON THE HIGH TEMPERATURE SIDE OF THE TRANSITION SEALED WITH ELECTRICAL DUCT SEAL OR A NON-LATEX, CLOSED CELL, EXPANDING FOAM SEALANT LISTED FOR THE PURPOSE, INSTALLED IN THE CONDUIT ENTERING THE COLDER SPACE.
- 12. PROVIDE LOCKABLE IN-USE WEATHERPROOF (WP) EXTRA DUTY COVER FOR ALL EXTERIOR RECEPTACLES.

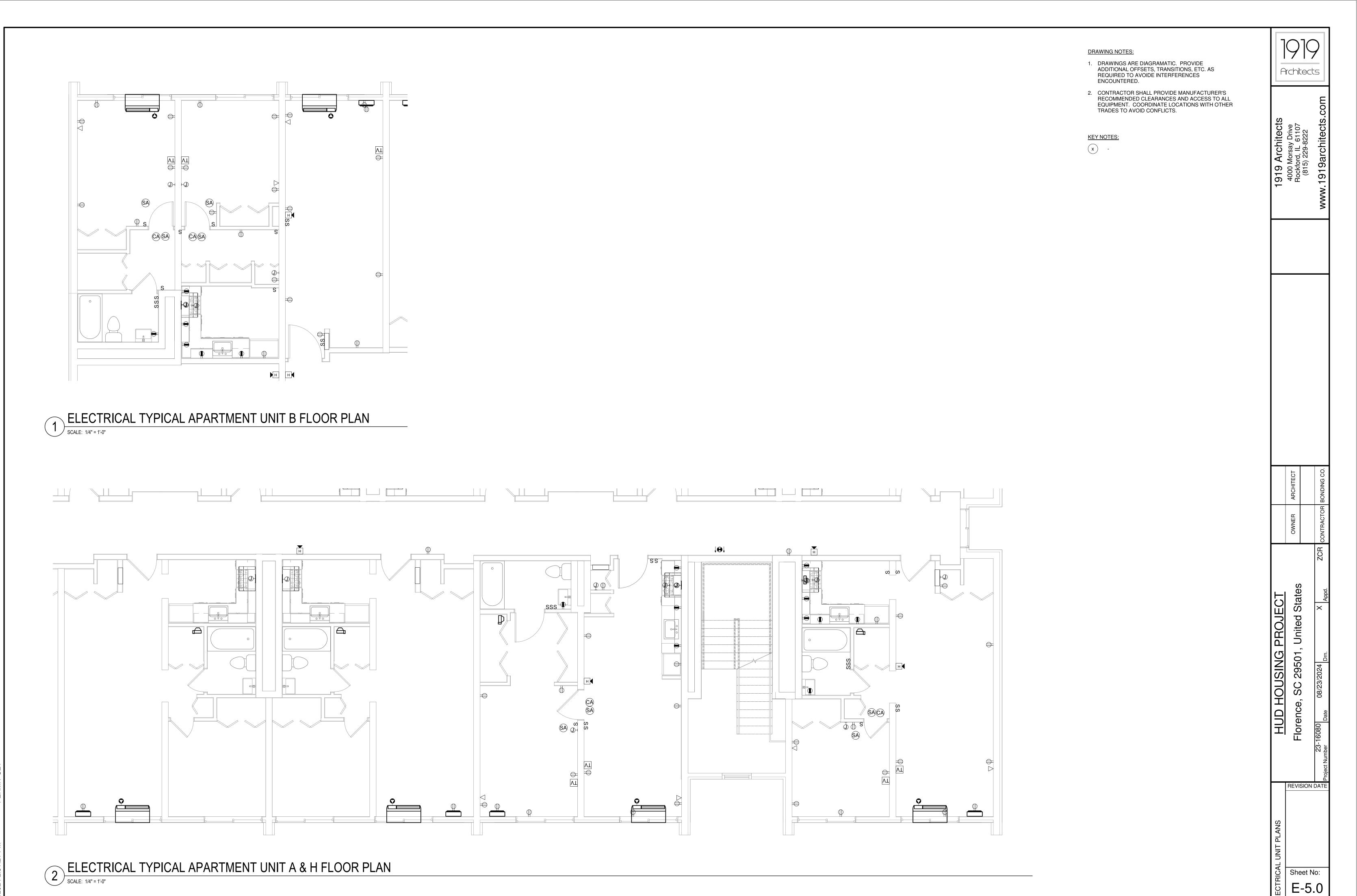


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- B. ALL APPLICABLE CODES, LAWS, REGULATIONS AND STANDARDS GOVERNING OR RELATING TO ANY PORTION OF THIS WORK ARE HEREBY INCORPORATED INTO AND MADE A PART OF THESE SPECIFICATIONS, AND THEIR PROVISIONS SHALL BE CARRIED OUT BY THE CONTRACTOR WHO SHALL INFORM THE OWNER, PRIOR TO SUBMITTING A PROPOSAL, OF ANY WORK OR MATERIAL WHICH VIOLATES ANY OF THE ABOVE LAWS AND REGULATIONS. ANY WORK DONE BY THE CONTRACTOR CAUSING SUCH VIOLATION SHALL BE CORRECTED BY THE CONTRACTOR.
- C. INVESTIGATE EACH SPACE THROUGH WHICH EQUIPMENT MUST BE MOVED. WHERE NECESSARY, EQUIPMENT SHALL BE SHIPPED FROM MANUFACTURER IN SECTIONS OF SIZE SUITABLE FOR MOVING THROUGH AVAILABLE RESTRICTIVE SPACES. ASCERTAIN FROM BUILDING OWNER AND TENANT AT WHAT TIMES OF DAY EQUIPMENT MAY BE MOVED THROUGH ALL AREAS.
- D. DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENT OF SYSTEMS AND WORK. CONDUIT ROUTING IS SHOWN DIAGRAMMATICALLY AND DOES NOT SHOW ALL OFFSETS, DROPS AND RISES OF RUNS. THE CONTRACTOR SHALL ALLOW IN HIS PRICE FOR ROUTING OF CONDUIT TO AVOID OBSTRUCTIONS. COORDINATION WITH EXISTING SERVICES, INCLUDING THOSE OF OTHER TRADES, IS REQUIRED. MAINTAIN HEADROOM AND SPACE
- INSTALL WORK SO AS TO BE READILY ACCESSIBLE FOR OPERATION, MAINTENANCE AND REPAIR. PROVIDE ACCESS PANELS PER ARCHITECTURAL SPECIFICATIONS, WHERE REQUIRED AND APPROVED BY ARCHITECT. MINOR DEVIATIONS FROM DRAWINGS MAY BE MADE TO ACCOMPLISH THIS, BUT CHANGES, WHICH INVOLVE EXTRA COST, SHALL NOT BE MADE WITHOUT APPROVAL.
- F. REMOVAL AND RELOCATION OF CERTAIN EXISTING WORK MAY BE NECESSARY FOR THE PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS CANNOT BE COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND INCLUDE ALL CHANGES AND CHARGES IN MAKING UP THE WORK PROPOSAL
- G. CONNECTIONS TO EXISTING WORK: INSTALL NEW WORK AND CONNECT TO EXISTING WORK WITH MINIMUM INTERFERENCE TO EXISTING FACILITIES. TEMPORARY SHUTDOWNS OF EXISTING SERVICES SHALL BE PERFORMED AT NO ADDITIONAL CHARGES, AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION OF EXISTING FACILITIES AND ONLY WITH WRITTEN CONSENT OF OWNER. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AS REQUIRED WITH NECESSARY TEMPORARY CONNECTIONS BETWEEN NEW AND EXISTING WORK. CONNECT NEW WORK TO EXISTING WORK IN NEAT AND ACCEPTABLE MANNER. RESTORE EXISTING DISTURBED WORK TO ORIGINAL CONDITION, INCLUDING MAINTENANCE OF WIRING CONTINUITY AS REQUIRED.
- H. DISCONNECT, REMOVE AND/OR RELOCATE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF NEW WORK.
- THE CONTRACTOR SHALL KEEP ALL EQUIPMENT AND MATERIALS, AND ALL PARTS OF THE BUILDING, EXTERIOR SPACES AND ADJACENT STREETS, SIDEWALKS AND PAVEMENTS, FREE FROM MATERIAL AND DEBRIS RESULTING FROM THE EXECUTION OF THIS WORK. EXCESS MATERIALS WILL NOT BE PERMITTED TO ACCUMULATE EITHER ON THE INTERIOR OR THE EXTERIOR.
- J. SEAL OPENINGS THROUGH PARTITIONS, WALLS AND FLOORS WITH MINERAL WOOL OR OTHER NONCOMBUSTIBLE MATERIAL. ALL PENETRATIONS THROUGH NEW AND EXISTING RATED FIRE AND SMOKE PARTITIONS AND/OR FLOORS SHALL BE COMPLETELY SEALED USING MATERIALS AND METHODS DESCRIBED IN SUBSEQUENT "FIRE STOPPING" SPECIFICATIONS SECTIONS.
- K. PROVIDE ALL NECESSARY FLASHING AND COUNTERFLASHING TO MAINTAIN THE WATERPROOFING INTEGRITY OF THE BUILDING AS REQUIRED BY THE INSTALLATION OR REMOVAL OF CONDUIT AND EQUIPMENT. PROVIDE EQUIPMENT CURBS AS REQUIRED.
- L. ALL EXISTING MATERIAL, EQUIPMENT AND CONSTRUCTION DEBRIS BEING REMOVED UNDER THIS CONTRACT SHALL BECOME THE PROPERTY OF THE CONTRACTOR WITH THE EXCEPTION OF SPECIFIC EQUIPMENT AND APPARATUS REQUESTED BY THE BUILDING REPRESENTATIVE, ARCHITECT OR AS NOTED TO BE RELOCATED ON THE DRAWINGS. REMOVED EQUIPMENT SHALL BE PROPERLY DISPOSED OF BY THIS CONTRACTOR.
- M. THE WORK IN THE BUILDING SHALL BE DONE WHEN AND AS DIRECTED. IN A MANNER SATISFACTORY TO THE OWNER. THE WORK SHALL BE PERFORMED SO AS TO CAUSE THE LEAST POSSIBLE INCONVENIENCE AND DISTURBANCE TO THE PRESENT OCCUPANTS.
- N. THE CONTRACTOR'S PROPOSAL FOR ALL WORK SHALL BE PREDICATED ON THE PERFORMANCE OF THE WORK DURING REGULAR WORKING HOURS. WHEN SO DIRECTED, HOWEVER, THE CONTRACTOR SHALL INSTALL WORK DURING OVERTIME HOURS AND THE ADDITIONAL COST TO BE CHARGED THEREFORE SHALL BE ONLY THE "PREMIUM" PORTION OF THE WAGES PAID.
- O. UNLESS OTHERWISE SPECIFICALLY NOTED OR SPECIFIED, INCLUDE ALL CUTTING AND PATCHING OF EXISTING FLOORS, WALLS, PARTITIONS AND OTHER MATERIALS IN THE EXISTING BUILDING. THE CONTRACTOR SHALL RESTORE THESE AREAS TO ORIGINAL CONDITION.
- P. ALL MATERIAL AND EQUIPMENT SHALL BE NEW UNLESS OTHERWISE NOTED AND SHALL BE IN ACCORDANCE WITH BUILDING STANDARDS.
- Q. SUBMISSION OF A PROPOSAL SHALL BE CONSTRUED AS EVIDENCE THAT A CAREFUL EXAMINATION OF THE PORTIONS OF THE EXISTING BUILDING, EQUIPMENT, ETC., WHICH AFFECT THIS WORK, AND THE ACCESS TO SUCH SPACES, HAS BEEN MADE AND THAT THE CONTRACTOR IS FAMILIAR WITH EXISTING CONDITIONS AND DIFFICULTIES THAT WILL AFFECT THE EXECUTION OF THE WORK. THE CONTRACTOR IS RESPONSIBLE TO INDICATE ANY DISCREPANCIES BETWEEN THE CONTRACT DRAWINGS AND ACTUAL FIELD CONDITIONS PRIOR TO SUBMITTAL OF BID. SUBMISSION OF A PROPOSAL WILL BE CONSTRUED AS EVIDENCE THAT SUCH AN EXAMINATION HAS BEEN MADE. LATER CLAIMS SHALL NOT BE MADE FOR LABOR; EQUIPMENT OR MATERIALS REQUIRED BECAUSE OF DIFFICULTIES ENCOUNTERED WHICH COULD HAVE BEEN FORESEEN DURING SUCH AN EXAMINATION. THE ON-SITE INSPECTION SHALL VERIFY EXISTING CONDUIT (SIZES, CLEARANCES, ETC) AND CONDITIONS.
- R. WHERE VARINCES OCCUR BETWEEN THE DRAWINGS AND THE SPECIFICATIONS OR WITHIN EITHER DOCUMENT ITSELF, THEITEMS/ARRANGEMENT OF BETTER QUEALITY, GREATER QUANTITY OR HIGHER COST SHALL BE INCLUDED IN THE CONTRACT PRICE. THE CONTRACTOR SHALL REQUEST CLARIFICATION IN WRITING FROM THE ARCHTECT ON WHICH ITEM AND MANNER IN WHICH THE SHALL BE INSTALLED.
- INSURANCE: IN ACCORDANCE WITH BUILDING REQUIREMENTS AND SHALL INCLUDE A HOLD HARMLESS CLAUSE FOR OWNER AND
- T. THE FINAL ACCEPTANCE SHALL BE MADE AFTER THE CONTRACTOR

HAS ADJUSTED HIS EQUIPMENT, TESTED THE VARIOUS SYSTEMS, DEMONSTRATED THAT IT FULFILLS THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS AND HAS FURNISHED ALL THE REQUIRED CERTIFICATES OF INSPECTION AND APPROVAL.

2. SCOPE OF WORK

- A. SCOPE OF WORK SHALL CONSIST OF PROVIDING LABOR, MATERIALS, EQUIPMENT, SERVICES AND FEES NECESSARY FOR COMPLETE AND SAFE INSTALLATION IN CONFORMITY WITH THE NATIONAL ELECTRICAL CODE (NEC) AND ALL OTHER APPLICABLE INDUSTRY, NATIONAL AND LOCAL CODES AND AUTHORITIES HAVING JURISDICTION, AS INDICATED ON DRAWINGS AND HEREIN SPECIFIED.
- B. ALL DRAWINGS, PLANS, DETAILS, SPECIFICATIONS AND SPECIFICATION ADDENDA ARE MADE PART OF THIS CONTRACT AND SHALL APPLY TO ALL WORK UNDER THE CONTRACT UNLESS OTHERWISE AMENDED, MODIFIED, SUPPLEMENTED OR SPECIFIED HEREIN.
- C. THE CONTRACTOR SHALL FURNISH A WRITTEN GUARANTEE TO REPLACE OR REPAIR PROMPTLY AND ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED FOR ANY WORKMANSHIP AND EQUIPMENT IN WHICH DEFECTS DEVELOP WITHIN ONE YEAR FROM THE DATE OF FINAL CERTIFICATE FOR PAYMENT AND/OR FROM DATE OR ACTUAL USE OF EQUIPMENT OR OCCUPANCY OF SPACES BY OWNER INCLUDED UNDER THE VARIOUS PARTS OF THE WORK, WHICHEVER DATE IS EARLIER. THIS WORK SHALL BE DONE AS DIRECTED BY THE OWNER. THIS GUARANTEE SHALL ALSO PROVIDE THAT WHERE DEFECTS OCCUR, THE CONTRACTOR WILL ASSUME RESPONSIBILITY FOR ALL EXPENSES INCURRED IN REPAIRING AND REPLACING WORK OF OTHER TRADES AFFECTED BY DEFECTS, REPAIRS OR REPLACEMENTS IN EQUIPMENT SUPPLIED BY THE CONTRACTOR.
- D. THE CONTRACTOR SHALL GIVE NECESSARY NOTICE, FILE DRAWINGS AND SPECIFICATIONS WITH ALL DEPARTMENTS HAVING JURISDICTION. OBTAIN PERMITS OR LICENSES NECESSARY TO CARRY OUT THIS WORK AND PAY ALL FEES THEREFORE. THE CONTRACTOR SHALL ARRANGE FOR INSPECTION AND TESTS OF ANY OR ALL PARTS OF THE WORK IF SO REQUIRED BY AUTHORITIES AND PAY ALL CHARGES FOR SAME. THE CONTRACTOR SHALL PAY ALL COSTS FOR, AND FURNISH TO THE OWNER BEFORE FINAL BILLING, ALL CERTIFICATES NECESSARY AS EVIDENCE THAT THE WORK INSTALLED CONFORMS WITH ALL REGULATIONS WHERE THEY APPLY TO THIS WORK.

3. SHOP DRAWINGS AND SUBMITTALS

A. PRIOR TO THE INSTALLATION OF ANY WORK AND PROCUREMENT OF EQUIPMENT, CONTRACTOR SHALL PROVIDE COMPLETE SETS OF COORDINATED SHOP DRAWINGS OF ALL NEW AND EXISTING EQUIPMENT, INDICATING CAPACITY, DIMENSIONS AND SEQUENCE OF OPERATION FOR WRITTEN APPROVAL BY THE ARCHITECT AND ENGINEER.

B. INDICATE ON EACH SUBMISSION:

- 1) PROJECT NAME AND LOCATION
- 2) NAME OF ARCHITECT AND ENGINEER
- 3) ITEM IDENTIFICATION
- 4) APPROVAL STAMP OF PRIME CONTRACTOR INDICATING FULL REVIEW

C. SUBMISSIONS

- 1) ELECTRONIC CATALOG AND DRAWING SUBMISSIONS SHALL BE IN PDF FORMAT. CATALOG SUBMISSIONS SHALL BE COMPLETE WITH ALL REQUIRED CHOICES AND OPTIONS INDICATED AS REQUIRED
- 2) HARD COPY SUBMISSIONS: SUBMIT THREE PRINTS TO THE ARCHITECT. THE ARCHITECT WILL FORWARD TWO PRINTS TO THE
- D. SUBMIT SHOP DRAWINGS FOR THE FOLLOWING (ALL ITEMS INDICATED WITH A "*" SHALL BE BY THE SAME MANUFACTURER):
 - 1) * DISCONNECT SWITCHES
 - 2) * CIRCUIT BREAKERS
 - 3) FUSES
 - 4) RACEWAYS
 - WIRE AND CABLE
 - 6) CONDUIT AND FITTINGS 7) INSERTION RECEPTACLES
- 4. AS-BUILT DRAWINGS AND EQUIPMENT OPERATIONAL INSTRUCTIONS
- A. UPON COMPLETION AND ACCEPTANCE OF WORK, CONTRACTOR SHALL FURNISH WRITTEN INSTRUCTIONS AND EQUIPMENT MANUALS AND DEMONSTRATE TO THE OWNER THE PROPER OPERATION AND

MAINTENANCE OF ALL EQUIPMENT AND APPARATUS FURNISHED

- UNDER THIS CONTRACT. B. THESE INSTRUCTIONS SHALL BE TYPED ON 8-1/2 IN. X 11 IN. PAPER AND BOUND IN THREE RING BINDERS WITH CLEAR ACETATE COVERS. CONTRACTOR SHALL GIVE THREE COPIES OF THE INSTRUCTIONS TO THE OWNER AND ONE COPY TO THE ENGINEER.
- C. THE INSTRUCTION BOOKLET SHALL BEAR THE NAME, ADDRESS AND TELEPHONE NUMBER OF THE PROJECT, ARCHITECT AND ENGINEER.
- D. REPRODUCIBLE "AS-BUILT" DRAWINGS PREPARED IN COMPUTER AIDED DRAFTED (AUTO CAD) FORMAT SHALL BE PROVIDED TO THE OWNER INDICATING THE AS INSTALLED CONDITIONS OF THE WORK. A COMPLETE "AS-BUILT" DRAWING FILE SHALL BE PROVIDED TO THE OWNER AFTER COMPLETION OF THE INSTALLATION.

5. GENERAL PROVISIONS FOR ELECTRICAL WORK

A. SPECIFICATIONS ARE OF SIMPLIFIED FORM AND INCLUDE INCOMPLETE SENTENCES. WORDS OR PHRASES SUCH AS "THE CONTRACTOR SHALL," "SHALL BE," "FURNISH," "PROVIDE," "A," "THE," AND "ALL" HAVE BEEN OMITTED FOR BREVITY.

B. DEFINITIONS

- 1) "PROVIDE": TO SUPPLY, INSTALL AND CONNECT UP COMPLETE AND READY FOR SAFE AND REGULAR OPERATION THE PARTICULAR WORK REFERRED TO UNLESS SPECIFICALLY OTHERWISE NOTED.
- 2) "INSTALL": TO ERECT, MOUNT AND CONNECT COMPLETE WITH RELATED ACCESSORIES.
- 3) "FURNISH" OR "SUPPLY": TO PURCHASE, PROCURE, ACQUIRE AND DELIVER COMPLETE WITH RELATED ACCESSORIES.
- 4) "WORK": LABOR, MATERIALS, EQUIPMENT, APPARATUS, CONTROLS, ACCESSORIES AND OTHER ITEMS REQUIRED FOR PROPER AND COMPLETE INSTALLATION.
- 5) "WIRING": RACEWAY, FITTINGS, WIRE, BOXES AND RELATED
- 6) "CONCEALED": NOT IN VIEW, EMBEDDED IN MASONRY OR OTHER

CONSTRUCTION, INSTALLED IN FURRED SPACES, WITHIN DOUBLE PARTITIONS OR HUNG CEILINGS, IN TRENCHES, IN CRAWL SPACES, OR IN ENCLOSURES.

- 7) "EXPOSED": NOT INSTALLED UNDERGROUND OR "CONCEALED" AS DEFINED ABOVE.
- 8) "SIMILAR" OR "EQUAL": EQUAL IN MATERIALS, WEIGHT, SIZE, DESIGN AND EFFICIENCY OF SPECIFIED PRODUCT AS DETERMINED BY THE ENGINEER AND ARCHITECT.

C. GENERAL

- 1) THE DRAWING SHOWS THE APPROXIMATE LOCATIONS OF ALL APPARATUS, THE EXACT LOCATIONS OF WHICH ARE SUBJECT TO THE APPROVAL OF THE OWNER, WHO RESERVES THE RIGHT TO MAKE ANY REASONABLE CHANGES IN THE LOCATION INDICATED WITHOUT EXTRA COST. WHILE THE GENERAL RUN OF CONDUIT AND CABLES ARE INDICATED ON THE DRAWING, IT IS NOT INTENDED THAT THE EXACT ROUTING OR LOCATIONS OF CONDUIT AND CABLES BE DETERMINED THEREFROM.
- 2) THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL REQUIRED BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO INSTALL HIS WORK TO CONFORM TO THE STRUCTURE, MAINTAIN HEADROOM AND KEEP OPENINGS AND PASSAGEWAYS CLEAR.
- 3) THE CONTRACTOR SHALL BE RESPONSIBLE TO COORDINATE WITH ALL TRADES.
- 4) WIRE ALL FIXTURES, DEVICES, ETC., TO RESPECTIVE PANEL AND CONTROLS AS SHOWN ON PLANS IN SYMBOL FORM.
- REMOVAL FROM THE SITE OF RESULTING DEBRIS UPON COMPLETION OF WORK UNDER THIS SECTION. 6) PROVIDE SEPARATE SYSTEMS AND ENCLOSURES FOR 120/208 VOLT POWER AND CONTROL WIRING AND FOR EMERGENCY AND

5) THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEAN-UP AND

- NORMAL POWER. COMMON PULL BOXES AND JB'S ARE NOT ACCEPTABLE. 7) LOCATIONS INDICATED FOR LOCAL WALL SWITCHES/CONTROLS ARE SUBJECT TO RELOCATIONS. AT OR NEAR DOORS INSTALL
- LOCATION IN FIELD PRIOR TO SWITCH OUTLET INSTALLATION. 8) HEIGHTS OF OUTLET FROM FINISHED FLOOR TO CENTERLINE OF OUTLETS SHALL CONFORM TO "ADA" CODE REQUIREMENTS

SWITCH INSIDE OPPOSITE HINGE, VERIFY FINAL DOOR HINGE

UNLESS OTHERWISE NOTED. 9) ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND. PROVIDE BARRIERS BETWEEN NORMAL ONLY AND

NORMAL/EMERGENCY SWITCHES INSTALLED WITHIN A COMMON

10) PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE FLOOR-TO-CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT AND WIRING; ADD BOX VOLUME WHERE

D. TEMPORARY LIGHT AND POWER

OUTLET BOX.

 PROVIDE TEMPORARY LIGHT AND POWER SYSTEMS AT EARLIEST POSSIBLE DATE WITHIN THE CONSTRUCTION AREAS FOR THE REQUIREMENTS OF ALL TRADES AS HEREIN DESCRIBED. EXTEND SYSTEMS TO NEW CONSTRUCTION AS SOON AS PHYSICALLY POSSIBLE. MAINTAIN SYSTEM DURING WORKING HOURS OF ALL TRADES. OWNER WILL PAY FOR COST OF ENERGY. PROVIDE ALL REQUIRED MAINTENANCE, INCLUDING LAMPS AND SOCKETS.

E. QUALITY ASSURANCE

- 1) QUALITY AND GAUGE OF MATERIALS: NEW, BEST OF THEIR RESPECTIVE KINDS, FREE FROM DEFECTS AND LISTED BY UNDERWRITERS LABORATORIES, INC., OR OTHER NATIONALLY APPROVED TESTING AGENCY AND BEARING THEIR LABEL. MATERIALS AND EQUIPMENT OF SIMILAR APPLICATION SHALL BE OF SAME MANUFACTURER, EXCEPT AS NOTED.
- 2) ALL WORK SHALL BE PERFORMED AND INSTALLED IN A NEAT AND WORKMANLIKE MANNER IN ACCORDANCE WITH THE GUIDELINES OF NECA STANDARD 1-2015 "GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION".
- 3) PROVIDE SKILLED JOURNEYMEN WHO ARE THOROUGHLY TRAINED AND EXPERIENCED IN THE NECESSARY CRAFTS AND WHO ARE COMPLETELY FAMILIAR WITH THE SPECIFIED REQUIREMENTS AND THE METHODS NEEDED FOR PROPER INSTALLATION OF THE WORK OF THIS DIVISION.
- 4) ON COMPLETION OF THE WORK, THE ENTIRE WIRING SYSTEM SHALL BE ENTIRELY FREE FROM GROUNDS, SHORT CIRCUITS, OPENS, OVERLOADS AND IMPROPER VOLTAGES AND THOROUGH TEST SHALL BE MADE. FURNISH ALL LABOR AND MATERIALS AND INSTRUMENTS.

5) VOLTAGE CHARACTERISTICS

- a. DISTRIBUTION: 120/208 VOLT, 3 PHASE, 4 WIRE, 60 HERTZ WITH GROUNDED NEUTRAL
- 6) HEIGHTS OF OUTLETS
- a. SEE TYPICAL DEVICE MOUNTING HEIGHT DETAIL ON DRAWINGS.
- b. EXCEPTIONS: AT JUNCTION OF DIFFERENT WALL FINISH MATERIALS, ON MOLDING OR BREAK IN WALL SURFACE, IN VIOLATION OF CODE, OR AS NOTED OR DIRECTED.
- c. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND CONFIRMING ALL MOUNTING HEIGHTS WITH ARCHITECT AND ARCHITECTURAL DRAWINGS.

F. PRODUCT DELIVERY, STORAGE AND HANDLING

- 1) MOVING OF EQUIPMENT: WHERE NECESSARY, SHIP IN CARTED SECTIONS OF SIZE TO PERMIT PASSING THROUGH AVAILABLE
- 2) ACCESSIBILITY: FOR OPERATION, MAINTENANCE AND REPAIR. MINOR DEVIATIONS SHALL BE PERMITTED. CHANGES OF MAGNITUDE OR INVOLVING EXTRA COST ARE NOT PERMISSIBLE

WITHOUT REVIEW. GROUP CONCEALED ELECTRICAL EQUIPMENT REQUIRING ACCESS WITH EQUIPMENT FREELY ACCESSIBLE THROUGH ACCESS DOORS.

G. MATERIALS

- 1) NAMEPLATES: PROVIDE BLACK LAMICOID SHEET WITH 3/4 IN. WHITE LETTERING, FASTENED WITH EPOXY CEMENT FOR EACH DISCONNECT SWITCH, CIRCUIT BREAKER, PANEL, CABINET, TRANSFORMER, ENCLOSURE, MOTOR CONTROLLER AND THE LIKE NAMEPLATES SHALL DESCRIBE THE NAME AND NUMBER OF EACH COMPONENT.
- 2) CABLE TAGS: TAG EACH CONDUCTOR PASSING THROUGH SPLICE OR PULLBOX WITH A WHITE LINEN TAG. INDICATING POINT OF ORIGIN AND TERMINATION OF THE CIRCUIT.
- 3) INSERTS AND SUPPORTS
- a. INSERTS: STEEL, SLOTTED TYPE, FACTORY PAINTED.
- (1) SINGLE ROD: SIMILAR TO GRINNELL FIG. 281.
- (2) MULTI-ROD: SIMILAR TO FEE AND MASON SERIES 9000 WITH END CAPS AND CLOSURE STRIPS.
- (3) CLIP FORM NAILS FLUSH WITH INSERTS.
- (4) MAXIMUM LOADING 75 PERCENT OF RATING.
- b. STRUT: GALVANIZED U-CHANNEL (SIMILAR TO UNISTRUT OR
- (1) COLD FORMED FROM LOW-CARBON STEEL WITH HOT-DIPPED GALVANIZED FINISH (ASTM 653 33)
- (2) MAXIMUM LOADING 75 PERCENT OF RATING

(3) ASSOCIATED FITTINGS (SPRING NUTS, PIPE STRAPS,

- ETC.) SHALL BE BY SAME MANUFACTURER AS STRUT. (4) FILE ALL CUT ENDS SMOOTH AND APPLY COLD GALVANIZING COMPOUND SPRAY (ZRC COLD
- c. SUPPORTS FROM BUILDING CONSTRUCTION: INSERTS, BEAM CLAMPS, STEEL FISHPLATES (IN CONCRETE FILL ONLY), CANTILEVER BRACKETS OR OTHER MEANS. SUBMIT FOR

GALVANIZING COMPOUND SPRAY OR EQUAL)

- d. GROUPED LINES AND SERVICES: TRAPEZE HANGERS OF **BOLTED ANGLES OR CHANNELS.**
- e. WHERE BUILDING CONSTRUCTION IS INADEQUATE: PROVIDE ADDITIONAL FRAMING. SUBMIT FOR REVIEW.
- H. PAINT SHALL BE THE BEST GRADE FOR ITS PURPOSE. DELIVER IN ORIGINAL SEALED CONTAINERS AND APPLY IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS. COLORS SHALL BE AS SELECTED BY ARCHITECT OR ENGINEER. UTILIZE GALVANIZED IRON PRIMER ON PANEL AND PULL BOXES, AFTER FABRICATION. UTILIZE HOT DIPPED GALVANIZED OR DIPPED IN ZINC CHROMATE FOR: OUTLET BOXES, JUNCTION BOXES, CONDUIT HANGERS, RODS, INSERTS AND SUPPORTS. RED LEAD OR ZINC CHROMATE WITH FINISH TO MATCH SURROUNDINGS SHALL BE USED FOR MARRED SURFACES OF STEEL EQUIPMENT AND RACEWAYS. A FIELD-APPLIED ZINC CHROMATE PRIME COAT SHALL BE UTILIZED FOR STEEL OR IRONWORK.
- BRUSH AND CLEAN WORK PRIOR TO CONCEALING, PAINTING AND ACCEPTANCE. PAINTED EXPOSED WORK SOILED OR DAMAGED; CLEAN AND REPAIR TO MATCH ADJOINING WORK BEFORE FINAL ACCEPTANCE. REMOVE DEBRIS FROM INSIDE AND OUTSIDE OF MATERIAL AND EQUIPMENT.
- J. FINAL LOCATIONS AND MOUNTING ORIENTATIONS OF ALL SWITCHES/CONTROLS, RECEPTACLES AND LIGHT FIXTURES SHALL BE VERIFIED WITH ARCHITECT, PRIOR TO ROUGH IN.
- K. WHERE PLYWOOD BACKBOARDS ARE REQUIRED OR SHOWN, PLYWOOD SHALL BE 3/4", MINIMUM GRADE B, PAINTED WITH 2 COATS OF FIRE RESISTANT BLACK PAINT.

L. ALL ACCESS DOOR LOCATIONS SHALL BE REVIEWED BY ARCHITECT

PRIOR TO INSTALLATION.

- A. "SELECTIVE DEMOLITION": IS HEREBY DEFINED TO INCLUDE BUT IS NOT NECESSARILY LIMITED TO THE REMOVAL OF THE FOLLOWING EXISTING MATERIALS, ITEMS AND EQUIPMENT.
- 1) REFER TO ELECTRICAL DEMOLITION PLAN AND RELATED NOTES FOR EXTENT OF DEMOLITION.
- 2) REFER TO EXISTING DRAWINGS AND SITE CONDITIONS FOR ALL REMOVAL OF WORK NECESSARY FOR COMPLETION OF NEW WORK AS SHOWN. EACH BIDDER SHALL CAREFULLY EXAMINE THE PREMISES AND DOCUMENTS DURING THE BIDDING PERIOD AND ASCERTAIN THE EXTENT OF REMOVAL OF EXISTING WORK. IF THE CONTRACTOR NOTES ADDITIONAL WORK, CALL IT TO THE ATTENTION OF THE ARCHITECT PRIOR TO SUBMITTING BID. BY SUBMITTING A BID, THE CONTRACTOR WILL HAVE DEEMED TO PROVIDE SUCH EXAMINATION, TO HAVE ACCEPTED SUCH CONDITIONS, AND TO HAVE MADE ALLOWANCES IN PREPARING HIS
- 3) ITEMS OF SALVAGE SHALL BE CAREFULLY REMOVED WITHOUT DAMAGE; NAILS AND OTHER FASTENERS REMOVED THAT ARE NOT INTEGRAL TO THEIR CONSTRUCTION; AND STORED AND PROTECTED AT LOCATIONS DIRECTED BY THE OWNER. IDENTIFY AND TAG ALL SALVAGE MATERIALS REGARDING LOCATION IN EXISTING BUILDING AND RELATIONSHIP OF PARTS.
- 4) ALL DEMOLISHED AND/OR REMOVED MATERIALS NOT REQUIRED BY OWNER SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE PREMISES AND DISPOSED OF IN A LEGAL MANNER, OFF-SITE.
- 5) CARE MUST BE TAKEN NOT TO DISTURB EXISTING WIRING, WHICH IS NOT AFFECTED BY DEMOLITION. RESTORE ALL CIRCUITS AND EQUIPMENT DISRUPTED OR DISTURBED BY THE REMOVAL OF ONLY PARTS OF EXISTING SYSTEMS. MAINTAIN CONTINUOUS OPERATION OF EXISTING FACILITIES AFFECTED BY THIS WORK. ALARM AND EMERGENCY SYSTEMS SHALL NOT BE INTERRUPTED.
- 6) PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREAS SHALL BE COORDINATED WITH BUILDING OWNER.
- 7) CONNECT NEW WORK TO EXISTING IN A NEAT AND APPROVED MANNER. RESTORE EXISTING WORK DISTURBED WHILE INSTALLING NEW WORK TO ACCEPTABLE CONDITION AS DETERMINED BY BUILDING OWNER.
- 8) ALL RACEWAYS TO BE ABANDONED SHALL BE REWORKED AS DEFINED WITHIN THE DEMOLITION NOTES. WHERE IT IS IMPRACTICAL TO REMOVE RACEWAY BACK TO SOURCE. DISCONNECT WIRING AT LOAD (EQUIPMENT) AND AT LINE SIDE. CUT AND CAP, FLUSH TO SURFACE. REMOVE CONDUCTORS FROM EXISTING RACEWAYS TO BE REWIRED. CLEAN RACEWAY AS

REQUIRED PRIOR TO REWIRING.

- 9) TEMPORARY SHUTDOWNS WHEN REQUIRED ARE TO BE MADE ONLY WITH WRITTEN CONSENT OF OWNER AT TIMES NOT TO INTERFERE WITH NORMAL OPERATION AND WITH NO ADDITIONAL
- 10) ALL REQUIRED WORK FOR TIE-IN TO THE EXISTING EQUIPMENT SHALL BE ACCOMPLISHED AFTER HOURS, THE EXACT DAY AND TIME SHALL BE DIRECTED BY OWNER, AND AT NO ADDITIONAL CHARGE.

7. CUTTING AND PATCHING

- A. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING OF THE EXISTING AND NEW CONSTRUCTION WORK, WHICH MAY BE REQUIRED FOR THE PROPER INSTALLATION OF THE ELECTRICAL WORK. ALL PATCHING SHALL BE OF THE SAME MATERIALS, WORKMANSHIP, AND FINISH, AND SHALL ACCURATELY MATCH ALL SURROUNDING WORK.
- B. CORE BORING OF CONCRETE FLOORS AND/OR WALLS IF REQUIRED, IS THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR.

8. EXCAVATION AND BACKFILLING

A. PROVIDE ALL EXCAVATION AND BACKFILLING REQUIRED FOR INSTALLATION OF WORK UNDER THIS DIVISION PER THE EARTHWORK SECTION OF THE ARCHITECTURAL SPECIFICATIONS.

COORDINATION

A. THE CONTRACTOR SHALL VERIFY LOCATIONS OF ALL EQUIPMENT WITH ARCHITECTURAL DRAWINGS. IN CENTERING OUTLETS AND LOCATING BOXES AND OUTLETS, ALLOW FOR OVERHEAD PIPES, DUCTS, AND MECHANICAL EQUIPMENT. VARIATIONS IN FIRE PROOFING AND PLASTERING, WINDOW AND DOOR TRIM, PANELING, HUNG CEILINGS, AND THE LIKE, AND CORRECT ANY INACCURACY RESULTING FROM FAILURE TO DO SO WITHOUT EXPENSES TO THE OWNER

10. EQUIPMENT FURNISHED BY OTHERS

A. WHERE INDICATED, THE CONTRACTOR SHALL FURNISH AND INSTALL WIRING FOR EQUIPMENT FURNISHED BY OTHERS, AS SHOWN ON DRAWINGS. COORDINATE WITH ALL OTHER TRADES OR DETAILS FOR INSTALLATION. THE TERM "WIRING" AS USED HERE-IN, INCLUDES, BUT IS NOT LIMITED TO, FURNISHING AND INSTALLING CONDUIT, WIRE, JUNCTION BOXES, DISCONNECTS AND MAKING CONNECTIONS. CONTRACTOR SHALL CHECK ARCHITECTURAL, MECHANICAL, AND PLUMBING DRAWINGS AND SPECIFICATIONS FOR EQUIPMENT TO BE INSTALLED BY OTHERS. CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER WIRING AND NECESSARY ELECTRICAL ADJUSTMENTS TO EQUIPMENT TO CONFORM TO SPECIFIED REQUIREMENTS OF THE EQUIPMENT.

11. LOW-VOLTAGE DISTRIBUTION EQUIPMENT

- A. PROVIDE COMPLETE EQUIPMENT INCLUDING: SWITCHES, FUSES, CIRCUIT BREAKERS, PANELS AND TRANSFORMERS.
- B. ALL EQUIPMENT SHALL CONFORM TO NEMA, ANSI AND IEEE STANDARDS.
- C. DISCONNECT SWITCHES SHALL BE FUSED OR NON-FUSED AS NOTED. VOLTAGE SHALL BE AS REQUIRED. SWITCHES SHALL BE HEAVY DUTY. EXCEPT AS NOTED, AND HORSEPOWER RATED FOR MOTOR LOADS.
- 1) TOGGLE TYPE SWITCHES SHALL BE NON-FUSED, LOAD BREAK, HAVING MAXIMUM RATINGS OF 30 AMP AT 600 VOLTS IN AN ALUMINUM NEMA 1 ENCLOSURE UON. TWO-POLE SWITCHES SHALL BE SIMILAR TO HUBBELL #HBL1372D. THREE-POLE SWITCHES SHALL BE SIMILAR TO HUBBELL #HBL1379D.
- 2) KNIFE-BLADE TYPE SWITCHES SHALL BE LOAD BREAK QUICK-MAKE-QUICK-BREAK, UL CLASS R UP TO 600 AMP. MAXIMUM RATING EXCEPT AS NOTED SHALL BE 800 AMP. ARC QUENCHERS SHALL BE PROVIDED. SWITCHES SHALL BE SIMILAR TO SQUARE D CLASS 3110. APPROVED EQUALS BY SQUARE D AND ALLEN-BRADLEY. ALL SWITCH ENCLOSURES SHALL BE DEAD FRONT, NEMA TYPE 1, EXCEPT AS NOTED.
- D. FUSES: DUAL ELEMENT FUSES FOR MOTOR LOADS SHALL BE TIME DELAY HAVING A MAXIMUM RATING OF 600 AMP AT REQUIRED VOLTAGE. 200,000 AMP IC FUSES SHALL BE SIMILAR TO LIMITRON FUSETRON FRN OR FRS (UL CLASS R). CURRENT LIMITING FUSES SHALL BE UTILIZED FOR OTHER LOADS. 200,000 AMP IC SHALL BE SIMILAR TO LIMITRON KTN, KTS, OR KTU (UL CLASS R UP TO 600 AMP; CLASS L OVER 600 AMP). ALL FUSES SHALL BE PROVIDED BY SAME MANUFACTURER. PROVIDE 1 SPARE MATCHING FUSE FOR EACH SET
- 1) CIRCUIT BREAKERS INSTALLED IN EXISTING PANEL BOARDS, SHALL BE OF THE SAME MANUFACTURER, TYPE AND A.I.C. RATING AS PRESENTLY IN USE.
- BALANCE THE LOAD OVER PHASES WHEN NEW CIRCUITS ARE ADDED TO NEW OR EXISTING PANELS, SWITCHBOARDS AND/OR SWITCHGEAR. PROVIDE MULTI-CABLE LUGS WHERE REQUIRED. DOUBLE LUGGING SHALL NOT BE PERMITTED. MOUNTING HEIGHT SHALL BE A MAXIMUM OF 6 FT.-6 IN. FROM FLOOR TO TOP SWITCH UNIT. UPDATE DIRECTORIES ON EXISTING PANELBOARDS WHERE CIRCUITING IS
- F. TESTS: OPEN AND CLOSE LOAD BREAK SWITCHING DEVICES UNDER

12. GROUNDING

a. AN EQUIPMENT-GROUNDING CONDUCTOR, COMMONLY DESCRIBED AS A "GREEN WIRE" SHALL BE PROVIDED FOR ALL BRANCH CIRCUITS PROTECTED BY OVERCURRENT DEVICES. "GREEN GROUND" WIRE SHALL ALSO BE PROVIDED FOR FLEXIBLE CONDUIT AND MOTOR CIRCUITS.

ACCESSORIES. CONDUIT OR TUBING SIZES REFERRED TO IN SPECIFICATIONS AND ON DRAWINGS ARE NOMINAL DIAMETERS. MINIMUM DIAMETER SHALL BE 3/4 IN.

13. RACEWAYS

B. MATERIALS

THREADED.

- 1) RACEWAYS a. RIGID STEEL CONDUIT: FULL-WEIGHT PIPE, GALVANIZED,
- b. ELECTROMETALLIC TUBING (EMT): THIN WALL PIPE,

GALVANIZED, THREADLESS.

A. PROVIDE RACEWAYS COMPLETE WITH BOXES, FITTINGS AND

- c. RIGID NON-METALLIC CONDUIT (PVC): POLYVINYL CHLORIDE. SCHEDULE 40 OR 80, UL STANDARD ANSI/UL 651
- d. FLEXIBLE STEEL CONDUIT: CONTINUOUS SINGLE STRIP, GALVANIZED.
- e. LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT: GALVANIZED LOW CARBON STEEL CORE WITH UL BONDED STRIP, WITH A FLAME

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2) FITTINGS AND ACCESSORIES

- a. RIGID STEEL: NONSPLIT, THREADED, STEEL OR MALLEABLE IRON. ZINC-PLATED STEEL ONLY ZINC DIE CAST NOT
- b. ELECTROMETALLIC TUBING: COMPRESSION TYPE 2 IN. AND UNDER. SET SCREW OR COMPRESSION TYPE 2-1/2 IN. AND LARGER. GALVANIZED RIGID STEEL ELBOWS, 2 IN. OR LARGER. ZINC-PLATED STEEL ONLY ZINC DIE CAST NOT PERMITTED. EXTERIOR EMT FITTINGS SHALL BE RAIN-TIGHT TYPE
- c. PVC: SLIP-ON TYPE, UL CATEGORY DWTT, INSTALLED WITH MANUFACTURER RECOMMENDED SOLVENT. CONDUIT STRAPS SHALL BE 2-HOLE TYPE.
- d. FLEXIBLE METALLIC CONDUIT: SQUEEZE TYPE COMPRESSION FITTING WITH INSULATED THROAT. ZINC-PLATED STEEL ONLY ZINC DIE CAST NOT PERMITTED.
- e. LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT: THREADED GASKETED MALLEABLE IRON, STEEL OR ALUMINUM WITH INSULATED THROAT, UL LISTED FOR WET LOCATIONS.
- f. BUSHINGS: METALLIC INSULATED OR PLASTIC TYPE.
- g. CONDUIT STRAPS SHALL BE 2-HOLE TYPE.

3) BOXES

- a. OUTLET BOXES: EXCEPT AS OTHERWISE REQUIRED BY CONSTRUCTION, DEVICES OR WIRING, BOXES SHALL BE STAMPED STEEL, 4 IN. SQUARE OR OCTAGON FOR FIXTURES. BOXES ABOVE CEILING SHALL BE 1-1/2 IN. DEEP. BOXES IN CEILING OR SLAB SHALL BE 3 IN. DEEP. BOXES IN WALL FOR FIXTURES SHALL BE 2-3/4 IN. DEEP. BOXES IN WALL FOR RECEPTACLES AND SWITCHES SHALL BE 1-1/2 IN. DEEP. FURNISH WITH RAISED COVERS AND FIXTURE STUDS WHERE REQUIRED.
- (1) WITHOUT FIXTURE OR DEVICE: FURNISH BLANK COVER. OFFSET BACK-TO-BACK OUTLETS WITH MINIMUM 6 IN. SEPARATION.
- (2) ERECT WALL AND SWITCH OUTLETS IN ADVANCE OF FURRING AND FIREPROOFING. OUTLET BOXES SHALL BE SET SQUARE AND TRUE WITH BUILDING FINISH. SECURE TO BUILDING STRUCTURE BY ADJUSTABLE STRAP IRON OR GROUT IN WITH MASONRY. VERIFY OUTLET LOCATIONS IN FINISHED SPACES WITH ARCHITECTURAL DRAWINGS OF INTERIOR DETAILS AND FINISHES. PROVIDE BARRIERS BETWEEN SWITCHES CONNECTED TO DIFFERENT PHASES FOR VOLTAGES EXCEEDING 150 VOLTS TO GROUND.
- b. JUNCTION AND PULL BOXES: GALVANIZED SHEET STEEL WITH SCREW-ON COVERS, EXCEPT AS NOTED. FURNISH WITH INSULATED SUPPORTS FOR CABLES. LOCATIONS SHALL BE AS NOTED OR REQUIRED AND ACCESSIBLE. PROVIDE BARRIERS IN RENOVATED BOXES BETWEEN 120/208 VOLT AND BETWEEN EMERGENCY AND NORMAL WIRING.
- C. PANEL, JUNCTION AND PULL BOXES SHALL BE LOCATED CLEAR OF OTHER TRADES. CONCEAL JUNCTION AND PULL BOXES IN FINISHED SPACES. WHERE NECESSARY, REROUTE RACEWAYS OR MAKE OTHER ARRANGEMENTS FOR CONCEALMENT. BOXES SHALL BE ACCESSIBLE. SUPPORT BOXES FROM BUILDING STRUCTURE, INDEPENDENT OF CONDUIT. PROVIDE FLOOR-TO-CEILING CHANNELS FOR MOUNTING ON DRYWALL AND LIGHTWEIGHT CONSTRUCTION. OUTLET BOXES FOR FIXTURES RECESSED IN HUNG CEILINGS SHALL BE ACCESSIBLE THROUGH OPENING CREATED BY REMOVAL OF FIXTURE. SECURE TO BLACK IRON OR GALVANIZED STEEL CHANNEL SUPPORT. MOTOR TERMINAL BOXES: COORDINATE WITH MOTOR BRANCH CIRCUIT CONDUIT AND WIRING; ADD BOX VOLUME WHERE REQUIRED.
- C. PROVIDE RACEWAYS ONLY AS HEREIN SPECIFIED, EXCEPT AS NOTED. RACEWAYS SHALL BE RUN CONCEALED, EXCEPT AS NOTED.
- 1) PROVIDE RACEWAY SUPPORT UTILIZING CEILING TRAPEZE, STRAPHANGERS, OR WALL BRACKETS. PROVIDE U-BOLTS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND CONNECTED TO ACCEPTABLE SUPPORTS. PROVIDE RISER CLAMPS AT EACH FLOOR LEVEL OF RISER RACEWAYS AND RESTING ON SLAB. FOR THROUGH-THE-FLOOR SYSTEMS, UTILIZE AN ASSEMBLY SIMILAR TO HUBBELL FIRE RATED POKE-THROUGH-FLOOR BOX SYSTEM. FOR ABOVE FLOOR FITTINGS, TELEPHONE SHALL BE BUSHED HOLE AND POWER SHALL BE DUPLEX RECEPTACLE OR OTHER AS NOTED. PROVIDE SEPARATION BARRIER BETWEEN POWER AND TELEPHONE COMPARTMENTS. PROVIDE JUNCTION BOX ON UNDERSIDE OF FLOOR. PACK FITTING TO RESTORE FIRE RATING OF FLOOR
- 2) SECURE ALL RACEWAYS TO SUPPORTS WITH PIPE STRAPS OR U-BOLTS. SPACING OF SUPPORTS SHALL BE A MINIMUM OF 10 FT. ON CENTER FOR METALLIC RACEWAY AND AS REQUIRED FOR NONMETALLIC RACEWAY. SPACING SHALL BE 5 FT. ON CENTER FOR WIREWAYS AND PER CODE AND AS NOTED FOR OTHERS. MOUNT SUPPORTS TO STRUCTURE MASONRY WITH TOGGLE BOLTS ON HOLLOW MASONRY, EXPANSION SHIELDS OR INSERTS IN CONCRETE AND BRICK, MACHINE SCREWS ON METAL, BEAM CLAMPS ON FRAMEWORK, WOOD SCREWS ON WOOD, AND PAN THROUGH STRAPS IN METAL DECK. NAILS, RAW PLUGS OR WOOD PLUGS SHALL NOT BE PERMITTED. WHERE REQUIRED BY STRUCTURE, FURNISH THROUGH BOLTS AND FISHPLATES.
- 3) RACEWAYS SHALL BE RUN PARALLEL WITH OR AT RIGHT ANGLES TO BUILDING AND STRUCTURAL LINES. PROVIDE CLEARANCE WITH WATER, STEAM OR OTHER PIPING (MINIMUM 3 IN. SEPARATION FROM STEAM AND HOT WATER PIPES, EXCEPT 1 IN. FROM PIPE COVER AT CROSSINGS AND 18 IN. FOR PARALLEL RUNS). FOR HUNG CEILING OUTLETS, RUN IN HUNG CEILING AND CONNECT TO CEILING SUPPORT CHANNELS. IN MASONRY AND POURED CONCRETE, RUN VERTICALLY ONLY.
- 4) MAINTAIN GROUNDING CONTINUITY OF INTERRUPTED METALLIC RACEWAYS WITH GROUND CONDUCTOR, AND IN FLEXIBLE CONDUIT FOR FEEDERS AND MOTOR TERMINAL CONNECTIONS.
- 5) EMPTY RACEWAYS OVER 10 FT LONG: PROVIDE FISH OR PULL WIRE, GALVANIZED OR NYLON ROPE.
- 6) RIGID STEEL CONDUIT SHALL BE PERMITTED FOR SERVICES, FEEDERS AND BRANCH CIRCUITS. PAINT MALE THREADS OF FIELD-THREADED CONDUIT WITH GRAPHITE-BASE PIPE COMPOUND AND BUTT CONDUIT ENDS. TOUCH UP MARRED SURFACES AND FIELD-CUT THREADS, CRC-COLD GALVANIZED.
- 7) EMT SHALL BE PERMITTED FOR BRANCH CIRCUITS, IN DRY LOCATIONS, DRY WALLS, HUNG CEILINGS, HOLLOW BLOCK WALLS AND FURRED SPACES. EMT SHALL BE PERMITTED FOR FEEDERS WHERE HIDDEN OR NOT EXPOSED TO POTENTIAL DAMAGE.

- WHERE DAMAGE IS A POSSIBILITY (I.E. WAREHOUSE WALL) USE RIGID ONLY.
- 8) IN WET LOCATIONS, PROVIDE GALVANIZED RIGID CONDUIT WITH THREADED COUPLING, PVC CONDUITS AND FITTINGS (SCHEDULE 80 WHERE EXPOSED TO DAMAGE) OR LIQUIDTIGHT FLEXIBLE METALLIC CONDUIT.
- 9) ALL EMERGENCY BRANCH CIRCUIT WIRE SHALL BE RUN IN CONDUIT.
- 10) UNLESS OTHERWISE NOTED, ALL RACEWAYS ROUTED ON EXPOSED SURFACES (I.E. BRICK OR PAINTED BLOCK WALLS, ETC.) SHALL BE SURFACE MOUNTED RACEWAY (WIREMOLD OR EQUAL) PAINTED TO MATCH THE SURROUNDING SURFACES.
- 11) FLEXIBLE STEEL CONDUIT SHALL BE UTILIZED FOR SHORT CONNECTIONS WHERE RIGID CONDUIT IS IMPRACTICAL. FROM OUTLET BOX TO RECESSED LIGHTING FIXTURE: PROVIDE MINIMUM 4 FT. AND MAXIMUM 6 FT. LENGTHS. FOR FINAL CONNECTION TO MOTOR TERMINAL BOX, TRANSFORMER AND OTHER VIBRATING EQUIPMENT: PROVIDE WITH POLYVINYL SHEATHING AND GROUND CONDUCTOR. MINIMUM LENGTH: 18 IN. WITH SLACK. CONNECT GROUND CONDUCTOR TO ENCLOSURE OR RACEWAY AT EACH END. FOR EXPANSION JOINT CROSSINGS, CROSS AT RIGHT ANGLES AND ANCHOR ENDS.
- 12) CUT CONDUIT ENDS SQUARE. REAM SMOOTH. PAINT MALE THREADS OF FIELD THREADED RACEWAYS WITH GRAPHITE BASE PIPE COMPOUND. DRAW UP TIGHT WITH RACEWAY COUPLING.
- 13) ALL COUPLINGS ON EMT RACEWAYS SHALL BE COMPRESSION TYPE UP TO AND INCLUDING 2 IN. CONDUIT. SET SCREW TYPE OR COMPRESSION FITTINGS SHALL BE USED ON 2-1/2 IN. EMT CONDUIT AND LARGER EXCEPT FOR EXTERIOR INSTALLATIONS WHERE ALL EMT FITTINGS SHALL BE RAINTIGHT TYPE.
- 14) EXPANSION FITTINGS SHALL BE INSTALLED AT RIGHT ANGLES WITH CLIP JOINT CENTERED IN EXPANSION JOINT. PROVIDE A LENGTH OF RUN IN ACCORDANCE MANUFACTURER'S RECOMMENDATIONS. PRESET FITTINGS SHALL ALLOW FOR TEMPERATURE VARIATION.
- SEAL OPENING WITH FIRE SEALANT APPROPRIATE TO CONSTRUCTION TO MAINTAIN FIRE RATING OF CONSTRUCTION.

15) RACEWAYS PASSING THROUGH FIRE-RATED CONSTRUCTION:

- 16) PROVIDE INTERNAL VAPOR SEALING OF ALL CONDUITS PASSING FROM EXTERIOR TO HEATED/CONDITIONED INTERIOR SPACES.
- 17) PROVIDE RACEWAYS CONTINUITY TESTS OF RESISTANCE OF FEEDER CONDUITS FROM SERVICE TO POINT OF FINAL DISTRIBUTION USING 1 CONDUCTOR RETURN. MAXIMUM RESISTANCE SHALL BE 25 OHMS.

14. WIRE AND CABLE

- A. PROVIDE WIRE AND CABLE COMPLETE WITH ACCESSORIES. SIZE REFERENCE SHALL BE AWG EXCEPT AS NOTED.
- B. CONDUCTORS SHALL BE COPPER, ASTM STANDARD SOLID OR STRANDED (NO. 10 AND SMALLER) OR STRANDED (NO. 8 AND LARGER). GENERAL USE CABLING SHALL BE NO. 12 MINIMUM. AT 120 VOLTS AND OVER 100 FT. CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM. AT 277 VOLTS AND OVER 200 FT. CIRCUIT LENGTH PROVIDE NO. 10 MINIMUM.
- CONTROL AND ALARM CABLING, EXCEPT AS NOTED, SHALL BE NO. 14 MINIMUM. AT 120 VOLTS AND OVER 200 FT. CIRCUIT LENGTH PROVIDE NO. 12 MINIMUM.
- 2) OTHER VOLTAGES AND PHASES: ADJUST CABLE SIZING AS REQUIRED TO MAINTAIN VOLTAGE DROP. INCREASE RACEWAY SIZES FOR LARGER WIRE AS REQUIRED.
- C. INSULATION SHALL BE RUBBER AND THERMOPLASTIC MEETING ASTM AND IPCEA STANDARDS. TYPE THW OR THWN SHALL BE UTILIZED FOR FEEDERS AND BRANCH CIRCUITS EXCEPT AS NOTED. TYPE SFF-2 SHALL BE UTILIZED FOR BRANCH CIRCUITS LOCATED IN AMBIENT TEMPERATURES OVER 90 DEGREES C. FOR UNGROUNDED ISOLATED BRANCH CIRCUITS PROVIDE CROSS-LINKED POLYETHYLENE INSULATION (TYPE XHHW).
- D. PRE-MANUFACTURED STEEL ARMOR, SPECIFICATION GRADE METAL CLAD CABLE (MC-TUFF) MAY BE UTILIZED FOR ALL NORMAL BRANCH CIRCUITS IN DRY HOLLOW STUD WALL LOCATIONS, ABOVE ACCESSIBLE CEILING AND WHERE PERMITTED BY ARTICLE #320 & #517 OF THE NATIONAL ELECTRICAL CODE (APPLICABLE EDITION) ONLY. MINIMUM CONDUCTOR SIZE SHALL BE NO. 12 AWG COPPER WITH INTEGRAL GREEN INSULATED CONTINUOUS GROUND CONDUCTOR AND BARE BONDING CONDUCTOR IN DIRECT CONTACT WITH THE OUTER METAL JACKET. WHERE UTILIZED FOR 0-10V DIMMING WIRING, PROVIDE MC CABLE WITH ADDITIONAL INTEGRAL PAIR OF #16 INSULATED TYPE TFN CONTROL WIRES TWISTED IN A PVC JACKET FOR ISOLATION FROM POWER WIRES (TYPE MC-PCS CABLE).
- E. THE INSULATION OF ALL CONDUCTORS SHALL BE 90 DEGREES C RATED THERMOPLASTIC WITH COLOR CODING AS FOLLOWS:
- 1) 120/208 VOLT SYSTEM
- a. BLACK FOR A PHASE
- b. RED FOR B PHASE
- c. BLUE FOR C PHASE
- 2) NEUTRAL WIRE SHALL UTILIZE WHITE OUTER COVERING THROUGHOUT. EQUIPMENT GROUND WIRE SHALL UTILIZE GREEN OUTER COVERING THROUGHOUT.
- a. WHERE COLOR-CODED CABLE IS NOT AVAILABLE, CERTIFY IN WRITING AND REQUEST PERMISSION TO OVERLAP CONDUCTORS WITH 6 IN. OF COLOR TAPING IN ACCESSIBLE LOCATIONS.
- F. TERMINATIONS, SPLICES AND TAPS UNDER 600 VOLTS: COPPER CONDUCTORS NO. 10 AND SMALLER SHALL UTILIZE COMPRESSION-TYPE OF TWIST-ON SPRING-LOADED CONNECTORS AND CLEAR NYLON-INSULATED COVERING. COPPER CONDUCTORS NO. 8 AND LARGER SHALL UTILIZE MECHANICAL BOLTED PRESSURE OR HYDRAULIC COMPRESSION TYPE USING MANUFACTURER'S RECOMMENDED TOOLING. CABLE LUGS AND CONNECTORS SHALL UTILIZE COMPRESSION TYPE OF SAME METAL AS CONDUCTOR. PROVIDE TO MATCH CABLE, WITH MARKING INDICATING SIZE AND TYPE. COPPER LUG CONNECTIONS TO BUS BARS: USE ANTI-SEIZE COMPOUND ON TANG.
- G. NOT MORE THAN 3 LIGHTING OR CONVENIENCE OUTLET CIRCUITS SHALL BE INSTALLED IN ONE CONDUIT UNLESS OTHERWISE INDICATED. PULL NO THERMOPLASTIC WIRES AT TEMPERATURES LOWER THAN 32 DEGREES F.
- H. LEAVE WIRES WITH SUFFICIENT SLACK TO PERMIT MAKING FINAL CONNECTIONS.
- I. PERFORM CONTINUITY AND INSULATION TESTS. MEGGER TEST 100 PERCENT OF FEEDERS, 10 PERCENT OF BRANCH CIRCUITS AND ALL MOTOR BRANCH CIRCUITS OVER 25 HP.
- J. PERFORM TESTS PRIOR TO CONNECTING EQUIPMENT AND IN PRESENCE OF AUTHORIZED REPRESENTATIVES. SUBMIT WRITTEN REPORT OF RESULTS. CORRECT OR REPLACE CABLE TESTING BELOW

MANUFACTURER'S STANDARDS.

15. POWER WIRING

A. PROVIDE ALL POWER WIRING TO ALL MOTORS AND EQUIPMENT FURNISHED UNDER ALL CONTRACTS ON THE PROJECT. INCLUDE EXTENSIONS FROM CONTROLLERS TO MOTORS AND MOTOR CONNECTIONS. MOUNT AND WIRE ALL CONTACTORS AND POWER DEVICES FURNISHED UNDER ALL CONTRACTS.

16. CONTROL WIRING

- A. PROVIDE ALL CONTROL WIRING FOR MOTORS AND EQUIPMENT FURNISHED UNDER ALL CONTRACTS AND AS SPECIFICALLY SHOWN ON THE DRAWINGS, EXCEPT AS NOTED FOR MECHANICAL/PLUMBING EQUIPMENT. INCLUDE MOUNTING AND WIRING OF ALL CONTROL DEVICES FURNISHED WITH EQUIPMENT.
- B. CONTROL WIRING LESS THAN 120 VOLTS FOR MOTORS, ALARMS FOR EQUIPMENT FURNISHED UNDER MECHANICAL/PLUMBING WILL BE PROVIDED UNDER A SEPARATE CONTRACT.

17. DEVICES

A. LOCAL SWITCHES

- 1) CONVENTIONAL QUITE TOGGLE TYPE, RATED AT 20 AMP, 120/277 VOLT AC SIMILAR TO LEVITON #1221-2, 1223-2, 1224-2 OR EQUAL BY HUBBELL OR PASS & SEYMOUR. THE OWNER OR ARCHITECT SHALL SELECT TOGGLE COLOR.
- 2) PILOT LIGHT TOGGLE TYPE WITH NEON LAMP, RATED AT 20 AMP, 120/277 VOLT AC SIMILAR TO LEVITON #1221-PLC OR EQUAL BY HUBBELL OR PASS & SEYMOUR..

B. MANUAL MOTOR STARTERS

 FLUSH OR SURFACE MOUNTED TYPE WITH INTEGRAL THERMAL OVERLOAD PROTECTION AND PILOT LIGHT. SIMILAR TO SQUARE D CLASS 2510 AND 2512 TYPE F.

C. MOTOR-RATED SWITCHES

1) FLUSH OR SURFACE MOUNTED TYPE WITH PILOT LIGHT. SIMILAR TO SQUARE D CLASS 2510, 2511 AND 2512 TYPE F.

D. INSERTION RECEPTACLES

1) CONVENTIONAL SPECIFICATION GRADE DUPLEX CONVENIENCE 125 VOLT, 2 POLE, 3 WIRE, 20 AMP WITH U GROUND SLOT GROUNDED, EXCEPT AS NOTED. DEVICE SHALL MEET OR EXCEED:

- a. UL 498
- b. UL HOSPITAL GRADE
- c. UL FEDERAL SPECIFICATION WC-596 LISTING.
- d. NEMA WD-1 AND WD-6
- e. DEVICE SHALL BE SIMILAR TO HUBBELL HBL5362 OR EQUAL BY LEVITON OR PASS & SEYMOUR. OWNER OR ARCHITECT SHALL SELECT FACE COLOR. DEVICES USED ON EMERGENCY BRANCH CIRCUITS SHALL BE RED FACE ONLY.
- 2) GROUND FAULT CIRCUIT INTERRUPTER WITH SELF-PROTECTION AND LED INDICATOR LIGHT. SIMILAR TO HUBBELL GFR5362 OR EQUAL BY LEVITON, OR PASS & SEYMOUR.
- a. WHERE GFCI RECEPTACLE DEVICES ARE SHOWN ON DRAWINGS A GFCI RECEPTACLE SHALL BE PROVIDED NO DOWNSTREAM WIRING OF STANDARD RECEPTACLES FROM THE LOAD SIDE OF A GFCI RECEPTACLE SHALL BE ACCAPTABLE AS A SUBSTITUTE FOR PROVIDING A GFCI RECEPTACLE DEVICE.
- 3) TAMPERPROOF SIMILAR TO HUBBELL HBL5362TR OR EQUAL BY LEVITON, OR PASS & SEYMOUR.
- TAMPERPROOF GROUND FAULT CIRCUIT INTERRUPTER SIMILAR TO HUBBELL GF5362SG OR EQUAL BY LEVITON, OR PASS &
- 5) TAMPERPROOF USB SIMILAR TO PASS & SEYMOUR TR5362USB OR EQUAL BY LEVITON OR HUBBELL.
- 6) TAMPERPROOF GROUND FAULT CIRCUIT INTERRUPTER WITH USB PORTS (ONE USB-A AND ONE USB-C) SIMILAR TO LEVITON GUAC2 OR EQUAL BY HUBBELL, OR PASS & SEYMOUR
- 7) ISOLATED GROUND SIMILAR TO HUBBELL IG5362 OR EQUAL BY LEVITON, OR PASS & SEYMOUR.
- 8) SPECIAL RECEPTACLES

SEYMOUR.

- a. THE TRADE CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE SPECIAL RECEPTACLES REQUIRED TO MATCH PROVIDED, EXISTING AND NEW EQUIPMENT PLUGS.
- 9) RECEPTACLE ORIENTATION
- a. CONTRACTOR SHALL COORDINATE ORIENTATION OF DEVICE WITH ARCHITECT.

E. DEVICE PLATES

- POLYCARBONATE THERMOPLASTIC BY SAME MANUFACTURER OF DEVICES COORDINATE COLORS WITH ARCHITECT.
- F. DEVICE WIRING
- 1) ALL DEVICES SHALL BE SIDE-WIRED VIA SCREW TERMINALS -PUSH-IN WIRING (AKA "QUICKWIRE") THROUGH THE BACK OF THE DEVICE IS NOT AN ACCEPTABLE WIRING METHOD.

18. FIRE STOPPING

- A. DRAWINGS AND GENERAL PROVISIONS OF CONTRACT, INCLUDING GENERAL AND SUPPLEMENTARY CONDITIONS AND DIVISION SPECIFICATION SECTIONS, APPLY TO WORK OF THIS SECTION.
- B. PROVIDE ALL REQUIRED FIRE STOPPING. WORK INCLUDES FIRE-STOPPING PENETRATIONS OF FIRE-RESISTANCE RATED FLOORS, WALLS AND PARTITIONS IN NEW CONSTRUCTION, AS WELL AS PRE-EXISTING PENETRATIONS IN RENOVATION AREAS OF EXISTING CONSTRUCTION.
- C. PRODUCT DATA: SUBMIT MANUFACTURER'S PRODUCT DATA FOR EACH FIRE-STOPPING PRODUCE REQUIRED, INCLUDING INSTRUCTIONS FOR SUBSTRATE PREPARATION AND FIRE-STOPPING INSTALLATION.
- D. FIRE RESISTANT JOINT SEALERS: PROVIDE MANUFACTURER'S STANDARD FIRE-STOPPING SEALANT WITH ACCESSORY MATERIALS, HAVING FIRE RESISTANCE RATINGS INDICATED AS ESTABLISHED BY TESTING IDENTICAL ASSEMBLIES PER ASTM E814 BY UNDERWRITERS LABORATORY, INC. OR OTHER TESTING AND INSPECTING AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION.
- E. MATERIALS PROVIDE THE FOLLOWING:
- 1) ONE-PART FIRE-STOPPING SEALANT: ONE PART LATEX BASED

INTUMESCENT SEALANT FORMULATED FOR USE IN A THROUGH-PENETRATION FIRE-STOP SYSTEM FOR SEALING OPENINGS AROUND CABLES, CONDUIT, PIPES AND SIMILAR PENETRATIONS THROUGH WALLS AND FLOORS. ACCEPTABLE PRODUCTS/MANUFACTURERS INCLUDE THE FOLLOWING:

a. SPEC SEAL LC SERIES

b. HILTI FS-ONE MAX

c. 3M FD150+

J. 1112111 G

19. TESTS

- A. BEFORE MAKING TESTS, COMPLETE ALL CONNECTIONS AT PANELS, FIXTURES AND OTHER EQUIPMENT. INSTALL FUSES AND HAVE ALL WIRING CONTINUOUS FROM SERVICE EQUIPMENT TO UTILIZATION OUTLETS. CORRECT ALL UNDESIRABLE GROUND, OPEN AND SHORT CIRCUIT CONDITIONS.
- B. PROVIDE SOURCE OF TEMPORARY POWER FOR MAKING TESTS IF NORMAL BUILDING POWER IS NOT AVAILABLE AT THE TIME.
- C. TAKE AND RECORD THE FOLLOWING READINGS ON SYSTEMS 600 VOLTS AND BELOW:
- MEGGER TESTS OF ALL FEEDER CIRCUIT CONDUCTORS, GROUND CONDUCTORS, AND CONDUIT GROUND.
- 2) AMMETER READINGS ON ALL PHASES AND NEUTRAL OF EACH FEEDER TO INDICATE BALANCE.
- 3) AMMETER READINGS ON ALL PHASES OF EACH POLYPHASE MOTOR. INCLUDE NAMEPLATE FULL LOAD CURRENT OF EACH MOTOR ON DATA SHEET.
- ACCORDANCE WITH DATA SHOWN ON THE DRAWINGS AND/OR MANUFACTURER'S RECOMMENDED SETTING.

 D. SEND FINAL CERTIFIED TEST REPORTS AND CERTIFICATIONS TO THE

4) CERTIFY THAT ALL OVERLOAD DEVICES HAVE BEEN SET IN

ARCHITECT FOR APPROVAL AND TRANSMITTAL TO THE OWNER.

20. DEMONSTRATION OF COMPLETE ELECTRICAL SYSTEMS

- A. SUBMIT WRITTEN CERTIFICATION THAT ELECTRICAL SYSTEMS ARE COMPLETE AND OPERATIONAL. SUBMIT CERTIFICATION WITH CONTRACTOR'S REQUEST FOR FINAL REVIEW.
- AT THE TIME OF FINAL REVIEW OF ELECTRICAL WORK,
 DEMONSTRATE THE OPERATION OF ELECTRICAL SYSTEMS.
 FURNISH LABOR, APPARATUS AND EQUIPMENT FOR SYSTEMS'
 DEMONSTRATION. THE VARIOUS TEST SHALL BE WITNESSED BY
 AND THE OWNER OR HIS REPRESENTATIVE.
- B. THE CONTRACTOR SHALL FURNISH ALL TEST EQUIPMENT, MATERIALS, LABOR, AND TEMPORARY POWER HOOK-UPS TO PERFORM START-UP AND ALL TESTS AS REQUIRED TO OBTAIN FINAL FIELD ACCEPTANCE FROM OWNER. ALL TESTS SHALL BE CONDUCTED IN THE PRESENCE OF THE OWNER OR HIS REPRESENTATIVE. ALL TEST PROCEDURES SHALL CONFORM TO THIS SPECIFICATION AND APPLICABLE STANDARDS THE ANSI, IEEE, NEMA, OSHA, NEPA, ETC.
- C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL TESTS AND TEST RECORD. TESTING SHALL BE PERFORMED BY AND UNDER THE IMMEDIATE SUPERVISION OF THE CONTRACTOR. TEST RECORD SHALL BE KEPT FOR EACH PIECE OF EQUIPMENT. COPIES SHALL BE FURNISHED TO THE ENGINEER FOR REVIEW AND/OR APPROVAL.
- D. A VISUAL INSPECTION OF ALL ELECTRICAL EQUIPMENT, TO CHECK FOR THE FOREIGN MATERIAL, TIGHTNESS OR WIRING AND CONNECTION, PROPER GROUNDING, MATCHING NAMEPLATE CHARTS WITH SPECIFICATION, ETC., SHALL BE MADE PRIOR TO ACTUAL TESTING.
- E. A COMPLETE OPERATIONAL TEST SHALL BE MADE ON THE REVISED LIFE SAFETY FIRE ALARM SYSTEM. THE CONTRACTOR SHALL CONSULT WITH THE EQUIPMENT VENDORS AND THEN SUBMIT FOR APPROVAL A STEP-BY-STEP PROCEDURE DESCRIBING THE METHOD OF MAKING THE TESTS, THE EQUIPMENT TO BE UTILIZED AND THE FEATURE TO BE CHECKED BY THE TEST. ALL INTERLOCKS AND PROTECTIVE FEATURES SHALL BE CHECKED OUT.

21. SPECIAL ENGINEERING SERVICES

- A. IN THE INSTANCE OF COMPLEX OR SPECIALIZED ELECTRICAL SYSTEMS SUCH AS EMERGENCY SYSTEM FIRE ALARM OR SIMILAR MISCELLANEOUS SYSTEMS, THE INSTALLATION, FINAL CONNECTIONS AND TESTING OF SUCH SYSTEMS SHALL BE MADE UNDER THE DIRECT SUPERVISION OF COMPETENT AUTHORIZED SERVICE ENGINEERS WHO SHALL BE IN THE EMPLOY OF THE RESPECTIVE EQUIPMENT MANUFACTURER.
- B. ANY AND ALL EXPENSES INCURRED BY THESE EQUIPMENT MANUFACTURERS' REPRESENTATIVES RELATED TO THIS PROJECT, SHALL BE BORNE BY THE ELECTRICAL CONTRACTOR.

22. DESIGN MODIFICATIONS

A. THE DRAWINGS SHOW ELECTRICAL SYSTEMS, WHICH SUPPLY, CONTROL, AND/OR MONITOR SYSTEMS SPECIFIED ELSEWHERE. THE ELECTRICAL SYSTEM SHOWN HAS BEEN BASED ON SPECIFIC MANUFACTURERS DATA OR INFORMATION CONVEYED TO THE ELECTRICAL DESIGNER. WHERE ANY AGREEMENT OR CHANGE IS MADE TO SUPPLY EQUIPMENT OF LARGER CAPACITY OR DIFFERENT ELECTRICAL CHARACTERISTICS, THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING THE ELECTRICAL SYSTEM TO EFFECT SUCH CHANGES WITHIN THE INTENT OF THESE SPECIFICATIONS AND TO INFORM THE ENGINEER, IN WRITING, OF SUCH CHANGE. FOR EXAMPLE, IF HVAC COMPRESSORS AND/OR MOTORS ARE ALLOWED TO BE CHANGED TO 230 VOLTS RATHER THAN THE ORIGINALLY SPECIFIED 208 VOLTS, BOOSTING OR BUCKING TRANSFORMERS SHALL BE SUPPLIED, INSTALLED, AND WIRED TO ACCOMMODATE THE CHANGE AT NO ADDITIONAL COST.

1919 Architects

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