MECHANICAL SYMBO	OLS						
HIS IS A MASTER LEGEND AND NOT AL	L SYMBOLS OR ABBR						V2.04
TANDARD MOUNTING HEIGHT		HVAC DUCTWOR	K AND ACCESSORIES	PIPING SYMBOLS		PIPING LINETYPES	
HERMOSTATS (USER ADJUSTABLE)(TOP OF DEVICE ONTROLS (TOP OF DEVICE)	E) 48" 48"	┣ <u></u>	LINEAR SLOT DIFFUSER		_ DIRECTION OF FLOW CONTROL VALVE	CD CON	IDENSATE DRAIN (CD)
,		~	INSULATED FLEXIBLE DUCT (MAX. 5'-0" LONG)	——————————————————————————————————————	THREE-WAY CONTROL VALVE		ILIARY CONDENSATE DRAIN (ACD)
STALL DEVICES AT THE MOUNTING HEIGHTS SHOWN STRUCTION DOCUMENTS. MOUNTING HEIGHTS					SHUTOFF VALVE		I-POTABLE WATER (NPW)
SEWHERE IN THE CONSTRUCTION DOCUMENTS A OTTOM OF DEVICE UNO. ALL DEVICES SHALL BE IN	ARE AFF OR AFG TO NSTALLED IN		BRANCH DUCT WITH 45° RECTANGLE-ROUND BRANCH FITTING AND MANUAL VOLUME DAMPER		CHECK VALVE		URAL GAS ON BOOF (C)
OMPLIANCE WITH CURRENT ADA AND LOCAL REQU	UIREMENTS.		ELBOW WITH TURNING VANES	, ith	BALANCING VALVE WITH PRESSURE PORTS		URAL GAS ON ROOF (G) DIUM PRESSURE NATURAL GAS (MPG)
NNOTATION			LEBOW WITH FORMING VAINES		_ TRIPLE DUTY VALVE WITH PRESSURE PORTS		DIUM PRESSURE NATURAL GAS ON ROOF (MGP)
1 MECHANICAL PLAN NOTE CALLOUT			BRANCH DUCT WITH BELL-MOUTH FITTING & MANUAL VOLUME CONTROL DAMPER	——————————————————————————————————————	_ STRAINER		L OIL SUPPLY (FOS)
CU\ MECHANICAL EQUIPMENT DESIGNATIO	ON (CONTRACTOR	l G			_ STRAINER WITH BLOWDOWN VALVE		L OIL RETURN (FOR)
CU MECHANICAL EQUIPMENT DESIGNATION 1 PURNISHED AND INSTALLED UNLESS N			RETURN, EXHAUST, OR OUTSIDE AIR DUCT UP	<u> </u>	_ RELIEF / SAFETY VALVE	FOV—FUE	L OIL VENT (FOV)
CONNECTION POINT OF NEW WORK TO	O EXISTING	N N	RETURN, EXHAUST, OR OUTSIDE AIR DUCT DOWN	——————————————————————————————————————	_ SOLENOID VALVE	——LPG—— LIQU	JEFIED PETROLEUM GAS (LPG)
		<u> M 18.2</u>	CURRLY AIR RUCT UR		_ PRESSURE REDUCING VALVE	BFW BOIL	ER FEED WATER (BFW)
DETAIL REFERENCE. UPPER NUMBER IN NUMBER LOWER NUMBER INDICATES			SUPPLY AIR DUCT UP	A	_ GAS PRESSURE REGULATOR	HPS HIGH	H PRESSURE STEAM SUPPLY (HPS)
SECTION CUT DESIGNATION			SUPPLY AIR DUCT DOWN		_ THERMOSTATIC MIXING VALVE	— —HPC— — HIGH	H PRESSURE STEAM CONDENSATE (HPC)
(M1)		↓	EQUIPMENT WITH FLEXIBLE DUCT CONNECTION		_ PIPE ANCHOR	——LPS—— LOW	/ PRESSURE STEAM SUPPLY (LPS)
BBREVIATIONS				<u>EJ</u>	_ EXPANSION JOINT	— —LPC— — LOW	/ PRESSURE STEAM CONDENSATE (LPC)
	HEATING WATER PUMP NCHES OF WATER		10" (NECK SIZE) CSD-1 (TYPE)	=	PIPE GUIDE	——PD—— CON	IDENSATE PUMP DISCHARGE (PD)
CCU AIR COOLED CONDENSING CUNIT L	COLUMN OUVER		300 CFM (CFM OF SUPPLY DIFFUSER OR REGISTER)		_ PIPING SUPPORT F & T TRAP	——HWS—— HEA	TING HOT WATER SUPPLY (HWS)
FF ABOVE FINISHED FLOOR T	EAVING AIR EMPERATURE		24x24 (NECK SIZE)	 ×	BUCKET TRAP		TING HOT WATER RETURN (HWR)
HJ AUTHORITY HAVING LP LO	EAVING DRY BULB OW PRESSURE		CEG-1 (TYPE) 800 CFM (CFM OF EXHAUST GRILLE)		THERMOSTATIC TRAP		LED WATER SUPPLY (CHWS)
HU AIR HANDLING UNIT LWT LI	EAVING WET BULB EAVING WATER			ø	BACKELOW PREVENTER		LED WATER RETURN (CHR)
O ANALOG OUTPUT MAU M	EMPERATURE MAKE-UP AIR UNIT	+ + +	MANUAL VOLUME DAMPER		PRESSURE GAUGE		/ CHILLED WATER SUPPLY (HCS)
PD AIR PRESSURE DROP MBH 10	MAXIMUM 000 BTU PER HOUR		SQUARE TO ROUND TRANSITION		THERMOMETER		/ CHILLED WATER SUPPLY (HCR)
BOILER MFR M	MOTORIZED DAMPER MANUFACTURER	RD _	DUOT MOUNTED OMOVE DETECTOR	т Ъ	PRESSURE AND TEMPERATURE TEST PLUG		IDENSER WATER SUPPLY (CWS)
SYSTEM N/A N	MINIMUM NOT APPLICABLE NORMALLY CLOSED	RD	DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY/RD=RETURN)	.1.	UNION		IDENSER WATER RETURN (CWR)
D BACKDRAFT DAMPER N/O N	NORMALLY CLOSED NORMALLY OPEN NOMINAL		RISER DESIGNATION		FLANGE CONNECTION		T PUMP WATER SUPPLY (HPWS) T PUMP WATER RETURN (HPWR)
FC BELOW FINISHED CEILING NC N	NOINTAL NOISE CRITERIA NON-FUSED	#	RISER DESIGNATION	^	VACUUM RELIEF VALVE		RIGERANT LIQUID (RL)
FG BELOW FINISHED GRADE NIC N	NOT IN CONTRACT OUTSIDE AIR	FD	FIRE DAMPER	- P AV	_ AUTOMATIC AIR VENT		RIGERANT DISCHARGE (HOT GAS) (RD)
HP BRAKE HORSEPOWER PICV P	PRESSURE INDEP.	(FSD)	FIRE SMOKE DAMPER	<u></u> MV_	_ MANUAL AIR VENT		RIGERANT SUCTION (RS)
D BINARY OUTPUT PROVIDE F	FURNISH AND INSTALL QUANTITY		THE SMOKE STAME EX	<u>P</u>	_ PRESSURE / VACUUM SWITCH		RIGERANT DISCHARGE BYPASS (RDB)
OS BOTTOM OF STRUCTURE RA R FU BRITISH THERMAL UNIT RC R	RETURN AIR ROOM CRITERIA	SD	SMOKE DAMPER		CLEANOUT		RIGERANT VENT (RV)
H CHILLER REA R	RETURN DUCT RELIEF AIR	(VD)	VOLUME DAMPER		CAP		
P CONDENSATE PUMP RFR R	RETURN FAN REFRIGERANT	_		——ю	ELBOW UP		
TRANSFORMER RH R	RELATIVE HUMIDITY ROOF HOOD	MD	MOTORIZED DAMPER	 ə	ELBOW DOWN		
CONDITIONING UNIT RTU R	REVOLUTIONS PER MINUTE ROOFTOP UNIT	BD	BACKDRAFT DAMPER		_ TEE UP		
T COOLING TOWER SCP S	SUPPLY AIR STEAM CONDENSATE PUMP SMOKE DUCT DETECTOR	_			_ TEE DOWN		
WP CONDENSER SD S	SUPPLY DUCT SUPPLY FAN			•	ELBOW UP WITH SHUT-OFF VALVE (SOV)		
J CONDENSING UNIT SH S	SENSIBLE HEAT CAPACITY SCOPE OF WORK			5	ELBOW DOWN WITH SHUT-OFF VALVE (SOV)		
B DECIBELS SP S	STATIC PRESSURE STEAM TRAP			ιδι	TEE UP WITH SHUT-OFF VALVE (SOV)		
DC DIRECT DIGITAL CONTROL STM S	STEAM O BE DETERMINED				_ TEE DOWN WITH SHUT-OFF VALVE (SOV)		
SC DISCONNECT TC/C TI N DOWN C	EMPERATURE CONTROLS CONTRACTOR			 >	_ REDUCER		
C DIRECT EXPANSION P.	EMPERATURE CONTROL PANEL				_ RECIRCULATION PUMP P-TRAP		
A EXHAUST AIR THA TO	RANSFER FAN O FLOOR ABOVE	ALL DUCT DIMENSIONS	S SHOWN ON DRAWINGS ARE INSIDE DIMENSIONS.		GAS COCK		
AIR TEMPERATURE TH T	O FLOOR BELOW OTAL HEAT CAPACITY		SPECIFICATIONS FOR DUCTWORK INSULATION AND	 -	TOP BEAM CLAMP		
DB ENTERING DRY BULB TT T	OTAL STATIC PRESSURE EMPERATURE	HVAC CONTROL I	DEVICES		TRAPEZE HANGER		
FF EFFICIENCY TYP T	RANSMITTAL YPICAL JNDERFLOOR				- FLEXIBLE CONNECTION	LINETYPE LEGEND	
SYSTEM U/G U	JNDERGROUND	H) HUMIDIS		11	, <u></u>		GS DIFFERENT LINETYPES ARE USED IN
PRESSURE UH U	JNDERSLAB JNIT HEATER JNLESS NOTED OTHERWISE	THERMO				EXISTING, TO BE DEMOLISHE	MBOLS TO INDICATE THE STATUS OF ITEMS AS ED, TO BE INCLUDED AS PART OF NEW WORK INTICIPATED TO BE PROVIDED IN THE FUTURE.
VB ENTERING WET BULB VAV V	/ARIABLE AIR VOLUME /ELOCITY		RESSURE SENSOR			THE STATUS OF ITEMS USING	G THESE LINETYPES ARE RELATIVE TO THE R. PHASING SHOWN IN DRAWINGS IS NOT
TEMPERATURE VFD V	/ARIABLE FREQUENCY DRIVE		ATURE SENSOR MONOXIDE SENSOR			INTENDED TO FULLY DESCRI	BE ALL NECESSARY CONSTRUCTION PHASING, HE CONTRACTOR AS PART OF THEIR
FA FROM FLOOR ABOVE VRF V	/ARIABLE REFRIGERANT FLOW		DIOXIDE SENSOR			RESPONSIBILITIES. ANY SUCI	H PHASES DESCRIBED IN THE CONSTRUCTION AND ONLY INTENDED TO INDICATE A BROAD
FINISHED FLOOR VRV V	/ARIABLE REFRIGERANT /OLUME		NTIAL PRESSURE SENSOR			ORDER FOR THE SAKE OF DE	ESCRIBING THE PROJECT. THE FOLLOWING I ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE,
PM FEET PER MINUTE W/ W C GENERAL CONTRACTOR W/O W	VITH VITHOUT	FS FLOW SV				ETC.	
PM GALLONS PER MINUTE WB W DA HAND-OFF-AUTOMATIC WC W	VET BULB VATER COLUMN		Y SENSOR			EXISTING -	NEW —
	VATER PRESSURE DROP EXPLOSION PROOF	PS PULL STA				DEMOLISH— — — -	
		<u> </u>				1	į l

GENERAL NOTES:

- 1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 2. COORDINATE THE INSTALLATION OF THE MECHANICAL SYSTEMS WITH OTHER TRADES TO ENSURE A NEAT AND ORDERLY INSTALLATION. INSTALL DUCTWORK AND PIPING AS TIGHT TO STRUCTURE AS POSSIBLE. COORDINATE WITH OTHER TRADES TO AVOID CONFLICTS. COORDINATE INSTALLATION OF DUCTWORK AND PIPING TO AVOID CONFLICTS WITH ELECTRICAL PANELS, LIGHTING FIXTURES, ETC. ANY MODIFICATIONS REQUIRED DUE TO LACK OF COORDINATION WILL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO EXTRA COST TO THE OWNER.
- 3. ALL MECHANICAL EQUIPMENT SHOWN ON THE MECHANICAL PLANS SHALL BE PROVIDED BY DIVISION 23 UNLESS OTHERWISE NOTED.
- 4. NEW MECHANICAL EQUIPMENT, DUCTWORK AND PIPING ARE SHOWN AT APPROXIMATE LOCATIONS. FIELD MEASURE FINAL DUCTWORK AND PIPING LOCATIONS PRIOR TO FABRICATION AND MAKE ADJUSTMENTS AS REQUIRED TO FIT THE DUCTWORK AND PIPING WITHIN THE AVAILABLE SPACE. VERIFY THAT FINAL EQUIPMENT LOCATIONS MEET MANUFACTURER'S RECOMMENDATIONS REGARDING SERVICE CLEARANCE AND PROPER AIRFLOW CLEARANCE AROUND EQUIPMENT.
- 5. REFER TO ARCHITECTURAL DRAWINGS FOR RELATED CONSTRUCTION DETAILS AS APPLICABLE TO THE HVAC SYSTEM. VERIFY CHASES AND PENETRATIONS SHOWN ON ARCHITECTURAL DRAWINGS THAT ARE INTENDED FOR DUCTWORK AND PIPING MEET REQUIREMENTS.
- COORDINATE LOCATION OF ROOF MOUNTED HVAC EQUIPMENT AND ROOF PENETRATIONS WITH THE ARCHITECTURAL AND STRUCTURAL DRAWINGS.
- 7. INDOOR AIR QUALITY MEASURES: PROTECT INSIDE OF (INSTALLED AND DELIVERED) DUCTWORK AND HVAC UNITS FROM EXPOSURE TO DUST, DIRT, PAINT AND MOISTURE. REPLACE INSULATION THAT HAS BECOME WET AT ANY TIME DURING CONSTRUCTION, DRYING THE INSULATION IS NOT ACCEPTABLE. SEAL ANY TEARS OR JOINTS OF INTERNAL FIBERGLASS INSULATION. REMOVE DEBRIS FROM CEILING/RETURN AIR PLENUM INCLUDING DUST. AN INDEPENDENT, PROFESSIONAL DUCT CLEANING COMPANY SHALL VACUUM CLEAN ANY DUCTWORK CONNECTED TO HVAC UNITS THAT WERE OPERATED DURING THE CONSTRUCTION PERIOD AFTER NEW FILTERS ARE INSTALLED AND PRIOR TO TURNING SYSTEM OVER TO THE OWNER. THE INTERNAL SURFACES AND ASSOCIATED COILS OF ANY HVAC UNITS THAT WERE OPERATED SHALL ALSO BE CLEANED.
- 8. INSTALL DUCTWORK AND PIPING PARALLEL TO BUILDING COLUMN LINES UNLESS OTHERWISE SHOWN OR NOTED.
- 9. OVERHEAD HANGERS AND SUPPORTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL BE FASTENED TO BUILDING JOISTS OR BEAMS. DO NOT ATTACH HANGERS AND SUPPORTS TO THE ABOVE FLOOR SLAB OR ROOF EXCEPT WHERE CONCRETE INSERTS IN CONCRETE SLABS ARE ALLOWED BY THE SPECIFICATIONS.
- 10. COORDINATE LOCATION OF EQUIPMENT SUPPORTS WITH LOCATION OF EQUIPMENT ACCESS PANELS/DOORS TO ENABLE SERVICE OF EQUIPMENT AND/OR FILTER REPLACEMENT.
- 11. SEAL PENETRATIONS THROUGH THE BUILDING COMPONENTS IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS. FIREPROOF PENETRATIONS THROUGH FIRE RATED COMPONENTS IN ACCORDANCE WITH U.L. REQUIREMENTS.
- 12. COORDINATE THE EXACT MOUNTING SIZE AND FRAME TYPE OF DIFFUSERS, REGISTERS AND GRILLES WITH THE SUPPLIER TO MEET THE CEILING, WALL AND DUCT INSTALLATION REQUIREMENTS.
- 13. ADJUST LOCATION OF CEILING DIFFUSERS, REGISTERS AND GRILLES AS REQUIRED TO ACCOMMODATE FINAL CEILING GRID AND LIGHTING LOCATIONS.
- 14. PAINT PORTIONS OF DUCTWORK AND INSULATION THAT ARE EXPOSED TO VIEW BY THE INSTALLATION OF DIFFUSERS, REGISTERS, AND GRILLES IN CEILINGS OR WALLS FLAT BLACK. PORTIONS INCLUDE BOTH THE INTERIOR OF UNLINED DUCTWORK AND THE EXTERIOR OF DUCTWORK AND INSULATION.
- 15. DUCTWORK CROSSING FIRE RATED WALLS OR OTHER FIRE RATED ASSEMBLIES SHALL BE MINIMUM 26 GAUGE SHEET
- 16. PROVIDE FIRE OR FIRE/SMOKE DAMPERS, AS APPLICABLE, IN DUCTWORK AT CEILINGS AND WALLS AT LOCATIONS SHOWN ON THE PLANS. FIRE AND FIRE/SMOKE DAMPERS SHALL CONFORM TO NFPA AS APPLICABLE. COORDINATE SLEEVE LENGTH WITH REQUIREMENTS OF INSTALLED LOCATION.
- 17. PROVIDE WALL OR DUCT ACCESS PANELS OR DOORS FOR ACCESS TO FIRE AND FIRE/SMOKE DAMPERS. ACCESS PANEL OR DOOR SHALL BE MINIMUM SIZE OF 10" BY 10" AND SHALL BE INSTALLED WITHIN 12" OF DAMPER. PROVIDE A REMOVABLE DUCT SECTION WHERE DUCT SIZE IS TOO SMALL FOR A 10" BY 10" ACCESS DOOR.
- 18. LOCATE AND SET THERMOSTATS AND HUMIDISTATS AT LOCATIONS SHOWN ON PLANS. VERIFY EXACT LOCATIONS WITH ARCHITECT PRIOR TO INSTALLATION. INSTALL DEVICES WITH TOP OF DEVICE AT MAXIMUM 48" AFF TO MEET ADA REQUIREMENTS UNLESS NOTED OTHERWISE ON PLANS. PROVIDE INSULATED BACKING FOR THERMOSTATS MOUNTED ON EXTERIOR BUILDING WALLS. INSTALL WIRING IN CONDUIT PROVIDED BY DIVISION 26. AT A MINIMUM, PROVIDE CONDUIT IN THE WALL FROM THE JUNCTION BOX TO 6" ABOVE THE CEILING.
- 19. COORDINATE THE LOCATION AND ELEVATION OF WALL-MOUNTED DEVICES WITH PRESENTATION BOARDS, DISPLAY CABINETS, SHELVES OR OTHER COMPONENTS SHOWN ON THE ARCHITECTURAL DRAWINGS THAT ARE TO BE INSTALLED UNDER OTHER DIVISIONS. CONTRACTOR WILL NOT BE REIMBURSED FOR RELOCATION OF WALL-MOUNTED DEVICES CAUSED BY A LACK OF COORDINATION.
- 20. PROVIDE A MANUAL BALANCING DAMPER IN EACH DUCT TAKEOFF FROM SUPPLY, RETURN, OUTDOOR AND EXHAUST AIR DUCTS.
- 21. PROVIDE A PREFABRICATED 45 DEGREE, HIGH EFFICIENCY, RECTANGULAR/ROUND BRANCH DUCT TAKEOFF FITTING FOR BRANCH DUCT CONNECTIONS AND TAKE-OFFS TO INDIVIDUAL DIFFUSERS, REGISTERS AND GRILLES. PROVIDE WITH INTEGRAL MANUAL BALANCING DAMPER AND LOCKING QUADRANT WHERE INDICATED ON PLANS.
- 22. BRANCH DUCTWORK TO AIR OUTLETS SHALL BE SAME SIZE AS OUTLET NECK SIZE UNLESS OTHERWISE NOTED.
- 23. REFER TO SPECIFICATIONS FOR DUCTWORK AND PIPING INSULATION REQUIREMENTS. DUCT SIZES ON MECHANICAL PLANS INDICATE CLEAR INSIDE AIRFLOW DIMENSIONS, INCREASE SHEET METAL SIZES ACCORDINGLY TO ACCOUNT FOR THICKNESS OF DUCT LINER.
- 24. FLEXIBLE DUCTWORK SHALL NOT EXCEED 5'-0" IN LENGTH AND SHALL BE INSTALLED AND SUPPORTED TO AVOID SHARP BENDS AND SAGGING. REFER TO SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- 25. RIGIDLY SUSPEND UNIT HEATER FROM STRUCTURE WITH SUPPORTING ANGLES AND ALL-THREAD HANGING RODS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- 26. PROVIDE A NEW SET OF AIR FILTERS IN UNITS PRIOR TO TESTING, ADJUSTING AND BALANCING AND BEFORE TURNING SYSTEM(S) OVER TO OWNER.

paragon of star

PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

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STRUCTURAL BSE STRUCTRAL ENGINEERS

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ELECTRICAL HENDERSON ENGINEERS

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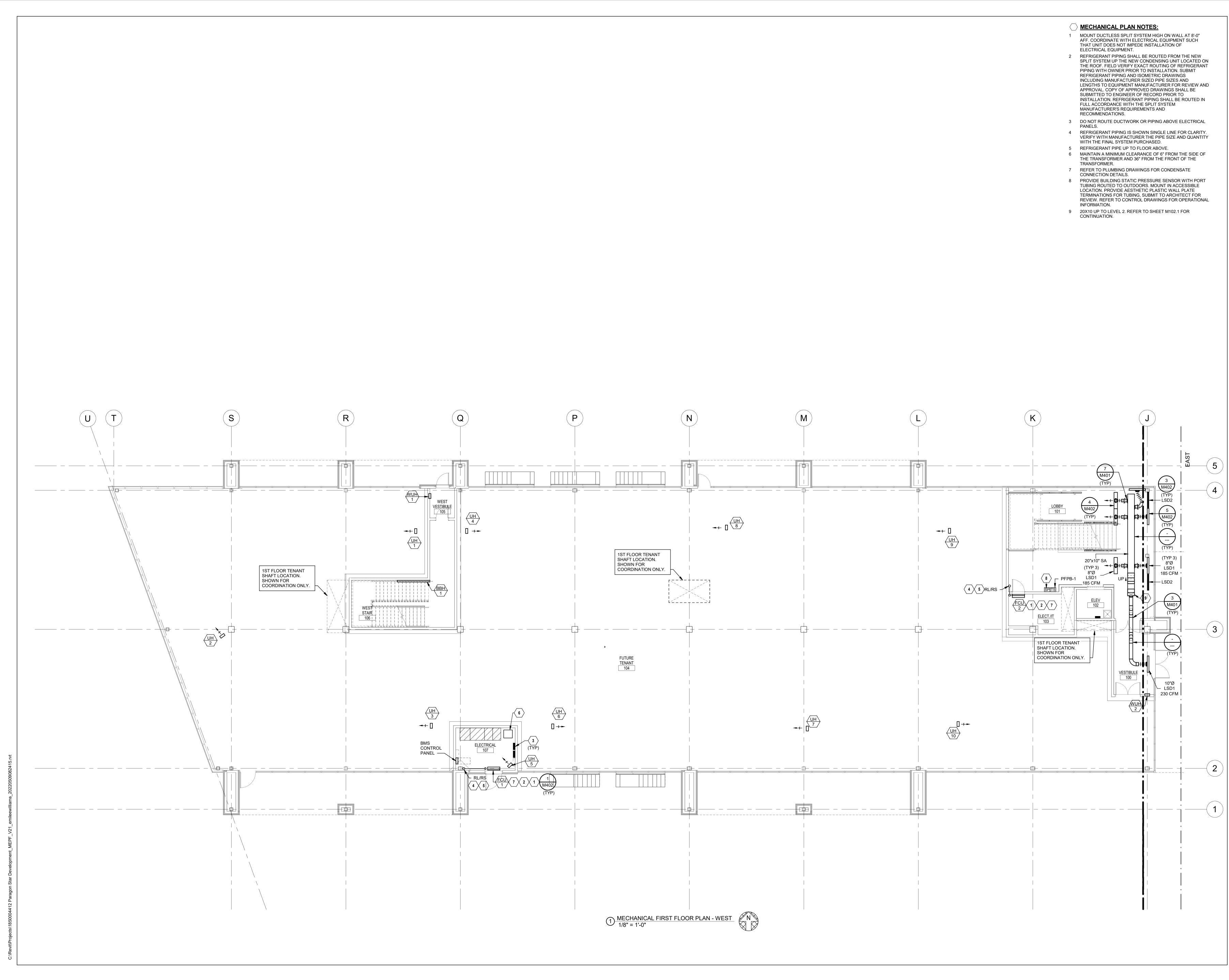
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MECHANICAL LEGENDS AND GENERAL NOTES





FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

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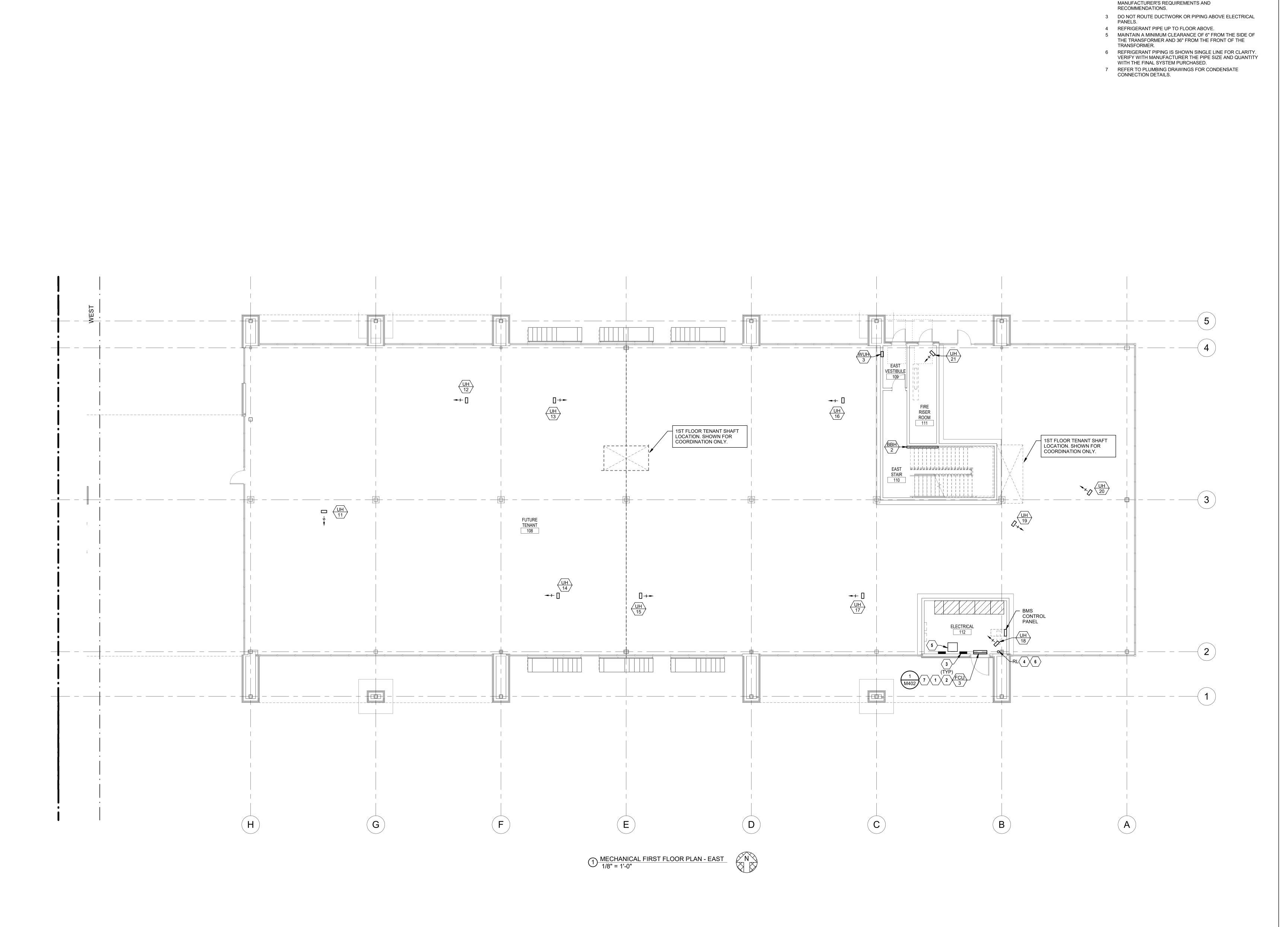
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SHEET TITLE

MECHANICAL FIRST FLOOR PLAN - WEST

SHEET NUMBER

M 1 0 1 . 1





MECHANICAL PLAN NOTES:

ELECTRICAL EQUIPMENT.

1 MOUNT DUCTLESS SPLIT SYSTEM HIGH ON WALL AT 8'-0"

AFF. COORDINATE WITH ELECTRICAL EQUIPMENT SUCH THAT UNIT DOES NOT IMPEDE INSTALLATION OF

2 REFRIGERANT PIPING SHALL BE ROUTED FROM THE NEW SPLIT SYSTEM UP THE NEW CONDENSING UNIT LOCATED ON

THE ROOF. FIELD VERIFY EXACT ROUTING OF REFRIGERANT PIPING WITH OWNER PRIOR TO INSTALLATION. SUBMIT REFRIGERANT PIPING AND ISOMETRIC DRAWINGS INCLUDING MANUFACTURER SIZED PIPE SIZES AND

LENGTHS TO EQUIPMENT MANUFACTURER FOR REVIEW AND APPROVAL. COPY OF APPROVED DRAWINGS SHALL BE SUBMITTED TO ENGINEER OF RECORD PRIOR TO

INSTALLATION. REFRIGERANT PIPING SHALL BE ROUTED IN

FULL ACCORDANCE WITH THE SPLIT SYSTEM

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

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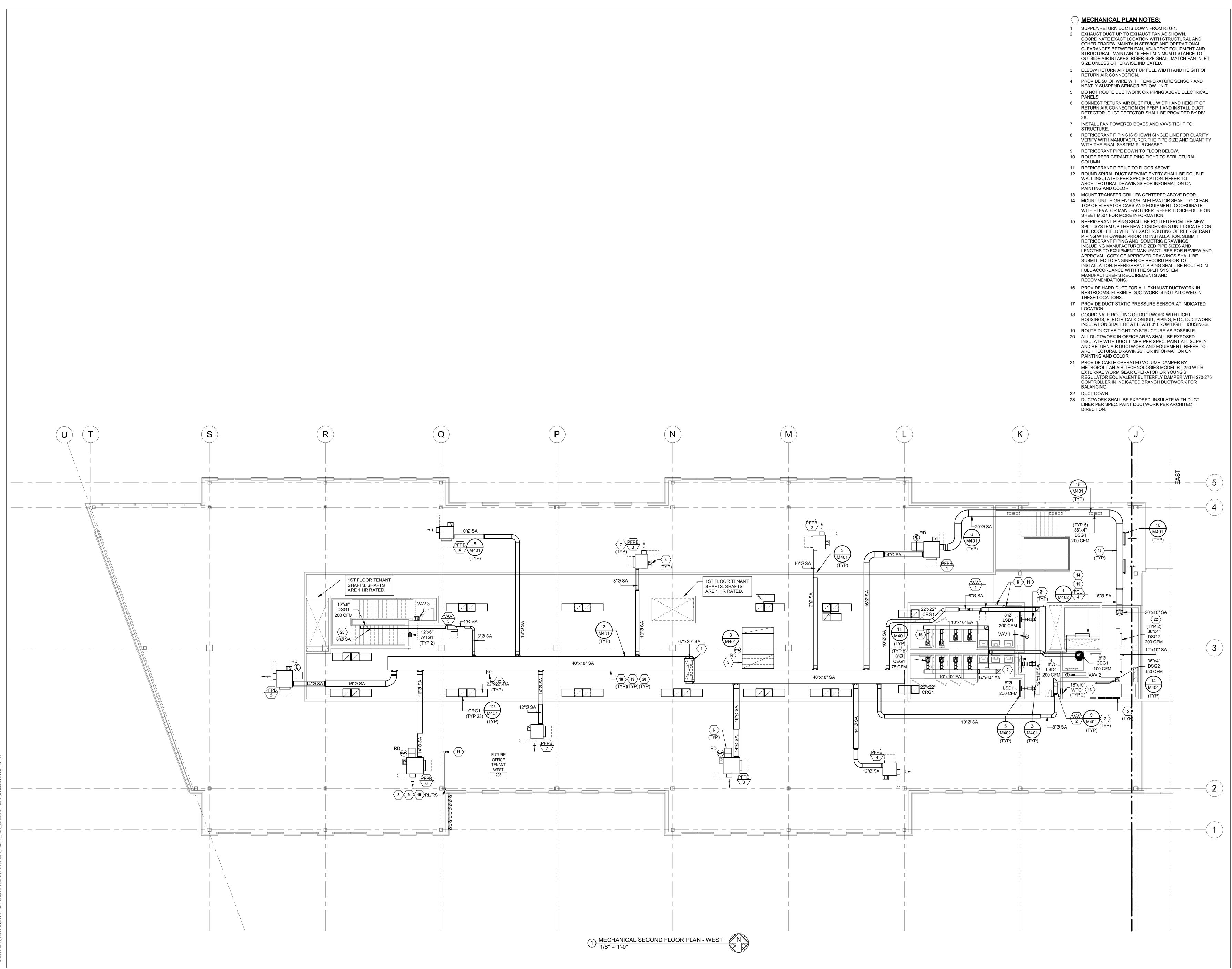
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SHEET TITLE

MECHANICAL FIRST FLOOR PLAN - EAST

M101.2

DLEY E. CHAMBON





FIRST PLAT, LOT 9

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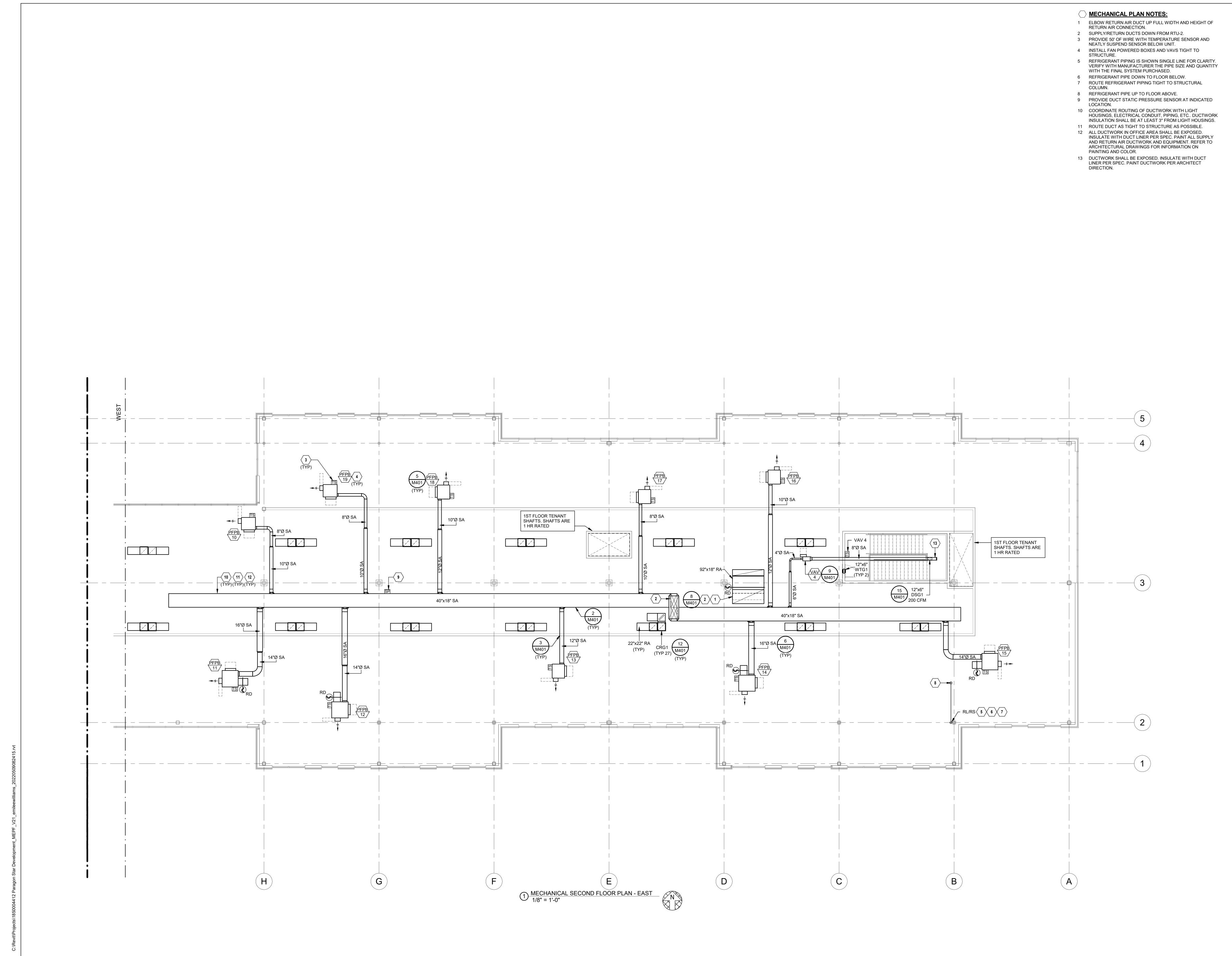
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SHEET TITLE

MECHANICAL SECOND FLOOR PLAN - WEST

SHEET NUMBER

M102.1





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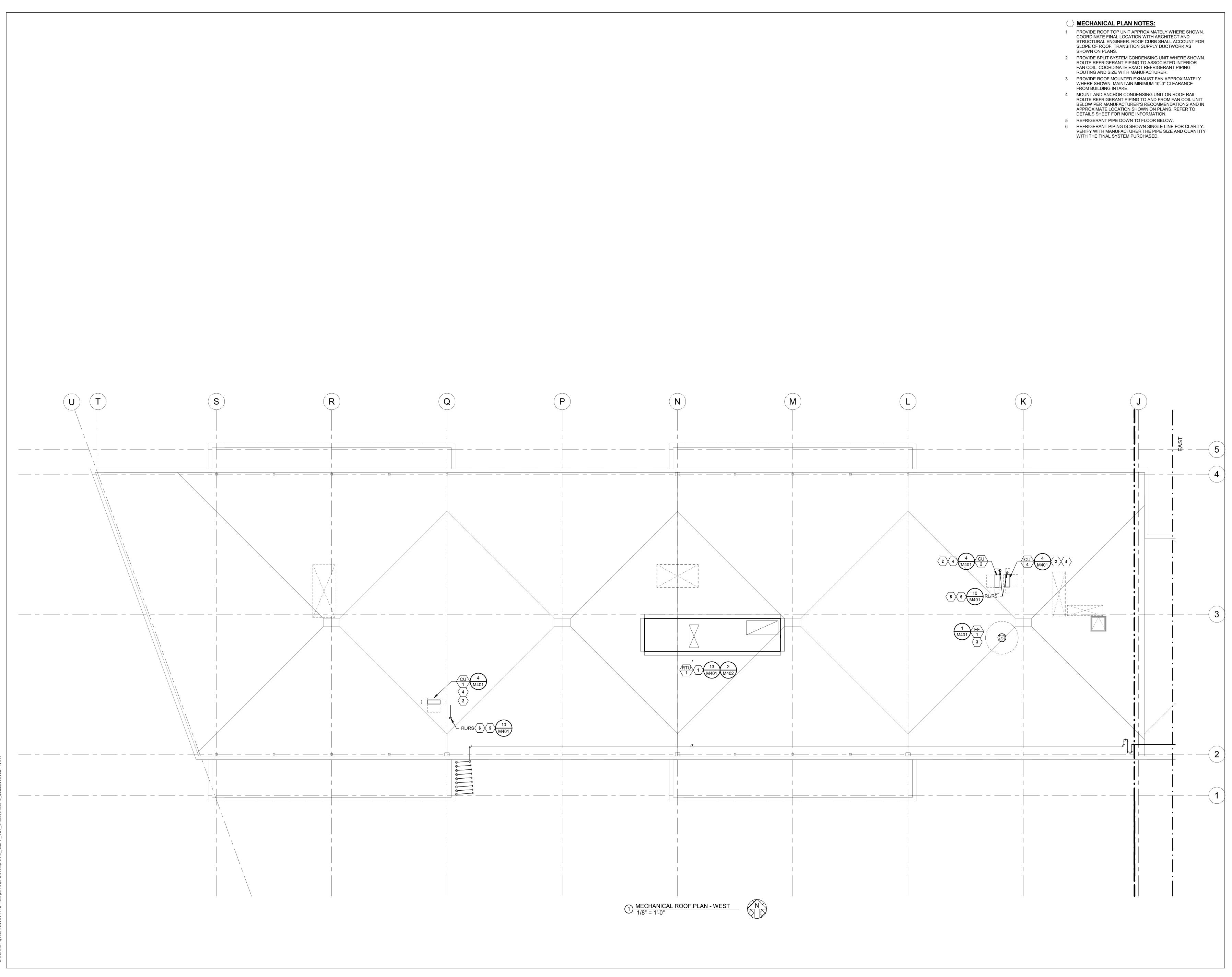
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MECHANICAL SECOND FLOOR PLAN - EAST

SHEET NUMBER

M102.2





FIRST PLAT, LOT 9

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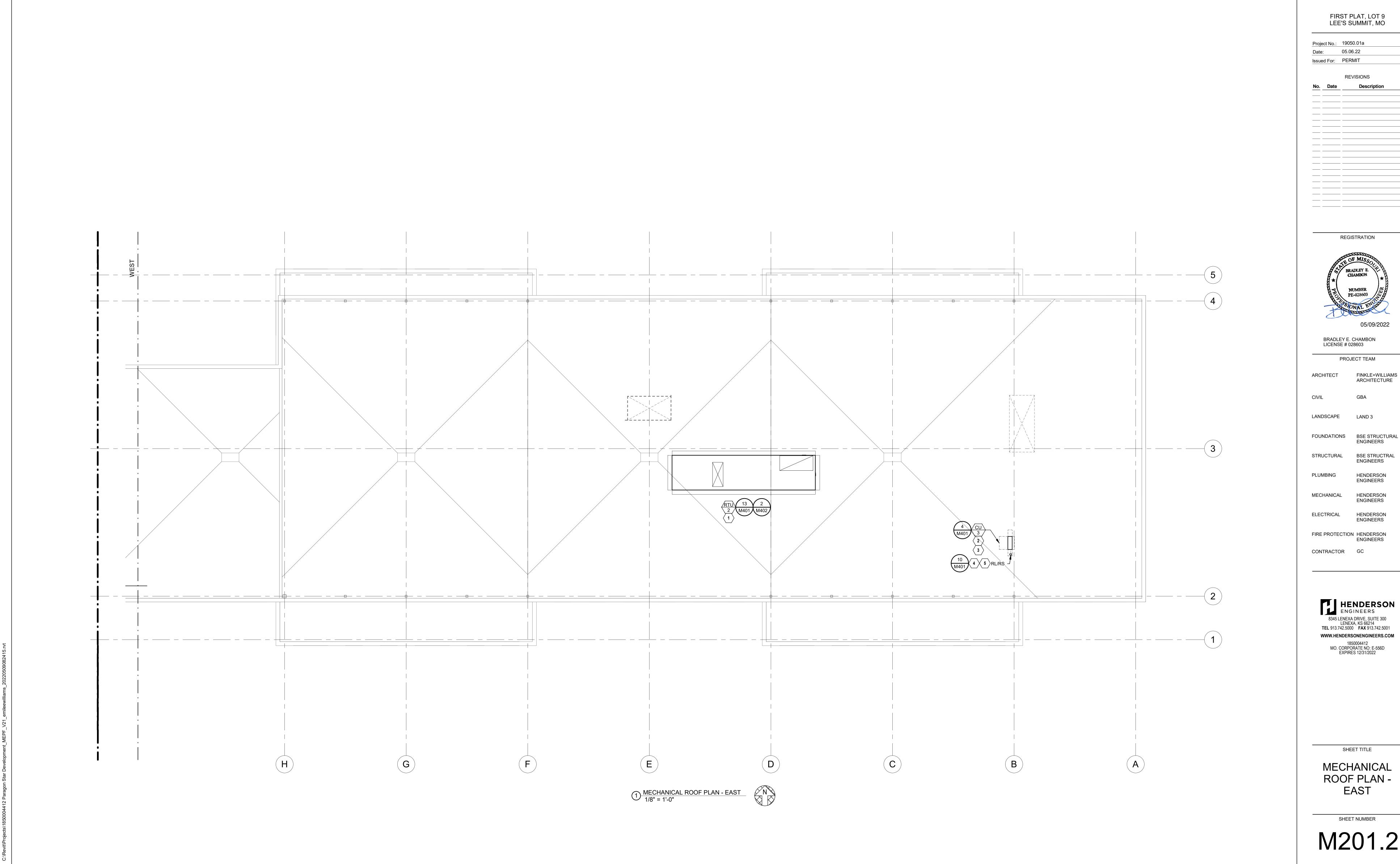
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SHEET TITLE

MECHANICAL ROOF PLAN -WEST

SHEET NUMBER

M201.1





MECHANICAL PLAN NOTES:

SHOWN ON PLANS.

1 PROVIDE ROOF TOP UNIT APPROXIMATELY WHERE SHOWN.

SLOPE OF ROOF. TRANSITION SUPPLY DUCTWORK AS

2 PROVIDE SPLIT SYSTEM CONDENSING UNIT WHERE SHOWN. ROUTE REFRIGERANT PIPING TO ASSOCIATED INTERIOR FAN COIL. COORDINATE EXACT REFRIGERANT PIPING

ROUTE REFRIGERANT PIPING TO AND FROM FAN COIL UNIT BELOW PER MANUFACTURER'S RECOMMENDATIONS AND IN APPROXIMATE LOCATION SHOWN ON PLANS. REFER TO

5 REFRIGERANT PIPING IS SHOWN SINGLE LINE FOR CLARITY. VERIFY WITH MANUFACTURER THE PIPE SIZE AND QUANTITY

3 MOUNT AND ANCHOR CONDENSING UNIT ON ROOF RAIL

ROUTING AND SIZE WITH MANUFACTURER.

DETAILS SHEET FOR MORE INFORMATION. 4 REFRIGERANT PIPE DOWN TO FLOOR BELOW.

WITH THE FINAL SYSTEM PURCHASED.

COORDINATE FINAL LOCATION WITH ARCHITECT AND STRUCTURAL ENGINEER. ROOF CURB SHALL ACCOUNT FOR

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO Project No.: 19050.01a 05.06.22 Issued For: PERMIT

REVISIONS

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

FINKLE+WILLIAMS

ARCHITECTURE

LANDSCAPE

STRUCTURAL BSE STRUCTRAL **ENGINEERS**

ENGINEERS

PLUMBING HENDERSON **ENGINEERS**

MECHANICAL HENDERSON

ELECTRICAL HENDERSON **ENGINEERS**

CONTRACTOR GC

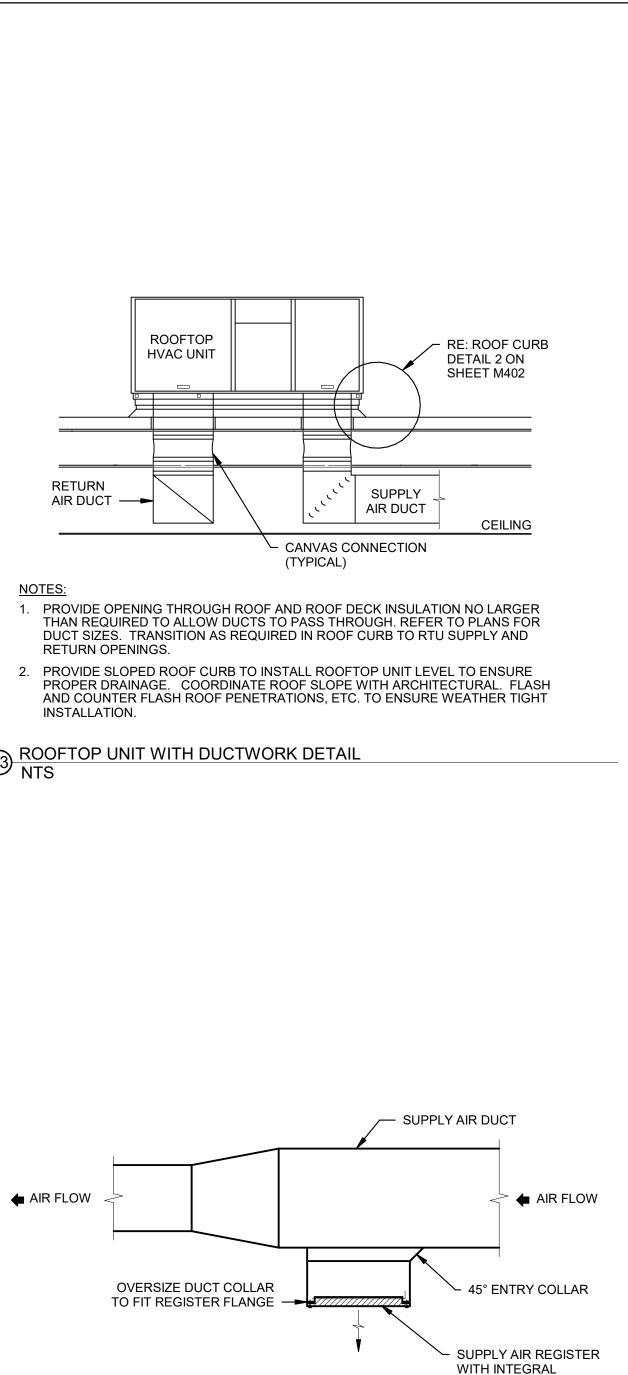
HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

MECHANICAL **ROOF PLAN -**EAST

SHEET NUMBER

M201.2



VOLUME DAMPER

- SUPPLY GRILLE OR

TODUCT COLLAR.

FOR NECK SIZE.

OVERSIZE DUCT

COLLAR TO FIT

ROUND SUPPLY DUCT

REGISTER FLANGE.

REFER TO DWG.'S FOR REGISTER NECK SIZE.

- SUPPLY GRILLE OR

TODUCT COLLAR.

FOR NECK SIZE.

DIFFUSER SECURED

REFER TO DRAWINGS

OVERSIZE DUCT

COLLAR TO FIT

FOR REGISTER

NECK SIZE.

SADDLE TYPE DUCT

WITH NEOPRENE

GASKET (TYPICAL)

REGISTER FLANGE

REFER TO DWG.'S

DIFFUSER SECURED

REFER TO DRAWINGS

ROUND SUPPLY DUCT

SIDE VIEW

END VIEW

SIDE VIEW

END VIEW

SADDLE TYPE DUCT

SADDLE TYPE DUCT

WITH NEOPRENE

VERTICAL REGISTER MOUNTING TO ROUND DUCT DETAIL NTS

16 HORIZONTAL REGISTER MOUNTING TO ROUND DUCT DETAIL NTS

GASKET (TYPICAL)

SADDLE TYPE DUCT

INVERTED DUCT

ROUND SUPPLY DUCT -

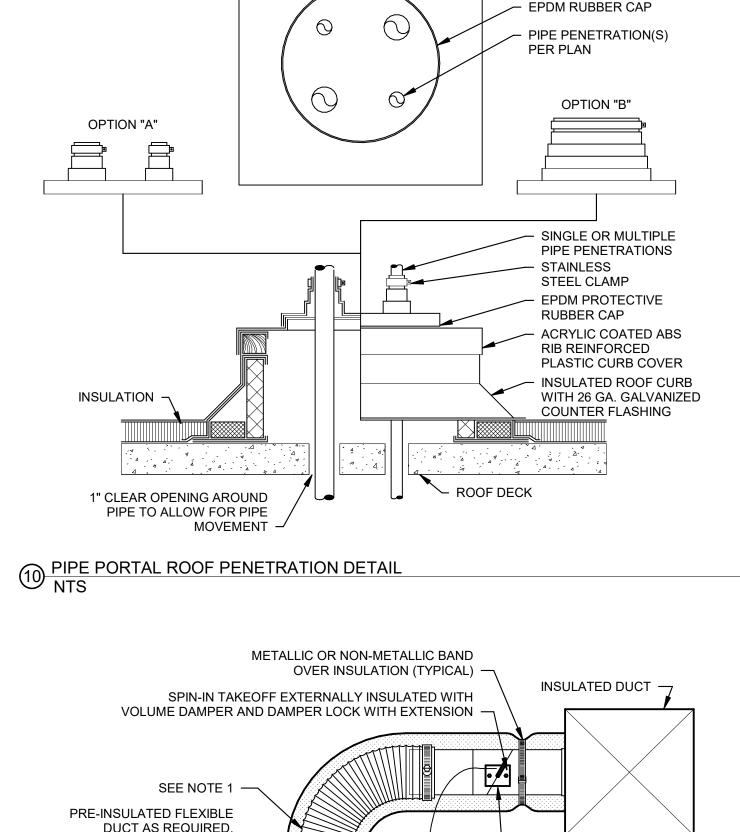
WITH NEOPRENE GASKET —

INVERTED DUCT

COLLAR

ROUND SUPPLY DUCT -

WITH NEOPRENE GASKET —



PIPING, DUCTWORK, CEILING

IN THIS 2' SPACE TO ALLOW

FOR MAINTENANCE.

DAMPER

BY DUCT SIZE -

INSULATION AND SEAL

SQUARE TO ROUND

TAKE-OFF FITTING

SUPPLY DUCT

4. ALL ACCESS DOORS MUST BE ABLE TO OPEN A MINIMUM OF 90 DEGREES.

1. SUPPORT AIR TERMINAL UNIT, BOTH ENDS WITH MINIMUM 2" WIDE GALVANIZED 22 GA. HANGER

2. INSTALL BOX NOT MORE THAN 2 FEET ABOVE THE CEILING TO ENABLE ACCESS FOR

3. FLEXIBLE CONNECTION SHALL BE ATCO MODEL UPC# 017 OR DURO-DYNE INSULFLEX.

SUPPORTS ETC. NOT ALLOWED

EXTERNAL INSULATION IF

NOT INTERNALLY LINED +

CONCENTRIC SHEETMETAL

REDUCER, WHEN REQUIRED

MAINTENANCE.

MAXIMUM 6" FLEXIBLE CONNECTION

SEE NOTE 3. PROVIDE DUCT WRAP

- SUPPLY DUCT

BOX FLOW

DIAMETER

METERING STATION

INSULATION AS REQUIRED

ABS CURB CAB

(EXTERNAL SHOWN)

- MINIMUM 3X DUCT

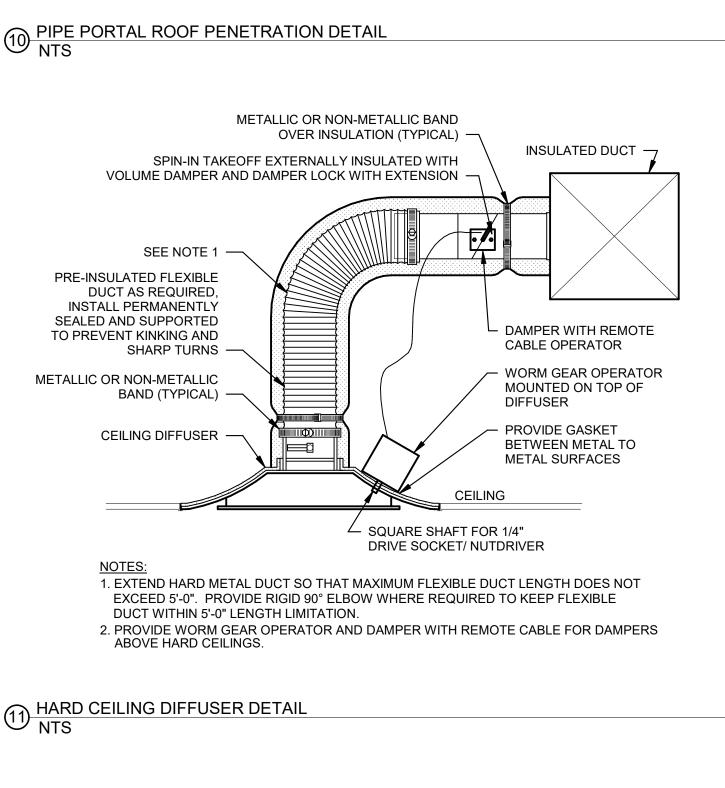
→ PIPING DUCTWORK, CEILING

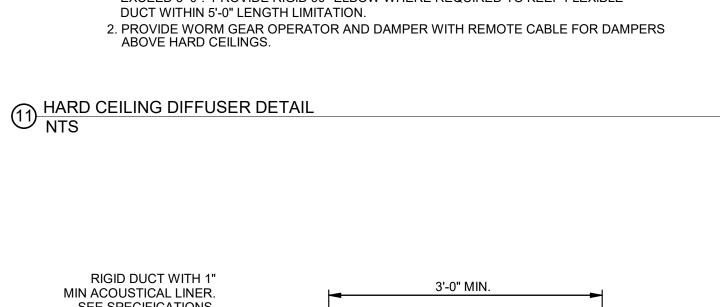
MAINTENANCE.

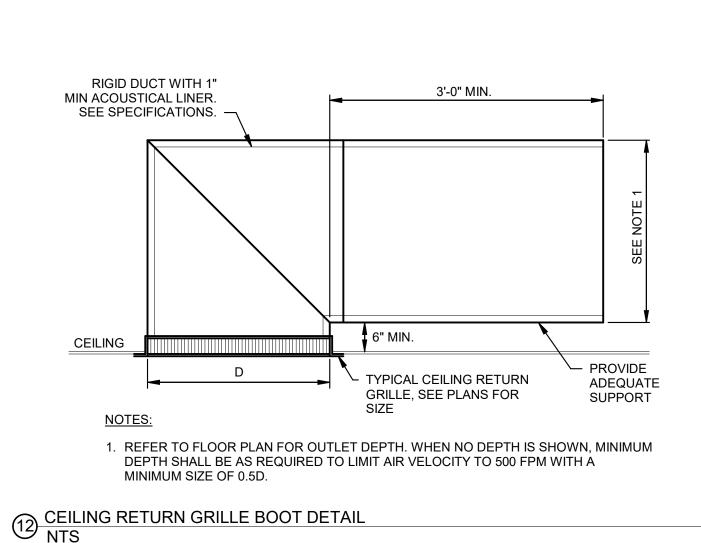
CONTROL BOX

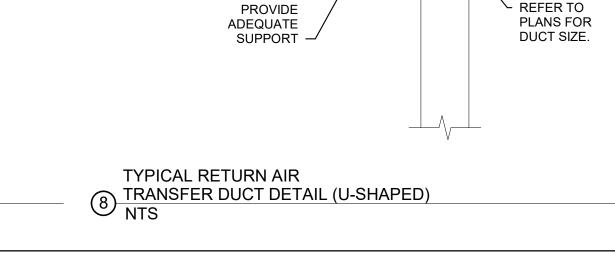
SUPPORTS ETC. NOT ALLOWED

IN THIS SPACE TO ALLOW FOR









GRIP LOCK WOVEN NYLON/ POLYESTER BLEND FLEXIBLE

CONNECTION MAXIMUM 6"

(SIMILAR TO METAL-FAB BY

WRAP INSULATION AND SEAL ----

SEE NOTE 4.

5' TOTAL LENGTH -

SQUARE TO ROUND

TAKE-OFF FITTING

MAINTAIN CLEARANCE FOR ACCESS TO UNIT COMPONENTS.

CONTROLS ENCLOSURE AND BOX CONTROLLER/ACTUATOR IS REQUIRED.

7. ALL ACCESS DOORS MUST BE ABLE TO OPEN A MINIMUM OF 90 DEGREES.

DURO DYNE) OVERLAP DUCT

EXTERNAL INSULATION IF VAV

PROVIDE LINED RETURN AIR BOOT FULL

SIZE OF BOX RETURN AIT OPENING OR

AS INDICATED ON PLANS. BOOT SHALL

BE "L" SHAPED AS SHOWN OR STRAIGHT

IF SPACE DOES NOT ALLOW ELBOW. MIN.

PROVIDE OR RELOCATE

FILTER RACK AS REQ'D.

MAINTENANCE.

PARALLEL FAN POWERED

HANGER

STRAP (TYP) -

SHEET METAL

NOTE 2.

TWIST STRAP

LOAD RATED

FASTENER (TYP) -

BAND OF SAME

STRAP (TYP)

DUCT (TYP) -

45° HIGH EFFICIENCY

TO ROUND FITTING -

SHEETMETAL DUCT

TAKE-OFF WITH SQUARE

ROUND

(MAX.

BALANCING DAMPER

(SEE NOTE 3 AND 4) —

WITH QUADRANT LOCK

45° LATERAL FLEXIBLE

DUCT TAKE OFF DETAIL

RIGID DUCT WITH 1"

SEE SPECIFICATIONS.

MIN ACOUSTICAL

LINER.

(MAX.

1. USE THREADED ROD FOR RECTANGULAR DUCTS LARGER THAN 60" WIDE.

FLEXIBLE DUCT (MAXIMUM

CUT OPENING IN SHEETMETAL DUCT ACCURATELY. INSTALL 45° LATERAL

INNER LINER & OUTER INSULATION SKIN WITH TAPE & METAL CLAMPS.

TO AVOID VISIBLE OPENINGS AND SECURE FITTING SUITABLY FOR PRESSURE

2. INSTALL FLEXIBLE DUCT IN AS STRAIGHT A RUN AS POSSIBLE. USE LONG RADIUS

3. EXTEND DAMPER ROD TO ACCOMMODATE INSULATION IF APPLICABLE. PULL ROD

END TO EDGE OF DUCTWORK AS REQUIRED AND SEAL TO MAINTAIN VAPOR

4. INSTALL LOCKING QUADRANT TO HANDLE ON BOTTOM OF DUCT FOR EASE OF

BENDS WHERE POSSIBLE. PULL DUCT TIGHT AT BOTH ENDS AND SECURE BOTH

OF 5'-0" WITH ONE 90°

2. OMIT SHEET METAL SCREWS IF HANGER STRAP IS CONTINUOUS AND LOOPS UNDER ENTIRE

FOR ROUND DUCTS LARGER THAN 36"Ø. USE TWO HANGER RODS TO SUPPORT DUCT FROM EACH
 HANGERS MUST NOT DEFORM DUCT SHAPE.

ELBOW)

SIZE AS HANGER

WHEN NECESSAR'

SCREWS. SEE

5 BOX WITH ELECTRIC REHEAT COIL NTS

LINE OF SIGHT -

BOX IS NOT INTERNALLY LINED -

PARALLEL FAN (SEE NOTE 1.) -

- SUPPLY DUCT

□ SUPPLY DUCT

RECTANGULAR DUCT

ANGLE IRON OR UNISTRUT

(ANY SIZE)

✓ FASTEN TO STRUCTURE

1" BAND CLAMP

CONNECT TO AIR

NOTED FLEX DUCT

IS SAME SIZE AS AIR

DEVICE NECK. UNLESS OTHERWISE

DEVICE NECK

 ackslash PULL INNER LINER OVER TAKE-OFF COLLAR &

TAPE SECURELY IN PLACE. PULL EXTERNAL

AT 45° ANGLE TO PREVENT GAPPING AND

LEAKAGE. APPLY MINIMUM 1/2" WIDTH

INSULATION SKIN OVER COLLAR AND LINER &

STAINLESS STEEL BAND OVER DOUBLE-SIDED

→ PARTITION OR WALL

TAPE TO COMPRESS AND SEAL FLEX TO COLLAR.

TAPE SECURELY IN PLACE. SLICE EDGE OF TAPE

SIZE BOLTS FOR LOAD

- THREADED

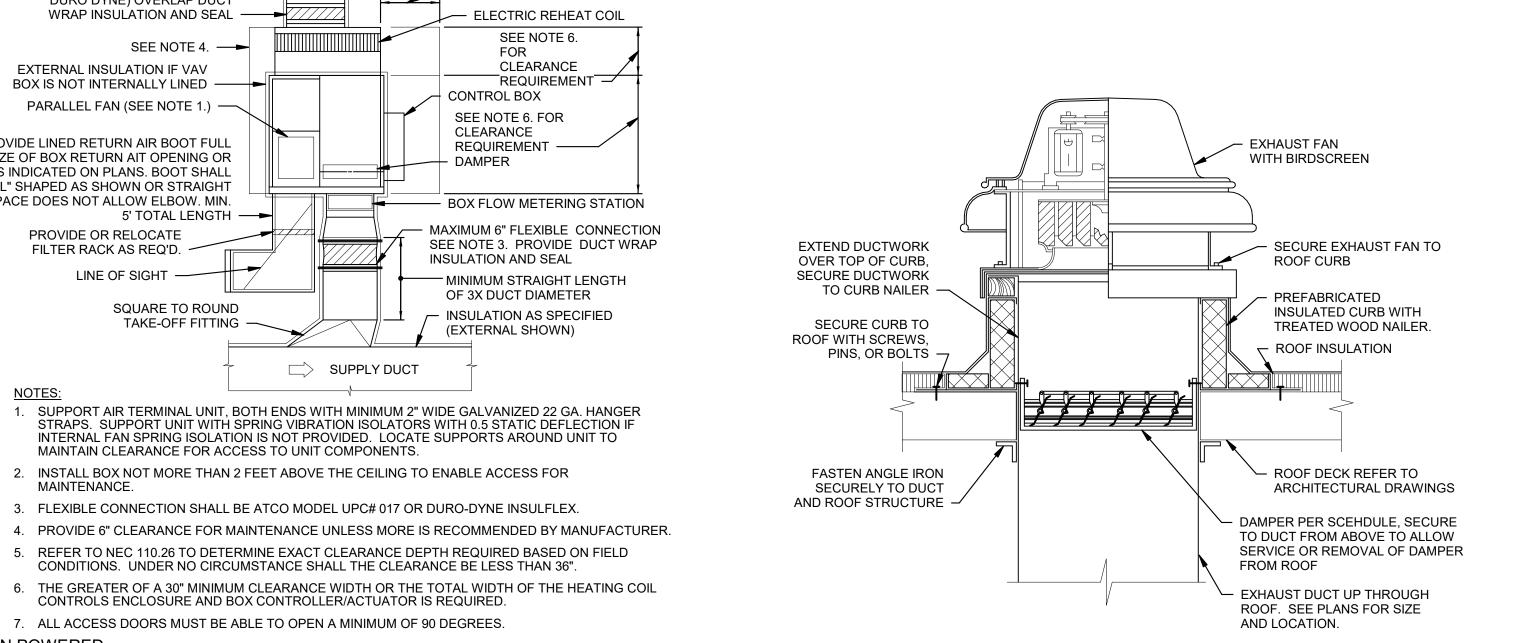
ROD (TYP)

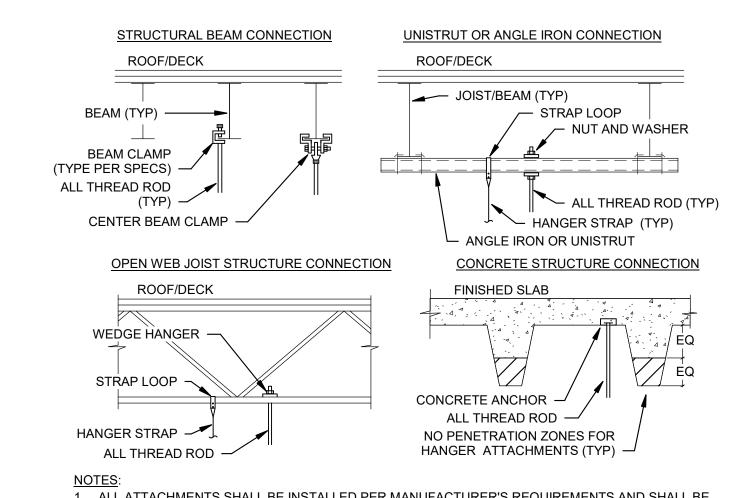
THREADED

ROD (TYP)

- SEE NOTE 5. FOR CLEARANCE

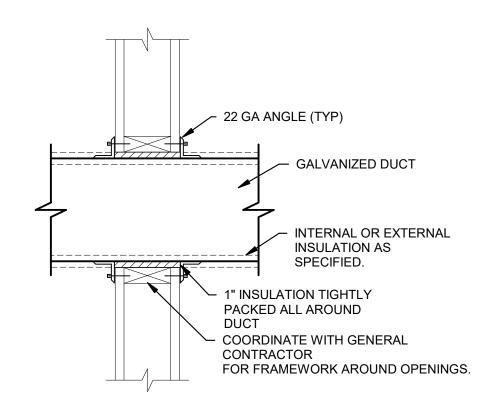
REQUIREMENT





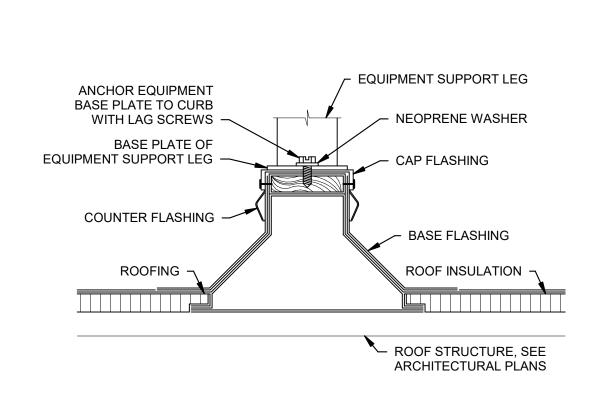
1. ALL ATTACHMENTS SHALL BE INSTALLED PER MANUFACTURER'S REQUIREMENTS AND SHALL BE APPROVED FOR THE SPECIFIC APPLICATION. COORDINATE ALL ATTACHMENTS WITH ARCHITECT AND STRUCTURAL ENGINEER. REFER TO SPECIFICATIONS FOR MORE INFORMATION ON APPROVED ATTACHMENT METHODS. REFER TO SPECIFICATIONS FOR REQUIREMENTS RELATING TO SEISMIC INSTALLATIONS. FOR OPEN WEB JOIST STRUCTURE. CONTRACTOR MAY HANG FROM TOP CHORD AND RUN DUCT AND PIPING THROUGH WEB JOIST WHEN APPROPRIATE. ANY CONCENTRATED LOADS NOT OCCURRING AT JOIST PANEL POINTS MUST BE REVIEWED BY A STRUCTURAL ENGINEER FOR FIELD INSTALLED PANEL BRACE REQUIREMENTS.

1 DOWNBLAST EXHAUST FAN DETAIL



1. DRYWALL, METAL STUDS OR ANY OTHER RIGID MATERIAL MUST NOT TOUCH DUCT. 2. SUPPORT DUCT FROM HANGERS

METAL DUCT NON-FIRE RATED WALL PENETRATION



PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT REVISIONS 10/02/20 BID PACKAGE #6

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT

ARCHITECTURE CIVIL GBA

LANDSCAPE LAND 3 FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

STRUCTURAL BSE STRUCTRAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS**

HENDERSON MECHANICAL **ENGINEERS**

ENGINEERS FIRE PROTECTION HENDERSON **ENGINEERS**

CONTRACTOR GC

HENDERSON

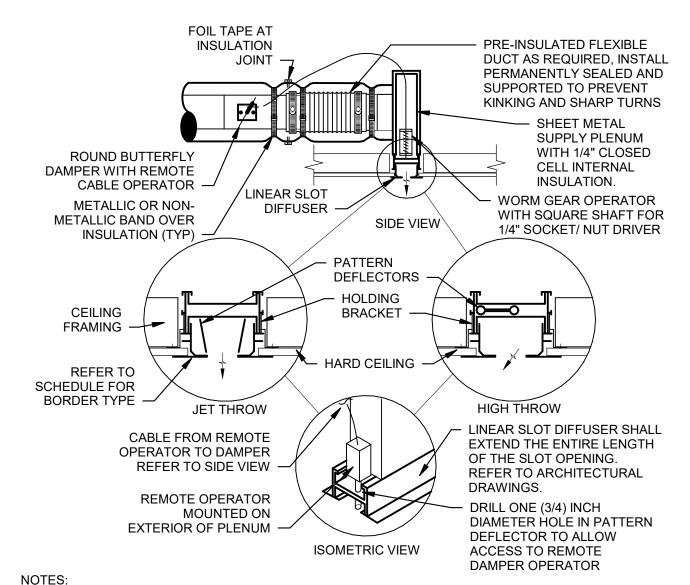
ELECTRICAL

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

> MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

MECHANICAL DETAILS

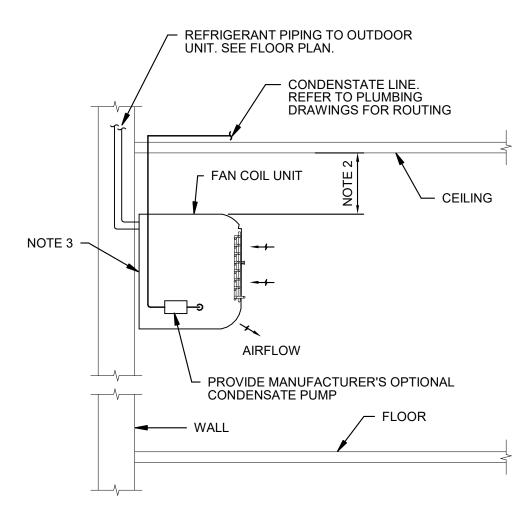


 EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0". PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0"

LENGTH LIMITATION.
2. COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.
3. REFER TO DIFFUSER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR EACH SCHEDULED BORDER TYPE.

4. REFER TO SPECIFICATIONS FOR FLEXIBLE DUCTWORK INSTALLATION REQUIREMENTS.

5 LINEAR SLOT DIFFUSER IN GYP CEILING DETAIL NTS



NOTES:

1. ARRANGEMENT SHOWN IS SCHEMATIC, ADJUST TO SUIT FIELD CONDITIONS OR MEET LOCAL CODE REQUIREMENTS.

2. PROVIDE MINIMUM 3.5" OF CLEARANCE AT THE TOP OF THE UNIT.

3. ATTACH FAN COIL UNIT TO MANUFACTURER'S PROVIDED INSTALLATION PLATE. MOUNT INSTALLATION

- FANLOOU LINUT MAALL MOUNTED

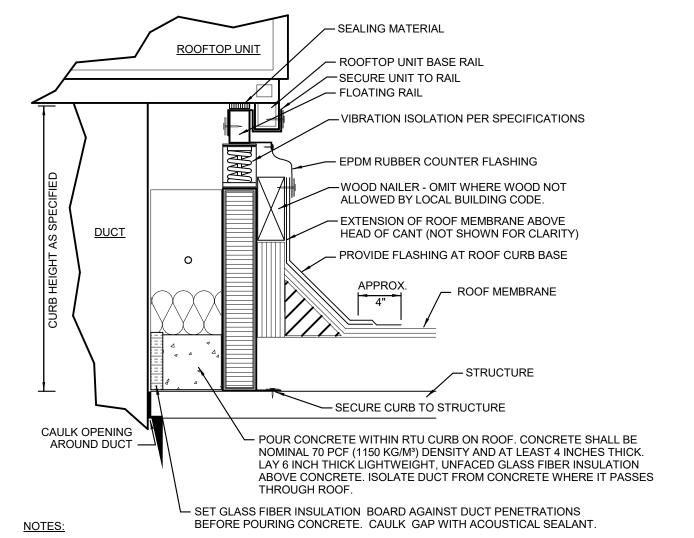
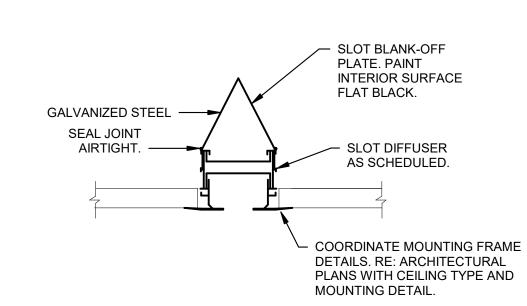


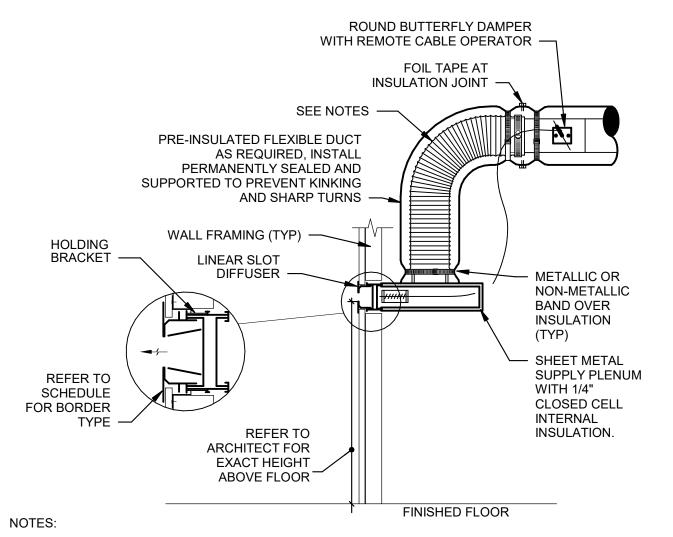
PLATE TO WALL PER MANUFACTURER'S RECOMMENDATIONS.

 CUT METAL DECKING TO ALLOW CURB INSTALLATION ON STEEL FRAMING. AFTER CURB IS SET IN PLACE, TRIM REMAINING METAL DECKING AND INSTALL WITHIN CURB. TACK WELD DECKING TO SUPPORT STEEL. DO NOT WELD INTERIOR DECKING TO ROOF CURB. PROVIDE ADDITIONAL CROSS FRAMING TO SUPPORT INTERIOR DECKING AND FILL MATERIAL AS REQUIRED.

2 VIBRATION ISOLATION ROOF CURB AND DUCT ISOLATION DETAIL NTS



3 SLOT BLANK OFF PLATE DETAIL NTS



- EXTEND HARD METAL DUCT SO THAT MAXIMUM FLEXIBLE DUCT LENGTH DOES NOT EXCEED 5'-0".
 PROVIDE RIGID 90° ELBOW WHERE REQUIRED TO KEEP FLEXIBLE DUCT WITHIN 5'-0" LENGTH
 LIMITATION.
- COORDINATE EXACT LENGTH AND LOCATION OF SLOT DIFFUSER WITH ARCHITECT'S REFLECTED CEILING PLAN.
 REFER TO DIFFUSER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR EACH SCHEDULED
- REFER TO DIFFUSER MANUFACTURER'S INSTALLATION INSTRUCTIONS FOR EACH SCHE BORDER TYPE.
 REFER TO SPECIFICATIONS FOR FLEXIBLE DUCTWORK INSTALLATION REQUIREMENTS.

SIDEWALL LINEAR SLOT DIFFUSER DETAIL NTS

paragon of star

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

No. Date Description
10/02/20 BID PACKAGE #6

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL

STRUCTURAL BSE STRUCTRAL ENGINEERS

MECHANICAL HENDERSON ENGINEERS

HENDERSON

ELECTRICAL HENDERSON ENGINEERS
FIRE PROTECTION HENDERSON

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MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

MECHANICAL DETAILS

SHEET NUMBER

BRADLEY E. CHAMBON

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY.

REFER TO SHEET M601 FOR PACKAGED MULTI-ZONE VAV ROOFTOP UNIT CONTROL DRAWING, POINTS LIST, AND SEQUENCE. EQUIPMENT SIZED FOR 105°F AMBIENT TEMPERATURE.

PROVIDE MERV 13, EFFICIENT PLEATED THROWAWAY AIR FILTERS.

PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.

STARTERS FOR ALL MOTORS SHALL BE FURNISHED INTEGRAL WITH UNIT.

PROVIDE FACTORY MOUNTED VARIABLE FREQUENCY DRIVE TO FACILITATE MODULATING FAN SPEED CONTROL. PROVIDE SHAFT GROUNDING SYSTEM ON MOTOR. REFER TO MOTOR SPECIFICATION FOR ADDITIONAL INFORMATION.

COORDINATE SIZE OF CONDUCTOR TERMINATION LUGS WITH CONDUCTOR SIZES SHOWN ON ELECTRICAL DRAWINGS.

PROVIDE 125 VAC, 20 AMP DUPLEX CONVENIENCE RECEPTACLE MOUNTED TO UNIT READY FOR FIELD WIRING WITH A COVER UL LISTED FOR WET AND DAMPER LOCATIONS WHEN IN USE. SPECIFIED FAN ESP ACCOUNTS FOR DUCT LOSSES EXTERNAL TO UNIT.

PROVIDE MOTOR HORSEPOWER TO OVERCOME INTERNAL UNIT STATIC PRESSURE DROP PLUS SPECIFIED EXTERNAL STATIC PRESSURE DROP. NOMINAL MOTOR HP SHALL BE NO LARGER THAN THE FIRST AVAILABLE NOMINAL MOTOR SIZE GREATER THAN THE REQUIRED BHP.

PROVIDE VIBRATION ISOLATION INSULATED ROOF CURB WITH MINIMUM HEIGHT OF 14" INCHES. REFER TO DETAILS SHEET M401 FOR CURB FILL AND SPRING DEFLECTION REQUIREMENTS. PROVIDE SLOPED CURB IF NEEDED TO MATCH ROOF SLOPE. PROVIDE FULL PERIMETER ISOLATION CURB.

PROVIDE SINGLE POINT POWER CONNECTION.

COOLING COIL LAT IS LEAVING AIR TEMPERATURE OF COIL.

PROVIDE GUARDS TO PROTECT CONDENSER COIL FROM HAIL OR OTHER DAMAGE.

PROVIDE HEATER TO MEET OR EXCEED SCHEDULED MINIMUM MBH OUTPUT. NOMINAL INPUT IS BASED ON LISTED MANUFACTURER'S STANDARD PRODUCT. COORDINATE EQUIPMENT GAS LOAD WITH PLUMBING CONTRACTOR IF DIFFERENT FROM THAT SCHEDULED. MEET MINIMUM EFFICIENCY SCHEDULED.

UNIT HEATER SCHEDULE (ELECTRIC)										
MARK	MANUFACTURER	MODEL	NOM	CFM	V/PH	NOTES				
			(KW)							
UH-1 THRU UH-21	QMARK	MU05-71	5	350	277/1	A, B, D, E				
WUH-1 THRU WUH-3	QMARK	SSAR4807	4.8	350	277/1	A, B, C, E				
						MANUFACTURER AND MODEL				

ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

A. PROVIDE WITH UNIT MOUNTED THERMOSTAT. . PROVIDE MANUAL SUMMER/WINTER CHANGE-OVER SWITCH

PROVIDE NECESSARY MOUNTING BRACKET AND ACCESSORIES FOR RECESSED WALL MOUNTING.

PROVIDE NECESSARY MOUNTING BRACKET AND ACCESSORIES FOR CEILING MOUNTING.

PROVIDE FACTORY MOUNTED DISCONNECT INSTALLED ON SERVICE SIDE OF UNIT.

				FAN-F	POWE	RED V	VARIA	BLE A	IR VO	LUME	TERI	MINAL S	CHE	DULE	(EL	EC	ΓRIC	HE	AT)					
MARK	SERVED	ZONE	MANUFACTURER	MODEL	BOX	BOX	INLET	PRIMARY	MIN PRIM	PRIM AIR		FAN						HEATING	G COIL		CP TRANS	SOUNI	D POWER	NOTES
	FROM	SERVED			TYPE	SIZE	SIZE (IN)	CFM	CFM	TEMP (F)	CFM	MOTOR TYPE	HP	V/PH	EAT	LAT	kW	STEPS	HTG CTRL	V / PH		RADIATED	DISCHARGE	1
PFPB-01	RTU-1	LOBBY	TITUS	DTQP	Parallel	06	14	2340	702	55	1170	EC MOTOR	1	277V / 1PH	66	93	16.0	-	SCR	480V / 3PH / 4W	INTEGRAL	33	25	A-P
PFPB-02	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	03	10	925	278	55	465	EC MOTOR	1/2	277V / 1PH	66	93	6.5	-	SCR	480V / 3PH / 4W	INTEGRAL	36	22	A-O
PFPB-03	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	03	8	625	188	55	315	EC MOTOR	1/2	277V / 1PH	66	94	4.5	-	SCR	480V / 3PH / 4W	INTEGRAL	32	21	A-O
PFPB-04	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	03	10	800	240	55	400	EC MOTOR	1/2	277V / 1PH	66	93	5.5	-	SCR	480V / 3PH / 4W	INTEGRAL	35	21	A-O
PFPB-05	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	06	14	2475	743	55	1240	EC MOTOR	1	277V / 1PH	66	93	17.0	-	SCR	480V / 3PH / 4W	INTEGRAL	33	25	A-P
PFPB-06	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	05	14	2125	638	55	1065	EC MOTOR	1	277V / 1PH	66	93	15.0	-	SCR	480V / 3PH / 4W	INTEGRAL	40	25	A-P
PFPB-07	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	04	12	1700	510	55	850	EC MOTOR	1/2	277V / 1PH	66	92	11.5	-	SCR	480V / 3PH / 4W	INTEGRAL	38	25	A-O
PFPB-08	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	05	14	2125	638	55	1065	EC MOTOR	1	277V / 1PH	66	93	15.0	-	SCR	480V / 3PH / 4W	INTEGRAL	40	25	A-P
PFPB-09	RTU-1	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	04	12	1700	510	55	850	EC MOTOR	1/2	277V / 1PH	66	92	11.5	-	SCR	480V / 3PH / 4W	INTEGRAL	38	25	A-O
PFPB-10	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	04	8	750	225	55	465	EC MOTOR	1/2	277V / 1PH	66	94	6.0	-	SCR	480V / 3PH / 4W	INTEGRAL	32	21	A-O
PFPB-11	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	05	14	2150	645	55	1075	EC MOTOR	1	277V / 1PH	66	93	15.0	-	SCR	480V / 3PH / 4W	INTEGRAL	40	27	A-P
PFPB-12	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	05	14	2125	638	55	1065	EC MOTOR	1	277V / 1PH	66	93	15.0	-	SCR	480V / 3PH / 4W	INTEGRAL	40	25	A-P
PFPB-13	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	04	12	1700	510	55	850	EC MOTOR	1/2	277V / 1PH	66	92	11.5	-	SCR	480V / 3PH / 4W	INTEGRAL	38	25	A-O
PFPB-14	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	06	16	2975	893	55	1490	EC MOTOR	1	277V / 1PH	66	92	20.0	-	SCR	480V / 3PH / 4W	INTEGRAL	40	25	A-P
PFPB-15	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	05	14	2025	608	55	1015	EC MOTOR	1	277V / 1PH	66	93	14.0	-	SCR	480V / 3PH / 4W	INTEGRAL	38	25	A-P
PFPB-16	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	04	10	1150	345	55	690	EC MOTOR	1/2	277V / 1PH	66	92	8.5	-	SCR	480V / 3PH / 4W	INTEGRAL	36	24	A-O
PFPB-17	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	03	8	700	210	55	350	EC MOTOR	1/2	277V / 1PH	66	94	5.0	-	SCR	480V / 3PH / 4W	INTEGRAL	34	22	A-O
PFPB-18	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	03	10	800	240	55	480	EC MOTOR	1/2	277V / 1PH	66	93	6.0	-	SCR	480V / 3PH / 4W	INTEGRAL	36	22	A-O
PFPB-19	RTU-2	2ND FLOOR PERIMETER	TITUS	DTQP	Parallel	03	8	650	195	55	325	EC MOTOR	1/2	277V / 1PH	66	93	4.5	-	SCR	480V / 3PH / 4W	INTEGRAL	34	22	A-O

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

HEATING COIL CAPACITY BASED ON 32 F MAX. AIR TEMPERATURE RISE AND 450 FPM MINIMUM COIL FACE VELOCITY.

INSTALL FLEXIBLE DUCT CONNECTOR AT ALL CONNECTIONS. PROVIDE INTEGRAL DISCONNECT SWITCH.

PROVIDE CONTROL POWER (CP) TRANSFORMER FACTORY INSTALLED. COORDINATE PRIMARY POWER WITH ELECTRICAL DRAWINGS. BOX NOT TO EXCEED SCHEDULED DISCHARGE OR RADIATED SOUND NC LEVEL USING 0.5 INCH PRESSURE DROP.

PROVIDE FACTORY-INSTALLED, PRESSURE INDEPENDENT DDC CONTROL PACKAGE. PROVIDE BOX WITH EITHER RIGHT HAND OR LEFT HAND CONFIGURATION AS SHOWN ON DRAWINGS.

INLET SIZE SHOWN IS THE MINIMUM ALLOWABLE INLET SIZE. NO SMALLER SIZES SHALL BE ACCEPTED.

VAV BOXES SHALL BE SIZED TO MEET THE SCHEDULED VALUES BASED ON THE FOLLOWING PRIORITIES: 1 - HEATING COIL CAPACITY, 2 - LEAVING AIR TEMPERATURE, 3 - WATER PRESSURE DROP. PROVIDE FILTER FRAME WITH 1 INCH THROWAWAY FILTERS.

MOUNT HEATING COIL ON SUPPLY AIR DISCHARGE DUCT.

FAN CFM BASED ON 0.35 INCH MINIMUM STATIC PRESSURE LEAVING BOX. INTERNALLY LINE BOX WITH MINIMUM R-3.5 FIBERGLASS LINER HAVING MINIMUM R-3.5 VALUE AND COMPLYING WITH UL 181 AND NFPA-901 PER SPECIFICATION.

DIVISION 28 CONTRACTOR SHALL PROVIDE SMOKE DETECTORS IN RETURN AIR DUCT.

				GRILLE, R	EGISTER A	ND DIFFUS	ER SCHEDULE			
MARK	MANUFACTURER	SERVICE	MODEL	CONSTRUCTION	FACE	MOUNTING	FACE SIZE	MAX.	MAX. PRESS.	NOTES
				TYPE	TYPE	LOCATION	(IN)	NC	DROP (IN. W.C.)	
CRG1	TITUS	RETURN	OMNI	ALUMINUM	PLAQUE	CEILING	24"x24"	25	0.10	A, B, D, G, L
CEG1	TITUS	EXHAUST	OMNI	ALUMINUM	PLAQUE	CEILING	12"x12"	25	0.10	A, B, D, G, L
DSG1	TITUS	SUPPLY	300FL	ALUMINUM	LOUVERED	DUCT	REFER TO PLANS	25	0.10	A, B, C, D, E, G, H, J, L
LSD1	TITUS	SUPPLY	TBDI-80	ALUMINUM	LINEAR SLOT	CEILING	2 SLOT, 1 1/2" WIDTH, 48" LENGTH	25	0.10	A, B, D, K, L
WSG1	TITUS	SUPPLY	300FL	ALUMINUM	LOUVERED	WALL	REFER TO PLANS	25	0.10	A, B, C, D, E, G, H, J, L
WTG1	TITUS	TRANSFER	350FL	ALUMINUM	LOUVERED	WALL	REFER TO PLANS	25	0.10	A, C, D, G, H, L
LSD2	TITUS	-	FL15	ALUMINUM	LINEAR SLOT	CEILING	2 SLOT, 1 1/2" WIDTH, 48" LENGTH	-	-	M

MODEL NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND MODEL NUMBERS ONLY. REVIEW THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS TO DETERMINE THE EXACT MATERIAL AND ACCESSORIES TO BE

. NECK SIZE SHOWN ON DRAWINGS. PROVIDE BRANCH DUCT TO MATCH NECK SIZE UNLESS OTHERWISE SHOWN ON DRAWINGS.

B. BAKED ENAMEL FINISH, WHITE TO MATCH CEILING COLOR.

FRONT BLADES PARALLEL TO LONG DIMENSION. FRAME TYPE TO MATCH CEILING/WALL CONSTRUCTION, COORDINATE WITH ARCHITECTURAL REFLECTED CEILING/WALL PLAN. PROVIDE WITH RAPID MOUNT FRAMING OPTION FOR LAY-IN

TYPE DIFFUSERS INSTALLED IN A HARD CEILING.

ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.

PROVIDE OPPOSED BLADE DAMPER ADJUSTABLE FROM FACE OF DEVICE. CONTRACTOR SHALL PROVIDE REMOTE CABLE-OPERATED VOLUME DAMPER BY METROPOLITAN AIR TECHNOLOGIES MODEL RT-250 WITH EXTERNAL WORM GEAR OPERATOR OR EQUIVALENT YOUNG REGULATOR BUTTERFLY DAMPER WITH 270-275 CONTROLLER. OPERATOR SHALL HAVE A SQUARE DRIVE FOR 1/4" NUT DRIVER. DAMPER ASSEMBLY SHALL INCLUDE

GALVANIZED STEEL DUCT WITH ROLLED BEAD STIFFENERS, REINFORCED BLADE, SELF LUBRICATING BEARING AND WORM GEAR MOUNTING PLATE. DAMPER SHALL BE INSTALLED IN

BRANCH DUCT NOT INLET OF PLENUM DIFFUSER. 3. PROVIDE DIFFUSERS AND GRILLES WITH NO EXPOSED MOUNTING SCREWS.

H. PAINT ALL INTERIOR SURFACES OF GRILLES FLAT BLACK. DOUBLE DEFLECTION BARS SHALL BE ADJUSTABLE.

. PROVIDE INSULATED PLENUM AND HIGHTHROW PATTERN CONTROLLER.

PAINT ALL INTERIOR SURFACES OF DIFFUSERS SLOTS, GRILLES, AND PLENUMS FLAT BLACK.

M. PROVIDE LINEAR SLOT DIFFUSER WITH FACTORY-FABRICATED BLANK-OFF PLATES WHERE NOTED ON THE PLANS.

G. PROVIDE 6" CONTROL CABINET.

			OUTSIDE A	IR REQUIREME	ENTS, IM	C-2018 (IF	')					
		SINGLE-ZONE	SYSTEMS ONLY	MULTI-ZONE SYSTEMS ONLY	FLOOR AREA	SYSTEM AVERAGED	SYSTEM	SYSTEM AVERAGED	REQUIRED	REQUIRED	•	
SYSTEM	SYSTEM TAB NAME	SINGLE-ZONE SYSTEM	SINGLE ZONE WORST CASE	SYSTEM VENTILATION	SERVED	AREA-BASED	POPULATION	PEOPLE-BASED	OA INTAKE	DCV OA INTAKE	DESIGN OA	NOTES
DESIGNATION	OR LIST 'SINGLE'	ASSOCIATED	ZONE AIR DISTRIBUTION	EFFICIENCY [Ev]	BY SYSTEM [As]	OUTDOOR AIR RATE	[Ps]	OUTDOOR AIR RATE	FLOW [Vot]	FLOW [Vot]	INTAKE FLOW [Vot]	
		VENTILATION ZONE	EFFECTIVENESS [Ez]		(SF)	(CFM/SF)	(PEOPLE)	(CFM/P)	(CFM)	(CFM)	(CFM)	
RTU-1	MULTIZONE (RTU-1)	-	-	0.61	19,514	0.056	113.55	5.00	2,718	2,431	2,725	-
RTU-2	MULTIZONE (RTU-2)	-	-	0.63	17,840	0.058	107.025	5.00	2,493	2,174	2,725	-
								TOTALS	5,211	4,605	5,450	

VENTILATION CALCULATIONS BASED ON IMC-2018.

SYSTEM POPULATIONS BASED ON MAX SEATING AND/OR CODE MAXIMUM VALUES. 100% OA SYSTEMS (Vot = ∑all zones Voz): WHEN ONE AIR HANDLER SUPPLIES ONLY OUTDOOR AIR TO ONE OR MORE ZONES. EACH ZONE IS INDIVIDUALLY CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING).

SINGLE ZONE SYSTEMS (Vot = Voz): SYSTEM VENTILATION EFFICIENCY CALCULATION IS NOT REQUIRED FOR SINGLE ZONE SYSTEMS. WORST CASE AIR DISTRIBUTION EFFECTIVENESS BETWEEN HEATING AND COOLING MODES OF OPERATION IS SHOWN IN TABLE.

MULTI-ZONE RECIRCULATING SYSTEMS: CALCULATOR USED TO DETERMINE VENTILATION AIRFLOW IN COMPLIANCE WITH IMC-2018 VRP AND ASHRAE 62.1-2016 APPENDIX A. VENTILATION RATE SHOWN IS ACTUAL CALCULATED WITH CORRECTION FACTORS INCLUDED. EACH ZONE IS CALCULATED WITH ITS WORST CASE ZONE AIR DISTRIBUTION EFFECTIVENESS (HEATING/COOLING) AS PART OF CALCULATIONS TO FIND Ev.

			ELE	CTRIC B	ASEBC	ARD HE	ATER SO	CHEDULE		
MARK	AREA	MANUFACTURER	MODEL	LENGTH (FT)	OUTPUT	INTAKE	OUTLET	MOUNTING	V/PH	NOTES
	SERVED				(WATTS)			TYPE		
BBH-1	WEST STAIR	VULCAN	LB-8150	8	1200	FRONT	TOP	PEDESTAL	208/1	A-G
BBH-2	EAST STAIR	VULCAN	LB-8150	8	1200	FRONT	TOP	PEDESTAL	208/1	A-G
OTES: PROVIDE	NECESSARY MOUN	NTING BRACKETS AND AC	CESSORIES (UNI	T SHALL BE APPROVE	D FOR ZERO CLEAR	RANCE).				
. PROVIDE	UNIT MOUNTED TH	IERMOSTAT.								
. ENCLOSI	JRE SHALL BE STEE	EL WITH BAKED ENAMEL F	INISH PAINTED B	LACK AS SPECIFIED E	BY ARCHITECT. FRO	NT COVER TO BE EXT	RUDED ALUMINUM.			
. PROVIDE	FRONT INTAKE, TO	P DISCHARGE								
PROVIDE		T DIGGITATOL.								
	WITH STANDARD E									

POINT ID	DESCRIPTION	POINT	DEFAULT	FAIL	STATUS	ALARM	NOTES
		TYPE	SETPOINT	POSITION	ALARM	RANGE	
ONE LEVEL SEN	SORS						
Z-T	ZONE TEMPERATURE	Al	SCHED.				A, B
Z-OR	MANUAL OCCUPANCY OVERRIDE	BI	2 HOURS				A
Z-TA	MANUAL TEMPERATURE SETPOINT ADJUST	Al	+/- 2 F				А
Z-T-DB	ZONE TEMPERATURE DEADBAND	BV	5 F				A
SINGLE DUCT BOX	X	·					·
CFM	PRIMARY AIRFLOW	Al	SCHED.				
CO	PRIMARY AIR DAMPER CONTROL OUTPUT	AO					
Р	DAMPER POSITION	Al		FIP			
LAT	DISCHARGE AIR TEMPERATURE	Al	SCHED.				

PROVIDE WITH MANUFACTURER'S FAN SPEED CONTROLLER FOR BALANCING PURPOSES.

PROVIDE WITH MANUFACTURER'S ELECTRONICALLY COMMUTATED (EC) MOTOR.

					FAN S	SCH	EDUL	_E						
MARK	SERVICE	MANUFACTURER	MOUNTING	MODEL	CFM	ESP	BHP	NOM	FAN	DRIVE	VFD	ELECTRICAL	WEIGHT	NOTES
	DESCRIPTION					(IN)		HP	RPM	(BELT/DIRECT)	(Y/N)	V/PH	(LBS)	
				ACE-D 101C15D NOT BE ORDERED BY NARE THE BASIS FOR THE		0.4 ER AND MOI	0.11 DEL NUMBER	1/8 RS ONLY. REV	1,550 IEW THE COMP	DIRECT LETE DESCRIPTION, N	N IOTES AND S	120/1 PECIFICATIONS T	100 O DETERMINI	A-E E THE EXAC
ODEL NUMBERS S ATERIAL AND ACC	SHALL NOT BE CONSI	DERED COMPLETE AN	ID MATERIAL SHALL	NOT BE ORDERED BY N	MANUFACTUR		-		,			1		
ODEL NUMBERS S ATERIAL AND ACC	SHALL NOT BE CONSI CESSORIES TO BE OF	DERED COMPLETE AN RDERED. THE MANUFA	ID MATERIAL SHALL ACTURERS LISTED A	NOT BE ORDERED BY N	MANUFACTUR E DESIGN.	ER AND MOD	DEL NUMBER	RS ONLY. REV	,			1		

MARK	MANUFACTURER	MODEL	REFR.		EVA	APORATOR SI	ECTION			CO	NDENSING S	SECTION	NOTES
			TYPE	CFM	TC (MBH)	EAT (DB/WB)	V (DC)	MCA	FLA	AMB (°F)	V/PH	MCA / MOCP	
FCU-1/CU-1	MITSUBISHI	PKA-A12/PUY-A12	R-410A	425	12	75/62	24	1	0.33	105	208/1	13/15	A-D
FCU-2/CU-2	MITSUBISHI	PKA-A12/PUY-A12	R-410A	425	12	75/62	24	1	0.33	105	208/1	13/15	A-D
FCU-3/CU-3	MITSUBISHI	PKA-A12/PUY-A12	R-410A	425	12	75/62	24	1	0.33	105	208/1	13/15	A-D
FCU-4/CU-4	MITSUBISHI	PKA-A12/PUY-A12	R-410A	425	12	75/62	24	1	0.33	105	208/1	13/15	A-D
ARE THE BASIS	FOR THE DESIGN.												
NOTES:													

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a

REVISIONS

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

ARCHITECTURE

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT

CIVIL

LANDSCAPE FOUNDATIONS BSE STRUCTURAL

ENGINEERS STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON

ELECTRICAL HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON

CONTRACTOR GC

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

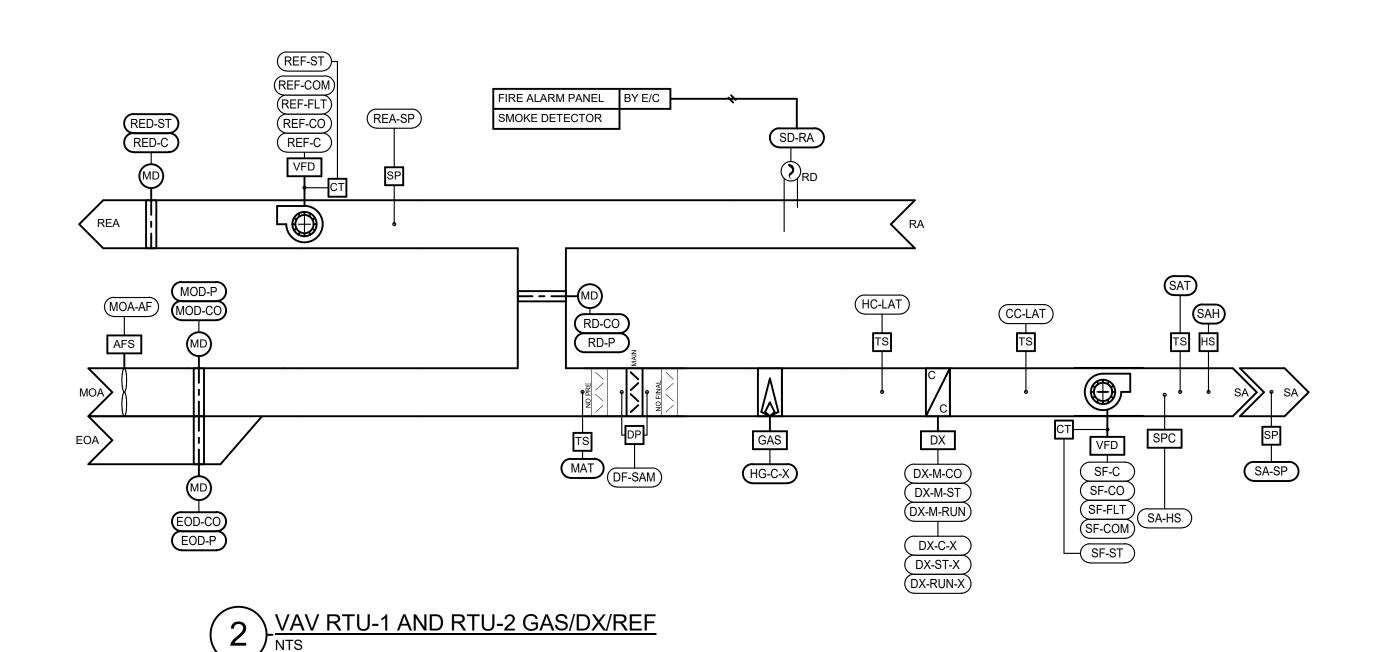
MECHANICAL SCHEDULES

MONDAY - FRIDAY	TBD BY OWNER
SATURDAY	TBD BY OWNER
SUNDAY	TBD BY OWNER
HOLIDAY	TBD BY OWNER

			·												
SPACE / UNIT		SET POINTS									SPAC	E OPERATING H	OURS	NOTES	
DESCRIPTION	(COOLING / DE-	HUMIDIFICATION	NC	HEA	TING	HUMIDIF	ICATION	ZONE \	/ENTILATIO	N RESET	OCC	JPIED / UNOCCI	JPIED	
	occ	UNOCC	MAX	MIN	occ	UNOCC	MIN	MAX	CONTROL	BASE	MAXIMUM				
	°F	°F	RH %	RH %	°F	°F	RH %	RH %	METHOD	PPM	PPM	M-F	SAT	SUN	
1ST FLOOR SHELL SPACE	NA	NA	NA	NA	40	40	NA	NA	NA	NA	NA	24	24	24	ALL
2ND FLOOR SHELL SPACE	75	80	50%	NA	60	60	NA	NA	NA	NA	NA	TBD	TBD	TBD	ALL
ENTRYWAY / VESTIBULE	75	80	50%	NA	70	60	NA	NA	NA	NA	NA	TBD	TBD	TBD	ALL
ELECTRICAL ROOM/ELEVATOR SHAFT	75	NA	50%	NA	NA	NA	NA	NA	NA	NA	NA	24	24	24	ALL

A. ZONE LEVEL SET POINT CONDITIONS SHALL BE AS SCHEDULED UNLESS OTHERWISE SCHEDULED OR NOTED ON THE DRAWINGS FOR ROOM SPECIFIC SPACE CONDITIONS.

. ZONE LEVEL OCCUPANCY HOUR SCHEDULE SHALL BE PER BUILDING OPERATING HOURS UNLESS OTHERWISE SCHEDULED. . ZONE LEVEL CONTROLS SHALL BE CAPABLE OF OPERATING WITH INDEPENDENT OCCUPANCY SCHEDULES.



SEQUENCE OF OPERATIONS
MULTI-ZONE VARIABLE AIR VOLUME **ROOF TOP UNIT (RTU-1 AND RTU-2)**

This sequence of operations is organized into the following main categories: operating modes; control setpoint resets; safeties, overrides and interlocks; and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that are required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections. Setpoints shall be adjustable (adj.) as noted.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation.

GENERAL DESCRIPTION

The variable air volume (VAV) air handling unit(s) covered by this sequence of operations consist(s) of a variable speed supply fan, variable speed relief-exhaust fan, gas-fired heat exchanger, direct expansion cooling coil, that operate with zone level variable air volume terminal units to provide heating, ventilation and air-conditioning, for the conditioned space as shown on the drawings.

OPERATING MODES OCCUPIED MODE:

The unit shall be in occupied mode per the Project Design Conditions Schedule shown on the control

UNOCCUPIED MODE: The AHU shall be in unoccupied mode for all periods not included in the occupied hours of operation.

Overrides of unoccupied schedule are defined at the zone level control. ECONOMIZER MODE - FIXED ENTHALPY WITH FIXED DRY-BULB TEMPERATURE ENABLED: The unit shall be in economizer mode when:

The supply fan status is on;

And- the outside air enthalpy is less than 28 Btu/lb (adj.); And- the outside air temperature is less than 75 F (adj.);

MORNING WARM-UP/COOL-DOWN MODE:

The unit shall be in morning warm-up/cool-down mode according to an optimum start sequence to allow the temperature control zones to reach their scheduled occupied setpoints before the scheduled occupancy time CONTROL SETPOINT RESETS

SUPPLY FAN STATIC PRESSURE RESET:

The supply air static pressure (SA-SP) setpoint shall be reset using trim and respond logic within the range as listed in the "Setpoint Reset Range" column of the points list. The control system shall monitor the zone level VAV box cooling loop output to determine the direction of reset (i.e., up or down). The control system shall be capable of excluding zones from the analysis.

Trim and respond logic: When fan is off, reset setpoint to the default value.

If all zone dampers included in the analysis are less than 90% of cooling loop output (adj.), every 2

minutes (adj.) decrease setpoint by 0.04 in-wg (adj). Repeat trim and respond logic until at least one

(adj.) damper is greater than 90% open. If at least one zone damper is greater than 95% open (adj.), every 2 minutes (adj.) increase setpoint

by 0.03 in-wg times the number of dampers greater than 95% open, but no more than 0.12 in-wg. Repeat trim and respond logic until all zone dampers are less than 95% open.

SUPPLY AIR TEMPERATURE RESET - TRIM AND RESPOND - COOLING ONLY: The supply air temperature reset sequence shall not be enabled until the supply air static pressure is reset to its lowest setpoint as defined in the "Setpoint Reset Range" column of the points list for 5 minutes (adj.).

While the supply air temperature reset is enabled, the supply air static pressure setpoint shall be held at its

minimum value. The supply air temperature (SAT) setpoint shall be reset using trim and respond logic within the range as listed in the "Setpoint Reset Range" column of the points list. The control system shall monitor the zone level VAV box damper positions to determine the direction of reset (i.e., up or down). The control system shall be capable of excluding zones from the analysis.

Trim and respond logic: When fan is off, reset setpoint to the default value.

- While fan is proven on:
- If all zone dampers included in the analysis are less than 90% open (adj.), every 2 minutes (adj.), increase the setpoint by 0.5° F (adj.). Repeat trim and respond logic until at least one (adj) damper is
- If at least one zone damper is greater than 95% open (adi.), every 2 minutes (adi.), decrease setpoint by 0.5° F. Repeat trim and respond logic until all zone dampers are less than 95% open.

The reset sequence shall be disabled when the supply air temperature is reset to its lowest setpoint in the "Setpoint Reset Range" column of the points list and has remained at this setpoint for 5 minutes (adj.) When in economizer mode, reset the mixed air temperature setpoint (MAT) to be equal to the SAT.

SAFETIES, OVERRIDES AND INTERLOCKS SMOKE DETECTOR INTERLOCK:

The unit shall be disabled via hard wired interlock on activation of a system smoke detector. Display smoke detector relay status (normal or alarm) at the BAS front end. FIRE ALARM CONTROL PANEL INTERLOCK:

The unit shall be disabled via relay circuit signal from the fire alarm control panel. Division 28 shall provide the relay and leads from relay to unit. BAS contractor shall connect leads to unit. Display relay status (normal or alarm) at BAS front end.

HIGH SUPPLY AIR STATIC PRESSURE INTERLOCK:

The unit shall be disabled via hard wired interlock at the fan start circuit upon activation of duct high static

pressure controller. RELIEF-EXHAUST FAN INTERLOCK(S):

The relief-exhaust air damper (RED) shall be interlocked with the relief-exhaust fan (REF) so that the damper is open when the exhaust fan is on. The relief-exhaust fan shall be interlocked to be OFF when the associated unit supply fan is OFF.

COMPONENT CONTROL LOOPS

SUPPLY FAN CONTROL- VFD:

When the HOA switch is in hand position, the variable speed supply fan shall operate at a speed set manually by the operator at the user interface of the drive. When the HOA switch is in off position, the fan shall be off.

When the HOA switch is in auto position, the variable speed supply fan shall operate subject to the unit

enable signal, and unit operating modes. When in Occupied Mode: The fan shall energize and slowly ramp to the initial minimum fan speed determined during system

startup. Minimum fan speed shall be established during balancing. The fan VFD shall modulate to control duct static pressure (SA-SP) at setpoint. Provide multiple sensors as shown on the drawings and control to the sensor furthest from setpoint. When in Unoccupied Mode:

The fan shall be OFF. On a call for cooling/heating or override signal from the zone level, the fan shall operate as in occupied mode until the call is cleared or the override is removed. When in Morning Warm -Up/Cool -Down Mode:

The fan shall operate as in occupied mode. RELIEF - EXHAUST FAN (REF) - BUILDING PRESSURE SENSOR CONTROL

When in Occupied Mode: The fan shall be OFF.

Occupied Mode.

When in Economizer Mode:

The fan shall energize ON and slowly ramp to the fan speed determined during systems startup. When in Unoccupied Mode:

The fan shall be OFF unless the MOA and EOA dampers are allowed to modulate as defined in the Mixed Air Damper Control Loop. When the MOA and EOA dampers are allowed to modulate, the fan shall operate as in

Occupied Mode. When in Morning Warm-Up/Cool-Down Mode: The fan shall be OFF unless the MOA and EOA dampers are allowed to modulate as defined in the Mixed Air Damper Control Loop. When the MOA and EOA dampers are allowed to modulate, the fan shall operate as in

MIXED AIR DAMPERS WITH ECONOMIZER

The mixed air damper assembly consists of a minimum outside air (MOA) damper, return air (RA) damper and economizer outside air (EOA) damper. When in Occupied Mode:

MOA Active Control- The MOA and RA dampers shall vary together to satisfy the minimum outside airflow

setpoint as indicated by the minimum OA airflow measuring station (MOA-AF). When in Unoccupied Mode: The MOA and EOA dampers shall be fully closed and RA damper shall be fully open. On a call for

cooling/heating or override signal, the MOA and EOA dampers shall remain closed unless beneficial for When in Economizer Mode:

The MOA shall remain open and the EOA and RA dampers shall modulate in opposing directions to maintain the supply air temperature (SAT) setpoint. When in Morning Warm-Up/Cool-Down Mode:

The MOA and EOA dampers shall be fully closed and the RA damper shall be fully open. The MOA and EOA dampers shall be allowed to open if beneficial for cooling or heating

RELIEF-EXHAUST AIR DAMPERS (NO PRESSURE CONTROL)

When in Economizer Mode: The damper shall be open.

When in All Other Modes: The damper shall be closed.

FILTER MONITORING

When in All Modes:

The controller shall monitor the differential pressure across each filter bank and shall provide a signal when The controller shall monitor the fan runtime to provide maintenance reminder at 50% of filter elapsed time of 1100 hours (adj.) and an alarm at 100% elapsed time of 2200 hours (adj.).

HEATING COIL- GAS MODULATED

When in Occupied Mode:

The controller shall modulate the heating to maintain the heating coil leaving air temperature setpoint

When in Unoccupied Mode:

(HC-LAT).

On a call for heating or override signal from the zone level the coil shall operate as in occupied mode

until the call is cleared or the override is removed. When in Economizer Mode:

The coil shall be OFF.

When in Morning Warm-Up Mode: The coil shall operate as in occupied mode.

COOLING COIL DX STAGED + VARIABLE CONTROL (MULTIPLE COMPRESSORS)

When in Occupied Mode: The variable compressor shall modulate in coordination with the constant speed compressor(s) (subject to the unit manufacturer's standard safeties) to maintain the supply air temperature setpoint (SAT).

The variable compressor represents the primary stage of cooling and shall vary continuously between minimum capacity and 100% capacity to maintain the supply air set point temperature. When the supply air temperature setpoint cannot be maintained and the variable compressor is at 100%, then the constant speed compressor shall be energized and the variable compressor shall return to minimum speed and modulate to maintain the supply air setpoint. Units with subsequent stages of cooling shall follow a similar loading and unloading logic.

When in Unoccupied Mode:

The compressor(s) shall be OFF.

On a call for cooling or override signal from the zone level the compressor(s) shall operate as in occupied mode until the call is cleared or the override is removed. When in Morning Cool-Down Mode:

The compressor(s) shall operate as in occupied mode.

BUILDING SENSORS

. INITIAL SETPOINT SHALL BE 0.05 IN. W.G. COORDINATE FINAL SETPOINT AT BUILDING STARTUP.

POINT SHALL BE OBTAINED FROM A METER THAT IS INDEPENDENT OF METER PROVIDED BY THE UTILITY COMPANY.

A. DISPLAY VALUE WITH AHU GRAPHIC AT BAS FRONT-END. REFERENCE GLOBAL BUILDING MONITORING SCHEDULE FOR CONTROL POINT.

DEVICE AND RELAY FROM FIRE ALARM SYSTEM PROVIDED BY DIVISION 28. DISPLAY DETECTOR RELAY STATUS (NORMAL/ALARM) AT BAS FRONT END.

3. DETERMINE SETPOINT DURING TESTING AND BALANCING. COORDINATE WITH THE TEST AND BALANCE CONTRACTOR.

. REFERENCE AIR TERMINAL UNIT CONTROL DIAGRAMS FOR PRIMARY AIRFLOW POINT DEFINITION (CFM). COORDINATE SETPOINT WITH AIR TERMINAL UNIT SCHEDULES (VAV BOXES).

3. DIVISION 26 SHALL PROVIDE SENSOR WITH DRY CONTACT FOR BAS INTERFACE.

COORDINATE NUMBER OF STAGES FOR CONTROL WITH EQUIPMENT FURNISHED.

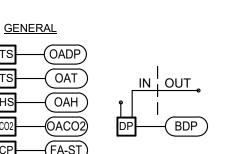
. REFERENCE PROJECT DESIGN CONDITIONS SCHEDULE FOR SETPOINT.

. DAMPER SHALL FAIL NORMALLY OPEN TO BYPASS THE COIL.

I. DAMPER SHALL FAIL NORMALLY OPEN TO THE COIL.

. POINT SHALL BE ADJUSTABLE.

ELECTRICITY METERING



APPLY A MOVING TIME AVERAGE TO BUILDING DIFFERENTIAL PRESSURE USING A SLIDING 5-MINUTE WINDOW TO REDUCE DAMPER AND FAN CONTROL FLUCTUATIONS. PERFORM PSYCHROMETRIC CALCULATION TO OBTAIN VALUE BASED ON OUTSIDE AIR DRY BULB TEMPERATURE (OAT) AND OUTSIDE AIR RELATIVE HUMIDITY (OAH). CALCULATE TOTAL UTILITY USE FROM THE SUM OF ALL METERS AND SUBMETERS SERVING END USE. EXCLUDE SUBMETERS ALREADY INCLUDED IN AN UPSTREAM METER.

II. RELAY FROM FIRE ALARM SYSTEM PROVIDED BY DIVISION 28. CONTROL WIRING FROM BAS TO RELAY BY DIVISION 23. DISPLAY FIRE ALARM SYSTEM STATUS (NORMAL/ALARM) AT BAS FRONT END.

E-EM-T E-KW **5-**4--ELEC---**5**

FUEL METERING

FM——G-FM-T **5----**GAS---**5**



POINT ID	DESCRIPTION	POINT	UNITS	ACCURACY	TRENDING	ENERGY	STATUS	AI ARM	NOTES
1 OIIVI IB	BESONII TION	TYPE	Orano	7100010101	INTERVAL	DASHBOARD	ALARM	RANGE	NOTES
		=				DISPLAY			
GENERAL									
DATE	DATE	AV	MM/DD/YYYY			Х			
TIME	TIME	AV	HH:MM			X			
BUILDING SENSORS		•	•				·		
BDP	BUILDING DIFFERENTIAL PRESSURE	Al	IN. W.G.	SPEC	15 MIN.	X	Х	-0.15 > BDP > +0.20	A, B
OACO2	OUTSIDE AIR CARBON DIOXIDE LEVEL	Al	PPM	SPEC	15 MIN.				
OAT	OUTSIDE AIR DRY BULB TEMPERATURE	Al	°F	SPEC	15 MIN.	X			
OAH	OUTSIDE AIR RELATIVE HUMIDITY	Al	%	SPEC	15 MIN.	X			
OADP	OUTSIDE AIR DEWPOINT	ВО	°F		15 MIN.				С
IFE SAFETY		·							
FA-ST	FIRE ALARM SYSTEM STATUS MONITORING	BI					Х	ON ACTIVATION	M
LECTRICITY METERING	3						·		
E-EM-T	ELECTRIC TOTALIZATION	AV	KWH		15 MIN.				D
E-KW	ELECTRIC DEMAND	Al	KW	±1.0%	15 MIN.	X			E

	POINTS L	-101 - A	IIK HANDI					
POINT ID	DESCRIPTION	POINT	DEFAULT	SET POINT	FAIL	STATUS	ALARM	NOTES
		TYPE	SET POINT	RESET RANGE	POSITION	ALARM	RANGE	
IR SENSING		•						·
SAT	SUPPLY AIR TEMPERATURE	Al	55 F CLG; 90 F HTG	52 - 65 F CLG		X	50 F > SAT > 100 F	D
SAH	SUPPLY AIR HUMIDITY	Al	85 PCT			Х	SAH > 90 RH	
MAT	MIXED AIR TEMPERATURE	Al	55 F	52 - 65 F CLG				D
HC-LAT	HEATING COIL LEAVING AIR TEMPERATURE	Al	SCHED			X	50 F > HC-LAT > 100 F	D
CC-LAT	COOLING COIL LEAVING AIR TEMPERATURE	Al	SCHED			Х	50 F > CC-LAT > 100 F	D
MOA-AF	MINIMUM OUTSIDE AIR AIRFLOW QUANTITY ABSOL. MIN./ MIN.(CFM)	Al	SCHED			X	MOA-AF < SCHED - 15%	D
SUPPLY FAN			331.22			7.		
SF-COM	SUPPLY FAN VFD COMMUNICATION	COM						
SF-C	SUPPLY FAN COMMAND (START/STOP)	ВО						
SF-CO	SUPPLY FAN CONTROL OUTPUT - SPEED (PERCENT)	AO		MONITORING ONLY				
SF-ST	SUPPLY FAN STATUS	BI				X	SF-ST <> SF-C	
SF-FLT	SUPPLY FAN VFD FAULT	BI				X	COMMON ALARM	
SA-SP	SUPPLY DUCT STATIC PRESSURE	Al	1.2 INWG	0.5 < SA-SP < SPT	+	X		G
SA-HS	SUPPLY DUCT HIGH STATIC CONTROLLER	BI	3.0-INWG	2.7 2.7 2.7		X	ON ACTIVATION	
REA-SP	RELIEF-EXHAUST AIR MIXING BOX PLENUM STATIC PRESSURE	Al	0.05 INWG					G
RELIEF-EXHAUST FAN								
REF-COM	RELIEF-EXHAUSTFAN VFD COMMUNICATION	СОМ						
REF-C	RELIEF-EXHAUST FAN COMMAND (START/STOP)	ВО						
REF-CO	RELIEF-EXHAUST FAN CONTROL OUTPUT - SPEED (PERCENT)	AO		MONITORING ONLY				
REF-ST	RELIEF-EXHAUST FAN STATUS	BI				X	REF-ST <> REF-C	
REF-FLT	RELIEF-EXHAUST FAN VFD FAULT	BI				X	COMMON ALARM	
RETURN AIR DAMPER (MO	DULATING)							
RD-CO	RETURN AIR DAMPER CONTROL OUTPUT	AO			NO			
RD-P	RETURN AIR DAMPER POSITION	Al				X	RD-P <> RD-CO	
RELIEF-EXHAUST AIR DAM								
RED-C	RELIEF-EXHAUST AIR DAMPER COMMAND	ВО			NC			
RED-ST	RELIEF-EXHAUST AIR DAMPER STATUS (END SWITCH)	BI					RED-ST <> RED-C	
MINIMUM OUTSIDE AIR DAI	MPER (MODULATING)							
MOD-CO	MINIMUM OUTSIDE AIR DAMPER CONTROL OUTPUT	AO			NC			
MOD-P	MINIMUM OUTSIDE AIR DAMPER POSITION	Al				Х	MOD-P <> MOD-CO	
CONOMIZER OUTSIDE AIR	R DAMPER (MODULATING)				_			-
EOD-CO	ECONOMIZER OUTSIDE AIR DAMPER CONTROL OUTPUT	AO			NC			
EOD-P	ECONOMIZER OUTSIDE AIR DAMPER POSITION	Al				Х	EOD-P <> EOD-CO	
ILTERS		•						
DF-SAM	DIRTY FILTER INDICATION (SA MAIN FILTER)	BI	SCHED.			X	ON ACTIVATION	D
COOLING COIL - DX MODU	LATING AND BINARY STAGES							
DX-M-CO	DX MODULATING COMPRESSOR CONTROL OUTPUT	AO						J
DX-M-ST	DX MODULATING COMPRESSOR STATUS	Al				Х	DX-M-ST <> DX-M-CO	J
DX-M-RUN	DX MODULATING COMPRESSOR RUNTIME	AV						J
DX-C-X	DX COMPRESSOR STAGE "X" COMMAND	ВО						J
DX-ST-X	DX COMPRESSOR STAGE "X" STATUS	BI				X	DX-ST-X <> DX-C-X	J
DX-RUN-X	DX COMPRESSOR STAGE "X" RUNTIME	AV						J
IEATING COIL - GAS FURN	IACE BINARY STAGED							
HG-C-X	GAS FURNACE HEAT STAGE "X" COMMAND	ВО						J
IRE ALARM/SMOKE DETE	CTORS							
SD	SMOKE DETECTOR STATUS	BI				X	ON ACTIVATION	K

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

E'S SUMMIT, N
19050.01a
05.06.22
PERMIT
PEVISIONS

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL

LANDSCAPE FOUNDATIONS BSE STRUCTURAL

STRUCTURAL BSE STRUCTRAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS**

ENGINEERS

ENGINEERS

MECHANICAL HENDERSON ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON CONTRACTOR GC

> HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

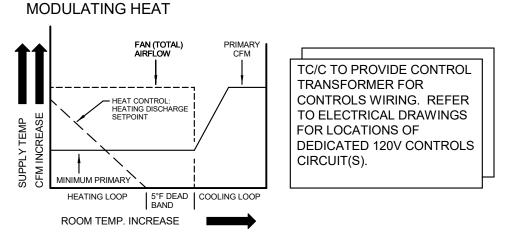
> > MO. CORPORATE NO: E-556D

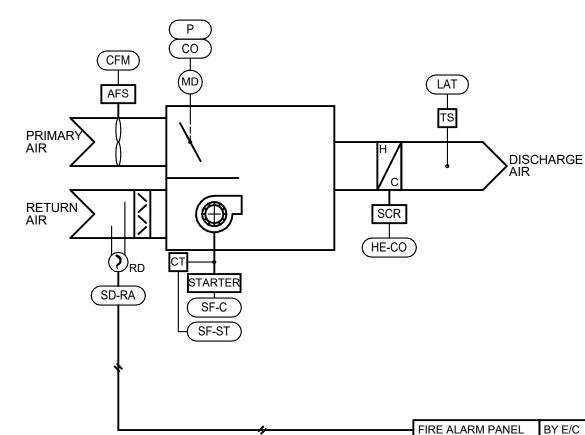
EXPIRES 12/31/2022

SHEET TITLE

MECHANICAL

SINGLE MAXIMUM





----ZONE ————— SENSOR LOCATIONS.)

(SPACE OCCUPANCY SENSOR PROVIDED BY ELECTRICAL CONTRACTOR. TC/C SHALL MONITOR OCCUPANCY SENSOR AUXILIARY CONTACTS AT BAS FOR UNIT CONTROL PER SEQUENCE. REFER TO ELECTRICAL PLANS FOR OCCUPANCY SENSOR REQUIREMENT IN EACH ZONE. REFER TO PLANS FOR ZONE

SMOKE DETECTOR

SEQUENCE OF OPERATIONS PARALLEL FAN POWERED BOX (PFPB-1-19)

This sequence of operations is organized into the following main categories: operating modes, control setpoint resets, safeties, overrides and interlocks, and component control loops. The operating modes describe the criteria that either enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct influence on the operation of the component. The control setpoint reset section describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that are required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in this document. The control responses of each component for the various modes of operation are described in the component control loop sections. Setpoints shall be adjustable (adj.) as noted.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation. GENERAL DESCRIPTION

The parallel fan powered box unit(s) consist of variable volume induced air fan, primary air damper, induced air inlet, electric SCR heater, discharge airflow sensor. Discharge air temperature sensor, and primary air temperature sensor to provide heating, air-conditioning and ventilation for the conditioned space as shown on the **OPERATING MODES**

UNOCCUPIED MODE:

The unit shall be in unoccupied mode for all periods not included in the occupied hours of operation. Overrides of unoccupied schedule are defined at the zone level

OCCUPIED MODE:

ONE LEVEL SENSORS

FAN-POWERED BOX

FIRE ALARM/SMOKE DETECTORS

. POINT SHALL BE ADJUSTABLE.

Z-T-DB

SD-RA

The unit shall be in occupied mode per the Project Design Conditions schedule shown on the control drawings.

ZONE TEMPERATURE

PRIMARY AIRFLOW

DAMPER POSITION

SUPPLY FAN COMMAND

SUPPLY FAN STATUS

ERMINAL HEATING COIL - ELECTRIC SCR MODULATING

ZONE TEMPERATURE DEADBAND

DISCHARGE AIR TEMPERATURE

PRIMARY AIR DAMPER CONTROL OUTPUT

ELECTRIC HEAT SCR CONTROL OUTPUT

RETURN AIR SMOKE DETECTOR STATUS

REFERENCE PROJECT DESIGN CONDITIONS SCHEDULE FOR SETPOINT.

ead band (Z-T-DB).	
EATING MODE (HEATING BOXES ONLY):	
he unit shall be in heating mode when the zone temperature (Z-T) falls be	elow the

The unit shall be in cooling mode when the zone temperature (Z-T) rises above the

dead band (Z-T-DB).

MORNING WARM UP/COOL DOWN MODE: The unit shall be in morning warm up/cool down mode when the associated air handler activates its morning warm up/cool down mode.

CONTROL SETPOINT RESETS <u>UNOCCUPIED MODE SPACE TEMPERATURE SETPOINT</u> RESET When in unoccupied mode the zone temperature set point shall be reset to the setback value indicated in the Project Design Conditions Schedule on the controls

SAFETIES, OVERRIDES AND INTERLOCKS **ELECTRIC HEATER AIRFLOW INTERLOCK:**

The unit electric heating coil shall not energize unless minimum airflow is across the heating coil. **SMOKE DETECTOR INTERLOCK:** For fan powered boxes with fans sized to deliver 2,000 cfm or more, the fan shall be

COMPONENT CONTROL LOOPS Supply Fan

disabled on activation of a system smoke detector.

PARALLEL SUPPLY FAN (TEMPERATURE) When in Occupied Mode: When in Cooling Mode:

POINTS LIST - AIR TERMINAL UNIT BOX

SETPOINT

SCHED.

SCHED.

COOLING MODE:

The fan shall be off. When in Heating Mode or when zone temperature (Z-T) is within the dead band between the heating and cooling setpoints: The fan shall be on.

POSITION ALARM

When in Unoccupied Mode:

The fan shall be off. On a call for cooling/heating or override signal from the zone, the fan shall operate as if in occupied mode until the call is cleared or the override is removed.

When in Morning Warm Up/Cool Down Mode:

The fan shall operate as in Occupied Mode. Damper Control PRIMARY AIR DAMPER - SINGLE MAXIMUM, SINGLE MINIMUM

setpoint to a 0-10 Vac signal for each box. When in Occupied Mode: When in Cooling Mode: The unit shall modulate the primary air damper between the primary airflow setpoint and minimum primary airflow setpoint as required to maintain zone

Correlate the minimum primary airflow setpoint and design primary airflow cooling

temperature setpoint. An increase in room temperature causes airflow to When in Heating Mode: The unit shall remain at the minimum primary airflow setpoint.

When in Unoccupied Mode: The unit shall operate as if in Occupied Mode, but the damper shall be allowed to modulate to a fully closed position.

When in Morning Warm Up/Cool Down Mode: The primary air damper shall operate as if in Occupied Mode when in cool down mode and shall actuate to full open in morning warm up.

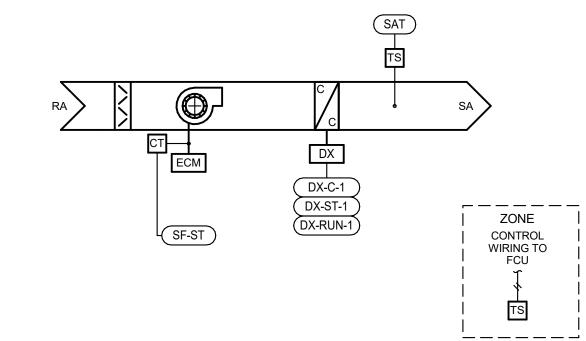
Heating Coil HEATING COIL - ELECTRIC SCR - MODULATING

When in Cooling Mode:

The heating coil shall remain off. When in Heating Mode:

NOTES

The heating coil SCR controller shall modulate as required to maintain zone temperature setpoint as measured by the zone temp sensor (Z-T).



SEQUENCE OF OPERATIONS **DUCTLESS SPLIT FAN COIL UNIT** (FCU-1 THRU 4 AND CU-1 THRU 4) GENERAL DESCRIPTION

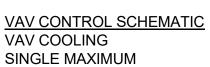
FCU-# / CU-# are ductless direct expansion split systems with cooling only operation. Computer room units and their associated roof mounted condensing unit shall be controlled by the manufacturer provided thermostat to maintain temperature set point of 75°F. Space temperature shall be monitored by the building automation system. SPACE TEMPERATURE MONITORING

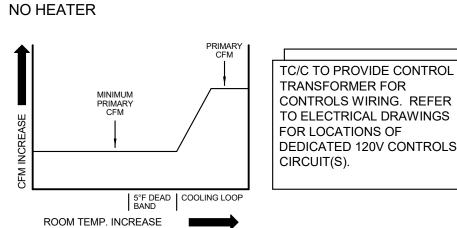
If the zone space temperature sensor senses space temperature above 80°F or below 40°F, an alarm shall be annunciated at the building automation system.

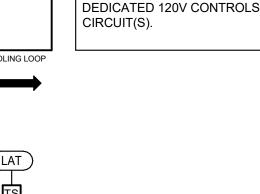


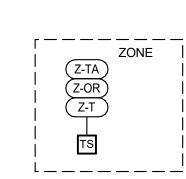
POINTS LIST - FAN COIL UNIT										
POINT ID	DESCRIPTION	POINT	DEFAULT	FAIL	STATUS	ALARM	NOTES			
		TYPE	SET POINT	POSITION	ALARM	RANGE				
SUPPLY FAN	'	'		'			<u>'</u>			
SF-ST	SUPPLY FAN STATUS	BI			Х	SF-ST <> SF-C				
COOLING COIL - DX	BINARY STAGED									
DX-C-1	DX COMPRESSOR STAGE "1" COMMAND	ВО					A			
DX-ST-1	DX COMPRESSOR STAGE "1" STATUS	BI			Х	DX-ST <> DX-C	A			
DX-RUN-1	DX COMPRESSOR STAGE "1" RUNTIME	AV					А			
NOTES:							'			
A. COORDINATE N	IUMBER OF STAGES FOR CONTROL WITH EQUIPMEN	T FURNISHED.								

ALL POINTS SHALL BE DISPLAYED GRAPHICALLY AND BE ADJUSTABLE AT THE BUILDING AUTOMATION SYSTEM OPERATOR WORKSTATION.









SINGLE DUCT VARIABLE AIR VOLUME UNIT

SEQUENCE OF OPERATIONS

This sequence of operations is organized into the following main categories: component control loops. The operating modes describe the criteria that either influence on the operation of the component. The control setpoint reset section this document. The control responses of each component for the various modes of operation are described in the component control loop sections. Setpoints shall be

adjustable (adj.) as noted. The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram. The controls contractor shall be responsible for coordinating any necessary time delay setpoints to establish stable system operation.

discharge airflow sensor. Discharge air temperature sensor to provide

air-conditioning and ventilation for the conditioned space as shown on the drawings.

REFERENCE PROJECT DESIGN CONDITIONS SCHEDULE FOR SETPOINT.

OPERATING MODES UNOCCUPIED MODE:

The unit shall be in unoccupied mode for all periods not included in the occupied hours of operation. Overrides of unoccupied schedule are defined at the zone level OCCUPIED MODE:

SF-ST <> SF-C

ON ACTIVATION

The unit shall be in occupied mode per the Project Design Conditions schedule shown on the control drawings. **COOLING MODE:**

The unit shall be in cooling mode when the zone temperature (Z-T) rises above the

The unit shall be in morning warm up/cool down mode when the associated air handler activates its morning warm up/cool down mode.

COMPONENT CONTROL LOOPS Damper Control

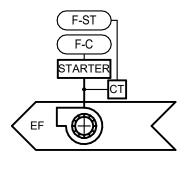
PRIMARY AIR DAMPER - SINGLE MAXIMUM, SINGLE MINIMUM Correlate the minimum primary airflow setpoint and design primary airflow cooling setpoint to a 0-10 Vac signal for each box.

When in Occupied Mode:

When in Cooling Mode: The unit shall modulate the primary air damper between the primary airflow setpoint and minimum primary airflow setpoint as required to maintain zone temperature setpoint. An increase in room temperature causes airflow to

When in Unoccupied Mode: The unit shall operate as if in Occupied Mode, but the damper shall be allowed to modulate to a fully closed position. When in Morning Warm Up/Cool Down Mode:

The primary air damper shall operate as if in Occupied Mode when in cool down mode and shall actuate to full open in morning warm up.



REFER TO SPECIFICATION FOR ADDITIONAL REQUIREMENTS.

BAS CONTRACTOR SHALL PROVIDE POINT AND DEVICE UNLESS OTHERWISE NOTED.

SEQUENCE OF OPERATIONS GENERAL EXHAUST FAN (EF-1)

This sequence of operations is organized into the following main categories: operating modes, safeties, overrides and interlocks. The operating modes describe the criteria that either enable or disable the various modes of operation. The safeties and interlocks section outlines the hardwired interlocks. Safeties and interlocks take precedence over all other control strategies outlined in this document.

The sequence of operations, the points list and control diagrams shall be used to provide a complete description of the control philosophy for the controlled equipment. Individual setpoint values, reset ranges, and alarm action levels are listed in the points list. Components and control sensor locations are graphically depicted on the control diagram.

GENERAL DESCRIPTION.

The general exhaust fans consist of a constant speed exhaust fan that operates based off the occupied / unoccupied schedule of the building as established by the building automation system (bas). OPERATING MODES

OCCUPIED MODE:

During occupied periods, the exhaust fan shall run continuously. If the current switch does not prove operation after 30 seconds (adj) a fan failure alarm shall be annunciated at the BAS, the unit shall stop. UNOCCUPIED MODE:

During unoccupied periods, the exhaust fan shall be off.

POINT ID	DESCRIPTION	POINT	DEFAULT	SET POINT	FAIL	ALARM	ALARM	NOTES
		TYPE	SET POINT	RESET RANGE	POSITION	STATUS	RANGE	
FAN	·							
F-C	FAN COMMAND (START/STOP)	ВО						
F-ST	FAN STATUS	BI				X	EF-ST <> EF-C	

ALL POINTS SHALL BE DISPLAYED GRAPHICALLY AND BE ADJUSTABLE AT THE BUILDING AUTOMATION SYSTEM OPERATOR WORKSTATION.



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO Project No.: 19050.01a

05.06.22 Issued For: PERMIT

REVISIONS

_____ _____

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS

PLUMBING

ENGINEERS STRUCTURAL BSE STRUCTRAL **ENGINEERS**

BSE STRUCTURAL

HENDERSON

ENGINEERS MECHANICAL HENDERSON

ENGINEERS HENDERSON ELECTRICAL

ENGINEERS FIRE PROTECTION HENDERSON **ENGINEERS**

CONTRACTOR GC

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

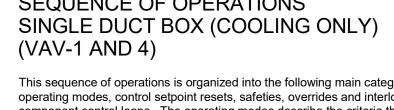
MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

SHEET TITLE

MECHANICAL CONTROLS

SHEET NUMBER



operating modes, control setpoint resets, safeties, overrides and interlocks, and enable or disable the various modes of operation. If a mode of operation is not listed within a component control loop section then that mode of operation has no direct describes the logic and reference variables that will be used to reset control setpoints to a new value within its reset range. The safeties, overrides, and interlocks section outlines the hardwired interlocks that are required to meet life safety requirements. Safeties and interlocks take precedence over all other control strategies outlined in

B. REFERENCE PLANS FOR UNITS PROVIDED WITH RETURN AIR SMOKE DETECTORS. SENSOR PROVIDED BY DIV 28.

GENERAL DESCRIPTION The single duct variable air volume terminal unit(s) consist of primary air damper and

dead band (Z-T-DB). MORNING WARM UP/COOL DOWN MODE:

CONTROL SETPOINT RESETS

UNOCCUPIED MODE SPACE TEMPERATURE SETPOINT RESET When in unoccupied mode the zone temperature set point shall be reset to the setback value indicated in the Project Design Conditions Schedule on the controls

POINTS LIST - AIR TERMINAL UNIT BOX DESCRIPTION DEFAULT FAIL STATUS NOTES SETPOINT POSITION ALARM ZONE LEVEL SENSORS ZONE TEMPERATURE 2 HOURS MANUAL OCCUPANCY OVERRIDE MANUAL TEMPERATURE SETPOINT ADJUST +/- 2 F Z-T-DB ZONE TEMPERATURE DEADBAND SINGLE DUCT BOX PRIMARY AIRFLOW PRIMARY AIR DAMPER CONTROL OUTPUT DAMPER POSITION DISCHARGE AIR TEMPERATURE SCHED. A. POINT SHALL BE ADJUSTABLE.

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition

1995 Edition Division 21 - Fire Suppression Division 15 Division 22 - Plumbing Division 15 Division 23 - HVAC Division 15 Division 26 - Electrical Division 16 Division 27 - Communications Division 16 6. Division 28 - Electronic Safety and Security Division 16

installation and similar operations." Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly,

Provide: "to furnish and install."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete and ready for intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementar Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR

1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria. Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions

include Value Engineering proposals. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

C. PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Install material and equipment in accordance with the manufacturer's installation instructions. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model numbers.

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards. Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes

The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc. Abnormal noise caused by rattling equipment, piping, ducts, air devices, and squeaks in rotating components shall not be acceptable. Materials and equipment shall be of commercial specification grade in quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated

Remove from the premises waste material present as a result of work, including cartons crating, paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and clean installation at the ermination of the work.

Repair or replace public and private property damaged as a result of work performed under this contract to the satisfaction of authorities and regulations having jurisdiction. Provide all

safety lights, guards, and warning signs required for the performance of the work and for the safety of the public.

E. MANUFACTURERS

any ranking or preference.

delay the work of other trades.

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and not in accordance with

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

F. COORDINATION Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute work in a manner as to not interfere with or

Figured dimensions shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are

not intended to designate the required trim. G. ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ , including any amendments and standards as set forth by the following:

National Electrical Code (NEC) National Fire Protection Association (NFPA) Underwriters Laboratories (UL) Occupational Safety and Health Administration (OSHA) American Society of Mechanical Engineers (ASME) American Society of Heating, Refrigerating, and Air Conditioning Engineers

American National Standards Institute (ANSI)

American Society of Testing and Materials (ASTM) Other national standards and codes where applicable

Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes,

ordinances, rules, and regulations exist, comply with the most stringent. Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer

for final resolution. Contractor will be held responsible for any violation of the law.

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain, pay for , and furnish certificates of inspection to Owner.

H. PROTECTION OF EQUIPMENT AND MATERIALS

Store and protect from damage equipment and materials delivered to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dust, dirt, paint, water, or physical damage. Replace insulation that has become wet at any time during construction. Drying the insulation is not acceptable. Seal any tears or joints of internal fiberglass insulation. Equipment and material damaged by construction activities shall be rejected and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises broom clean of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of the work. Remove debris from ceiling/return air plenum, including dust.

Plug, seal, or cap open ends of ductwork and piping systems while stored and installed during construction when not in use to prevent the entrance of debris into the systems. Remove temporary protection prior to starting equipment and turning the system over to the I. SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request Form for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is

the specified Work in all respects unless stated otherwise in the substitution request. 2. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts. Proposed substitution has received necessary approvals of authorities having . Same warranty will be furnished for proposed substitution as for specified Work.

If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects. No substitutions will be considered unless the Substitution Request Form is completed and

prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids. If the proposed substitution is approved prior to receipt of bids, such approval will be stated

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these contract documents and the design concept. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of

Submittals shall contain the project name, applicable specification section, submittal date equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified. indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name, and password information needed to access the submittals. For submittals sent by e-mail Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal.

The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, size of members, or quantities, omissions of with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, the written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work. accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below. See Division 01 and General Conditions for additional information.

manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents. Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall

be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this brochure. Include Record Drawings as described above Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

N. SPARE PARTS Furnish to Owner, with receipt, the following spare parts for the equipment furnished for this

1. One set of spare filters of each type required for each unit. In addition to the spare set of filters, install new filters prior to testing, adjusting, and balancing work and before urning system over to Owner Furnish one complete set of belts for each fan. Furnish three operating keys for each type of air outlet and inlet that require them.

Provide training to include, but not be limited to, an overview of the system and/or equipment as it relates to the facility as a whole; operation and maintenance procedures and schedules related to startup and shutdown, troubleshooting, servicing, preventive maintenance and appropriate operator intervention; and review of data included in the operation and maintenance manuals. Submit a certification letter to the Architect stating that the Owner's designated

representative has been trained as specified herein. Letter shall include date, time, attendees and subject of training. The Contractor and the Owner's representative shall sign the certification letter indicating agreement that the training has been provided. Schedule training with Owner with at least 7 days advance notice.

P. WARRANTIES

workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects occurring within the warranty period(s), as stated in the General Conditions and Division 01

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer or Owner At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each

warranty instrument shall be addressed to the Owner and state the commencement date

GENERAL MATERIALS AND INSTALLATION

A. BUILDING OPERATION

Comply with the schedule of operations as outlined in the architectural portions of this specification. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and/or tenant. Coordinate interruption of building operation with the Owner and/or tenant a minimum of seven (7) days in advance of work.

B. COINCIDENTAL DAMAGE

C. CUTTING AND PATCHING Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division. Obtain permission from the Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect and Structural Engineer, For post-tension slabs, x-ray slab and closely

coordinate all core drill locations with Architect and Structural Engineer prior to performing

any work. Obtain approval from Architect and Structural Engineer for all core drills and

penetrations at least four days prior to performing work. Penetrations shall be made as

as possible while maintaining required clearances between the building element penetrated and the system component. Patch around openings to match the adjacent construction including fire ratings, if applicable, Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

M. AIR FILTERS

otherwise indicated for rooftop unit equipment

throwaway type filters, minimum MERV 8.

N. REFRIGERANT AND OIL

exterior non-concealed locations.

multiple duct runs as required for clarity.

A. DUCT INSULATION

Manville, Owens-Corning, or Knauf.

All return ductwork.

wrapped insulation.

shall have U.L. Label.

are not routed through the ductwork

fabrication and prior to shipping.

minimum 1-1/2 inches slack.

ACCESSORIES. AND FANS

otherwise indicated for fan powered box equipment.

Provide Camfil AP-Thirteen, pleated, throwaway type filters, minimum MERV 13, or similar

as manufactured by Air Filter, Inc., American Air Filter, Flanders, or approved equal, unless

Provide Camfil Farr 30/30, pleated, throwaway type filters, minimum MERV 8, or similar as

manufactured by Air Filter, Inc., American Air Filter, Flanders, or approved equal, unless

Temporary filters used to protect openings in ductwork and inside equipment when

permanent HVAC equipment is used during the construction period shall be pleated.

spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and

of required identification requires lettering larger than 1 inch height. Stencil paint shall be

markers maximum 50 feet along each duct side and within 5 feet of all control and

Provide fiberglass duct liner with fibers firmly bonded together with a thermosetting resir

C1338 for fungi resistance, and shall be cleanable using duct cleaning methods and

Liner surface shall serve as a barrier against infiltration of dust and dirt, shall meet ASTM

equipment outlined by North American Insulation Manufacturers Association (NAIMA) duct

manufacturer's instructions and recommendations. Ductwork sizes shown on drawings are

Provide rectangular liner conforming to ASTM C1071, Type I or II that is 2 inch thick, 1-1/2

Provide round liner that is 2 inch thick, 4 pound density, minimum R-8.4 Johns Manville

pound density, minimum R-8.3 Certainteed Corp. "Toughgard" or equivalent, Johns

Provide liner on the following interior air ducts and where specified on the drawings:

1. Exposed round and rectangular supply ductwork and the first 15 feet of duct

At interface of lined and wrapped ductwork, overlap lined ductwork at least 2 feet beyond

Cover concealed, rigid ductwork with ASTM C553, Type II flexible fiberglass insulation

Certainteed or equivalent Johns Manville, Owens-Corning, or Knauf with heavy-duty

foil-scrim-kraft facing, and with joints taped with 3 inch wide foil tape as follows:

Unlined Round and rectangular supply and return air ductwork.

Installed insulation shall be 3 inch thick, 1-1/2 pound density, minimum R-8.0 duct wrap,

Round and rectangular exhaust and relief air ductwork within 10 feet of exterior

Insulating materials, adhesives, coatings, etc., shall not exceed flame spread rating of 25

and smoke developed rating of 50 per ASTM E84. Containers for mastics and adhesives

Provide galvanized steel ductwork and housings as shown on drawings. Construct ductwork

including fittings and transitions in conformance with current SMACNA standards relative to

Reinforce housings and ductwork over 30 inches with 1-1/4 inch angles not less than 5'-6"

support ceiling grid, conduits, pipes, equipment, etc. from ductwork. Coordinate routing of

ductwork with other contractors such that piping, electrical conduit, and associated supports

on centers, and closer if required for sufficient rigidity to prevent vibration. Support

horizontal runs of duct from strap iron hangers on centers not to exceed 8'-0". Do not

Construct non-VAV supply ducts to meet SMACNA positive pressure of 2 inches w.g.

Construct Return and Exhaust ductwork upstream of fans to meet SMACNA negative

Construct VAV primary supply air ducts (upstream of terminal boxes) to meet SMACNA

Provide mill phosphatized or galvanealed finish for exposed ductwork to be field painted.

Seal ductwork with heavy liquid sealant, Hardcast Irongrip 601, Design Polymer DP 1010

United Mcgill duct sealer or approved equal, applied according to sealant manufacturer's

instructions. Seal all longitudinal and transverse ductwork joints airtight to meet SMACNA

Seal Class A. Tapes and mastics shall be listed and labeled in accordance with UL 181A

Provide radius elbows, turns, and offsets with a minimum centerline radius of 1-1/2 times

with a minimum of two continuous splitter vanes. Vanes shall be the entire length of the

less than 45 degrees shall not require turning vanes. Mitered elbows 45 degrees and

greater shall have single thickness turning vanes of same gauge as ductwork, rigidly

fastened with guide strips in ductwork. Vanes for mitered elbows shall be provided in all

Ducts shall be connected to fans, fan casings and fan plenums by means of flexible

the duct width. Where space does not permit full radius elbows, provide short radius elbows.

bend. Provide mitered elbows where space does not permit radius elbows, where shown on

the drawings, or at the option of the contractor with the engineer's approval. Mitered elbows

supply and exhaust ductwork and in return and outside air ductwork that has an air velocity

and replace all installed elbows of this type with an approved elbow at no additional cost to

connectors. Flexible connectors shall be neoprene coated glass cloth canvas connections,

Duro-Dyne, Elgen, Ventfabric or equal. Flexible connectors shall have a flame spread of 25

or less and smoke developed rating not higher than 50. Make airtight joints and install with

Provide balancing dampers, manufactured by Cesco, Greenheck, Louvers & Dampers,

Nailor Industries, Pottorff, Ruskin, Tamco, or approved equal, where shown on drawings

and wherever necessary for complete control of air flow. Splitter dampers shall be

exceeding 1000 fpm. The use of square throat, radius heel elbows is prohibited. Remove

Shop treated sheet metal shall have galvanized metal primer applied in the shop after

of terminal boxes) to meet SMACNA positive pressure of 2 inches w.g.

positive pressure of 4 inches w.g. Construct VAV secondary supply air ducts (downstream

downstream of equipment outlets or 5 feet past first elbow, whichever is greater.

"Spiracoustic Plus" or equivalent, Certainteed or Owens-Corning.

cleaning guide. Install with liner adhesive and mechanical fasteners in accordance with

inside clear dimensions. Increase sheet metal by liner thickness in both directions where

DUCT INSULATION, DUCTWORK,

long distance identification, white or black color for best contrast.

D. ROUGH-IN

Coordinate without delay all roughing-in with other divisions. Conceal piping conduit, and rough-in except in unfinished areas and where otherwise shown.

E. SUPPORT SYSTEMS

Structural steel used for support of equipment, ductwork and piping shall be new, clean, and conform to ASTM Designation A-36. Support mechanical components from the building structure. Do not support mechanical components from ceilings, other mechanical or electrical components, and other

ACCESS PANELS AND DOORS Provide access doors for all concealed equipment and duct and piping accessories that require service where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction for type of construction in which it is installed. Obtain Architect's approval of type, size, location and color before ordering. Provide factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation, concealed hinges, flush screwdriver-operated cam lock, and anchor straps. Provide access doors manufactured by Milcor, Titus, Zurn, or equal.

G. PENETRATIONS

Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide 10 gauge galvanized steel sleeves for sleeves 6 inches and smaller. Provide galvanized sheet metal sleeves for larger than 6 inches. Schedule 40 PVC sleeves are acceptable for installation in areas without return air

Seal elevated floor, exterior wall and roof penetrations watertight and weathertight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of 1/2 inch of sealant.

penetration fire stop system Extend pipe insulation for insulated pipe through floor, wall and roof penetrations, including fire rated walls and floors. The vapor barrier shall be maintained. Size sleeve for a minimum

Provide prefabricated roof curbs manufactured by AES Industries, Custom Curb, Inc., Pate Company, Thybar or approved equal. Provide roof curb with factory installed wood nailer; welded, 18 gauge galvanized steel shell, base plate and flashing; 1-1/2 inch thick, 3 pound rigid insulation; fully mitered 3-inch raised cant; cover of weather-resistant, weather-proof material and pipe collar of weather-resistant material with stainless steel pipe clamps. Attach curb to roof structure.

Provide box frames for rectangular openings welded 12 gauge galvanized steel attached to forms and of a maximum dimension established by the Architect. Notify the General Contractor or Architect before installing any box openings not shown on the Architectural or Structural drawings.

Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL acceptable to AHJ.

Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire stop

Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications

Provide motors and starting equipment where not furnished with the equipment package Motors shall have copper windings, Class B insulation, and standard squirrel cage with starting torque characteristics suitable for the equipment served. Motors controlled by variable frequency drives shall be rated for voltage peaks and minimum rise times in accordance with NEMA MG1. Part 31. Motors 5 horsepower and larger controlled by variable frequency drives shall be provided with a shaft grounding system equal to Aegi SGR Bearing Protection Ring, Inpro/Seal Current Diverter Ring (CDR) or approved equal. Motors for air handling equipment shall be selected for quiet operation. Each motor shall be checked for proper rotation after electrical connection has been completed. Provide drip-proof enclosure for locations protected from weather and not in air stream of fan: and totally enclosed fan cooled enclosure for motors exposed to weather. Motors shall be manufactured by Century, General Electric, Louis Allis, Westinghouse, or approved equal.

Provide every motor, except fractional horsepower single phase motors with an approved type of "built-in" thermal overload protection, with a motor starter. Each starter shall be provided with overload heaters sized to the motor rating, and every three phase motor starter shall have overload heaters in each phase. Ambient compensated heaters shall be installed wherever necessary. Unless noted otherwise, motor starters shall be furnished by the Division 23 Contractor for installation and connection by the Division 26 Contractor. Starters shall be Allen-Bradley, Clark, Furnas, Square D, or approved equal.

VARIABLE FREQUENCY DRIVES

Provide PWM variable frequency drives (VFD) to control fan motors as indicated on the

Provide a magnetic contactor manual bypass integral to each drive. Provide two magnetic disconnect switch to allow removal of power to the inverter for service while still operating the motor across the line. Bypass shall include a 120/1/60 control transformer, fused on both the primary and secondary, and bi-metallic thermal motor overload relays with adjustable trip settings.

impedance, and "K" rated per IEEE C57-110 for harmonic current content. Reactors shall be integral to the drive enclosure without need for field wiring. The VFD shall have an RS-485 port as standard. The standard protocols shall be Johnson

Controls N2 bus, Modbus, and Siemens Building Technologies FLN, Optional protocols for BACnet. DeviceNet. Ethernet. LonWorks, and Profibus shall be available. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be "certified" by the governing authority. Use of non-certified protocols is not allowed. The VFD shall allow the DDC system to control the digital and analog outputs of the drive via the serial interface. This control shall be independent of any VFD function. In addition, all the digital and analog inputs of the drive shall be capable of being monitored by the DDC system. Drive supplier shall provide jobsite start-up, Owner training, and a one-year parts and

controlled by locking guadrants; provide Young Regulator or Ventlok end bearings for the damper rod. Rectangular volume dampers shall be opposed blade interlocking type. Round volume dampers shall be single-blade type consisting of circular blade mounted to a shaft Provide Flexmaster model STO or equal 45 degree rectangular/round side takeoff fitting with model BO3 damper with locking guadrant and insulation build out for round ductwork branch takeoffs to individual air devices. Omit damper at takeoff fitting when damper is High voltage wiring is defined as 50 Volts or higher. Low voltage wiring is defined as less located downstream of takeoff than 50 Volts. Line voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for mechanical systems shall also be provided by Division 26. Low voltage Where access to dampers through a hard ceiling is required, provide a Metropolitan Air

> shall be provided with no sleeves, springs or screw adjustments to come loose after installation. Support cable assembly to avoid bends and kinks in cable. Round ductwork shall be FlaktGroup Semco, United, Hercules Industries or equal, sheetmetal, with smooth interior surface, with low pressure (duct pressure class up to and including 2 inches w.g.) Round ductwork gauges per the following table (reference SMACNA HVAC duct construction standards for gauges when pressures exceed 2 inches

Technology model RT-250 or equal by Young's Regulator concealed, cable operated

volume damper with remote operator. Damper shall be adjustable through the diffuser face

or frame with standard 1/4 inch nutdriver or flat screwdriver. Cable assembly shall attach to

damper as one piece with no linkage adjustment. Positive, direct, two-way damper control

Size Duct Gauge Fitting Gauge 14" & under 26

Provide double wall insulated round ductwork where indicated. Fabricate double-wall insulated ducts and fittings with an outer shell, insulation, and an inner liner as specified below. Dimensions indicated on internally insulated ducts are inside dimensions. Outer shell shall be 2 inches longer than inner shell and insulation and shall be gauge as specified for single wall duct. Insulation shall be fiberglass with thickness as required for thermal resistance of R-8. Perforated inner liner shall be 24 gauge up to 34 inches. Provide 3/32-inch perforations with an overall open area of 23 percent. Maintain concentricity of liner to outer shell be mechanical means. Retain insulation from dislocation by mechanical

Lewis & Lambert, Linx Industries Lindab Safe, or approved equal factory-manufactured round ductwork and fittings may be substituted for specified round branch ductwork, at Contractors option. Heavy liquid joint sealant may be omitted on factory-manufactured

Low pressure (duct pressure class up to and including 2 inches w.g.) Fittings 24 inches in diameter and less shall be prefabricated, spot-welded and internally sealed. Continuously weld fittings larger than 24 inches in diameter. Fitting gauge shall be 22 gauge for 36 inch fittings and under, 20 gauge for larger sizes. 90 degree tees shall be conical type. Seal longitudinal and transverse ductwork joints airtight with heavy liquid sealant applied according to manufacturer's instructions. Provide gauge thickness in medium pressure (duct pressure class 3 inches to 6 inches w.g.) ductwork as recommended by SMACNA.

At Contractors option, provide Ductmate, Gripple, or approved equal wire rope duct hanging using 7x7 or 7x19 aircraft quality zinc coated cable or galvanized steel wire rope. Secure wire rope to duct using Ductmate Clutcher or Gripple hang fast adjustable rope attachment. Where applicable for upper attachment provide Ductmate FZ-I ock wire rope beam clamp with locking nut adjustment or Gripple ceiling, beam, or purlin clips. Wire rope, adjustable duct attachment, and upper attachment to structure shall each have minimum 5 to 1 load

filters at all openings in the ductwork and inside equipment to protect the system from dust, dirt. paint, and moisture. Replace and maintain filters when needed, but not less than every month. On the day of Substantial Completion, clean the unit and ductwork and provide a new set of filters in the unit. Refer to section "Air Filters" for filter requirements. An independent, professional duct cleaning company shall vacuum clean all internal surfaces of equipment, coils, and ductwork connected to permanent HVAC units that are

operated during the construction period. Conduct cleaning after new air filters are installed

and prior to turning the system over to the owner.

If permanent HVAC equipment is used during the construction period, provide temporary

C. FLEXIBLE DUCT Low pressure (duct pressure class up to and including 2 inches w.g.) and medium pressure (duct pressure class 2.1 inch to 6 inches w.g.) flexible duct shall be Flexmaster type 8B. Thermaflex type G-KM, M-KE, JPL type Silver Jacket, or equal (fire retardant polyethylene) protective vapor barrier, U.L.181 Class 1, acoustical insulated duct, R-8.0 fiberglass insulation. Provide CPE liner with steel wire helix mechanically locked or permanently bonded to the liner.

Connect flexible duct to rigid metal duct or air devices as recommended by the manufacturer. At a minimum, install two wraps of duct tape around the inner core connection and a metallic or non-metallic clamp over the tape and two wraps of duct tape or a clamp over the outer jacket. Duct clamps shall be labeled in accordance with UL-181B and marked 181B-C. Duct tape shall be labeled in accordance with UL 181B and marked

D. AIR DEVICES

Provide air devices as scheduled on drawings, manufactured by Carnes, Krueger, Metalaire, Nailor Industries, Price, Titus, or Tuttle & Bailey. Select air devices to limit room noise level to no higher than NC-30 unless otherwise shown. Provide devices with a soft plastic gasket to make an airtight seal against the mounting surface. Coordinate final

number. Submit samples of each air device as requested by the Engineer. Provide wall transfer air grilles with horizontal 35 or 45 degree angle vision-proof bars.

Provide concealed fasteners for wall mounted registers and grilles.

Provide ceiling supply air registers of aluminum curved blade type with blades parallel to long dimension and with throw pattern as indicated on drawings. Provide opposed blade dampers for supply air registers and exhaust air registers unless indicated otherwise. Provide ceiling mounted air devices of lay-in or surface mounted type as required to be

Provide linear slot diffusers of standard one-piece lengths up to 6-feet and furnish in multiple sections greater than 6-feet. Provide alignment components by the manufacture halancing dampers or branch ducts more than 25 feet length and within 5 feet on each side Provide plenums by the slot diffuser manufacturer. Plenums shall be externally wrapped by of wall, floor, and ceiling penetrations. Provide additional markers in congested areas or at the contractor. Comply with insulation requirements specified under duct insulation section.

E. CONTROL DAMPERS

and as specified. Individual damper sections shall not be larger than 48 inches x 60 inches with maximum blade width of 6 inches. Frame construction shall be minimum 16 gauge galvanized steel for rectangular dampers, 20 gauge for round, 1/8 inch thick for aluminum with flanges for duct mounting. Provide elastomeric or neoprene seals, mechanically attached and field replaceable. Provide a minimum of one damper actuator per section. Test damper performance in accordance with AMCA 500-D.

Provide modulating dampers with linear flow characteristics. Size modulating dampers

based on the smaller of 1.500 FPM through the damper or full open air pressure drop of 0.1

inches W.C. Size two-position dampers full duct size and select to minimize pressure drop.

pressure encountered. Each operator shall be provided with spring-return for normally closed or normally open position for fail safe operation to account for fire, low temperatures, or power interruption as required by the control systems specified on the drawings. Dampe

Provide roof mounted exhaust fans as scheduled on the drawings, or equal ACME, Carnes, Cook. Greenheck. Pennbarry. or Twin City Fans complete with aluminum housing, aluminum centrifugal wheel, motor with integral thermal overload protection, disconnect switch mounted inside the housing, birdscreen, backdraft damper, and pate prefabricated

4. HVAC EQUIPMENT

Provide electric cooling, gas heating rooftop units as scheduled on the drawings, manufactured by Aaon, Carrier, Daikin, Lennox, Johnson Controls, Trane, or York, with features as noted in the RTU schedule and in the RTU Control Matrix, and complete with factory installed direct-drive hermetic compressors with internal spring vibration isolation. built-in motor thermal overload protection, crankcase heater, and low pressure switches: direct expansion cooling and condensing coils, minimum SEER or EER rating (cooling) as required by the applicable energy code or greater if scheduled on the drawings, centrifugal evaporator blower; air filter rack, propeller type condenser fan; aluminized steel heat greater if scheduled on the drawings, forced combustion air blower; complete factory installed micro-processor controls including anti-short cycle timers, time delay relays and minimum "on" time controls, 100 percent safety gas shutoff, direct spark ignition system; built-in thermal overload protection on motors and compressors; outdoor air damper: relief: weathertight housing constructed of zinc coated, heavy gauge, galvanized steel with weather-resistant baked enamel finish; minimum insulated roof curb with minimum height as scheduled on the drawings; single point electrical power connection. Provide sloped roof curb as required to match slope of roof structure so that unit is installed level. Provide guards or louvered panels to protect the condenser coil from hail or other damage. Provide a 125 VAC, 20 amp duplex convenience receptacle mounted to unit ready for field wiring with a cover UL listed for wet and damp locations when in use. Provide unit complete with manufacturer's one year quarantee on components plus an additional four year quarantee on the compressors and heat exchangers. For units equipped with an economizer assembly, the assembly shall be covered with minimum 5 year manufacturer warranty certified to operate through 60.000 damper opening and closing cycles, and certified to

meet leakage requirements specified under the section, "Control Dampers."

Brasch, Indeeco, Markel, QMark, or Raywall, standard type propeller unit heaters with sidewall mounting brackets and hardware for horizontal airflow. Furnish heater fan motors complete with a manual motor starter with automatic thermal cutouts sized to the motor load disconnect switch, and other code required safety devices. Provide unit mounted thermostat and manual summer/winter changeover switch. C. ELECTRIC BASEBOARD HEATERS

Provide electric unit heaters as scheduled on the drawings, manufactured by Berko

nominally 7 inches tall x 5 inches wide. They shall have an 18 gauge rear panel, A 16 gauge front panel and A 14 gauge grille with anodized finish, color as selected by the Architect. Provide tamper proof hardware for all removable covers. Air inlet shall be through the bottom or side and the air discharge shall be through the top. Provide blank sections. corner and end caps as required. All sections shall be factory fabricated, no section shall be Baseboard heaters shall be provided with a continuous raceway, equivalent to a 3/4 inch

conduit, the entire length of the enclosure. Conductors shall be suitable for the D. SPLIT DUCTLESS AIR-CONDITIONING SYSTEMS

Provide split ductless system consisting of evaporator section for wall mounting as indicate and remote condensing section similar to Carrier, Daikin, Lennox, LG, Mitsubishi, Sanyo, Trane, or York. Evaporator cabinet shall be factory assembled pre-wired consisting of furniture-grade steel with baked-enamel finish, front access, with direct-drive centrifugal fans, 2-speed motor, and cleanable foam filter. Evaporator coil shall be direct-expansion cooling coil of seamless copper tubes expanded into aluminum fins, with thermal-expansion valve with external equalizer. Air-cooled condenser shall be of corrosion-resistant cabine containing compressor, copper-tube aluminum-fin coils, direct-drive propeller fans with motors with internal overload protection; capacity control to 0 degrees Fahrenheit.

Provide refrigerant piping sized as recommended by equipment manufacturer with foamed plastic insulation on the suction line as specified in this section. Control System: Unit-mounted panel with contactors, control transformer with circuit breaker, solid-state temperature- and humidity-control modules. Provide solid-state, unit-mounted control panel with start-stop switch, adjustable humidity set point, and

adjustable temperature set point. Refer to sequence of operation. VAV BOXES

Construct box casing of 22 gauge zinc coated steel, internally lined with minimum R-3.5 fiberglass liner having minimum R-3.5 value and complying with UL 181 and NFPA-90A. Fully cover edges of insulation with metal cover strips. Provide removable access panels with airtight gaskets and quarter-turn latches for access to internal box components

Construct the damper blade of heavy gauge steel with shaft rotating in Delrin or bronze oilite self-lubricating bearings. Damper blades shall seat against gasketed stops to limit leakage in full closed position to 10 percent of rated airflow when subjected to 6 inches

configuration with a minimum of 12 pick-up points. The static pressure drop shall not exceed 0.35 inches WG at the scheduled maximum air flow and the noise criteria discharge shall not exceed 30 at a differential static pressure of 0.15 inches including room and ceiling effects.

F. FAN POWERED BOXES

Provide Carnes, Environmental Technologies Inc., Johnson Controls, Kreuger, Price Industries. Titus or Trane pressure independent variable volume fan powered terminal boxes as noted and scheduled on the drawings. Construct box casing of 22 gauge zinc coated steel, internally lined with minimum R-3.5 fiberglass liner having minimum R-3.5 value and complying with UL 181 and NFPA-90A. Fully cover edges of insulation with metal for access to internal box components requiring service.

the rated CFM at 3 inches inlet static pressure. Set minimum position of damper at the factory and allow field adjustment. Construct fan blower of steel with FC blades, dynamically balanced wheels and direct drive

> required. Transient suppression shall be provided as an integral part of the relay. Contactors shall be single coil, electrically operated, mechanically held, double-break, silver-to-silver type protected by arcing contacts. Positive locking shall be obtained without the use of hooks, latches, or semi-permanent magnets. Operating and release times shall

> > Provide electrical and control wiring as specified under the section "Electrical Wiring." SEQUENCE OF OPERATION

8. COMMISSIONING

Provide commissioning that verifies and documents the commissioned building systems have been designed, installed, and function according to the owner's project requirements, construction documents, and to minimum code requirements. Retain the services of a third-party registered design professional or approved agency that is regularly engaged in conducting commissioning to develop a commissioning plan, supporting documentation, and reports. Refer to the latest adopted edition of the applicable energy code for more information. Complete all related commissioning requirements prior to final inspections. percent chromium. Provide NEMA 1 control panel, aluminized or galvanized steel frame, Submit final TAB report and final commissioning report to the Engineer and Owner within 90

> IECC Commissioning Requirements: Provide commissioning of all mechanical systems included in the scope of work, except for packaged equipment not equipped with an economizer. Packaged equipment includes unitary air conditioners and condensing units, unitary air-cooled and water-cooled heat pumps, and packaged terminal air conditioning units. Contract the third-party registered design professional or approved agency to develop a commissioning plan, preliminary commissioning report, and final commissioning

Commissioning plan shall include the following:

Narrative description of activities and personnel required during commissioning List of equipment and systems to be tested with description of tests to be performed. 3. List of functions to be tested, including calibration and economizer controls.

List of measurable criteria for performance.

1. Results of preliminary functional performance tests. Organize equipment and components specified by other Divisions in separate sections for independent review. 2. List of functional performance testing procedures used during commissioning, including measurable criteria for test acceptance

time of preliminary commissioning report preparation 5. List of deferred tests that cannot be performed at the time of preliminary commissioning report preparation because of climatic conditions

6. List of climatic conditions required for the performance of the deferred tests. Final commissioning report shall include the following:

performance tests shall demonstrate the following:

report preparation because of climatic conditions. Conduct functional performance tests on equipment, controls, and economizers. Functional

11. The operation, function, and maintenance serviceability for each commissioned equipment, component, and system is confirmed according to the approved plans and specifications. and mode of operation upon a loss of power and restoration of power for each control device, equipment, component, and system operate in accordance with the approved plans and specifications.

ALTERNATES

DESCRIPTION

Refer to the architectural portion of the specification for list of alternates. Applicable sections of the base specifications shall apply to all work required by the alternate unless otherwise specified. Determine whether or not and how each alternate affects work. Include labor, materials, equipment, and transportation services necessary for and incidental to the completion of work under each particular alternate. Furnish separate bid for each alternate applicable to work, stating the amount to be added or deducted from the base bid.

END OF SECTION 23

PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

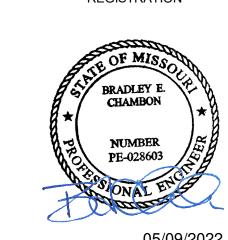
Project No.: 19050.01a 05.06.22

Issued For: PERMIT REVISIONS

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REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

PROJECT TEAM

CIVIL

BSE STRUCTURAL **ENGINEERS**

ENGINEERS PLUMBING HENDERSON **ENGINEERS**

MECHANICAL HENDERSON **ENGINEERS** ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON

CONTRACTOR GC

SHEET NUMBER

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following:

Proposed substitution has been fully investigated and determined to meet or exceed

attached with the appropriate substitution documentation. No substitution will be considered

in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded

unless specifically provided in the contract documents.

J. SUBMITTALS

this time for resubmittal, if required. Only resubmit those sections requested for resubmittal.

review if the above mentioned requirements are not met.

K. ELECTRONIC DRAWING FILES

.. RECORD DRAWINGS (AS-BUILT DRAWINGS)

M. OPERATION AND MAINTENANCE INSTRUCTIONS During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions. manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment

O TRAINING At a time mutually agreed upon between the Owner and Contractor, provide the services of a factory trained and authorized representative to train Owner's designated personnel on the operation and maintenance of the equipment provided for this project.

Warrant each system and each element thereof against all defects due to faulty

Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of the work. Repair materials shall match existing construction. Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect.

non-structural elements.

Provide full refrigerant and oil charge in new air conditioning refrigeration systems, and maintain it for full term of the guarantee O. IDENTIFICATION Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive. pressure-sensitive vinyl pipe markers. Color code pipe markers to comply with ANSI A13.1. Install pipe markers on each HVAC piping system and include arrows to show normal Locate pipe markers and color bands wherever piping is exposed to view in occupied

Seal around penetrations of fire rated assemblies. Coordinate fire ratings and locations with the architectural drawings. Refer to architectural specifications for fire stoppings. Provide a product schedule for UL listing, location, wall or floor rating and installation drawing for each

of 1 inch annular clear space between inside of sleeve and outside of insulation.

H. FIRESTOPPING

Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum

data for testing agency. MOTORS AND STARTERS

drawings. Provide VFD as manufactured by AC Technology, Asea Brown Boveri, Danfoss, Reliance Electric, or Yaskawa. Include an integral, door-interlocked input circuit breaker or fused disconnect which may be padlocked in the "OFF" position. contactors, mechanically and electrically interlocked, to isolate the inverter output from line voltage. The inverter input shall be isolated by either a third magnetic contactor or a second

Provide input AC line reactors without exception. Reactors shall be minimum 3 percent

on-site labor warranty. Multiple visits shall be included to allow for tuning and troubleshooting of the controls system as required. K. ELECTRICAL WIRING

control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as

required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing

amps for mechanical equipment (from the equipment nameplate) to ensure proper

Provide power and communication wiring with transient protection in accordance with IEEE C62.41.2. All control and interlock wiring shall comply with the NEC. Control wiring shall be sized to accommodate the voltage drop associated with the distance between the control device and the controller. Control wiring not installed in conduit shall be UL rated for plenum installation. All NEC Class 1 (line voltage) wiring shall be UL listed in approved raceway according to the NEC and Division 26 requirements. Maximum allowable voltage for control wiring shall be 120 V. All low-voltage wiring shall meet NEC Class 2

requirements. Low-voltage power circuits shall be sub-fused when required to meet Class

commercially available. Verify the integrity of the entire network following the cable

L. SYSTEM TESTING, ADJUSTING, AND BALANCING

interpretation of that standard for execution and reporting of all TAB work.

Work shall include but not be limited to: Perform test readings on fans, units, coils, etc. and

adjust equipment to deliver specified amounts of air. Prepare testing and balancing report

systems, and operation of safety controls, adjust thermostats, and control setpoints, limits

the Construction Documents. Adjust fans for proper and efficient operation. Certify to

Architect that adjustments have been made and that system is operating satisfactorily.

Calibrate, set, and adjust automatic temperature controls. Check proper sequencing of

Division 23 contractor shall align bearings and replace bearings that have dirt or foreign

material in them with new bearings without additional cost to the Owner.

interlock systems, and operation of safety controls.

and time based adjustment to operate in accordance with the performance requirements of

match the record documents.

installation. Use appropriate test measures for each particular cable. Label all wiring and

cabling at each end within 2 inches of termination with the controller termination number.

Label control devices used in the system with permanent labels using the identifiers that

Conduit for Control Wiring: EMT with compression fittings, cold rolled steel, zinc coated or zinc-coated rigid steel with threaded connections. Pull and Junction Boxes: Size according to number, size, and position of entering raceway as required by National Electrical Codes. Enclosure type shall be suited to location. Install wiring parallel to building lines wherever possible. Conceal all control wiring in finished rooms. Do not install Class 2 wiring in raceway containing Class 1 wiring. Boxes and panels containing high voltage wiring and equipment may not be used for low-voltage wiring except for the purpose of interfacing the two wires (e.g., relays and transformers). All wire-to device and wire-to-wire connections shall be made at a terminal block or terminal strip. All runs of communication wiring shall be unspliced length when that length is

Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish labor and equipment required to test each system installed under this contract. Assume all costs involved in making the tests and repairing and/or replacing any damages resulting therefrom. Final system testing, balancing and adjustments (TAB) shall be performed by a Contractor Council (AABC), or Testing, Adjusting and Balancing Bureau (TABB) . TAB shall be performed in accordance with the most current edition of the certified agencies procedural standard for testing, adjusting and balancing and shall comply with the strictest

log showing air supply quantities, air entering and leaving temperatures and pressures at design flow, fan and unit test readings, motor voltage and amp draws, etc., and submit six copies of the final compilation of data to the Architect for evaluation and approval before final inspection of the project. Balance air systems to within plus or minus 10 percent for terminal devices and branch lines and plus or minus 5 percent for main ducts and air handling equipment of the amount of air shown on the drawings. TAB Contractor shall record space temperatures and make adjustments in airflow to each diffuser to obtain uniform temperature (no greater than +/- 3 F) in spaces. Document temperatures and adjustments in tab report. Adjust equipment to operate as intended by the specification. TAB report shall include a 'report summary/remarks' section in accordance with the procedural standard that provides both system set up and a summary of deficiencies as defined by the procedural standard. TAB Contractor shall be responsible to calibrate, set, and adjust automatic temperature control sensors, actuators and control devices. Check proper sequencing of interlock

Flexible duct runs shall not exceed 5 feet in length, and shall be installed fully extended and straight as possible avoiding tight turns. Install flexible duct in accordance with manufacturer's instructions. Support flexible duct at maximum 5 feet on center and within 6 inches of bends. Bends shall not exceed a centerline radius of one duct diameter. Duct sag shall not exceed 1/2 inch. Supporting material in direct contact with the duct shall not be less than 1-1/2 inches in width.

location, frame, and mounting type of air devices with Architectural reflected ceiling plans Submit complete shop drawings including information on noise level, pressure drop, throw, CFM for each air device, styles, borders, etc. Clearly marked with specified equipment

Provide stenciled signs for equipment identification at Contractor's option or where distance exterior type, oil-based, alkyd enamel, minimum 1-1/4 inch height or greater as required for compatible with ceiling construction. Provide ceiling diffusers and grilles with white enamel finish unless noted otherwise. Provide duct markers or provide stenciled signs and arrows indicating ductwork service and flow direction in black or white lettering for best contrast with duct or insulation color. Locate

Provide factory fabricated, parallel blade control dampers sized as shown on the drawings

Provide dampers as manufactured by Greenheck, CESCO, Pottorff, Nailor, or Ruskin. Reference manufacturer with model number for outside air dampers is Ruskin CD-50 constructed of aluminum, and all other applications is Ruskin CD-35 constructed of galvanized steel. Provide damper operator for each automatic damper with sufficient capacity to operate the damper under all conditions and to guarantee tight close-off of dampers against system

operators shall be manufactured by Belimo, Johnson Controls or approved equal. Provide transformer for damper motors if different voltages are required. F. EXHAUST AIR SYSTEMS

A. ROOFTOP UNITS (GAS FIRED HEAT)

B. ELECTRIC UNIT HEATERS

Provide electric baseboard heaters as scheduled on the drawings, manufactured by Runtal, Berko, Erincraft, Markel, Q-Mark, or Raywall,. Enclosures shall be extruded aluminum,

Provide Carnes, Environmental Technologies Inc., Johnson Controls, Kreuger, Price Industries, Titus or Trane single duct, variable air volume terminal of sizes and capacities shown on drawings.

Provide pressure independent controls accurate to 1.5 degrees Fahrenheit and adjustable from 65 to 85 degrees Fahrenheit. Factory install direct digital controls for the control sequence specified in the schedule and control diagram. Air flow sensors shall be cross

Construct the primary air valve damper of metal with peripheral gasket pivoting in self-lubricating bearings. When closed, the damper leakage shall not exceed 2 percent of

be EIA 485 twisted cable pair according to Master Slave/Token Passing (MS/TP) protocol r Ethernet according to ISO 8802-2 protocol. Provide password protected web-based or web-accessible interface to the network over the Internet via the Owner's local area network (LAN) connection. Interface shall include system graphics, text-based parameter display, and be compatible with standard web

operations. Provide thermostats with the features as indicated:

installation location. Provide common keying for all panels. C. THERMOSTAT CONTROL EQUIPMENT Provide thermostat control equipment with sufficient communication, programming, input and output connections, and modulating or staging capability to meet the sequence of

LCD or LED display screen.

Display operating mode.

Adjust fan switch setting.

D. SENSORS AND RELAYS

Display temperature.

Button or touchscreen interface

Display temperature setpoint.

Security lockout. Security cover. Recessed mounting with aspirating box. Provide thermostat control equipment that shall interface with a BAS by Automated Logic Delta Controls, Honeywell, Johnson Controls, KMC Controls, Schneider Electric, Siemens, or Trane with quality and features as indicated.

Manufacturers and model numbers are listed for reference as to quality and features

required for the sensors and relays. Provide general-purpose type sensing elements for

use in input and output sensors. Provide transmitters or transducers with sensor as

required, compatible with the controllers used, with range suitable for the systems

encountered. Transmitters and transducers shall have offset and span adjustments, temperature compensation, shock and vibration immunity, and zeroing capability. Accuracy requirements shall include the combined effects of linearity, hysteresis, repeatability, and Provide sensors that meet the following minimum performance: Dry-bulb temperature sensors at a minimum shall be accurate to +/- 2 degrees Fahrenheit over the range of 40 to 80 degrees Fahrenheit. 2. Wet-bulb temperature shall be calculated using dry-bulb temperature and humidity and shall be accurate to +/- 2 degrees Fahrenheit, Enthalpy shall be calculated using dry-bulb temperature and humidity and shall be accurate to +/- 3 BTU/lb over the range of 20 to 36 BTU/lb. 4. Humidity sensors at a minimum shall be accurate within +/- 3 percent full range between 20 and 95 percent, with drift less than 1 percent full scale per year. 5. Pressure transmitters at a minimum shall be accurate to +/- 1 percent full scale with drift less than 1 percent full scale per year. Carbon dioxide (CO2) sensors shall measure total percentage of CO2 in ppn

Sensor shall have an accuracy of plus/minus 75 ppm at a 600 and 1000 ppm concentration

and certified by the manufacturer to require calibration no more frequently than once every

Operating mode override button. Provide relays with contact rating, configuration, and coil voltage that is suitable for the application. Relay shall be general purpose, enclosed plug-in type and protected by a heat and shock resistant duct cover. Number of contacts and operational function shall be as

Temperature setpoint adjust button with plus/minus 3 degree setpoint.

Provide remote sensors where indicated on the drawings and integrate them with the

thermostat control equipment. Remote sensors shall have the following features:

E. WIRING

be 100 milliseconds or less.

Wired connection.

Temperature sensor

Reference mechanical controls sheets for sequences of operation.

overload protection. Design motor for use with electronic fan speed controller. Provide isolation between motor and blower assembly. Provide an electronic speed controller which Provide box with a backdraft damper, filter and filter frame, and direct digital controls. Incorporate a single point electrical connection with electrical components enclosed in a Provide electric resistance heating coils of open coil construction with 80 percent nickel, 20

motor. Provide permanent split capacitor type motors with lubricated bearings and thermal

Division 23 contractor shall provide UL listed duct type smoke detectors as required by

Copper tubing: ASTM B 280, alloy C12200, Type ACR, hard-drawn straight lengths, and

installation, and have ends capped to protect cleanliness of pipe interiors prior to shipping.

Brazing filler metals: BCUP - 5: copper (CU), phosphorus (P) 4.8 - 5.2 percent, and silver

(AG) 14.5 - 15.5 for joining wrought copper fittings and copper tubing. Braze joints with a

Insulate suction lines with 1-1/2 inch and liquid lines with 1/2 inch foamed plastic insulation,

Armaflex or equal. Piping insulation shall have a flame spread of 25 or less, and a smoke

developed rating of 50 or less when tested in accordance with ASTM E84. Coat insulation

that is exposed to the elements with a protective sealer. Install and support piping to keep

noise and vibration to a minimum. Support and secure piping to Unistrut type supports so

that no vibration passes to the building structure. Pipe attachments shall be copper-plated

or have nonmetallic coating for electrolytic protection where attachments are in direct

from rupturing the insulation. Replace insulation that is cut or broken by the hangers.

and in good order. Pitch suction lines down slightly (1 inch in 20 feet) towards the

compressor. Provide oil traps at the base of vertical suction risers over 6 feet high.

Install liquid line sight glasses in liquid lines nearest the expansion valve. Factory mount

expansion valves with the sensing bulbs shipped loose. Field mount expansion valve bulb

after refrigerant piping is complete (damage may occur if bulbs come in contact with heat).

sulation, Armaflex or equal, on the suction and liquid lines. Provide quick-connect flare

tubing compression fittings or solder connections as required to match the connections of

For systems of 5 ton capacity and smaller, the contractor shall have the option to provide

length as required for the installation. Provide minimum 1 inch thick foamed plastic

Blow out refrigeration lines with dry nitrogen at a suitable pressure before making final

connection at the condensing unit or coil to ensure against dirt, scale, or other foreign

material being in the lines. Draw a vacuum to 29 inches of mercury. Break this vacuum by

charging dry refrigerant gas into the system, raising the pressure to 0 PSIG. Repeat the

latter two steps for a triple evacuation before the final evacuation is started. Make final

microns) and allowing the pump to run at this pressure for a minimum of two hours.

Record the amount of refrigerant by weight charged into the system for each circuit

recorded to the nearest 1/4 pound on tags and attach tags to the liquid line near the

condensing unit. Refrigerant shall be supplied by the HVAC Contractor.

TEMPERATURE CONTROLS

and wiring as required to control the systems as specified on the drawings.

evacuation by reducing the system absolute pressure to a maximum of 0.5 millimeters (500

Repeat the proper amount of refrigerant charge per the manufacturer's recommendations.

Provide a complete temperature control system including control panels, controllers, control

power transformers, thermostats, sensors, time switches, override timers, actuators, relays,

Submit shop drawings of equipment provided for temperature control. Submit operation and

maintenance data, including trouble-shooting maintenance guide, step-by-step procedures

equipment and package wiring furnished with the HVAC equipment. Control wiring shall be

sized to accommodate the voltage drop associated with the distance between the control

Provide supervision and on-job checkout service as required to ensure that installation and

specifications, and sequences of operation. The system shall be guaranteed for a period of

one year following the acceptance of the system by the Architect/Engineer. Correct defects

Install control devices with top of device at 48 inches AFF to meet ADA requirements unless

operation of the temperature control system meets requirements of the drawings,

B. BUILDING AUTOMATION CONTROL EQUIPMENT

than controllers need not be manufactured by the manufacturers listed above.

Building automation system (BAS) manufacturers and model numbers are listed for

reference as to quality and features required for the control devices. Provide controllers by

Provide BACnet Testing Laboratory (BTL) certified controllers conforming to the advanced

application controller (B-AAC) device profile or application specific controller (B-ASC)

Controllers shall have the following features: Microprocessor with sufficient memory to

real-time clock for scheduling; self-diagnostics; capability of standalone operation if network

communication is lost; logging capability; service communication port for local connection to

support the controller's operating system, database, and programming requirements:

a portable operator's terminal; local keypad and display for interrogating and editing

controller data; diagnostic LEDs for power, communication and processor; non-volatile

memory which is capable of maintaining all BIOS and programming information for a

Controller software shall support the following applications: System security restricting

modification without password; object scheduling with daily, weekly, annual, holiday, and

management; sequencing; PID control characteristics; staggered starting of equipment;

exception events; alarm reporting via text message or email and logging; maintenance

anti-short cycling; on-off control with differential; trending; run-time, pulse, and event

Network all HVAC controllers together, including controllers furnished with packaged

equipment, using a common communication backbone that is capable of central access.

Network communication protocol shall be based upon BACnet protocol complying with

ASHRAE Standard 135. Physical/Data Link communication bus between controllers shall

browsers. Interface shall grant the user access to all system data and the ability to view

Provide control panels listed according to UL 508A and NEMA rated according to its

alarms, adjust setpoints, monitor equipment status, adjust schedules, and trend data points

nimum of 72 hours; power and noise immunity; and surge and transient protection.

Electric, Siemens, or Trane with quality and features as indicated. Control devices other

automated Logic, Delta Controls, Honeywell, Johnson Controls, KMC Controls, Schneider

occurring during this period at no additional cost to the Owner.

device profile to facilitate the sequences of operation specified.

Provide a keyed security cover over controller.

indexed for each controller and thermostat function, inspection period, cleaning methods

Provide integrated wiring diagrams showing interconnections between field -installed

B. SYSTEM EVACUATION AND CHARGING

contact with copper tubing. Install a support within one foot of each change of direction.

Mount pipe hangers around the outside of the insulation with saddles to prevent hangers

Run refrigerant lines parallel and perpendicular to wall and floor lines and to appear straight

soft-annealed coils, seamless copper tubing. Tubing shall be factory cleaned, ready for

code in each unit exceeding 2,000 cfm to shut down unit upon detection of smoke.

PIPING AND PIPING SPECIALTIES

allows continuously adjustable fan speed from maximum to minimum.

single control box with an access panel sealed from primary air flow.

airflow switch, thermal overload protection and magnetic contactors.

A. REFRIGERANT PIPING AND INSULATION

Fittings: wrought-copper fittings: ANSI B16.22, streamlined pattern.

slow stream of dry nitrogen passing through the piping.

the condensing unit and evaporator coil.

A. GENERAL REQUIREMENTS

and materials, and calibration tolerances.

device and the controller.

otherwise noted on the plans.

days of the date of receipt of the certificate of occupancy.

4. List of conditions under which the tests shall be performed.

Submit a copy of the preliminary commissioning report to the AHJ. Preliminary commissioning report shall include the following:

3. Completed Commissioning Compliance Checklist. Refer to energy code for the form 4. Itemization of deficiencies found during testing that have not been corrected at the

Results of final functional performance tests. Organize equipment and components specified by other Divisions in separate sections for independent review. copper refrigerant tubing line set sized as recommended by equipment manufacturer and of 8. List of functional performance testing procedures used during commissioning, including measurable criteria for test acceptance. 9. Itemization of resolved deficiencies found during preliminary commissioning. 10 I ist of deferred tests that cannot be performed at the time of final commissioning

> 12. The sequence of operations, including modes, backup modes (if applicable), alarms, 13. Control devices, components, equipment, and systems are calibrated, adjusted, and 14. Air economizers operated in accordance with manufacturer's specifications and specified sequence of operation.

LANDSCAPE LAND 3 **FOUNDATIONS** STRUCTURAL BSE STRUCTRAL

> LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

> > MO. CORPORATE NO: E-556D

SHEET TITLE

GENERAL NOTES:

- 1. PROVIDE A CONSTRUCTION RECORD SET OF "AS-BUILT" DOCUMENTS TO THE ARCHITECT REFLECTING ANY VARIANCES OF INSTALLED PIPING LOCATIONS OR EQUIPMENT CONTRARY TO THE CONSTRUCTION DOCUMENTS, REFER TO SPECIFICATIONS.
- 2. DRAWINGS ARE DIAGRAMMATIC ONLY AND REPRESENT THE GENERAL SCOPE OF THE WORK. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND PLANS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY THE ARCHITECT OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 3. PROVIDE TO THE ARCHITECT A COPY OF INSPECTION REPORTS AND APPROVAL CERTIFICATES FROM LOCAL AND STATE INSPECTIONS, REFER TO SPECIFICATIONS.
- 4. INSTALLATION SHALL COMPLY WITH LEGALLY CONSTITUTED CODES AND THE REQUIREMENTS OF AUTHORITIES HAVING JURISDICTION AND ALSO MEET ALL REQUIREMENTS OF THE LANDLORD. OBTAIN A COPY OF THE LANDLORD'S REQUIREMENTS AND REVIEW PRIOR TO SUBMITTING BID.
- 5. PLANS AND SPECIFICATIONS GOVERN WHERE THEY EXCEED CODE REQUIREMENTS.
- 6. VERIFY LOCATION AND DEPTH OF UTILITIES AT POINTS OF CONNECTION BEFORE START OF PIPING INSTALLATION.
- 7. REFER TO ARCHITECTURAL PLANS FOR EXACT LOCATION AND MOUNTING HEIGHTS OF PLUMBING FIXTURES.
- 8. DO NOT SCALE FLOOR PLANS FOR EXACT HORIZONTAL
- LOCATION OF PIPE ROUTING. 9. INSTALL CONCEALED PIPING TIGHT TO THE STRUCTURE AND
- AS HIGH AS POSSIBLE.
- 11. INSTALL EXPOSED PIPING, WHERE NECESSARY, IN FINISHED AREAS TIGHT TO THE STRUCTURE, WALL OR CEILING AND AS HIGH AS POSSIBLE. INSTALL PIPING PARALLEL AND / OR PERPENDICULAR TO WALLS. ROUTE PIPING TIGHT TO COLUMNS WHERE POSSIBLE.

10. VALVES SHALL BE LINE SIZE UNLESS OTHERWISE NOTED.

- 12. INSTALL VALVES AND APPURTENANCES A MAXIMUM OF 24" ABOVE CEILING IN ACCESSIBLE LOCATION WITHIN 24" OF ACCESS DOORS OR ACCESSIBLE CEILING TILES. PROVIDE PIPE AND FITTINGS TO INSTALL VALVES AND APPURTENANCES AT REQUIRED HEIGHT AND WITHIN 24" OF ACCESS DOORS OR ACCESSIBLE CEILING TILES.
- 13. INSTALL NO PLASTIC PIPE OF ANY KIND ABOVE SLAB INSIDE.
- 14. COORDINATE ALL WORK WITH OTHER TRADES AND CONTRACTORS.
- 15. COORDINATE PIPING INSTALLATION WITH STRUCTURAL GRADE BEAMS, FOOTINGS, COLUMN PIERS, ETC. SLEEVE PIPING THROUGH GRADE BEAMS, FOOTING, ETC. WHERE REQUIRED AND AS NOTED ON PLANS. COORDINATE SLEEVE INSTALLATIONS WITH THE ARCHITECT, STRUCTURAL ENGINEER, STRUCTURAL CONTRACTOR AND GENERAL CONTRACTOR BEFORE CONCRETE IS INSTALLED.
- 16. CLEAN FAUCET AERATORS AND PIPE STRAINERS PRIOR TO TURNING BUILDING OVER TO THE OWNER.
- 17. PROVIDE TRAP PRIMERS WHERE REQUIRED BY LOCAL AUTHORITIES.
- 18. COORDINATE PIPE ROUTING AWAY FROM ELECTRICAL PANELS. DO NOT INSTALL PIPING OVER ELECTRICAL PANELS.
- 19. PAINT ALL EXPOSED GAS AND WATER PIPING USING RUST INHIBITOR PAINT. PAINT AND COLOR SHALL BE COORDINATED WITH THE ARCHITECT AND / OR OWNER.
- 20. COORDINATE ALL ROOF PENETRATIONS WITH OTHER TRADES. MAINTAIN 10' MINIMUM CLEARANCE FROM ALL AIR INTAKES. MAINTAIN 2' CLEARANCE FROM ALL OTHER EQUIPMENT.
- 21. INSULATE PIPING ROUTED IN EXTERIOR BUILDING WALLS WITH MINIMUM 2" BATT INSULATION TO PREVENT FREEZING.
- 22. PROVIDE "HEAVY-DUTY" NO-HUB COUPLINGS ON SANITARY PIPING 3" AND LARGER. SEE DIVISION 22 SPECIFICATION SECTION "SANITARY DRAINAGE AND VENT AND PIPING
- SPECIALTIES" FOR MORE INFORMATION. 23. PROVIDE "HEAVY-DUTY" NO-HUB COUPLINGS ON STORM PIPING, INCLUDING CONNECTIONS TO ROOF DRAINS. SEE DIVISION 22 SPECIFICATION SECTION "STORM DRAINAGE PIPING AND SPECIALTIES" FOR MORE INFORMATION.
- 24. PROVIDE TRANSITION ADAPTER COUPLINGS FOR CONNECTION OF PVC DWV TO CAST IRON SANITARY, WASTE AND VENT PIPE AT SLAB ON GRADE. SEE DIVISION 22 SPECIFICATION SECTION "SANITARY DRAINAGE AND VENT PIPING AND SPECIALTIES" FOR MORE INFORMATION.
- 25. PROVIDE TRANSITION ADAPTER COUPLINGS FOR CONNECTION OF PVC DWV TO CAST IRON STORM PIPE AT SLAB ON GRADE. SEE DIVISION 22 SPECIFICATION SECTION "STORM DRAINAGE PIPING AND SPECIALTIES" FOR MORE INFORMATION.
- 26. FLOW CONTROL VALVES SHALL BE SIZE 1/2" AND SET AT 0.5 GPM UNLESS NOTED OTHERWISE.
- 27. WATER HAMMER ARRESTORS SHALL BE SIZE "A" UNLESS NOTED OTHERWISE.
- 28. PROVIDE VERTICAL LIFT SPRING LOADED CHECK VALVES IN HOT AND COLD WATER SUPPLIES FOR MOP SINK FAUCETS DOWNSTREAM OF SHUTOFF VALVES.
- 29. PROVIDE WALL PIPES AT PIPING PENETRATIONS OF ELEVATED WATERPROOF FLOOR SLABS, REFER TO SPECIFICATIONS.
- 30. VERIFY EXISTING EQUIPMENT, INCLUDING ACCESSORIES, IS NOT DAMAGED AND IS IN GOOD WORKING ORDER. REPORT

ANY DEFICIENCIES TO THE ARCHITECT.

31. PROVIDE SIZE AND LENGTH OF HOT WATER FIXTURE SUPPLY PIPE FROM CIRCULATED HOT WATER BRANCH OR MAIN TO TERMINATION OF HOT WATER FIXTURE SUPPLY PIPE AT EACH FIXTURE PER 2015 INTERNATIONAL ENERGY CONSERVATION CODE, TABLE C404.3.1. FOR ½" HOT WATER FIXTURE SUPPLY PIPE SIZE TO INDIVIDUAL LAVATORIES, PROVIDE MAXIMUM LENGTH OF TWO FEET. FOR 1/2" HOT WATER FIXTURE SUPPLY PIPE SIZE TO INDIVIDUAL SINKS. PROVIDE MAXIMUM LENGTH OF 43 FEET. FOR 3/4" HOT WATER FIXTURE SUPPLY PIPE SIZE TO INDIVIDUAL SINKS, PROVIDE MAXIMUM LENGTH OF 21 FEET.

### SECOND CONTROL SE	THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBE STANDARD MOUNTING HEIGHTS	PIPING SYMBOLS	<u>-</u> D.	PIPING LINETYPES	<u> </u>
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### APP CONTROL CONTRO		×	PIPE ANCHOR	——CD——	CONDENSATE DRAIN (CD)
MOSE DESIGN			EXPANSION JOINT	———ACD———	AUXILIARY CONDENSATE DRAIN (ACD)
18			BACKFLOW PREVENTER	SPD	SUMP OR SEWAGE PUMP DISCHARGE (SP
INSTRUCTION		<u> </u>	PRESSURE GAUGE	———G———	NATURAL GAS (G)
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HZ HERTZ IE INVERT ELEVATION IE INVERT ELEVATION IN WC INCHES OF WATER COLUMN JB JUNCTION BOX JUNCTION BOX WC WATER COLUMN J-BOX JUNCTION BOX WW WITH WSFU WATER SUPPLY FIXTURE MAX MAXIMUM MBH 1000 BTU PER HOUR VS VENT STACK VS VENT STACK VS VENT STACK RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC. RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORDER FOR THE SAKE OF DESCRIBED IN THE CONSTRUCTION ORD	GPM GALLONS PER MINUTE VFD VARIABLE FREQUENCY HD HEAD, HUB DRAIN DRIVE	WHICH IS DETERMINED	BY THE CONTRACTOR AS PART OF THEIR		
IN WC INCHES OF WATER COLUMN JB JUNCTION BOX W/O WITHOUT LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, STC. KW KILOWATT WSFU WATER SUPPLY FIXTURE MAX MAXIMUM UNIT UNIT UNIT WSSTU PER HOUR WVS WASTE VENT STACK MBH 1000 BTU PER HOUR WVS WASTE VENT STACK W// WITH ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE, ETC. ETC. NEW ————————————————————————————————————	HZ HERTZ VS VENT STACK	RESPONSIBILITIES. ANY	SUCH PHASES DESCRIBED IN THE CONSTRUCTION		
J-BOX JUNCTION BOX KW KILOWATT WS WASTE STACK MAU MAKE-UP AIR UNIT WSFU WATER SUPPLY FIXTURE MAX MAXIMUM UNIT EXISTING NEW MBH 1000 BTU PER HOUR WVS WASTE VENT STACK	IN WC INCHES OF WATER COLUMN W/ WITH	ORDER FOR THE SAKE	OF DESCRIBING THE PROJECT. THE FOLLOWING		
MAU MAKE-UP AIR UNIT WSFU WATER SUPPLY FIXTURE MAX MAXIMUM UNIT EXISTING NEW ———————————————————————————————————	J-BOX JUNCTION BOX WC WATER COLUMN		· , , , ,,		
MBH 1000 BTU PER HOUR WVS WASTE VENT STACK	MAU MAKE-UP AIR UNIT WSFU WATER SUPPLY FIXTURE	FXISTING -	NFW		
MH MANHOLE DEMOLISH — — — I FUTURE	THE CHILD CONT.				



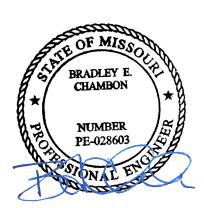
PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO Project No.: 19050.01a 05.06.22

REVISIONS

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BRADLEY E. CHAMBON

LICENSE # 028603

PROJECT TEAM FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

ENGINEERS BSE STRUCTRAL STRUCTURAL ENGINEERS

FOUNDATIONS BSE STRUCTURAL

PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON

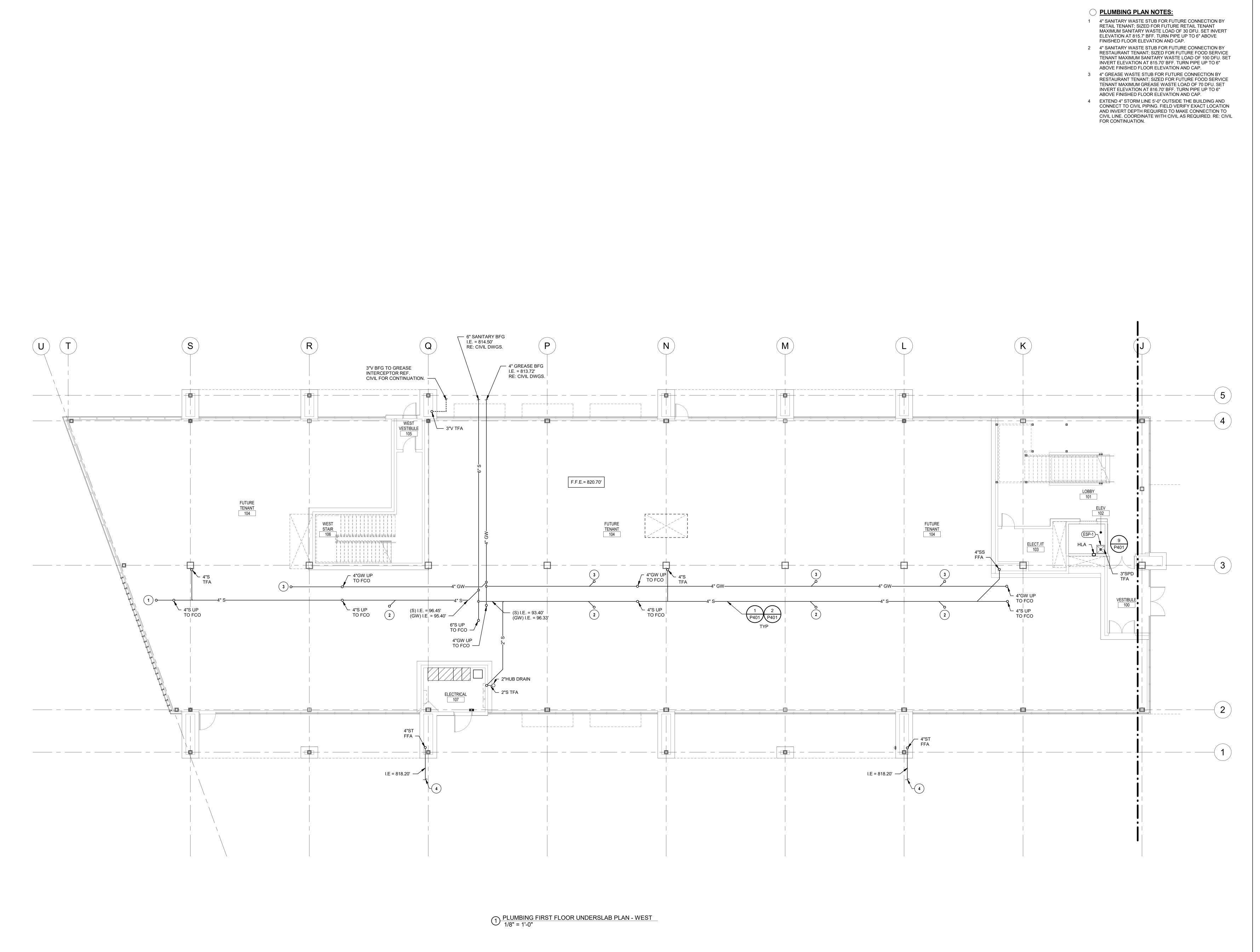
ENGINEERS HENDERSON ELECTRICAL **ENGINEERS**

FIRE PROTECTION HENDERSON CONTRACTOR GC

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SHEET TITLE **PLUMBING** LEGENDS AND **GENERAL** NOTES





> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

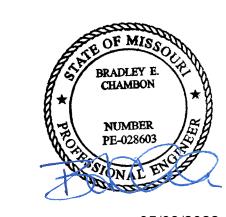
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ARCHITECT

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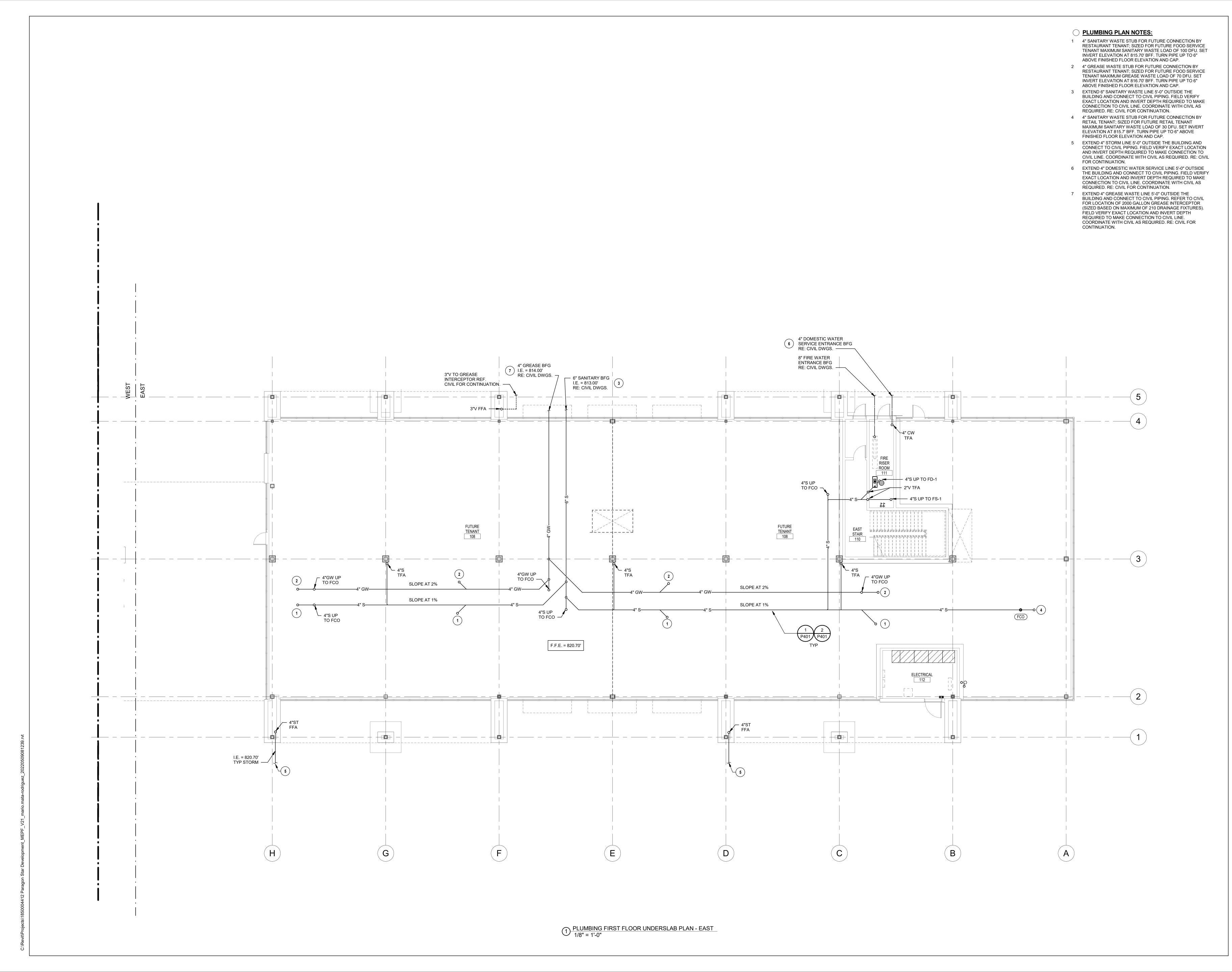
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PLUMBING FIRST FLOOR UNDERSLAB PLAN - WEST

P100.1





FIRST PLAT, LOT 9

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05/09/2022 BRADLEY E. CHAMBON

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS

ARCHITECTURE

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LICENSE # 028603

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ENGINEERS

STRUCTURAL BSE STRUCTRAL

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ENGINEERS

MECHANICAL HENDERSON

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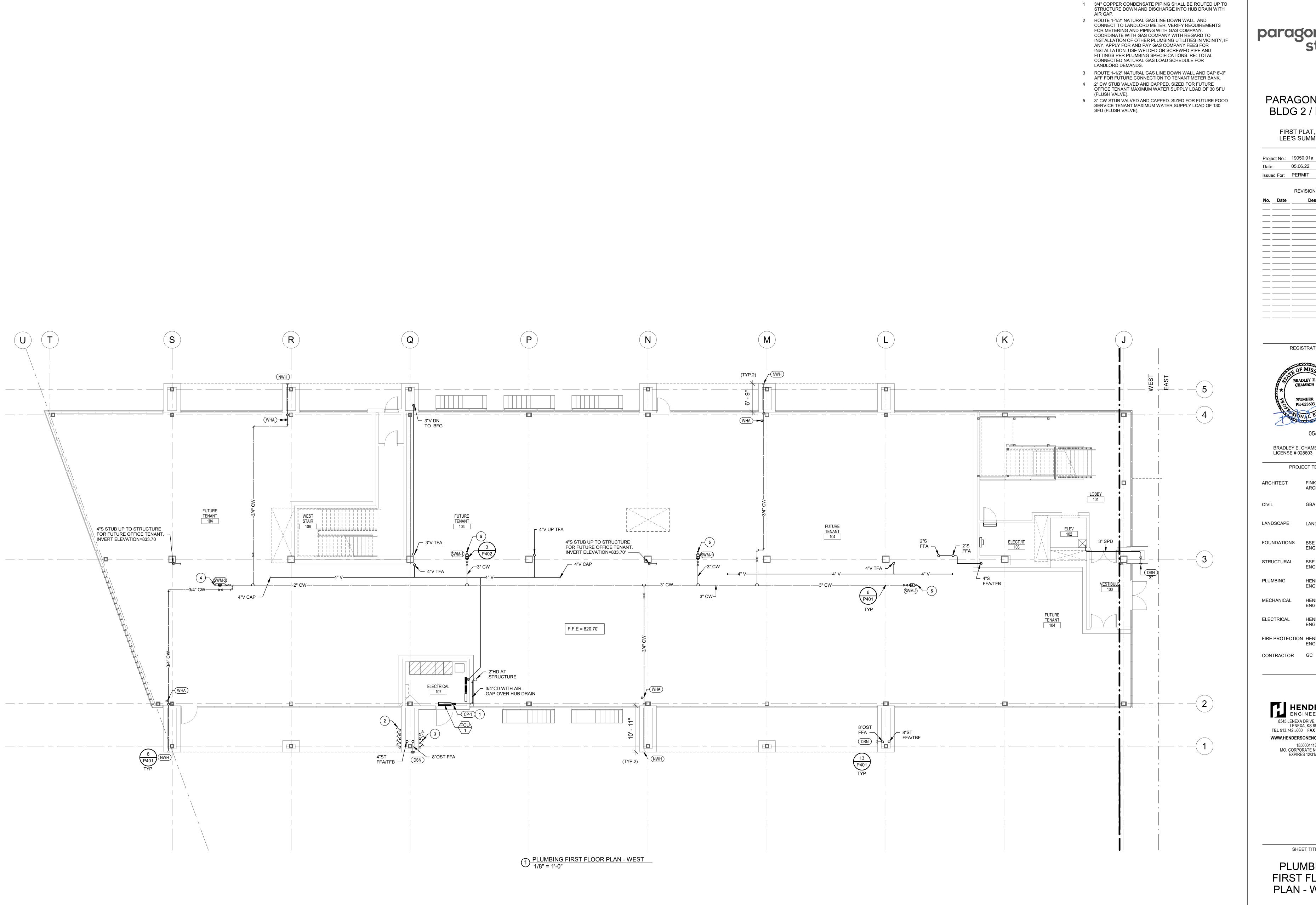
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PLUMBING FINISH FLOOR UNDERSLAB PLAN - EAST

P100.2





PLUMBING PLAN NOTES:

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

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SHEET TITLE

PLUMBING FIRST FLOOR PLAN - WEST

SHEET NUMBER P101.1



- 1 3/4" COPPER CONDENSATE PIPING SHALL BE ROUTED UP TO STRUCTURE DOWN AND DISCHARGE INTO HUB DRAIN WITH
- 2 DO NOT INSTALL PLUMBING PIPING OVER ELECTRICAL PANELS OR EQUIPMENT.
- 3 2-1/2" CW STUB VALVED AND CAPPED. SIZED FOR FUTURE FOOD SERVICE TENANT MAXIMUM WATER SUPPLY LOAD OF
- 130 SFU (FLUSH VALVE).

 4 2" CW STUB VALVED AND CAPPED. SIZED FOR FUTURE
 OFFICE TENANT MAXIMUM WATER SUPPLY LOAD OF 30 SFU
 (FLUSH VALVE).



FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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PLUMBING HENDERSON

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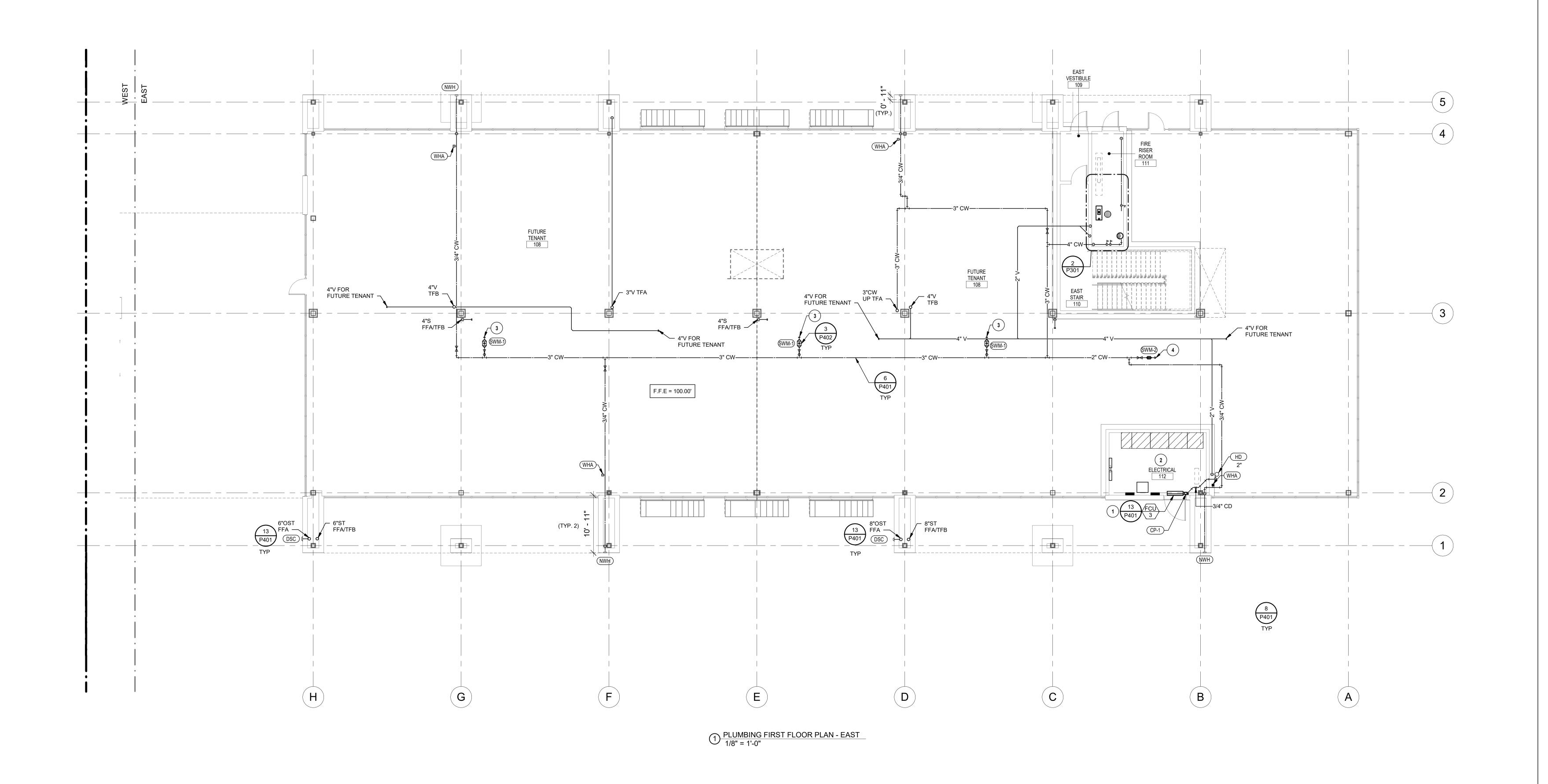
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SHEET TITLE

PLUMBING FIRST FLOOR PLAN - EAST

P101.2



1 PLUMBING SECOND FLOOR PLAN - WEST 1/8" = 1'-0"

paragon of star

PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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PLUMBING SECOND FLOOR PLAN - WEST

SHEET NUMBER

P102.1



FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

 Project No.:
 19050.01a

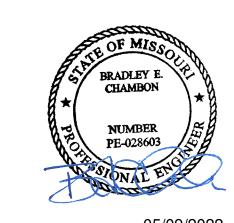
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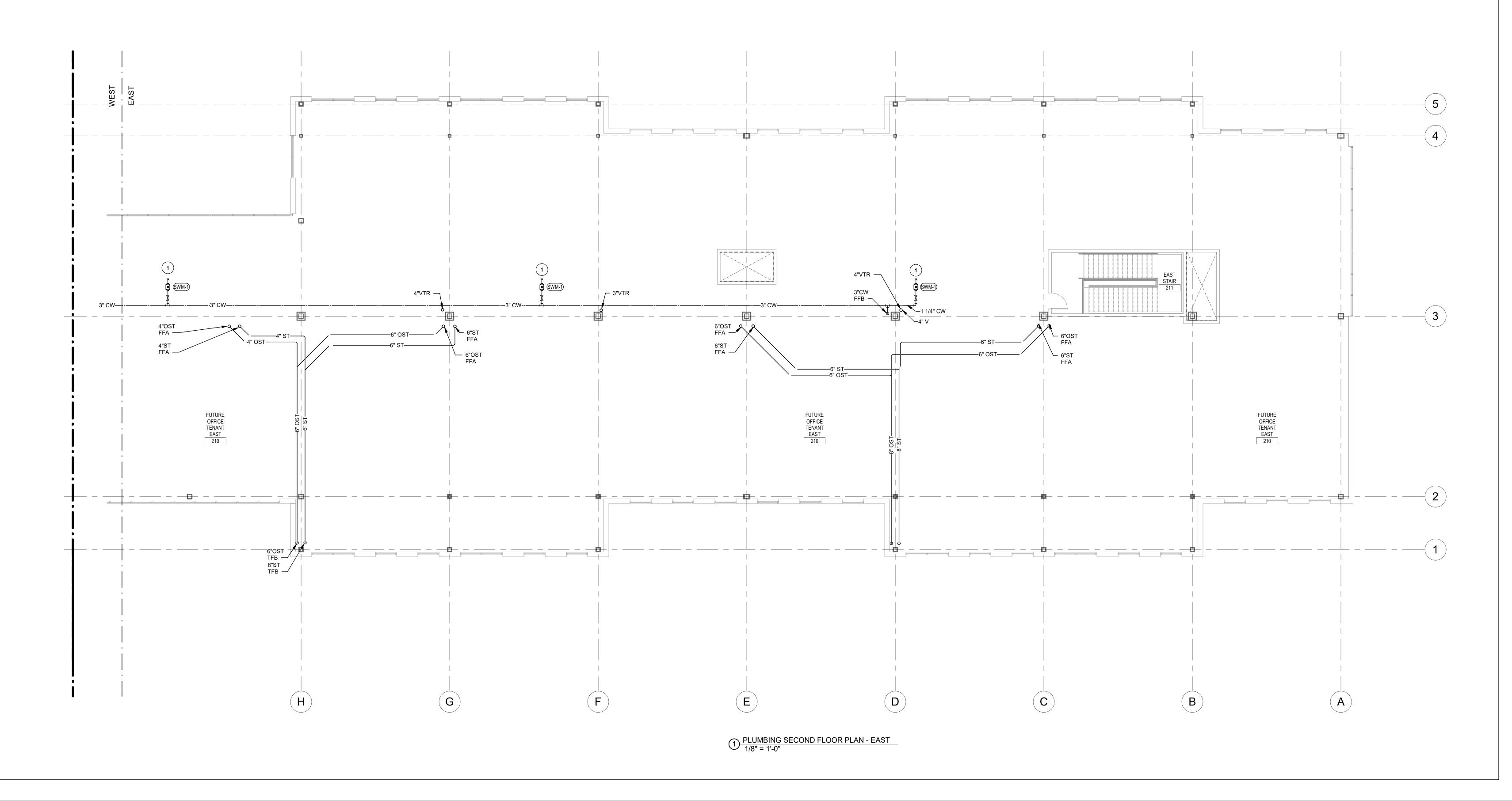
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SHEET TITLE

PLUMBING SECOND FLOOR PLAN - EAST

P102.2





FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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LANDSCAPE LAND 3

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ENGINEERS

STRUCTURAL
ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

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SHEET TITLE

PLUMBING ROOF PLAN -WEST

SHEET NUMBER

P201.1

1 PLUMBING ROOF PLAN - EAST 1/8" = 1'-0"



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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ENGINEERS

HENDERSON **ENGINEERS**

ENGINEERS

PLUMBING HENDERSON **ENGINEERS**

MECHANICAL HENDERSON

ELECTRICAL

FIRE PROTECTION HENDERSON

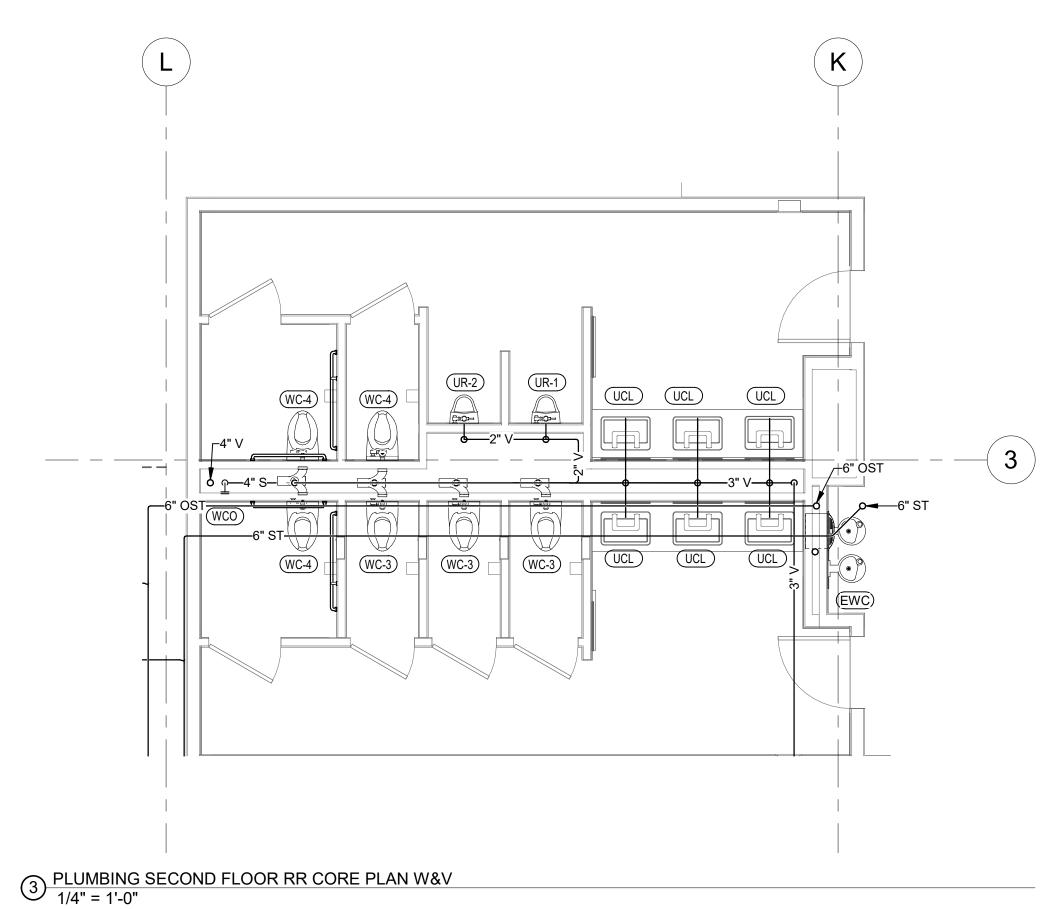
CONTRACTOR GC

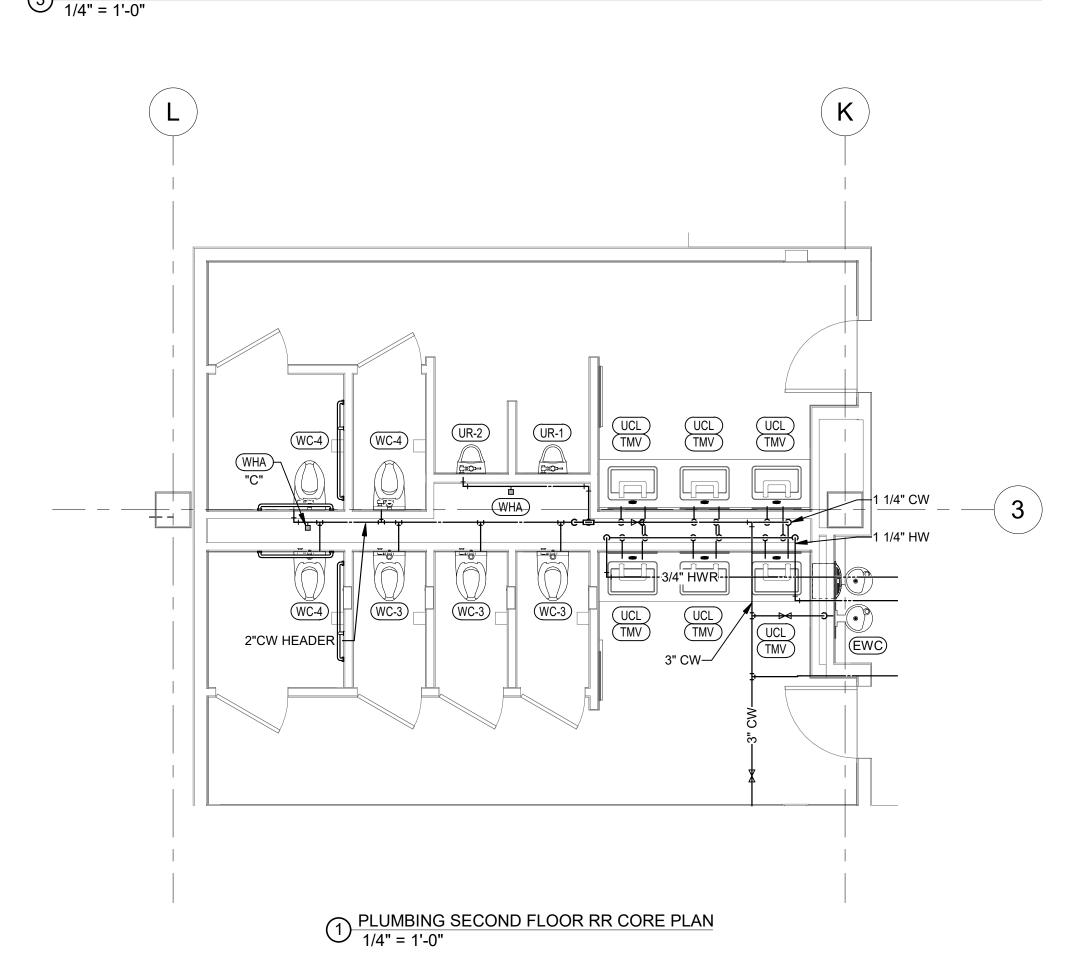
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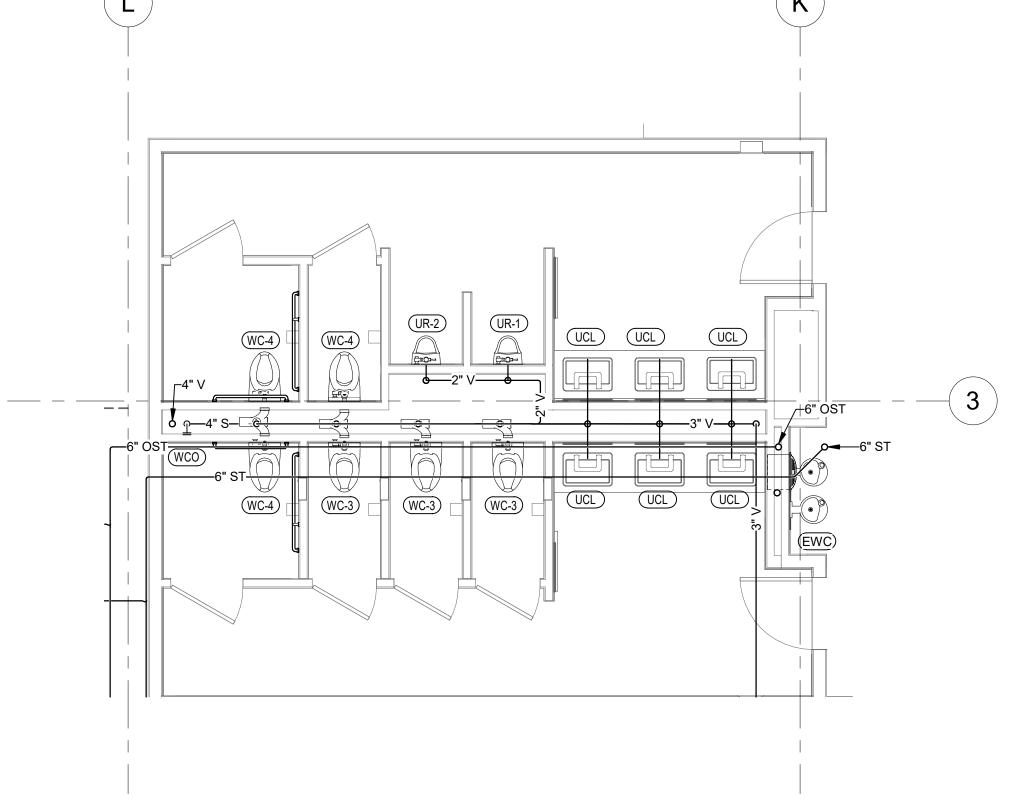
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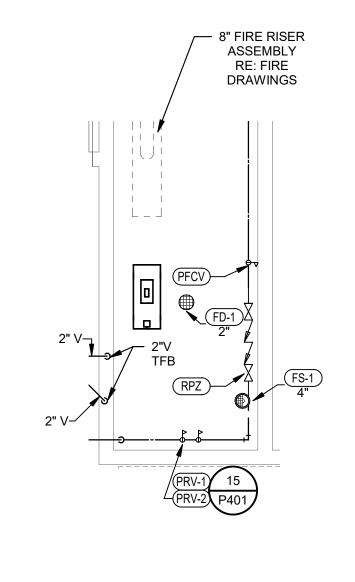
PLUMBING ROOF PLAN -EAST

SHEET NUMBER P201.2









2 PLUMBING FIRST FLOOR WATER ENTRY 1/4" = 1'-0"



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

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FIRE PROTECTION HENDERSON ENGINEERS CONTRACTOR GC

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> > SHEET TITLE

PLUMBING ENLARGED PLANS

INVESTIGATIONS. REFER TO SPECIFICATIONS FOR OTHER CONDITIONS. DO NOT INSTALL

PIPES UNDER INTERIOR BUILDING SPREAD FOOTINGS OR PILE CAPS. COORDINATE WITH

AFFECTED CONTRACTORS PRIOR TO THE START OF WORK.

2 PIPE AND TRENCH LOCATION

SUPPLEMENTARY STEEL FRAMING AROUND ROOF OPENING. COORDINATE ROOF DRAIN

OVERFLOW DRAIN WEIR ELEVATION 2" ABOVE PRIMARY ROOF DRAIN WEIR ELEVATION.

INSTALLATION WITH ARCHITECTURAL DETAILS AND ROOFING INSTALLATION. SET

ROOF DRAIN INSTALLATION

TO SUIT FIELD CONDITIONS. REFER TO SPECIFICATIONS AND PLUMBING FIXTURE

SCHEDULE FOR MORE INFORMATION. INSTALL TRAP PRIMER VALVE AND

DISTRIBUTION UNIT PER MANUFACTURER'S RECOMMENDATIONS.

4 TRAP PRIMER OVERHEAD NTS

PROVIDE SLEEVE AND SEAL

SHALL OPEN WITH FLOW

TOWARD FINISH GRADE

SEALANT

OR PAVEMENT

 SEAL AIR GAP AROUND PIPE WATER TIGHT WITH SILICONE

THREADED ADAPTER

PENETRATION SPECIFICATIONS

INSTALL DOWNSPOUT COVER MINIMUM 18'

SECURING COVER FLAPPER. FLAPPER

PITCH DOWNSPOUT COVER SLIGHTLY

ELEVATOR SHAFT WALL

DOWNSPOUT COVER.

- FIRST FLOOR SLAB

· 2" SUMP PUMP DISCHARGE

GALVANIZED STEEL WITH

MALLEABLE IRON FITTINGS

(SPD), SCHEDULE 40

STRUCTURAL FOOTING

HIGH LEVEL ALARM

ON-OFF TETHERED

FLOAT SWITCH

MINIMUM 12" ABOVE ROOF

HEIGHT OF PARAPET WHEN

WITHIN 10' OF PARAPET, OR

NORMALLY. EXTEND TO

ABOVE MAXIMUM LOCAL

SNOW DEPTH.

STRUCTURE.

MINIMUM 12" BELOW

FOR TYPE OF PIPE,

FITTINGS, AND

LOCATION(S).

REFER TO SPECIFICATIONS

CONNECTORS. REFER TO

PLANS FOR SIZE(S) AND

REMOVE SURFACE MATERIAL

TO LIMITS SHOWN, REPLACE

FOR CONCRETE OR ASPHALT

COORDINATE WITH ARCHITECT

FINAL BUILDING BASE MATERIALS

DEPTH PER ARCHITECT

GRAVEL BUILDING FILL

SEE NOTE 3.

REQUIREMENTS AND/OR SOIL ENGINEER, ARCHITECT AND CIVIL ENGINEER. OTHERWISE, PROVIDE

A MINIMUM SIDE SLOPE OF 1 TO 1 UNLESS OTHERWISE REQUIRED BY SOILS ENGINEER OR CIVIL

UNDISTURBED EARTH OR

SUB BASE FILL MATERIAL

BEDDING MATERIAL BACKFILL

HAND PLACED AND TAMPED -

OF THE LARGEST PIPE

MINIMUM 6" COVER OVER TOP

BEDDING MATERIAL MINIMUM 6

SUBGRADE LEVEL

WITH NEW TO MATCH EXISTING

TETHERED FLOAT SWITCH

PENETRATION

AIR TIGHT

- 2" (SPD) TO

RE: DETAIL

ABOVE GRADE. REMOVE SCREW

EXTERIOR WALL

PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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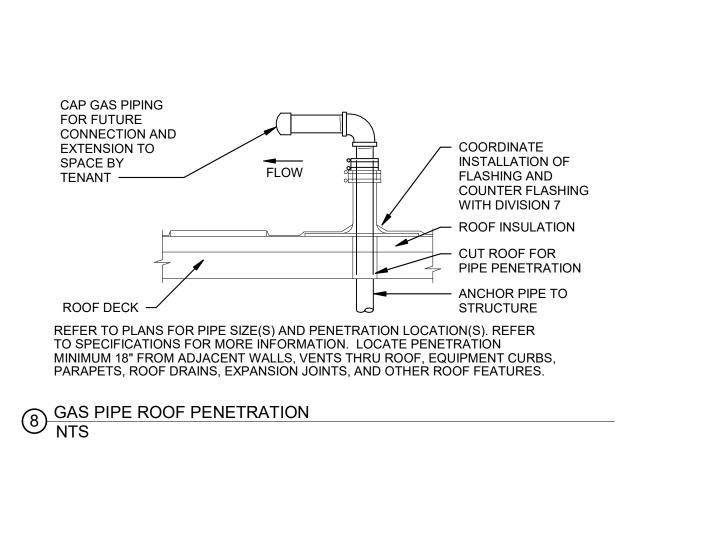
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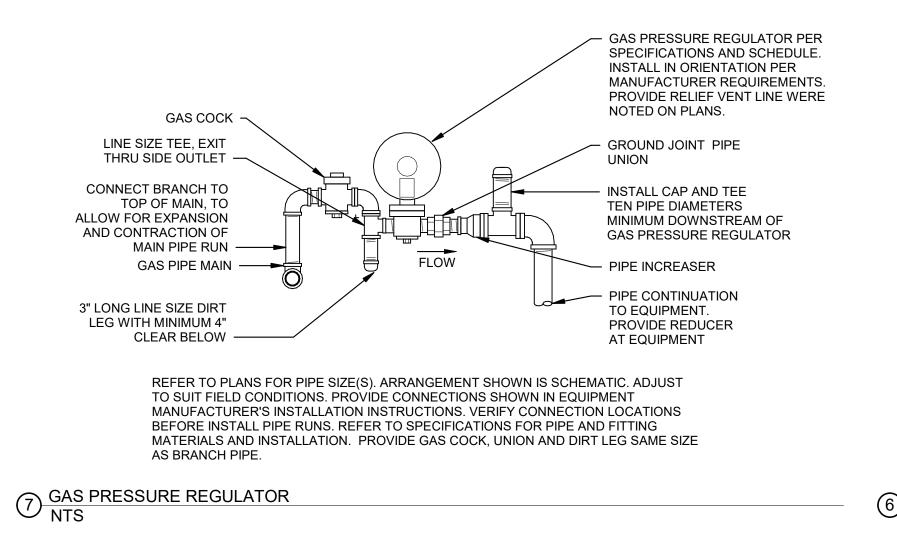
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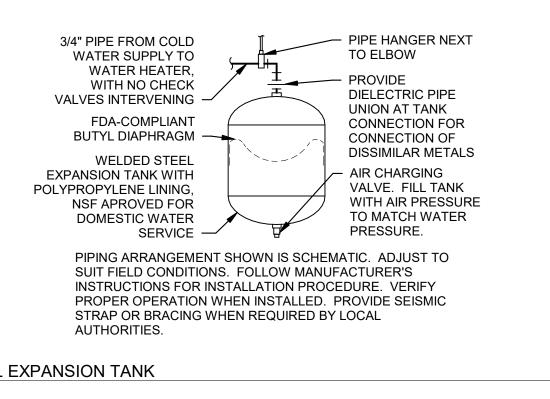
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PLUMBING DETAILS

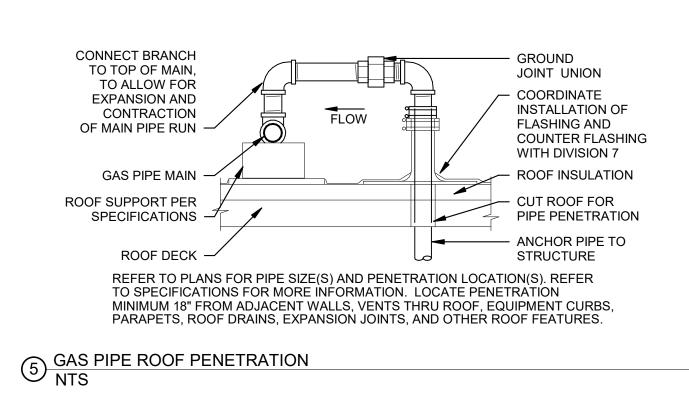


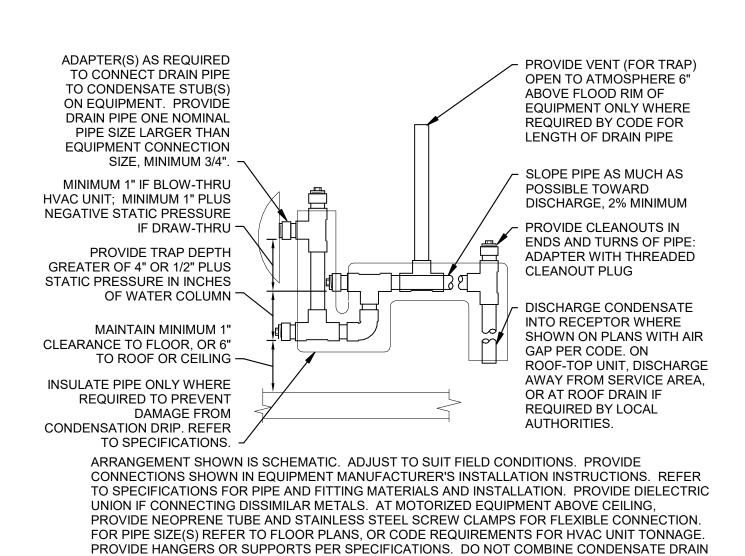




- GAS FIRED ROOF-TOP AIR

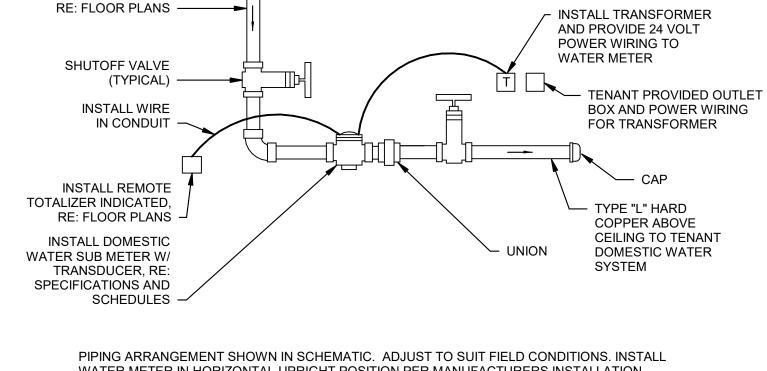
CONDITIONING UNIT OR MAKEUP





PIPES WITH NON-CONDENSATE INDIRECT DRAINS.

4 CONDENSATE DRAIN INSTALLATION NTS

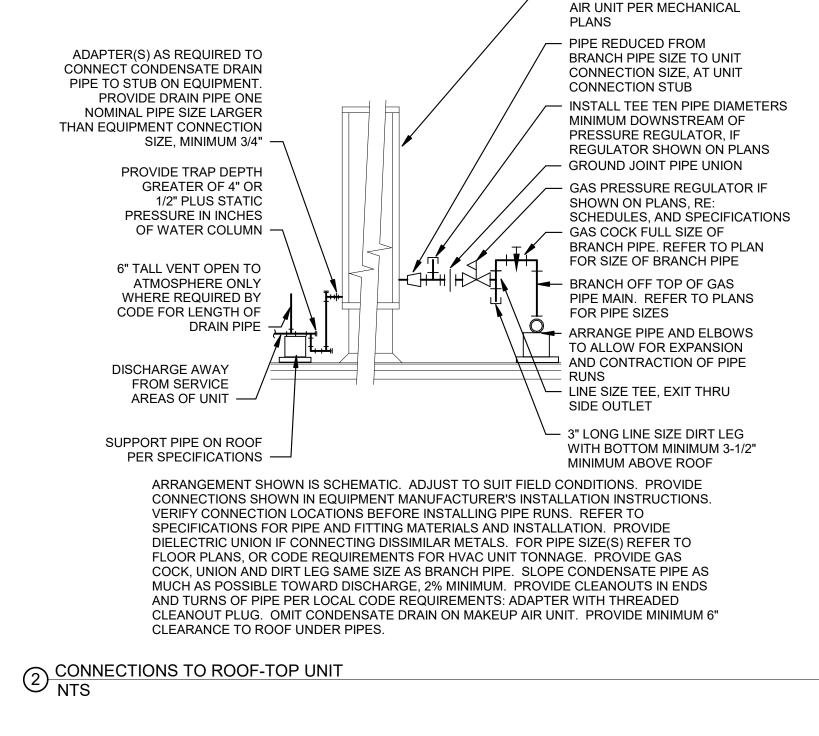


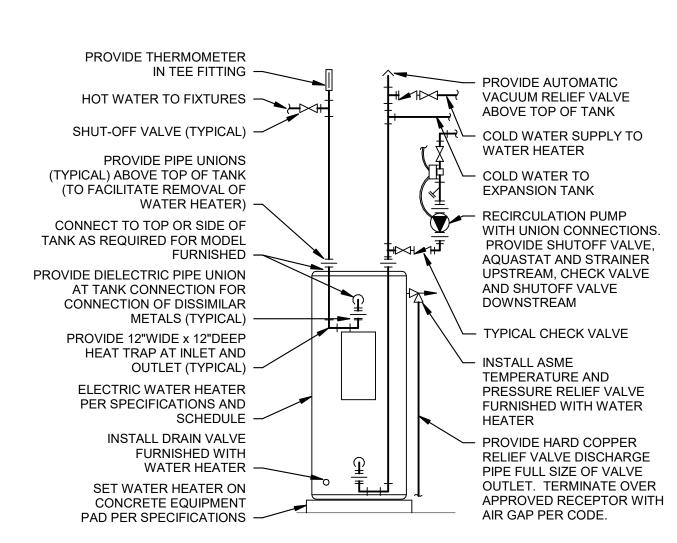
TYPE "L" HARD COPPER

TENANT CONNECTION,

FROM COLD WATER







REFER TO SPECIFICATIONS, SCHEDULES, AND NOTES FOR MORE INFORMATION. PIPING ARRANGEMENT SHOWN IS SCHEMATIC. ADJUST TO SUIT FIELD CONDITIONS. VERIFY CONNECTION SIZES AND LOCATIONS WITH WATER HEATER FURNISHED. REFER TO FLOOR PLANS FOR PIPE SIZES AND CONTINUATIONS. PROVIDE SEISMIC STRAP OR BRACING WHEN REQUIRED BY LOCAL AUTHORITIES. POWER WIRING AND DISCONNECT SWITCH ARE SPECIFIED BY ELECTRICAL. INTERLOCK OF AQUASTAT WITH RECIRCULATION PUMP IS SPECIFIED BY ELECTRICAL.

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

Project No.: 19050.01a Issued For: PERMIT

REVISIONS



LICENSE # 028603 PROJECT TEAM

BRADLEY E. CHAMBON

FINKLE+WILLIAMS

ARCHITECT ARCHITECTURE

CIVIL LANDSCAPE

LAND 3

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON **ENGINEERS**

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> > MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

PLUMBING

ELECTRIC STORAGE WATER HEATER SCHEDULE ELECTRICAL DATA VOLTS PHASE KW (GPH) NOTES 208 1 5 22 A, D, F MANUFACTURER | MODEL# | AREA SERVED | (GALLONS) #DEN-30 FLOOR 2 A.O. SMITH RESTROOMS

NOTES:

WH-1

93°F TEMPERATURE RISE WITH 140°F OPERATING TEMPERATURE

73°F TEMPERATURE RISE WITH 120°F OPERATING TEMPERATURE SINGLE ELEMENT

DUAL ELEMENT WIRED FOR NON-SIMULTANEOUS OPERATION DUAL ELEMENT WIRED FOR SIMULTANEOUS OPERATION WITH UNBALANCED THREE PHASE CIRCUIT

FURNISH WITH IMMERSION THERMOSTAT "LOW BOY" DESIGN

PLUMBING EXPANSION TANK SCHEDULE

MARK MANUFACTURER MODEL (GALLONS) VOLUME (GALLONS) SERVICE AMTROL ST-5 2

A. CHARGE TANK WITH AIR TO IDENTICAL PRESSURE AS STATIC DOMESTIC WATER PRESSURE.

RECIRCULATION PUMP SCHEDULE											
					HEAD	CONNECTION	ELECT	RICAL	DATA		
MARK	MANUFACTURER	MODEL	LOCATION	GPM	(FT.)	SIZE	VOLTS	PH	HP	NOTES	
RP-1	BELL & GOSSETT	NBF-9U	FLOOR 2 JANITOR	1	7	3/4"	120	1	1/18	A,B,C,D	

NOTES:

A. ALL LEAD FREE CAST BRONZE BOOSTER.

PROVIDE WITH STRAINER UPSTREAM OF PUMP.

PROVIDE ADJUSTABLE, SURFACE MOUNTED AQUASTAT - HONEYWELL L6006C. SET AQUASTAT TO SHUT OFF RECIRCULATION PUMP AT WATER HEATER SET POINT AND ON AT 10°F BELOW SET POINT.

	ELEVATOR SUMP PUMP SCHEDULE									
						DISCHARGE		ELECTRICAL		
MARK	MANUFACTURER	MODEL	LOCATION	GPM	HEAD (FT.)	SIZE (IN.)	VOLTS	PH	HP	NOTES
ESP-1	WEIL	1413-500	ELEVATOR PIT	50	20.5	3"	208	1	0.5	A-F
										•

PROVIDE WEIL #320.158.523A 208V SINGLE PHASE FLOAT SWITCH WITH POWER CORD AND PIGGYBACK PLUG. PROVIDE WITH WEIL #8341K1015 HIGH LEVEL ALARM WITH AUXILIARY CONTACT, REFER TO SPECIFICATIONS.

REFER TO DETAIL FOR MORE INSTALLATION INFORMATION.

INSTALL IN 24"SQUARE x 24" DEEP SUMP PIT LOCATED IN ELEVATOR PIT, SEE ARCHITECTURAL DRAWINGS.

PROVIDE FIBERBASIN #FIB24SQ 28" X 1.5" THICK SQUARE LIGHT DUTY FIBERGLASS GRID GRATE WITH FRAME. PROVIDE 2" DISCHARGE PIPING, SHUTOFF VALVE AND ZOELLER #30-0030 FLAPPER NON-CLOG CHECK VALVE. FIXTURE BRANCH CONNECTION SCHEDULE

FIXTURE	COLD WATER	HOT WATER	WASTE	VENT
WATER CLOSET (FV)	1 1/4"		4"	2"
URINAL	1"		2"	2"
MULTI-STATION LAVATORY	1/2"	1/2"	2"	1 1/2"
DRINKING FOUNTAIN	1/2"		2"	1 1/2"
JANITOR'S SINK	1/2"	1/2"	3"	2"
SINK	1/2"	1/2"	2"	2"

NOTE: PIPE SIZES SHOWN ARE MINIMUM.

BASED ON NFPA 54 EQUATION 4-2

TOTAL CON	NECTE	ED NATURAL G	SAS LO	DAC
EUTIDMENT DESIGNATION	$\bigcap IANITITV$	DESCRIPTION	CEH (EVCH)	TOTAL CELL

QUIPMENT DESIGNATION	QUANTITY	DESCRIPTION	CFH (EACH)	TOTAL CFH
CHANICAL EQUIPMENT				,
RTU 1	1	ROOFTOP UNIT	500	500
RTU 2	1	ROOFTOP UNIT	500	500
				1000

Grand total

NATURAL GAS SYSTEM OPERATING PRESSURE OF 2.0 PSI.

NATURAL GAS SYSTEM SIZED WITH TOTAL DEVELOPED LENGTH FROM GAS METER TO MOST REMOTE PIECE OF EQUIPMENT OF 700' WITH A PRESSURE DROP OF 1.5 PSI.

HIGH PRESSURE GAS PIPE SIZING CHART					
PIPE SIZE	LOAD (CFH)				
1/2"	199				
3/4"	416				
1"	784				
1-1/4"	1,609				
1-1/2"	2,411				
2"	4,643				
2-1/2"	7,400				
3"	13,082				
4"	26,684				
6"	78,168				
SPECIFIC GRAVITY OF GAS =	0.60				
UPSTREAM PRESSURE (PSI) =	2				
DOWNSTREAM PRESSURE (PSI) =	0.5				
PRESSURE LOSS (PSI) =	1.5				
TOTAL DEVELOPED					
LENGTH (FEET) =	700				

	WATER PIPE SIZING CHART (IPC)							
	FIXTURE UNITS VS. PRESSURE LOSS IN PSI / 100 FEET FOR TYPE "L" COPPER TUBE							
		COLD WATER (3.00 PSI / 100'			НОТ	WATER @ 3.0 PSI	/ 100'
PIPE	INTERNAL	FLUSH TANK	FLUSH VALVE	VELOCITY	FLOW	FLUSH TANK	VELOCITY	FLOW
SIZE	DIAMETER	SFU	SFU	FEET / SEC	GPM	SFU	FEET / SEC	GPM
1/2"	0.545	0.6	N/A	2.5	1.8	*	*	*
3/4"	0.785	1.8	N/A	3.1	4.7	*	*	*
1"	1.025	5.1	N/A	3.7	9.5	*	*	*
1-1/4"	1.265	13.3	5.6	4.3	16.6	*	*	*
1-1/2"	1.505	40.0	9.7	4.7	26.3	*	*	*
2"	1.985	148.7	61.1	5.7	54.4	120.9	5	48.2
2-1/2"	2.465	356.4	228.5	6.5	96.2	246.8	5	74.3
3"	2.945	661.5	578.8	7.2	153.7	406	5	106.1
4"	3.905	1764.4	1764.4	8.0	298.6	859.4	5	186.6
6"	5.845	5269.9	5269.9	8.0	669.0	2859.7	5	418.1
8"	7.725	10143.1	10143.1	8.0	1168.6	5653.3	5	730.3
		SIZE	D WITH HAZEN WILLIA	MS CONSTANT "C" =	135	*UTILIZE	COLD WATER SIZING	CHART

GAS PRESSURE REGULATOR SCHEDULE FOR 2 PSI SYSTEMS									
MARK	MANUFACTURER	MODEL	VALVE TYPE	VALVE BODY SIZE (INCHES)	MAX. FLOW RATE CFH	INLET PRESSURE PSI	OUTLET PRESSURE INCHES WATER COLUMN	SERVICE	NOTES
GPR-1	PIETRO-FIORENTINI	31051	С	1/2"	552	1	14	RTU-1	A, C, D, E, F, G, H
GPR-2	PIETRO-FIORENTINI	31051	С	1/2"	552	1	14	RTU-2	A, C, D, E, F, G, H

C = SELF CONTAINED "DIRECT ACTING" DIAPHRAGM TYPE WITH INTERNAL VENT LIMITER.

DROOP = 1" WATER COLUMN MAXIMUM. DROOP = 2" WATER COLUMN MAXIMUM.

65# ALUMINUM BODY, SCREWED CONNECTIONS AND OVERPRESSURE PROTECTION TO 25#.

MAXIMUM FLOW RATE SCHEDULED, MATCH BODY SIZE AND MAXIMUM FLOW RATE TO EQUIPMENT FLOW RATE. REFER TO EQUIPMENT SHOP DRAWINGS FOR EXACT LOADS. LISTED TO MEET ANSI Z21.80 / CSA6.22 WITH CSA LISTING STAMP ON REGULATORY BODY.

GAS PRESSURE REGULATOR INLET PRESSURE = OPERATING PRESSURE - DESIGN FRICTION LOSS. 2 PSI MAXIMUM INLET PRESSURE AND 1 PSI MINIMUM INLET PRESSURE.

PLUMBING FIXTURE SCHEDULE

FIXTURES IN THIS SCHEDULE OR THEIR APPROVED EQUIVALENT ARE PROVIDED BY THE PLUMBING CONTRACTOR. SUBMIT SHOP DRAWINGS ON EACH OF THESE ITEMS. REFER TO SPECIFICATIONS FOR FURTHER INFORMATION AND INSTALLATION REQUIREMENTS. VERIFY ROUGH-IN REQUIREMENTS WITH MANUFACTURER'S INSTALLATION INSTRUCTIONS AND INSTALL PER MANUFACTURER'S RECOMMENDATIONS. REFER TO THE ARCHITECTURAL DRAWINGS FOR THE PLUMBING FIXTURE MOUNTING HEIGHTS.

PLUMBING MARK	
DSC	DOWNSPOUT COVER: JAY R. SMITH # 1775, ROUND FABRICATED STAINLESS STEEL FRAME WITH FABRICATED SECURED PERFORATED STAINLESS STEEL HINGED COVER. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.
DSN	DOWNSPOUT NOZZLE: JAY R. SMITH # 1770T, CAST BRONZE BODY AND FLANGE. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.
EL1	EXPANSION LOOP - NATURAL GAS (FOR PIPE SIZES 1/2" THRU 4"): METRAFLEX # MLACT4000 SERIES. REFER TO PLANS FOR PIPE SIZE. LOOPS 2" AND LARGER INSTALLED IN ANY ORIENTATION OTHER THAN HANGING DOWN MUST HAVE THE 180° RETURN SUPPORTED.
FCO	INSTALL PER MANUFACTURER RECOMMENDATIONS. FLOOR CLEANOUT: JAY R. SMITH, CAST IRON BODY, FLASHING FLANGE WITH CLAMPING COLLAR, ABS PLUG, AND ADJUSTABLE, ROUND, SECURED, NICKEL BRONZE, TOP. # 4031L (-F-C), SCORIATED TOP FOR EXPOSED, FLUSH WITH FINISHED FLOOR, APPLICATION(S), # 4031L (-F-C-Y), STAINLESS STEEL MARKER FOR INSTALLATION IN CARPETED FLOOR AREA(S), # 4151 (-F-C), 1/8" RECESS FOR INSTALLATION IN TERRAZZO AND SIMILAR POURED FLOOR AREA(S). REFER TO SPECIFICATIONS FOR INSTALLATION.
FD-1	PVC FLOOR DRAIN: SIOUX CHIEF # 842 SERIES WITH ADJUSTABLE SIX AND ONE-HALF INCH ROUND MEDIUM DUTY CAST NICKEL STRAINER, WITH FLANGED PVC ADAPTER AND TRAP PRIMER PORT. CLEAN AND POLISH STRAINER AFTER INSTALLATION, PROVIDE A DEEP SEAL TRAP AND FLANGED PVC ADAPTER WITH BLANK TRAP PRIMER PORT IF NO TRAP PRIMER IS PROVIDED ON THE DRAWINGS.
FS-1	FLOOR SINK: JAY R. SMITH # 3041C (-12), 6" DEEP CAST IRON BODY WITH ACID RESISTING ENAMELED INTERIOR, ANCHOR FLANGE WITH SEEPAGE HOLES, CLAMP COLLAR, WHITE ABS SEDIMENT BUCKET, AND 8-1/2" ROUND NICKEL BRONZE RIM AND HALF GRATE. USE CAULK JOINT OF OUTLET SIZE AS SHOWN ON PLANS.
НВ	HOSE BIBB: PRIER PRODUCTS # C-258CP.75, POLISHED CHROME PLATED BRASS 3/4" MALE INLET, 3/4" THREADED HOSE CONNECTION, LOOSE KEY HANDLE, AND ASSE 1011 INTEGRAL VACUUM BREAKER.
HD	HUB DRAIN FLOOR SINK: JAY R. SMITH # 3821T (-DBS), 7" DEEP x 4" DIAMETER CAST IRON BODY WITH ACID RESISTING ENAMELED INTERIOR AND EXTERIOR FUNNEL WITH 2" CAST IRON P-TRAP WITH THREADED CONNECTION AND ALUMINUM DOME BOTTOM STRAINER.
JS-1	JANITOR'S SINK: FIAT # MSB-2424, 24" x 24" x 10" HIGH MOLDED STONE BASIN WITH FACTORY INSTALLED STAINLESS STEEL DOME STRAINER AND SEDIMENT BASKET. FAUCET: CHICAGO FAUCET # 897-CP FAUCET WITH WALL BRACE, INTEGRAL VACUUM BREAKER, PAIL HOOK, AND 3/4" MALE HOSE THREADED OUTLET. SECURE FAUCET IN WALL WITH BACKBOARD. TRIM: # MSG-2424 TYPE 304, 20 GAUGE, STAINLESS STEEL WALL SURROUNDS, # 832-AA 30" LONG REINFORCED HOSE WITH 3/4" CHROME COUPLING AND WALL HOOK, # E77AA24 EXTRUDED VINYL BUMPER GUARD AND # 889-CC 24" STAINLESS STEEL MOP HANGER.
NWH	NON-FREEZE WALL HYDRANT: PRIER PRODUCTS # C-634NBX1, SATIN NICKEL PLATED BRASS 1" MALE INLET BY 3/4" FEMALE INLET, 3/4" THREADED HOSE CONNECTION, LOOSE KEY HANDLE, HYDRANT LENGTH AS REQUIRED FOR INSTALLED WALL THICKNESS, ADJUSTABLE WALL CLAMP, BRASS BOX WITH SATIN NICKEL PLATED FINISH AND INTEGRAL ASSE 1052 DOUBLE CHECK VACUUM BREAKER.
ORD	OVERFLOW ROOF DRAIN: JAY R. SMITH # 1080Y (-E0X-C-R-CID), 15" DIAMETER CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, UNDERDECK CLAMP, SUMP RECEIVER, HUBLESS OUTLET, FIXED EXTENSION – HEIGHT AS REQUIRED BY INSTALLED INSULATION THICKNESS, CAST IRON DOME BOLTED OR LOCKED DOWN AND 2" HIGH WATER DAM. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.
PFCV	FLOOD PROTECTION VALVE: WATTS #LFF113-6RFP, [X"] LEAD FREE EPOXY COATED 300# DUCTILE IRON GLOBE PATTERN BODY WITH FLANGED CONNECTIONS, STAINLESS STEEL SEAT, STEM, AND SPRING, "FLO-CLEAN" STRAINER, ISOLATION COCK, PILOT OPERATED DIAPHRAGM, #JB113 WALL-MOUNTED JUNCTION BOX, FIG. 51 LIMIT SWITCH FOR REMOTE ALARM, #FS99 FLOW SENSOR, AND OUTLET SIZE AS SHOWN ON PLANS. ELECTRICAL REQUIREMENTS: 120V SINGLE PHASE.
PRV-1	PRESSURE REDUCING VALVE: 2" WATTS # LF223, BRONZE BODY, STAINLESS STEEL SEAT, STAINLESS STEEL BOLTS, INLET AND OUTLET SIZE AS SHOWN ON PLANS, 25 - 75 PSI REDUCED PRESSURE RANGE. SET OUTLET PRESSURE TO 77 PSI WITH FLOW RATE OF 120 GPM AT A FALL OFF PRESSURE OF 44 PSI DIFFERENTIAL.
PRV-2	PRESSURE REDUCING VALVE: 1-1/4" WATTS # LF223, BRONZE BODY, STAINLESS STEEL SEAT, STAINLESS STEEL BOLTS, INLET AND OUTLET SIZE AS SHOWN ON PLANS, 25 - 75 PSI REDUCED PRESSURE RANGE. SET OUTLET PRESSURE TO 72 PSI WITH FLOW RATE OF 60 GPM AT A FALL OFF PRESSURE OF 44 PSI DIFFERENTIAL.
RD	ROOF DRAIN: JAY R. SMITH # 1010Y (-E0X-C-R-CID), 15" DIAMETER CAST IRON BODY, FLASHING CLAMP, GRAVEL STOP, UNDERDECK CLAMP, SUMP RECEIVER, HUBLESS OUTLET, FIXED EXTENSION – HEIGHT AS REQUIRED BY INSTALLED INSULATION THICKNESS, AND CAST IRON DOME BOLTED OR LOCKED DOWN. PROVIDE OUTLET SIZE AS SHOWN ON PLANS.
RH	ROOF NON-FREEZE POST HYDRANT: MAPA PRODUCTS # MPH-24FP FREEZE PROOF POST HYDRANT MEETING ASSE #1057 WITH BLACK POWDER COATED CAST ALUMINUM WEATHER-GUARD DOME HANDLE, STAINLESS STEEL SHROUD WITH WELDED STAINLESS STEEL FLANGE, UNDER DECK CLAMP, BRONZE GLOBE ANGLE VALVE, 3/4" HOSE CONNECTION, QUICK DISCONNECT WITH BUILT-IN VACUUM BREAKER, STAINLESS STEEL RESERVOIR.
RPZ	REDUCED PRESSURE ZONE BACKFLOW PREVENTER: WATTS # 957-NRS, MEETING ASSE 1013, 304 STAINLESS STEEL BODY AND SLEEVE, QUARTER TURN TEST COCKS, RESILIENT SEATED NON-RISING STEM GATE VALVES AND WATTS #77F-DI-FDA EPOXY COATED CAST IRON STRAINER AND # 957AG AIR GAP FITTING.
RT	REMOTE TOTALIZER: BADGER METER # RTR PULSE GENERATOR FOR MOUNTING IN METER REGISTER WITH REMOTE TOTALIZER. PULSE

GENERATOR WITH SEALED THERMOPLASTIC BODY AND LITHIUM

PER MANUFACTURERS INSTALLATION INSTRUCTIONS.

BATTERY POWER. REMOTE TOTALIZER #RED WITH PLASTIC BODY, SOLENOID AND RATCHET ARM AND REGISTERED IN GALLONS.

PROVIDE CONTROL WIRING FROM PULSE GENERATOR TO TOTALIZER

MARK SWM-1	Description WATER METER: BADGER METER # M170 2", LEAD FREE BRONZE
	MAINCASE AND MEASURING CHAMBER, BOTTOM PLATE, STAINLESS STEEL TRIM AND BOLTS, THERMOPLASTIC STRAINER, OSCILLATING
	PISTON MEASURING ELEMENT, STRAIGHT READING HERMETICALLY
	SEALED REGISTER, REGISTRATION IN US GALLONS, MAGNETIC DRIVE, AND COMPLIANCE WITH ANSI / AWWA C700. PROVIDE WITH REMOTE
SWM-2	READING SYSTEM IF / AS REQUIRED. WATER METER: BADGER METER # 55 1", LEAD FREE BRONZE
	MAINCASE AND MEASURING CHAMBER, BOTTOM PLATE, STAINLESS STEEL TRIM AND BOLTS, THERMOPLASTIC STRAINER, OSCILLATING
	PISTON MEASURING ELEMENT, STRAIGHT READING HERMETICALLY SEALED REGISTER, REGISTRATION IN US GALLONS, MAGNETIC DRIVE,
	AND COMPLIANCE WITH ANSI / AWWA C700. PROVIDE WITH REMOTE READING SYSTEM IF / AS REQUIRED.
ГМУ	THERMOSTATIC MIXING VALVE: POWERS # LFG480, SOLID LEAD FREE
	BRASS OR BRONZE BODY, THERMOSTATIC WAX ELEMENT, CORROSION RESISTANT INTERNAL PARTS, AND INTEGRAL CHECKS, ASSE 1070
	COMPLIANT, CAPABLE OF 1.6 GPM WITH A 20 PSI DIFFERENTIAL AND A MINIMUM FLOW RATE OF 0.25 GPM. SET TEMPERATURE TO 110F FOR
	DUAL TEMPERATURE LAVATORIES AND HAND SINKS, 100F FOR SINGLE TEMPERATURE LAVATORIES AND HAND SINKS AND 120F FOR SINKS.
	MOUNT BELOW THE PLUMBING FIXTURE WHERE INDICATED ON PLAN(S).
ΓS	TIME SWITCH: INTERMATIC #ET1705CSPST, 7 DAY, ONE
	CIRCUIT-SINGLE POLE SINGLE THROW, ELECTRONIC TIME SWITCH OR EQUAL BY TORK. TIME SWITCH SHALL BE MOTOR RATED (1 H.P. @ 120
	VOLT, SINGLE PHASE), MINIMUM OF 20 SET POINTS (14 ON/OFF CYCLES) AND BATTERY BACK UP. COORDINATE WITH DIVISION 16 FOR
	INSTALLÁTION AND INTERLOCK OF TIME SWITCH IN SERIES WITH THE AQUASTAT AND RECIRCULATION PUMP.
JCL	UNDERCOUNTER LAVATORY & FAUCET: BRADLEY WB1-WB-ER1 "WASHBAR WITH EVERO UNDERMOUNT" 24" X 14-7/16" SQUARE CAST
	EVERO UNDERMOUNT BASIN, PATAGONIA IN COLOR. WASHBAR ALL-IN-ONE FAUCET WITH 0.5 GPM AERATORS, HAND DRYER, AND
	LIQUID SOAP DISPENSER. STAINLESS STEEL SWING DOWN ACCESS
	PANEL. SET IN BED OF SILICONE SEALANT WITH PROVIDED CLIPS. TRIM- McGUIRE # LF2165CCLK LEAD FREE BRASS LOOSE KEY
	COMPRESSION ANGLE STOP VALVES WITH RISERS AND ESCUTCHEONS, McGUIRE # B8872CF 1-1/4" 17 GAUGE CAST CHROME PLATED BRASS
	ADJUSTABLE P-TRAP AND WASTE ARM WITH CLEANOUT PLUG AND ESCUTCHEON.
JR-1	URINAL: AMERICAN STANDARD # 6561.017 "TRIMBROOK" WHITE VITREOUS CHINA FIXTURE WITH FLUSHING RIM, 3/4" TOP SPUD, AND
	SIPHON FLUSH ACTION. VALVE - SLOAN "G2 OPTIMA PLUS" # 8186-0.125 GALLON PER FLUSH,
	EXPOSED, CHROME-PLATED, TOP MOUNTED PLASTIC AND CHROME
	PLATED METAL HOUSING WITH OVERRIDE BUTTON, BATTERY POWERED SENSOR OPERATED, DIAPHRAGM TYPE FLUSH VALVE WITH
	CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE, ESCUTCHEON, INTEGRAL SCREWDRIVER STOP WITH VANDAL
	RESISTANT CAP, VACUUM BREAKER AND 3/4" FLUSH TUBE, AND SWEAT ADAPTER KIT.
JR-2	TRIM: SUITABLE CARRIER WITH STANCHIONS TO FLOOR. URINAL (ADA ACCESSIBLE): AMERICAN STANDARD # 6561.017
	"TRIMBROOK" WHITE VITREOUS CHINA FIXTURE WITH FLUSHING RIM, 3/4" TOP SPUD, AND SIPHON FLUSH ACTION.
	VALVE - SLOAN "G2 OPTIMA PLUS" # 8186-0.125 GALLON PER FLUSH, EXPOSED, CHROME-PLATED, TOP MOUNTED PLASTIC AND CHROME
	PLATED METAL HOUSING WITH OVERRIDE BUTTON, BATTERY POWERED
	SENSOR OPERATED, DIAPHRAGM TYPE FLUSH VALVE WITH CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE,
	ESCUTCHEON, INTEGRAL SCREWDRIVER STOP WITH VANDAL RESISTANT CAP, VACUUM BREAKER AND 3/4" FLUSH TUBE, AND SWEAT
	ADAPTER KIT. TRIM: SUITABLE CARRIER WITH STANCHIONS TO FLOOR.
NC-3	WALL-MOUNTED WATER CLOSET: AMERICAN STANDARD # 2257.103
	"AFWALL" WHITE VITREOUS CHINA FIXTURE WITH ELONGATED BOWL, 1.6 GALLON PER FLUSH, AND DIRECT-FED SIPHON JET ACTION.
	VALVE: SLOAN "SLOAN" # 111 SFSM-1.28 1.28 GALLON PER FLUSH, EXPOSED, CHROME-PLATED, SIDE MOUNTED PLASTIC AND CHROME
	PLATED METAL HOUSING WITH OVERRIDE BUTTON, BATTERY POWERED SENSOR OPERATED, DIAPHRAGM TYPE FLUSH VALVE WITH
	CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE, ESCUTCHEON, INTEGRAL SCREWDRIVER STOP WITH VANDAL
	RESISTANT CAP, VACUUM BREAKER AND 1-1/2" FLUSH TUBE AND SWEAT ADAPTER KIT.
	TRIM: CHURCH # 9500SSC WHITE OPEN-FRONT CONTOURED, SOLID PLASTIC, HEAVY DUTY, SEAT LESS COVER WITH SELF-SUSTAINING
	CHECK HINGES AND STAINLESS STEEL BOLTS. PROVIDE SUITABLE FIXTURE CARRIER.
WC-4	WALL-MOUNTED WATER CLOSET (ADA ACCESSIBLE): AMERICAN
	STANDARD # 3351.101 "AFWALL MILLENNIUM FLOWISE WHITE VITREOUS CHINA FIXTURE WITH ELONGATED UNIVERSAL BOWL AND DIRECT-FED
	SIPHON JET ACTION. VALVE: SLOAN "SLOAN" # 111 SFSM-1.28 1.28 GALLON PER FLUSH,
	EXPOSED, CHROME-PLATED, SIDE MOUNTED PLASTIC AND CHROME PLATED METAL HOUSING WITH OVERRIDE BUTTON, BATTERY POWERED
	SENSOR OPERATED, DIAPHRAGM TYPE FLUSH VALVE WITH CHLORAMINE RESISTANT DIAPHRAGM WITH PROTECTED ORIFICE,
	ESCUTCHEON, INTEGRAL SCREWDRIVER STOP WITH VANDAL RESISTANT CAP, VACUUM BREAKER AND 1-1/2" FLUSH TUBE AND SWEAT
	ADAPTER KIT.
	TRIM- CHURCH # 9500SSCT WHITE OPEN-FRONT CONTOURED, SOLID PLASTIC, HEAVY DUTY, SEAT LESS COVER WITH SELF-SUSTAINING
	CHECK HINGES AND STAINLESS STEEL BOLTS. PROVIDE SUITABLE FIXTURE CARRIER.
WCO	WALL CLEANOUT: SIOUX CHIEF #873 SERIES, BRASS COUNTERSUNK PLUG, 20 GAUGE STAINLESS STEEL COVER AND SCREW. CLEANOUT
	TEE TO BE PROVIDED SEPARATELY. REFER TO SPECIFICATIONS FOR INSTALLATION.
VHA	WATER HAMMER ARRESTER: PRECISION PLUMBING PRODUCTS, HARD DRAWN COPPER BODY WITH WROUGHT COPPER FITTINGS, PISTON
	TYPE WITH LUBRICATED EPDM "O" RING SEALS, MEETING ASSE 1010
	OR PDI WH-201. PROVIDE PDI SIZES "A" THROUGH "F" AS SHOWN ON PLANS. PROVIDE SIZE "A" UNLESS SHOWN OTHERWISE ON THE PLANS.



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

Project No.:		19050.01a
Date	:	05.06.22
Issue	d For:	PERMIT
		REVISIONS
No.	Date	Description
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REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3 FOUNDATIONS BSE STRUCTURAL

ENGINEERS BSE STRUCTRAL STRUCTURAL **ENGINEERS**

PLUMBING HENDERSON **ENGINEERS** MECHANICAL HENDERSON

HENDERSON ELECTRICAL **ENGINEERS**

FIRE PROTECTION HENDERSON **ENGINEERS**

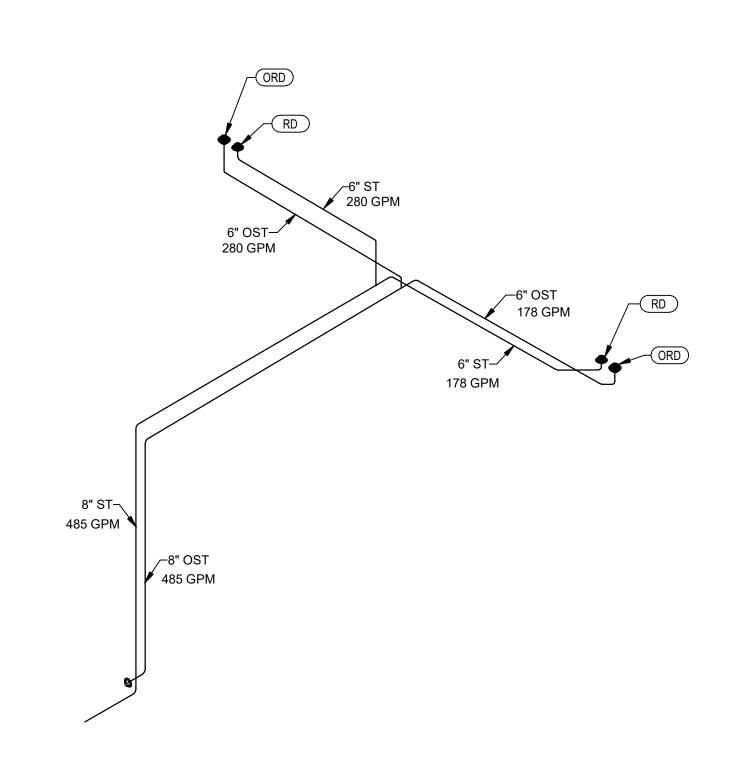
CONTRACTOR GC

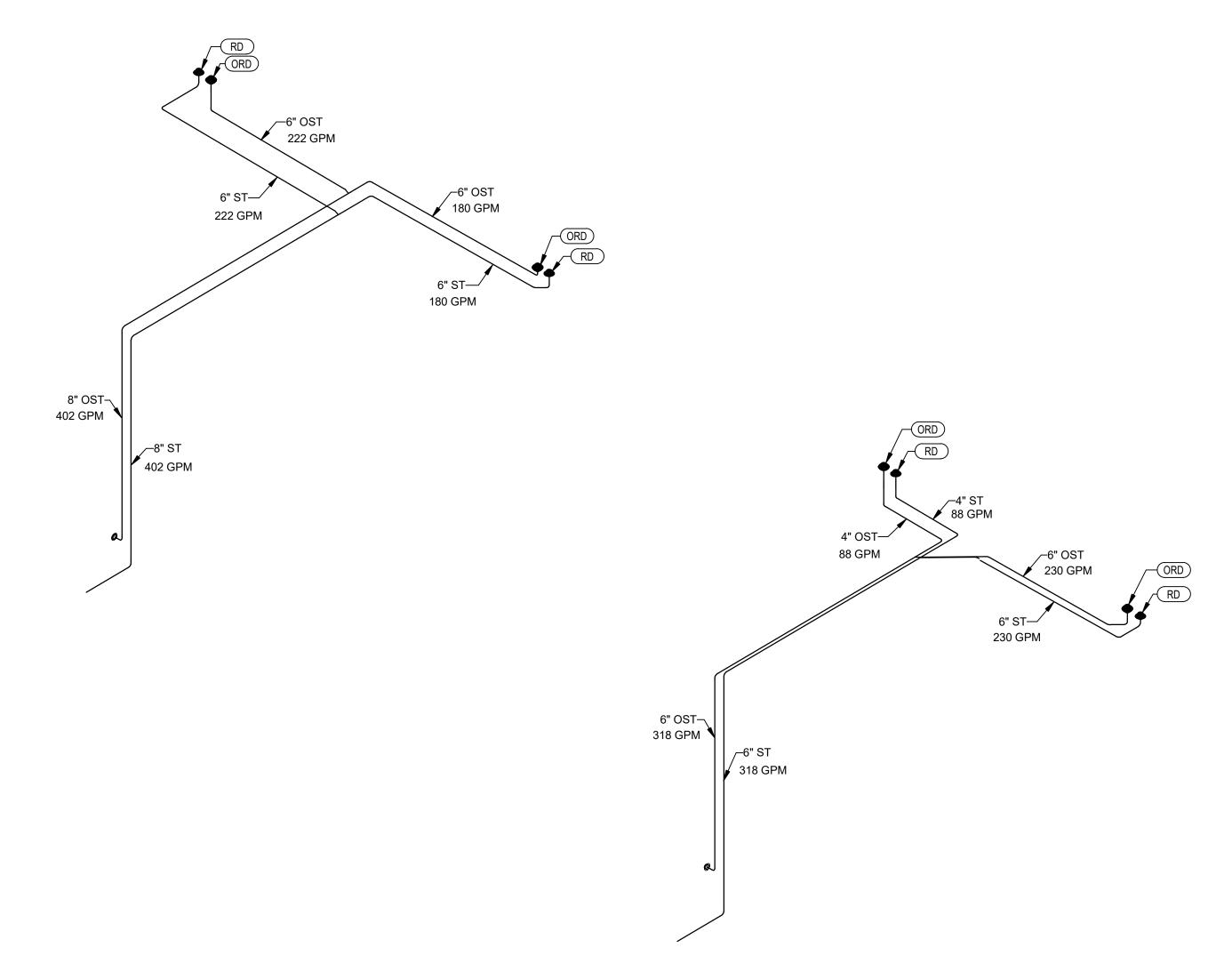
HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

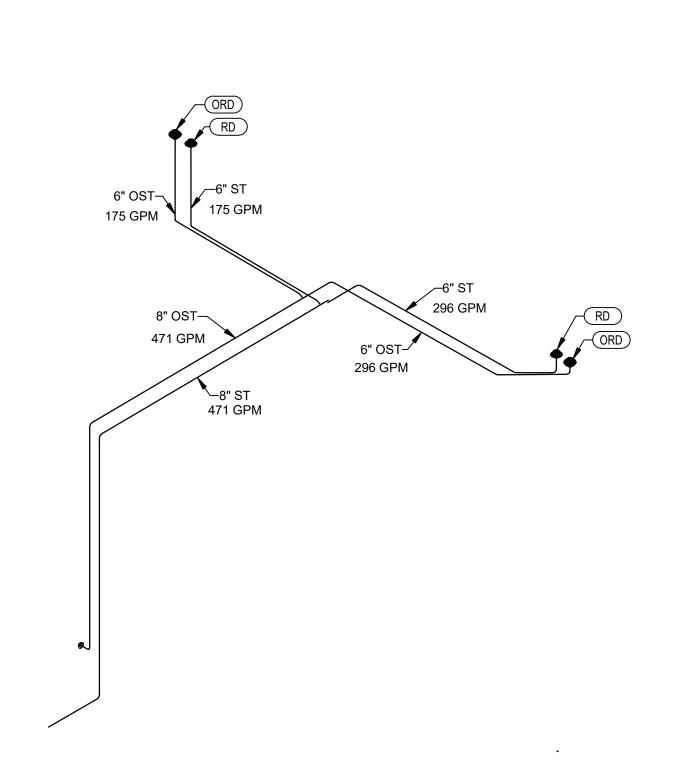
MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

PLUMBING SCHEDULES







1 PLUMBING STORM RISER DIAGRAM



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

 Project No.:
 19050.01a

 Date:
 05.06.22

 Issued For:
 PERMIT

 REVISIONS

 No.
 Date
 Description

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTRAL

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR GC

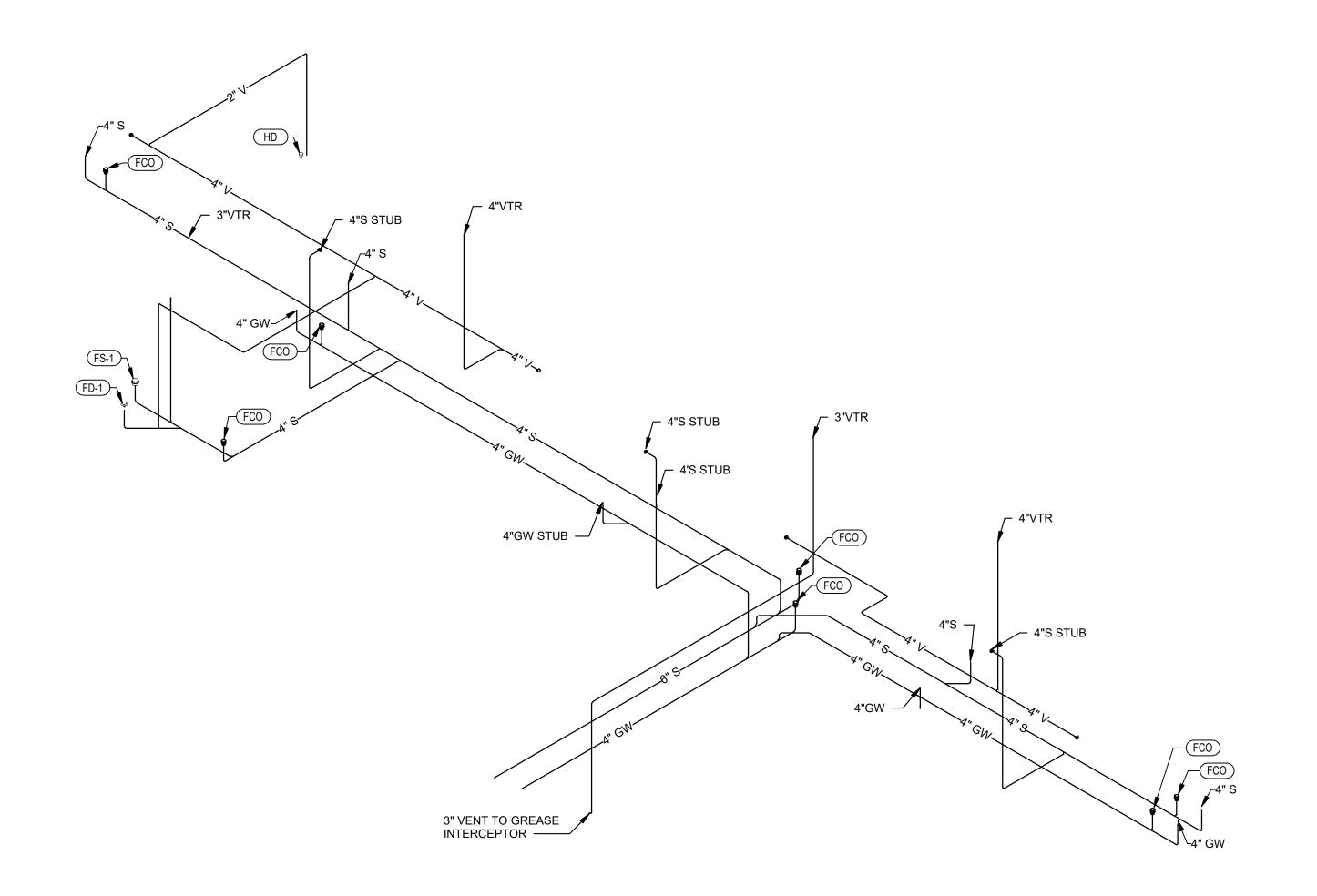
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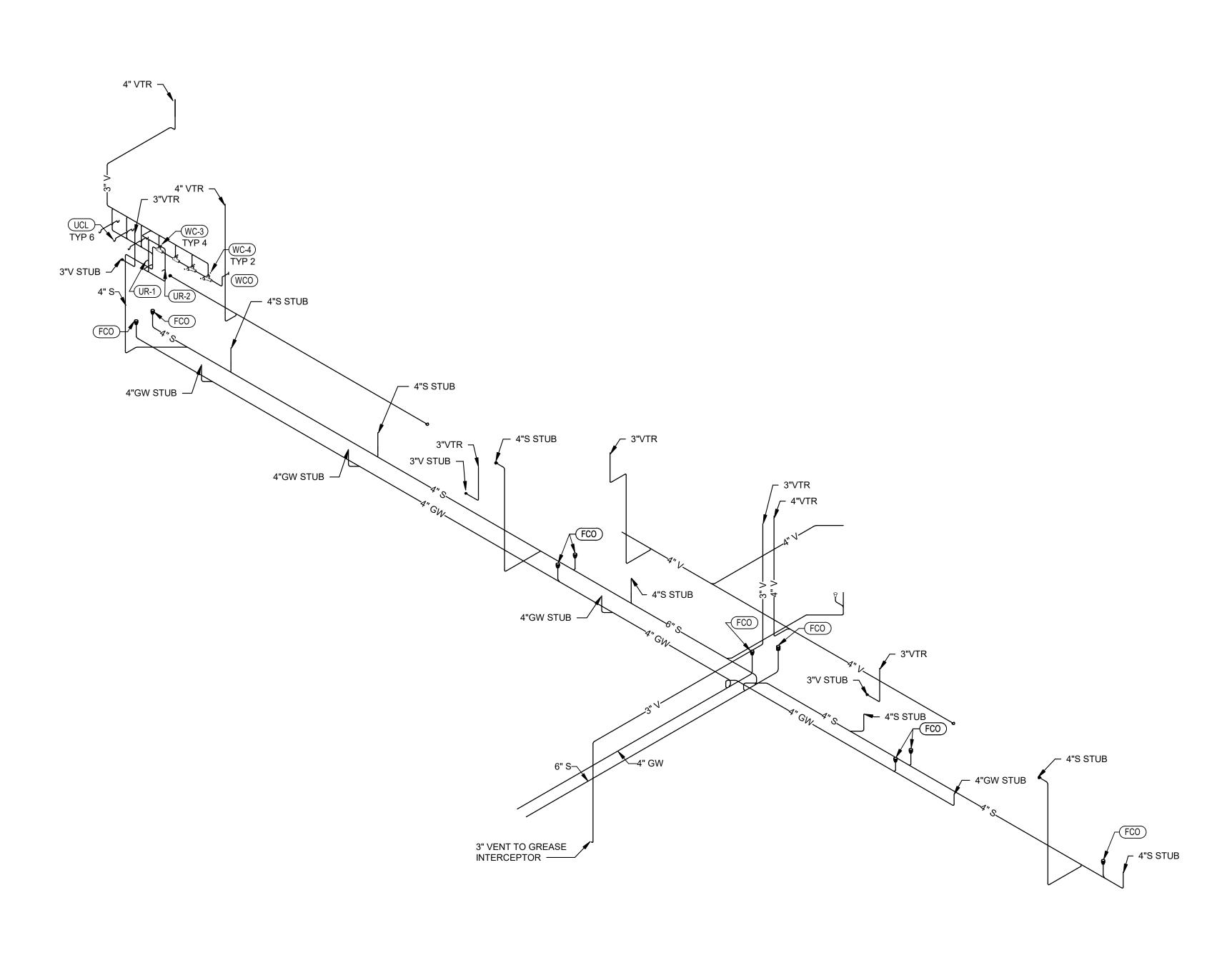
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LENEXA, KS 66214
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WWW.HENDERSONENGINEERS.COM

1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

PLUMBING STORM RISER DIAGRAM





1 PLUMBING WASTE AND VENT RISER DIAGRAM



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a

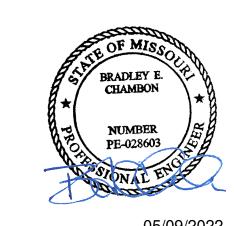
Date: 05.06.22

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REVISIONS

No. Date Description

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

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ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR GC

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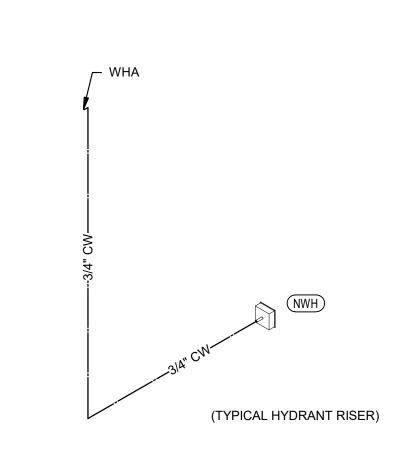
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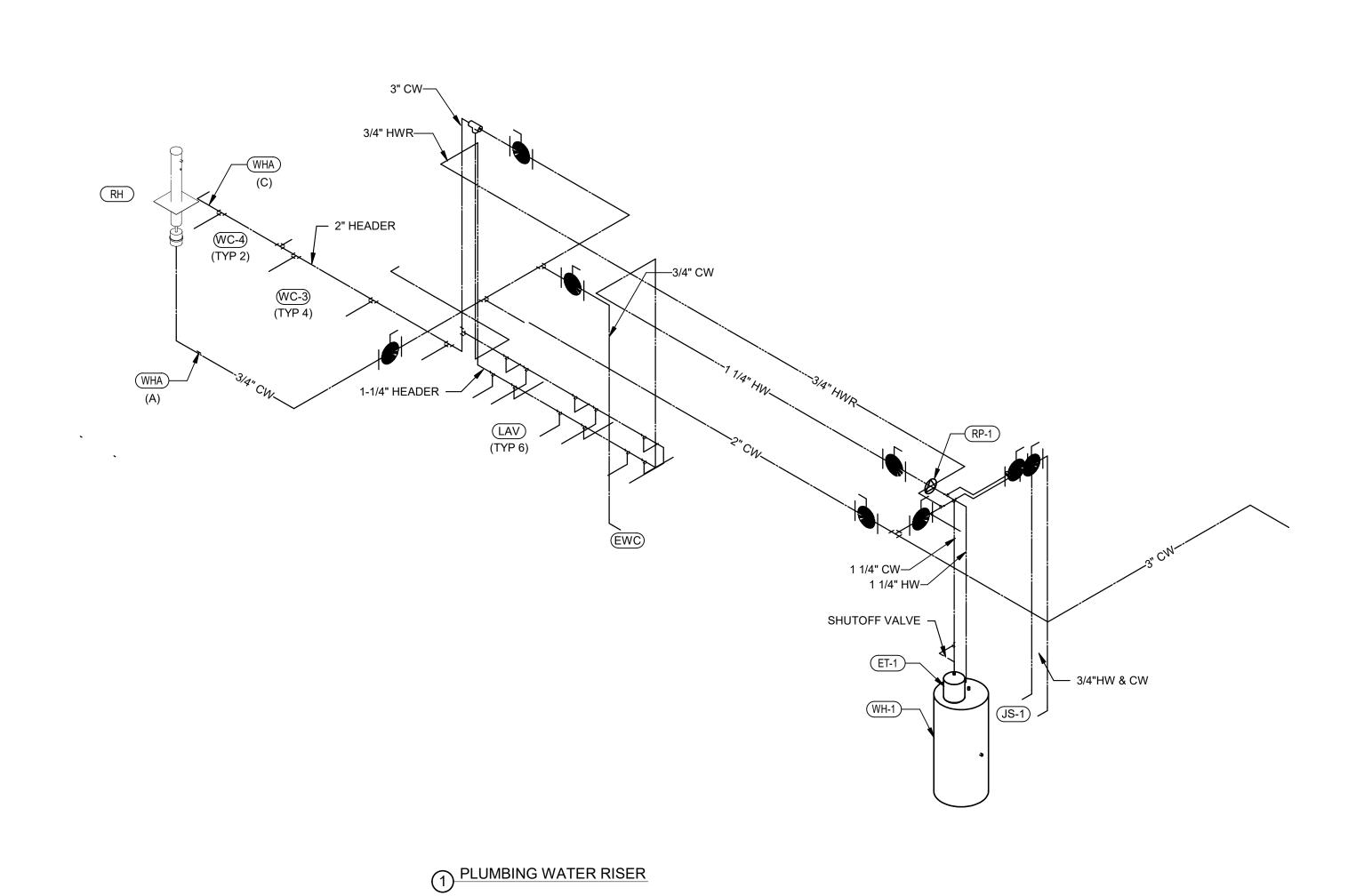
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1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

PLUMBING WASTE & VENT RISER DIAGRAM





paragon of star

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

 Project No.:
 19050.01a

 Date:
 05.06.22

 Issued For:
 PERMIT

 REVISIONS

 No.
 Date
 Description

REGISTRATION



05/09/2022

BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON

ENGINEERS

ELECTRICAL HENDERSON ENGINEERS

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR GC

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WWW.HENDERSONENGINEERS.COM

1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

PLUMBING WATER RISER DIAGRAM

SHEET NUMBER

P603

The specifications and drawings for the Project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

1995 Edition Division 21 – Fire Suppression Division 15 Division 22 – Plumbing Division 15 Division 23 – HVAC Division 15 Division 26 – Electrical Division 16 Division 16 Division 27 – Communications Division 28 – Electronic Safety and Security Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install, complete and ready for the intended use."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use. including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals. A Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

The term lead free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content of less than or equal to 0.25% per safe drinking water act as amended January 4, 2011 Section

PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price. D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Install material and equipment in accordance with the manufacturer's installation instructions. Model numbers listed in specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of the trim govern model

Pipe, pipe fittings, pipe specialties and valves shall be manufactured in plants located in the United States or certified to meet the specified ASTM and ANSI standards. Work performed under this contract shall provide a neat and "workmanlike" appearance when completed, to the

satisfaction of the Architect and Engineer. Workmanship shall be the finest possible by experienced mechanics. Installations shall comply with applicable codes and laws. The complete installation shall function as designed and intended with respect to efficiency, capacity, noise level, etc.

Abnormal noise caused by rattling equipment, piping and squeaks in rotating components shall not be acceptable.

Materials and equipment shall be of commercial specification grade in quality. Light duty and residential grade equipment shall not be accepted unless otherwise indicated. Remove from the premises waste material present as a result of his work, including cartons, crating, paper, stickers, and/or excavation material not used in backfilling, etc. Clean equipment installed under this contract to present a neat and

clean installation at the termination of the work. Repair or replace public and private property damaged as a result of work performed under this contract to the

satisfaction of authorities and regulations having jurisdiction. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety of the public.

. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years. . COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings when required. Contractor shall keep informed as to the work of other trades engaged in the construction of the project and shall execute his work in such a manner as not to interfere with or delay the work of other trades

Figured dimensions shall be taken in preference to scaled dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors which could have been avoided by proper checking and verification.

Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim.

G. ORDINANCES AND CODES Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes Comply with the schedule of operations as outlined in the architectural portions of this specification. Building shall be in

having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following:

National Fire Protection Association (NFPA) Underwriters Laboratories (UL) Occupational Safety and Health Administration (OSHA)

American Society of Mechanical Engineers (ASME) American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) American National Standards Institute (ANSI)

American Society of Testing Materials (ASTM) Other national standards and codes where applicable.

Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent.

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain, pay for, and furnish certificates of inspection to Owner.

H. PROTECTION OF EQUIPMENT AND MATERIAL

Store and protect from damage equipment and material after delivery to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment and material damaged by construction activities shall be rejected and Contractor shall furnish new equipment and material of a like kind at his own

Keep premises broom clean of foreign material created during work performed under this contract. Piping, equipment, etc. shall have a neat and clean appearance at the termination of the work.

Plug or cap open ends of piping systems while stored and installed during construction when not in use to prevent the entrance of debris into the systems.

Keep the manufacturer-provided protective coverings on floor drains, floor sinks and trench drains during construction. Remove coverings at the termination of the work and polish exposed surfaces.

I. SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request From for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following: 1. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request. 2. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts.

Proposed substitution has received necessary approvals of authorities having jurisdiction. 4. Same warranty will be furnished for proposed substitution as for specified Work. 5. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby. 6. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to

bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids. If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after H. the contract is awarded unless specifically provided in the contract documents.

J. SUBMITTALS

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Prior to transmitting submittal, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal, if required. Only resubmit those sections requested for resubmittal.

Submittals shall contain the project name, applicable specification section, submittal date, equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not met.

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01. Contractor shall include the website, user name, and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal.

The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, size of members, or quantities, omissions of components or fittings; coordination of electrical requirements; and not coordinating items with actual building conditions and adjacent work. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information.

M. OPERATION AND MAINTENANCE INSTRUCTIONS During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment

manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General

to save required literature shipped with the equipment itself for inclusion in this brochure.

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

Contractor, Sub-Contractor, and an index of contents. Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen

Include record drawings as described above.

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

N. SPARE PARTS

Furnish to Owner, with receipt, the spare parts for faucet washers and O-rings, flushometer repair kits, and water closet tank repair kits for the fixtures furnished for this project.

WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

Warranty shall include a guarantee of free circulation of liquids throughout the system as intended without leaks, excessive noise, or water hammer.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date and term. installing any material or joining method.

2. GENERAL MATERIALS AND INSTALLATION

BUILDING OPERATION

operation during normal workday hours. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and/or tenant. Coordinate interruption of building operation with the Owner and/or tenant a minimum of seven (7) days in advance of work.

B. EXCAVATION AND BACKFILLING

Perform excavation and backfill required for installation of underground work under this contract. Trenches shall be of sufficient width. Crib or brace trenches to prevent cave-in or settlement. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect. Use pumping equipment if required to keep trenches free of water. Backfill trenches in maximum 6 inch layers of well-tamped dry earth in a manner to prevent future

Excavation as specified herein shall be classified as common excavation. Common excavation shall comprise the satisfactory removal and disposition of material of whatever substances and of every description encountered, including rock, if any, within the limits of the work as specified and shown on the drawings. Excavation shall be performed to the lines and grades indicated on the drawings. Dispose of excavated materials that are considered unsuitable for backfill and 12454-B with ASTM 2665 socket fittings with solvent weld joints is also permitted where approved by code. surplus of excavated material which is not required for backfill to the satisfaction of the Architect

EXTERIOR UTILITY CONNECTIONS

Terminate domestic water, storm, and sewer lines at a point approximately five feet from the building wall, or as shown on the drawings. Make connection to the various services provided by others and coordinate connection requirements with civil engineer. Verify that installation will tie into the various services provided by others at the indicated invert elevation point prior to installation. If the installation will not tie into the indicated invert elevation point while maintaining proper fall, notify architect and civil engineer so that an alternative may be determined.

Provide service piping and accessories required to complete utility connections that are not furnished by the serving utility. Coordinate with the local gas service company to provide a new gas service, including gas meter, shut-off valves, and regulator as indicated on the drawings. Installation shall be in complete conformance with the requirements of the local gas service company.

COINCIDENTAL DAMAGE

Repair work shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the degrees. Architect. Conform to requirements of Division 02 of this specification

CUTTING AND PATCHING

Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division. Obtain permission from the Architect prior to cutting. Do not disturb structural members without prior approval from the Architect. Cut holes as small as possible. Patch walls, floors, and other portions of the facility as required by work under this division. Patching shall match original material and construction including fire ratings, if applicable. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

F. ROUGH-IN

Coordinate without delay all roughing-in with other divisions. Conceal piping, conduit, and rough-in except in unfinished areas and where otherwise shown.

CONCRETE BASES

Provide concrete bases (e.g., housekeeping pads) for equipment where indicated on the drawings and as specified herein. Concrete bases shall have chamfered edges. Size of base shall be a minimum of 4 inches greater than the footprint of the equipment that it is supporting and shall have a minimum height as described below.

Construct equipment bases of a minimum 28 day, 4000 psi concrete conforming to American Concrete Institute Standard Building Code for Reinforced Concrete (ACI 318-99) and the latest applicable recommendations of the ACI standard practice manual. Concrete shall be composed of cement conforming to ASTM C150 Type I, aggregate conforming to

Unless otherwise specified or shown on the structural drawings, reinforce equipment bases and housekeeping pads with No. 4 reinforcing bars conforming to ASTM A615 or 6x6 – W2.9 x W2.9 welded wire mesh conforming to ASTM A185. Place reinforcing bars 24 inches on center with a minimum of two bars each direction.

ASTM C33, and potable water. Exposed exterior concrete shall contain 5 to 7 percent air entrainment.

Provide galvanized anchor bolts for equipment placed on concrete equipment bases and housekeeping pads or on concrete slabs. Anchor bolts size, number and placement shall be as recommended by the manufacturer of the

Concrete equipment bases shall have minimum heights in accordance with the following:

For water heaters minimum height is 3-1/2 inches.

Structural steel used for pipe supports, equipment supports, etc., shall be new and clean, and shall conform to ASTM

Support plumbing equipment and piping from the building structure. Do not support plumbing equipment and piping from ceilings, other mechanical or electrical components, and other non-structural elements.

PENETRATIONS

Provide sleeves for pipes passing through above grade concrete or masonry walls, concrete floor or roof slabs. Sleeves are not required for core drilled holes in existing masonry walls, concrete floors or roofs. Provide 10 gauge galvanized steel sleeves for sleeves 6 inches and smaller. Provide galvanized sheet metal sleeves for larger than 6 inches. Schedule (NPS) 40 PVC sleeves are acceptable for installation in areas without return air plenums.

Seal elevated floor, exterior wall and roof penetrations watertight and weathertight with non-shrink, non-hardening commercial sealant. Pack with mineral wool and seal both ends with minimum of 1/2 inch of sealant.

Seal around penetrations of fire rated assemblies. Coordinate fire ratings and locations with the architectural drawings. Refer to architectural specifications for fire stoppings. Provide a product schedule for UL listing, location, wall or floor rating and installation drawing for each penetration fire stop system.

Extend pipe insulation for insulated pipe through floor, wall and roof penetrations, including fire rated walls and floors. The Cover fittings with Zeston, Knauf, or equal one-piece PVC pre-molded insulating covers. Fitting covers, jackets and vapor barrier shall be maintained. Size sleeve for a minimum of 1 inch annular clear space between inside of sleeve and outside of insulation.

Seal concrete or masonry exterior wall penetrations below grade with wall sleeve and mechanical sleeve seals. Provide

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without galvanized schedule 40 steel wall sleeve with 2" wide metal plate. Wall sleeve is not required for existing concrete walls with core drilled penetrations. Provide modular mechanical sleeve seals, manufactured by Advance Products & Systems, Calpico, GPT Industries/Link Seal, Metraflex, or Proco Products. Seal elevated concrete slab with water proof membrane penetrations with "wall pipes" and water proof sealant. Secure

> waterproof membrane flashing between "wall pipe" clamping flange and clamping ring. Provide cast iron "wall pipes" with soft temper copper tubing shall be of the flared type installed in compliance with the fitting manufacturer's integral waterstop ring manufactured by Josam, Jay R. Smith, Wade, Watts or Zurn. Provide sleeves for horizontal pipe passing through or under foundation. Sleeves shall be cast iron soil pipe two nominal pipe sizes larger than the pipe served.

Provide Schedule 40 PVC pipe sleeves for vertical pressure pipe passing through concrete slab on grade. Sleeves shall be one nominal pipe size larger than the pipe served and two pipe sizes larger than pipe served for ductile iron pipes with restraining rods. Seal water-tight with silicone caulk.

Provide 1/2 inch thick cellular foam insulation around perimeter of non-pressure pipe passing thru concrete slab on grade. Insulation shall extend to 2 inches above and below the concrete slab.

Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814. or other NRTL acceptable to AHJ. Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum Company, or 3M corp.

rating, and installation drawing for each penetration fire stop system. Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include qualifications

Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor

ELECTRICAL WIRING

data for testing agency.

FIRESTOPPING

Line voltage wiring shall be provided by Division 26. Line voltage control and interlock wiring for plumbing systems shall also be provided by Division 26. Low voltage control wiring shall be provided by Division 23. Furnish wiring diagrams to Division 26 as required for proper equipment hookup. Coordinate with Division 26 the actual wire sizing amps for plumbing equipment (from the equipment nameplate) to ensure proper installation.

SYSTEM TESTING AND ADJUSTING

Upon completion of each phase of the installation, test each system in conformance with local code requirements and as noted below. Furnish labor and equipment required to test each system installed under this contract. Assume all costs involved in making the tests and repairing and/or replacing any damages resulting therefrom.

Notify the Architect and the AHJ, three (3) working days prior to making plumbing system tests. Leave concealed work uncovered until the required tests have been completed, but if necessary due to construction procedure, tests on portions of the work may be made, and when satisfactory, the work may be concealed. Test piping before insulation is installed, and before backfill. Pipes, joints, flanges, valve stems, etc., shall be leak tight. Repair or replace system defects with new materials. Caulking of defective joints, cracks or holes will not be permitted. Repeat tests after defects have been eliminated. Make tests in the presence of the administrative authority and/or the Owner's authorized representative.

Upon completion of the systems installation, and prior to acceptance by the Architect and Engineer, make general operating tests to demonstrate that equipment and systems are in proper working order, and are functioning in conformance with the intent of the drawings and specifications. As a part of these tests, open every water outlet to ensure complete system flushing, remove and clean faucet aerators, clean strainers, light pilot lights, and operate every piece of equipment furnished under this contract to demonstrate proper functioning.

Test the drainage and vent system by plugging openings with test plugs, except those at the top of the stacks. Fill the system with water; test results will be satisfactory if the water level remains stationary for not less than one (1) hour. Subject the drainage and vent system to a pressure of at least ten (10) feet of water. If leaks develop, repair them and

Test the domestic water system by filling it with water and then isolating the system from its source. Keep the system closed for a period of twenty-four hours with no fixture being used. The pressure differential for this test period shall not exceed 10 psig. Test water piping to a 125 PSI hydrostatic pressure.

For low pressure natural gas systems, subject the pipe to 10 psig air pressure for a period of one hour. The resultant pressure differential for this period shall be 0 psig. Test per gas company requirements where required. For welded natural gas systems and systems with an operating pressure in excess of 14" water column, subject the pipe

to 60 psig air pressure for a period of one hour. The resultant pressure differential for this period shall be 0 psig. Test per

gas company requirements where required. 3. PLUMBING PIPING

grade outside building at adequate depth to prevent freezing.

PIPING MATERIALS

Materials specified or noted on the drawings are subject to the approval of local code authorities. Verify approval before Domestic Water (Cold, Hot and Hot Water Recirculation): Domestic water piping installed above the floor slab inside the

95/5 solder. Brazed mechanically formed tee connections (T-drill) may be used in copper lines where approved by code; connection shall be brazed joints made with AWS A5.8, BAg Silver filler metal. Underground domestic water piping 2 inch and smaller shall be Type "K" soft temper copper tubing with flared copper alloy fittings and connections, or Type "K" hard temper copper tubing with conventional wrought copper fittings and brazed joints made with AWS A5.8, BAg Silver filler meta. Install as few underground copper piping joints as possible. At building

building shall be Type "L" hard temper copper tube with wrought copper fittings and soldered connections made up with

Underground domestic water piping 3 inch and larger shall be class 52 ductile iron meeting the requirements of ANSI / AWWA Standard C151/A21.51. Piping shall be double cement lined in accordance with ANSI / AWWA Standard C104/A21.4. Fittings shall have mechanical joints. At contractor's option, pipe joints in straight runs (not at fittings) and not Below Ground Installation for Soil, Waste, and Storm: Install soil and waste piping to a uniform slope of not less than 1/8 installed under or within 5 feet of the building slab may be push-on joints. Joints shall conform to the requirements of ANSI

service entrance, no joints shall be installed under or within 5 feet of the building. Install domestic water piping below

Interior Waste And Vent Below Slab: Waste and vent pipe below slab inside building shall be service weight cast iron soil pipe with hub and spigot fittings with neoprene gasket joints, meeting ASTM A74, manufactured by AB & I Foundry, Charlotte or Tyler pipe and bearing the trademark of the CISPI and NSF. Hubless waste and vent pipe is not permitted below base slab. PVC schedule 40 DWV ASTM D2665 pipe with PVC meeting ASTM D1784, "solid wall" cell class

Interior Waste and Vent Above Slab: Waste and vent pipe above slab inside building shall be hubless cast iron soil pipe and fittings, meeting ASTM A888 and CISPI 301, manufactured by AB & I foundry, Charlotte or Tyler pipe and bearing the trademark of the CISPI and NSF.

Natural Gas Above Slab: Gas piping above ground shall be Schedule 40 black steel with malleable iron screwed fittings for 2" and smaller and Class 150 welded fittings for 2-1/2" and larger.

Connections to Plumbing Fixtures and Equipment: 1-1/4 inch and larger waste connections from fixture traps to cast iron

pipe shall be "DWV" copper with wrought copper drainage pattern fittings with copper sweat or compression joints at

Interior Storm: Inside building shall be same as specified for interior waste and vent pipe.

fixture trap connections and threaded joints at connections to cast iron pipe.

Indirect and Condensate Drain Inside Building: Indirect and condensate drain pipe installed inside the building shall be Type "M" hard copper with wrought copper fittings for 1" and smaller and "DWV" copper with wrought copper drainage pattern fittings for 1-1/4" and larger hard temper copper tube and soldered connections made with 95/5 solder, Schedule 40 PVC pipe and fittings with solvent weld joints where allowed by code. Install cleanouts at elbows greater than 45

gutter or other location as shown drawings. Install cleanouts at elbows greater than 45 degrees. Sump Pump Discharge: Sump pump discharge piping above grade shall be ASTM A53 Schedule 40 galvanized steel pipe with galvanized malleable iron fittings.

pipe and fittings with solvent weld joints where allowed by code and approved by Owner.] Terminate at nearest roof drain,

B. PIPING AND EQUIPMENT INSULATION

Provide domestic cold water, hot water, hot water recirculation, condensate drain pipe (within building), interior horizontal storm drain piping, and all storm piping within exterior unconditioned cavity spaces, with one-piece fiberglass insulation with all-service jacket with self-sealing lap to provide a continuous vapor barrier by Certainteed, Owens-Corning or Armstrong. Provide Insulation thickness as follows:

1" thick for cold piping

1" thick for storm piping and overflow storm piping

1" thick for condensate piping

PIPING JOINTS

experienced certified welders.

Up to 140F hot water and hot water return piping: 1" thick for 1-1/4" and smaller and 1-1/2" thick for 1-1/2" and larger. Greater than 140F to 160F hot water and hot water return piping: 1-1/2" thick for 1-1/4" and smaller and 2" thick for 1-1/2"

Provide 1 inch fiberglass insulation on vent piping within six feet of vent through the roof.

Provide fiberglass insulation on domestic cold and hot water pipes installed in walls and chases. Roof Drain Bodies: 2 inch one-piece fiberglass covering with fire-resistant jacket with self-sealing lap to provide a

continuous vapor barrier, by Certainteed, Owens-Corning or Armstrong. For hot and cold water piping installed inside masonry units of walls, provide 1/2 inch flexible unicellular insulation by

For hot piping, provide pipe hangers and riser clamps sized for the outside diameter of piping. Butt insulation to hanger or riser clamp for vertical pipe. Seal exposed insulation with insulation sealer. Exception for Vertical Piping: Provide clamps sized for the outside diameter of the vertical pipe and extend clamp through insulation. Seal penetrations of insulation and vapor barrier with wet coat of vapor barrier lap cement. For 2-1/2" and larger cold piping at hangers, provide 8 inch long sections of high density, high temperature calcium silicate by Johns-Manville, Fiberglass by Knauf or flexible unicellular piping insulation meeting ASTM C 534-01A, Type I with integral high density pipe supports and encased in steel insulation shield by Cooper B-line, Armacell, or approved equal. Insulation shall be continuous along the pipe surface, except at valves, unions, and where piping is exposed at fixtures. For pipes 2 inch and smaller using fiberglass or flexible elastomeric insulation without pre-insulated supports, provide insulation protection shields installed between hanger and pipe which meets the following minimum length requirements: Insulation Minimum Shield Length, (in)

Hanger Spacing, (ft) (inches) 3 5 5 - - -Less than 1" 1 5 6 8 9 11 11 1.5 5 6 8 8 9 9 2 5 5 6 6 8 8 2" and Less

Thickness

adhesives shall not exceed flame spread rating of 25 and smoke development rating of 50 per ASTM E84. Fill voids between covers and piping with fiberglass insulation and tape joints at all elbows and tees. Install pipe insulation in compliance with manufacturer's recommendations. Where pre-molded insulating fittings are not approved by the local AHJ, miter insulation at fittings.

Copper Tubing: Joints in hard temper tubing shall be soldered joints using lead-free 95/5 solder except where tubing is

installed below grade or below the base slab, in which case joints shall be soldered with silver solder (Sil-Fos). Joints in

Threaded Steel Pipe: Threaded joints shall be full and clean, cut with not more than three (3) threads exposed beyond the fittings. Make joints tight with graphite base pipe joint compound, use joint compound for gas systems for gas piping joint tape is not accepted).. No caulking, lamp-wick or other material will be permitted for correction of defective joints. Welded Steel Pipe: Welded joints shall be of the butt welded single "Vee" type. Bevel pipe at a 45 degree angle to within

Cast Iron Pipe Below Grade: Joints in bell and spigot cast iron waste and vent pipe shall be neoprene compression

1/16 inch of the inside wall, and build up the weld to one fourth greater depth than the pipe wall thickness. Welding shall be either electric or oxy-acetylene, performed in conformance with the ASME code for pressure pipe welding, and only by

Cast Iron Pipe Above Grade: Joints in hubless pipe shall be standard CISPI 310 NSF certified by Anaco, Ideal, Misson or Tyler. Joints in storm piping, including connections to roof drains, shall be heavy duty couplings meeting ASTM C1540 and FM 1680, Anaco Husky #HD-2000, Clamp-All "Hi Torque" 80 in. lb, Ideal Tridon "HD" or Mission "Heavyweight". PVC Pipe: Clean joints free from debris and moisture. Apply PVC primer meeting ASTM F656 to each joint. Apply solvent cement meeting ASTM D2564 and make joint while wet and in accordance with ASTM D2855.

Dissimilar Pipes Above Grade: Make connection of new waste pipe to new or existing dissimilar waste pipe using shielded transition couplings meeting ASTM C1460 with neoprene adapter gasket with stainless steel shield and hose clamps, Fernco, Proflex 3000 Series or Mission Flexseal MR56 Series

Dissimilar Pipes Below Grade: Make connection of new waste pipe to new or existing dissimilar waste pipe using shielded adapter couplings meeting ASTM C1173 with neoprene adapter gasket with stainless steel shield and hose clamps, Fernco, 1056 Series or Mission Sewer Couplings.

PIPING INSTALLATION

vertical pipe shall be B-Line #B3373 galvanized steel.

General: Clean pipe thoroughly prior to installation. Ream ends of pipe to remove burrs. Cut pipe accurately to measurements taken on the job. Install with adequate clearance for installation of coverings where required. Pipe shall not be sprung or bent. Neatly align pipe, connect it securely, and support it from the building structure with hangers as specified below. Provide chrome-plated escutcheons on pipes passing through ceilings, floors or walls of finished spaces Run pipes freely through floor and wall penetrations using pipe sleeves. Do not grout in place unless required for structural fire integrity. Install pipe concealed in finished spaces wherever possible. Use a dielectric union where ferrous and copper pipe connect. Dielectric union shall have a zinc-plated steel body, a threaded nylon insert, and insulating pressure gasket. No ferrous metal-to-copper connection made without insulating unions will be allowed.

Hanger & Supports: Pipe hangers shall be as described in the specifications by B-Line or equal by Anvil, Elite

thread hanger rods. Provide engineered support struts between joists and other structural members as required to provide a rigid hanging installation. Do not hang pipes from other pipes, conduit or ductwork. Provide hanger rods and space hangers at intervals as specified in "hanger spacing". Provide support within 1 foot of each elbow and tee. Provide supports within 1 foot of each equipment connection. Provide two nuts on threaded supports to securely fasten the support. Install hanger types or supports for various piping as follows: Copper Tube: Adjustable band hangers for bare copper tube 3 inches and smaller shall be B-Line #B3170 CT copper plated adjustable band swivel ring type. Adjustable band hangers for insulated copper tube 3 inches and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for insulated copper tube 4 inches and larger shall be

Components, FNW, Michigan, Truscon, or Unistrut. Connect hangers to the structure with side beam connectors and all

flanges. Support copper tube in chases and walls at plumbing fixtures with plastic or copper brackets secured to structure and U-bolts sized to bare on the pipe. Riser clamps to support vertical copper tube shall be B-Line #B3373CT copper coated steel, cut insulation, seal vapor barrier, and attach to bare tube. Steel Pipe: Adjustable band hangers for 2 inch and smaller shall be B-Line #B3170 NF adjustable band swivel ring type. Clevis hangers for 2-1/2 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support

B-Line #B3198RCT copper coated extension split ring pipe clamps, 3/8 inch threaded rod and B-Line #B3199CT ceiling

Cast Iron Pipe: Adjustable band hangers for 2 inch and smaller. Clevis hangers for 3 inch and larger shall be B-Line #B3100 galvanized steel clevis type. Riser clamps to support vertical pipe shall be B-Line #B3373 galvanized steel. Insulation Protection Shields: B-Line #B3151 of 18 gauge galvanized sheet metal. Shield shall cover half of the

circumference of the pipe and shall be of length indicated by manufacturer for pipe size and thickness of insulation.

Hanger Spacing, Rod Sizes & Connectors: Connect rods to steel beams or joists with B-Line #B3031 or #B3033 beam clamps as required. Connect rods to concrete with B-Line #3014 malleable iron single type inserts with malleable iron nut. Connect rods in wood construction with B-Line #B3058 side beam connectors. Hang and support piping with spacing and rod sizes as follows

Copper Tube: 1-1/2 inch and smaller - every 6 feet with 3/8 inch hanger rods; 2 inch - every 10 feet with 3/8 inch hanger rods; 2-1/2 inch - every 10 feet with 3/8 inch hanger rods; 3 inch - every 10 feet with 1/2 inch rods, 4 inch - every 10 feet with 5/8 inch hanger rods. Support vertical copper tube every 10 feet. Steel Pipe: 1 inch and smaller - every 8 feet with 3/8 inch hanger rods; 1-1/4 inch through 2 inch - every 10 feet with 3/8

inch hanger rods; 2-1/2 inch and 3 inch - every 10 feet with 1/2 inch hanger rods, 4 inch - every 10 feet with 5/8 inch

hanger rods. Support vertical steel pipe every 10 feet. inch hanger rods; 4 inch with 5/8 inch hanger rods; 6 inch with 3/4 inch hanger rods; 8 inch and larger with 7/8 inch hanger or equal by Cash-ACME or Wilkins. rods. Support vertical cast iron pipe every 15 feet.

Miro or Portable Pipe Hangers: 4 inch x 4 inch x 12 inch long closed cell polyethylene blocks with embedded pre-

Supports on Roof: Support piping on roof with pre-engineered roof pipe supports manufactured by B-line, Erico, FNW,

engineered support strut or pre-engineered support struts with factory plastic bases. Two piece straps shall be captivated at the shoulder when attachment nut is tightened and designed for use with strut system. All nuts, brackets and clamps shall have the same finish as the channels. Support pipe with spacing as described above at a minimum 7 inches above the roof. Set supports on 18 inch x 18 inch x 3/16 inch thick roof walkway material compatible with actual roof material. inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Slope storm piping at 1/8 inch per foot. Lay pipe at uniform slope, free from sags, with hub end upstream. Make changes in direction from norizontal to vertical, at fixture branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y and 1/8 bend" fittings, or 45 degree "ells" (1/8 bend fittings), 1/6 bend or 1/16 bend and "Y" fittings. Install pipe with the barrel of the pipe on firm, solid earth for its entire length, and excavate holes for the pipe bells. Lay pipe in a

straight line and install with uniform grade to line with batten boards set not more than 24'-0" apart. Close open ends of

pipe with a stopper when pipe laying is not in progress. Center spigots accurately in bells for uniform caulking. Provide a

smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact locations in such a manner as to maintain proper clearance. Prior to installation of any building drain pipe, verify elevation of connection point of existing sewer, service line or existing tenant connections indicated on the drawings. If the installation will not tie into the indicated invert elevation point while maintaining proper fall, notify Architect so that an alternative may be determined. Above Ground Installation for Soil, Waste, and Storm: Install soil and waste piping to a uniform slope of not less than 1/8 inch per foot for piping 4 inch or larger, and not less than 1/4 inch per foot for piping 3 inch or smaller. Slope storm piping at 1/8 inch per foot. Lay pipe at uniform slope free from sags. Support pipe within 12 inches of each joint. Make changes in direction from horizontal to vertical, at fixture branches and other branch connections with sanitary "tees" or short sweep "ells". Make changes in direction from vertical to horizontal or horizontal to horizontal with long radius fittings, long sweeping "ells", combination "Y and 1/8 bend" fittings, or 45 degree "ells" (1/8 bend fittings), 1/6 bend or 1/16 bend and "Y" fittings. Provide a smooth and uniform invert in the system. Drilling or tapping of soil and waste lines, and saddle hubs and bands are not permitted. Locate and install soil and waste lines as indicated on the drawings. Determine exact

Plumbing Vent: Connect plumbing vent pipes to fixture drain pipes as indicated on the drawings or as required by the installation practices adopted and enforced by local codes official, and extend vent pipes full size through the roof line. Grade pipe to a uniform slope so as to drain back by gravity to the drainage piping system. Vents passing through the roof shall be minimum 3 inch size except in tropical climates. Turn flashing down into stacks at least 2 inches, and extend flashing 24 inches in all directions from the pipe at the roof line. Vent lines shall be air and water tight. Indirect And Condensate Drain Outside Building: Indirect and condensate drain pipe installed outside the building above ground shall be ASTM A53 Schedule 40 galvanized steel pipe with galvanized malleable iron fittings. Schedule 40 PVC

Domestic Water: Arrange cold, hot, and hot water recirculation piping to drain at the lowest point in each system. Install at

least one pipe union adjacent to all shutoff valves, at connection points of each piece of equipment, and elsewhere in the

expansion and contraction where required by the installation. Where water piping occurs in exterior walls, hold pipe as

close as possible to the interior face of wall and install insulation batt or other insulation (minimum R-8) between piping

system where required to allow proper maintenance. Provide unions of the ground joint type. Make allowance for

locations in such a manner as to maintain proper clearance.

Natural Gas: Pitch natural gas piping and provide accessible dirt legs at the low points. Take branch pipes off the top or sides of main pipes to prevent accumulation of water in the branches. Install gas piping valves and unions only in accessible locations. Do not install gas pipe below the base slab.

PIPING SANITIZATION

Sanitize the entire domestic water piping system (cold, hot, and hot water return) with a solution containing not less than 50 ppm available chlorine. Keep solution in the system for a minimum of 24 hours, with each valve being operated several times during the period. After completion, flush system with city water until chlorine residual is lowered to incoming city

PIPE AND VALVE MARKERS

Provide manufacturer's standard pre-printed, semi-rigid snap-on or permanent adhesive, pressure-sensitive vinyl pipe markers. Pipe markers shall be color-coded complying with ANSA A13.1.

Install pipe markers on each plumbing piping system and include arrows to show normal direction of flow. Locate pipe markers and color bands wherever piping is exposed to view in occupied spaces, machine rooms, accessible maintenance spaces (shafts, tunnels, plenums) and exterior non-concealed locations.

Provide plastic laminate or brass valve tag on every valve, cock and control device in each plumbing piping system; exclude check valves, valves within factory-fabricated equipment units, plumbing fixture faucets, convenience and lawnwatering hose bibbs, and shut-off valves at plumbing fixtures and similar rough-in connections of end-use fixtures and

PLUMBING SPECIALTIES

WATER HAMMER ARRESTORS AND TRAPS

Provide water hammer arrestors at valves or batteries of fixtures as indicated on the drawings to prevent water hammer. Arrestors shall be Josam, Sioux Chief, Smith, Precision Plumbing Products, Proflo, Wade, Watts, or Zurn, stainless steel bellows type, or O-ring sealed and lubricated acetal piston. Install water hammer arrestors per the Plumbing and Drainage Institute (PDI) WH-201 installation instructions. Installation of arrestors at batteries of fixtures precludes the requirement for individual air chambers at each battery fixture. Submit certification that water hammer arrestors comply with NSF 61 Annex G and/or NSF 372.

Provide water-seal traps on floor drains, fixtures and equipment with drain connections, including traps not furnished in combination with fixtures and equipment. Place trap as close to the fixture or drain as possible. Exposed traps in finished spaces shall be chrome-plated brass.

Provide conventional "P" type trap, water-sealed self-cleaning design. Full "S" traps or trap standards shall be used only where specifically called for on the drawings or elsewhere in this specification. Trap water seals shall not be less than 2 inches, and deep seal traps shall be provided where specified or indicated. Each trap not integral with the fixture or floor drain or installed below the base slab shall be provided with an accessible cleanout of adequate size. Provide trap primers where required by code and where indicated on the drawings.

Cleanouts, floor drains and roof drains shall be by one manufacturer if possible. Acceptable manufacturers are Josam,

MIFAB, Sioux Chief, Smith, Wade, Watts, and Zurn. Provide long sweep fittings for cleanout extensions; short sweeps at

start of runs or change in direction and combination way and eight bend fittings in horizontal runs. Install cleanouts with a

minimum of 18 inches clear all around, consult local codes for other requirements, for easy system maintenance. Install

CLEANOUTS, FLOOR DRAINS AND ROOF DRAINS

VALVES, STRAINERS, HOSE BIBBS, AND UNIONS

70-LF-200, Hammond # UP8501, Milwaukee # UPBA-150.

regulator dome horizontal or vertically upright with factory breather plug.

controls or equal, dielectric type with threaded nylon insert.

water pipe served and seal with caulk.

plug with Teflon joint compound.

finished floor construction.

Floor Drains: As scheduled on the drawings. Floor Cleanouts: As scheduled on the drawings. Install cleanouts at points as noted on the drawings, at the building exit; at a minimum of every 50 feet in horizontal soil and waste lines; and at turns of pipe greater than 45 degrees cleanouts shall be full size of the pipe up to 4 inches, and 4 inch size for pipes larger than 4 inches. Determine the type of floor

covering to be used at each floor cleanout location and provide top with variations suitable for floor covering (carpet markers, recessed for tile and scoriated for unfinished floor). Rough-in and install each floor cleanout flush with the

Wall Cleanouts: As scheduled on the drawings. Install wall cleanouts at points as noted on the drawings; at the foot of each soil, waste or interior downspout stack; at horizontal soil and waste branches longer than five feet not served by a floor cleanout; consult local codes for installation at specific fixture types. Install wall cleanouts above the flood rim of the fixture served within four feet of the floor and install extensions from the cleanout tee to the wall to locate the plug within 2 inch of the wall where required. Install cleanouts on urinals and sinks where required by code.

Roof Drains: As scheduled on the drawings. Provide with roof sump receiver, extension, secondary flashing clamps and underdeck clamp as required; provide expansion joints where required. Provide overflow roof drains where indicated on the drawings with inlet flow line 2 inches above the primary roof drain inlet.

valves on the hot and cold water lines at the water heater connections and other items of equipment, at branches from mains serving groups of fixtures, and at other places indicated or required by the installation to allow ease of tuture maintenance. Submit certification that valves, fittings and specialties comply with NSF 61 Annex G and / or NSF 372. Except for the following: Hose bibbs, hydrants, backflow preventers isolating irrigation or mechanical make-up systems,

Plumbing system valves shall be designed for 125 psi steam working pressure and 200 psi cold water pressure. Install

wedge disc. By Apollo # 102S-LF, Hammond # UP-668, Milwaukee # UP668 or Nibco # S-113-LF Gate Valves 2-1/2 inch and Larger: Class 125, non-rising stem, iron body flanged wedge gate with brass seats and stem by Apollo # 611, Hammond IR # 1138, Milwaukee # F-2882 or Nibco #619.

Ball Valves 2 inch and Smaller (may be used in lieu of gate valves up to 2 inch): Class 150, two piece lead free cast

bronze body, with sweat ends, chrome plated bronze ball with conventional port, 600 psi, blow-out proof stem by Apollo #

Gate Valves 2 inch and Smaller: Class 125, rising stem, soldered lead free cast bronze body and parts, sweat ends, with

Swing Check Valves 2 inch and Smaller: Class 125, lead free cast bronze body and with sweat ends by Apollo # 163S-LF, Milwaukee #UP-1509, or Nibco # S-413-Y-LF. Install in horizontal pipe runs. Lift Check Valves 2 inch and Smaller: Class 125, lead free cast bronze body, stainless steel spring and with sweat ends

by Hammond # LP-947 or Nibco # S-413-Y-LF. Install in vertical pipe or in horizontal runs where required.

Gas Cocks 2 inch and Smaller: Lubricated type with semi-steel body and full area rectangular port with screwed ends by Homestead # 601, Milliken #200M or RM Energy Systems # D125. Point of Use Thermostatic Mixing Valves: Thermostatic mixing valves shall be Powers as scheduled on the drawings by Powers or equal by Acorn Engineering Co., Cash ACME or Leonard meeting ASSE 1070 with lead free brass body, noncorrosive internal parts, tamper resistant temperature adjustment, union inlets and check stops with strainers. Install valve at public lavatories and handwashing sink locations in accessible location. Set temperature as scheduled on the drawings. Gas Line Pressure Regulators: Gas line pressure regulators shall be CSA listed by Karl Dungs, Maxitrol or Pietro-

Fiorentini with capacities as scheduled on the drawings. Regulators shall be single stage, steel jacketed, corrosionresistant type with interstitial relief valve with atmospheric vent, vent limiter for indoor installation, elevation compensator; with threaded ends, for inlet and outlet. Install with regulator dome vertically upright and level with listed vent factory vent limiter. Install gas pressure regulators located outside the building with the relief port facing down to prevent the entry of B-Line #B3100 galvanized steel clevis type. Support exposed copper tube 2 inches and smaller to walls or in chases with rainwater with the relief port a minimum of 18" above the roof or finish grade. Remove vent limiter and provide with line size (same size as gas vent relief port) insect screen or gas relief vent and 1" long schedule 40 black steel nipple. Where

manufacturer does not allow the gas pressure regulator to be installed upside down, install gas pressure regulator with

Insect Screens: Black steel body with 20 mesh stainless steel screen and MNPT end by Northtown Pipe Protection Strainers: Strainers 2 inch and smaller shall be Watts #LFS777SI with lead free cast bronze body and soldered ends, brass cap and Monel 40 mesh screen. Strainers 2-1/2 inch and larger shall be Watts #77F-DI-FDA-125 with flanged iron

body with fused FDA epoxy coating, bolted iron cap and stainless steel screen with 1/16 inch perforations. Strainers size

2-1/2 inch and larger shall have a 1 inch blow-off line with a 1 inch gate valve connected to the blow-off connection and

shall be extended to the nearest floor drain. Drain Valves and Interior Hose Bibbs: As specified on the drawings by Prier or equal by Woodford or Watts. Exposed Interior Hose Bibbs: As specified on the drawings by Chicago or equal by Speakman, T&S Brass or Zurn.

Wall Hydrants: As specified on the drawings by Prier or equal Woodford, Josam, Prier, Wade, Watts or Zurn. Provide

accessible shutoff valve and water hammer arrestor inside building. Sanitary Post Hydrants: As specified on the drawings by Hoeptner or equal by Woodford.

Sanitary Roof Hydrants: As scheduled on the drawings by MAPA with no substitutions accepted. Unions: Ferrous unions shall be Crane or equal, combination iron and brass, ground joint with screwed ends. Copper unions shall be streamline or equal, cast bronze sweat type with ground joint. Ferrous to copper unions shall be universal

Cast Iron Pipe: Every 10 feet and within 1 foot of each joint. 2 inch and smaller with 3/8 inch hanger rods; 3 inch with 1/2

Pressure Reducing Valves: Self contained type shall be of the type as scheduled and indicated on the drawings by Watts

WATER SERVICE ENTRANCE: PRESSURE REDUCING VALVE AND BACKFLOW PREVENTER

Backflow Preventers: Shall be of the type as scheduled and indicated on the drawings by Watts, Conbraco, Febco or

Provide a backflow preventer (BFP) of type required by local code, and a pressure reducing valve (PRV) if required by

water pressure greater than 80 psi, on the domestic water service immediately downstream of the backflow preventer at

the water service entry. Set the pressure reducing valve as indicated on the drawings. Provide a pressure gauge and hose bibb with isolation valve down stream of the backflow preventer and / or PRV for system drain down. For water services 3 inch and larger, provide ductile iron pipe and fittings from five feet outside the building to 12 inches above the floor. Provide a shutoff valve at 12 inches above the floor. Provide a PVC sleeve two pipe sizes larger than the

E. SYSTEM ACCESSORIES

Thermometers shall be American 3 inch bi-metal dial type with separable socket, and shall be installed where indicated or

Pressure gauges shall be Ashcroft 3 inch dial type with shut-off cock, and shall be installed where indicated or required. Provide trap primers where required by local authorities. Trap primers shall be as specified on the drawings, Precision Plumbing Products "Prime Rite" or equal by Mifab or Sioux Chief with brass body and integral vacuum breaker. Provide

distribution box where more than one trap is indicated to be primed on the drawings. Provide access panel where

Frap seals shall be by Proset systems or equal by Mifab, Smith, Sure Seal Systems or Zurn of molded PVC elastomer that allows the flow of waste water and closes upon termination of flow. Install per manufacturer's installation instructions. Do not touch elastomeric plug or allow contact with primer or solvent cement. Or, shall be by Sure Seal, Inc. of smooth, soft, flexible, elastomeric PVC material with a flapper closure. The flow of wastewater allows flapper to open and adequately discharge to floor drain through its interior. The flapper closes and returns to original molded shape after wastewater discharge is complete.

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT

REVISIONS

____ ____ ____ ____ ____ ____ ____ _____

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603 PROJECT TEAM

FINKLE+WILLIAMS

ARCHITECTURE CIVIL

ARCHITECT

LANDSCAPE LAND 3 BSE STRUCTURAL FOUNDATIONS

ENGINEERS

ENGINEERS

HENDERSON

STRUCTURAL BSE STRUCTRAL **ENGINEERS** PLUMBING HENDERSON

ENGINEERS ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON

CONTRACTOR GC

MECHANICAL

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001

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MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

SHEET TITLE

PLUMBING

A. PLUMBING FIXTURES

Furnish and install commercial grade plumbing fixtures, see the drawings for quantities and descriptions. Provide china fixtures as scheduled by American-Standard or approved equal by Gerber, Kohler, PROFLO, Sloan Valve Co, Toto-Kiki or Zurn. Provide stainless steel sinks as scheduled by Elkay or equal by Just. Provide electric water coolers as scheduled by Elkay or approved equal by Acorn / Aqua, Halsey Taylor or Haws. Provide mop sinks as scheduled by Stern-Williams or equal by Acorn Engineering Co., Fiat or Florestone. Provide emergency equipment as scheduled by Bradley or equal by Chicago, Encon, Guardian, Haws or Speakman. Provide fixtures of same manufacturer where possible.

Fixtures shown on the drawings or specified herein shall be furnished and installed, set firm and true, connected to required piping services, thoroughly cleaned, left clean and ready for use. Exposed fittings and piping at the fixtures shall be chrome-plated, and water supply piping shall be valved at each fixture.

Vitreous china fixtures shall be of the best grade vitreous ware, without pit holes or blemishes, and the outlines shall be generally true. The engineer reserves the right to reject any pieces which, in his opinion, are faulty. Fixtures set against walls shall have ground backs and shall be caulked with silicone sealant of a matching color.

Submit certification that faucets and trim comply with NSF 61 Annex G and / or NSF 372. Except for the following: Faucets not used for drinking water or cooking, shower valves and heads or flush valves.

Fixture trim shall have the manufacturer's name stamped clearly and visibly on each item.

Fixture P-traps shall be 17 gauge brass body with cleanout, 17 gauge seamless tubular wall bend with cast brass slip nut, shallow steel flange, all chrome plated by McGuire, Brass Craft, Dearborn Brass, EBC, Proflo, Watts Brass and Tubular

Lavatory and water closet supplies shall be solid brass angle or straight type with full turn brass stem, wheel handle, or loose key types as noted on drawings, shallow steel flange, 3/8 inch copper riser flange, all chrome plated, final connection as required by McGuire, Brass Craft, EBC, Proflo or Zurn.

Provide diaphragm type flush valves as specified on drawings: Sloan or equal by Delaney or Zurn

Provide Smith, Josam, Wade, Watts, or Zurn chair carriers for mounting wall mounted water closets and lavatories as described on the drawings. Securely fasten carriers to floor and test per manufacturer's recommendations prior to installation of partitions. Secure wall-mounted water closet carriers to floor with 3/8 inch anchor bolts, including the anchor foot. Secure lavatory chair carriers to floor with 1/2 inch anchor bolts.

C. WATER HEATER

Water heater shall be by A.O. Smith, Bradford-White, Lochinvar, State, HTP, Rheem or Ruud with capacity as scheduled on the drawings. Unit shall be electric glass-lined tank type complete with steel jacket, fiberglass insulation, magnesium anode, integral thermostats and controls, and temperature & pressure relief valve. Water heater shall be UL listed and meet ASHRAE 90.1B standards for thermal efficiency and standby heat loss.

Temperature and Pressure Relief Valve: lead free brass body meeting ANSI Z21.22, The temperature shall be normally set to relieve at 210 F and the pressure relief shall be equal to the tank pressure rating . Install line size relief valve discharge line to discharge to an approved receptor with air gap.

Vacuum Relief Valve: Lead free brass body meeting ANSI Z21.22 with silicon disc. Valve shall open at 0.5 inches HG vacuum and be rated for 200 psig working pressure and 250 F operating temperature by Apollo #37, Cash ACME #VR801, Watts #N36 or Wilkins #VR-10. Install in cold water supply to each water heater downstream of the shutoff and check valves.

Recirculation Pump: By B&G as scheduled on the drawings, or equal by Armstrong, Grundfos or Taco, of all bronze construction with Aquastat and/or timer.

Expansion Tank: Expansion tank shall be Amtrol "Therm-X-Trol" as scheduled on the drawings or equal by Armstrong, Bell & Gossett, Proflo, Taco, or Watts. Unit shall be constructed of welded carbon steel listed for 150 psig working pressure, with a FDA approved butyl rubber diaphragm, taps for pressure gage, air charging fitting, and drain fitting. Support as detailed on the drawings. Charge tank with air pressure equal to the static water pressure.

D. ELEVATOR SUMP PUMP AND HIGH LEVEL ALARM

Sump pumps shall be Weil Pump Company as scheduled on the drawings or equal by ABS Pump or Flygt simplex, vertical, centrifugal, direct connected, air filled motor, end suction, single stage, cast iron body, stainless steel shaft, cast iron impeller, mechanical seal, permanently lubricated upper and lower ball bearings complete with integral inlet strainer, mechanical float switch, and power cord with ground.

Oil Sensing Sump Pump Alarm Panel shall be remote type 120V NEMA 3R panel, oil and water sensor, power cord, receptacle for pump power cord, 85 bd alarm horn, oil present alarm light, water present alarm light, silence switch, test switch and alarm contacts for each alarm condition by Weil Pump Company or SeeWater, Inc.

COMMISSIONING

Provide commissioning that verifies and documents the commissioned building systems have been designed, installed, and function according to the owner's project requirements, construction documents, and to minimum code requirements. Retain the services of a third-party registered design professional or approved agency that is regularly engaged in conducting commissioning to develop a commissioning plan, supporting documentation, and reports. Refer to the latest adopted edition of the applicable energy code for more information. Complete all related commissioning requirements prior to final inspections. Submit final TAB report and final commissioning report to the Engineer and Owner within 90 days of the date of receipt of the certificate of occupancy.

ASHRAE 90.1 Commissioning Requirements: Test control systems to ensure the control elements are calibrated, adjusted, and in proper working condition. Commission systems according to ASHRAE Guideline 1.1 "HVAC&R" Technical Requirements for the Commissioning Process", most current edition.

IECC Commissioning Requirements: Provide commissioning of all service water heating systems included in the scope

Commissioning plan shall include the following:

- Narrative description of activities and personnel required during commissioning. List of equipment and systems to be tested with description of tests to be performed.
- List of functions to be tested, including calibration and economizer controls. List of conditions under which the tests shall be performed.
- List of measurable criteria for performance.

Submit a copy of the preliminary commissioning report to the AHJ. Preliminary commissioning report shall include the

- Results of preliminary functional performance tests. Organize equipment and components specified by other Divisions in separate sections for independent review.
- 2. List of functional performance testing procedures used during commissioning, including measurable criteria for test acceptance.
- Completed Commissioning Compliance Checklist. Refer to energy code for the form. 4. Itemization of deficiencies found during testing that have not been corrected at the time of preliminary
- commissioning report preparation. 5. List of deferred tests that cannot be performed at the time of preliminary commissioning report

preparation because of climatic conditions. 6. List of climatic conditions required for the performance of the deferred tests.

Final commissioning report shall include the following:

because of climatic conditions.

- Results of final functional performance tests. Organize equipment and components specified by other
- Divisions in separate sections for independent review. List of functional performance testing procedures used during commissioning, including measurable
- criteria for test acceptance. Itemization of resolved deficiencies found during preliminary commissioning. 4. List of deferred tests that cannot be performed at the time of final commissioning report preparation

Conduct functional performance tests on equipment, controls, and economizers. Functional performance tests shall demonstrate the following:

- 1. The operation, function, and maintenance serviceability for each commissioned equipment, component, and system is confirmed according to the approved plans and specifications.
- 2. The sequence of operations, including modes, backup modes (if applicable), alarms, and mode of operation upon a loss of power and restoration of power for each control device, equipment, component, and
- 3. Control devices, components, equipment, and systems are calibrated, adjusted, and operate in
- accordance with the approved plans and specifications. 4. Air economizers operated in accordance with manufacturer's specifications and specified sequence of operation.

END OF SECTION 22

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT REVISIONS ____ ____ ____

REGISTRATION



BRADLEY E. CHAMBON LICENSE # 028603

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT

ARCHITECTURE

CIVIL

LANDSCAPE

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

BSE STRUCTRAL STRUCTURAL **ENGINEERS**

PLUMBING HENDERSON **ENGINEERS**

MECHANICAL HENDERSON **ENGINEERS**

HENDERSON ELECTRICAL

ENGINEERS FIRE PROTECTION HENDERSON

CONTRACTOR GC

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300

LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM

> 1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

PLUMBING SPECIFICATIONS

SHEET TITLE

TRADES PRIOR TO ROUGH-IN. PROVIDE LINE VOLTAGE WIRING AND MAKE FINAL CONNECTIONS TO ALL DUCT-MOUNTED SMOKE DETECTORS, FIRE/SMOKE AND SMOKE DAMPERS WHERE APPLICABLE, COORDINATE

REQUIREMENTS WITH OTHER TRADES PRIOR TO INSTALLATION.

DEVICES MOUNTED ON ACOUSTICAL TILE CEILINGS SHALL BE CENTERED ON THE TILE, UNO. PROVIDE BOX AND 3/4" CONDUIT FROM EACH THERMOSTAT

LOCATION TO MECHANICAL EQUIPMENT, (FLUSH MOUNT BOX WHEREVER PRACTICABLE). COORDINATE LOCATION OF ALL THERMOSTAT BOXES WITH MECHANICAL/CONTROLS CONTRACTOR AND OWNER PRIOR TO ROUGH-IN. PROVIDE BOXES AND CONDUITS FOR THE FIRE PROTECTION

SYSTEM LOW VOLTAGE WIRING AS REQUIRED. THIS INCLUDES EXPOSED WIRING LESS THAN 96" AFF. AT A MINIMUM, PROVIDE 3/4" CONDUIT, UNLESS NOTED OTHERWISE, COORDINATE REQUIREMENTS AND LOCATIONS WITH SYSTEM INSTALLER AND FIRE ALARM SPECIFICATIONS.

AT A MINIMUM, PROVIDE EXTRA DEEP, DOUBLE GANG COMMUNICATION OUTLET BOXES. (FLUSH MOUNTED WHEREVER PRACTICABLE), WITH SINGLE-GANG PLASTER RING AND 1" CONDUIT STUBBED-UP CONCEALED TO ACCESSIBLE CEILING SPACE, UNLESS NOTED OTHERWISE. PROVIDE SURFACE MOUNTED DATA BOXES WITHIN CABINETRY, AND SELECT OTHER LOCATIONS AS INDICATED ON THE DRAWINGS. COORDINATE TELEPHONE/DATA BOX AND CONDUIT LOCATIONS AND SIZES WITH OWNER AND OTHER TRADES PRIOR TO ROUGH-IN.

PROVIDE NYLON BUSHINGS FOR ALL COMMUNICATIONS AND LOW VOLTAGE WIRING CONDUITS AND SLEEVES, UNLESS NOTED

ALL COMMUNICATIONS AND LOW VOLTAGE WIRING CONDUIT SHALL BE INSTALLED WITH AN ACCESSIBLE PULLBOX BETWEEN EVERY 180 DEGREE CHANGE IN DIRECTION AND AT 100' INTERVALS OF CONTINUOUS RUNS.

MINIMUM BEND RADIUS FOR COMMUNICATIONS CONDUIT IS 6 TIMES THE INSIDE DIAMETER FOR CONDUITS 2" IN DIAMETER AND SMALLER AND 10 TIMES THE INSIDE DIAMETER FOR CONDUITS GREATER THAN 2" IN DIAMETER, UNLESS NOTED OTHERWISE.

LOW VOLTAGE COMMUNICATION, ENERGY MANAGEMENT, SOUND SYSTEM, SECURITY AND RELATED WIRING IS TO BE PERFORMED BY OTHERS UNDER A SEPARATE CONTRACT, UNLESS NOTED OTHERWISE. PROVIDE BOXES AND CONDUIT IN FINISHED AND RATED FLOORS/WALLS/CEILINGS TO ACCESSIBLE LOCATIONS FOR ALL LOW VOLTAGE WIRING. PROVIDE ALL LINE VOLTAGE CIRCUITRY (120V AND HIGHER) TO OWNER FURNISHED EQUIPMENT AND LOW VOLTAGE STEP-DOWN TRANSFORMERS AS REQUIRED. COORDINATE ELECTRICAL REQUIREMENTS AND LOCATIONS WITH SYSTEM INSTALLER AND OWNER.

1. ALL LOW VOLTAGE CLASS 2 OR 3 WIRING NOT IN CONDUIT SHALL BE PLENUM RATED WHERE APPLICABLE.

12. LOW VOLTAGE CABLE SHEATH LABELS AND RELATED MANUFACTURER INFO SHALL REMAIN APPARENT IN ALL EXPOSED APPLICATIONS. PROTECT ALL EXPOSED CABLING FROM PAINTING AND OVERSPRAY (INCLUDES CABLE NOT ROUTED IN CONDUIT AND THAT IS IN CABLE TRAY)

13. CABLES SHALL BE ROUTED THROUGH THE BUILDING CABLE TRAY/RACEWAY SYSTEM. UNLESS NOTED OTHERWISE. EXPOSED CABLING SHALL NOT BE ROUTED IN AREAS EXPOSED TO STRUCTURE UNLESS SPECIFICALLY PERMITTED BY THE OWNER. IN AREAS WHERE EXPOSED CABLES ARE ALLOWED, IT SHALL BE INSTALLED IN A NEAT AND WORKMAN LIKE MANNER IN ACCORDANCE WITH THE OWNER'S REQUIREMENTS. WHERE REQUIRED, PROVIDE CONDUIT TO ROUTE LOW VOLTAGE CABLING TO THE CABLE TRAY OR NEAREST ACCESSIBLE CEILING

14. CONDUITS FOR COMMUNICATIONS OUTLETS SERVING ELEVATOR EQUIPMENT ROOMS, FACP, AND SIMILAR CRITICAL EQUIPMENT AS DESIGNATED BY THE OWNER SHALL BE CONTINUOUS ("HOMERUN") FROM OUTLET TO SERVING COMMUNICATIONS

ELECTRICAL SUPPLEMENTAL SPECIFICATIONS

1. PRIOR TO SUBMITTING BID. VISIT THE JOB SITE AND BECOME FULL ACQUAINTED WITH THE EXISTING CONDITIONS. AS APPLICABLE, REVIEW THE LANDLORD CRITERIA, GENERAL NOTES, OTHER TRADE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS THAT MAY NOT BE CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS, NOTIFY ARCHITECT AND ENGINEER OF ANY CONFLICTS OR DISCREPANCIES PRIOR TO SUBMITTING BID.

2. ALL WORK SHALL CONFORM TO ALL LOCAL CODES AND ORDINANCES AS WELL AS APPLICABLE INDUSTRY STANDARDS. AL EQUIPMENT SHALL BEAR LABELS FOR THE USE INTENDED BY AN AHJ ACCEPTED NATIONALLY RECOGNIZED TESTING LABORATORY (NRTL), SUCH AS UL OR ETL. THE FINAL ELECTRICAL INSTALLATION OF THE FACILITY OCCUPIED BY OWNER SHALL BE FREE FROM ELECTRICAL DEFECTS TO THE SATISFACTION OF THE AHJ, OWNER, ARCHITECT AND ENGINEER.

COORDINATE FINAL LOCATION AND INSTALLATION REQUIREMENTS OF ALL LIGHT FIXTURES, ELECTRICAL EQUIPMENT AND ELECTRICAL DEVICES WITH ARCHITECTURAL DRAWINGS, EXISTING CONDITIONS AND OTHER TRADES PRIOR TO ROUGH-IN. PROVIDE ALL NECESSARY DEVICES, CORDS, PLUGS, DISCONNECTS AND FINAL CONNECTIONS TO ELECTRICAL EQUIPMENT FOR PROPER OPERATION IN ACCORDANCE WITH CODE, OWNER AND MANUFACTURER REQUIREMENTS.

4. ELECTRICAL DRAWINGS ARE DIAGRAMMATIC/SCHEMATIC IN NATURE AND REPRESENT THE GENERAL SCOPE OF WORK. IT IS NOT WITHIN THE SCOPE OF THE ELECTRICAL DRAWINGS TO SHOW ALL NECESSARY RACEWAY ROUTING, BENDS, OFFSETS, PULL BOXES AND OBSTRUCTIONS. CONTRACTOR SHALL COORDINATE THE FINAL LOCATION OF EQUIPMENT AND WIRING DEVICES WITH OTHER TRADES PRIOR TO INSTALLATION AND INSTALL ALL WORK TO CONFORM TO THE OWNER REQUIREMENTS.

ALL CONDUCTOR AND CONDUIT LENGTHS SHOWN IN THESE DESIGN DOCUMENTS ARE INTENDED SOLELY FOR USE IN THE DESIGN CALCULATIONS BY THE DESIGN PROFESSIONAL, UNLESS NOTED OTHERWISE. LENGTHS SHOWN SHALL NOT BE USED TO ASSIST IN THE BIDDING TAKEOFF PROCESS. THE CONTRACTOR IS SOLELY RESPONSIBLE FOR THE MATERIAL QUANTITIES REQUIRED TO BID AND CONSTRUCT THE COMPLETE PROJECT.

6. PROVIDE PROPER FIRE PROOFING AND SEALANT FOR PENETRATIONS THROUGH FIRE RATED ASSEMBLIES. THE FIRE STOPPING METHOD, MATERIAL AND ITS APPLICATION SHALL BE NRTL LISTED, CODE COMPLIANT AND APPROVED BY AHJ.

FOR CAST-IN-PLACE CONCRETE, TILT-UP WALLS, PRECAST OR SIMILAR PRE-ENGINEERED WALL SYSTEMS: COORDINATE THE FINAL LOCATION OF ALL ELECTRICAL DEVICES, RACEWAYS, LIGHT FIXTURES AND PENETRATIONS WITH ARCHITECT, WALL SUPPLIER AND OTHER TRADES PRIOR TO WALL CONSTRUCTION. CONDUIT/RACEWAY IMBEDDED IN CONCRETE WALLS SHALL BE SCHEDULE 80 PVC OR LFMC; OTHER TYPES MAY BE ALLOWED IF APPROVED BY WALL SYSTEM MANUFACTURER AND ENGINEER.

B. WHEN CONCRETE TRENCHING/CORING IS REQUIRED, THE METHODS, DEPTHS, AND LOCATIONS SHALL BE PRE-APPROVED BY LANDLORD, ARCHITECT, AND STRUCTURAL ENGINEER PRIOR TO THE START OF WORK, X-RAY SLAB AS NECESSARY TO AVOID DAMAGING ANY UNDER-SLAB UTILITIES OR STRUCTURE. SLAB REPLACEMENT SHALL BE INSTALLED WITH DOWELLING AND REINFORCED CONCRETE AS DIRECTED BY THE STRUCTURAL ENGINEER. WHERE SLAB ON GRADE IS SAW-CUT AND REMOVED FOR TRENCHING THE CONTRACTOR SHALL INSTALL MOISTURE BARRIER PER LANDLORD'S REQUIREMENTS. PROVIDE 3/4" MINIMUM CONDUITS ROUTED THROUGH SLAB AND STUBBED UP INTO DEVICES. FOR SLAB ON DECK, THE FLOOR SHALL BE SLEEVED AND EQUIPPED WITH THE APPROPRIATE LISTED ASSEMBLY. PROVIDE 3/4" MINIMUM CONDUITS ROUTED BELOW SLAB. TIGHT TO STRUCTURE, AND STUBBED UP INTO DEVICES.

9. ALL APPLICABLE SWITCHES, RECEPTACLES, OUTLETS, AND CONTROLS SHALL BE PLACED AT HEIGHTS THAT ARE IN ACCORDANCE WITH ADA ACCESSIBILITY GUIDELINES.

SOUND TRANSMISSION BETWEEN ROOMS, UNO.

10. COORDINATE FLOOR MOUNTED BOX, RECEPTACLE, AND COVER PLATE TYPES WITH ARCHITECT AND OWNER PRIOR TO ORDER.

UNDER A SINGLE COVER PLATE, UNO. 12. WIRING DEVICES SHOWN BACK-TO-BACK ON A COMMON WALL SHALL BE OFFSET A MINIMUM OF 12" HORIZONTALLY TO REDUCE

11. WIRING DEVICES ADJACENT TO EACH OTHER SHALL BE INSTALLED

13. ALL WP OUTLET BOX HOODS SHALL BE "EXTRA-DUTY" AND "WHILE-IN-USE COVER" TYPE. OUTLET BOX HOODS SHALL BE LOW PROFILE WHEREVER PRACTICABLE, UNLESS NOTED OTHERWISE. THE USE OF LARGE BUBBLE COVERS SHALL BE AVOIDED ON THE EXTERIOR OF THE BUILDING OR BEHIND EQUIPMENT IN ORDER TO PREVENT DAMAGE TO THE COVER AND TO ALLOW THE EQUIPMENT TO BE LOCATED CLOSE TO THE WALL.

14. ALL 120V RECEPTACLES 50A OR LESS, 208V AND 240V RECEPTACLES 100A OR LESS. SHALL BE GFCI PROTECTED IN LOCATIONS REQUIRED BY CODE; THIS INCLUDES BATHROOMS KITCHENS/FOOD PREP AREAS, EXTERIOR LOCATIONS AND RECEPTACLES WITHIN 6 FEET OF A SINK. GFCI RECEPTACLES SHALL BE READILY ACCESSIBLE AND SHALL NOT BE LOCATED BEHIND STATIONARY EQUIPMENT. GFCI PROTECTION MAY BE VIA A GFCI CIRCUIT BREAKER OR GFCI RECEPTACLE, UNLESS NOTED OTHERWISE. WHERE NECESSARY, GFCI PROTECTION MAY BE ACHIEVED VIA A BLANK FACE GFCI DEVICE LOCATED IN A READILY ACCESSIBLE LOCATION NEAR RECEPTACLE BEING PROTECTED. FOR DOWNSTREAM WIRING DEVICES LOCATED ON THE SAME BRANCH CIRCUIT, THE GFCI PROTECTION MAY BE PROVIDED FOR BY A SINGLE UPSTREAM DEVICE IF ALL PROTECTED DEVICES ARE LABELED PER CODE.

15. FLEXIBLE CONDUIT IS ONLY PERMITTED WHERE SPECIFICALLY ALLOWED IN THE CONSTRUCTION DOCUMENTS, WHERE CONCEALED FROM VIEW OR EXPOSED FINAL CONNECTIONS TO LIGHT FIXTURES AND EQUIPMENT IN LENGTHS OF 6'-0" OR LESS.

16. ALL EMPTY CONDUIT/RACEWAY SHALL BE INSTALLED WITH PULL STRINGS. TERMINATE CONDUIT STUB-UP WITH A NYLON BUSHING.

17. EXPOSED CONDUIT/RACEWAY SHALL BE PAINTED TO MATCH ADJACENT SURFACE, UNLESS NOTED OTHERWISE. COORDINATE REQUIREMENTS WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.

18. CONDUITS/RACEWAYS SHALL BE CONCEALED FROM VIEW WHEREVER PRACTICABLE, UNLESS NOTED OTHERWISE. ROUTE CONDUITS SERVING ROOFTOP EQUIPMENT CONCEALED INSIDE EQUIPMENT CURB AND MINIMIZE ROOF PENETRATIONS AND EXTERIOR CONDUIT RUNS WHERE PRACTICABLE. SUPPORT RACEWAY FROM STRUCTURE, NOT ROOF DECK. MAINTAIN 2" MIN SPACING FROM BOTTOM OF ROOF DECK TO PREVENT ROOFING SCREWS FROM PENETRATING RACEWAY. DO NOT ROUTE CONDUITS ACROSS SKYLIGHTS, ACCESS PANELS, HATCHED TILES HVAC DIFFUSERS, OR EQUIPMENT WORKING CLEARANCE SPACE. ROUTE ALL EXPOSED NON-FLEXIBLE CONDUITS TIGHT TO STRUCTURE, PARALLEL TO BUILDING LINES AND IN STRUT OR CABLE/PIPE TRAY WHERE PRACTICABLE. INSTALL CONDUITS PLUMB/ LEVEL WHERE EXPOSED TO VIEW. COORDINATE RACEWAY ROUTING AND INSTALLATION WITH OTHER TRADES PRIOR TO

19. WHERE PRACTICABLE, ALL UNDER-FLOOR/UNDER-GROUND CONDUITS/RACEWAY SHALL BE INSTALLED A MINIMUM OF 24" BELOW BOTTOM OF SLAB/PAVING/GRADE, UNLESS NOTED OTHERWISE. NOTE: THE DESIGN INTENT FOR INSTALLING ELECTRICAL CIRCUITRY AT THIS DEPTH IS TO PROTECT THE ELECTRICAL CIRCUITRY FROM DAMAGE DUE TO FUTURE WORK.

20. PROVIDE LABEL AT EACH RECEPTACLE COVER PLATE WITH THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.

21. MULTIWIRE BRANCH CIRCUITS ARE NOT ALLOWED, UNLESS NOTED

22. PROVIDE INSULATED EQUIPMENT GROUNDING CONDUCTOR FOR ALL CIRCUITS, UNLESS NOTED OTHERWISE.

ABOVE FINISHED FLOOR

AMPERE INTERRUPTING

AMPERE SWTICH SIZE

AMPERE TRIP SETTING

AUTOMATIC TRANSFER

BUILDING AUTOMATION

ABOVE FINISHED GRADE

AUTHORITY HAVING

AIR HANDLING UNIT

JURISDICTION

CAPACITY

AUDIO VISUAL

SYSTEM

BREAKER

CONDUIT

D/DEMO DEMOLITION

DOUBLE-POLE

DOUBLE-POLE.

E/ETR/EX EXISTING TO REMAIN

FXHAUST FAN

ENERGY MANAGMENT

FAULT CURRENT AMPS

GENERAL CONTRACTOR

GROUNDING ELECTRODE

GROUNDING ELECTRODE

SHORT CIRCUIT CURRENT

MINIMUM CIRCUIT AMPACITY WR

THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED IN

COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF ITEMS AS

EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW WORK

THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO THE

VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS NOT

WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR

AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE FUTURE

INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING

RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION

LINETYPES MAY BE USED ON ANY DEVICE, EQUIPMENT, NOTE, LINE, SHAPE,

FUTURE

DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD

ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING

LOCKED ROTOR AMPS

GROUND FAULT RELAY

ISOLATED GROUND

EMERGENCY

FAN COIL UNIT

CONDUCTOR

SYSTEM

GROUND

LINEAR FEET

MAKE-UP AIR UNIT

MCB MAIN CIRCUIT BREAKER

JB/J-BOX JUNCTION BOX

LTG/LTS LIGHTING/LIGHTS

MAXIMUM

LINETYPE LEGEND

DEMOLISH — — — —

EXISTING

FINISHED FLOOR

FULL LOAD AMPS

DOUBLE-THROW

CATV

FAAP

GES

CATEGORY

APPLICABLE CODE

CURRENT TRANSFORMER

ELECTRICAL CONTRACTOR

ELECTRICAL SYMBOLS THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED STANDARD MOUNTING HEIGHTS ANNOTATION AUDIBLE APPLIANCES (CENTERLINE) MECHANICAL OR FIRE PROTECTION PLAN NOTE CALLOUT ALARMS ANNUNCIATOR PANELS (DISPLAY) CONTROLS (TOP OF DEVICE) PLUMBING PLAN NOTE CALLOUTE EXIT SIGNS (WALL MOUNTED) FIRE ALARM ANNUNCIATOR PANEL (DISPLAY) FIRE ALARM BELL (EXTERIOR) (CENTERLINE) ELECTRICAL OR FIRE ALARM PLAN NOTE CALLOUT FIRE ALARM CONTROL PANEL/UNIT (DISPLAY) INTERCOM (AFEA ONLY) INTERCOMS (TOP OF DEVICE) TECHNOLOGY PLAN CALLOUT PULL STATIONS (TOP OF DEVICE) PHOTOCELLS RECEPTACLES PLUMBING EQUIPMENT DESIGNATION. (CONTRACTOR RECEPTACLES (EXTERIOR) FURNISHED AND INSTALLED). REFER TO PLUMBING FIXTURE RECEPTACLES (GARAGES) OR EQUIPMENT SCHEDULES RECEPTACLES (POOLS) RECEPTACLES (ABOVE COUNTER) +6" ABOVE BACKSPLASH/COUNTER, 40" MAX RECEPTACLES IN EQUIPMENT ROOMS EQUIPMENT DESIGNATION (OWNER FURNISHED, REMOTE INDICATING LIGHT (EQUIPMENT ROOMS) CONTRACTOR INSTALLED) REMOTE INDICATING LIGHT (FINISHED AREAS) CEILING SAFETY SWITCHES (TOP OF DEVICE) STARTERS (TOP OF DEVICE) MECHANICAL EQUIPMENT DESIGNATION (CONTRACTOR SWITCHES (TOP OF DEVICE) FURNISHED AND INSTALLED UNLESS NOTED OTHERWISE) ELEPHONE, DATA OUTLETS SAME AS ADJACENT DEVICE, UNO TELEPHONE TERMINAL BOARD (BOTTOM) REFER TO ARCH DRAWINGS TELEVISION OUTLETS CONNECTION POINT OF NEW WORK TO EXISTING **VISIBLE APPLIANCES (CENTERLINE)** DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER INSTALL OUTLET BOXES AT THE MOUNTING HEIGHTS SHOWN ABOVE UNO IN THE CONSTRUCTION DOCUMENTS. MOUNTING HEIGHTS LISTED ABOVE. OR ELSEWHERE IN THE CONSTRUCTION DOCUMENTS, ARE AFF OR AFG TO SECTION CUT DESIGNATION BOTTOM OF OUTLET BOX, UNO. ALL DEVICES SHALL BE INSTALLED IN COMPLIANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS. ABBREVIATIONS CIRCUITING & WIRING HOMERUN TO PANELBOARD. INFORMATION AT ARROWS MCC MOTOR CONTROL CENTER AMPERE FUSE SIZE ABOVE FINISHED CEILING MANUFACTURER MFR

MINIMUM

MAIN LUGS ONLY

PROTECTION

NON-FUSED

NOT APPLICABLE

NOT TO SCALE

PARTIAL CIRCUIT

PROVIDE FURNISH AND INSTALL

QUANTITY

RATING

RELOCATE

RECEPTACLE

ROOFTOP UNIT

SQUARE FEET

DOUBLE-THROW

SINGLE-POLE,

SINGLE-POLE,

SHUNT TRIP

SWITCHGEAR

TWISTI OCK

TX/XFMR TRANSFORMER

TMGB TELECOMMUNICATIONS

UNDERFLOOR

UNDERSLAB

UNIT HEATER

UNDERGROUND

VOLTAGE DROP

VACANCY SENSOR

WEATHER PROOF

EXPLOSION PROFF

WATERTIGHT

WEATHER RESISTANT

SINGLE-THROW

RUNNING LOAD AMPS

SMOKE DUCT DETECTOR

SUPPLY-SIDE BONDING

TELECOMMUNICATIONS

TELECOMMUNICATIONS

MAIN GROUND BUS BAR

UNLESS NOTED OTHERWISE

UNITERRUPTIBLE POWER

VARIABLE FREQUENCY

BONDING BACKBONE

TO BE DETERMINED

GROUND BUS BAR

PHASE

MOUNTED

I MLO

MOCP

PART

PH/Ø

RCPT

SCCR

SPDT

SSBJ

I TGB

U/S

I VFD

ELECTRONIC LOW-VOLTAGE | SWBD SWITCHBOARD

CABLE TELEVISION SYSTEM PNL PANEL

ADOPTED BY JURISDICTION R/REL

CUMULATIVE VOLTAGE DROP | RTU

ELECTRIC WATER COOLER | SWGR

FIRE ALARM ANNUNCIATOR TBB

FIRE ALARM CONTROL PANEL TBD

CLOSED CIRCUIT TELEVISION | PNLBD PANELBOARD

, ARE CIRCUIT NUMBERS AND PANELBOARD FOR TERMINATION. REFER TO PANELBOARD SCHEDULES FOR BRANCH CIRCUIT CONDUCTOR SIZES. MAGNETIC LOW-VOLTAGE - INDICATES RELAY NUMBER MAXIMUM OVERCURRENT INDICATES MULTI-VOLTAGE CIRCUIT - "480/277/3" DENOTES PHASE VOLTAGE/NEUTRAL VOLTAGE/PHASE POLES. CONTRACTOR SHALL PULL NEUTRAL WIRE IN ORDER TO DERIVE NEUTRAL VOLTAGE SHOWN. COORDINATE WITH EQUIPMENT NIGHT LIGHT (24HR ON) PROVIDED FOR PROPER CONNECTIONS. NATIONALLY RECOGNIZED TESTING LABORATORY CIRCUIT CONTINUATION OR PARTIAL CIRCUIT (CSA, ETL, NSF, UL) CONDUIT CONCEALED OCCUPANCY SENSOR CONDUIT CONCEALED (EMERGENCY)

LIGHTING

•

ΠЮ

O O

LIGHT FIXTURE

⊥ = WALL MOUNT

> = ARROW INDICATED AIMING DIRECTION

LIGHT FIXTURE CIRCUITED AS A NIGHT LIGHT (NL)

LIGHT FIXTURE WITH DUAL BALLASTS CIRCUITED

EXTERIOR PEDESTRIAN POST TOP LIGHT FIXTURE

AFEA (AREA FOR EVACUATION ASSISTANCE) SIGN -

CEILING/WALL MOUNTED, ARROWS AS INDICATED

PLYWOOD TERMINAL BOARD FOR TELEPHONE

ELECTRICAL DISTRIBUTION PANELBOARD

200/3/150/3R AMPERES/POLE/FUSE/NEMA ENCLOSURE RATING,

MOTOR STARTER "30/3/15/1/3R" DENOTES

30/3/15/1/3R AMPERES/POLE/FUSE/NEMA STARTER SIZE/NEMA

STANDARD NEMA 1 RATING

ENCLOSURE RATING

VARIABLE FREQUENCY DRIVE

EMERGENCY POWER OFF BUTTON

MUSHROOM-TYPE PUSH BUTTON

OVERHEAD PADDLE FAN

3-POLE, UNO

INDICATING LIGHT

SWITCHBOARD OR MOTOR CONTROL CENTER ON

DISCONNECT SWITCH - "200/3/150/3R" DENOTES

BREAKER (30/3/CB/1), NO VALUE (200/3/150/1) FOR

MAGNETIC MOTOR STARTER, NEMA SIZE AS NOTED.

NEMA ENCLOSURE MEANS STANDARD NEMA 1

STOP-START PUSH BUTTON CONTROL STATION

HAND-OFF-AUTO PUSH BUTTON CONTROL STATION

LIGHTING TRACK (# INDICATES RELAY NUMBER)

○ ■ EXTERIOR PARKING LOT LIGHT FIXTURE

EXTERIOR LIT BOLLARD LIGHT

INDICATED, FACE HATCHED

POWER EQUIPMENT & DEVICES

TYPE AS NOTED

PACK - CEILING/WALL MOUNTED

ELECTRICAL PANELBOARD (SURFACE OR FLUSH

SYSTEM, UNO. SIZE AS NOTED

HOUSEKEEPING PAD

TRANSFORMER

MIRROR LIGHTS

CONDUIT IN/UNDER FLOOR/GROUND CONSTRUCTION — - - — EXPOSED CONDUIT POTENTIAL TRANSFORMER EXPOSED CONDUIT (EMERGENCY) FLEXIBLE CONDUIT LOW VOLTAGE CABLE (NOT ROUTED IN CONDUIT) SHORT-CIRCUIT CURRENT

CONDUIT TURNING DOWN CONDUIT TURNING UP CONNECTION POINT OR EQUIPMENT TERMINATION EQUIPMENT TERMINATION

CONDUCTOR TICK MARK LEGEND WHERE TICK MARKS ARE SHOWN, THE FOLLOWING SHALL GOVERN: SWITCHED HOT (PHASE) CONDUCTORS (SHOWN TRAILING NEUTRAL) - NEUTRAL (GROUNDED) CONDUCTOR

- UNSWITCHED HOT (PHASE) CONDUCTORS (SHOWN LEADING NEUTRAL) NOTE: HASH MARKS INDICATE QUANTITY OF CONDUCTORS - EQUIPMENT GROUNDING CONDUCTOR IN CONDUIT (GREEN INSULATION OR BARE)

- ISOLATED GROUNDING CONDUCTOR IN CONDUIT (GREEN INSULATION WITH YELLOW TRACER) BRANCH CIRCUIT CONDUCTOR TABLE WHERE TICK MARKS ARE NOT SHOWN, THE FOLLOWING SHALL GOVERN: # OF POLES | HOT (PHASE)* | (GROUNDED)** | GROUNDING***

(1) UNO (2) (1) UNO 3P (3) (1) UNO PROVIDE ADDITIONAL CONDUCTORS THROUGH ENTIRE CIRCUIT

(SWITCHED, UNSWITCHED/EM, ETC.) AS INDICATED THROUGHOUT CONSTRUCTION DOCUMENTS AND AS REQUIRED FOR A COMPLETE AND WORKING SYSTEM. REFER TO SPECIFICATIONS FOR LIMITATIONS ON SHARING NEUTRAL (GROUNDED) CONDUCTORS. DO NOT CIRCUIT AS A MULTI-WIRE BRANCH CIRCUIT, UNO.

* PROVIDE ADDITIONAL ISOLATED GROUNDING CONDUCTORS WHERE INDICATED. REFER TO SPECIFICATIONS, PLANS, NOTES, WIRING AND CONTROL DIAGRAMS FOR ADDITIONAL CIRCUITING

SIGNALING SIGNALING BELL SIGNALING BUZZEF

LV TRANSFORMER

REQUIREMENTS.

BOXES, LIGHTING CONTROL & WIRING DEVICES SWITCH LETTER DESIGNATIONS AS FOLLOWS: BLANK = SINGLE 2 = TWO POLE a = LOWER CASE LETTER IS SWITCH IDENTIFIER 3 = THREE-WAY 4 = FOUR-WAY A = UPPER CASE LETTER INDICATES LIGHT FIXTURE D = DIMMER F = FAN SPEED CONTROL FH = FRACTIONAL HORSEPOWER MANUAL CONTROLLER IH = INTEGRAL HORSEPOWER MANUAL CONTROLLER K = KEYED LV# = LOW VOLTAGE / DIGITAL M = MANUAL MOTOR STARTER DISCONNECT OS# = OCCUPANCY SENSOR P = SPST PILOT LIGHT EMERGENCY LIGHT FIXTURE WITH EMERGENCY LIGHTING BATTERY PACK OR CONNECTED TO EMERGENCY SOURCE NIGHT LIGHT/EMERGENCY LIGHT FIXTURE WITH EMERGENCY BATTERY PACK OR CONNECTED TO EMERGENCY SOURCE SEPARATELY (SHADING IMPLIES EMERGENCY LIGHT EXIT SIGN - CEILING / WALL MOUNTED, ARROWS AS AMPERAGE) EMERGENCY LIGHTING UNIT EQUIPMENT WITH BATTERY PS# REFER TO LIGHT FIXTURE SCHEDULE FOR MORE INFORMATION TS# TIME SWITCH ELECTRICAL CABINET (SURFACE OR FLUSH MOUNT), ORO EMERGENCY RECEPTACLE* NF= NON-FUSED, CB= CIRCUIT BREAKER (200/3/CB), BACKSPLASH* NO VALUE (200/3/150) FOR NEMA ENCLOSURE MEANS COMBINATION DISCONNECT (SAFETY) SWITCH AND ENCLOSURE RATING. NF= NON-FUSED, CB= CIRCUIT

WP = WEATHER PROOF # = REFER TO LIGHTING CONTROL DEVICE SCHEDULE AUTOMATIC LOAD CONTROL RELAY BRANCH CIRCUIT TRANSFER SWITCH ((#)) # # (# INDICATES TYPE PER SCHEDULE) CEILING / WALL MOUNTED OCCUPANCY SENSOR CORNER 90 DEGREE SENSING ONE-DIRECTION SENSING, CEILING/WALL MOUNT - CEILING MOUNT, TWO DIRECTION SENSING CEILING MOUNT, FOUR DIRECTION SENSING CONTACTOR (SIZE, COIL VOLTAGE AND NUMBER OF POLES AS INDICATED) TRACK-MOUNTED CURRENT LIMITER (## INDICATES DAYLIGHT SENSOR (# INDICATES TYPE PER SCHEDULE) LIGHTING CONTROLS PROCESSOR AND/OR EQUIPMENT ATS# (W/BYPASS) POWER PACK (# INDICATES TYPE PER SCHEDULE) PHOTOELECTRIC SWITCH ROOM CONTROLLER (# INDICATES TYPE PER SCHEDULE) 480Y/277V. 3Ø. 4W SIMPLEX RECEPTICAL - NEMA 5-20R, UNO DUPLEX RECEPTICAL - NEMA 5-20R, UNO DOUBLE DUPLEX RECEPTICAL - NEMA 5-20R, UNO SPECIAL RECEPTICAL - NEMA TYPE AS NOTED TWIST-LOCK TYPE RECEPTICAL BLANK FACE GFCI FEED THROUGH DEVICE **♦**OR**♦** GFCI TYPE RECEPTACLE* ISOLATED GROUND TYPE RECEPTACLE*

RECEPTACLE INSTALLED ABOVE COUNTER OR RECEPTACLE INSTALLED IN CEILING* RECEPTACLE INSTALLED IN FLOOR* RECEPTACLE INSTALLED VIA DROP CORD* RECEPTACLE LETTER DESIGNATIONS AS FOLLOWS: C = AUTOMATICALLY CONTROLLED CH = CLOCK HANGER TYPE G=RCPT PROTECTED BY GFCI CIRCUIT BREAKER OR UPSTREAM GFCI DEVICE H = HORIZONTALLY MOUNTED S = MANUALLY CONTROLLED SP / TVSS = SURGE PROTECTION TR = TAMPER RESISTANT TV = TELEVISION USB = USB/DUPLEX WP = WEATHER PROOF COVER WR = WEATHER RESISTANT MULTI-OUTLET ASSEMBLY ▼▼ TELEPHONE OUTLET

☑ ▽ ▼ DATA OUTLET MULTI-SERVICE OUTLET; TELEPHONE AND DATA - ABOVE COUNTER, TYP - WALL. TYP FLOOR, TYP MULTI-SERVICE POWER POLE WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS

MULTI-SERVICE FLOOR BOX WITH TELEPHONE, DATA AND POWER OUTLETS A = TYPE, REFER TO PLANS, SCHEDULES AND SPECIFICATIONS POKE THROUGH, A = TYPE, REFER TO PLANS, SCHEDULES

AND SPECIFICATIONS THERMOSTAT ☐ ☐ CEILING/FLOOR MOUNT JUNCTION/OUTLET BOX

REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR MORE

INFORMATION.

SYMBOL DEMONSTRATED WITH DUPLEX RECEPTACLE, WHEN USED IN COMBINATION WITH OTHER DEVICES MEANING IS SIMILAR FOR THOSE

SWITCH (RATING AS INDICATED) DRAWOUT CIRCUIT BREAKER (RATINGS AS INDICATED) ###AF FRS FUSED SWITCH (RATING, POLES AND FUSE TYPE AS INDICATED) FRS NEMA # COMBINATION FUSED SWITCH/STARTER AND STARTER SIZE FRS NEMA # CIRCUIT BREAKER (RATINGS AS INDICATED) COMBINATION CIRCUIT BREAKER/STARTER AND STARTER PANELBOARD, SINGLE OR MULTI-SECTION (REFER TO SCHEDULES)

ELECTRICAL ONE-LINE & RISER DIAGRAM

ISOLATED POWER PANELBOARD W/ INTEGRAL TRANSFORMER (REFER TO SCHEDULES) TRANSFORMER (TYPE AND RATINGS AS INDICATED) SHIELDED TRANSFORMER (TYPE AND RATINGS AS INDICATED) AUTOMATIC TRANSFER SWITCH (RATINGS AS INDICATED)

ATS# (W/BYPASS AUTOMATIC TRANSFER SWITCH WITH BYPASS (RATINGS AS INDICATED) ##KW GENERATOR

- NON-SEPARATELY DERIVED SOURCE - SEPARATELY DERIVED SOURCE MDP SWITCHBOARD ELEC ROOM ### AMPS 480Y/277V 3Ø 4W SWITCHGEAR, SWITCHBOARD AND/OR DISTRIBUTION PANELBOARD (TYPE, RATING, DEVICES AND

ACCESSORIES AS INDICATED) COMBINATION DIGITAL VOLT METER/AMMETER CIRCUIT IDENTIFICATION (REFER TO CIRCUIT SCHEDULE) GFR **GROUND FAULT RELAY** PHASE FAILURE RELAY

KIRK-KEY INTERLOCK (# INDICATES KEY PAIR) SHUNT TRIP AMMETER (RANGE AS SPECIFIED OR REQUIRED)

VOLTMETER (RANGE AS SPECIFIED OR REQUIRED) UTILITY METER (AS REQUIRED BY UTILITY) AMMETER SWITCH **VOLTMETER SWITCH** WATT-HOUR METER, "D" DENOTES DEMAND REGISTER, "15"

DENOTES MINUTES OF DEMAND INTERVAL CURRENT TRANSFORMER RATING AS SPECIFIED OR POTENTIAL TRANSFORMER RATING AS SPECIFIED OR

SURGE-PROTECTIVE DEVICE GROUND CONNECTION

GROUND CONNECTION WITH TEST WELL GROUND ROD LIGHTNING ARRESTER

CAPACITOR HEATER MOTOR

BLOCK LOAD KW OR KVA FAULT POINT REFERENCED IN SHORT CIRCUIT CURRENT AND VOLTAGE DROP SPREADSHEET

APPLICABLE ELECTRICAL CODES: NOTE: PROJECT IS DESIGNED IN COMPLIANCE WITH THE FOLLOWING CODES. THIS IS NOT AN EXHAUSTIVE LIST. PROJECT SHALL COMPLY WITH ALL APPLICABLE CODES, STANDARDS AND LOCAL REQUIREMENTS. REFER TO THE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.

ELECTRICAL CODE: 2017 NATIONAL ELECTRICAL CODE, (NFPA 70) BUILDING CODE: 2018 INTERNATIONAL BUILDING CODE ENERGY CODE: 2018 INTERNATIONAL ENERGY CONSERVATION CODE

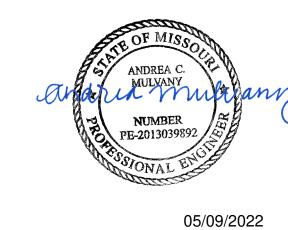
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PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO Project No.: 19050.01a 05.06.22 Issued For: PERMIT **REVISIONS**

REGISTRATION



ANDREA C. MULVANY LICENSE # PE-2013039892 PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL

LANDSCAPE LAND 3

FOUNDATIONS

STRUCTURAL BSE STRUCTRAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS**

BSE STRUCTURAL

ENGINEERS

HENDERSON MECHANICAL **ENGINEERS** ELECTRICAL HENDERSON **ENGINEERS**

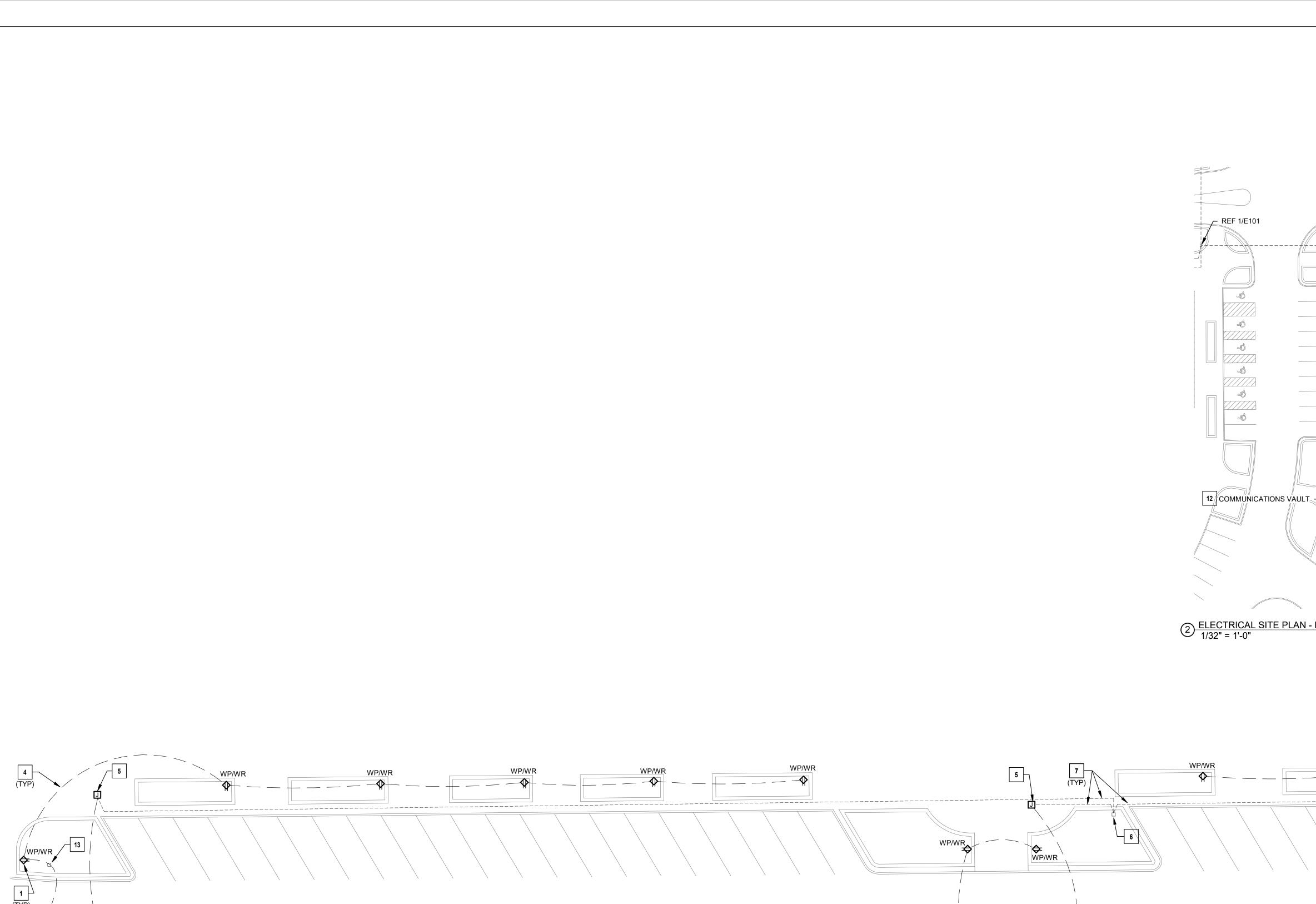
FIRE PROTECTION HENDERSON CONTRACTOR GC

> HENDERSON **ENGINEERS** 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 **TEL** 816.663.8700 **FAX** 816.663.8701 WWW.HENDERSONENGINEERS.COM

> > MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE **ELECTRICAL LEGENDS AND GENERAL NOTES**

E000



ELECTRICAL PLAN NOTES:

- 1 PROVIDE WEATHERPROOF, WEATHER-RESISTENT RECEPTACLE IN PLANTER. COORDINATE EXACT MOUNTING
- IN PLANTER WITH CIVIL PRIOR TO INSTALLATION.

 2 PROVIDE #8 AWG IN 1" PVC CONDUIT FOR HOME RUN TO PANELBOARD AS INDICATED. ROUTE CONDUIT VIA 12"X12" QUAZITE BOX AS INDICATED.
- ROUTE CIRCUIT VIA LIGHTING CONTROL PANEL IN ELECTRICAL ROOM. REFER TO LIGHTING CONTROL PANEL SCHEDULE ON SHEET E502 FOR ADDITIONAL INFORMATION.
 PROVIDE #10 AWG IN 1" PVC CONDUIT FOR BRANCH WIRING
- BETWEEN PLANTERS.

 5 PROVIDE POWER AND DATA STUB-UPS FOR DIGITAL SIDEWALK DISPLAY. COORDINATE FINAL TERMINATION WITH
- DISPLAY.

 6 PROVIDE 12"X12" QUAZITE (OR EQUIVALENT) BOX IN PLANTER FOR LOW VOLTAGE DISTRIBUTION. COORDINATE
- FLANTER FOR LOW VOLTAGE DISTRIBUTION. COORDINATE
 FINAL LOCATION WITH CIVIL PRIOR TO ROUGH-IN.

 7 PROVIDE 2" PVC CONDUIT (WITH PULL STRING) FOR DIGITAL
 SIDEWALK DISPLAY. COORDINATE EXACT LOCATION WITH
- CIVIL DRAWING PRIOR TO INSTALLATION.

 8 PROVIDE 3" PVC CONDUIT (WITH PULL STRING) TO 30"X48"
 PULL BOX. REFER TO CIVIL DRAWINGS FOR EXACT
- PULL BOX. REFER TO CIVIL DRAWINGS FOR EXACT LOCATION.

 9 PROVIDE 3" PVC CONDUIT (WITH PULL STRING) FOR

LOW-VOLTAGE DISTRIBUTION. REFER TO CIVIL DRAWINGS

- FOR EXACT LOCATION.

 10 PROVIDE 30"X48" QUAZITE PG3048 SERIES (OR APPROVED EQUIVALENT) PRE-FORMED PLYMER CONCRETE HAND HOLE. PROVIDE OPEN BOTTOM WITH PEA GRAVEL. PROVIDE ANSI TIER RATING FOR TRAFFIC REQUIREMENTS AT LOCATION. REFER TO CIVIL DRAWINGS FOR EXACT LOCATION.
- (3) 5" HDPE CONDUITS, TWO OF THE CONDUITS SHALL HAVE(4) 2" FABRIC INNERDUCT. REFER TO CIVIL DRAWINGS FOR EXACT LOCATION.
- COMMUNICATIONS VAULT NEAR 'HUB' BUILDING. REFER TO CIVIL DRAWINGS FOR EXACT LOCATION.
 PROVIDE 12"X12" QUAZITE (OR EQUIVALENT) BOX IN PLANTER. COORDINATE FINAL LOCATION WITH CIVIL PRIOR TO ROUGH-IN.

ELECTRICAL SITE GENERAL NOTES:

- 1. REFER TO CIVIL DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION. COORDINATE THE FINAL LOCATION OF ALL SITE LIGHTING POLES, SIGNAGE, UNDERGROUND UTILITIES, CONDUITS, CIRCUITRY, TRANSFORMERS AND OTHER EQUIPMENT WITH CIVIL DRAWINGS, LANDSCAPING DRAWINGS AND OWNER PRIOR TO INSTALLATION.
- 2. COORDINATE ALL SITE ELECTRICAL REQUIREMENTS WITH EQUIPMENT MANUFACTURER INFORMATION AND OTHER TRADES AND ADJUST ELECTRICAL PROVISIONS AS REQUIRED TO MEET REQUIREMENTS.
- 3. SITE ELECTRICAL CONDUITS SHALL BE 1" MINIMUM, UNLESS NOTED OTHERWISE. WHERE PRACTICABLE, ALL SITE ELECTRICAL CONDUITS SHALL BE INSTALLED A MINIMUM OF 24" BELOW GRADE, UNLESS NOTED OTHERWISE. COORDINATE FINAL CONDUIT ROUTING WITH EXISTING OBSTRUCTIONS AND OTHER TRADES AND ADJUST AS NECESSARY.
- 4. CAP AND MARK ALL UNDERGROUND CONDUITS PROVIDED FOR FUTURE USE AND INCLUDE PULL STRINGS. PROVIDE DIMENSIONED LOCATIONS OF TERMINATION POINTS ON ASBUILT DRAWINGS AND SUBMIT TO OWNER.
- 5. MINIMUM WIRE SIZE FOR SITE ELECTRICAL CIRCUITS SHALL BE #10 AWG CU, UNLESS NOTED OTHERWISE. ALL SITE ELECTRICAL BRANCH CIRCUIT WIRING SHALL BE SIZED SUCH THAT THE MAXIMUM BRANCH CIRCUIT VOLTAGE DROP IS LESS THAN 3 PERCENT.



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

Project No.: 19050.01a

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10/02/20 BID PACKAGE #6

REGISTRATION



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

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STRUCTURAL BSE STRUCTRAL ENGINEERS

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ENGINEERS

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ELECTRICAL HENDERSON

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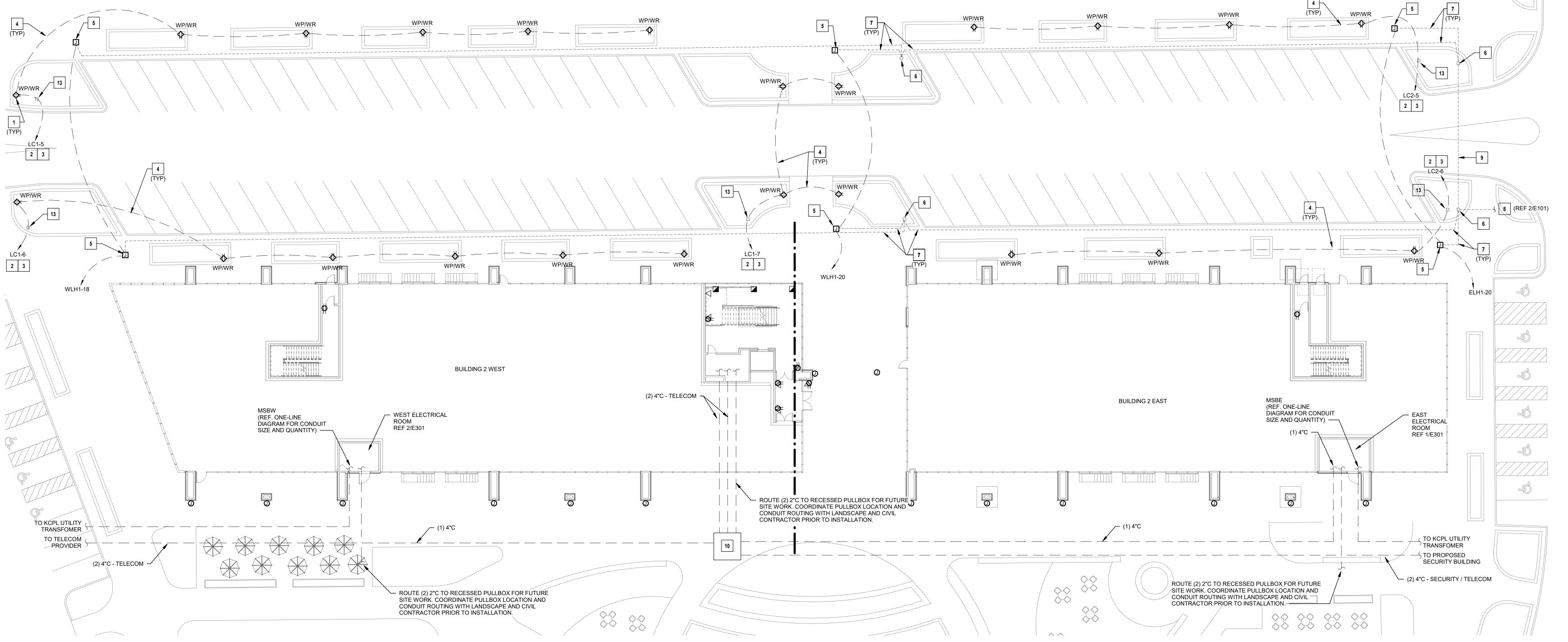
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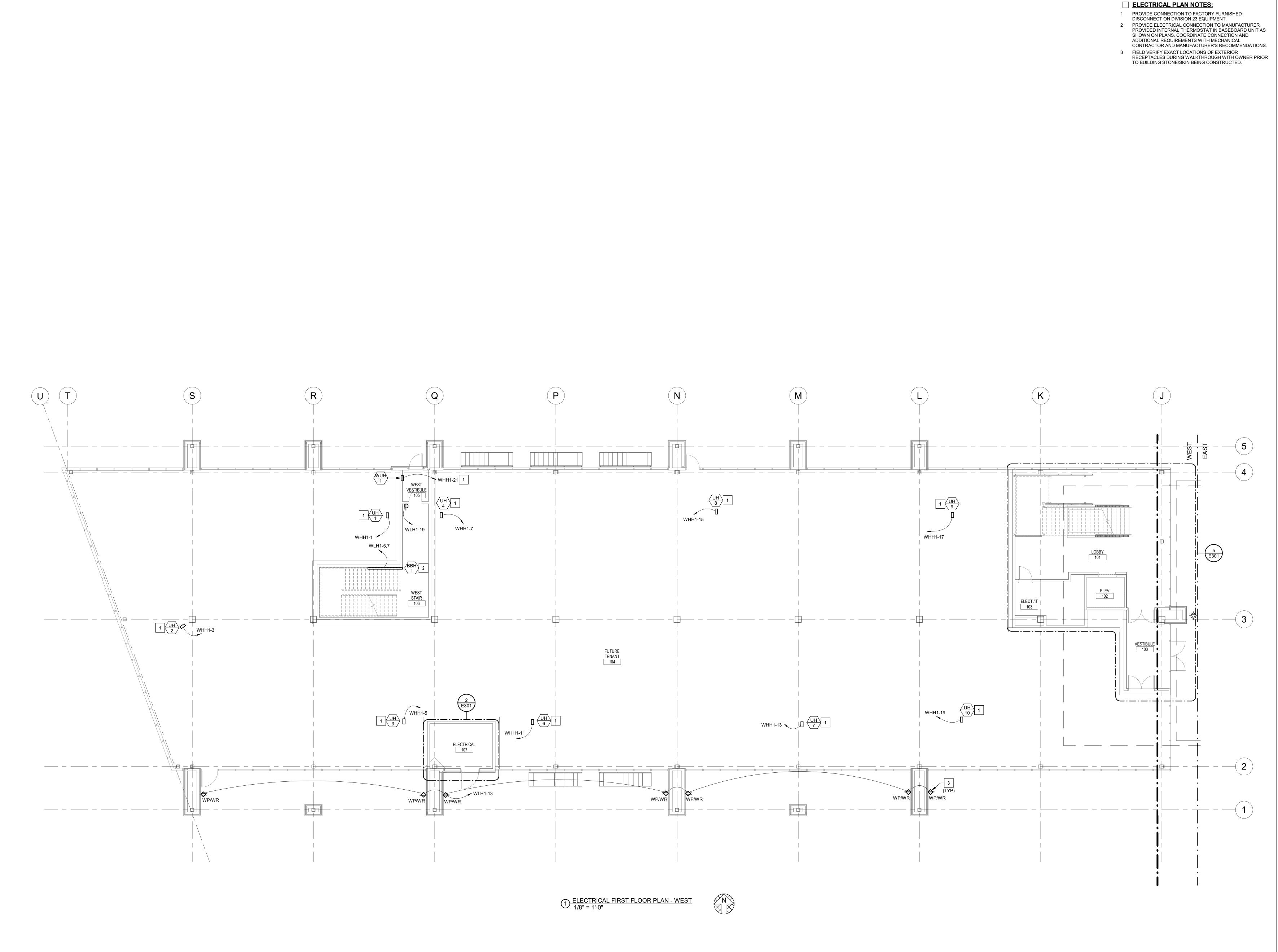
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SHEET TITLE

ELECTRICAL SITE PLAN

E101







FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

 Project No.:
 19050.01a

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05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

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SHEET TITLE

ELECTRICAL FIRST FLOOR PLAN - WEST

SHEET NUMBER

E 101.1

ELECTRICAL PLAN NOTES:

ROUGH-IN.

- PROVIDE CONNECTION TO FACTORY FURNISHED DISCONNECT ON DIVISION 23 EQUIPMENT.
 PROVIDE 120V, 20A CONNECTION TO IRRIGATION CONTROLLER AND (1) 1"C STUBBED TO LANDSCAPING PLANTER ADJACENT TO FIRE RISER ROOM FOR CONTROL WIRING. COORDINATE LOCATION AND MOUNTING WITH IRRIGATION CONTRACTOR AND MANUFACTURER'S REQUIREMENTS PRIOR TO ROUGH-IN.
- 3 PROVIDE 2 WAY NOTIFICATION DEVICE MOUNTED ON WALL NEXT TO FIRE ALARM CONTROL PANEL. COORDINATE MOUNTING AND INSTALLATION WITH GENERAL CONTRACTOR AND FIRE ALARM CONTRACTOR PRIOR TO ROUGH-IN. REFERENCE SPECIFICATIONS FOR MORE INFORMATION.

 4 PROVIDE FLECTRICAL CONNECTION TO MANUFACTURER
- PROVIDE ELECTRICAL CONNECTION TO MANUFACTURER PROVIDED INTERNAL THERMOSTAT IN BASEBOARD UNIT AS SHOWN ON PLANS. COORDINATE CONNECTION AND ADDITIONAL REQUIREMENTS WITH MECHANICAL CONTRACTOR AND MANUFACTURER'S RECOMMENDATIONS.
 FIELD VERIFY EXACT LOCATIONS OF EXTERIOR RECEPTACLES DURING WALKTHROUGH WITH OWNER PRIOR TO BUILDING STONE/SKIN BEING CONSTRUCTED.
 PROVIDE POWER AND DATA CONNECTION AT AN ACCESSIBLE LOCATION IN THE CEILING. COORDINATE

LOCATION OF ACCESS PANEL WITH ARCHITECT PRIOR TO



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

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ARCHITECT FINKLE+WILLIAMS

ARCHITECTURE

IL GBA

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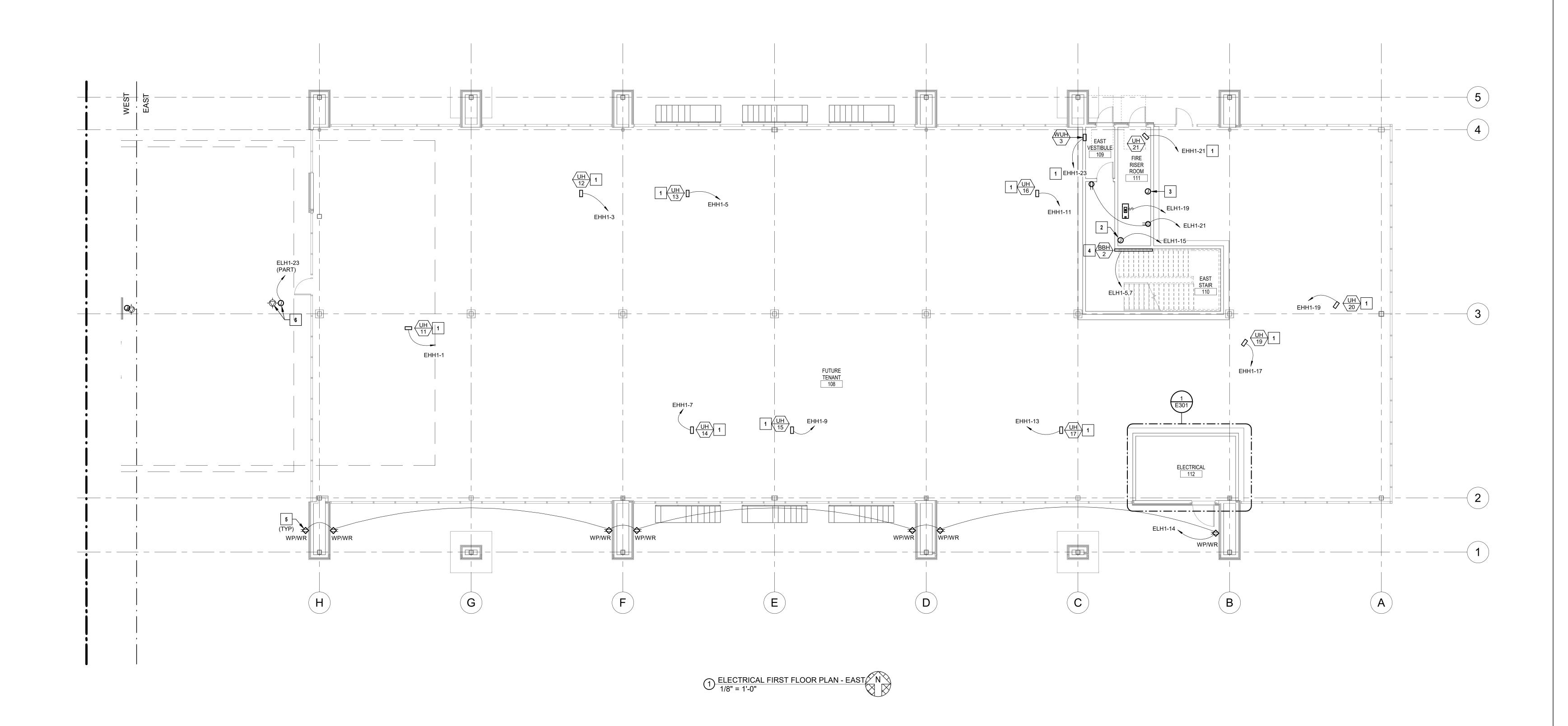
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SHEET TITLE

ELECTRICAL FIRST FLOOR PLAN - EAST

E101.2



ELECTRICAL PLAN NOTES: 1 PROVIDE CONNECTION TO FACTORY FURNISHED DISCONNECT ON DIVISION 23 EQUIPMENT. 2 PROVIDE MAINTENANCE/CONVENIENCE RECEPTACLE FOR MECHANICAL EQUIPMENT. 3 E.C. TO MOUNT MAINTENANCE/CONVENIENCE RECEPTACLE AND/OR E.C. PROVIDED DISCONNECT SWITCHES SO THAT ALL REQUIRED MECHANICAL EQUIPMENT CLEARANCES ARE MAINTAINED. PROVIDE BUS-STRUT MOUNTING AS NECESSARY. COORDINATE LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN. EHH1-7,9,11 (480/277/3) ELECTRICAL/ TELECOM

ANDREA C. MULVANY LICENSE # PE-2013039892 PROJECT TEAM ARCHITECT FINKLE+WILLIAMS ARCHITECTURE LANDSCAPE LAND 3 FOUNDATIONS BSE STRUCTURAL **ENGINEERS** STRUCTURAL BSE STRUCTRAL

PLUMBING

MECHANICAL

ELECTRICAL

PARAGON STAR

BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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Project No.: 19050.01a

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CONTRACTOR GC

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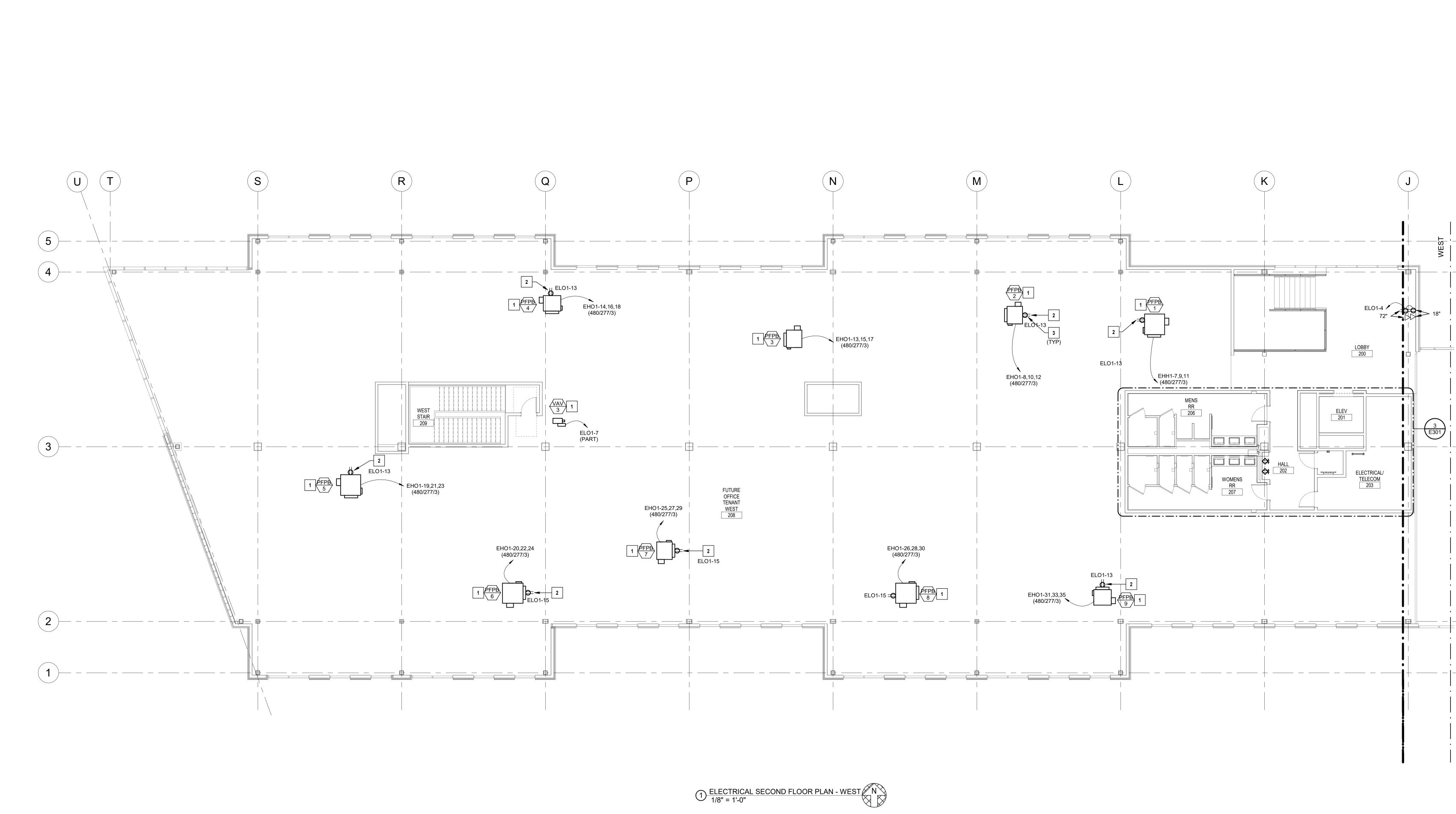
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SHEET TITLE

ELECTRICAL SECOND FLOOR PLAN - WEST

SHEET NUMBER E102.1



ELECTRICAL PLAN NOTES:

1 PROVIDE CONNECTION TO FACTORY FURNISHED DISCONNECT ON DIVISION 23 EQUIPMENT.

2 PROVIDE MAINTENANCE/CONVENIENCE RECERTACLE FOR

2 PROVIDE MAINTENANCE/CONVENIENCE RECEPTACLE FOR MECHANICAL EQUIPMENT.
3 E.C. TO MOUNT MAINTENANCE/CONVENIENCE RECEPTACLE AND/OR E.C. PROVIDED DISCONNECT SWITCHES SO THAT ALL REQUIRED MECHANICAL EQUIPMENT CLEARANCES ARE MAINTAINED. PROVIDE BUS-STRUT MOUNTING AS NECESSARY. COORDINATE LOCATION WITH MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

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05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON

ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON ENGINEERS

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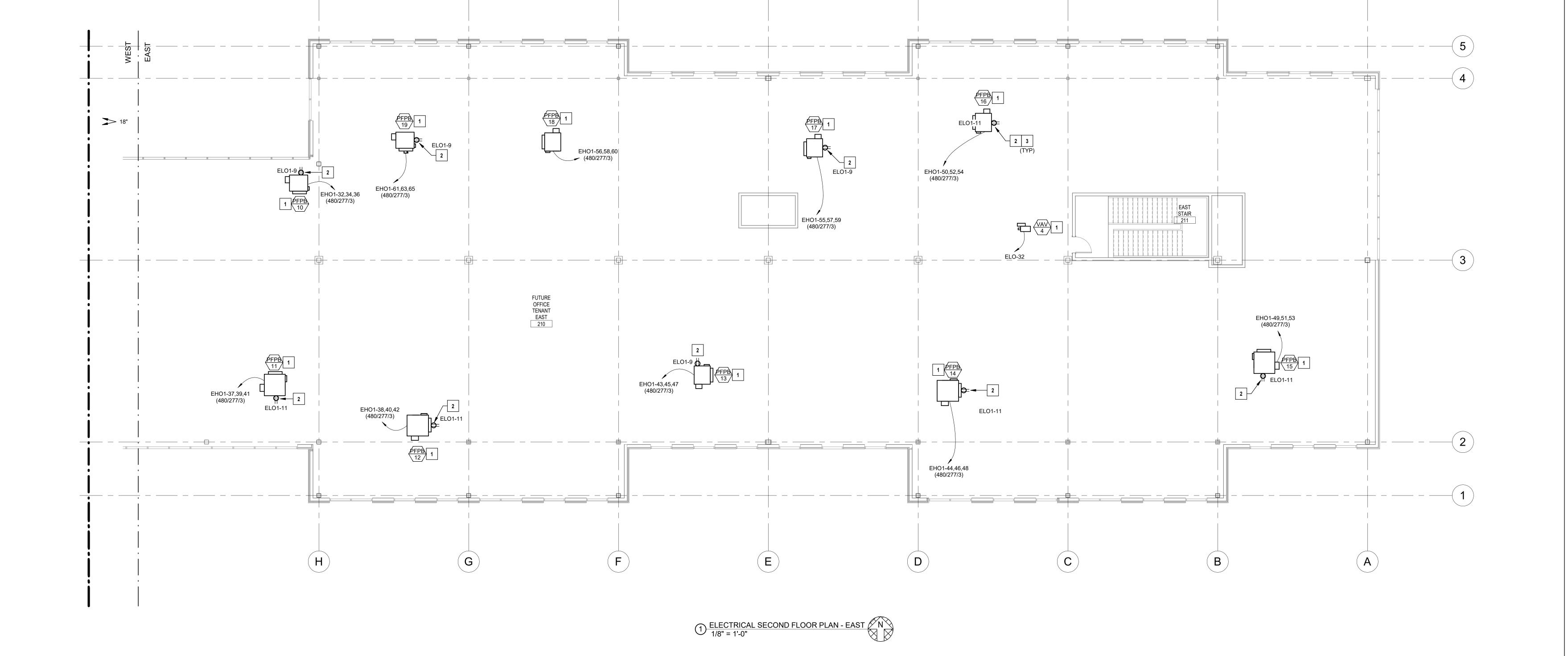
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SHEET TITLE

ELECTRICAL SECOND FLOOR PLAN - EAST

E102.2



LIGHTING SUPPLEMENTAL SPECIFICATIONS:

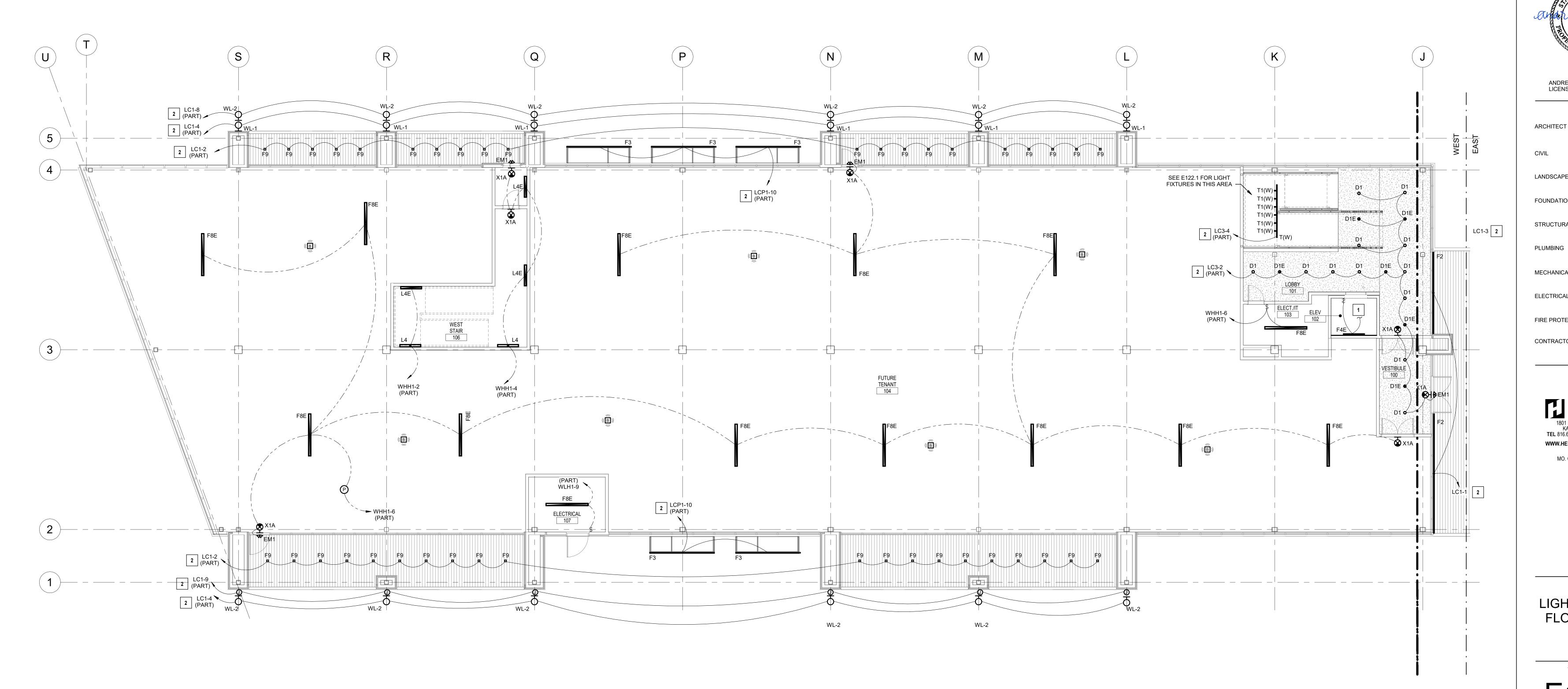
- REFER TO THE ARCHITECTURAL DRAWINGS FOR LIGHT FIXTURE LOCATIONS, MOUNTING HEIGHTS, TRACK LENGTHS AND ADDITIONAL MOUNTING INFORMATION. CONTRACTOR SHALL BE RESPONSIBLE FOR INSURING THAT COORDINATION AND CONFLICT ISSUES ARE RESOLVED PRIOR TO INSTALLATION OF LIGHT FIXTURES. CONTACT ARCHITECT/ENGINEER IMMEDIATELY IF THERE ARE DISCREPANCIES.
 - 2. THROUGH WIRING OF RECESSED LIGHT FIXTURES, IN SUSPENDED CEILINGS, IS NOT PERMITTED. CONNECT EACH LIGHT FIXTURE BY A WHIP TO A JUNCTION BOX. PROVIDE CABLE WHIPS OF SUFFICIENT LENGTHS TO ALLOW FOR RELOCATING EACH LIGHT FIXTURE WITHIN A 5'-0" RADIUS OF ITS INDICATED LOCATION. CABLE WHIPS SHALL NOT EXCEED 6'-0" OF UNSUPPORTED LENGTHS.
 - 3. ALL EMERGENCY LIGHTS AND EXIT SIGNS WITH INTEGRAL BATTERY BACK-UP SHALL BE CONNECTED TO A SEPARATE UNSWITCHED CONDUCTOR BYPASSING ALL OTHER CONTROLS AND CONTACTORS, UNLESS NOTED OTHERWISE. EXIT SIGNS SHALL NOT BE SWITCHED. REFER TO MANUFACTURER'S WRITTEN INSTRUCTIONS FOR PROPER INSTALLATION AND TESTING. ALLOW BATTERY TO CHARGE FOR A MINIMUM OF 48 HOURS BEFORE LIGHT LEVEL TESTING. IN ORDER TO PREVENT BATTERY DAMAGE, DO NOT TURN OFF POWER FOR EXTENDED PERIODS OF TIME AFTER EMERGENCY LIGHT HAS BEEN POWERED.
 - 4. PROVIDE A NEUTRAL CONDUCTOR TO ALL WALL MOUNTED LINE VOLTAGE LIGHT SWITCHES, UNLESS NOTED OTHERWISE. IF NEUTRAL TERMINATION IS NOT REQUIRED FOR THE DEVICE THEN CAP CONDUCTOR AND TAG AS "NEUTRAL FOR FUTURE USE".
 - COORDINATE ALL OCCUPANCY/VACANCY SENSOR SETTINGS WITH OWNER AND ADJUST AS NECESSARY FOR PROPER OPERATION. SETTINGS MUST COMPLY WITH AHJ AND LOCAL ENERGY CODE REQUIREMENTS.
 - 6. DO NOT INSTALL OCCUPANCY/VACANCY SENSORS WITHIN 48" OF AIR DIFFUSER OR SIMILAR OBSTRUCTION THAT MAY ADVERSLY AFFECT THE SENSOR PERFORMANCE. COORDINATE FINAL SENSOR LOCATIONS WITH OTHER TRADES AND INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

LIGHTING GENERAL NOTES:

- 1. THE EMERGENCY LIGHTING SYSTEM HAS BEEN DESIGNED TO PROVIDE AN INITIAL FLOOR ILLUMINANCE LEVEL OF 1 FC AVERAGE, 0.1 FC MINIMUM AND NO MORE THAN A 40:1 MAX/MIN RATIO ALONG THE EMERGENCY EGRESS PATHS. WHERE APPLICABLE, ADJUST AIMING OF EMERGENCY LIGHTS AS REQUIRED TO PROVIDE PROPER ILLUMINATION AT FLOOR AVOIDING OBSTACLES AND SHADOWS AFTER STORE SET-UP IS COMPLETE.
- 2. WALL MOUNTED EXITS SIGNS SHALL BE MOUNTED 12" ABOVE DOOR FRAME AND CENTERED ABOVE DOOR OPENING, UNLESS NOTED OTHERWISE. CEILING/PENDANT MOUNTED EXIT SIGNS SHALL BE SUSPENDED TO 12'-0" AFF IN OPEN STRUCTURE AREAS, UNLESS NOTED OTHERWISE. EXIT SIGNS SHALL BE READILY VISIBLE FROM DIRECTION OF EGRESS TRAVEL. COORDINATE FINAL EXIT SIGN LOCATIONS WITH AHJ AND OWNER.
- 3. PROVIDE LABEL AT EACH MANUAL LIGHT SWITCH INDICATING THE LIGHT FIXTURE(S) THAT THE SWITCH CONTROLS AND THE RESPECTIVE "PNLBD-CKT#" DESIGNATION. A SINGLE LIGHT SWITCH FOR A SMALL ROOM DOES NOT NEED TO INDICATE THE SPACE CONTROLLED SINCE IT IS INTUITIVELY OBVIOUS. COORDINATE LABEL REQUIREMENTS WITH THE OWNER PRIOR TO INSTALLATION. REFER TO THE SPECIFICATIONS FOR MORE INFORMATION.
- 4. ALL REMOTELY LOCATED LIGHT FIXTURE POWER SUPPLIES SHALL BE LOCATED IN AN ACCESSIBLE LOCATION WITH PROPER VENTILATION IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. CONCEAL DEVICES AND RELATED WIRING FROM CUSTOMER/PUBLIC VIEW. PROVIDE ENCOSURE IF REQUIRED. COORDINATE LOCATION AND ENCLOSURE TYPE WITH ARCHITECT AND OWNER PRIOR TO INSTALLATION.
- 5. PER 2017 NEC 700.2 AND 700.24, ALL DIRECTLY CONTROLLED LUMINAIRES USED FOR EMERGENCY ILLUMINATION AND ALL APPLICABLE CONTROLS SHALL HAVE UL 924 LISTING OR EQUIVALENT NRTL LISTING. IF EMERGENCY LUMINAIRE OR CONTROL MANUFACTURER DOES NOT HAVE APPROPRIATE LISTING THEN FIELD LISTING OF EQUIPMENT IS ACCEPTABLE (AT CONTRACTOR'S COST), IF APPROVED BY THE AHJ. ALTERNATIVELY, AS ALLOWED PER 2017 NEC 90.4, THE CONTRACTOR MAY OBTAIN SPECIAL PERMISSION FROM THE AHJ AND SUBMIT SAID PERMISSION IN WRITING TO THE ENGINEER FOR REVIEW. IF USING NON-LISTED EQUIPMENT FOR APPLICABLE EMERGENCY SYSTEMS, THE ALTERNATIVE METHOD MUST BE FIELD TESTED AND ACHIEVE EQUIVALENT OBJECTIVES TO CODE INTENT. IN ADDITION, ALTERNATE METHOD AND EQUIPMENT USED MUST BE DEEMED SAFE AND ACCEPTABLE TO BOTH THE AHJ AND THE ENGINEER.

LIGHTING PLAN NOTES:

- 1 REFER TO DETAIL 5 SHEET E301 FOR CIRCUIT CONTINUATION.
- ROUTE LIGHTING BRANCH CIRCUIT THROUGH LIGHTING CONTROL PANEL. REFER TO PANELBOARD SCHEDULES ON SHEET E501 AND LIGHTING CONTROL PANEL SCHEDULES ON SHEET E502 FOR MORE INFORMATION.



1 LIGHTING FIRST FLOOR PLAN - WEST N 1/8" = 1'-0"



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

Project No.: 19050.01a

Date: 05.06.22

Issued For: PERMIT

REVISIONS

No. Date Description

1 10/02/20 BID PACKAGE #6

REGISTRATION



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTRAL ENGINEERS

HENDERSON

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS
FIRE PROTECTION HENDERSON

CONTRACTOR GC

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1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

LIGHTING FIRST FLOOR PLAN -WEST

SHEET NUMBER

E121.1



FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a

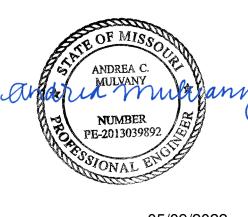
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PLUMBING HENDERSON ENGINEERS

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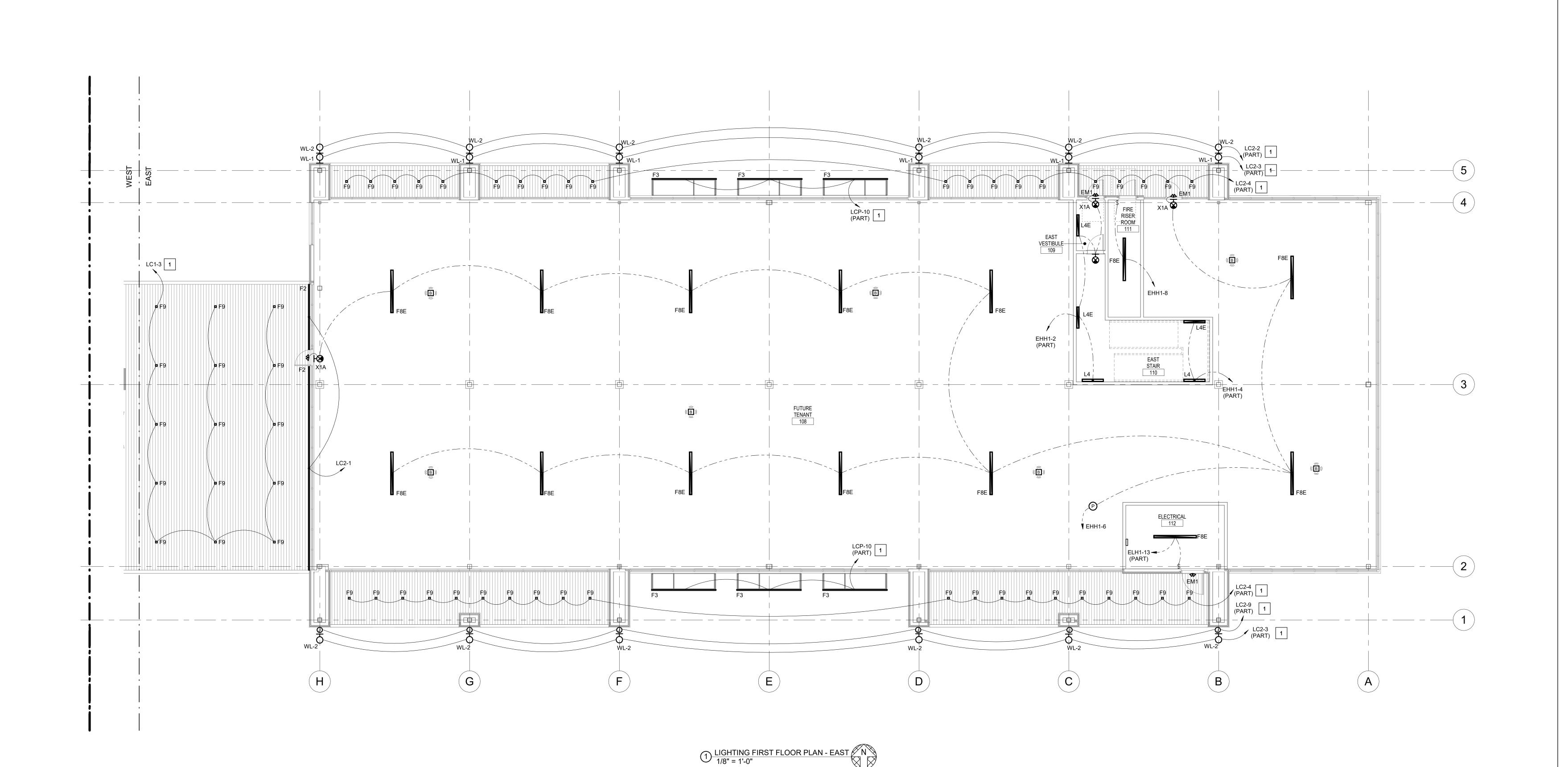
WWW.HENDERSONENGINEERS.COM

1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

LIGHTING FIRST FLOOR PLAN -EAST

E121.2





FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a

Date: 05.06.22

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ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

PROJECT TEAM

_ GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL

STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON

ENGINEERS

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1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

LIGHTING SECOND FLOOR PLAN - WEST

SHEET NUMBER

E 1 2 2 . 1

ANDREA C. MULVANY



FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a

Date: 05.06.22

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ARCHITECTURE

IVIL GBA

ARCHITECT

LANDSCAPE LAND 3

STRUCTURAL BSE STRUCTRAL ENGINEERS

FOUNDATIONS BSE STRUCTURAL

PLUMBING HENDERSON ENGINEERS

HENDERSON

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ELECTRICAL

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1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

LIGHTING SECOND FLOOR PLAN - EAST

SHEET NUMBER

E 122.2

ELECTRICAL PLAN NOTES:

- 1 PROVIDE CONNECTION TO FACTORY FURNISHED
- DISCONNECT ON DIVISION 23 EQUIPMENT. 2 PROVIDE MAINTENANCE/CONVENIENCE RECEPTACLE FOR
- MECHANICAL EQUIPMENT. 3 E.C. TO MOUNT MAINTENANCE/CONVENIENCE RECEPTACLE AND/OR E.C. PROVIDED DISCONNECT SWITCHES SO THAT ALL REQUIRED MECHANICAL EQUIPMENT CLEARANCES ARE MAINTAINED. PROVIDE BUS-STRUT MOUNTING AS NECESSARY. COORDINATE LOCATION WITH MECHANICAL
- CONTRACTOR PRIOR TO ROUGH-IN. 4 PROVIDE CONNECTION TO MAINTENANCE RECEPTACLE FURNISHED WITH ROOF TOP UNIT.



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO Project No.: 19050.01a

05.06.22

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PROJECT TEAM

FINKLE+WILLIAMS

ARCHITECTURE

ENGINEERS

LANDSCAPE

FOUNDATIONS BSE STRUCTURAL

ENGINEERS STRUCTURAL BSE STRUCTRAL

ENGINEERS PLUMBING HENDERSON

MECHANICAL HENDERSON

ELECTRICAL HENDERSON

ENGINEERS FIRE PROTECTION HENDERSON

CONTRACTOR GC

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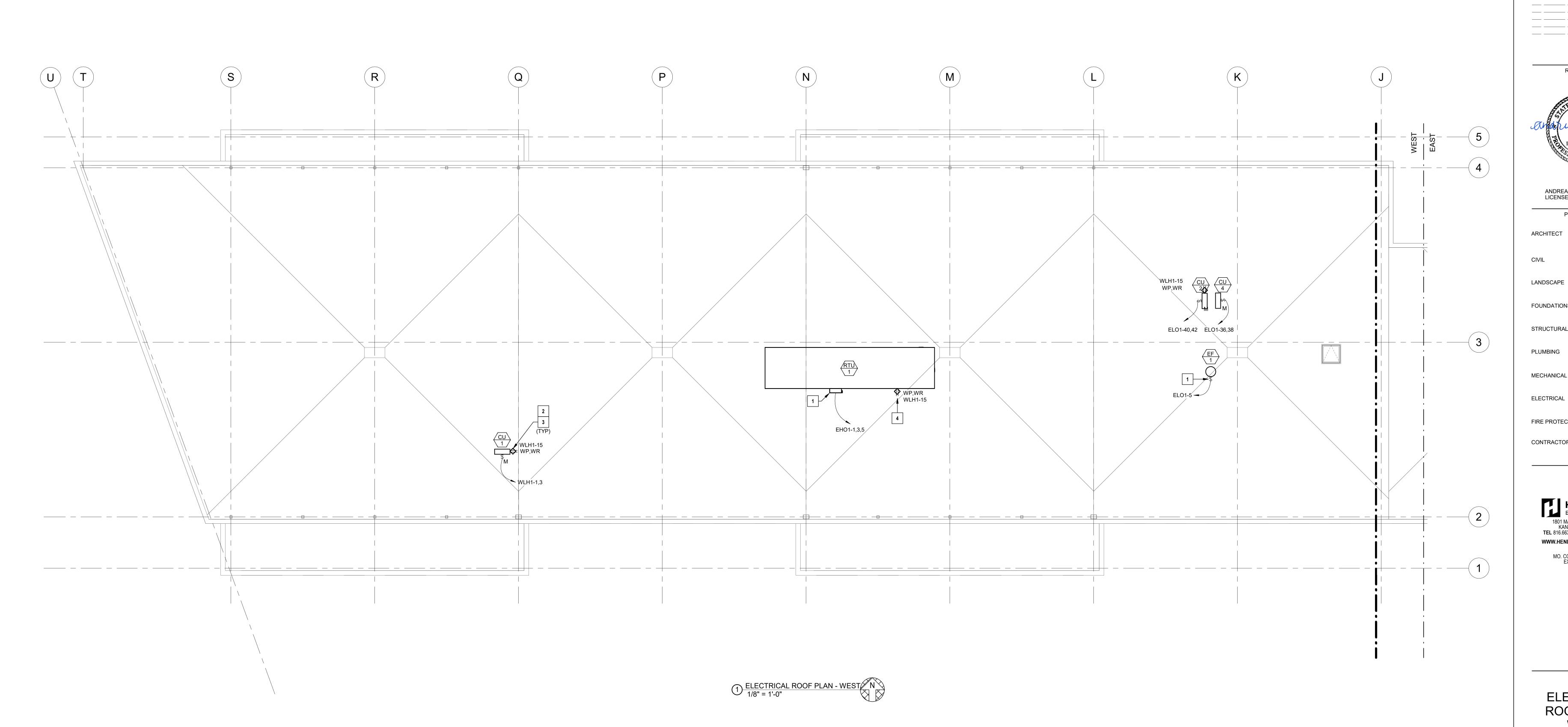
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SHEET TITLE

ELECTRICAL ROOF PLAN -WEST

SHEET NUMBER

E201.1



ELECTRICAL PLAN NOTES:

- 1 PROVIDE CONNECTION TO FACTORY FURNISHED
- DISCONNECT ON DIVISION 23 EQUIPMENT. 2 PROVIDE MAINTENANCE/CONVENIENCE RECEPTACLE FOR

NECESSARY. COORDINATE LOCATION WITH MECHANICAL

- MECHANICAL EQUIPMENT. 3 E.C. TO MOUNT MAINTENANCE/CONVENIENCE RECEPTACLE AND/OR E.C. PROVIDED DISCONNECT SWITCHES SO THAT ALL REQUIRED MECHANICAL EQUIPMENT CLEARANCES ARE MAINTAINED. PROVIDE BUS-STRUT MOUNTING AS
- CONTRACTOR PRIOR TO ROUGH-IN. 4 PROVIDE CONNECTION TO MAINTENANCE RECEPTACLE FURNISHED WITH ROOF TOP UNIT.



PARAGON STAR BLDG 2 / LOT 9

LEE'S SUMMIT, MO

FIRST PLAT, LOT 9

Project No.: 19050.01a 05.06.22

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REGISTRATION



ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

LANDSCAPE LAND 3

ENGINEERS

STRUCTURAL BSE STRUCTRAL **ENGINEERS**

HENDERSON

ENGINEERS

PLUMBING

MECHANICAL HENDERSON

> HENDERSON **ENGINEERS**

CONTRACTOR GC

FIRE PROTECTION HENDERSON

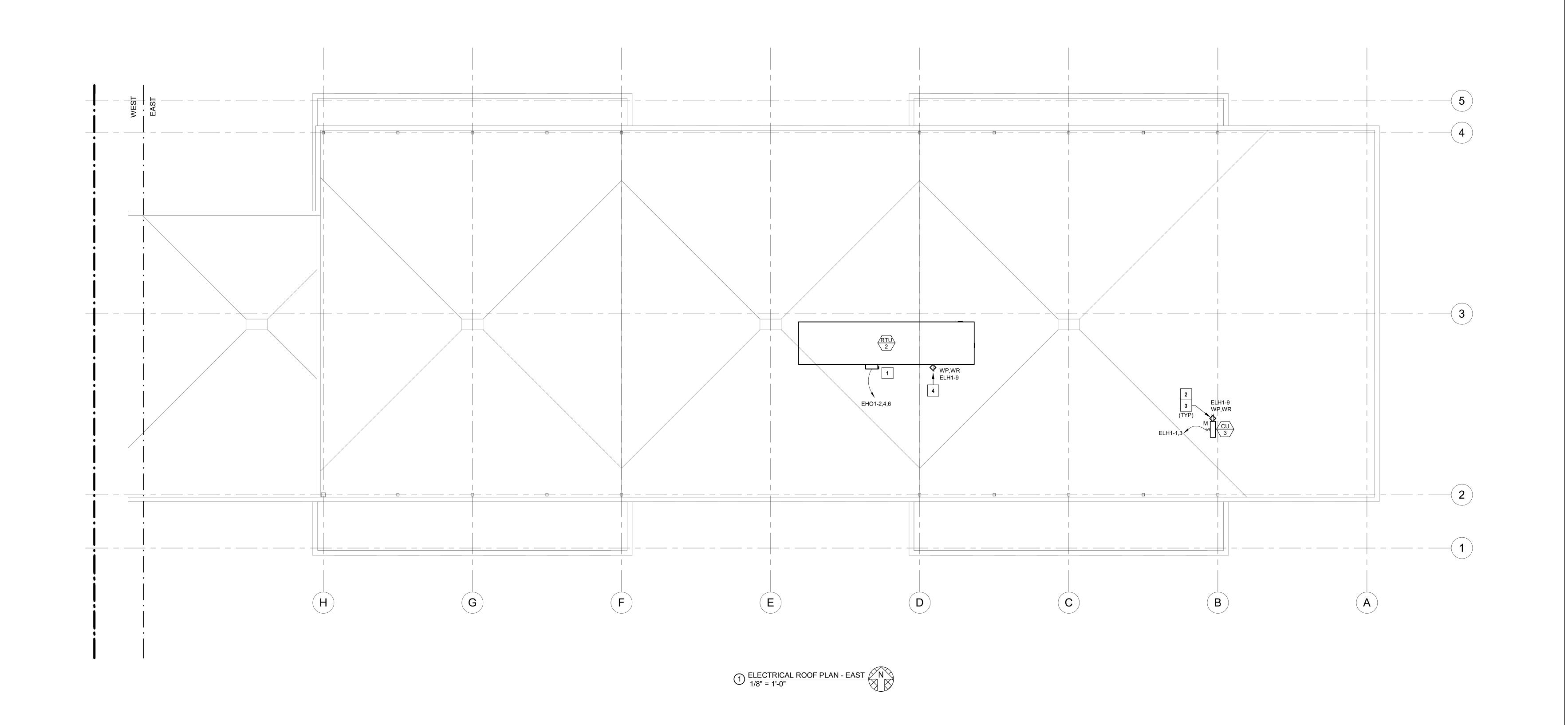
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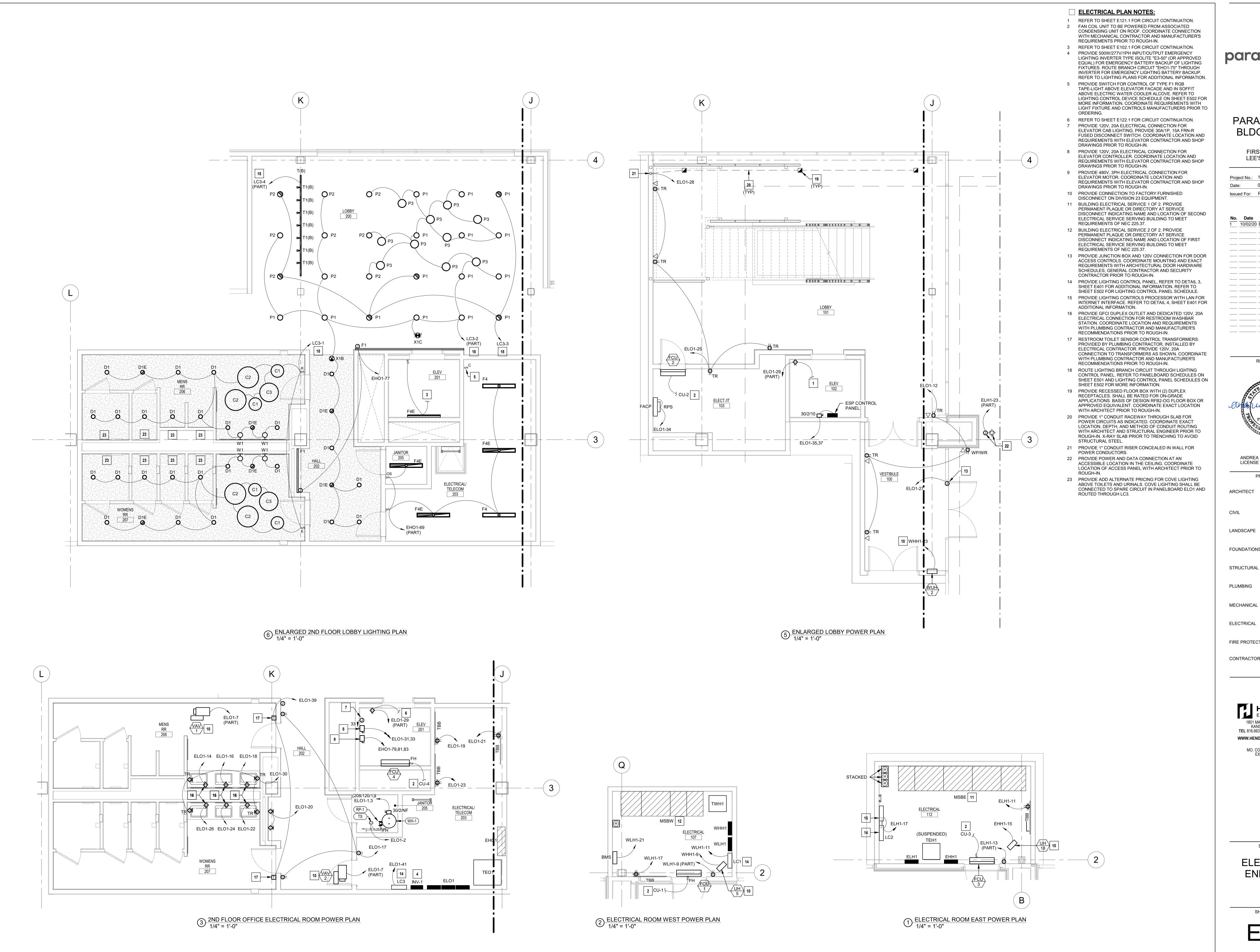
SHEET TITLE

ELECTRICAL ROOF PLAN -EAST

SHEET NUMBER

E201.2







FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

 Project No.:
 19050.01a

 Date:
 05.06.22

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 No.
 Date
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 1
 10/02/20
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05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS
ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL

ENGINEERS

STRUCTURAL BSE STRUCTRAL

PLUMBING HENDERSON

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1850004412
MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

SHEET TITLE

ELECTRICAL ENLARGED PLAN

E301

DREA C. MULVANY

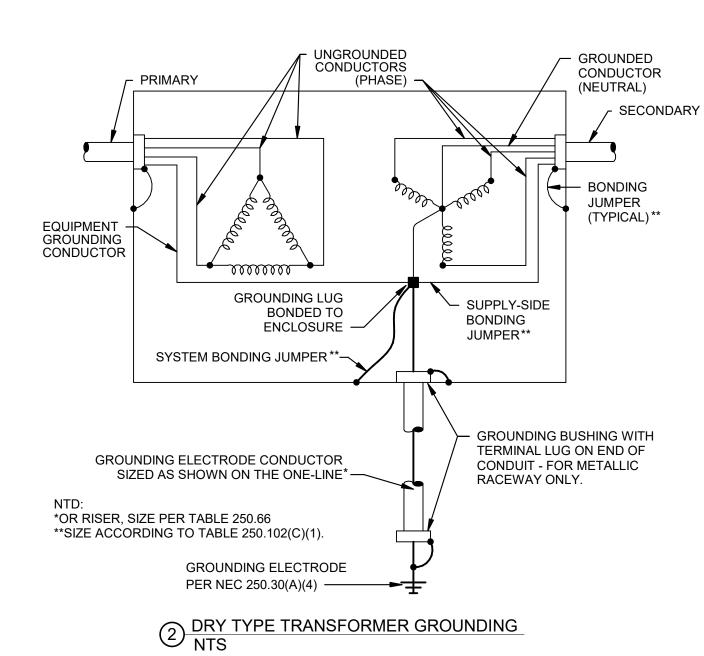
CONTROLLED LOAD CONTROL EQUIPMENT — GROUNDING CONDUCTOR TO OTHER
LIGHTING
LIGHTING
OONTRO!
LIGHTING
LIGHTING
OONTRO! TO LIGHTING LIGHTING CONTROL GROUNDING LUG BONDED TO ENCLOSURE -SYSTEM BONDING JUMPER **-1. REFER TO LIGHTING CONTROL DEVICE SCHEDULE FOR DEVICE AND EQUIPMENT SPECIFICATIONS. 2. DETAIL IS DIAGRAMMATIC AND IS BASED ON LEGRAND. THIS REPRESENTS THE GENERAL SCOPE OF WORK AND LOCATION OF DEVICES IN RELATION TO EACH OTHER ALONG THE POWER CIRCUIT. DIAGRAMS MAY BE DIFFERENT FOR ALLOWED EQUIVALENT MANUFACTURERS. ELECTRICAL CONTRACTOR SHALL COORDINATE FULL SYSTEM REQUIREMENTS WITH SELECTED MANUFACTURER. PROVIDE ALL PARTS NOT PIECES IN THE PROPERTY OF THE PROPER INSTALLATION INSTRUCTIONS AND WIRING DIAGRAMS FOR INSTALLATION. GROUNDING ELECTRODE CONDUCTOR SIZED AS SHOWN ON THE ONE-LINE* 3. CIRCUITING SHOWN ON PLAN(S) CORRESPONDS TO LIGHTING CONTROL INTENT. IF CIRCUITING IS FIELD-MODIFIED, ENSURE THAT SYSTEM PROGRAMMING WITH REVISED CIRCUITING MEETS ORIGINAL LIGHTING CONTROL INTENT. UPDATE LIGHTING CONTROL PANEL SCHEDULE(S) IN RECORD DRAWINGS. *OR RISER, SIZE PER TABLE 250.66
**SIZE ACCORDING TO TABLE 250.102(C)(1). 4. LEAVE A TYPEWRITTEN SCHEDULE INCLUDING ANY FIELD-MODIFICATIONS IN EACH LIGHTING CONTROL PANEL DOOR. 5. PROVIDE SYSTEM COMMISSIONING AS REQUIRED PER ENERGY CODE. GROUNDING ELECTRODE 6. REFER TO LIGHTING CONTROL PANEL SCHEDULE(S) FOR MORE INFORMATION. PER NEC 250.30(A)(4) —— 3 LIGHTING CONTROL PANEL DETAIL NTS

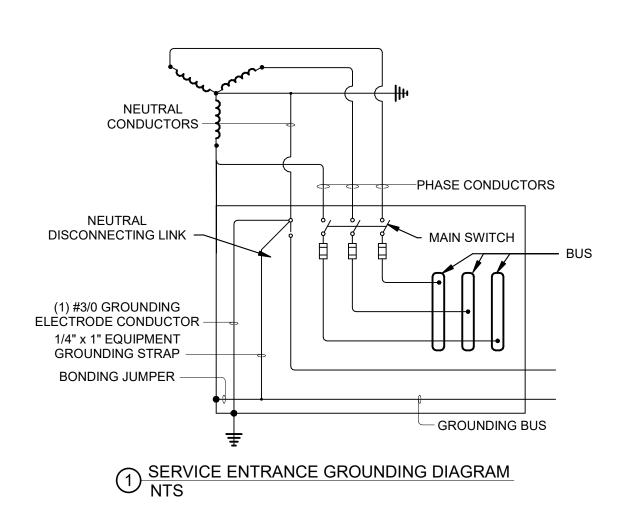
CONTROL POWER SUPPLY

BRANCH CIRCUIT / FEEDER

POWER 5

PROCESSOR





PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a Issued For: PERMIT **REVISIONS**



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL **ENGINEERS** STRUCTURAL BSE STRUCTRAL

ENGINEERS PLUMBING HENDERSON **ENGINEERS**

MECHANICAL HENDERSON

ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON **ENGINEERS** CONTRACTOR GC

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1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

ELECTRICAL DETAILS

US / AIN OLT	IELBOARD: WHH MPS: 125A SIZE/TYPE: MLO S/PHASE: 480Y/277V, 3PH, ON: 1	·	')			AIC RA SERV MOUN	ROM: I ATING: ES: 480 ITING: V	V H	FCA OUS RFAC	E LOAI	DS	L ROOM					
KT	DESCRIPTION	N	VOL	TAMPS/PH	IASE	WIRE	BKR	Р	Р	BKR	WIRE	VOL	TAMPS/PHA	ASE	DESCRIPTION	CKT	
Ο.			А	В	С	NO.	AMP			AMP	NO.	Α	В	С		NO.	
	UH-1		5,000			10	25	1	1	20	12	152			LTG - W STAIRWELL CIRC 1	2	
}	UH-2			5,000		10	25	1	1	20	12		140		LTG - W STAIRWELL CIRC 2	4	
;	UH-3				5,000	10	25	1	1	20	12			961	LTG - TENANT SPACE WEST	6	
	UH-4		5,000			10	25	1	1						SPACE	8	
	UH-5			5,000		10	25	1	1						SPACE	10	
	UH-6				5,000	10	25	1	1						SPACE	12	
3	UH-7		5,000			10	25	1	1						SPACE	14	
5	UH-8			5,000		10	25	1	1						SPACE	16	
7	UH-9				5,000	10	25	1	1						SPACE	18	
)	UH-10		5,000			10	25	1	1						SPACE	20	
	WUH-1			4,800		10	25	1	1						SPACE	22	
	WUH-2				4,800	10	25	1	1						SPACE	24	
5	SPARE						20	1	1						SPACE	26	
<u> </u>	SPACE							1	1						SPACE	28	
)	SPACE							1	1						SPACE	30	
l	SPACE							1	1						SPACE	32	
3	SPACE							1	1						SPACE	34	
	SPACE							1	1						SPACE	36	
	SPACE							1				5,394				38	
	SPACE							1	3	80	OL		3,641		PANELBOARD WLH1	40	
	SPACE							1						4,060	VIA 30KVA XFMR TWH1	42	
	SUBTOTAL		20,000	19,800	19,800	_						5,546	3,781	5,021	SUBTOTAL		
_	TOTAL PHASE A - VA	25,546	LOAD		CONN. VA	٩	DF		LOA	AD			CONN. VA	DF			
	AMPS	92	COOLING				0	Ī	REF	FRIG				1.00	1		
	TOTAL PHASE B - VA	23,581	HEATING		59,600	ı	1.00		SIG	N/DISF)			1.25			
	AMPS	85	LIGHTING	i	3,658	1	1.25		KIT	CHEN				1.00			
	TOTAL PHASE C - VA	24,821	RECEPTA	CLES	5,400)	1.0/.5		EXI	ISTING				1.00			
	AMPS	90	MOTORS				1.00		LRO	G МОТ	OR			1.25	TOTAL DEMAND		
	TOTAL PNLBD - VA	73,948	SUPP HEA	ΑT	1,200		1.00		SHO	OW WN	IDW			1.25	74,863	VA	
	AMPS	89	MISC EQL	JIP	4,090)	1.00		LTG	3 TRAC	K			1.00	90	0 A	

1	BUS A MAIN OLT	NELBOARD: WLH1 (NEW) AMPS: 100A SIZE/TYPE: 100A MCB S/PHASE: 208Y/120V, 3PH, 4W TION: 1				AIC RA SERVE MOUN	ATING: ES: 208 ITING: S	V H	FCA OUS FAC	A +10% N SE LOAI SE		1 FULLY RA	TED		EQUIPMENT GROUN	ND BUS	5
	CKT	DESCRIPTION	VOL	TAMPS/Ph	HASE	WIRE	BKR	Р	Р	BKR	WIRE	VOL	TAMPS/PH	ASE	DESCRIPTION	СКТ	
L	NO.		Α	В	С	NO.	AMP			AMP	NO.	Α	В	С		NO.	
Ī	1	CU-1	595			12	15	2	1	20	10	316			LTG - BREEZEWAY WEST COVE	2	RP,VD
	3			595					1	20	10		627		LTG - CANOPY DOWNLIGHTS	4	RP,VD
	5	PWR - BBH-7			600	10	20	2	1	20	10			84	LTG - EXT FLOODLIGHTS	6	RP,VD
	7		600						1	20	10	363			LTG - EXT SCONCES	8	RP,VD
	9	RCPT/LTG - ELEC ROOM WEST		241		12	20	1	1	20	10		500		LTG - SOUTH EXT JBOXES	10	RP,VD
	11	PWR - RELAY PANEL			600	12	20	1	1	20	8			1,080	RCPT - PLANTERS N	12	RP,VD
	13	RCPT - EXT SOUTH COLUMNS	1,260			10	20	1	1	20	8	1,080			RCPT - PLANTERS S	14	RP,VD
	15	RCPT - ROOF MECH CONV. W		540		12	20	1	1	20	8		720		RCPT - PLANTERS C	16	RP,VD
	17	RCPT - TBB			360	10	20	1	1	20	10			1,000	PWR - SIDEWALK DISPLAY W	18	
	19	RCPT - STAIRWELL	180			12	20	1	1	20	10	1,000			PWR - SIDEWALK DISPLAY C	20	
	21	PWR - BMS PANEL		300		12	20	1	1	20	10		118		LTG - BREEZEWAY CEILING	22	RP,VD
	23	SPACE						1	1	20	10			336	LTG - AWNING STRIP	24	RP,VD
L	25	SPACE						1	1						SPACE	26	
	27	SPACE						1	1						SPACE	28	
L	29	SPACE						1	1						SPACE	30	
L		SUBTOTAL	2,635	1,676	1,560							2,759	1,965	2,500	SUBTOTAL		
Γ		TOTAL PHASE A - VA 5,394	LOAD		CONN. VA	A	DF		LOA	AD			CONN. VA	DF		-	
r		AMPS 45	COOLING				1.00	İ	REI	FRIG				1.00	†		
l		TOTAL PHASE B - VA 3,641	HEATING				0		SIG	N/DISF	,			1.25			
r		AMPS 30	LIGHTING		2,405		1.25		KIT	CHEN				1.00			
r		TOTAL PHASE C - VA 4,060	RECEPTA	CLES	5,400		1.0/.5		EXI	ISTING				1.00			
r		AMPS 34	MOTORS				1.00		LRO	G MOT	OR .			1.25	TOTAL DEMAND		
r		TOTAL PNLBD - VA 13,095	SUPP HEA	\T	1,200		1.00		SHO	OW WN	IDW			1.25	13,696 V/	4	
r		AMPS 36	MISC EQL	IIP	4,090		1.00		LTC	G TRAC	K			1.00	38 /	Δ .	

BUS A MAIN /OLT	IELBOARD: EHH1 (NEW) AMPS: 125A SIZE/TYPE: MLO S/PHASE: 480Y/277V, 3PH, 4W ION: 1				AIC RA SERVI	ITING: S	V H	FCA OUS	SE LOAI	os	I FULLY RA	ATED		EQUIPMENT GROU	IND BUS
CKT	DESCRIPTION	VOI	TAMPS/PH	IASF	WIRE	BKR	Р	Р	BKR	WIRF	VOI	LTAMPS/PH/	ASF	DESCRIPTION	СКТ
NO.	223.11.113.1	A	В	С	NO.	AMP	•	•	AMP	NO.	A	В	С		NO.
1	UH-11	5,000			10	25	1	1	20	12	152			LTG - E STAIRWELL CIRC 1	2
3	UH-12	0,000	5,000		10	25	1	1	20	12	102	140		LTG - E STAIRWELL CIRC 2	4
5	UH-13		0,000	5,000	10	25	1	1	20	12			888	LTG - TENANT SPACE EAST	6
7	UH-14	5,000		0,000	10	25	1	1	20	12	61			LTG - FIRE RISER ROOM	8
9	UH-15	,,,,,,	5.000		10	25	1	2	20	8		2.241		LTG - PARKING LOT A	10
11	UH-16		.,,,,,,,	5,000	10	25	1	1				,	2,241		12
13	UH-17	5,000		-,,,,,	10	25	1	2	20	8	2,241			LTG - PARKING LOT B	14
15	UH-18		5,000		10	25	1				,	2,241			16
17	UH-19		,	5,000	10	25	1	1						SPACE	18
19	UH-20	5,000			10	25	1	1						SPACE	20
21	UH-21		5,000		10	25	1	1						SPACE	22
23	WUH-3			4,800	10	25	1	1						SPACE	24
25	SPARE					20	1	1						SPACE	26
27	SPACE						1	1						SPACE	28
29	SPACE						1	1						SPACE	30
31	SPACE						1	1						SPACE	32
33	SPACE						1	1						SPACE	34
35	SPACE						1	1						SPACE	36
37	SPACE						1				5,836				38
39	SPACE						1	3	80	OL		3,035		PANELBOARD ELH1	40
41	SPACE						1						3,638	VIA 30KVA XFMR TEH1	42
	SUBTOTAL	20,000	20,000	19,800							8,290	7,657	6,767	SUBTOTAL	
	TOTAL PHASE A - VA 28,290	LOAD		CONN. V	4	DF		LO	AD			CONN. VA	DF		
	AMPS 102	COOLING				0		RE	FRIG				1.00		
	TOTAL PHASE B - VA 27,657	HEATING		59,800		1.00		1	N/DISF)			1.25		
	AMPS 100	LIGHTING		12,448		1.25		KIT	CHEN				1.00		
	TOTAL PHASE C - VA 26,567	RECEPTA	CLES	3,780		1.0/.5		EXI	ISTING				1.00		
	AMPS 96	MOTORS	MOTORS 1,1	1,176		1.00		-	G MOT				1.25	TOTAL DEMAND	
	TOTAL PNLBD - VA 82,514	SUPP HE		1,200		1.00		-	OW WN				1.25	85,626 V	
	AMPS 99	MISC EQU	JIP	4,110		1.00		LTC	G TRAC	K			1.00	103	Α

E	BUS /	NELBOARD: ELH1 AMPS: 100A SIZE/TYPE: 100A MCB	` ,				AIC RA	ROM: E Ating: Es: 208	8V H	FCA IOUS	4 +10% I E LOA	MINIMUN	/I FULLY RA	TED		LINE-SIDE LUGS: MECH, EQUIPMENT GROUN	
		⁻ S/PHASE: 208Y/120V, 3PH, F ION: 1	400					ITING: S				CAL RO	ОМ				
Γ	CKT	DESCRIPTION	١	VOL	TAMPS/P	HASE	WIRE	BKR	Р	Р	BKR	WIRE	VOL	TAMPS/PH/	ASE	DESCRIPTION	СК
	NO.			А	В	С	NO.	AMP			AMP	NO.	Α	В	С		NC
Γ	1	CU-3		595			12	15	2	1	20	10	403			LTG - AWNING STRIP	2
	3	-			595					1	20	10		84		LTG - EAST EXT FLOODLIGHTS	4
⟨	5	PWR - BBH-2				600	12	20	2	1	20	10			362	LTG - EAST EXT SCONCES	6
	7	1		600						1	20	10	500			LTG - SOUTH EXT JBOXES	8
	9	RCPT - ROOF MECH CON	V.		360		12	20	1	1	20	10		316		LTG - BREEZEWAY EAST COVE	10
	11	RCPT - TBB EAST				360	12	20	1	1	20	10			456	LTG - CANOPY DOWNLIGHTS	1:
	13	RCPT/LTG - ELEC ROOM	EAST	302			12	20	1	1	20	10	1,260			RCPT - EXT SOUTH COLUMNS	1
	15	PWR - IRRIGATION CONT	ROL		600		12	20	1	1	20	8		720		RCPT - PLANTERS N	1
	17	PWR - RELAY PANEL				600	12	20	1	1	20	8			540	RCPT - PLANTERS S	1
	19	PWR - AIR COMPRESSOR	}	1,176			12	20	1	1	20	10	1,000			PWR - SIDEWALK DISPLAYS	2
	21	RCPT - FIRE RISER ROOM	Л		360		12	20	1	1	20					SPARE	2
	23	PWR - BREEZEWAY CEILI	NG			720	12	20	1	1	20					SPARE	2
	25	SPACE							1	1	20					SPARE	2
	27	SPACE							1	1	20					SPARE	2
	29	SPACE							1	1	20					SPARE	3
		SUBTOTAL		2,673	1,915	2,280							3,163	1,120	1,358	SUBTOTAL	
		TOTAL PHASE A - VA	5,836	LOAD		CONN. VA	4	DF		LOA				CONN. VA	DF		
L		AMPS	49	COOLING				1.00			FRIG				1.00		
L		TOTAL PHASE B - VA	3,035	HEATING				0			N/DISF)			1.25		
L		AMPS	25	LIGHTING	i	2,243		1.25		KIT	CHEN				1.00		
L		TOTAL PHASE C - VA	3,638	RECEPTA	CLES	3,780		1.0/.5		_	STING				1.00		_
L		AMPS	30	MOTORS		1,176		1.00			3 MOT				1.25	TOTAL DEMAND	
L		TOTAL PNLBD - VA	12,509	SUPP HEA		1,200		1.00		_	NW WC				1.25	13,070 V	_
L		AMPS	35	MISC EQU	JIP	4,110)	1.00		LTC	3 TRAC	K			1.00	36 /	A

NOT ALL ABBREVIATIONS ARE USED.

	NELBOARD LEGEND
ABBRE	VIATIONS V1.00
AF C# CL EM EX F AF EP HT IG # K LO N OL PS E RP ST	ARC FAULT CIRCUIT INTERRUPTER. CIRCUIT VIA LIGHTING CONTACTOR #. CIRCUIT VIA CURRENT LIMITING DEVICE. DISCONNECT CIRCUITRY FOR REMOVED LOAD, UPDATE CIRCUIT DIRECTORY TO SPARE AND TURN OFF. EMERGENCY LIGHTING HANDLE-ON CLAMP. EXISTING. FUTURE LOAD; NOTE AS SPARE AND TURN OFF. RED/HANDLE-ON CLAMP. GROUND-FAULT CIRCUIT INTERRUPTER TYPE CIRCUIT BREAKER (5 mA). GROUND FAULT EQUIPMENT PROTECTION BREAKER (30 mA). PROVIDE HANDLE-TIE FOR MULTI-WIRE BRANCH CIRCUIT PER CODE. ISOLATED GROUND CIRCUIT. LIGHTING CONTROL SCHEME NUMBER. HANDLE PADLOCKABLE-OFF DEVICE. HANDLE-ON CLAMP. PROVIDE NEW CIRCUIT BREAKER. REFER TO ELECTRICAL ONE-LINE/RISER DIAGRAM. POWER-SWITCHING CIRCUIT BREAKER. EMERGENCY POWER-SWITCHING CIRCUIT BREAKER. REUSE EXISTING CIRCUIT BREAKER FOR NEW/REVISED LOAD. CIRCUIT VIA RELAY PANEL. SHUNT TRIP CIRCUIT BREAKER.
V	VERIFY EXISTING LOAD AND UPDATE DIRECTORY, IF UNUSED, NOTE AS SPARE AND TURN OFF.

BUS	NELBOARD: EHO1 (NEW) AMPS: 1000A I SIZE/TYPE: MLO				AIC R	FROM: I ATING: ES: 480		FCA			M FULLY RA	TED		EQUIPMENT GRO	UND E
	TS/PHASE: 480Y/277V, 3PH, 4W					ES: 480 NTING: \$				סט					
	FION: 1						_			CTRIC	AL ROOM				
		1			-										
CKT	DESCRIPTION	_	TAMPS/PH			BKR	P	P		WIRE		TAMPS/PF		DESCRIPTION	C
NO.		A	В	С	NO.	AMP			AMP	NO.	A	В	С		N
1		39,574									39,574				
3	RTU-1		39,574		2/0	175	3	3	175	2/0		39,574		RTU-2	
5				39,574									39,574		
7		7,174									3,294				
9	PFBP-1		5,334		8	35	3	3	15	12		2,167		PFBP-2	
11				5,334									2,167		
13	DEDD 0	2,627	1.500		40	45			4.5	40	1,834	0.004		DEDD 4	
	PFBP-3		1,500	4.500	12	15	3	3	15	12		2,961	4.004	PFBP-4	
17 19		5,667		1,500							5,000		1,834		
21	_ PFBP-5	5,007	7,507		8	35	3	3	35	8	3,000	5,000		PFBP-6	
23	1.12.0		7,007	5,667								0,000	6,840	11.5. 3	
25		3,834		0,001							6,840		0,0.0		
27	PFBP-7	•	3,834		10	25	3	3	35	8	,	5,000		PFBP-8	
29				4,961									5,000		
31		4,961									2,000				;
33	PFBP-9		3,834		10	25	3	3	15	12		3,127		PFBP-10	
35				3,834									2,000		
37	 	5,000									5,000				
39	PFBP-11 		6,840	5.000	8	35	3	3	35	8		5,000	0.040	PFBP-12	-
41		3.834		5,000							9.507		6,840		
45	_ PFBP-13	3,034	3,834		10	25	3	3	40	8	8,507	6,667		PFBP-14	
47	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		3,034	4,961	10	25			40			0,007	6,667	1101-14	
49		6,507		1,001							2,834		0,007		
51	PFBP-15		4,667		10	30	3	3	20	12	,	3,961		PFBP-16	
53				4,667									2,834		
55		1,667									2,000				
57	PFBP-17		2,794		12	15	3	3	15	12		2,000		PFBP-18	
59				1,667									3,127		
61		1,500			4.0			1	20	10	3,073			LTG - S. WEST PARAPET	
63	PFBP-19 -		1,500	0.007	12	15	3	1	20	10		3,073	0.070	LTG - N. WEST PARAPET	
65 67	LTG - RESTROOMS	972		2,627	12	20	1	1	20	10	2.072		3,073	LTG - S. EAST PARAPET LTG - N. EAST PARAPET	
69	LTG - WEST OFFICE	972	980		12	20	1	1	20	10	3,073			SPARE SPARE	
	LTG - EAST OFFICE		300	1,042	12	20	1	1	20					SPARE	
	LTG - LOBBY NORMAL	752		1,012	12	20	1	1						SPACE	
75	LTG - LOBBY EM		128		12	20	1	1						SPACE	
77	LTG - LOBBY ELEVATOR COVE			176	12	20	1	1						SPACE	
79		6,928									9,635				
81	PWR - ELEVATOR		6,928		10	30	3	3	250	OL		10,035		PANELBOARD ELO1	
83				6,928									10,554	VIA 150KVA XFMR TEO1	
	SUBTOTAL	90,997	89,254	87,938							92,664	88,565	90,510	SUBTOTAL	
	TOTAL PHASE A - VA 183,661	LOAD		CONN. VA		DF	1 1	LOA				CONN. VA	DF		
	AMPS 663	COOLING	i	134,352		0		REF	FRIG				1.00		
	TOTAL PHASE B - VA 177,819	HEATING		208,017		1.00	4 1	_	N/DISF)			1.25	_	
	AMPS 642	LIGHTING		17,250		1.25	4 1		CHEN				1.00	4	
	TOTAL PHASE C - VA 178,448	RECEPTA		7,920		1.0/.5	-		STING			00 447	1.00	TOTAL BELIEVE	
	AMPS 644 TOTAL PNLBD - VA 539,928	MOTORS SUPP HE		131,154		1.00	1 1		OW WC			22,447	1.25	TOTAL DEMAND	1//
	TOTAL PNLBD - VA 539,928 AMPS 649	MISC EQU		5,000 13,788		1.00	1 1		TRAC			3,600	1.25 1.00	419,100	VA 04 A
	7 (1VII O 0-TO	OO LQ(1	10,700		1.00				• • •		5,500	1.00	1	. т / \

FED FROM: EHO1 VIA XFMR TEO1

PANELBOARD: ELO1 (NEW)

	AMPS: 600A I SIZE/TYPE: MLO				_	ATING: ES: 208					M FULLY RA	TED		EQUIPMENT GROU	אם טאונ
	ΓS/PHASE: 208Y/120V, 3PH, 4W					ITING: S								FEED THE	RU LUC
SECT	TION: 1				LOCA	TION: 2	ND F	FLO	OR ELE	ECTRIC	AL ROOM				
CKT NO.	DESCRIPTION	VOI A	TAMPS/PH B	IASE C	WIRE NO.	BKR AMP	Р	Р	BKR AMP	WIRE NO.	VOL A	TAMPS/PH B	ASE C	DESCRIPTION	CK
1	PWR - WH-1	2,500	_		10	30	2	1	20	12		_		RP-1, TIME SWICTH	2
3	1	2,000	2,500					1	20	12		360		RCPT - LOBBY 200	4
5	PWR - EF-1			528	12	15	1	1	15	12			208	LTG - TRACK	6
7	PWR - VAV-1, VAV-2, VAV-3	150			12	20	1	1						SPARE	8
	RCPT - OFFICE N EAST MECH		540		10	20	1	1						SPARE	1
	RCPT - OFFICE S EAST MECH			720	10	20	1	1	20	12			720	RCPT - LOBBY VEST.	1:
	RCPT - OFFICE N WEST MECH	720	5.40		12	20	1	1	20	12	1,200	4.000		PWR - M RR WASHBAR 1	14
	RCPT - OFFICE S WEST MECH RCPT - ELEC, JAN, HALL		540	720	12	20	1	1	20	12 12		1,200	1,200	PWR - M RR WASHBAR 2 PWR - M RR WASHBAR 3	18
	RCPT - TBB WEST	360		720	12	20	1	1	20	12	500		1,200	PER - WATER FOUNTAINS	20
	RCPT - TBB EAST	300	360		12	20	1	1	20	12	300	1,200		PWR - W RR WASHBAR 1	2
23	RCPT - TBB WEST			360	12	20	1	1	20	12		.,200	1,200	PWR - W RR WASHBAR 2	2
25	RCPT - LOBBY	720			12	20	1	1	20	12	1,200			PWR - W RR WASHBAR 3	20
27	PWR - LOBBY DOOR		600		12	20	1	1	20	12		1,080		RCPT - LOBBY FLOOR	28
29	RCPT/LTG - ELEVATOR SHAFT			820	12	20	1	1	20	12			1,248	RCPT - RR'S / EWC	30
31	PWR - ELEVATOR CONTROL	600			12	20	1	1	20	12	50			VAV-4	32
33	PWR - ELEVATOR CAB LTS		600		12	20	1	1	20	12		360		FACP, RPS	34
35	PWR - ELEVATOR SUMP	4 = 1 =		1,040	12	20	2	2	15	12	F0-		595	CU-4	36
37	PWR - RR SENSOR XFMRS	1,040	400		10	20	1		15	10	595	FOF		CH 2	38
	PWR - RR SENSOR XFMRS PWR - RELAY PANEL		100	600	12	20	1	2	15	12		595	595	CU-2	42
	TION: 2			000	12	20	<u> </u>						393		42
	SPACE						1	1						SPACE	44
45	SPACE						1	1						SPACE	46
47	SPACE						1	1						SPACE	48
49	SPACE						1	1						SPACE	50
51	SPACE						1	1						SPACE	52
	SPACE						1	1						SPACE	54
55	SPACE						1	1						SPACE	56
57	SPACE						1	1						SPACE	58
59	SPACE						1	1						SPACE	60
61	SPACE						1	1						SPACE	62
63 65	SPACE SPACE						1	1						SPACE SPACE	64
67	SPACE						1	1						SPACE	68
69	SPACE						1	1						SPACE	70
71	SPACE						1	1						SPACE	72
73	SPACE						1	1						SPACE	74
75	SPACE						1	1						SPACE	76
77	SPACE						1	1						SPACE	78
79	SPACE						1	1						SPACE	80
81	SPACE						1	1						SPACE	82
	SPACE						1	1						SPACE	84
	TION: 3										1				
	SPACE				_		1	1						SPACE	86
87	SPACE						1	1						SPACE	88
89 91	SPACE SPACE						1	1						SPACE SPACE	90
91	SPACE						1	1						SPACE	94
95	SPACE						1	1						SPACE	96
97	SPACE						1	1						SPACE	98
99	SPACE						1	1						SPACE	10
101	SPACE						1	1						SPACE	10
	SPACE						1	1						SPACE	10
	SPACE						1	1						SPACE	10
	SPACE						1	1						SPACE	10
							1	1						SPACE	11
	SPACE				-		1	1						SPACE	11
	SPACE SPACE						1	1						SPACE SPACE	11
							1	1						SPACE	11
	SPACE						1	1						SPACE	12
	SPACE						1	1						SPACE	12
							1	1						SPACE	12
	SPACE						1	1						SPACE	12
	SUBTOTAL	6,090	5,240	4,788				•	•	•	3,545	4,795	5,766	SUBTOTAL	
	TOTAL PHASE A - VA 9,635	LOAD		CONN. VA	4	DF		LOA				CONN. VA	DF		
	AMPS 80	COOLING				1.00			FRIG	<u> </u>			1.00	_	
	TOTAL PHASE B - VA 10,035 AMPS 84	HEATING LIGHTING		908		1 25	4 1		N/DISF	-			1.25	-	
	TOTAL PHASE C - VA 10,554	RECEPTA		7,920		1.25	4 1		STING				1.00	-	
	AMPS 88	MOTORS		122		1.07.5	1 1		3 MOT			2,486	1.25	TOTAL DEMAND	\neg
	TOTAL PNLBD - VA 30,224	SUPP HE		5,000		1.00	1 1		AW WC			_,	1.25	32,873 \	/A
		I I I I I I		, 0,000		1			~ · · · · · · · · · · · ·	• •			1.20	JZ,073 V	



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.:	19050.01a
Date:	05.06.22
Issued For:	PERMIT
	REVISIONS
No. Date	Description
1 10/02/2	BID PACKAGE #6
	_
	_
	_
	_
	_

REGISTRATION



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892 PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE CIVIL GBA LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL **ENGINEERS** STRUCTURAL BSE STRUCTRAL **ENGINEERS** PLUMBING HENDERSON

ENGINEERS

MECHANICAL HENDERSON **ENGINEERS** ELECTRICAL HENDERSON **ENGINEERS**

FIRE PROTECTION HENDERSON **ENGINEERS** CONTRACTOR GC

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 TEL 816.663.8700 FAX 816.663.8701 WWW.HENDERSONENGINEERS.COM 1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

FEED THRU CONNECTION: (2) Sets of 350kcmil

LTG TRACK - TRACK LENGTH

ELECTRICAL SCHEDULES

		LIGHT	ING CONTROL DEVICE SCHEDUL	.E		
			LINE-VOLTAGE WALL SWITCH OCCUPANCY SENSORS			
SYMBOL	MANUFACTURER	ALTERNATE		COVERAGE		
TAG	MODEL/SERIES	MANUFACTURER	DEVICE DESCRIPTION	(WXD)	VOLTAGE	NOTES
	LEGRAND	ACUITY, COOPER	WALL MOUNT PASSIVE INFRARED OCCUPANCY SENSOR.	MAJOR 30' x 35'	120/	
\$ ^{os}	PW-100	HUBBELL, LEVITON	INTEGRAL MANUAL OVERRIDE SWITCH. SINGLE RELAY. LINE VOLTAGE.	MINOR 15' x 20'	277	
4		LUTRON	LOAD: 120V=800W, 277V=1200W.			
			STAND-ALONE LOW-VOLTAGE LIGHTING CONTROL SYSTEMS			
			STAND-ALONE LOW-VOLTAGE OCCUPANCY SENSORS			
SYMBOL	MANUFACTURER	ALTERNATE		COVERAGE		
TAG	MODEL/SERIES	MANUFACTURER	DEVICE DESCRIPTION	(W X D)	VOLTAGE	NOTES
	LEGRAND	ACUITY, COOPER	CEILING MOUNT PASSIVE INFRARED OCCUPANCY SENSOR.	MAJOR 44' Ø	24	
	CI-300	HUBBELL, LEVITON	360 DEGREE COVERAGE. LOW VOLTAGE. ISOLATED RELAY.	MINOR 25' Ø		
	LEGRAND	COOPER, HUBBELL	CEILING MOUNT ULTRASONIC OCCUPANCY SENSOR.	24' x 24'	24	
	UT-300-1	LEVITON	360 DEGREE COVERAGE. LOW VOLTAGE. ISOLATED RELAY.			
			STAND-ALONE LOW-VOLTAGE POWER PACKS			
SYMBOL	MANUFACTURER	ALTERNATE				
TAG	MODEL/SERIES	MANUFACTURER	DEVICE DESCRIPTION		VOLTAGE	NOTES
	LEGRAND	ACUITY, COOPER	POWER PACK FOR LOW VOLTAGE OCCUPANCY SENSORS. 20A LOAD. (1) RELAY. MAN	IUAL-	120/	
	BZ-250	HUBBELL, LEVITON	AND AUTO-ON MODES. HOLD-ON AND -OFF INPUTS. LOAD: 16A AT 120V OR 277V.		277	
(P)			OUTPUT: 225mA AT 24V. PLENUM RATED.			
			STAND-ALONE LOW-VOLTAGE SWITCHES			
SYMBOL	MANUFACTURER	ALTERNATE				
TAG	MODEL/SERIES	MANUFACTURER	DEVICE DESCRIPTION		VOLTAGE	NOTES
	SUPERBRIGHT LEDS	ACUITY, COOPER	WALL MOUNT WIRELESS RGB LED CONTROLLER. LOW VOLTAGE.		24	
C	EZD-RGB-WM	HUBBELL, LEGRAND				
\$ ^c	EZD-4C8A					

GENERAL NOTES:

- A. OCCUPANCY SENSOR LAYOUT DESIGNED FROM BASIS-OF-DESIGN COVERAGE PATTERNS. IF SUBMITTING ALTERNATE PER 'EQUIVALENT MANUFACTURER' COLUMN, ADJUST SENSOR QUANTITIES AND LOCATIONS PER MANUFACTURER-SPECIFIC SPACING CRITERIA.
- B. PROVIDE SHOP DRAWINGS FOR ENGINEER AND ARCHITECT REVIEW THAT INCLUDE PRODUCT CUTSHEETS AND PROJECT-SPECIFIC LAYOUTS. LAYOUTS MUST INCLUDE SENSOR LOCATIONS, HEIGHTS, ORIENTATION, AND COVERAGE AREAS. SHOW COORDINATION WITH ALL OTHER CEILING DEVICES
- INCLUDING BUT NOT LIMITED TO HVAC SUPPLY AND RETURN GRILLES, SPRINKLERS, LIGHT FIXTURES, AND OTHER OWNER-PROVIDED CEILING MOUNTED DEVICES SUCH AS SPEAKERS, SECURITY CAMERAS, PROJECTORS, ETC. (SENSORS MAY BE ADVERSELY AFFECTED IF LOCATED TOO CLOSE TO OTHER
- CEILING MOUNTED DEVICES). ALSO PROVIDE SCHEMATICS AND SCHEDULES WHEN APPLICABLE. C. LIGHTING CONTROLS PRICING SHALL BE COMPLETELY SEPARATE OF ANY LIGHT FIXTURE PRICING.
- D. VERIFY COLOR(S) FOR ALL WALL AND CEILING MOUNTED DEVICES WITH THE ARCHITECT.
- E. ALL WALL SWITCH AND CEILING SENSORS SHALL HAVE AN ADJUSTABLE TIME DELAY RANGE OF 0-30 MIN, UNO. CONFIRM SENSOR SETTINGS WITH
- SEQUENCE OF OPERATIONS AND OWNER PRIOR TO SYSTEM COMMISSIONING.
- F. PROVIDE COPIES OF OPERATION AND MAINTENANCE INSTRUCTIONS FOR ALL DEVICES TO OWNER.
- G. PROVIDE A NEUTRAL CONDUCTOR TO ALL WALL SWITCH LOCATIONS PER NEC REQUIREMENTS.
- H. DO NOT SHARE NEUTRAL CONDUCTOR ON LOAD SIDE OF DIMMERS.

	VERS	ON

LIGHTING CONTROL PANEL SCHEDULE

PANEL N	AME:	LC1	MOUNTING:	SURFACE	
LOCATIO	N:	WEST ELECTRICAL ROOM	VOLTAGE:	120V	
RELAY	CIRCUIT	LOAD CONTROLLED	MODULE	LOAD	ZONE
			TYPE	(WATTS)	
1	WLH1-2	BREEZEWAY WEST COVE	ELV	316	
2	WLH1-4	WEST CANOPY DOWNLIGHTS	NON-DIM	627	
3	WLH1-22	BREEZEWAY CEILING	ELV	105	
4	WLH1-8	WEST EXTERIOR SCONCES	NON-DIM	324	
5	WLH1-12	NORTH PLANTERS RECEPTACLES	NON-DIM	1080	
6	WLH1-14	SOUTH PLANTERS RECEPTACLES	NON-DIM	1080	
7	WLH1-16	CENTRAL PLANTERS RECEPTACLES	NON-DIM	720	
8	WLH1-6	WEST EXTERIOR FLOODLIGHTS	NON-DIM	75	
9	WLH1-10	SOUTH EXTERIOR JUNCTION BOXES	NON-DIM	500	
10	WLHI-24	EXTERIOR AWNING STRIP LIGHTS	0-10V	300	
11		SPARE			
12		SPARE			

MODULE TYPE LEGEND: ELV = ELECTRONIC LOW VOLTAGE DIMMING MLV = MAGNETIC LOW VOLTAGE DIMMING NON-DIM = SWITCHING ONLY LOAD (NO DIMMING) FAN = FAN SPEED CONTROL

WITH LIGHTING CONTROL VENDOR AND FIELD CONDITIONS.

0-10V = 0-10V DIMMING2-WIRE = 2-WIRE DIMMING 3-WIRE = 3-WIRE DIMMING DMX = COLOR CHANGING DIMMING

MOTOR = MOTOR CONTROL RELAY NUMBERING ON SCHEDULE IS INTENDED TO COMMUNICATE DESIGN INTENT AND IS FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING FINAL RELAY CONFIGURATION

LIGHTING CONTROL PANEL SCHEDULE

544151 41		1.00	140111171110	011054.05	
PANEL N	AME:	LC2	MOUNTING:	SURFACE	
LOCATIO	N:	EAST ELECTRICAL ROOM	VOLTAGE:	120V	
RELAY	CIRCUIT	LOAD CONTROLLED	MODULE	LOAD	ZONE
			TYPE	(WATTS)	
1	ELH1-10	BREEZEWAY EAST COVE	ELV	316	
2	ELH1-4	EAST EXTERIOR FLOODLIGHTS	ELV	75	
3	ELH1-6	EAST EXTERIOR SCONCES	0-10V	324	
4	ELH1-12	EAST CANOPY DOWNLIGHTS	NON-DIM	456	
5	ELH1-16	NORTH PLANTERS RECEPTACLES	NON-DIM	720	
6	ELH1-18	SOUTH PLANTERS RECEPTACLES	NON-DIM	540	
7	EHH1-10,12	EXTERIOR PARKING LOT LIGHTS	NON-DIM	4500	
8	EHH1-14,16	EXTERIOR PARKING LOT LIGHTS	NON-DIM	4500	
9	ELH1-8	SOUTH EXTERIOR JUNCTION BOXES	NON-DIM	500	
10	ELH1-2	EXTERIOR AWNING STRIP LIGHTS	0-10V	360	
11		SPARE			
12		SPARE			

MODULE TYPE LEGEND: ELV = ELECTRONIC LOW VOLTAGE DIMMING MLV = MAGNETIC LOW VOLTAGE DIMMING NON-DIM = SWITCHING ONLY LOAD (NO DIMMING)

FAN = FAN SPEED CONTROL

WITH LIGHTING CONTROL VENDOR AND FIELD CONDITIONS.

0-10V = 0-10V DIMMING 2-WIRE = 2-WIRE DIMMING 3-WIRE = 3-WIRE DIMMING DMX = COLOR CHANGING DIMMING

MOTOR = MOTOR CONTROL RELAY NUMBERING ON SCHEDULE IS INTENDED TO COMMUNICATE DESIGN INTENT AND IS FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING FINAL RELAY CONFIGURATION

LIGHTING CONTROL PANEL SCHEDULE

PANEL NAME:		LC3	MOUNTING:	SURFACE	
LOCATIO	N:	2ND FLOOR ELECTRICAL ROOM	VOLTAGE:	120V	
RELAY	ELAY CIRCUIT LOAD CONTROLLED		MODULE	LOAD	ZOI
			TYPE	(WATTS)	
1	EHO1-67	RESTROOM LIGHTING	NON-DIM	742	
2	EHO1-73	LOBBY NORMAL LIGHTING	0-10V	646	
3	EHO1-75	LOBBY EMERGENCY LIGHTING	0-10V	86	
4	ELO1-6	LOBBY TRACK	ELV	208	
5	EHO1-62	SOUTH WEST PARAPET	NON-DIM	2744	
6	EHO1-64	NORTH WEST PARAPET	NON-DIM	2744	
7	EHO1-66	SOUTH EAST PARAPET	NON-DIM	2744	
8	EHO1-68	NORTH EAST PARAPET	NON-DIM	2744	

ELV = ELECTRONIC LOW VOLTAGE DIMMING MLV = MAGNETIC LOW VOLTAGE DIMMING NON-DIM = SWITCHING ONLY LOAD (NO DIMMING)

WITH LIGHTING CONTROL VENDOR AND FIELD CONDITIONS.

0-10V = 0-10V DIMMING 2-WIRE = 2-WIRE DIMMING 3-WIRE = 3-WIRE DIMMING DMX = COLOR CHANGING DIMMING

FAN = FAN SPEED CONTROL MOTOR = MOTOR CONTROL

RELAY NUMBERING ON SCHEDULE IS INTENDED TO COMMUNICATE DESIGN INTENT AND IS FOR INFORMATIONAL PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING FINAL RELAY CONFIGURATION

LIGHT FIXTURE SCHEDULE

					1 1/\ 1	OIL	3011	IEDULE
TYPE	MANUFACTURER / MODEL #	APPROVED ALTERNATES	LAMPING / LIGHT SOURCE	DIMMING TYPE	VOLTAGE	INPUT WATTS	INPUT VA	DESCRIPTION
C1	VIBIA - DUO - 4870 4870-18	-	LED 90 CRI, 2700K	0-10V	UNV (120-277V)	31	34	19" ROUND LED SURFACE MOUNT DOWNLIGHT, ALUMINUM HOUSING WITH WOOD SHADE, UNIVERSAL VOLTAGE (120-277V) 0-10V DIMMING DRIVER, 1705 LUMENS, 2700K CCT, 90 CRI, BLACK FINISH
C2	VIBIA - DUO - 4872	-	1705 LUMENS LED	0-10V	UNV	62	69	31" ROUND LED SURFACE MOUNT DOWNLIGHT, ALUMINUM HOUSING WITH WOOD SHADE, UNIVERSAL VOLTAGE
	4872-18		90 CRI, 2700K 4032 LUMENS		(120-277V)			(120-277V) 0-10V DIMMING DRIVER, 4032 LUMENS, 2700K CCT, 90 CRI, BLACK FINISH
C3	VIBIA - DUO - 4880 4880-18	-	LED 90 CRI, 2700K 1705 LUMENS	0-10V	UNV (120-277V)	31	34	28" ROUND LED SURFACE MOUNT DOWNLIGHT, ALUMINUM HOUSING WITH WOOD SHADE, UNIVERSAL VOLTAGE (120-277V) 0-10V DIMMING DRIVER, 1705 LUMENS, 2700K CCT, 90 CRI, BLACK FINISH
D1	FOCAL POINT - ID+ TRIMLESS FLC4D-RT-1000L-UNV-LD1 LC4-RT-1000L-835K-DN-FL2-CD	-	LED 80 CRI, 3500K 1000 LUMENS	0-10V	UNV (120-277V)	11	12	4" TRIMLESS LED DOWNLIGHT, ALUMINUM HOUSING, UNIVERSAL VOLTAGE (120-277V) 0-10V DIMMING DRIVER, 1000 LUMENS, 3500K CCT, 80 CRI, 50 DEGREE CUT-OFF, FLOOD 2 DISTRIBUTION WITH CLEAR DIFFUSE LENS
D1E	FOCAL POINT - ID+ TRIMLESS FLC4D-RT-1000L-UNV-LD1-EM LC4EM-RT-1000L-835K-DN-FL2-CD	-	204,000 HRS LED 80 CRI, 3500K 1000 LUMENS	0-10V	UNV (120-277V)	11	12	SAME AS FIXTURE TYPE D1 EXCEPT WITH INTEGRAL 7 WATT EMERGENCY BATTERY CAPABLE OF PROVIDING AT LEAST 650 LUMENS FOR 90 MINUTES, UL 924 LISTED. H
EM1	EELP - OMEL OMEL-10W-W-EM-CC-SD	-	204,000 HRS LED	N/A	UNV (120-277V)	10	10	ARCHITECTURAL MULLION MOUNTED LED EMERGENCY EGRESS LIGHT, ALUMINUM HOUSING, UNIVERSAL VOLTAGE (120-277V) DRIVER, INTEGRAL BATTERY PACK CAPABLE OF PROVIDING AT LEAST 90 MINS OF RUN TIME, UL 924 LISTED SELF DIAGNOSTIC, CUSTOM COLOR
F1	BEULUX - FLORENCE - RGBW CT02-F-RGB-IP20	-	LED RGB	0-10V	277-24V	7.3 PER FT	8.1 PER FT	RGB LED TAPE LIGHT, CT02 SURFACE MOUNT ALUMINUM EXTRUSION, 277-24V 0-10V DIMMING DRIVER, SATINED LENS, 330 LUMENS PER FOOT
F2	FOCAL POINT - SEEM 2	-	330 LUMENS/FT LED	0-10V	UNV	4.75	5.2 DED ET	RECESSED WET LOCATION LED COVE LIGHT, ALUMINUM HOUSING, UNIVERSAL VOLTAGE (120-277V) 0-10V DIMMING 2 DRIVER 275 LUMENS DED FOOT 3500K CCT 20 CRI. HARD SUBFACE MOUNTING HARDWARE WHITE FINISH
	FSM2LWL-FL-375LF-35K-1C-UNV-LD1-XFN-FW-WH-XX		80 CRI, 3500K 375 LUMENS/FT 270,000 HRS	2.404	(120-277V)	PER FT	PER FT	
F3	DIODE LED - NEON BLAZE 24V-SE-NBL2-35-32		LED 80 CRI, 3500K 120 LUMENS/FT	0-10V	24V	2.44 PER FT	2.73 PER FT	WET LOCATION FLEXIBLE LED STRIP LIGHT, DIFFUSED LIGHT OUTPUT PROVIDE WITH 60W DRIVER PER 20 FEET OF FIXTURE LENGTH
F4	EATON - METALUX - SNLED LENSED 4SNLED-LD5-29SL-SLW-UNV-L840-CD1	-	LED 80 CRI, 4000K 2900 LUMENS 60,000 HRS	0-10V	UNV (120-277V)	25	28	4 FT LED STRIP LIGHT, COLD ROLLED STEEL HOUSING, FROSTED SQUARE LENS, UNIVERSAL (120-277V) 0-10V DIMMING DRIVER, 2900 LUMENS, 4000K CCT, 80 CRI
F4E	EATON - METALUX - SNLED LENSED 4SNLED-LD5-29SL-SLW-UNV-EL14W-L840-CD1	-	LED 80 CRI, 4000K 2900 LUMENS 60,000 HRS	0-10V	UNV (120-277V)	25	28	SAME AS FIXTURE TYPE F4 EXCEPT WITH INTEGRAL 14 WATT EMERGENCY BATTERY AND TEST / INDICATOR LIGHT CAPABLE OF PROVIDING AT LEAST 1600 LUMENS FOR 90 MINUTES. UL 924 LISTED.
F8	EATON - METALUX - SNLED LENSED 8TSNLED-LD5-70SL-SLW-UNV-L840-CD1	-	LED 80 CRI, 4000K 7000 LUMENS 60,000 HRS	0-10V	UNV (120-277V)	61	68	8 FT LED STRIP LIGHT, COLD ROLLED STEEL HOUSING, FROSTED SQUARE LENS, UNIVERSAL (120-277V) 0-10V DIMMING DRIVER, 7000 LUMENS, 4000K CCT, 80 CRI
F9	LITELINE - LUNA LED RA2S-7F-BK		LED 90 CRI, 4000K 560 LUMENS	ELV	120	7	7.9	RECESSED 2" SQUARE, ALUMINUM HOUSING, 40 DEGREE BEAM SPREAD , SUITABLE FOR WET LOCATIONS PROVIDE ADD ALTERNATE FOR FULL RANGE RGB VERSION
F8E	EATON - METALUX - SNLED LENSED 8TSNLED-LD5-70SL-SLW-UNV-EL14W-L840-CD1	-	LED 80 CRI, 4000K 7000 LUMENS	0-10V	UNV (120-277V)	61	68	SAME AS FIXTURE TYPE F8 EXCEPT WITH INTEGRAL 14 WATT EMERGENCY BATTERY AND TEST / INDICATOR LIGHT CAPABLE OF PROVIDING AT LEAST 1600 LUMENS FOR 90 MINUTES. UL 924 LISTED.
L4	EATON - CORELITE - CONTINUA WALL LED CTW-F-2575-40L-835-1D-UNV-STD-W-WM-4	-	60,000 HRS LED 80 CRI, 3500K 4000 LUMENS	0-10V	UNV (120-277V)	35	39	4 FT LED DIRECT / INDIRECT WALL MOUNT STRIP FIXTURE, ALUMINUM HOUSING WITH FROSTED LENS, UNIVERSAL VOLTAGE (120-277V) 0-10V DIMMING DRIVER, 25% UP - 75% DOWN DISTRIBUTION, 4000 LUMENS, 3500K CCT, 80 CRI WHITE FINISH
L4E	EATON - CORELITE - CONTINUA WALL LED CTW-F-2575-40L-835-1D-UNV-STD-BSL6-W-WM-4	-	121,000 HRS LED 80 CRI, 3500K 4000 LUMENS	0-10V	UNV (120-277V)	35	39	SAME AS FIXTURE TYPE L4 EXCEPT WITH INTEGRAL 6 WATT EMERGENCY BATTERY PACK CAPABLE OF PROVIDING AT LEAST 690 LUMENS FOR 90 MINUTES. UL 924 LISTED.
P1	EATON - PORTFOLIO - LSR8B LSR8B10D010MB-EC8B10208035-8LBM3B- P836MB-SP60	-	121,000 HRS LED 80 CRI, 3500K 1000 LUMENS	0-10V	UNV (120-277V)	11	12	8 INCH ROUND DECORATIVE SURFACE MOUNT CYLINDER, ALUMINUM HOUSING, UNIVERSAL VOLTAGE (120-277V) DIMMING DRIVER, 1000 LUMENS, 3500K CCT, 80 CRI, MATTE BLACK FINISH WITH SPECULAR BLACK MEDIUM DISTRIBUTION REFLECTOR, 60" MATTE BLACK PENDANT STEM KIT
P2	EATON - PORTFOLIO - LSR8B LSR8B20D010MB-EC8B10208035-8LBM3B- P836MB-SP60	-	50,000 HRS LED 80 CRI, 3500K 2000 LUMENS	0-10V	UNV (120-277V)	21	23	8 INCH ROUND DECORATIVE SURFACE MOUNT CYLINDER, ALUMINUM HOUSING, UNIVERSAL VOLTAGE (120-277V) DIMMING DRIVER, 2000 LUMENS, 3500K CCT, 80 CRI, MATTE BLACK FINISH WITH SPECULAR BLACK MEDIUM DISTRIBUTION REFLECTOR, 60" MATTE BLACK PENDANT STEM KIT
P3	BARBICAN - SALSA 16-2001-52D-42H-XX-SM-BLK-9W/LF-277V-3500K-	-	50,000 HRS LED 90 CRI, 3500K	0-10V	277V	18	20	DECORATIVE LED PENDANT FIXTURE, FABRIC PETAL SHADES OVER ALUMINUM HOUSING, 277V 0-10V DIMMING DRIVER, 900 LUMENS, 3500K CCT, 90 CRI, BLACK STEM AND CANOPY
Т	90CRI-DB(0-10V) HALO SINGLE CIRCUIT TRACK L653-P/MB	-	900 LUMENS TRACK	-	120	-	-	COORDINATE FABRIC FINISH WITH ARCHITECT AND OWNER PRIOR TO ORDERING SINGLE CIRCUIT LINE VOLTAGE TRACK (W)/(B) ON PLAN INDICATES WHITE OR BLACK FINISH
T1	HALO MINI SERIES L812 TRACK HEAD L-812-11-NF-90-35-P/MB	-	LED 90 CRI. 3500K	ELV	120	15.5	17	LED MINI TRACK HEAD. (W)/(B) ON PLAN INDICATES WHITE OR BLACK FINISH
W1	TECH LIGHTING - KENWAY WALL	-	LED	0-10V	277V	11	12	17 INCH TALL WALL MOUNTED LED VANITY FIXTURE, ALUMINUM HOUSING WITH ACRYLIC SHADE, 277 VOLT 0-10V
WL-1	700WSKNWBLED930-277 LIGHTWAY	-	90 CRI, 3000K 734 LUMENS 50,000 HRS LED	0-10V	UNV	27	31	DIMMING DRIVER, 734 LUMENS, 3000K CCT, 90 CRI, MATTE BLACK FINISH EXTERIOR LED DECORATIVE WALL SCONCE, SATING BLACK, STEEL HOUSING, CUSTOM ACCENT MATERIAL
	MERW-638-LED-2-X-B1-SC		80 CRI, 3000K		(120-277V)			
WL-2	MOVIT - RECTANGULAR S.3000W-JB-REM-01 REMOTE DRIVER - 4548-0024-025-UNV-ND	-	LED 90 CRI, 3000K 700 LUMENS	NON-DIM	UNV (120-277V)	12.5	14	SURFACE MOUNTED, SURFACE SLIM FLOODLIGHT PROJECTOR, ASYMMETRICAL, INDIRECT PROVIDE ADD ALTERNATE FOR FULL RANGE RGB VERSION
WL-4	SENIK G4 PZM-WWG4-120/277-3000K-WH-25	-	LED 3000K 4800 LUMENS	NON-DIM	UNV (120-277V)	98	110	HEAVY DUTY 4FT LINEAR WALL WASHER PROVIDE ADD ALTERNATE FOR FULL RANGE RGB VERSION
X1A	EATON - SURE-LITES - ES SERIES ES7-1-70-S-BL-G-W	-	LED	N/A	UNV (120-277V)	2	3.2	LED EDGE LIT SURFACE WALL MOUNT EXIT SIGN, STEEL HOUSING, GREEN LETTERS ON HIGH IMPACT ACRYLIC PANEL SINGLE FACE, NO CHEVRONS, BLACK FINISH. INTEGRAL BATTERY BACKUP CAPABLE OF PROVIDING AT LEAST 90 MINUTES OF RUN TIME, UL 924 LISTED.
X1B	EATON - SURE-LITES - ES SERIES ES7-1-70-S-BL-G-C	-	LED	N/A	UNV (120-277V)	2	3.2	LED EDGE LIT SURFACE CEILING MOUNT EXIT SIGN, STEEL HOUSING, GREEN LETTERS ON HIGH IMPACT ACRYLIC PANEL, SINGLE FACE, NO CHEVRONS, BLACK FINISH. INTEGRAL BATTERY BACKUP CAPABLE OF PROVIDING AT LEAST 90 MINUTES OF RUN TIME, UL 924 LISTED.
X1C	EATON - SURE-LITES - ES SERIES ES7-2-70-S-BL-G-DA-C	-	LED	N/A	UNV (120-277V)	2	3.2	LED EDGE LIT SURFACE CEILING MOUNT EXIT SIGN, STEEL HOUSING, GREEN LETTERS ON HIGH IMPACT ACRYLIC PANEL, DOUBLE FACE, DOUBLE CHEVRONS, BLACK FINISH. INTEGRAL BATTERY BACKUP CAPABLE OF PROVIDING AT LEAST 90 MINUTES OF RUN TIME, UL 924 LISTED.
X2	EATON - SURE-LITES - LPX SERIES LPX7SD	-	LED	N/A	UNV (120-277V)	1	1	LED EXIT SIGN, GREEN LETTERING ON WHITE HIGH IMPACT POLYCARBONATE HOUSING, INTEGRAL BATTERY BACKUP CAPABLE OF PROVIDING AT LEAST 90 MINUTES OF RUN TIME, SELF DIAGNOSTIC, UL 924 LISTED.

A. REFER TO LIGHT FIXTURE SCHEDULE GENERAL NOTES AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

2. CONTRACTOR TO FIELD VERIFY AND COORDINATE LENGTHS WITH ARCHITECT PRIOR TO ORDERING.

1. COORDINATE LIGHT FIXTURE FINISH COLOR WITH ARCHITECT, GENERAL CONTRACTOR AND CURTAIN WALL SYSTEM MANUFACTURER PRIOR TO ORDERING.

LIGHT FIXTURE SCHEDULE GENERAL NOTES:

- 1. ALL LIGHT FIXTURES AND RELATED COMPONENTS SHALL BE PROVIDED BY THE CONTRACTOR, UNLESS NOTED OTHERWISE.
- 2. THE PARTY SUPPLYING THE LIGHT FIXTURES IS RESPONSIBLE FOR SUPPLYING THE PROPER QUANTITY OF LIGHT FIXTURES.

LIGHT FIXTURE SCHEDULE SUPPLEMENTAL **SPECIFICATIONS**:

- 1. ANY PROPRIETARY, SOLE-SOURCED LIGHT FIXTURE LISTED IN THE LIGHT FIXTURE SCHEDULE SHALL BE UNIT PRICED ONLY. NO PACKAGING OR LOT PRICING OF THESE LIGHT FIXTURES SHALL BE ALLOWED. UNIT PRICES SHALL BE CLEARLY IDENTIFIED ON THE BID FORM.
- 2. PACKAGING OF LIGHT FIXTURES WILL NOT BE CONSIDERED OR APPROVED. REPRESENTATIVE AGENTS SHALL BE ALLOWED TO OFFER MINI-LOT PRICING (MLP) FOR LIGHT FIXTURES AS ALLOWED IN ELECTRICAL SPECIFICATIONS.
- 3. LIGHTING CONTROLS PRICING, INCLUDING BUT NOT LIMITED TO THOSE REFERENCED IN ELECTRICAL SPECIFICATIONS, SHALL BE COMPLETELY SEPARATE OF ANY LIGHT FIXTURE PRICING. ANY LIGHTING CONTROLS PRICING THAT IS SUBMITTED WITH LIGHT FIXTURE PRICING (UNIT OR MINI-LOT) WILL BE IMMEDIATELY REJECTED IN ITS ENTIRETY.
- 4. CATALOG NUMBERS SHALL NOT BE CONSIDERED COMPLETE AND MATERIAL SHALL NOT BE ORDERED BY MANUFACTURER AND CATALOG NUMBERS ONLY. FIRST READ THE COMPLETE DESCRIPTION, NOTES AND SPECIFICATIONS IN CONJUNCTION WITH THE CATALOG NUMBER TO DETERMINE THE MATERIAL AND ACCESSORIES TO BE ORDERED. THE MANUFACTURERS LISTED ARE THE BASIS FOR THE DESIGN.
- 5. FOR SUBSTITUTIONS: PROVIDE PHOTOMETRIC CALCULATIONS AND OTHER NECESSARY INFORMATION FOR ENGINEER REVIEW. REFER TO SPECIFICATIONS FOR MORE INFORMATION.
- 6. COORDINATE LIGHT FIXTURE MOUNTING HARDWARE AND TRIMS NEEDED TO SUIT CEILING CONDITIONS. LIGHT FIXTURES NEAR OR IN CONTACT WITH INSULATION SHALL COMPLY WITH CODE. MAINTAIN 3" MINIMUM WORKING CLEARANCE BETWEEN NON-IC RATED LIGHT FIXTURE HOUSINGS AND INSULATION ON ALL ADJACENT DUCTWORK, PIPING, WALLS, AND CEILINGS.
- 7. STRIP LIGHT FIXTURES SUBJECT TO DAMAGE, INCLUDING THOSE MOUNTED ON EQUIPMENT MEZZANINES, STORAGE, RECEIVING AND STOCKROOM AREAS, SHALL BE PROVIDED WITH WIRE GUARDS, PROTECT-A-LAMP COVERS OR EQUIVALENT SHIELDED OR SHATTERPROOF LAMPS/LIGHT SOURCES. COORDINATE REQUIREMENTS AND AFFECTED LIGHT FIXTURES WITH OWNER.



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO Project No.: 19050.01a 05.06.22 Issued For: PERMIT

REVISIONS 10/02/20 BID PACKAGE #6

REGISTRATION



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CIVIL

LANDSCAPE LAND 3

BSE STRUCTURAL FOUNDATIONS **ENGINEERS**

STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON

ENGINEERS

MECHANICAL HENDERSON

ELECTRICAL

ENGINEERS FIRE PROTECTION HENDERSON

HENDERSON

CONTRACTOR GC

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 TEL 816.663.8700 FAX 816.663.8701 WWW.HENDERSONENGINEERS.COM

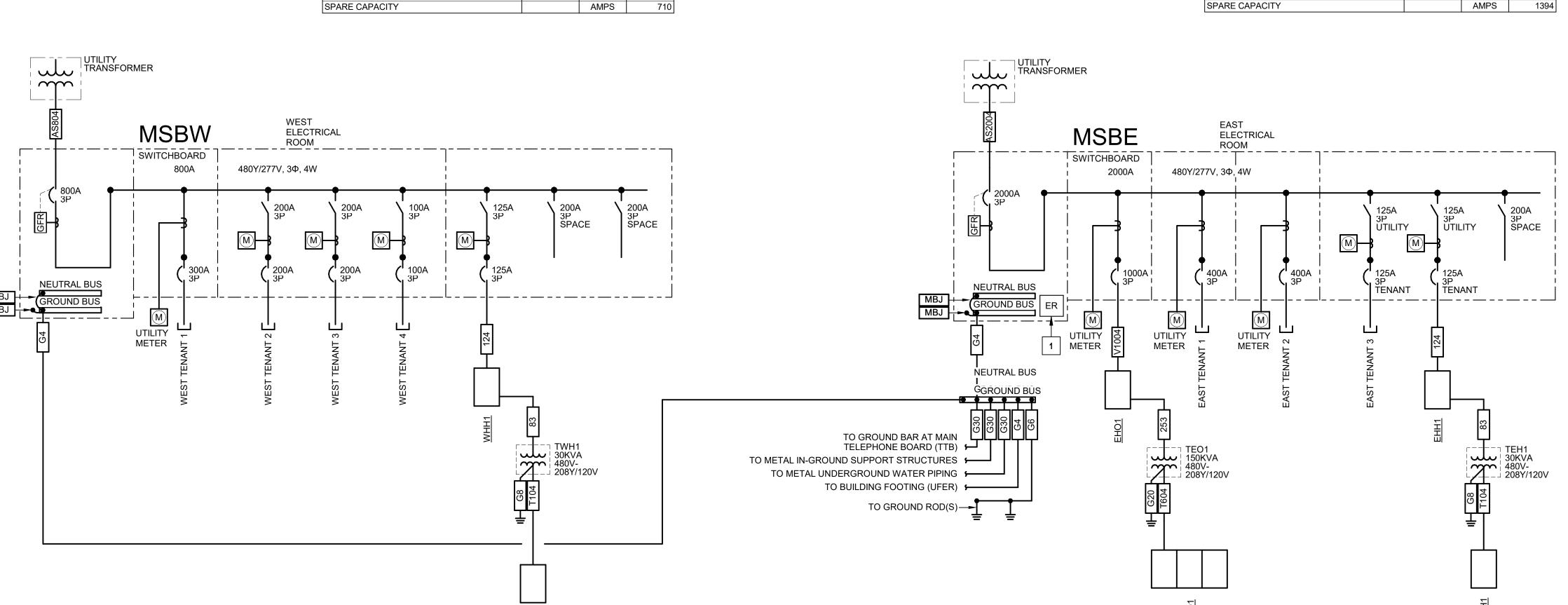
MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

ELECTRICAL

Short-Circuit and Voltage Drop Calculations Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance The following calculations are based on the "Point-by-Point" method where: VOLTAGE DROP (3Ø): $ISC(2) = ISC(1) \times M(1)$ $f(3\emptyset) = 1.732 \times L \times lsc$ XFMR: $f(3\emptyset) = IP(sca)x Vp x 1.73 x \%Z$ %VD= ((R x cos(arccos(pf)) + X x sin (arccos(pf))) x L/# x I x 1.73) / E IS(sca) = Vp x M x IP(sca)ISC (1) = short circuit current at fault point 1 100,000 x KVA VOLTAGE DROP (1Ø): СхЕ ISC (2) = short circuit current at fault point 2 %VD= ((R x cos(arccos(pf)) + X x sin(arccos(pf))) x 2 x L/# x I) / E $f(1\emptyset) = 2 \times L \times lsc$ XFMR: $f(1\emptyset) = IP(sca)x Vp x \%Z$ 100,000 x KVA CxE IP = Primary short circuit current Vp = Primary voltage IS= Secondary short circuit current %VD CUM= Cumulative Voltage Drop from Fault Point 1 to Fault Point # R= resistance in ohms per LF Vs= Secondary voltage L = Length of circuit E = Line to line volts X= reactances in ohms per LF C = "C" Factor from Bussman table where "C" = 1 / impedance per linear foot Feeder Types = NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer Date of Calculations: Sept 11 201 System Voltage: 480Y/277V - 3 phase Transformer Conductor 'C' Busway 'C' L-L Voltage Circuit Load Power Circuit Load Power (Amperage) Cumulative Fault Source Isc Point (F#) Quantity of Parallel Sets and Bus/ Phase Value Value (E) **Bus/Feeder Description** (Fault Phase Current Voltage Drop Point New Xfmr | Existing | Secondary Resistance Reactance Factor (pf) (Amperage) Drop (%VD) (amps) Type (%VD) (amps) Xfmr Ž Voltage & Neutral Size (X) 1 Utility Service Point 10.472 at the secondary of the utility transformer Source Isc + 6X Motor Contribution = 240 The connected full load motor amps (includes compressors) on the system Motor Contribution 2 At Switchboard MSBW 11912 NM AL 3 Set(s) of 400 kcmil 0.000054 0.000040 0.451027 3/0 AWG 0.000079 0.000052 0.451027 0.074 0.93 9771 -0.14% -1.02% 3 At Panelboard WHH1 10491 1 Set(s) of 12844 M CU 0.000310 0.000060 0.451027 0.046 0.96 9338 -0.02% -1.05% 4 At Transformer TWH1 1 Set(s) of 5 Thru Transformer TWH1 6.314 0.14 2946 -1.05% 5 3 2946 M CU 1 Set(s) of 3 AWG 6 At Panelboard WLH1 208 5 0.9 80 0.000250 0.000059 0.451027 0.026 | 0.97 | 2872 | -0.08% | -1.13% | 6 Short-Circuit and Voltage Drop Calculations Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance The following calculations are based on the "Point-by-Point" method where: VOLTAGE DROP (3Ø): $ISC(2) = ISC(1) \times M(1)$ $f(3\emptyset) = 1.732 \times L \times lsc$ %VD= ((R x cos(arccos(pf)) + X x sin (arccos(pf))) x L/# x I x 1.73) / E XFMR: $f(3\emptyset) = IP(sca)x Vp x 1.73 x \%Z$ IS(sca)= Vp x M x IP(sca) ISC (1) = short circuit current at fault point 1 100,000 x KVA VOLTAGE DROP (1Ø): СхЕ ISC (2) = short circuit current at fault point 2 XFMR: $f(1\emptyset) = IP(sca)x Vp x \%Z$ %VD= ((R x cos(arccos(pf)) + X x sin(arccos(pf))) x 2 x L/# x I) / E $f(1\emptyset) = 2 \times L \times lsc$ 100,000 x KVA CxE IP = Primary short circuit current Vp = Primary voltage %VD CUM= Cumulative Voltage Drop from Fault Point 1 to Fault Point # IS= Secondary short circuit current Vs= Secondary voltage R= resistance in ohms per LF L = Length of circuit X= reactances in ohms per LF E = Line to line volts C = "C" Factor from Bussman table where "C" = 1 / impedance per linear foot NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer Date of Calculations: Sept 11 2019 System Voltage: 480Y/277V - 3 phase | Conductor 'C' | Busway 'C' | L-L Voltage | Length (L) Cumulative Fault Voltage Drop (%VD) Load Power | Circuit Load Source Isc Point (F#) **Bus/Feeder Description** Voltage Drop New Xfmr | Existing | Secondary Quantity of Parallel Sets and Bus/ Phase Resistance Reactance Factor (pf) (Amperage) (%VD) (amps) & Neutral Size 1 Utility Service Point Source Isc + 6X Motor Contribution = 31,415 at the secondary of the utility transformer Motor Contribution 600 The connected full load motor amps (includes compressors) on the system 2 At Switchboard MSBE 0.000036 0.000039 -0.69% -0.69% 6 Set(s) of 30981 30981 0.000025 0.000048 0.451027 0.535 20177 -1.90% 3 At Panelboard EHO1 3 Set(s) of 600 kcmil 0.65 -1.21% 4 At Transformer TEO1 20177 Set(s) of 250 kcmil 0.000052 0.022 0.98 19741 -0.03% -1.92% 5 Thru Transformer TEO1 -1.92% 19741 3.786 0.21 9519 6 At Panelboard ELO1 2 Set(s) of 350 kcmil 19704 0.000039 0.000050 0.451027 0.010 0.99 9424 -0.06% -1.98% 7 At Panelboard EHH1 1 Set(s) of 1 AWG 7293 -0.81% 30981 M CU 480 20 0.000160 0.000057 0.451027 0.307 | 0.77 | 23712 | -0.12% 0.112 0.90 21316 -0.02% -0.83% 7 3 23712 8 At Transformer TEH1 1 Set(s) of 4 AWG 40 0.000310 0.000060 0.451027 9 Thru Transformer TEH1 8 3 21316 TX -0.83% 14.413 0.06 3191 10 At Panelboard ELH1 METER SOCKET METER SOCKET (BY CONTRACTOR) -(BY CONTRACTOR) METER METER (BY UTILITY) (BY UTILITY) - METERING CONDUCTORS (BY UTILITY) METERING CONDUIT (BY CONTRACTOR) SERVICE POINT SECONDARY PANELBOARD MSBW LOAD SUMMARY PANELBOARD MSBE LOAD SUMMARY TERMINATIONS AT TRANSFORMER 480Y/277V, 3PH, 4W (BY UTILITY) LOAD DESCRIPTION Connected | Demand | Demand LOAD DESCRIPTION PRIMARY TERMINATIONS AT KVA FACTOR KVA TRANSFORMER (BY UTILITY) HVAC - SUMMER HVAC - SUMMER 100% HVAC - WINTER 59.60 100% 59.60 HVAC - WINTER CONCRETE PAD 125% LIGHTING LIGHTING (BY CONTRACTOR) RECEPTACLES RECEPTACLES 5.40 | 100%;50% | - SECONDARY CONDUCTOR TERMINATIONS AT MSB KITCHEN EQUIPMENT 65% 0.00 KITCHEN EQUIPMENT 0.00 - PRIMARY CONDUITS AND TRENCH (BY CONTRACTOR) 100% MOTOR LOADS MOTOR LOADS (BY CONTRACTOR) *** SECONDARY TRENCH LARGEST MOTOR LOAD 0.00 125% LARGEST MOTOR LOAD - PRIMARY CONDUCTORS AND BACKFILL SUPPLEMENTAL ELECTRIC HEAT SUPPLEMENTAL ELECTRIC HEAT 100% (BY UTILITY) (BY CONTRACTOR) MISCELLANEOUS EQUIPMENT 100% MISCELLANEOUS EQUIPMENT 4.09 4.09 - SECONDARY CONDUITS DISPLAY CASE REFRIGERATION EQUIPMENT 100% 0.00 (BY CONTRACTOR) SECONDARY CONDUCTORS SHOW WINDOW SHOW WINDOW 0.00 PER NEC (BY CONTRACTOR) **EXTERIOR LIGHTING** 2.34 125% EXTERIOR LIGHTING TOTAL LOAD TOTAL LOAD 73.95 KVA 3 UTILITY COORDINATION DETAIL 12" = 1'-0" 88.95 AMPS TOTAL AMPACITY TOTAL AMPACITY 90.05 PANEL AMPACITY PANEL AMPACITY 800 AMPS 800.00 AMPS SPARE CAPACITY SPARE CAPACITY WEST **MSBW MSBE** ELECTRICAL ELECTRICAL SWITCHBOARD ROOM ROOM SWITCHBOARD 800A 480Y/277V, 3Ф, 4W 2000A 480Y/277V, 3Φ, 4W 200A 100A 200A SPACE 300A 100A 200A 200A 1000A I 400A I **4**00A **NEUTRAL BUS** - - --- - -GROUND BUS FR

(2) WEST ELECTRICAL SERVICE ONE-LINE DIAGRAM NTS



ONE-LINE DIAGRAM GENERAL NOTES: **CIRCUIT SCHEDULE:** ALL CONDUCTOR SIZES ARE BASED ON 1. THE INFORMATION SHOWN IN THE SHORT-CIRCUIT AND VOLTAGE DROP

E H H 1

75 DEG C RATED TERMINATIONS. COPPER

FEEDER TAG FEEDER DESCRIPTION

83 (3)#4, (1)#8 G, 1" C

124

253

G6

G8

G30

T604

SPACE

SUFFIX

480Y/277V, 3PH, 4W

Connected | Demand | Demand

KVA FACTOR KVA

11.70 100%;50%

3.60 PER NEC

626.04 KVA

753.01 AMPS

2000 AMPS

267.82

6.32

0.00

132.33

22.45

17.90

23.38

1 EAST ELECTRICAL SERVICE ONE-LINE DIAGRAM NTS

100%

100%

125%

65%

100%

125%

100%

100%

125%

125%

267.82

10.85

0.00

132.33

28.06

6.20

17.90

0.00

503.88

606.07

2000.00

CONDUCTORS ARE BASED ON THHN/THWN-2

(4)#1, (1)#6 G, 1-1/2" C

AS804 (3) 3"C, EACH W/ (4)-400 kcmil

G20 #2/0 COPPER GROUND, 3/4" (

T104 (4)#3, (1)#8 SSBJ, 1-1/4" C

PREFIX E EAST DISTRIBUTION -

208Y/120V

PANFI 1

PANEL 2

VOLTAGE H 480Y/277V

(3)-250 kcmil, (1)#4 G, 2" C

AS2004 (6) 3-1/2" C, EACH W/ (4)-600 kcmil

#4 COPPER GROUND, 3/4" C

#6 COPPER GROUND, 3/4" C

#8 COPPER GROUND, 3/4" C

#3/0 COPPER GROUND, 1" C

ELECTRICAL PANELBOARD NAMING CONVENTION

W WEST DISTRIBUTION

H HOUSE DISTRIBUTION -

OFFICE DISTRIBUTION

TENANT DISTRIBUTION

(2) 3" C, EACH W/ (4)-350 kcmil, (1)#2 SSBJ

V1004 (3) 3-1/2" C, EACH W/ (4)-600 kcmil, (1)#4/0 G

INSULATION. ALUMINUM CONDUCTORS (PREFIX "A")

ARE BASED ON XHHW-2 INSULATION. FOR ANY OTHER

CONDITIONS ALLOWED PER SPECIFICATIONS, OR FOR

THAN 75 DEG C, MODIFY SIZES ACCORDING TO NFPA 70.

TERMINATIONS OR INSULATION TYPES RATED LESS

CALCULATIONS SCHEDULE IS SHOWN FOR CALCULATION PURPOSES ONLY. CONTRACTOR SHALL NOT USE THE CONDUIT TYPES, CONDUCTOR TYPES, SIZES, QUANTITIES OR LENGTHS FOR TAKEOFFS OR BIDDING PURPOSES. CONTRACTOR SHALL NOTIFY ENGINEER OF ANY CONFLICTS BETWEEN THIS SCHEDULE AND OTHER PORTIONS OF THE CONSTRUCTION DOCUMENTS. CONTRACTOR SHALL NOTIFY ENGINEER OF AS-BUILT CONDITIONS THAT CONSTITUTE A CHANGE FROM WHAT IS SHOWN BELOW; THIS INCLUDES CONDUCTOR LENGTHS DIFFERING BY MORE THAN 10%.

2. REFER TO THE SHORT-CIRCUIT AND VOLTAGE DROP CALCULATIONS TABLE ON THIS SHEET. AVAILABLE FAULT CURRENT INFORMATION IS LISTED UNDER THE "FAULT CURRENT" COLUMN, VOLTAGE DROP VALUES ARE LISTED UNDER THE "CUMULATIVE VOLTAGE DROP" COLUMN. THE AIC/SCCR RATING OF THE EQUIPMENT SHALL NOT BE LESS THAN THE AVAILABLE 3-PHASE SYMMETRICAL FAULT CURRENT. ALL SERIES RATED

EQUIPMENT SHALL BE PROPERLY LISTED AND LABELED PER CODE. . FEEDER NUMBER DESIGNATIONS PRECEDED BY "V" INDICATE THAT THE CONDUCTORS ARE UP-SIZED DUE TO VOLT-DROP CONSIDERATIONS. PROVIDE LUG ADAPTERS AS NEEDED IN ORDER TO PROPERLY LAND

4. FEEDER SIZES ARE BASED ON COPPER (CU) THHN/THWN-2 INSULATION. UNLESS NOTED OTHERWISE. CONDUIT SIZES SHOWN ARE APPROPRIATE FOR SCHEDULE 40 PVC, EMT, GRS, IMC AND RMC; ADJUST SIZE AS NEEDED FOR OTHER RACEWAY TYPES. NUMBER DESIGNATIONS PRECEDED BY "A" INDICATE THAT THE SIZE IS BASED ON ALUMINUM (AL) WIRE. AL CONDUCTOR SIZES ARE BASED ON XHHW-2 INSULATION. UNLESS NOTED OTHERWISE. AL WIRE MAY BE SUBSTITUTED FOR CU FEEDERS AS ALLOWED BY CODE, SPECIFICATIONS AND OWNER, UNLESS NOTED OTHERWISE. AT CONTRACTOR'S OPTION, CU WIRE MAY BE SUBSTITUTED FOR AL, UNLESS NOTED OTHERWISE. ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATIONS, UNLESS NOTED OTHERWISE. FOR ANY OTHER CONDITIONS MODIFY SIZES PER CODE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

CONDUCTORS AT TERMINATION(S).

5. BRANCH CIRCUIT SIZES ARE BASED ON COPPER (CU) THHN/THWN-2 INSULATION, UNLESS NOTED OTHERWISE. CONDUIT SIZES SHOWN ARE APPROPRIATE FOR SCHEDULE 40 PVC. EMT. GRS. IMC AND RMC: ADJUST SIZE AS NEEDED FOR OTHER RACEWAY TYPES. ALL CONDUCTOR SIZES ARE BASED ON 60 DEG C RATED TERMINATIONS. UNLESS NOTED OTHERWISE. FOR ANY OTHER CONDITIONS MODIFY SIZES PER CODE. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

6. INSTALL FEEDERS OVERHEAD AS HIGH AS PRACTICABLE AND ORTHOGONALLY ALONG BUILDING STRUCTURE, UNLESS NOTED OTHERWISE. COORDINATE FINAL ROUTING WITH OTHER TRADES.

7. CIRCUIT BREAKERS RATED 1200A OR HIGHER SHALL HAVE APPROPRIATE DOCUMENTATION AND METHOD TO REDUCE CLEARING TIME IN ORDER TO REDUCE ARC FLASH ENERGY PER CODE. PROVIDE ELECTRONIC TRIP UNIT WITH INSTANTANEOUS TRIP AND ENERGY-REDUCING MAINTENANCE SWITCH WITH LOCAL STATUS INDICATOR FOR COMPLIANCE. PROVIDE PROVISIONS TO INTERFACE WITH OWNER ALARM/MONITORING SYSTEM TO INDICATE MAINTENANCE SWITCH STATUS.

8. PROVIDE A PERMANENT LABEL ON FRONT OF EQUIPMENT ENCLOSURE: REFER TO SPECIFICATIONS FOR LABEL REQUIREMENTS. LABEL SHALL READ AS FOLLOWS (INCLUDE RESPECTIVE NAMES IN BLANKS):

SERVICE EQUIPMENT LABEL: EXAMPLE:

208Y/120V, 60HZ SCCR = 65,000A

FOLLOWING:

MAX AVAILABLE FAULT CURRENT = 58,815A CALCULATED: 01/01/2018

PANELBOARD/SWITCHBOARD LABEL: LINE 1: PANELBOARD "_____" SUPPLIED BY UPSTREAM LINE 2: PANELBOARD/SWITCHBOARD "_____" LINE 3: LOCATED IN "_

LINE 4: PANELBOARD " __" SUPPLIES DOWNSTREAM LINE 5: PANELBOARD(S) "___ TRANSFORMERS LABEL:

LINE 1: TRANSFORMER " " SUPPLIED BY UPSTREAM LINE 2: PANELBOARD/SWITCHBOARD "_____" LINE 3: LOCATED IN " LINE 4: TRANSFORMER " _____ SUPPLIES DOWNSTREAM LINE 5: PANELBOARD(S) "_____

ELECTRICAL UTILITY CONTACT NOTE

UTILITY COMPANY: KANSAS CITY POWER AND LIGHT UTILITY CONTACT: JEFF WILLIAMS PHONE: (816) 220-5204 EMAIL: JEFF.WILLIAMS@KCPL.COM

FAULT CURRENT GENERAL NOTE (ESTIMATED VALUE): THE MAXIMUM AVAILABLE 3-PHASE SYMMETRICAL FAULT CURRENT VALUE AT THE UTILITY TRANSFORMER SECONDARY/POINT OF SERVICE COULD NOT BE DETERMINED AT THE TIME OF THIS SUBMITTAL. THE ESTIMATED WORST CASE VALUE OF 30,106A FOR THE WEST SERVICE, AND 90,318 FOR THE EAST SERVICE IS BASED ON AN INFINITE BUS CALCULATION AT THE UTILITY TRANSFORMER. CONTRACTOR SHALL VERIFY ACTUAL AVAILABLE FAULT CURRENT VALUE WITH UTILITY. NOTIFY ENGINEER IF ACTUAL VALUE EXCEEDS ESTIMATED CALCULATED VALUE. ESTIMATED DESIGN VALUE IS BASED ON THE

UTILITY TRANSFORMER SECONDARY VOLTAGE: 480Y/277V, 3Ø, 4W UTILITY TRANSFORMER SIZE: WEST - 500KVA, Z=2.0% EAST - 1500KVA, Z=2.0%

ONE-LINE DIAGRAM SUPPLEMENTAL SPECIFICATIONS:

1. GROUNDING ELECTRODE SYSTEM SHALL BE PER LOCAL

REQUIREMENTS AND SHALL NOT BE LESS STRINGENT THAN THAT SPECIFIED IN THE CONSTRUCTION DOCUMENTS. 2. PROVIDE PROPERLY SIZED LUGS FOR ALL EQUIPMENT, CIRCUIT

BREAKERS, AND OTHER ELECTRICAL DEVICES TO ACCOMMODATE INSTALLED CONDUCTORS. A LARGER FRAME. OVERSIZED LUGS OR NON-STANDARD PRODUCT MAY BE REQUIRED IN SOME INSTANCES. UTILIZE PIN ADAPTERS ONLY IF NECESSARY AND ONLY AS ALLOWED BY MANUFACTURER AND AHJ.

3. PROVIDE ANY AVAILABLE SPACE IN SWITCHBOARDS/PANELBOARDS WITH BUSSING.

4. PROVIDE (4) EMPTY 1" CONDUITS WITH PULL STRINGS FROM EACH RECESSED PANELBOARD UP TO ACCESSIBLE CEILING SPACE. CAP AND LABEL CONDUITS FOR FUTURE USE.

5. PROVIDE TYPED FINAL CIRCUIT DIRECTORY FOR ALL PANELBOARDS TO REFLECT ACTUAL AS-BUILT CONDITIONS. COORDINATE FINAL ROOM NAMES, NUMBERS AND DESCRIPTIONS WITH OWNER PRIOR TO COMPLETION. CIRCUIT DESCRIPTIONS SHALL BE PER CODE AND SHALL BE DISTINGUISHABLE FROM ALL OTHERS.

ELECTRICAL PLAN NOTES:

PROVIDE ENERGY REDUCTION MAINTENANCE SWITCH FOR CONTROL OF ALL CIRCUIT BREAKERS & FUSES 1200A OR LARGER IN SWITCHBOARD. SWITCH SHALL BE PROVIDED WITH AUXILIARY CONTACTORS TO REPORT STATUS TO BMS

PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT REVISIONS ____

REGISTRATION



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

PROJECT TEAM

GBA LANDSCAPE LAND 3

BSE STRUCTURAL FOUNDATIONS **ENGINEERS**

CIVIL

STRUCTURAL **BSE STRUCTRAL ENGINEERS** PLUMBING HENDERSON

ENGINEERS MECHANICAL HENDERSON **ENGINEERS**

HENDERSON ELECTRICAL **ENGINEERS**

ENGINEERS CONTRACTOR GC

FIRE PROTECTION HENDERSON

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 TEL 816.663.8700 FAX 816.663.8701 WWW.HENDERSONENGINEERS.COM

MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

SHEET TITLE

ELECTRICAL ONE-LINE DIAGRAM

E601

B. DEFINITIONS

All requirements under Division 01 and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01, this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and the

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the Work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations. offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

Division 21 - Fire Suppression Division 15 Division 22 - Plumbing Division 15 Division 23 - HVAC Division 15 Division 26 - Electrical Division 16 Division 27 - Communications Division 16

6. Division 28 - Electronic Safety and Security

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations."

Division 16

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use." Provide: "to furnish and install.

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete, and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division.

Engineer: Where referenced in this Division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are

acceptable to the AHJ and standards that meet the specified criteria. Homerun: That portion of an electrical circuit originating at a junction box, termination box, receptacle, or switch with termination at an electrical panelboard. Note: Where MC cable is utilized for receptacle and/or lighting branch circuiting loads, the originating point of the homerun shall be at the first load in the circuit or at a junction box located in an accessible ceiling space as close as possible to the first load.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, certified, or all three, by an NRTL, and acceptable to the AHJ over this project.

C. PRE-BID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price. D. MATERIAL AND WORKMANSHIP

Provide new material, equipment, and apparatus under this contract unless otherwise stated herein, of best quality normally used for the purpose in good commercial practice, and free from defects. Model numbers listed in the specifications or shown on the drawings are not necessarily intended to designate the required trim, written descriptions of

Provide markings or a nameplate for all material and equipment identifying the manufacturer and providing sufficient reference to establish quality, size, and capacity. All workmanship shall be of the finest possible by experienced mechanics of the proper trade. In general, provide the following quality grade(s) for all materials and equipment

Provide all hoists, scaffolds, staging, runways, tools, machinery, and equipment required for the performance of the electrical work. Store and maintain material and equipment in clean condition, and protected from weather, moisture, and physical damage.

t that are listed, labeled, certified, or all three, by an NRTL whenever any listing or labeling exists for the types of material and equipment

At a minimum, general work practices for electrical construction shall be in accordance with NECA 1 (latest edition), "Standard Practices for Good Workmanship in Electrical

E. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified. Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years. F. COORDINATION

Coordinate all work with other divisions and trades so that various components of the systems are installed at the proper time, fit the available space, and allow proper service access to those items requiring maintenance. Components which are installed without regard to the above shall be relocated at no additional cost to the Owner.

Unless otherwise indicated, the General Contractor shall provide chases and openings in building construction required for installation of the systems specified herein. Contractor shall furnish the General Contractor with information where chases and openings are required. Contractor shall keep informed as to the work of other trades engaged

in the construction of the project and shall execute work in a manner as to not interfere with or delay the work of other trades. Figured dimensions shall be taken in preference to scale dimensions. Contractor shall take his own measurements at the building, as variations may occur. Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

Provide materials with trim that will properly fit the types of ceiling, wall, or floor finishes actually installed. Model numbers listed in the specifications or shown on the drawings are not intended to designate the required trim

Make all offsets required to clear equipment, beams, and other structural members, and to facilitate concealing raceways in the manner anticipated in the design. Provide materials with trim that will fit properly the types of ceiling, wall, or floor finishes actually installed.

G. ORDINANCES AND CODES

Work performed under this contract shall, at a minimum, be in conformance with applicable national, state and local codes having jurisdiction. Equipment furnished and associated installation work performed under this contract shall be in strict compliance with current applicable codes adopted by the local AHJ, including any amendments and standards as set forth by the following: National Fire Protection Association (NFPA) Underwriters Laboratories (UL)

Occupational Safety and Health Administration (OSHA) American National Standards Institute (ANSI) American Society of Testing Materials (ASTM)

Rules and regulations of public utilities and municipal departments affected by connection of services. Other national standards and codes where applicable.

Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence. Where conflicts between various codes, ordinances, rules, and regulations exist, comply with the most stringent

Promptly bring all conflicts observed between codes, ordinances, rules, regulations, referenced standards, and these documents to the attention of the Architect and Engineer for final resolution. Contractor will be held responsible for any violation of the law.

Procure and pay for permits and licenses required for the accomplishment of the work herein described. Where required, obtain, pay for, and furnish certificates of inspection to Owner. Provide all safety lights, guards, and warning signs required for the performance of the work and for the safety of the public. H. PROTECTION OF EQUIPMENT AND MATERIALS

Store and protect from damage equipment and materials delivered to job site. For materials and equipment susceptible to changing weather conditions, dampness, or temperature variations, store inside in conditioned spaces. For materials and equipment not susceptible to these conditions, cover with waterproof, tear-resistant, heavy tarp or polyethylene plastic as required to protect from plaster, dirt, paint, water, or physical damage. Equipment and material damaged by construction activities shall be rejected, and Contractor shall furnish new equipment and material of a like kind at his own expense.

Keep premises broom clean of foreign material created during work performed under this contract. Conduit, equipment, etc. shall have a neat and clean appearance at the

Plug or cap open ends of conduits while stored and installed during construction when not in use to prevent the entrance of debris into the systems.

I. SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request From for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following: Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request. Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of

Proposed substitution has received necessary approvals of authorities having jurisdiction

Same warranty will be furnished for proposed substitution as for specified Work. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby.

6. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents

Provide factory generated point-by-point calculations for all exterior light fixtures (photometric files supplied so the engineer can generate a point-by-point do not suffice for the point-by-point calculations). Provide interior point-by-point calculations at the discretion of the engineer. J. SUBMITTALS

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Prior to transmitting submittals, verify that the equipment submitted is mutually compatible with and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed

Transmit submittals as early as required to support the project schedule. Allow two weeks for Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittals, if required. Only resubmit those sections requested for resubmittal.

Submittals shall contain the project name, applicable specification section, submittal data, equipment identifications acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples, and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will

Submittals and shop drawings shall not contain firm name, logo, the seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the

Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used. Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not met. Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01

to purchase the materials and/or equipment in the submittal. The checking and subsequent acceptance of submittals by the Engineer and/or Architect shall not relieve the Contractor from responsibility for deviations from the drawings and specifications, errors in dimensions, details, sizes of equipment, or quantities, omissions of components or fittings, coordination of electrical requirements, and not coordinating items with actual building conditions and adjacent work. Contractor shall request and secure written acceptance from the Engineer and Architect prior to implementing any

Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01. Contractor shall include

Architect and Engineer. Contractor shall allow for the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required

the website, user name, and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the

K. ELECTRONIC DRAWING FILES

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a shipping and handling fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary agreement form and to specify shipping method and drawing format. In addition to payment, the written authorization from the Architect and release agreement form from the Engineer must be received before electronic drawing files will be sent.

RECORD DRAWINGS (AS-BUILT DRAWINGS) accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, See Division 01 and General Conditions for additional information

M. OPERATION AND MAINTENANCE INSTRUCTIONS

During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this brochure.

Include Record Drawings as described above.

N. WARRANTIES

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion. unless specific items are noted to carry a longer warranty in these construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects

occurring within the warranty period(s) as stated in the General Conditions and Division 01. Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

Also warrant the following additional items:

All raceways are free from obstructions, holes, crushing, or breaks of any nature. All raceway seals are effective The entire electrical system is free from all short circuits and unwanted open circuits and grounds.

At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and state the commencement date

2. GENERAL MATERIALS AND INSTALLATION

A. BUILDING OPERATION

E. ROUGH-IN

Comply with the schedule of operations as outlined in the architectural portions of this specification. Building shall be in operation during normal workday hours. Accomplish work requiring interruption of building operation at a time when the building is not in operation and only with written approval of building Owner and/or tenant. Coordinate interruption of building operation with the Owner and/or tenant a minimum of seven (7) days in advance of work.

B. EXCAVATION AND BACKFILLING Perform excavation and backfill required for installation of underground work under this contract. Trenches shall be of sufficient width. Crib or brace trenches to prevent cave-in or settlement. Do not excavate trenches close to columns and walls of new building without prior consultation with the Architect. Use pumping equipment if required to keep

trenches free of water. Backfill trenches in maximum 6-inch layers of well tamped dry earth in a manner to prevent future settlement. Excavation as specified herein shall be classified as common excavation. Common excavation shall comprise the satisfactory removal and disposition of material of whatever substances and of every description encountered, including rock, if any, within the limits of the work as specified and shown on the drawings. Excavation shall be performed to the lines and grades indicated on the drawings. Dispose of excavated materials that are considered unsuitable for backfill, and surplus of excavated material, which is not required for backfill, all to the satisfaction of the Engineer.

C. COINCIDENTAL DAMAGE Repair streets, sidewalks, drives, paving, walls, finishes, and other facilities damaged in the course of this Work. Repair materials shall match existing construction. Repair work

shall meet all requirements of the Owner, local authorities having jurisdiction, and meet the satisfaction of the Architect. Repair work shall be thoroughly first class. D. CUTTING AND PATCHING Conform to the requirements in Division 01. Cut walls, floors, ceilings, and other portions of the facility as required to install work under this division. Obtain permission of the

Architect prior to cutting. Do not cut or disturb structural members without prior approval from the Architect. Cut holes as small as possible. Patch walls, floors, and other portions of the facility as required by work under this division. Patching shall match the original material and construction including fire ratings, if applicable. Repair and refinish areas disturbed by work to the condition of adjoining surfaces in a manner satisfactory to the Architect.

Coordinate without delay all roughing-in with other divisions. Conceal all conduit and raceways except in unfinished areas and where otherwise indicated on the drawings. F. CONCRETE BASES

Provide concrete bases (e.g., housekeeping pads) for equipment where indicated on the drawings and as specified herein. Concrete bases shall have chamfered edges. Size of base shall be a minimum of 4 inches greater than the footprint of the equipment that it is supporting and shall have a minimum height of 3-1/2 inches. Construct equipment bases of a minimum 28-day, 4000-psi concrete conforming to American Concrete Institute Standard Building Code for Reinforced Concrete (ACI 318) and the latest applicable recommendations of the ACI standard practice manual. Concrete shall be composed of cement conforming to ASTM C 150 Type I, aggregate conforming to

Unless otherwise specified or shown on the structural drawings, reinforce equipment bases with No. 4 reinforcing bars conforming to ASTM A615 or 6x6 - W2.9 x W2.9 welded wire mesh conforming to ASTM A185. Place reinforcing bars 24 inches on center with a minimum of two bars each direction.

Provide galvanized anchor bolts for equipment placed on concrete bases or on concrete slabs. Anchor bolts size, number, and placement shall be as recommended by the manufacturer of the equipment G. SUPPORT SYSTEMS

Steel Slotted Support Systems (Slotted Channel): Comply with MFMA-3, factory-fabricated components for field assembly; 12-gauge, 1-5/8-inch by 1-5/8-inch.

1. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-3.

ASTM C33, and potable water. Exposed exterior concrete shall contain 5 to 7 percent air entrainment.

Aluminum Slotted Support Systems (Slotted Channel): Comply with MFMA-3, Type 6063-T6, per ASTM B221; factory-fabricated components for field assembly; 12-gauge,

Manufacturers: Cooper B-Line, ERICO International, Hilti, Power-Strut, Thomas and Betts, or Unistrut. Field Fabrication

Where field cutting of standard lengths of channel are required, make cuts straight and perpendicular to manufactured surfaces.

For field-cut or damaged surfaces of coated channels, dress cut ends, damaged surfaces, or both, with an abrasive material (e.g., file, grinding stone, or similar) and cleanser to remove oils, rust, sharp edges, and shards.

For channel with a factory-applied coating, re-finish cut edges with a coating compatible with the factory finish and as recommended by the manufacturer (e.g., manufacturer's touch-up paint or zinc-rich cold-galvanizing compound, as applicable). H. ACCESS DOORS

Provide access doors for all concealed equipment where indicated or as required, except where above lay-in ceilings. Access doors shall be adequately sized for the devices served with a minimum size of 18 inches x 18 inches. Access doors must be of the proper construction for the type of construction in which it is installed. Obtain Architect's approval of type, size, location and color before ordering. Provide factory-fabricated and assembled units, complete with attachment devices and fasteners ready for installation, concealed hinges, flush screwdriver-operated cam lock, and anchor straps. Provide access doors manufactured by: Bar-Co, J.L. Industries, Karp Associates, Milcor, Nystrom Building Products, Wade, or Zum. I. PENETRATIONS

Coordinate sleeve selection and application with selection and application of fire-stopping specified in Division 07 section "Through-Penetration Firestop Systems."

1. Coordinate all roof penetrations with Engineer, Owner, and as applicable, the roofing contractor providing a roof warranty. 2. Keep all raceway penetrations within mechanical equipment curbs wherever possible. Coordinate with Division 01

3. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum 0.052 inch thickness and of length to suit application.

Flash and counterflash all openings through roof, and/or provide pre-fabricated molded seals compatible with the roof construction installed, or as required by the Engineer, Owner, or roofing contractor. All roof penetrations shall be leaktight at the termination of the work and shall not void any new or existing roof warranties.

1. Steel Pipe Sleeves for Raceways and Cables: ASTM A53/A53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends, and drip rings.

Cast-Iron Pipe Sleeves for Raceways and Cables: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless

J. FIRESTOPPING Sealants and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, or other NRTL

Manufacturers: Hilti, RectorSeal, Specified Technologies Inc., United States Gypsum Company, or 3M corp.

Through and Membrane Penetration Firestopping Systems Product Schedule: Provide UL listing, location, wall or floor rating, and installation drawing for each penetration fire Where project conditions require modification to qualified testing and inspecting agency's illustrations for a particular firestopping condition, submit illustration, with modifications

qualifications data for testing agency. K. EQUIPMENT FURNISHED BY OTHERS

Provide necessary equipment and accessories that are not provided by the equipment supplier or Owner to complete installation of equipment furnished by others in locations as indicated on the drawings, specified herein, or both. Equipment and accessories not provided by the equipment supplier may include, but not be limited to, flexible cords and plugs as required for proper operation of the complete system, in accordance with the manufacturers' instructions.

Adjust, align, and test all electrical equipment on this project provided under this division and all electrical equipment furnished by others for installation or wiring under this

marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Include

L. SYSTEM TESTING AND ADJUSTING

Test all systems and equipment according to the requirements in NETA ATS (latest edition) and all additional requirements specified in following sections. Maintain the following on the project premises at all times: a true RMS reading voltmeter, a true RMS reading ammeter, and a megohmmeter insulation resistance tester.

Contractor shall be responsible for correct rough-in dimensions, and verify them with Architect and/or equipment supplier prior to rough-in and service installations.

M. EQUIPMENT IDENTIFICATION Provide equipment identification nameplates on all switchboards, panelboards, electrical equipment enclosures, access doors, transformers, disconnect switches, enclosed circuit breakers, motor starters, feeder devices in switchboards, distribution panelboards, and motor control centers

Engraved, contrasting color, three-layer, laminated plastic , indicating the name of the equipment, load, or circuit as designated on the drawings and in the specifications:

Field-applied permanent epoxy adhesive, compatible with the equipment finish. Attachment method shall be acceptable to the manufacturers of the equipment to which the nameplates are being applied.

Nameplate Color: Black background with white letters for Normal Power; Letter height: 3/8-inch minimum. N. SYSTEM START UP

Perform the following prior to starting up the electrical systems:

Provide test data readings as requested or as required by the Engineer.

Check all components and devices and lubricate items accordingly. Tighten screws and bolts for connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B. Adjust taps on each transformer for rated secondary voltage when the transformer is at minimum load.

Check and record building's service entrance voltage, grounding conditions, grounding resistance, and proper phasing. Replace all burned-out lamps and lamps used for temporary construction lighting in permanent light fixtures. After all systems have been inspected and adjusted, confirm all operating features required by the drawings and specifications and make final adjustments as necessary. END OF SECTION 26

Division 26: BASIC ELECTRICAL MATERIALS AND METHODS

1. RACEWAYS

A. METALLIC CONDUIT AND TUBING

Electrical Metallic Tubing, Couplings, and Fittings (EMT): ANSI C80.3, UL 797. Only steel products allowed. Reduced wall EMT is not allowed

Flexible Metal Conduit (FMC): Zinc-coated steel or aluminum, UL 1. Reduced-wall FMC is not allowed.

Intermediate Metal Conduit (IMC): Hot-dip Galvanized Rigid Steel Conduit, ANSI C80.6, UL 1242.

Install raceways set in forms for concrete structure in such a manner that installation will not affect the strength of the structure.

Liquidtight Flexible Metal Conduit (LFMC): Flexible steel conduit with PVC jacket, UL 360; fittings: NEMA FB 1.

Hot-dip Galvanized Rigid Steel Conduit (GRS): ANSI C80.1, UL 6. Plastic-Coated IMC, RMC, and Fittings: NEMA RN 1, NRTL listed. Coating thickness of 0.04 inches minimum.

IMC and RMC Fittings: NEMA FB 1: compatible with conduit type and material, NRTL listed. Manufacturers: AFC Cable, Alflex, Anamet Electrical, Electri-Flex, Indalex, Manhattan/CDT/Cole-Flex, O-Z/Gedney, Republic Raceway, Tyco International, Western Tube and

B. NON-METALLIC CONDUIT AND TUBING

Rigid Nonmetallic Conduit (RNC): Schedule 40 PVC, 90 deg C rated, NEMA TC-2, UL 651

Fittings: NEMA TC 3, TC 6; UL 651, compatible with conduit/tubing type and material, NRTL listed.

Manufacturers: AFC Cable, American International, Anamet Electrical, Amco, Cantex, Certainteed, Condux International, Elecsys, Electri-Flex, Lamson and Sessions, Manhattan/CDT/Cole-Flex, Prime Conduit, Raco, Spiralduct, Superflex Ltd, or Thomas and Betts.

2. RACEWAY INSTALLATION

A. GENERAL RACEWAY INSTALLATION REQUIREMENTS

Install raceways parallel and perpendicular to building lines.

Install raceways to requirements of structure, to requirements of all other work on the project, and to clear all openings, depressions, pipes, ducts, reinforcing steel, and other immovable obstacles.

Except where approved in writing by the Engineer, install no raceway in a slab-on-grade. Locate raceway below granular fill below slabs-on-grade. Install raceways continuous between connections to outlets, boxes, and cabinets with a minimum possible number of bends and not more than the equivalent of four 90-degree bends between connections. Use manufactured elbows for all 45- and 90-degree bends, unless approved by the Engineer in advance. Make other bends smooth and even and

without flattening raceway or flaking galvanizing or enamel. Radii of bends shall be as long as possible and never shorter than the corresponding trade elbow.

Use long radius elbows for all underground installations, where necessary, or where otherwise indicated. Securely fasten raceways in place with approved straps, hangers, and steel supports as required. Attach raceway supports to the building structure. Hang single raceways for feeders with malleable split ring hangers with rod and turnbuckle suspension from inserts spaced not over 10 feet apart in construction above. Clamp groups of horizontal feeder raceways to steel channels that are suspended from inserts spaced not over 10 feet apart in construction above. Securely clamp vertical feeder raceways to structural steel members attached to structure. Install cable clamps for support of vertical feeders where required. Add raceway supports within 12 inches of all bends, on both sides of the

bends. Do not support raceways from suspended ceiling components. Ream raceway ends, thoroughly clean raceways before installation, and keep clean after installation. Plug or cover openings and boxes as required to keep raceways clean during construction and fish all raceways clear of obstructions before pulling conductor wires. Provide raceways of ample size for pulling of wire, not smaller than code requirements and not less than 1/2-inch in size, unless indicated otherwise on Drawings. Homeruns containing more than one branch circuit shall not be less than 3/4-inch in

Protect all raceway installations against damage during construction. Repair all raceways damaged or moved out of line after roughing-in to meet Engineer's approval without additional cost to the Owner

Align and install true and plumb all raceway terminations at panelboards, switchboards, motor control equipment, and junction boxes. Install approved expansion/deflection fittings where raceways pass through (if embedded) or across (if exposed) expansion joints, and when using RNC or RAC in exposed environments in accordance with NFPA 70 and expansion/contraction properties of RNC or RAC.

Install a pull wire in each empty raceway that is left for installation of conductors or cables under other divisions or contracts. Use polypropylene or monofilament plastic line with

not less than 200-lb tensile strength. Leave at least 24 inches of slack at each end of pull wire. Make all joints and connections in a manner that will ensure mechanical strength and electrical continuity.

B. ABOVE GROUND RACEWAY USE: Install all circular raceways concealed above suspended ceilings or concealed in walls or floors wherever possible except where otherwise indicated. Provide GRS for all

Provide GRS installed below grade with a corrosion-resistant bonded-plastic or approved mastic coating. This shall include the 90-degree elbow below grade and the entire

Unless noted otherwise, all other raceway may be EMT where approved by local code. Use compression type fittings for EMT, with all fittings NRTL listed for the environment in which they are used. Unless noted otherwise, set-screw type fittings are not allowed. C. UNDERGROUND RACEWAY USE:

RNC conduit may be used underground where permitted by local code and where not specifically restricted by these documents. When used, provide plastic-coated GRS, as specified above, for all bends greater than 30 degrees, including the 90-degree elbows below grade and the entire vertical risers for transitions from below to above grade or

Use only metal raceways for all power wiring from the output of variable frequency drives to their respective motors.

4. CONDUCTORS AND CABLES

or sunlight. Provide all FMC and LFMC with an insulated bonding conductor

D. EQUIPMENT CONNECTIONS

shall enter the enclosure squarely.

conduits exposed to weather or other hazardous conditions

3. BUSHINGS AND LOCKNUTS Rigidly terminate conduits entering sheet metal enclosures to the enclosure with a bushing and locknut on the inside and a locknut or an approved hub on the outside. Conduit

Use FMC for final connection to each motor, transformer, and any device that would otherwise transmit motion, vibration, or noise. Use LFMC where exposed to liquids, vapors,

Provide bushings and locknuts made of galvanized malleable iron with sharp, clean-cut threads.

Where EMT enters a box, provide approved EMT compression connectors. Use insulated, grounding, or combination bushings wherever connection is subject to vibration or moisture, when required by NFPA 70, or both.

Annealed (soft) copper complying with ICEA S-95-658/NEMA WC70 and UL standards 44 or 83 as applicable . Conductor Insulation Types: 90-degree C-rated, Type THHN/THWN-2 or XHHW-2 complying with ICEA S-95-658/NEMA WC70.

the drawings for a branch circuit, provide three No. 12 AWG conductors, in 3/4-inch raceway, and a 20A circuit breaker

Sizes of conductors and cables indicated or specified are in American Wire Gage (AWG - Brown and Sharpe).

All feeder and branch circuit conductors No. 8 AWG and larger: Stranded. All conductors, No. 10 AWG and smaller: Solid copper. All Branch Circuit Wiring: Not smaller than No. 12 AWG. If no conductor size is indicated on the Drawings for a branch circuit, provide conductors and conduit sized per NFPA 70 and based on the indicated branch circuit overcurrent protective device (OCPD) rating and number of poles. Where no circuit size (i.e., conductors and OCPD) is indicated on

Control Wiring: Stranded copper conductors, 600V insulation, of the proper type, size, and number as required to accomplish specified function. Minimum size: No. 14 AWG, unless noted otherwise Flexible Cords and Cables: Stranded copper conductors for all, unless noted otherwise. Special Purpose Conductors And Cables, Such As Low Voltage Control And Shielded Instrument Wiring: As recommended by the system equipment manufacturer unless

Connections: Apply a zinc based anti_oxidizing compound to connections. Do not use terminals on wiring devices to feed through to the next device.

crimp connectors and terminal blocks for control wiring, and keep to the minimum required. Insulate all splices, taps, and joints as required by codes

5. CONDUCTORS AND CABLES INSTALLATION where specified or indicated for low-voltage wiring, where specified or indicated for direct-buried cables, or where type MC cable is indicated or specified as acceptable.

Install all conductors and cables in raceways continuous without taps or splices. Splice or tap only in approved boxes and enclosures with approved solderless connectors, or

Copper Conductor Manufacturers: Advance Wire and Cable, AFC Cable, Alan Wire, Alflex, American Insulated Wire, Encore Wire, Northern Cables, Okonite, or Southwire.

All materials used to terminate, splice, or tap conductors: designed for, properly sized for, and NRTL listed for the specific application and conductors involved, and installed in strict accordance with the manufacturer's recommendations, using the manufacturer's recommended tools Where wiring is indicated as installed, but the connection is indicated "FUTURE" or "BY OTHER DIVISION, TRADES, OR CONTRACTS", leave a minimum 3-foot "Pigtail" at the box, tape the ends of the conductors, and cover the box.

In general, the direction of branch circuit "home run" routing is indicated on the drawings, complete with circuit numbers and panelboard designation. Continue all such "home run" wiring to the designated panelboard, as though "circuit runs" were indicated in their entirety. Common or shared neutrals are not allowed unless shown on the drawings to be used or specifically noted to be allowed.

Where multi-wire branch circuits (i.e., shared neutral) are allowed, they shall be provided with a means that will simultaneously disconnect all ungrounded conductors at the point the branch circuit originates. Multi-pole breakers or 3 single-pole breakers with a handle tie are two examples. When multiple home runs are combined into a single raceway such that the number of conductors exceeds four (conductor count is made up of any combination of phase and neutral conductors), the following restrictions apply, which are in addition to those in NFPA 70:

Normal or Non-Essential circuits: Maximum of 16 conductors in a single raceway. For up to eight conductors in a raceway, minimum raceway size: 3/4-inch. For greater than eight conductors, minimum

raceway size: 1-inch. Do not install any other type of circuit in this raceway. 2. Minimum wire size for all conductors in this raceway: No. 10 AWG.

3. Only 15A and 20A branch circuit homeruns may be combined into one raceway.

1. Do not use multi-conductor circuits, with a shared neutral, for any GFCI circuit breaker or receptacle circuit. For branch circuits fed from GFCI circuit breakers, limit the one-way conductor length to 100 feet between the panelboard and the most remote receptacle or load on the GFCI

erly identify all terminal blocks and wire terminals for control wiring with vinyl stick-on markers or equivalent. Provide Engineer with a list of proposed identifying numbers for review prior to installing markers. Provide an equipment-grounding conductor or bonding jumper, as applicable, in all feeders and branch circuits, sized in accordance with NFPA 70 Tables 250.66 or 250.122, as

applicable, unless indicated as larger on the drawings Wiring shall have insulation of the proper color to match color code system in the table below unless there is a color system currently in use by the facility, in which case the colors are to match the existing system. In larger sizes where properly colored insulation is not available, use vinyl plastic electrical tape of the appropriate color around each conductor at all termination points, junctions, and pull boxes.

240V and under, including 208Y/120, 120/240, 120/208, and 240D/120 systems: Phase A: Black

Equipment Ground: Green. Isolated Ground: Green with yellow stripe. 480V and 480Y/277V

Phase B: Red

Phase C: Blue.

Neutral: White.

. Phase A: Brown

Phase B: Orange Phase C: Yellow Neutral: Gray 5. Equipment ground: green. 6. MC CABLE

A. CABLE SPECIFICATIONS

Metal-clad cable (MC Cable): 600V, unjacketed; UL Standard 83, 1569, and 1685; NFPA 70 Article 330; aluminum or galvanized steel interlocked armor; THHN- or XHHW-insulated conductors; color code: ICEA Method 1, with green insulated grounding conductor; listed for use in UL 1, 2, and 3 hour through-penetration firestop systems. MC Cable manufacturers: AFC Cable Systems, Encore Wire Corporation, Kaf-Tech, or Southwire.

In lieu of flexible conduit and wiring from light fixtures located in accessible ceilings to junction boxes attached to building structure directly above the ceiling. Provide cable whips of sufficient lengths to allow for relocating each light fixture within a 5 foot radius of its installed location, but not exceeding 6 feet in unsupported lengths.

3. In lieu of EMT, only for 15A and 20A branch circuits (with up to four (4) conductors, not including ground conductor), and only in dry concealed locations above grade,

C. PROHIBITED USE OF MC CABLE UNLESS NOTED ABOVE

except where specifically not permitted by NFPA 70 owner, landlord, ahi, or noted in list below.

Examples of those uses include, but are not limited to the following: Homeruns to panelboards (refer to Section 26: Definitions).

Where exposed to view Where exposed to damage. Hazardous locations

Wet locations. When restricted otherwise. When specifically disallowed by the local AHJ. When specifically disallowed by the landlord.

Circuits supplied by an emergency or standby power source. 7. MC CABLE INSTALLATION

Secure and support cable per NFPA 70 Article 330. Secure cable within 12 inches of every box or fitting. Securing and supporting intervals shall not exceed six feet. Maintain consistent spacing to avoid derating due to bundling per NFPA 70 Section 310.15. Utilize steel cable hangers, Arlington SMC series or equivalent, to support wherever possible so cables can be routed in a neat and workmanship like manner.

on the drawings. Size as required for the specific function or as required by NFPA 70 , whichever is larger. Construction shall be of a NEMA design suitable for the environment Junction boxes installed behind wall cases and in or on other store fixtures, except where otherwise specified, shall be 4 inches square or larger with galvanized covers.

Provide junction boxes, pull boxes, cabinets, and wireways wherever necessary for proper installation of various electrical systems according to NFPA 70 and where indicated

8. JUNCTION BOXES, PULL BOXES, CABINETS, AND WIREWAYS

junction boxes to adequately contain all required conductors and splices. 9. OUTLET BOXES

11. MOUNTING HEIGHTS

All outlets including light fixture, switch, receptacle, and similar outlets: galvanized steel knockout boxes, suitable in design to the purpose they serve and the space they occupy. Size as required for the specific function or as required by NFPA 70, whichever is larger. Set all outlet boxes in walls, columns, floors, or ceilings so they are flush with the finished surface, accurately set, and rigidly secured in position. Provide plaster rings, extension rings and/or masonry rings as required for flush mounting. Provide approved cast

Horizontally mount junction boxes under center fixtures (and cases), handy boxes or 4-inch square boxes with tops of boxes not more than 3-1/2 inches above the floor. Size

outlet boxes with hubs and weatherproof covers in all areas subject to damp, wet, or harsh conditions. Manufacturers: Appleton, Cooper, Erikson Electrical, Hoffman, Killark Electric, O-Z/Gedney, Raco, Robroy Industries, Scott Fetzer, Spring City Electrical, Thomas and Betts, Walker Systems, or Woodhead.

10. OUTLET LOCATIONS Coordinate locations of outlet boxes. Outlets are only approximately located on the small scale drawings. Use great care in the actual location by consulting the various large scale detailed drawings used by other division trades, and by securing definite locations from the Architect

Unless noted otherwise, install wiring devices vertically aligned at height indicated on construction drawings.

A. RECEPTACLES Unless indicated otherwise, install vertically with the ground slot mounted at the top

Above counter: mount vertically aligned. Mechanical and electrical equipment rooms and janitors closets: mount vertically aligned

Where installed horizontally, install with the neutral slot mounted at the top

Weatherproof exterior receptacles: horizontally aligned. GFCI receptacles: Same as general receptacles

Isolated ground receptacles: Same as general receptacles

Garages: mount vertically aligned.

B. SWITCHES

SPD receptacles: Same as general receptacles Clock Receptacles: 84 inches above finished floor.

Concrete Block Walls: As long as ADA requirements are maintained, dimensions above may be adjusted slightly as required to compensate for variable joint dimensions such

Concrete Block Walls: As long as ADA requirements are maintained, dimensions above may be adjusted slightly as required to compensate for variable joint dimensions, such

General: All switches shall be mounted at the same height throughout the project unless noted otherwise. Above Counters: Same as for receptacles.

C. TELEPHONE/DATA OUTLET BOXES

provide wiring devices equivalent to those specified for 20A, but rated for 15A.

that bottom or top of boxes, as applicable, are at block joints.

that bottom or top of boxes, as applicable, are at block joints. Walls with Wainscoting: 6 inches minimum above wainscoting, but not exceeding 48 inches above finished floor.

General: Match mounting height of adjacent wiring device listed above. Wall-mounted Telephone (Public): One at 48 inches above finished floor and one at 36 inches above finished floor.

For other than wiring devices, refer to paragraphs, articles, sections, divisions, or drawings to obtain mounting heights for specific equipment or systems.

12. WIRING DEVICES The catalog numbers listed for wiring devices are generally for 20A rated devices. Where 15A rated devices are indicated on the drawings or required for circuit rating limitations,

All receptacles located outdoors or in damp or wet locations: Listed as 'weather Resistant', designated by a 'WR' on the faceplate.

Minor changes relative to the location of electrical equipment may be made to comply with structural and building requirements as determined in the course of construction. Provide all wiring devices of the same manufacturer and not mixed on the project, to the maximum extent possible. Provide color of toggles and receptacles as requested by the Architect. Refer to detail showing receptacles table Cooper Wiring Duplex Receptacles - Commercial Grad

Ouplex Receptacle	BR20	CR20	CR20	CR20
Duplex Receptacle - Tamper esistant	BR20TR	TR20	TBR20	TRCR20
Duplex Receptacle - Weather esistant	BR20WR	WR20TRW	WBR20	WRBR20
	Oth	ner Receptacles	1	
GFCI Receptacle	GF20LA	2095	7899-H	VGF20
GFCI Receptacle - Weather esistant	GFTR20	2095TRWR	W7899	WRVGF20
GFCI Receptacle - Tamper esistant and weather resistant	GFTR20	2095TRWR	W7899-T	TWRVGF20
	Switches	- Commerical Grade	1	
Single Pole Switch	DS120	CS20AC1	CSB1-20	CSB120
	•	•	•	•

Other Switches

PS20AC-L

Switch Installations in Door/Side Light Frames: Despard type ivory switch, Pass and Seymour ACD201-i or approved equal. Switch and Pilot Installations: One Despard type ivory switch and one Despard type flush 1/25 Watt neon pilot light, both installed in a single-gang box with cover plate. Pass

and Seymour ACD201-IV switch and 1475 pilot light, or approved equals. Automatic Load Control Relay (ALCR) (also referred to as emergency shunt relay): UL 924 listed as emergency lighting and power equipment. Connect ALCR in parallel with a lighting control device. Loss of normal power shall cause relay to automatically shunt emergency power to lighting circuit regardless of lighting control device position. Emergency lighting circuit shall continue to operate at full power until normal power has been restored. Provide a two-gang junction box with separation barrier and plaster ring for the ALCR, and install it adjacent to its associated lighting control device or above accessible ceiling. Provide Acuity (Lighting Controls and Design) Model GR2001 ALCR, or

13. SWITCH AND OUTLET COVER PLATES Switch and Outlet Plates: Colored, smooth nylon; by the same manufacturer as the wiring devices, wherever possible. Verify desired materials and colors with Architect before

14. WEATHERPROOF COVER PLATES

equivalent by Bodine, Cooper, Hubbell, Legrand, or Leviton.

HBL1221L

installation. Switch plates in unfinished rooms and spaces: Stamped steel, cadmium plated. Install groups of switches under one ganged-plate, usually horizontally; or, where required by details, vertically. Set all cover plates plumb, parallel, and finished flush with the wall.

Provide GFCI receptacles for designated weatherproof receptacles, unless indicated otherwise on the drawings Unattended Exterior, Wet Locations or Other Locations as Indicated: In-use, NEMA 3R, recessed or flush mount, NRTL labeled plates molded from a clear high impact ultraviolet stabilized polycarbonate material for easy verification that cords are plugged in and that the GFCI is functioning. Back box must be suitable for conduit connecting. Coordinate back box with wall depth. Intermatic WP1000RC/HRC or equal.

Attended Wet Or Damp Locations: Weatherproof cover plates NRTL listed for wet locations with cover(s) closed; die-cast aluminum or Type 302 stainless steel; single-cover for

Cover Plates: By the same manufacturer as the wiring devices; complying with NFPA 70 ARTICLES 406.9 (A) or (B) requirements for attended or unattended use as applicable. 15. ELECTRICAL SERVICE AND GROUNDING

switches and vertically mounted receptacles; double-cover for horizontally mounted receptacles; self-closing covers.

A. ELECTRICAL SERVICE See drawings for type, size, voltage, phase, and other requirements.

Provide, or arrange with the serving utility for installation to provide, a recording voltmeter at the service point, on the first day the facility is open for business, for a 24-hour voltage test. If voltage and regulation are not within acceptable limits, arrange with the utility for proper voltage. Submit to the Owner a report of maximum and minimum voltage and a copy of the recording voltmeter chart.

conjunction with the utility involved in the installation of all services. Provide all materials and equipment required for complete utility connection but not furnished by the serving

utility. Notify the utility companies involved within two weeks after notice to proceed of all required information necessary for the utility to supply the project without delay. Pay all

B. CONNECTION TO SERVING UTILITIES Provide raceways, terminations, metering provisions, and miscellaneous equipment as required for electrical and telephone services for connection by the serving utility, in strict compliance with the requirements of all applicable codes and of the serving utility involved. Verify all service terminations and connection points in the field and work in

charges of the serving utility for the electrical service(s).

C. GROUNDING

Permanently and effectively ground and bond the electrical installation in a thorough and efficient manner, and in conformance, at a minimum, with NFPA 70, or these documents, where they exceed code requirements. Use bare or insulated conductors as specified herein, and other materials indicated on the Drawings.

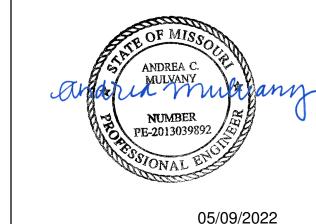
FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT

REVISIONS

____ ____ ____ ____ ____

REGISTRATION



PROJECT TEAM ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

ANDREA C. MULVANY

LICENSE # PE-2013039892

CIVIL LANDSCAPE LAND 3

BSE STRUCTURAL

ENGINEERS

HENDERSON

ENGINEERS

FOUNDATIONS

MECHANICAL

BSE STRUCTRAL STRUCTURAL **ENGINEERS** PLUMBING HENDERSON **ENGINEERS**

ELECTRICAL HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON

CONTRACTOR GC

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 **TEL** 816.663.8700 **FAX** 816.663.8701 WWW.HENDERSONENGINEERS.COM MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

SHEET TITLE

16. DISTRIBUTION AND CONTROL EQUIPMENT

A. SERVICE ENTRANCE AND POWER DISTRIBUTION SWITCHBOARDS:1600A AND LARGER

Service entrance and power distribution switchboards must conform with the requirements of the local codes and serving utility; manufactured according to current requirements of UL 891, "Dead-Front Switchboards"; NRTL listed and permanently labeled for service entrance use when applicable; short circuit interrupting and bracing rating as shown on

Integral ground fault relays and operators, self-powered, where indicated or required by NFPA 70.

Contained in a single factory-assembled dead-front enclosure with front accessible connections to incoming mains and outgoing feeder circuit breakers

Circuit Breakers: Bolt-on, thermal magnetic, "quick-make quick-break" type; toggle switching mechanism to provide manual and automatic operation; and automatic tripping clearly indicated by a neutral handle position in-between the "on" and "off" positions.

Manufacturers: Square D QED type or approved equal by Eaton, G .E., or Siemens.

Manufacturers: Square D Masterpact NW Type or equal by Eaton, G.E., or Siemens.

B. SERVICE ENTRANCE SWITCH: FUSIBLE, 800A-4000A

Fusible Switch: Number of phases and ratings of switch and fuses as indicated on the drawings; permanently labeled as suitable for use as service entrance equipment; integral ground fault relay and operator where indicated or required by NFPA 70; provisions for bolt-in fuses as appropriate for the fuses specified; interlocked cover and an engraved nameplate for identification. Provide with integral and separate neutral and ground assemblies, suitable for the sizes of conductors indicated. Do not double-lug any terminations not specifically listed as suitable for more than one conductor. Enclosure: Free-standing switchboard section of NEMA design suitable for the environment in which installed or

Manufacturers: Square D Type B/l Bolt-Loc or equivalent by Eaton, G.E., or Siemens.

C. SERVICE ENTRANCE CIRCUIT BREAKER: ENCLOSED, 100A-6000A

Enclosed Circuit Breaker: Number of phases and ratings as indicated on the drawings; permanently labeled as suitable for use as service entrance equipment; integral ground fault relay and operator where indicated or required by NFPA 70; interlocked cover and an engraved nameplate for identification. Provide with integral and separate neutral and ground assemblies, suitable for the sizes of conductors indicated. Do not double-lug any terminations not specifically listed as suitable for more than one conductor. Enclosure: NEMA design suitable for the environment in which installed or as indicated.

D. POWER DISTRIBUTION PANELBOARDS: CIRCUIT BREAKER, 1200A BUS OR SMALLER

Panelboards: Dead-front distribution panelboards with number and sizes of circuit breakers as indicated on the drawings; where installed as service entrance equipment, permanently label as suitable for use as service entrance equipment; fully-rated for the available fault current indicated on the drawings; hinged, lockable front door that covers the circuit breaker handles. Circuit breakers: Quick-make, quick-break, indicating type; engraved nameplates for circuit identification of each circuit breaker. Provide a typewritten card directory indicating exactly what each circuit breaker controls on the inside face of the door for circuit identification.

Manufacturers: Square D Type I-Line, Eaton type Pow-R-Line 4, G.E. types CCB or AV-1, or Siemens types S4 or S5.

F. LIGHTING AND APPLIANCE PANELBOARDS

Panelboards: Complete with bolt-on thermal magnetic, molded case circuit breakers assembled in a dead-front finished cabinet containing a typewritten card directory indicating exactly what each circuit breaker controls; fully- rated and with the integrated short circuit current ratings indicated on the drawings. Plug-in type breakers will not be acceptable. All two- and three-pole breakers: Common trip type.

1. Type SWD Circuit Breakers: Use when breaker serves as a switch for 120V or 277V lighting circuits.

2. GFCI Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip). Use as indicated on drawings.

3. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30-mA trip). Use as indicated on drawings.

indicated on drawings. Breakers serving fire alarm loads must have a permanently-affixed red label stating "FA" in white letters adjacent to the circuit breaker. 5. Handle padlocking device: fixed attachment for locking circuit breaker handle in "on" or "off" position. Use as indicated on drawings.

Manufacturers: Square D Type NQOD or NF (as applicable, based on voltage and ampere ratings and required short-circuit interrupting ratings as scheduled on the drawings) or approved equal by Eaton, G.E., or Siemens.

Disconnect (Safety) Switches: Heavy-duty, fused or non-fused (as indicated on drawings or required) NEMA KS1, externally operated, visible-blade safety switches; NEMA enclosure type indicated on the drawings or suitable for the environment in which installed, based on fusible switch and fuse sizes indicated, include Class R, J, or L fuse

Where indicated, provide fusible switches permanently labeled as suitable for use as service entrance equipment, with integral and separate neutral and ground assemblies, suitable for the sizes of conductors indicated. Do not double-lug any terminations not specifically listed as suitable for more than one conductor.

Provide switches where not furnished with the starting equipment, at all other points required by NFPA 70, and where indicated on the drawings.

Where indicated, provide the disconnect switch with an integral auxiliary switch, open when the main switch blades are open, and wire it into the controller to disable the motor

Provide each circuit and set of fuse clips throughout the work with sizes and types as required or indicated. All fuses larger than 600A: UL Class L, similar to type KRP-C Bussmann Low Peak or equal. Fuses used to protect motors: UL Class RK5, Bussmann Fusetron or equal. Fuses used to protect all other electrical equipment: UL Class RK1,

Furnish three spare fuses of each size and type used on the project (except for main switch fuses, furnish one spare), neatly contained in a properly labeled cabinet.

Manufacturers: Bussmann, Edison Fuse, Mersen/Ferraz Shawmut, or Littlefuse.

Transformers: General purpose, NRTL listed/labeled. Comply with NEMA ST 20 and UL 1561.

Insulation Class: For three-phase transformers less than 15 kVA and all single-phase, 185 degrees C, NRTL-component-recognized insulation system with a maximum of 115 degree C rise above a 40 degree C ambient temperature; for three-phase transformers 15 kVA and larger, 220 degrees C, NRTL-component-recognized insulation system with a maximum of 150 degree C rise above a 40 degree C ambient temperature. NRTL-component-recognized insulation system replaces the UL 1446 insulation rating system that

Phases, Voltages, and Sizes: As indicated on the drawings.

Sound Level: Not exceeding 3 dBa less than NEMA ST 20 standards for the sizes indicated when factory tested according to IEEE C57.12.91.

Full-Capacity Primary Taps: For three-phase below 25 kVA and all single-phase, one 5 percent tap above and one 5 percent tap below; 25 kVA to 500 kVA, six 2.5 percent taps (2 above, 4 below); above 500 kVA, four 2.5 percent (2 above, 2 below).

Transformer Core and Coil Assemblies: Mounted on integral vibration-absorbing pads.

Transformers 75 kVA and larger shall be floor mounted unless indicated otherwise. Transformers 45 kVA and smaller may be wall mounted where wall construction is suitable for the load. Floor mounted transformers shall be securely bolted to a 4 inch house keeping pad with vibration isolation pads. Wall mounted or suspended transformers shall have a means of isolating vibration from the support. Wall mounts must be by same manufacturer as and provided with transformer. Transformers up through 1000 kVA shall be mounted on elastomeric vibration isolation pads. Pad shall be constructed of neoprene, rubber, glass fiber, or a combination thereof.

Pads shall be "ribbed" or "waffled" in texture. Pads shall be selected for smallest durometer (hardness), preferably less than 50. Deflection of pad shall be 0.25 inches static minimum. Stack pads until the desired deflection is achieved. Make final conduit connections to transformers with flexible conduit, with at least 6 inches of slack in all directions. Minimum flexible conduit length shall be 2 feet.

Transformer Enclosures: Removable front cover, core and coil encapsulated within resin compound, drip-proof, fabricated of heavy gauge sheet steel construction. Dry locations: Ventilated, NEMA 250 Type 2. Damp or wet locations: Ventilated with weather shields, NEMA 250 Type 3R. Corrosive locations: Totally enclosed, non-ventilated,

Provide energy-efficient transformers complying with federal regulation 10 CFR 431.192 thru 431.196 requirements.

K-rated transformers shall be provided as indicated on the drawings and be listed for 115 degree C rise. Manufacturers: ACME, Eaton, G.E., Siemens, Hammond, Sola/Hevi-Duty, or Square D.

K. FRACTIONAL HORSEPOWER MANUAL CONTROLLER

Manual motor starters for fractional horsepower single-phase motors shall consist of a manually operated toggle switch equipped with melting alloy type overload relay. Thermal unit shall be of one piece construction and interchangeable. Starter shall be inoperative if thermal unit is removed. Provide flush mounted units in finished areas and surface mounted units in unfinished areas. Starters shall have NEMA I general purpose enclosure, unless otherwise indicated, and be rated for the motor horsepower required. Provide with handle guard with locking provisions and an integral pilot light.

Manufacturers: Square D Class 2510 Type F, Eaton 9101 series, G.E. CR101 series, Siemens MSF series, or Westinghouse MST series.

Motor starting switches shall consist of a toggle operated two- or three-pole switch. Contacts shall be double break silver alloy, visible from both sides of the switch, and shall have a direct linkage to the operator for positive break. Provide flush mounted units in finished areas and surface mounted units in unfinished areas. Starters shall have NEMA I general purpose enclosure, unless otherwise indicated, and be rated for the motor horsepower required. Provide handle guard with locking provisions.

17. LIGHT FIXTURES, LAMPS AND BALLASTS

A. LIGHT FIXTURE LOCATIONS

Light fixtures shown on the drawings represent general arrangements only. Refer to architectural drawings for more exact locations. Coordinate location with all other trades before installation to avoid conflicts. Coordinate light fixture locations in mechanical rooms with final installed piping and ductwork layouts.

Provide light fixtures as scheduled on drawings, including all lamps, all necessary accessories, material and labor to securely hang, clean, and make light fixtures completely ready for use. Light fixture model numbers scheduled on the drawings show only the manufacturer, grade, and style of light fixtures required. Provide all hangers, supports, and miscellaneous hardware required to install light fixtures, proper trim to fit each ceiling condition actually encountered, and additional tie wires connected to structure to conform to seismic requirements where required by the applicable building code.

Packaging of light fixtures will not be allowed. Only those luminaires listed in the Light Fixture Schedule or approved in accordance with substitutions of these specifications will be accepted. Where the Light Fixture Schedule indicates an allowance for a specific light fixture, the price is a Contractor price. Include all additional costs for freight, lamps, and

Install light fixtures hung in continuous rows on channel struts specifically designed for this purpose.

Surface-mount all light fixtures located in areas with a ceiling but without suspended ceilings unless otherwise indicated on the drawings. Provide rigid metal spacers finished in white enamel between the top of each light fixture and the ceiling above to maintain a 1-1/2 inch space. Spacers shall be approved before installation.

Install all light fixtures located in areas without ceilings immediately below the roof-framing members, or suspended from chain hangers suitable in length to provide the indicated mounting height. Hangers: "Hydee" hanger type for outlet box mounting, complete with grounding receptacle, plug, 3-wire cord, and necessary chain.

allow for relocating each light fixture within a 5-foot radius of its installed location, but not exceeding 6 feet in unsupported lengths.

Description: Self-contained units complying with UL 924

Battery: Sealed, maintenance-free, lead-acid type. The batteries shall be of suitable rating and capacity to supply and maintain at not less than 87-1/2 percent of the nominal battery voltage for the total lamp load associated with the unit for a period of at least 1-1/2 hours, or the unit equipment shall supply and maintain not less than 60 percent of the

Charger: Fully automatic, solid-state type with sealed transfer relay.

Operation: Relay automatically turns lamp on when power supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on

Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power, and demonstrates unit operability.

LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge, and bright glow indicates charging at end of discharge cycle.

Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an

LED Lamps and Luminaires: Comply with ANSI C78.377 for white light LED color range; minimum CRI of 80 unless noted otherwise; LED binning specification tolerance to be within 3 macadam ellipses of rated values; all LEDs used for same fixture type throughout the project must originate from the same production bin; minimum average rated life of 20,000 hours for LED lamps and 50,000 hours for LED luminaires; Rohs compliant. LED lamp manufacturers: Bridgelux, Cree, Nichia, Osram, or Xicato.

LED Drivers: Comply with NRTL requirements and ANSI C82.77; designed for type and quantity of lamps served; sound levels not exceeding Class A ambient noise levels; lamp current crest factor of 1.5 or less; 90-percent power factor or greater; line transient withstand ratings as defined in ANSI/IEEE C62.41, Category A.; total harmonic distortion less

than 20 percent; shall tolerate sustained open circuit and short circuit output conditions without damage; shall not over-drive LEDs at a current or voltage above LED rated values; ROHS compliant; meets EN610000 requirements for input harmonics. F. DIMMABLE LIGHT FIXTURES

For dimmable light fixtures provide both control and power wiring between light fixture and control device and between light fixtures. Quantity of low voltage and line voltage wiring and wire type shall be per manufacturer's recommendations. Coordinate light fixture and control device dimming types for compatibility.

18. MISCELLANEOUS ELECTRICAL

A. WIRING OF MECHANICAL EQUIPMENT

Provide all raceways and power wiring for all Division 23 equipment requiring electrical connections, including but not limited to pumps, water heaters, and HVAC equipment, and all line-voltage control and interlock wiring not provided under Division 23. Connect per manufacturers' wiring diagrams. Coordinate with Division 23 for disconnects and variable frequency drives (VFD) furnished with equipment, and provide all disconnect switches and final connections as required. If VFD is separate or does not have an integral disconnect feature, provide disconnect switch with auxiliary contact such that motor will be turned off if switch is off, provide VFD cable, Belden or approved equivalent, for connection of VFD to motor when required. After installing wiring, verify that each motor load has the correct phase rotation.

Verify the actual "Maximum Overcurrent Protection" (MOCP) device ratings and "Minimum Circuit Ampacity" (MCA) conductor sizing for mechanical equipment from the equipment nameplate. Base electrical installations on actual required amperages, which may vary somewhat from the conductor and equipment sizes shown on the drawings; however, in no case, reduce the size of conductors indicated on the drawings without authorization from the Engineer. Provide properly sized electrical wiring and equipment without extra cost to the Owner. Notify the Engineer of all changes required in the electrical installation due to equipment variances so that the effects on feeders, branch circuits, panelboards, fuses and circuit breakers can be checked prior to purchasing and installation. Be responsible for coordinating with Division 23 to verify the actual ampacities and correct sizes of all conductors and overcurrent protective devices for all equipment, and correct overload heaters for all motors, when starters are provided under Division 26.

B. WIRING OF THERMOSTATS, TIME AND TEMPERATURE CONTROLS

boxes with 1 inch conduit stub-up with pull-string concealed to accessible ceiling space at locations as indicated on the drawings.

Provide all raceways, power wiring, and line-voltage control and interlock wiring not provided under Division 23, for all thermostats, temperature control devices, and controls, including, but not limited to, night-stats, water heater interlocks, time switches and override timers. See mechanical drawings for locations and temperature control diagrams. Low-voltage conductors for thermostats and temperature control system may be run exposed above finished accessible ceilings, if approved and listed for this purpose, but shall be installed in conduit within walls and where exposed in the work areas.

C. TELEPHONE SYSTEM PROVISIONS

Provide incoming telephone service raceways as indicated on drawings or as required by the serving telephone company. Provide 3/4-inch thick plywood board, fire-retardant-treated and stamped FRT, securely anchored to the wall, at the location and of the size as indicated on the drawings. Provide flush mounted telephone outlet

D. DATA SYSTEM PROVISIONS

Provide flush mounted data outlet boxes with 1 inch conduit stub-up with pull-string concealed to accessible ceiling space at locations as indicated on the drawings. E. TIME SWITCHES

Manufacturers: Intermatic, Paragon, or Tork.

Time switches: Electronic digital astronomical, type as indicated, with manual bypass switch, NEMA enclosure suitable for the environment installed; number and types of contacts, sequence, and voltage as indicated on the drawings, or as required, based on the time switch function and the number of branch circuits or contactors controlled. Provide wiring to photocells, contactors, relays or other control points as required.

F. PHOTO CONTROL

The photo control shall:

Provide automatic switching (or dimming, as specified) for lighting loads using a thermal design with built_in delay to ensure that the controlled lighting does not switch off due to ambient light or lightning striking the photocell.

Have a rating based on NRTL testing at 50 percent power factor for ballast loads, be NRTL listed, and meet all applicable agency requirements.

Be stem-mounting type with all necessary mounting hardware and instructions; have a housing constructed of high impact poly-carbonate; photo control components consisting of a metal film resistor, dual temperature compensating bi_metal blades, snap action contact blades, chemically treated/polymer encapsulated cadmium sulfide photocell, and silver alloy contacts to ensure reliable 5 year manufacturer warranted operation. Photo control shall be 100 percent factory tested for function within manufacturer's specified

Be from the same manufacturer of and totally compatible with the time switches specified above.

Short Circuit Current Rating: 22,000A at 240V maximum and 14,000A at 480V maximum.

G. LIGHTING CONTACTORS

Industrial duty type; silver alloy, double break contacts, convertible with N.O. and N.C. indicators; capable of adding poles in the field; number and rating of poles as indicated on the drawings or required by the load controlled; typed directory affixed to the inside of the enclosure door listing all branch circuits switched and the control power branch circuit; complying with NEMA ICS 2 and UL 508.

Fusing: Provide fuse blocks and fuses in the contactor enclosures, of the ampacity and Class recommended by the manufacturer to obtain a contactor minimum RMS symmetrical short circuit current rating of 100,000A. Mount fuse blocks ahead of the input to each contact, both used and spare (if any). Also provide a fuse puller and spare fuses (25-percent of total fuses or a minimum of 2 of each rating, whichever is greater) affixed to the inside of the enclosure.

Enclosures: NEMA 1. Coil Voltage: 120V ac.

Mechanically-held type, control interface shall be 2-wire input module with 3-wire output Square D Class 8903 LX or equivalent of G.E., Siemens, Cutler Hammer, or ASCO

H. MISCELLANEOUS EQUIPMENT AND CONNECTIONS

All raceways, wiring, and connections of devices to energy management system that are not the responsibility of Division 23

All wiring and connections of exit door alarms. I. AUTOMATIC DOOR OPERATORS

Make connection from junction boxes to the entry door operators located in the transom above sliding doors, and from door operators to actuation devices as required. Provide key-operated switches at locations shown on the drawings and provide all other required electrical connections for door systems.

J. AREA OF RESCUE ASSISTANCE COMMUNICATIONS SYSTEM

General: Provide all labor, equipment, materials, and perform all operations in connection with the installation of the area of rescue assistance system as specified, as indicated on the drawings, or both, and conforming to applicable local code requirements, the Americans with Disabilities Act, and NFPA 70 Description: Provide a complete and functioning area of rescue assistance communication system as outlined in the Americans with Disabilities Act guidelines, including a master call station, remote call stations, all wiring, connections to devices, outlet boxes, junction boxes, raceways, and all other necessary materials.

Operation: The system shall allow two-way communications between the remote call stations and the master call station via both voice and visual indicating lights. Label

Call Stations: Master Call Station: Cornell A4204, Remote Call Stations: Cornell 4201. Testing: Fully test the complete area of rescue assistance system in the presents of the Owner's representative. Certify in writing to the Owner and Engineer that the

each "AREA OF RESCUE ASSISTANCE" with a lighted sign, and include operating instructions, adjacent to it, on use of the call station.

system has been successfully tested END OF SECTION 26



PARAGON STAR

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT **REVISIONS**

_____ _____ ____ ____ ____

REGISTRATION



05/09/2022 ANDREA C. MULVANY LICENSE # PE-2013039892 PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE CIVIL

LANDSCAPE

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

BSE STRUCTRAL

HENDERSON

ENGINEERS PLUMBING HENDERSON **ENGINEERS**

STRUCTURAL

ELECTRICAL

MECHANICAL HENDERSON **ENGINEERS**

ENGINEERS FIRE PROTECTION HENDERSON

CONTRACTOR GC

HENDERSON ENGINEERS 1801 MAIN STREET, SUITE 300 KANSAS CITY, MO 64108 TEL 816.663.8700 FAX 816.663.8701 WWW.HENDERSONENGINEERS.COM

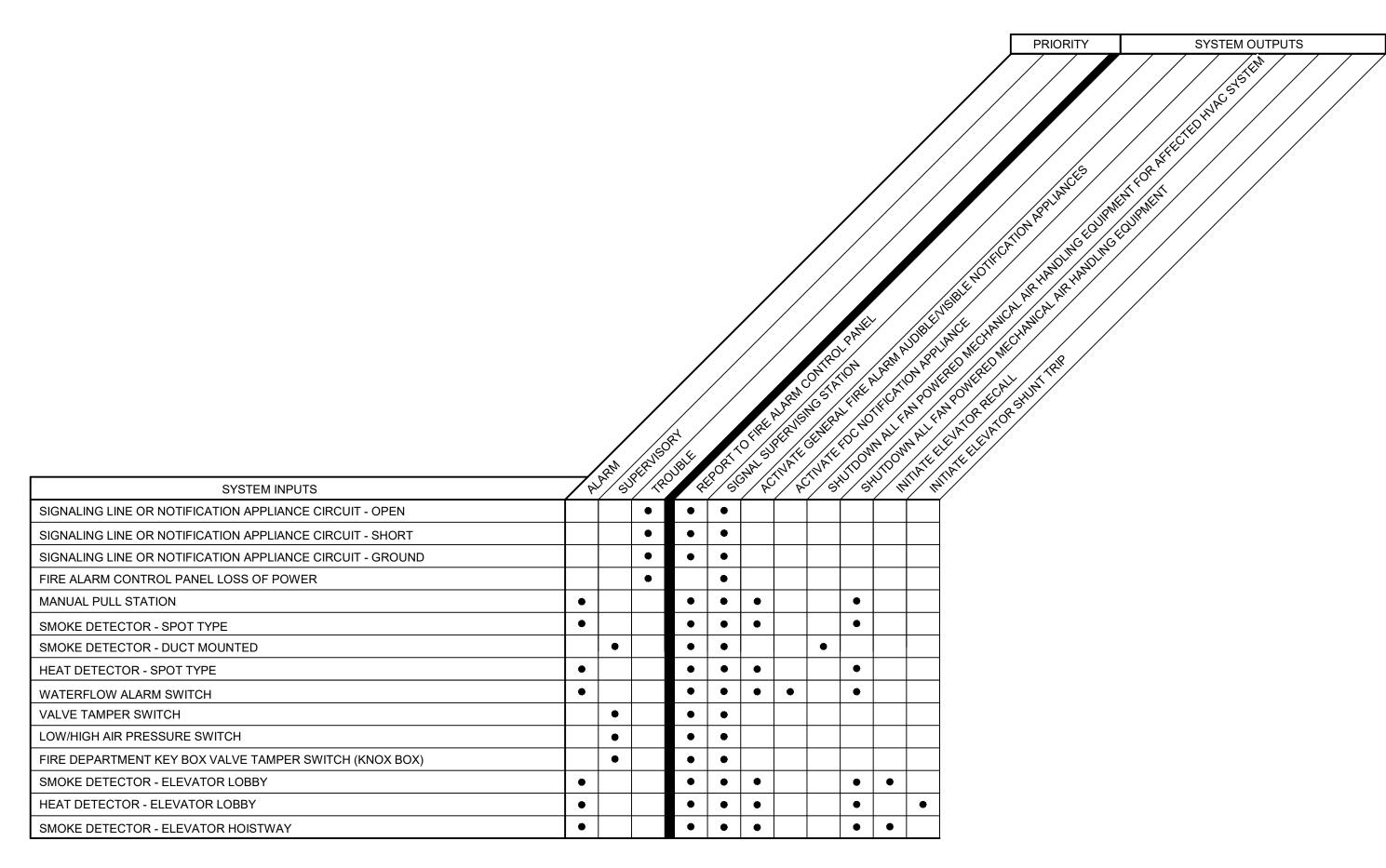
> MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

FIRE PROTECTION GENERAL NOTES:

- 1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 2. SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH APPLICABLE NFPA STANDARDS. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES, FIRE CODES AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
- 3. INFORMATION ON CONTRACT DOCUMENTS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE FINAL SYSTEM DESIGN AND LAYOUT OF ALL COMPONENTS, COORDINATION WITH ALL OTHER TRADES, AND SYSTEM CALCULATIONS REQUIRED FOR APPROVAL BY THE AUTHORITY HAVING JURISDICTION, ENGINEER, AND OWNER'S INSURER.
- 4. THE CONTRACTOR SHALL FOLLOW THE ENGINEER OF RECORD'S SYSTEM DESIGN AND LAYOUT OF ALL COMPONENTS EXCEPT WHERE MODIFICATION TO THE DESIGN IS NECESSARY. MODIFICATIONS SHALL BE REFLECTED IN THE CONTRACTOR'S SHOP DRAWINGS AND CALCULATIONS.
- 5. DEVIATIONS FROM ENGINEER'S DESIGN WILL NOT BE CONSIDERED UNLESS A FORMALLY SUBMITTED RFI IS RECEIVED AND APPROVED.
- 6. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM AS INDICATED IN THE DRAWINGS AND SPECIFICATIONS.
- 7. PROVIDE ADDITIONAL MATERIALS AND LABOR REQUIRED DUE TO LACK OF COORDINATION OR TO MEET AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER REQUIREMENTS AT NO ADDITIONAL COST TO THE OWNER.
- 8. FORWARD COMPLETED CERTIFICATE OF COMPLETION AND CONTRACTOR MATERIAL TEST CERTIFICATES TO THE OWNER.
- 9. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

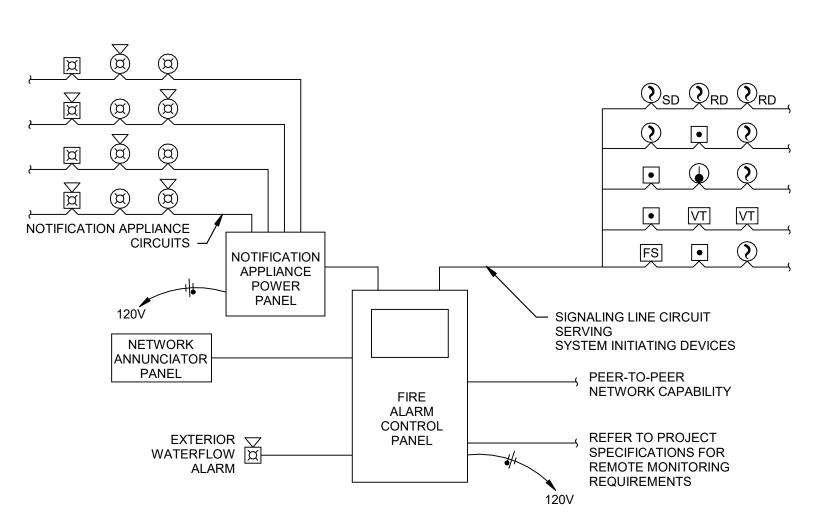
FIRE	E ALARM SY	MBOLS		
		ND NOT ALL SYMBOLS OR ABB		
ABBREV	/IATIONS		FIRE ALA	ARM
AFF AFG CD DI ESFR	ABOVE FINISHED FLOOR ABOVE FINISHED GRADE CANDELA DUCTILE IRON EARLY SUPPRESSION FAST RESPONSE	NIC NOT IN CONTRACT OC ON CENTER PIV POST INDICATOR VALVE PROVIDE FURNISH AND INSTALL PRV PRESSURE REDUCING VALVE	FACP FACP FAAP	FIRE ALARM CONTROL PANEL/UNIT RECESSED FIRE ALARM CONTROL PANEL/UNIT FIRE ALARM ANNUNCIATOR PANEL
ETR FHC FP GC GPM JB/J-BOX MAX MIN N/A	EXISTING TO REMAIN FIRE HOSE CABINET FIRE PROTECTION CONTRACTOR GALLONS PER MINUTE JUNCTION BOX MAXIMUM MINIMUM NOT APPLICABLE	RD RETURN DUCT REV REVISION SD SUPPLY DUCT SF SQUARE FEET TYP TYPICAL UNO UNLESS NOTES OTHERWISI V VOLT(S) W WATTS WP WEATHERPROOF	FAAP AMP RPS RT RL	RECESSED FIRE ALARM ANNUNCIATOR PANEL AMPLIFIER PANEL REMOTE POWER SUPPLY REMOTE TEST STATION WITH INDICATING LIGHT REMOTE INDICATING LIGHT
ANNOTA	TION	<u> </u>	PS	PRESSURE SWITCH LOW/HIGH
(1)	FIRE PROTECTION PLAN	NOTE CALLOUT	FS VT	WATERFLOW ALARM SWITCH CONTROL VALVE TAMPER SWITCH
9	CONNECTION POINT OF N	NEW WORK TO EXISTING ER NUMBER INDICATES DETAIL	DH CM	MAGNETIC DOOR HOLD OPEN DEVICE CONTROL MODULE
F1		R INDICATES SHEET NUMBER	MM K	MONITOR MODULE FIRE DEPARTMENT KEY BOX
	D MOUNTING HEIGHT		- ▼ ^F	PULL STATION FIREFIGHTER'S PHONE JACK
FIRE ALAR FIRE ALAR FIRE ALAR PULL STAT	M PPLIANCES (CENTERLINE) M ANNUNCIATOR PANEL (DI: M BELL (EXTERIOR) M CONTROL PANEL/UNIT (DI IONS (HANDLE) PPLIANCES (CENTERLINE)	120"	(1) (2) (3) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	HEAT DETECTOR (E INDICATES ELEVATOR RECALL) SMOKE DETECTOR (E INDICATES ELEVATOR RECALL) SINGLE STATION SMOKE DETECTOR PROJECTED BEAM SMOKE DETECTOR
OTHERWIS LISTED ARI (AFG). ALL ADA AND L	E IN THE SPECIFICATIONS OF ABOVE FINISHED FLOOR (A DEVICES SHALL BE INSTALING OCAL REQUIREMENTS.	S SHOWN ABOVE UNLESS NOTED OR ELSEWHERE. MOUNTING HEIGHTS AFF) OR ABOVE FINISHED GRADE LED IN COMPLIANCE WITH CURRENT	RD RD CO RW	DUCT MOUNTED SMOKE DETECTOR (SD=SUPPLY/RD=RETURN) CARBON MONOXIDE DETECTOR AREA OF REFUGE 2-WAY COMMUNICATION SYSTEM WALL MOUNTED AUDIBLE NOTIFICATION APPLIANCE
THROUGH		RENT LINETYPES ARE USED IN INDICATE THE STATUS OF ITEMS AS		#W INDICATES WATTAGE (VOICE EVACUATION SYSTEMS ONLY) WALL MOUNTED VISIBLE NOTIFICATION APPLIANCE ## INDICATES CANDELA
EXISTING, AND/OR ITE THE STATU VIEW IN WE	TO BE DEMOLISHED, TO BE EMS WHICH ARE ANTICIPATE IS OF ITEMS USING THESE L HICH THEY APPEAR. PHASIN	INCLUDED AS PART OF NEW WORK ED TO BE PROVIDED IN THE FUTURE. INETYPES ARE RELATIVE TO THE NG SHOWN IN DRAWINGS IS NOT		WALL MOUNTED AUDIBLE/VISIBLE NOTIFICATION APPLIANCE ## INDICATES CANDELA #W INDICATES WATTAGE (VOICE EVACUATION SYSTEMS ONLY)
INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION PHASING, WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONSTRUCTION DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A BROAD ORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING				CEILING MOUNTED AUDIBLE NOTIFICATION APPLIANCE #W INDICATES WATTAGE (VOICE EVACUATION SYSTEMS ONLY CEILING MOUNTED VISIBLE NOTIFICATION APPLIANCE ## INDICATES CANDELA
ETC.		ICE, EQUIPMENT, NOTE, LINE, SHAPE,	(B) ##	CEILING MOUNTED AUDIBLE/VISIBLE NOTIFICATION APPLIANCE ## INDICATES CANDELA #W INDICATES WATTAGE (VOICE EVACUATION SYSTEMS ONLY)
EXISTING -		NEW ————————————————————————————————————		END OF LINE RESISTOR
				ABORT SWITCH BELL



CONTRACTOR TO PROVIDE ALL NECESSARY EQUIPMENT AND CONNECTIONS REQUIRED TO ACCOMPLISH THE FUNCTIONS INDICATED, AT MINIMUM.

SEQUENCE OF OPERATIONS INDICATED IS SCHEMATIC. MODIFY TO SUIT CONDITIONS AND MEET APPLICABLE CODE REQUIREMENTS.

SEQUENCE OF OPERATIONS



RISER DIAGRAM IS SCHEMATIC IN NATURE. NOT ALL DEVICES ARE SHOWN. REFER TO PLANS FOR EQUIPMENT QUANTITIES AND LOCATIONS.

DUCT DETECTORS MAY HAVE INTEGRAL RELAYS FOR AIR HANDLING UNIT SHUT-DOWN AND FIRE/SMOKE DAMPER CONTROL. WIRING FOR THIS FUNCTION HAS NOT BEEN SHOWN. COORDINATE WITH MECHANICAL SYSTEM INSTALLER.

REFER TO PLANS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.

THE ALARM RISER DIAGRAM - ADDRESSABLE SYSTEM (NON-VOICE)

NTS



PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

	E'S SUMMIT, MO
Project No.:	19050.01a
Date:	05.06.22
Issued For:	PERMIT
	REVISIONS
No. Date	Description
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REGISTRATION



05/09/2022 CHRISTOPHER J. CULP LICENSE # PE-2013037646

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTRAL

ENGINEERS

ENGINEERS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR GC

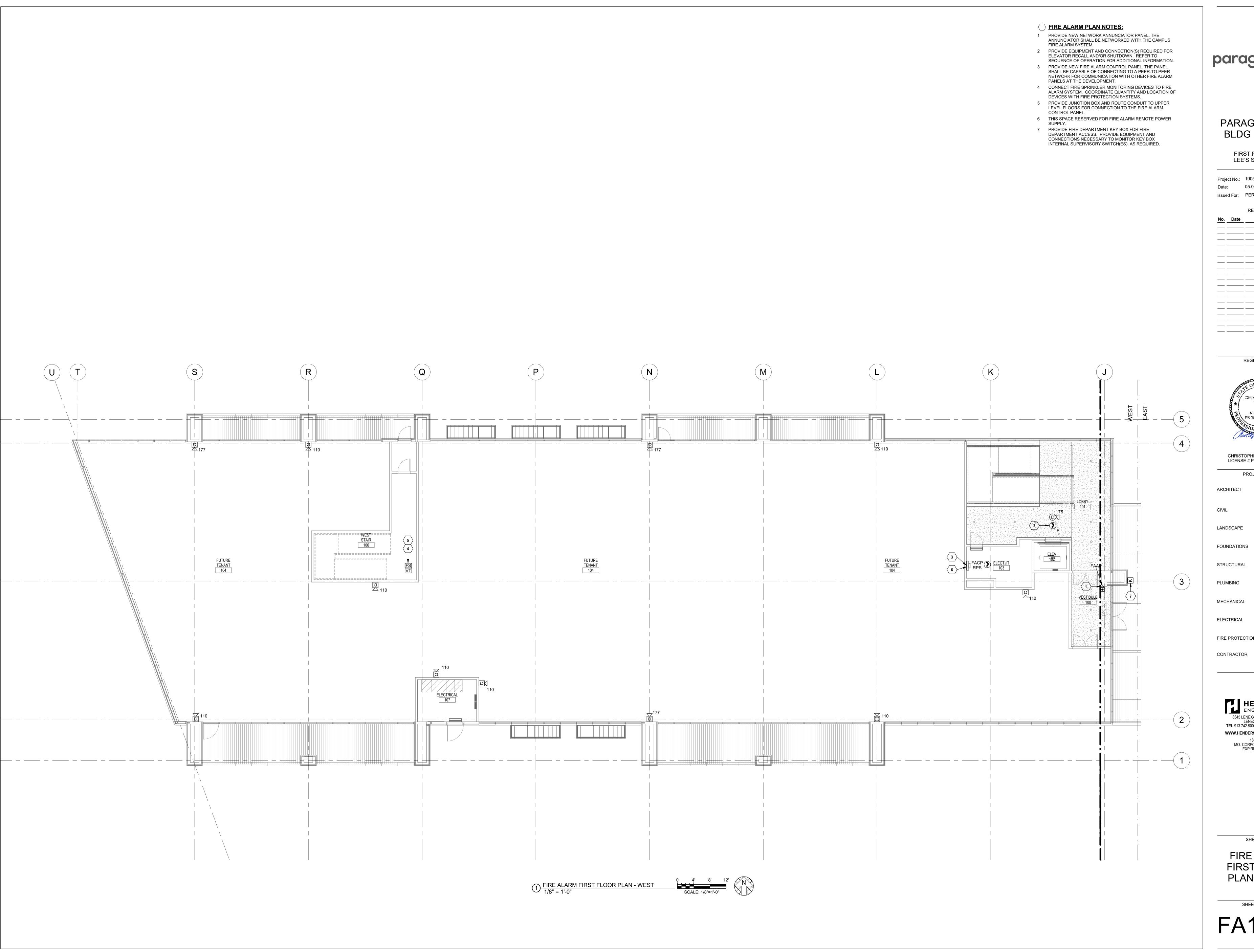
HENDERSON
ENGINEERS

8345 LENEXA DRIVE, SUITE 300
LENEXA, KS 66214
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WWW.HENDERSONENGINEERS.COM

1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE
FIRE ALARM
LEGENDS AND
GENERAL





FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT **REVISIONS**

REGISTRATION



CHRISTOPHER J. CULP LICENSE # PE-2013037646

PROJECT TEAM FINKLE+WILLIAMS

ARCHITECTURE

FOUNDATIONS BSE STRUCTURAL

ENGINEERS STRUCTURAL BSE STRUCTRAL **ENGINEERS**

HENDERSON

ENGINEERS MECHANICAL HENDERSON

ELECTRICAL HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON

CONTRACTOR GC

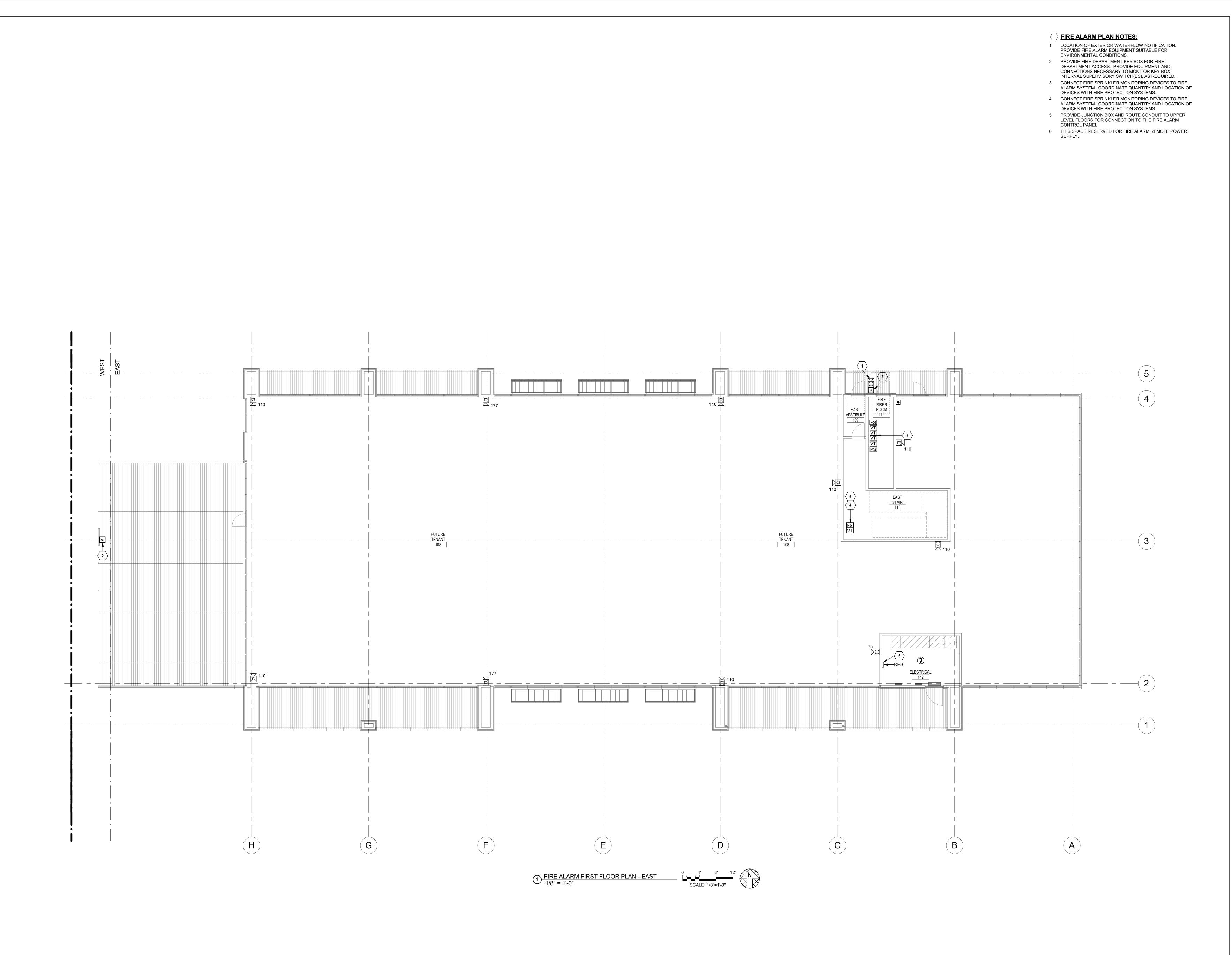
HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

FIRE ALARM FIRST FLOOR PLAN - WEST

SHEET NUMBER

FA101.1





FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

 Project No.:
 19050.01a

 Date:
 05.06.22

 Issued For:
 PERMIT

 REVISIONS

 No.
 Date
 Description

REGISTRATION



05/09/2022 CHRISTOPHER J. CULP LICENSE # PE-2013037646

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL

STRUCTURAL BSE STRUCTRAL ENGINEERS

HENDERSON

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL

ENGINEERS

FIRE PROTECTION HENDERSON
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CONTRACTOR GC

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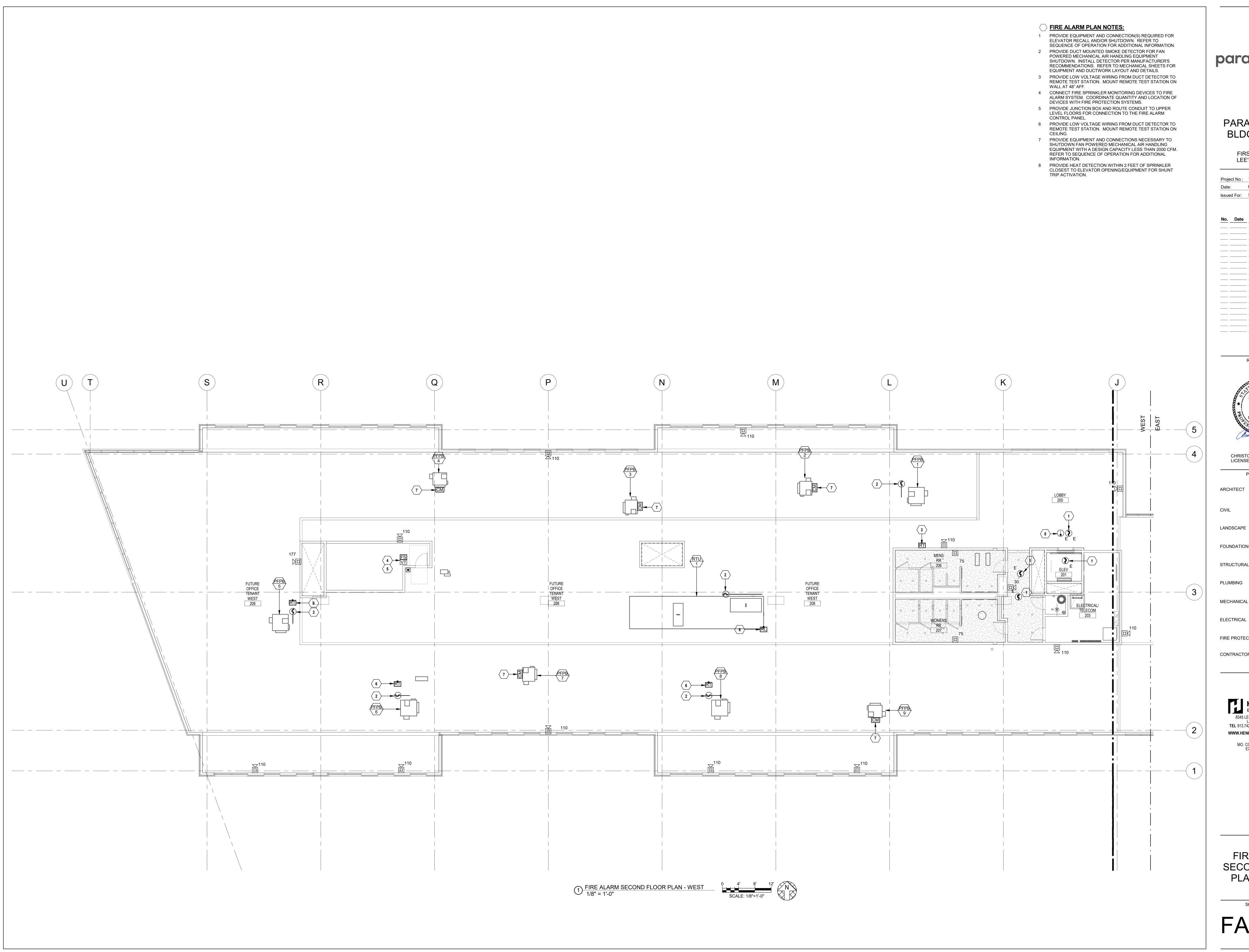
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1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

FIRE ALARM FIRST FLOOR PLAN - EAST

FA101.2





FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

 Project No.:
 19050.01a

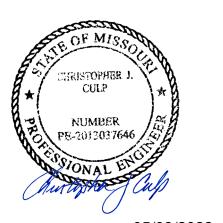
 Date:
 05.06.22

 Issued For:
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 REVISIONS

 No.
 Date
 Description

REGISTRATION



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PROJECT TEAM

CT FINKLE+WILLIAMS

ARCHITECTURE

GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL ENGINEERS

STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON ENGINEERS
FIRE PROTECTION HENDERSON

CONTRACTOR GC

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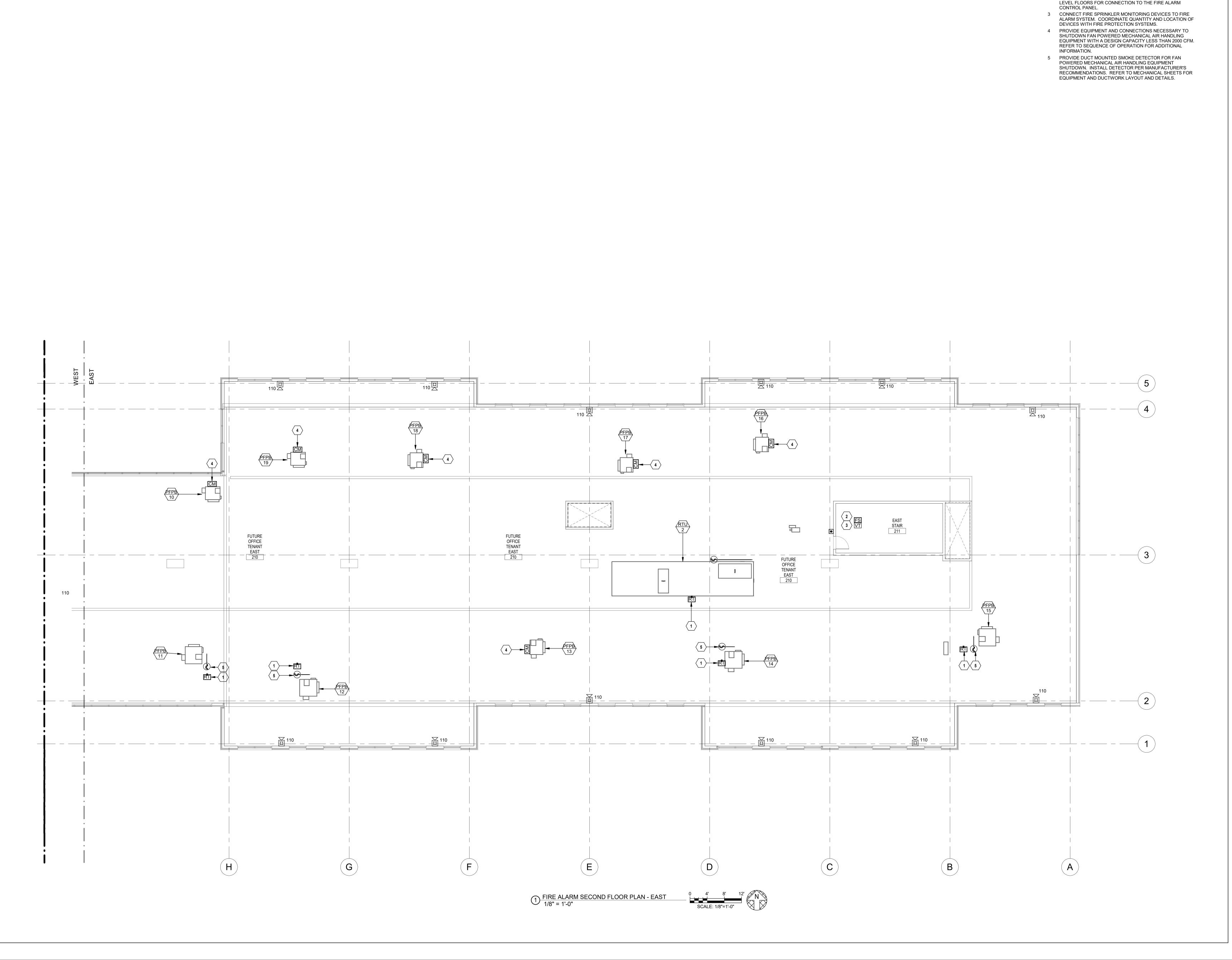
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EXPIRES 12/31/2022

SHEET TITLE

FIRE ALARM SECOND FLOOR PLAN - WEST

SHEET NUMBER

FA102.1





> FIRE ALARM PLAN NOTES:

1 PROVIDE LOW VOLTAGE WIRING FROM DUCT DETECTOR TO REMOTE TEST STATION. MOUNT REMOTE TEST STATION ON

2 PROVIDE JUNCTION BOX AND ROUTE CONDUIT TO UPPER

PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a

Date: 05.06.22

Issued For: PERMIT

REVISIONS

ate Description

REGISTRATION



05/09/2022 CHRISTOPHER J. CULP LICENSE # PE-2013037646

PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

II GBA

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL

ENGINEERS

STRUCTURAL BSE STRUCTRAL

PLUMBING HENDERSON

HENDERSON

ENGINEERS

MECHANICAL

ELECTRICAL HENDERSON

ENGINEERS
FIRE PROTECTION HENDERSON

CONTRACTOR GC

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EXPIRES 12/31/2022

FIRE ALARM SECOND FLOOR PLAN - EAST

SHEET TITLE

SHEET NUMBER

FA102.2

All requirements under Division 01 (General Requirements) and the general and supplementary conditions of these specifications apply to this section and division. Where the requirements of this section and division exceed those of Division 01 (General Requirements), this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of each system as implied by the design and the equipment

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

Installation of devices shall be performed or supervised by a National Institute for Certification of Engineering Technologies (NICET) Level 2 or higher fire alarm technician. Submit copies of the certification for employees through shop drawing submittals.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

2004 Edition 1995 Edition 1. Division 21 – Fire Suppression Division 15 2. Division 22 – Plumbing Division 15 3. Division 23 – HVAC Division 15

4. Division 26 – Electrical Division 16 5. Division 27 – Communications Division 16 6. Division 28 – Electronic Safety and Security Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install, complete and ready for the intended use."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

C. PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price. D. SCOPE OF WORK

The scope of work in this section includes fire alarm control panels, remote annunciator panels, manual fire alarm pull stations, automatic smoke and heat detectors, fire alarm notification appliances, auxiliary fire alarm equipment, activation and powering of combination fire and smoke dampers, sprinkler system waterflow and valve tamper alarms, air handling unit shutdown, elevator recall, and battery stand-by power. E. CODES AND STANDARDS

Provide an integrated fire alarm system, which meets the current versions of NFPA 70. National Electrical Code; NFPA 72, National Fire Alarm Code; and all local building and fire codes. All fire alarm equipment shall

be Underwriters Laboratory (UL) approved for the type and class of service performed.

F. SYSTEM DESCRIPTION

The fire alarm system shall be a non-coded manual and automatic fire alarm system with connections to a remote supervising station. Control panel shall be micro-processor based, with fully addressable alarm

G. COORDINATION

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components installed without regard to the above shall be relocated at no additional cost to the

H. SUBMITTALS

Upon being awarded a contract, submit to the Architect for approval, six (6) copies of manufacturer's shop drawings for equipment to be furnished under this contract, items requiring coordination between contractors, and sheet metal ductwork fabrication drawings. Before submitting shop drawings and material lists, verify that equipment submitted is mutually compatible and suitable for the intended use, and will fit the available space and allow ample room for maintenance. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being proposed. Submit shop drawings as early as required to support the project schedule. Allow for two weeks Engineer review time plus mailing time plus a duplication of this time for resubmittal if required.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

The checking and subsequent approval of such shop drawings by the Engineer shall not relieve the Contractor from responsibility for errors in dimensions, details, size of members, quantities, omissions of components or fittings; coordination of electrical requirements; or for coordinating items with actual building conditions. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

Submit a detailed sequence of operation. Pre-printed, generic material will not be accepted and will be rejected. Highlight, mark, list or indicate the materials, performance criteria and accessories that are being

Submit shop drawings showing fire alarm floor plans and a full building riser diagram. Fire alarm floor plans and riser diagram shall show fire alarm control panel, annunciator, all fire alarm initiating devices and notification appliances. Show typical wiring diagrams of control panel/s, annunciator and each device and wiring connections required. Show all interfaces to other systems, such as temperature control systems, and

Where required by the AHJ, Contractor is responsible for obtaining a professional engineer or NICET stamp and signature on their shop drawing submittal. The Engineer is not responsible and will not provide this.

Shop drawings shall be produced using Computer Aided Design. Hand drawn documents will not be reviewed or approved.

Shop drawing scale shall match the Engineer's drawings where possible. Scale shall not be less than 3/32" =

Submit a bill of material and manufacturers product data for all devices and equipment.

Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the shop drawings have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal and shall clearly indicate the materials. performance criteria and accessories being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

I. ELECTRONIC DRAWINGS

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, written authorization from the Architect and release agreement from the Engineer must be received before electronic drawing files will be sent.

J. RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described

See Division 01 and General Conditions for additional information.

K. QUALIFICATIONS

The manufacturer shall be a company specializing in manufacturing the products specified in this section with minimum three years documented experience. The installer shall be a company specializing in installing the products specified in this section with minimum three years documented experience, be a bonded and licensed contractor and merchant of electronic automated fire alarm systems, and employ full-time factorytrained installers and technicians. The equipment manufacturer's service department shall be fully stocked in standard parts and components and engaged in the maintenance of fire alarm systems. On-the-premises service shall be available within 4 hours of notification, 7 days a week, 24 hours a day. Furnish service and maintenance of fire alarm system for one year from date of substantial completion.

L. WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and

All corrective software modifications made during warranty periods shall be updated on all user documentation and on user and manufacturer archived software disks.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed including term limits for warranties extending beyond the one year period and any actions the Owner must take in order to maintain warranty status. Each warranty instrument shall be addressed to the Owner and

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

state the commencement date and term. 2. MATERIALS AND INSTALLATION

A. MANUFACTURERS

Subject to compliance with requirements, provide products manufactured by the following manufacturers: Notifier; SimplexGrinnell; Siemens-Cerberus Division; Kidde/Edwards; Gamewell-FCI; FIKE Corporation; Farenhyt or Engineer approved equal.

B. FIRE ALARM CONTROL PANEL

The fire alarm system shall be a microprocessor-based system designed specifically for fire applications. The system shall be UL listed under Standard 864 (Control Units for Fire-Protective Signaling Systems). Modular construction with a flush mounted enclosure.

Remote Annunciator: Provide supervised remote annunciator(s) where shown on the plans, including audible and visible indication of fire alarm by address, and audible and visible indication of system trouble and supervisory. Install in flush mounted enclosure.

Power Supply: Provide two separate and reliable power supplies. The control panel shall receive 120 Vac power via a dedicated branch circuit of the building's electrical system. Each shall have adequate capacity for the system. The fire alarm contractor shall submit battery calculations for review and approval. The calculations shall indicate each device and the load required in stand-by and alarm mode. The secondary power system shall be a battery-operated emergency power supply and charger with capacity for operating system in standby mode for 24 hours followed by alarm mode for 5 minutes.

System Supervision: Automatically detects and reports open circuits, shorts, and grounds of wiring for initiating device, signaling line, and notification appliance circuits. Alarm, supervisory and trouble signals shall be monitored by the supervising station over a Digital Alarm Communicator Transmitter (DACT), or other approved method.

Initiating Device Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the style and class of the circuitry selected. Initiating device circuits shall be Class B. Notification Appliance Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the style and class of the circuitry selected. Notification appliance circuits shall be

Signaling Line Circuits: Provide circuitry, which meets the performance requirements during abnormal conditions, based upon the style and class of the circuitry selected. Signaling line circuitry shall be Class B.

Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts to provide accessory functions specified

Digital Alarm Communicator Transmitter (DACT): Electrically supervised, capable of transmitting alarm, supervisory and trouble signals over telephone lines to remote station receiver. The installing contractor shall select the appropriate DACT equipment based on the available communication methods. Coordinate with General Contractor to ensure proper connections are provided for communication to and from the DACT. Two (2) separate communication methods are required and shall not be subject to a common failure within the scope of work identified within these contract documents. Unless noted otherwise, the installing contractor shall utilize two (2) of the following communication methods:

1. Copper wire (POTS) telephone line for fire alarm use as required by NFPA 72. Exception: If two (2) POTS telephone lines are utilized per NFPA 72, additional communication

methods are not required. 2. Building 10/100 Base network (LAN), DSL modem, or cable modem. 3. GSM cellular networks in the area including 2G, 3G and 4G. The transmitter shall automatically detect and choose the best network in the area based on signal strength and immediately self-adjust for

4. Other alternative method complying with the performance requirements of NFPA 72 for Communication Methods for Supervising Station Alarm Systems that is acceptable to the Authority Having Jurisdiction and the Engineer of Record. Approval of any alternative methods must be obtained from the Engineer of Record via an RFI prior to submitting bids for the scope of work.

Provide trouble acknowledge, drill, and alarm silence switch.

The control panel and remote annunciator panel shall have dedicated alarm, supervisory and trouble LED's and dedicated alarm, supervisory and trouble acknowledge switches.

Lamp Test: Manual lamp test function causes each LED to function at fire alarm control panel.

Drill Sequence of Operation: Manual drill function causes alarm mode operation as described above. Addressable systems shall have silent walk test, history logging for a minimum of 400 events, 80 character

C. SEQUENCE OF OPERATIONS

Trouble Sequence of Operation: System or circuit trouble places system in trouble mode, which causes the following system operations:

1. Visible and audible trouble alarm indicated at fire alarm control panel and remote annunciator panel

Trouble signal transmitted to supervising station. 3. Manual acknowledge function at fire alarm control panel silences audible trouble alarm; visible alarm

is displayed until initiating failure or circuit trouble is cleared. Supervisory Sequence of Operation: The activation of any sprinkler valve tamper switch or duct-mounted smoke detector places system in supervisory mode, which causes the following system operations:

1. Visible and audible supervisory alarm indicated by address at fire alarm control panel and remote

annunciator panel (if provided) 2. Supervisory signal transmitted to supervising station. 3. Duct-mounted smoke detectors shall shutdown their respective unit upon detection of smoke and

remain down until manually reset. 4. Fan-powered terminal units that are less than 2,000 cfm and are not provided with duct detection

shall shutdown when its respective air handling unit is shutdown. 5. Manual acknowledge function at fire alarm control panel and remote annunciator panel silences audible supervisory alarm; visible alarm is displayed until device is returned to its normal

position/supervisory condition is cleared. Alarm Sequence of Operation: Actuation of an alarm initiating device places system in alarm mode, which causes the following system operations.

1. Audible notification appliances shall sound until silenced by the alarm silence switch at the control

2. All visible alarm notification appliances shall display a continuous synchronized pattern until reset by

the Alarm Reset Switch. Alarm signal transmitted to supervising station. 4. All fan-powered air-handling equipment shall shutdown and remain down until the fire alarm control

5. The alarm LED shall flash on the control panel and remote annunciator panel until the alarm has been acknowledged at the control panel/remote annunciator panel. Once acknowledged, this same LED shall latch on and the custom label for the address in alarm shall be displayed on the alphanumeric LCD

readout. A subsequent alarm received from another address after acknowledged shall flash the alarm LED on the control panel showing the new alarm information. 6. A pulsing alarm tone shall occur within the control panel until acknowledged.

Activation of an elevator lobby or elevator machine room smoke detector or heat detector located in the elevator pit shall place the system in alarm mode and shall initiate Phase I elevator recall per ASME A17.1. Provide output signals and logic as required by code and by the elevator system supplier and installer. D. INITIATING DEVICES

Manual Pull Station: Provide semi-flush, non-coded type, double action manual pull station.

Smoke Detector (Photoelectric type): Device shall have visible indication of detector actuation, self-restoring, plug-in with an integral addressable module indicating the detector status. Photoelectric detectors shall have sensitivity between 0.5 and 3.5 percent/foot smoke obscuration.

Heat Detector – Fixed Temperature Type: The device shall be actuated by a fixed temperature alarm point rating of 135 degree F. The base shall be plug-in with an integral addressable module indicating the detector

Duct Mounted Smoke Detector: Photoelectric detector along with a standard, relay or isolator detector mounting base. Provide for variations in duct air velocity between 100 and 4000 feet per minute. Protect the measuring chamber from damage and insects. Provide an air exhaust tube and an air sampling inlet tube that extends into the duct air stream up to ten feet. Provide drilling templates and gaskets to facilitate locating and mounting the housing. Provide remote alarm LEDs and remote test stations as shown on the plans. Provide duct detection and shutdown for air distribution systems exceeding 2,000 cfm.

E. NOTIFICATION APPLIANCES

Alarm Horn: Surface type fire alarm horn. Sound rating: 90 dB at 10 feet.

Visible Alarm Notification Appliances (Strobes): Strobes shall be xenon or equivalent, unfiltered or clear filtered white light, intensity as indicated on drawings, flash rate range from 1 to 3 Hz, a maximum pulse duration of 0.2 sec with a maximum duty cycle of 40 percent. Strobe shall meet all requirements of the Americans with Disabilities Act.

Audible/Visible Alarm Notification Appliances (Horn/Strobes): Combination units shall provide a common enclosure for the fire alarm audible and visible alarm appliances and be UL listed for its purpose. Minimum audible level and strobe intensity shall meet all requirements for separate appliances.

Provide flush or recessed devices unless otherwise noted.

F. AUXILIARY DEVICES

Waterflow Alarm Switches: Provided by the Fire Sprinkler Installer and shall be wired, complete and ready for use, by the Fire Alarm System Installer. Switch shall have an adjustable delay to minimize false alarms due to

Gate Valve (Tamper) Switches: Shall be provided by the Fire Sprinkler Installer and shall be wired complete and ready for use by the Fire Alarm System Installer.

Monitor Module: Addressable microelectronic module providing a system address for alarm initiating devices for wired applications with normally open contacts. Include address setting means on the module.

Control Relay Module: Provide intelligent control relay modules. The control relay module shall provide one form "C" dry relay contact rated at 2 amps at 24 Vdc to control external appliances or equipment shutdown. The control relay shall be rated for pilot duty and releasing systems. The position of the relay contact shall be confirmed by the system firmware.

Fire Department Key Box: By Knox Company. Provide with an internal switch to indicate a supervisory condition at the fire alarm control and annunciator panels when the lid is removed.

G. FIRE ALARM WIRE AND CABLE

Fire Alarm Power Branch Circuits: Building wire as specified in Division 26.

Signaling Line, Initiating Device, and Notification Appliance Circuits: Power limited fire-protective signaling cable, solid copper conductor, 300 Volts insulation, suitable for temperature, conditions and location installed. Minimum wire size for initiating device circuits, control circuits and notification appliance circuits shall be determined by calculations and manufacturer's requirements or recommendations. Wire and cable shall be twisted and shielded if recommended by the system manufacturer. Initiating, notification, and control circuits shall be sized based on 20 percent additional power consuming devices. The conductors shall meet the requirements of NEC Article 760.

All wiring provided on this project shall be UL listed for the intended use. All wiring including wiring to existing modified devices and appliances shall be new.

EXECUTION

A. GENERAL

Install, program, and test all new equipment identified in this contract and revise existing equipment as noted.

The installation supervisor shall be on the job site during the entire installation. The installation supervisor shall maintain marked up copies of the drawings at the job site showing as-built conditions. These drawings shall be updated daily and available for Owner review.

Provide all required conduit and all associated hardware and install (pull), connect, and test all cable for a complete fire alarm system. Install all wiring in accordance with the guidelines of these specifications and documents as well as the NFPA codes and standards listed in these specifications.

B. INSTALLATION Pathways above suspended ceilings and in nonaccessible locations may be routed exposed where permitted by NFPA 70 & 72. Exposed pathways located less than 96 inches above the floor shall be installed in conduit. Minimum allowable conduit size shall be 3/4 inch. Size the conduit so that conduit fill does not exceed 75 percent of NFPA 70 maximum fill requirements. Cables in vertical risers shall not exceed 50 percent of NFPA 70 maximum fill requirements. Conduit installation shall be as required by the Contractor's layout and as

acceptable shall be rerouted and replaced without expense to the Owner. Conceal all wire, cable, conduit, and raceways in walls, ceiling spaces, electrical shafts, or closets in finished areas except as specifically noted otherwise. Conduit and raceways may be exposed in unfinished areas or

described in these specifications. All conduit field routing shall be acceptable to the Owner. Routing not

Except as otherwise specified or indicated on the drawings, Install all conduit parallel or perpendicular to dominant surfaces with right angle turns made of symmetrical bends or fittings. Except where prevented by the location of other work, a single conduit or a conduit group shall be centered on structural members. Locate conduit at least six inches from hot water or steam pipes and from other hot surfaces. Conduit shall

not block access to any existing equipment or fixtures. Label all conduits and junction boxes as specified in Division 26.

conventional hardwired Class B initiating and notification appliance circuits.

where specifically approved by the Owner.

Terminate all wiring at devices or panels using terminal connectors for screw type terminals. All terminal connectors for conductors shall be pre-insulated ring type or pre-insulated spade type. Pre-insulated terminal connectors shall include a vinyl sleeve, color coded to indicate conductor size. Pre-insulated terminal connectors shall include a metallic support sleeve bonded to the vinyl-insulating sleeve and designed to grip the conductor insulation.

Mount end-of-line device in box with last device or separate box adjacent to last device in circuit for

Securely fasten conduit to all boxes and cabinets. Threads on metallic conduit shall project through the wall of the box to allow the bushing to butt against the end of the conduit. The locknuts both inside and outside shall then be tightened sufficiently to bond the conduit securely to the box. Conduit shall enter cabinets from the

Install manual stations with operating handle 48 inches above floor unless noted otherwise on drawings. Install ceiling mounted initiating devices in areas with exposed structure tight to underside of floor/roof deck. Do not install smoke detectors in a direct air flow nor closer than 3 feet (1 meter) from an air supply diffuser or

Install wall mounted visible and audible/visible notification appliances with visible element (strobe) between 80

inches and 96 inches above finished floor unless noted otherwise on drawings. Install wall mounted audible devices with the top of the device at least 90 inches above finished floor or 6 inches below the ceiling, whichever is lower, unless noted otherwise on drawings. If combination devices are

installed, they shall be installed per the visible signal device requirements.

Make conduit and wiring connections to equipment provided by others.

Provide strobe synchronization as required per NFPA 72.

return air opening.

C. FIELD QUALITY CONTROL Systems shall be checked and tested in accordance with the instructions provided by the manufacturer to ensure that the system functions as required and is free of grounds, opens, and shorts. Each device shall be

Upon completion of the system installation and before the date of final acceptance, a factory-trained technician shall perform all necessary tests and adjustments and shall file a Letter of Certification and a Certificate of Completion (NFPA 72) with the Owner indicating that the system functions and conforms to the

specifications.

tested. Smoke detectors shall be tested with products of combustion.

adjustments in the presence of the Owner's designated personnel.

Test in accordance with NFPA 72 and local fire department requirements.

D. MANUFACTURER'S FIELD SERVICES Include services of factory trained and certified technician to supervise installation, adjustments, final

connections, and system testing as performed by the Contractor's factory-trained technicians. The equipment supplier's factory trained technician shall train the Owner's personnel in the proper use and maintenance of the system. Training sessions shall be conducted as needed, not to exceed a total of 2 sessions, with each session lasting a maximum of 4 hours each.

E. ACCEPTANCE TESTING Upon completion of the system installation, a factory-trained technician shall perform all necessary tests and

END OF SECTION 28

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

05.06.22 Issued For: PERMIT **REVISIONS** ____ ____ ____ ____ ____ ____ ____ ____ _____ ____

Project No.: 19050.01a

REGISTRATION



PROJECT TEAM

FINKLE+WILLIAMS ARCHITECT ARCHITECTURE

CHRISTOPHER J. CULP

LICENSE # PE-2013037646

CIVIL

LANDSCAPE LAND 3

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

STRUCTURAL BSE STRUCTRAL **ENGINEERS**

PLUMBING HENDERSON **ENGINEERS**

HENDERSON

HENDERSON

ENGINEERS

ENGINEERS

MECHANICAL

ELECTRICAL

FIRE PROTECTION HENDERSON

CONTRACTOR GC

HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

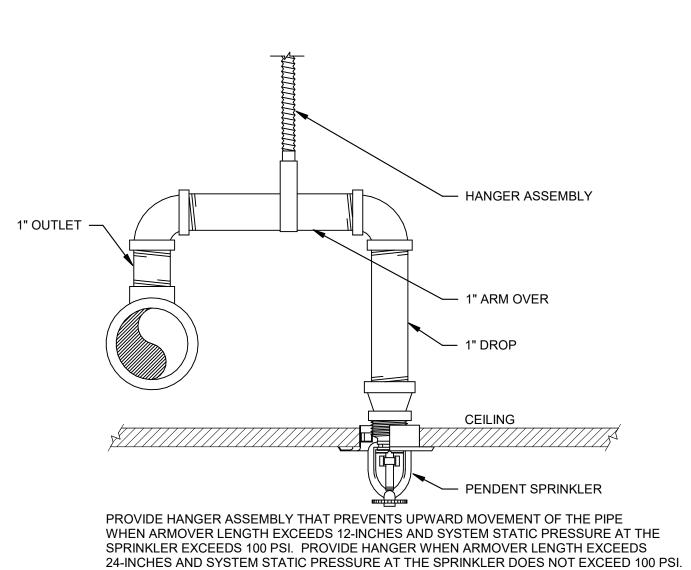
SHEET TITLE

FIRE ALARM

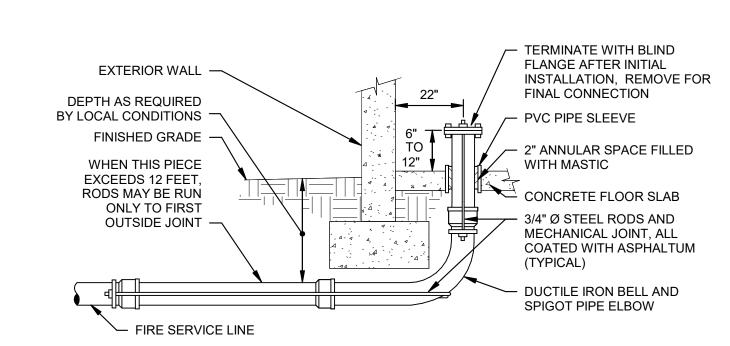
FIRE PROTECTION GENERAL NOTES:

- 1. PRIOR TO SUBMITTING BID, VISIT THE JOB SITE AND BECOME FULLY ACQUAINTED WITH THE EXISTING CONDITIONS OF THE PROJECT. REVIEW THE GENERAL NOTES, SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL REQUIREMENTS WHICH MAY NOT BE SPECIFICALLY CALLED OUT IN THIS PORTION OF THE CONSTRUCTION DOCUMENTS. NOTIFY ARCHITECT, ENGINEER AND/OR OWNER OF CONFLICTS OR DISCREPANCIES PRIOR TO SUBMISSION OF BID.
- 2. SYSTEM DESIGN, INSTALLATION AND MATERIALS SHALL BE IN ACCORDANCE WITH APPLICABLE NFPA STANDARDS. SYSTEM SHALL ALSO MEET ALL APPLICABLE BUILDING CODES. FIRE CODES AND THE REQUIREMENTS OF THE AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER. VERIFY REQUIREMENTS PRIOR TO BID SUBMITTAL.
- 3. INFORMATION ON CONTRACT DOCUMENTS IS GENERAL INFORMATION AND FOR BID PURPOSES ONLY. CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR THE FINAL SYSTEM DESIGN AND LAYOUT OF ALL COMPONENTS, COORDINATION WITH ALL OTHER TRADES, AND SYSTEM CALCULATIONS REQUIRED FOR APPROVAL BY THE AUTHORITY HAVING JURISDICTION, ENGINEER, AND OWNER'S INSURER.
- 4. THE CONTRACTOR SHALL FOLLOW THE ENGINEER OF RECORD'S SYSTEM DESIGN AND LAYOUT OF ALL COMPONENTS EXCEPT WHERE MODIFICATION TO THE DESIGN IS NECESSARY. MODIFICATIONS SHALL BE REFLECTED IN THE CONTRACTOR'S SHOP DRAWINGS AND CALCULATIONS.
- 5. DEVIATIONS FROM ENGINEER'S DESIGN WILL NOT BE CONSIDERED UNLESS A FORMALLY SUBMITTED RFI IS
- 6. THE CONTRACTOR SHALL PROVIDE ALL EQUIPMENT AND LABOR REQUIRED FOR A COMPLETE AND OPERATIONAL SYSTEM AS INDICATED IN THE DRAWINGS AND SPECIFICATIONS.
- NO ADDITIONAL COST TO THE OWNER.
- CONTRACTOR MATERIAL TEST CERTIFICATES TO THE OWNER.

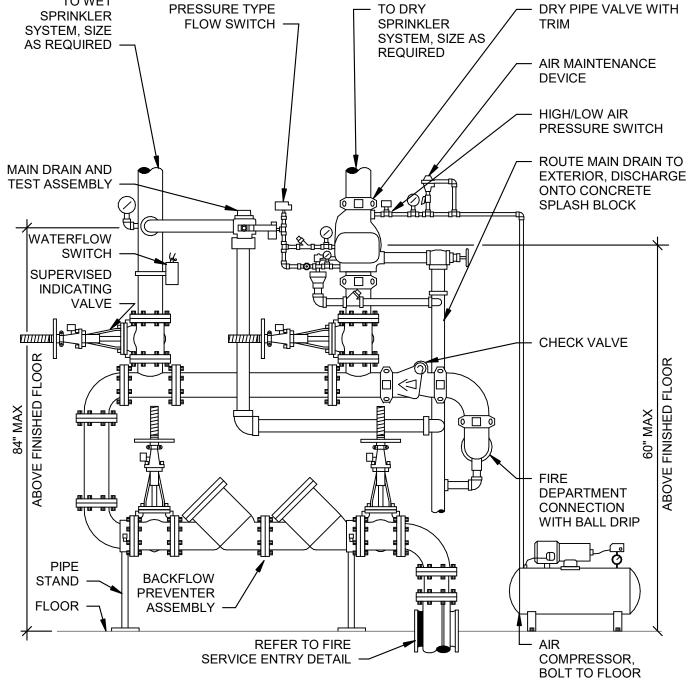
THIS IS A M	MASTER LEGEND A	ND NOT ALL SYMBOLS OR ABBR	EVIATIONS ARE US	SED.		V2.01	
ABBREVIA [®]	TIONS		LINETYPE LEGEN)			
AFG AFG CD C, DI DI ESFR E, ETR EX FHC FI FP FI GC CG GPM G, JB/J-BOX JU MAX M	BOVE FINISHED FLOOR BOVE FINISHED GRADE ANDELA UCTILE IRON ARLY SUPPRESSION AST RESPONSE XISTING TO REMAIN IRE HOSE CABINET IRE PROTECTION ONTRACTOR IALLONS PER MINUTE UNCTION BOX IAXIMUM IINIMUM	FINISHED GRADE LA E IRON SUPPRESSION ESPONSE G TO REMAIN OSE CABINET ROTECTION ACTOR IS PER MINUTE ON BOX IM M OC ON CENTER PIV POST INDICATOR VALVE PROVIDE FURNISH AND INSTALL PRV PRESSURE REDUCING VALVE RD RETURN DUCT REV REVISION SUPPLY DUCT SF SQUARE FEET TYP TYPICAL UNO UNLESS NOTES OTHERWIS V VOLT(S) W WATTS		THROUGHOUT THE DRAWINGS DIFFERENT LINETYPES ARE USED COMBINATION WITH THE SYMBOLS TO INDICATE THE STATUS OF I EXISTING, TO BE DEMOLISHED, TO BE INCLUDED AS PART OF NEW AND/OR ITEMS WHICH ARE ANTICIPATED TO BE PROVIDED IN THE THE STATUS OF ITEMS USING THESE LINETYPES ARE RELATIVE TO VIEW IN WHICH THEY APPEAR. PHASING SHOWN IN DRAWINGS IS INTENDED TO FULLY DESCRIBE ALL NECESSARY CONSTRUCTION WHICH IS DETERMINED BY THE CONTRACTOR AS PART OF THEIR RESPONSIBILITIES. ANY SUCH PHASES DESCRIBED IN THE CONST DOCUMENTS ARE GENERAL AND ONLY INTENDED TO INDICATE A LORDER FOR THE SAKE OF DESCRIBING THE PROJECT. THE FOLLOWING THE PROJECT. THE FOLLOWING THE PROJECT. THE FOLLOWING THE PROJECT.			
N/A N	OT APPLICABLE	WP WEATHERPROOF	EXISTING		NEW -		
ANNOTATION			DEMOLISH — — —		FUTURE		
(1) F	FIRE PROTECTION PLAN I	NOTE CALLOUT	FIRE SPRINKLER	S			
CONNECTION POINT OF NEW WORK TO EXISTING 1 DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER LOWER NUMBER INDICATES SHEET NUMBER 1 SECTION CUT DESIGNATION FIRE SPRINKLER PIPING			UPRIGHT SPRINKLER PENDENT SPRINKLER CONCEALED SPRINKLER DRY PENDENT SPRINKLER DRY SIDEWALL SPRINKLER SIDEWALL SPRINKLER		RINKLER SPRINKLER SPRINKLER L SPRINKLER		
——————————————————————————————————————	SHUTOFF VALVE	/E	WATER SUPP STATIC PRESSUR RESIDUAL PRESS WATER FLOW: 220	E: 169 PSI URE: 84 PSI 00 GPM			
	FIRE PUMP TES	IENT CONNECTION	WATER SUPPLY INFORMATION IS NOT AVAILABLE AT THIS TIME. THE ABOVE IS AN ASSUMED WATER SUPPLY AND IS TO BE USED FOR BID PURPOSES ONLY. SUBMIT AN RFI FOR ACTUAL WATER SUPPLY INFORMATION PRIOR TO SYSTEM DESIGN. THE SUPPLY IS ASSUMED WITH A 10% REDUCTION AT A SOURCE 25 FEET FROM THE BUILDING.				
•	SPRINKLER RIS TOP BEAM CLA TRAPEZE HANG	SER MP					



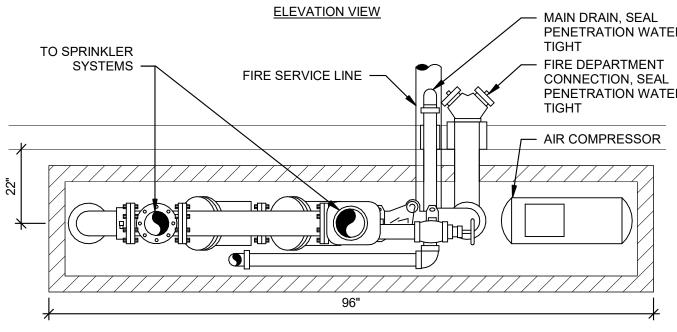
ARRANGEMENT SHOWN IS SCHEMATIC. MODIFY TO SUIT CONDITIONS AND MEET APPLICABLE CODE REQUIREMENTS.



ARRANGEMENT SHOWN IS SCHEMATIC. MODIFY TO SUIT FIELD CONDITIONS AND MEET APPLICABLE CODE REQUIREMENTS. VERIFY FOUNDATION WITH ARCHITECTURAL DRAWINGS. COORDINATE WHO IS TO PROVIDE THE FIRE SERVICE ENTRY WITH THE GENERAL CONTRACTOR OR CONSTRUCTION MANAGER PRIOR TO SUBMITTING BID.

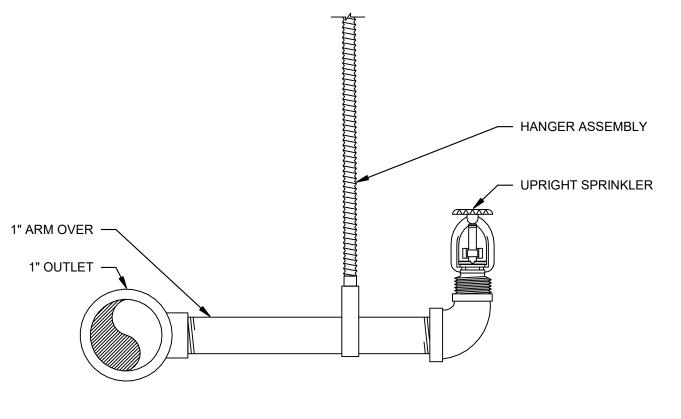


ARRANGEMENT SHOWN IS SCHEMATIC. MODIFY TO SUIT CONDITIONS AND MEET APPLICABLE CODE REQUIREMENTS. COORDINATE INSTALLATION OF ALARM DEVICES WITH OTHER TRADES.



CROSS HATCHED AREA IS THE MAXIMUM ALLOWABLE AREA TO BE USED FOR SPRINKLER SYSTEM RISERS AND BACKFLOW PREVENTER. INSTALLATION MUST ALLOW FOR ALL REQUIRED MAINTENANCE ACCESS WITHIN CROSS HATCHED AREA. PLAN VIEW

1 FIRE PROTECTION RISER - WET PIPE AND DRY PIPE NTS



PROVIDE HANGER WHEN ARMOVER LENGTH EXCEEDS 24 INCHES.

/ / / TRAPEZE HANGER PRESSURE TYPE TO DRY SPRINKLER

> HENDERSON ENGINEERS PENETRATION WATER 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 PENETRATION WATER WWW.HENDERSONENGINEERS.COM MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

> > SHEET TITLE FIRE SPRINKLER LEGENDS AND **GENERAL** NOTES

PARAGON STAR

BLDG 2 / LOT 9

FIRST PLAT, LOT 9

LEE'S SUMMIT, MO

REVISIONS

REGISTRATION

CULP

CHRISTOPHER J. CULP

ARCHITECT

LANDSCAPE

STRUCTURAL

PLUMBING

MECHANICAL

ELECTRICAL

CIVIL

LICENSE # PE-2013037646

PROJECT TEAM

GBA

LAND 3

ENGINEERS

ENGINEERS

HENDERSON **ENGINEERS**

HENDERSON **ENGINEERS**

HENDERSON

ENGINEERS

ENGINEERS

FIRE PROTECTION HENDERSON

CONTRACTOR GC

BSE STRUCTRAL

FOUNDATIONS BSE STRUCTURAL

FINKLE+WILLIAMS

ARCHITECTURE

Project No.: 19050.01a

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05.06.22

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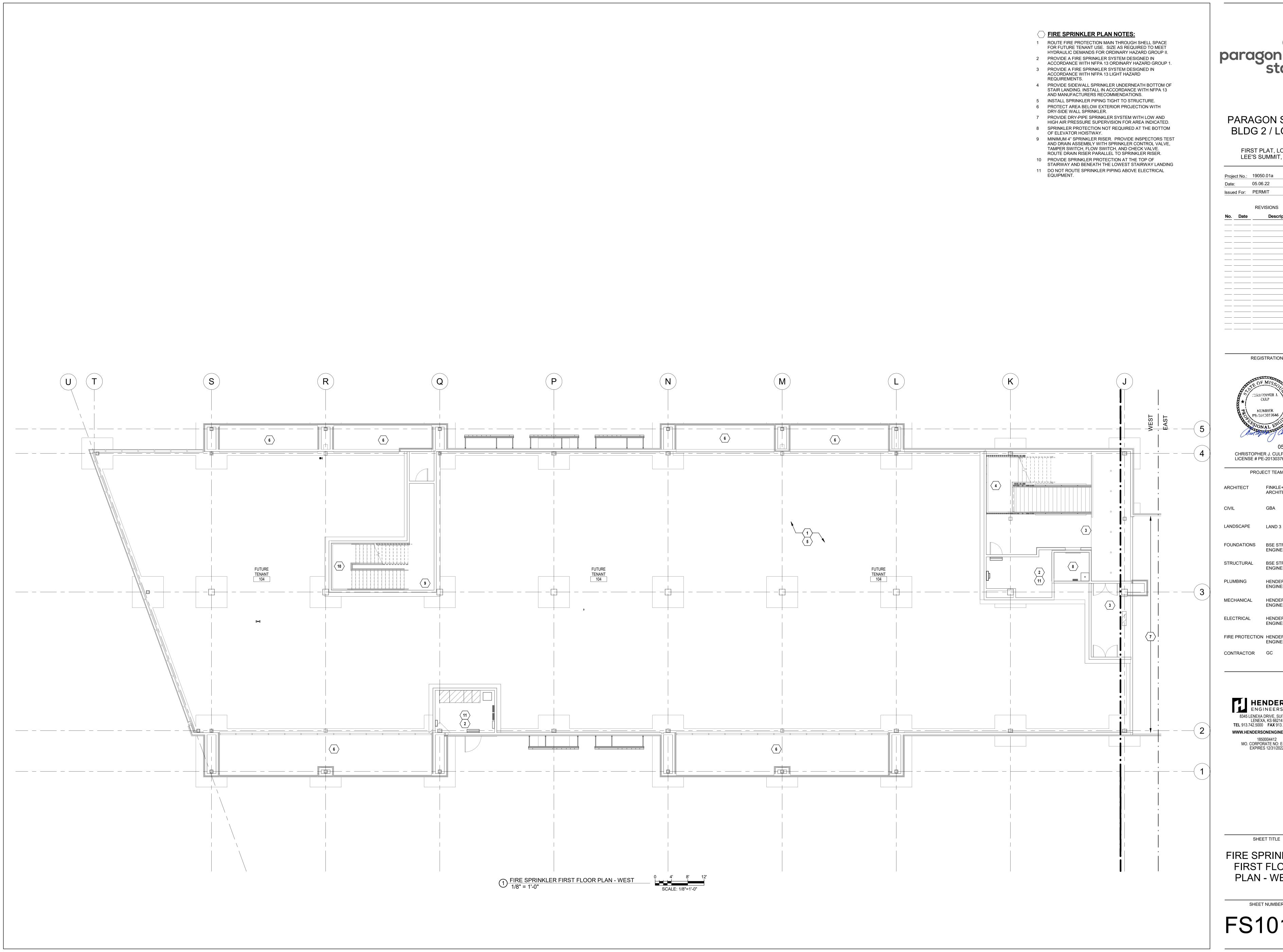
ARRANGEMENT SHOWN IS SCHEMATIC. MODIFY TO SUIT CONDITIONS AND MEET APPLICABLE CODE REQUIREMENTS.

RECEIVED AND APPROVED.

7. PROVIDE ADDITIONAL MATERIALS AND LABOR REQUIRED DUE TO LACK OF COORDINATION OR TO MEET AUTHORITY HAVING JURISDICTION AND INSURANCE CARRIER REQUIREMENTS AT

8. FORWARD COMPLETED CERTIFICATE OF COMPLETION AND

9. REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.





FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Project No.: 19050.01a 05.06.22 Issued For: PERMIT REVISIONS

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> FINKLE+WILLIAMS ARCHITECTURE

PROJECT TEAM

FOUNDATIONS BSE STRUCTURAL **ENGINEERS**

BSE STRUCTRAL STRUCTURAL **ENGINEERS**

> HENDERSON **ENGINEERS**

HENDERSON HENDERSON

ENGINEERS

FIRE PROTECTION HENDERSON

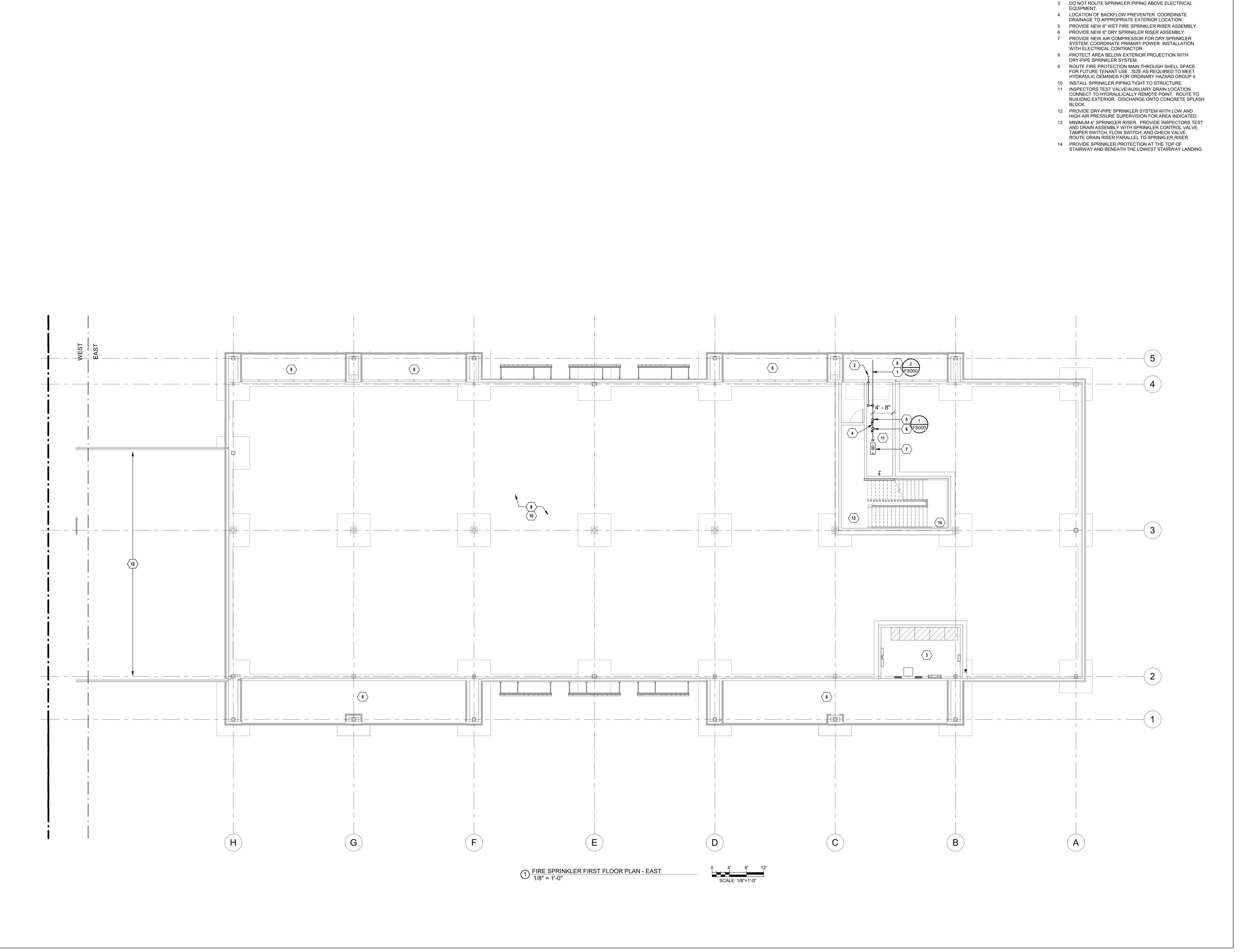
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SHEET TITLE

FIRE SPRINKLER FIRST FLOOR PLAN - WEST

SHEET NUMBER

FS101.1





○ FIRE SPRINKLER PLAN NOTES:

FOR CONTINUATION.

1 8" FIRE PROTECTION SERVICE ENTRANCE. REFER TO CIVIL

4-INCH STORZ FIRE DEPARTMENT CONNECTION, REFER TO SPECIFICATIONS FOR ADDITIONAL INFORMATION.

PARAGON STAR BLDG 2 / LOT 9

FIRST PLAT, LOT 9

Project No.: 19050.01a

Date: 05.06.22

Issued For: PERMIT

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05/09/2022 CHRISTOPHER J. CULP LICENSE # PE-2013037646

PROJECT TEAM

FINKLE+WILLIAMS

ARCHITECTURE
_ GBA

LANDSCAPE LAND 3

ARCHITECT

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STRUCTURAL BSE STRUCTRAL ENGINEERS

PLUMBING HENDERSON ENGINEERS

ENGINEERS

MECHANICAL HENDERSON ENGINEERS

ELECTRICAL HENDERSON

FIRE PROTECTION HENDERSON ENGINEERS

CONTRACTOR GC

HENDERSON
ENGINEERS

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LENEXA, KS 66214
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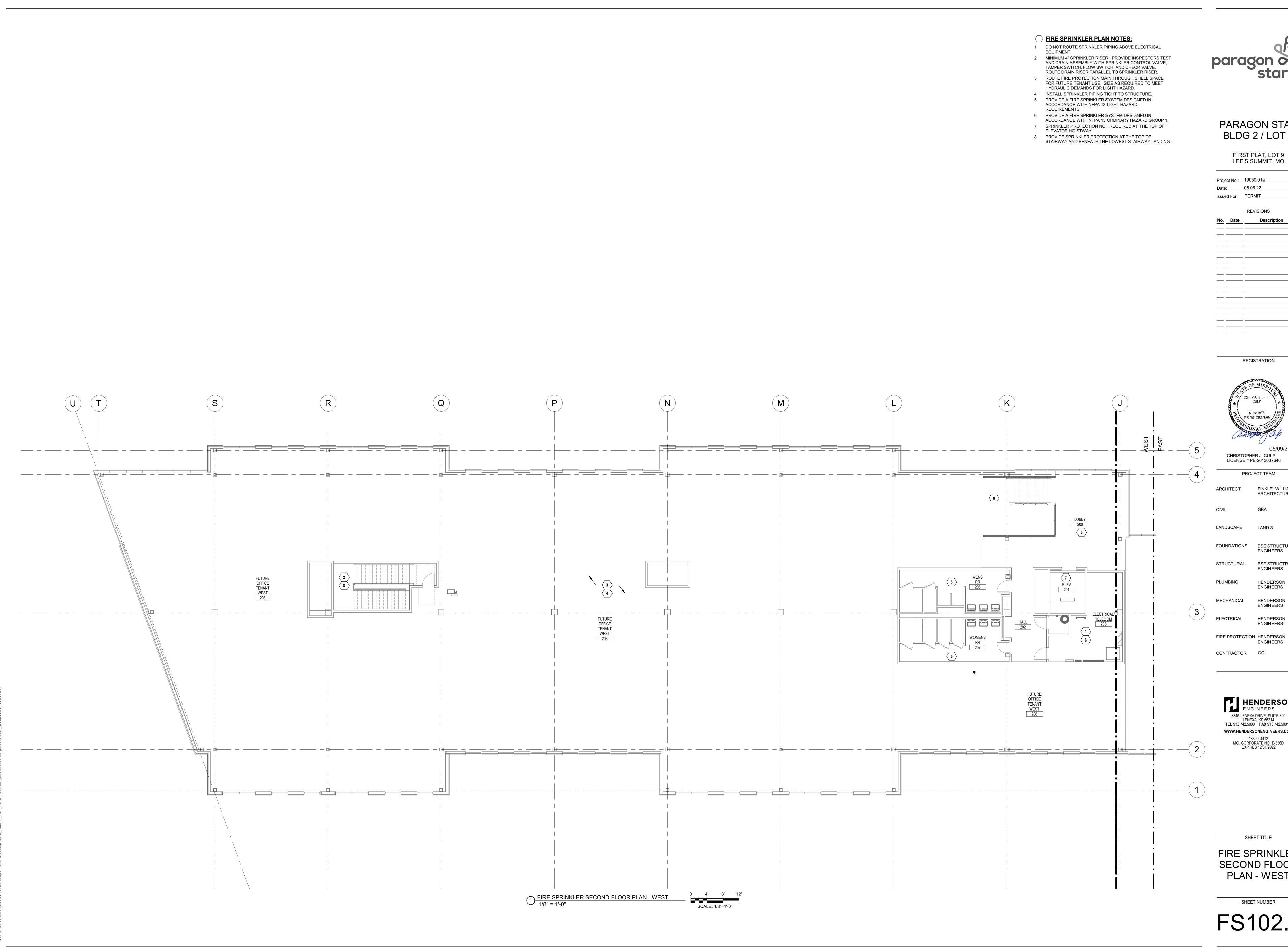
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1850004412
MO. CORPORATE NO: E-556D
EXPIRES 12/31/2022

SHEET TITLE

FIRE SPRINKLER FIRST FLOOR PLAN - EAST

FS101.2





FIRST PLAT, LOT 9

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PROJECT TEAM FINKLE+WILLIAMS

ARCHITECTURE

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> **BSE STRUCTRAL ENGINEERS**

ENGINEERS HENDERSON **ENGINEERS**

HENDERSON

ENGINEERS

HENDERSON **ENGINEERS** FIRE PROTECTION HENDERSON

CONTRACTOR GC

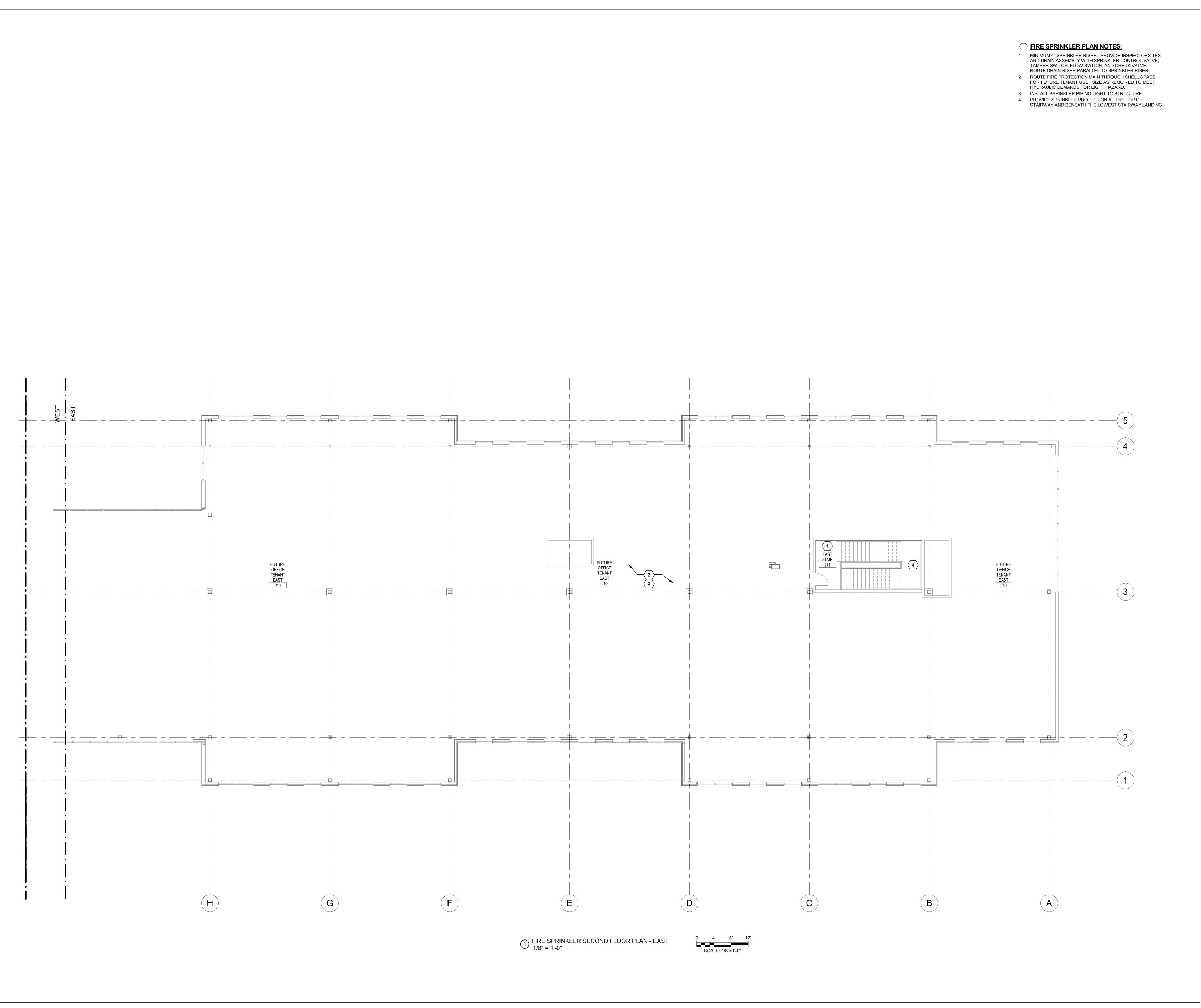
HENDERSON ENGINEERS 8345 LENEXA DRIVE, SUITE 300 LENEXA, KS 66214 TEL 913.742.5000 FAX 913.742.5001 WWW.HENDERSONENGINEERS.COM 1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

FIRE SPRINKLER SECOND FLOOR PLAN - WEST

SHEET NUMBER

FS102.1





FIRST PLAT, LOT 9

 Project No.:
 19050.01a

 Date:
 05.06.22

 Issued For:
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LEE'S SUMMIT, MO

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PROJECT TEAM

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

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STRUCTURAL BSE STRUCTRAL

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON ENGINEERS

CONTRACTOR GC

ELECTRICAL

FIRE PROTECTION HENDERSON ENGINEERS

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1850004412 MO. CORPORATE NO: E-556D EXPIRES 12/31/2022

SHEET TITLE

FIRE SPRINKLER SECOND FLOOR PLAN - EAST

SHEET NUMBER

FS102.2

each system as implied by the design and the equipment specified.

A. GENERAL REQUIREMENTS

Requirements under Division 01 and the general and supplementary conditions of these specifications shall apply to this section and division. Where the requirements of this section and division exceed those of Division 01, this section and division take precedence. Become thoroughly familiar with all its contents as to requirements that affect this division, section, or both. Work required under this division includes all material, equipment, appliances, transportation, services, and labor required to complete the entire system as required by the drawings and specifications, or reasonably inferred to be necessary to facilitate the function of

The specifications and drawings for the project are complementary, and any portion of work described in one shall be provided as if described in both. In the event of discrepancies, notify the Engineer and request clarification prior to proceeding with the work involved.

Drawings are graphic representations of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shapes, locations, and connections. They convey the scope of work, indicating the intended general arrangement of the systems without showing all of the exact details as to elevations, offsets, control lines, and other installation requirements. Use the drawings as a guide when laying out the work and to verify that materials and equipment will fit into the designated spaces, and which when installed per manufacturers' requirements, will ensure a complete, coordinated, satisfactory, and properly operating system.

Refer to Division 22 for additional requirements that apply to this installation that are not written herein.

B. DEFINITIONS

Division: References contained in this specification follow the numbering system defined in the Construction Specifications Institute (CSI) MasterFormat 2004 Edition. Specification Divisions 01 through 13 provided with this project may reference the CSI MasterFormat 1995 Edition. The corresponding division references between the 2004 Edition and 1995 Edition are as follows:

- 2004 Edition 1995 Edition

 1. Division 21 Fire Suppression Division 15

 2. Division 22 Plumbing Division 15

 3. Division 23 HVAC Division 15
- 4. Division 26 Electrical Division 16
 5. Division 27 Communications Division 16
 6. Division 28 Electronic Safety and Security Division 16

Furnish: "to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations."

Install: "to perform all operations at the project site including, but not limited to, the actual unloading, unpacking, assembling,

erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use."

Provide: "to furnish and install, complete and ready for the intended use."

Furnished by Owner (or Owner-Furnished) or Furnished by Others: "an item furnished by the Owner or under other divisions or contracts, and installed under the requirements of this division, complete and ready for the intended use, including all items and services incidental to the work necessary for proper installation and operation. Include the installation under the warranty required by this division."

Engineer: Where referenced in this division, "Engineer" is the Engineer of Record and the Design Professional for the work under this division, and is a consultant to, and an authorized representative of the Architect, as defined in the General and/or Supplementary Conditions. When used in this division, Engineer means increased involvement by and obligations to the Engineer, in addition to involvement by and obligations to the Architect.

AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the work.

NRTL: Nationally recognized testing laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA), and acceptable to the AHJ over this project. Nationally recognized testing laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ and standards that meet the specified criteria.

Substitution: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor. Substitutions include Value Engineering proposals.

Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

The terms "approved equal", "equivalent", or "equal" are used synonymously and shall mean "accepted by or acceptable to the Engineer as equivalent to the item or manufacturer specified". The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

C. PREBID SITE VISIT

Prior to submitting bid, visit the site of the proposed work and become fully informed as to the conditions under which the work is to be done. Failure to comply with this requirement shall not be considered sufficient justification to request or obtain extra compensation over and above the contract price.

D. MANUFACTURERS

In other articles where lists of manufacturers are introduced, subject to compliance with requirements, provide products by one of the manufacturers specified.

Where a list is provided, manufacturers are listed alphabetically and not in accordance with any ranking or preference.

Where manufacturers are not listed, provide products subject to compliance with requirements from manufacturers that have been actively involved in manufacturing the specified product for no less than 5 years.

E. COORDINATION

Coordinate the connection of the fire sprinkler alarm devices to the fire alarm system.

Coordinate work with that of other trades so that the various components of the systems are installed at the proper time, will fit the available space, and will allow proper service access to those items requiring maintenance. Components installed without regard to the above shall be relocated at no additional cost to the Owner.

F. SUBSTITUTIONS

Materials, products, equipment, and systems described in the Bidding Documents establish a standard of required function, dimension, appearance and quality to be met by the proposed substitution. The base bid shall include only the products from manufacturers specifically named in the drawings and specifications. To request a substitution, request the Substitution Request Form from the Architect or Engineer. Complete and send the Substitution Request From for each material, product, equipment, or system that is proposed to be substituted. The burden of proof of the merit of the proposed substitution is upon the proposer.

Unless stated otherwise in writing to the Engineer by the Contractor, Contractor warrants to the Engineer, Architect, and Owner the following:

- 1. Proposed substitution has been fully investigated and determined to meet or exceed the specified Work in all respects unless stated otherwise in the substitution request.
- Proposed substitution is consistent with the Contract Documents and will produce indicated results, including functional clearances, maintenance service, and sourcing of replacement parts.
- Proposed substitution has received necessary approvals of authorities having jurisdiction.
 Same warranty will be furnished for proposed substitution as for specified Work.
- 5. If accepted substitution fails to perform as required, Contractor shall replace substitute material or system with that originally specified and bear costs incurred thereby.

6. Coordination, installation and changes in the Work as necessary for accepted substitution will be complete in all respects.

No substitutions will be considered unless the Substitution Request Form is completed and attached with the appropriate

substitution documentation. No substitution will be considered prior to receipt of bids unless written request for approval to bid has been received by the Engineer at least ten (10) calendar days prior to the date for receipt of bids.

If the proposed substitution is approved prior to receipt of bids, such approval will be stated in an addendum. Bidders shall not rely upon approvals made in any other way. Verbal approval will not be given. No substitutions will be considered after the contract is awarded unless specifically provided in the contract documents.

G. SUBMITTALS

Assemble and submit for review shop drawings, material lists, manufacturer product literature for equipment to be furnished, and items requiring coordination between contractors under this contract. Provide submittals in sufficient detail so as to demonstrate compliance with these Contract Documents and the design concept. Prior to transmitting submittal, verify that the equipment submitted is mutually compatible and suitable for the intended use, will fit the available space, and maintain manufacturer recommended service clearances. If the size of equipment furnished makes necessary any change in location or configuration, submit a shop drawing showing the proposed layout.

Transmit submittals as early as required to support the project schedule. Allow for two weeks Engineer review time, plus to/from mailing time via the Architect, plus a duplication of this time for resubmittal if required. Only resubmit those sections requested for

Submittals shall contain the project name, applicable specification section, submittal date, equipment identification acronym as used on the drawings, and the Contractor's stamp. The stamp shall certify that the submittal has been checked by the Contractor, complies with the drawings and specifications, and is coordinated with other trades. Manufacturer product literature shall include shop drawings, product data, performance sheets, samples and other submittals required by this division. Highlight, mark, list, or indicate the materials, performance criteria, and accessories that are being proposed. General product catalog data not specifically noted to be part of the specified product will be rejected and returned without review.

Shop drawings shall meet the requirements of NFPA 13 for working level drawings and shall include the following:

- 1. Working plans per NFPA 13, including layout drawings of the complete overhead sprinkler system that indicates the relationship of sprinkler piping and sprinklers to all other overhead items, including ceiling grid and tiles, light fixtures, diffusers, registers, grilles, ductwork, structure, soffits, obstructions, etc. Location of risers, piping, etc., shall be as inconspicuous as possible and shall fulfill all functional requirements. System design capabilities and demand shall also be noted on the drawings.
- Complete details and sections as required to clearly define and clarify the design, including a materials list describing all proposed materials by manufacturer's name and catalog number.
- 3. Hydraulic calculations.
- 4. Product data for all fire sprinkler system components. Clearly indicate components to be used where multiple components appear on the same cut sheet.

Where required by the AHJ, Contractor is responsible for obtaining a professional engineer or NICET stamp and signature on their shop drawing submittal. The Engineer is not responsible and will not provide this.

Submittals and shop drawings shall not contain the firm name, logo, seal, or signature of the Engineer. They shall not be copies of the work product of the Engineer. If the Contractor desires to use elements of such product, refer to paragraph "Electronic Drawing Files" for procedures to be used.

Separate submittals according to individual specification sections. Illegible submittals will be rejected and returned without review. Shop drawings shall be produced using Computer Aided Design. Hand drawn documents will not be reviewed or approved. Catalog data shall be properly bound, identified, indexed and tabbed in a 3-ring binder. Each item or model number shall be clearly marked and accessories indicated. Label the catalog data with the equipment identification acronym or number as used on the drawings and include performance curves, capacities, sizes, weights, materials, finishes, wiring diagrams, electrical requirements and deviations from specified equipment or materials. For equipment with motor starters or VFDs, include short circuit current ratings. Mark out inapplicable items. Shop drawings will be returned without review if the above mentioned requirements are not

Provide the quantity of submittals required by Division 01. If not indicated and hard-copy sets are provided, submit a minimum of six (6) copies. Refer to Division 01 for acceptance of electronic submittals for this project. For electronic submittals, Contractor shall submit the documents in accordance with the procedures specified in Division 01. Contractor shall notify the Architect and Engineer that the submittals have been posted. If electronic submittal procedures are not defined in Division 01, Contractor shall include the website, user name and password information needed to access the submittals. For submittals sent by e-mail, Contractor shall copy the designated representatives of the Architect and Engineer. Contractor shall allow the Engineer review time as specified above in the construction schedule. Contractor shall submit only the documents required to purchase the materials and/or equipment in the electronic submittal.

The checking and subsequent approval of such shop drawings by the Engineer shall not relieve the Contractor from responsibility for errors in dimensions, details, size of members, quantities, omissions of components or fittings; coordination of electrical requirements; or for coordinating items with actual building conditions. Proceed with the procurement and installation of equipment only after receiving approved shop drawings relative to each item.

H. ELECTRONIC DRAWINGS

In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format on CD-ROM disk, DVD disk, flash drive, or direct download, as desired, from the Engineer for a fee of \$200 for a drawing set up to 12 sheets and \$15 per sheet for each additional sheet. Contact the Architect for written authorization and Engineer for the necessary release agreement form and to specify shipping method and drawing format. In addition to payment, written authorization from the Architect and release agreement from the Engineer must be received before electronic drawing files will be appet.

I. RECORD DRAWINGS (AS-BUILT DRAWINGS)

During progress of the work in this division, Contractor shall maintain an accurate record of all changes made during the installation of the system. Upon completion of the work, accurately transfer all record information to three identical sets of the approved shop drawings. Insert one set into each copy of the manual described below.

See Division 01 and General Conditions for additional information.

J. OPERATION AND MAINTENANCE INSTRUCTIONS

During the course of construction, collect and compile a complete brochure of equipment furnished and installed on this project. Include operational and maintenance instructions, manufacturer's catalog sheets, wiring diagrams, parts lists, approved submittals and shop drawings, warranties, and descriptive literature as furnished by the equipment manufacturer. Include an inside cover sheet that lists the project name, date, Owner, Architect, Engineer, General Contractor, Sub-Contractor, and an index of contents.

Submit three copies of literature bound in approved binders with index and tabs separating equipment types to the Architect, for Engineer's review, at the termination of the work. Paper clips, staples, rubber bands, loose-leaf binding, and mailing envelopes are not considered approved binders. Final approval of systems installed under this contract shall be withheld until this equipment brochure is received and deemed complete by the Architect and Engineer. Instruct workmen to save required literature shipped with the equipment itself for inclusion in this brochure.

Literature shall contain the following items:

1. Identification clearly visible on or through the cover, the name of the project, and description "Fire Sprinkler System"

- Neatly typed index at front with all emergency information clearly identified.
- 3. Complete list of all system components with manufacturer's names, catalog numbers, and all data for ordering parts.
- 4. One copy of the record drawings as described above.
- 5. All information required to secure emergency repairs or service.
- 6. Test reports and certificates including "Contractor's Material and Test Certificate(s) for Underground Piping" and "Contractor's Material and Test Certificate(s) for Above Ground Piping" as described in NFPA 13.

Refer to Division 01 for acceptance of electronic manuals for this project. For electronic manuals, refer to paragraph "Submittals" for requirements.

K. WARRANTIES

Warrant each system and each element thereof against all defects due to faulty workmanship, design, or material for a period of 12 months from date of Substantial Completion, unless specific items are noted to carry a longer warranty in the construction documents or manufacturer's standard warranty exceeds 12 months. Remedy all defects, occurring within the warranty period(s), as stated in the General Conditions and Division 01.

Warranties shall include labor and material, including travel expenses. Make repairs or replacements without any additional costs to the Owner, and to the satisfaction of the Owner, Architect, and Engineer.

Perform the remedial work promptly, upon written notice from the Engineer or Owner.

At the time of Substantial Completion, deliver to the Owner all warranties, in writing and properly executed, including term limits for warranties extending beyond the one year period, each warranty instrument being addressed to the Owner and stating the commencement date and term.

L. SCOPE

Provide a wet-pipe and dry-pipe, automatic fire sprinkler system for the building as shown on the drawings. Contractor shall be approved and state licensed for design and installation of fire protection systems. The work done under this section shall be performed only by a Contractor whose workmen are experienced and regularly engaged in the installation of fire protection systems. Contractor shall be capable of preparing hydraulic calculations and system layouts.

Provide all fire sprinkler alarm devices including waterflow alarm and valve tamper switches for all system control valves. Provide a notification appliance acceptable to the AHJ on the exterior of the building at 8'-0" above finished grade, adjacent to the fire department connection. Coordinate all wiring and conduit for a complete and functional installation.

System shall, at a minimum, be in accordance with the latest edition of NFPA 13, 24, Underwriters Laboratories (UL), and must be acceptable to the Owner's Insurer, the AHJ, and all applicable local, state and national codes and standards. Where the contract documents exceed the requirements of the referenced codes, standards, etc., the contract documents shall take precedence.

Work shall include, but shall not necessarily be limited to the following:

- 1. All underground piping (which pertains to the fire sprinkler system) as indicated on the drawings, including all required pipe, valves, etc., as well as the required preparatory and finishing work such as trenching, backfilling, and pavement replacement. Provide thrust blocks, supervised post indicating valve, and valve pit as required or shown on drawings.
- 2. Connection to city main shall be a wet tap and shall include all required fittings, valves, meter vaults, backflow preventers, backflow preventer vault, etc. Provide backflow prevention equipment as required by local codes.
- 3. Design and installation of a complete wet-pipe and dry-pipe, automatic fire sprinkler system for the area of work shown on the drawings or specified herein.
- 4. Portions of systems subject to freezing or temperatures below 40 degrees F shall be protected against freezing as required by NFPA 13. The Contractor shall be responsible for repairs and all costs incurred from damage caused by freezing of the fire protection system.
- 5. Dry Pipe Sprinkler System for Breezeway: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open a dry pipe valve. Water then flows into piping and discharges from sprinklers that are open.

M. SYSTEM DESIGN

Contractor shall verify design criteria and rating hazards with the Owner's Insurer prior to designing the system. Waterflow and pressure test data shall be acquired before system is calculated and be dated not more than 12 months prior to the submittal of sprinkler shop drawings. Arrangements for and cost of flow tests shall be the responsibility of the Contractor.

Submit hydraulic calculations and plan, including a supply and demand graph; all hydraulic reference points and area of application shall appear on the plan. Contractor shall verify with AHJ any minimum safety factor requirements. Demand shall not be less than 10 percent below the supply at the demand point.

Protect entire building with a wet-type sprinkler system designed in accordance with NFPA 13 unless noted otherwise. Design system for Ordinary Hazard Group 2, 0.20 gpm/SF over the hydraulically remote 1500 SF area. Include minimum 250 gpm hose allowance added at the base of riser.

system for Ordinary Hazard Group 1, 0.15 gpm/SF over the hydraulically remote 1500 SF area or entire area, whichever is smaller. Include minimum 250 gpm hose allowance added at the base of riser.

Protect breezeway with a dry-type sprinkler system designed in accordance with NFPA 13 unless noted otherwise. Design system

Protect mechanical and electrical areas/rooms with a wet-type sprinkler system designed in accordance with NFPA 13. Design

The Contractor shall be fully responsible for the hydraulic calculations, the final system design, and the layout of all components of the system as required for approval by the Owner's Insurer and the AHJ.

for Light Hazard, 0.10 gpm/SF over the hydraulically remote 1500 SF area. Include minimum 100 gpm hose allowance added at

The Contractor shall be fully responsible for coordinating system layout with other contractors. Changes to system design due to lack of coordination shall be paid for by the Contractor.

Designs requiring cutting of structural members for passage of sprinkler pipes or hangers shall not be accepted. When design appearance or similar aspects require cutting due to economy, it shall be held to an absolute minimum and done only with the

period.

Sprinkler spacing shall conform to NFPA 13. Extended coverage sprinklers shall not be used in unfinished (shell) spaces.

Architect and Structural Engineer's written approval. Any excessive requirements of this type shall be identified during the bid

The hydraulic area of operation may not be reduced as allowed by NFPA 13 for areas utilizing quick response sprinklers in unfinished shell spaces. For all other areas, the hydraulic area of operation shall not be reduced as allowed by NFPA 13 for areas utilizing quick response sprinklers unless specifically approved by the Engineer via a formally submitted RFI.

2. MATERIALS AND INSTALLATION

- A. PRODUCTS
- A. PRODUCTS

the base of riser.

- All fire protection system components shall be Underwriter's Laboratories listed for their intended use.
- B. PIPING AND COMPONENTS

Underground piping shall be cement lined ductile iron or other approved or listed material, installed in accordance with NFPA; fire main shall include all required fittings and valves.

Sprinkler piping 2-1/2" and larger shall be Schedule 10 or Schedule 40 black steel. Threaded sprinkler piping 2" and smaller shall be Schedule 40 black steel. Roll-grooved sprinkler piping 2" and smaller shall be Schedule 10 or Schedule 40 black steel. Pipes shall have welded, threaded, or mechanically joined fittings, based on the pipe material and size per NFPA 13 requirements.

Acceptable alternatives to Schedule 10 and Schedule 40 pipe shall be manufactured to standards recognized by NFPA 13. Pipe shall have a corrosion resistance rating of 1.0 or greater. Crimp-type couplings are not permitted. Threadable thinwall pipe with corrosion resistance rating less than 1.0 is not permitted.

All piping on the exterior of the building and/or exposed to the elements shall be externally galvanized.

Dry-Pipe Valves: Standard: UL 260.

Design: Differential-pressure type.

Include UL 1486, quick-opening devices, trim sets for bypass, air supply, drain, priming level, alarm connections, ball drip valves, pressure gauges, drip cup assembly piped with check valve to main drain piping, priming chamber attachment, and fill-line

Air-Pressure Maintenance Device:

Type: Automatic device to maintain minimum air pressure in piping. Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig adjustable range, and 175-psig outlet pressure.

Air Compressor:
Type: Oil-less, air-cooled
Motor Horsepower: Fractional.

C. SPRINKLERS

Sprinklers in areas with gypsum board ceilings shall be one of the following:

1. White–plated, recessed type with white escutcheons.

Sprinklers in areas with suspended acoustical ceilings shall be one of the following:

1. White–plated, recessed type with white escutcheons.

Sprinklers in areas with exposed piping may be pendent or upright types with rough brass finish.

Provide quick response sprinklers in all light and ordinary hazard areas.

Coordinate sprinkler temperature rating near heat-producing sources in accordance with NFPA 13.

D. SERVICE ENTRANCE

Locate fire protection service entrance where indicated on the drawings. Equip the service with a UL listed backflow preventer assembly as required by the AHJ. Service entrance assembly shall include approved outside screw and yoke (OS&Y) valves with tempor switches

Equip sprinkler system riser with an approved indicating control valve with tamper switch, waterflow alarm switch, notification appliance, check valve, system drain terminating outdoors, gauges, and fire department connection with check valve. Each riser shall meet NFPA 13 standards and requirements for acceptable valve arrangements. Separate control valve and check valve may be omitted if backflow preventer is located at the service entrance and building is protected with a single riser.

Provide a printed sheet giving brief instructions regarding control, emergency procedure and other data as required by NFPA next to the sprinkler riser. Protect sheet with glass or a transparent plastic cover. Permanently attach a placard indicating the location and basis of design (discharge density and system demand) to the riser for hydraulically designed systems.

Provide all control valve supervisory switches, waterflow alarm switches, and sprinkler system equipment panels requiring interconnection to the fire alarm system. Provide a line seizure type automatic dialer (Ademco or equal) and related telephone wiring for remote monitoring of fire sprinkler alarm devices and operation of the notification appliance.

Provide Storz fire department connection, UL listed, 4" with rough brass connection and drain, located where indicated on Drawings. Fire department connection shall be complete with 30 degree elbow and hose inlet cap with chain. Provide check valve sized per NFPA 13 with 3/4 inch ball drip drain piped to the exterior of the building. Fire department connection shall be permanently labeled "AUTOMATIC SPRINKLER FIRE DEPARTMENT CONNECTION".

Provide a cabinet containing spare sprinklers and appropriate wrench(es) per NFPA 13 at the fire sprinkler system service entrance area.

3. EXECUTION

A. PIPING AND FINISHES

Excavation, trenching and backfilling shall be in accordance with requirements of the excavation and backfill section of the

Conceal piping in areas having ceilings, other than the underside of the roof deck. Piping in areas without ceilings may be exposed but kept at a minimum distance from the deck. All piping shall be clean and free of rust. Install system such that all piping is rigidly secured and supported. All ductwork, lights, structural members and main runs of piping shall take precedence over sprinkler piping. Cutting of structural members for passage of sprinkler pipes or hangers shall not be permitted. All horizontal piping in ceiling space shall be at an elevation above the top of light fixtures and air outlets to allow for access to light fixtures and air outlets without removing horizontal piping. Route all sprinkler piping and provide all offsets, bends, and elbows around all mechanical, electrical, and structural members as required.

Where exposed piping passes through finish work, install chrome plated (or other finish acceptable to the architect) split wall plates or escutcheons to fit snugly around the piping. Provide at each penetration to assure effectiveness of construction as a fire stop where piping is concealed or installed in unfinished areas.

All openings for piping shall be anticipated and indicated on the approved shop drawings. Any additional cutting of openings must

have the written approval of the Architect.

Route piping parallel to major building lines.

Coordinate pipe routing near electrical equipment in accordance with NFPA 70.

Do not connect more than one sprinkler to a one inch outlet unless hydraulic calculations are included to verify performance.

Installation shall allow for suitable drainage of system to meet with the approval of the AHJ. Provide access panels as required. All drain locations requiring access panels shall be approved by the Architect prior to installation.

Sprinklers in suspended ceilings shall be not less than 6-inches from the grid in all directions.

B. PENETRATIONS

C. TESTING AND ACCEPTANCE

Seal all fire protection floor, wall and roof penetrations watertight and weathertight. Provide UL listed penetration assembly to maintain fire resistance rating of fire-rated assemblies.

Complete the automatic fire sprinkler system, as soon as possible, when building construction allows. Following system installation, Place the system in service. After the system has been placed in service for continuous use, water charges, if any, will be paid by Owner.

Upon completion of the systems installation, and prior to acceptance by the Engineer and Owner, the Contractor shall make general operating tests to demonstrate that all equipment and systems are in proper working order, and are functioning in conformance with the intent of the drawings and specifications.

Prior to connecting to the overhead sprinkler piping, the underground main shall be thoroughly flushed and tested in accordance

with NFPA 24. Secure all required approvals and written documentation of the flushing operation. Test above ground piping in

accordance with NFPA 13. Hydrostatically test all sprinkler piping at a minimum pressure of 200 psi for a minimum 2-hour period of

time. Correct any faulty or leaking joints and pipe. The use of any substance or material added to the water to correct leaks shall

not be permitted. Caulking of defective joints, cracks or holes shall not be permitted. Repeat tests after defects have been

eliminated. Perform all tests in the presence of the AHJ and/or the Owner's authorized representative.

Upon completion of each phase of the installation, test each system in conformance with local code requirements. Furnish all labor

the tests and repair and/or replace all damage resulting therefrom.

Notify the Architect and the AHJ three (3) working days prior to making sprinkler system tests. Concealed work shall remain uncovered until the required tests are complete. Portions of the work may be concealed if approved by the AHJ or if necessary

and equipment required to properly test all sprinkler equipment installed under this contract. Assume all costs involved in making

due to construction procedure. A. INSTRUCTIONS

specification.

After completion of all installation, tests, etc., and prior to the final acceptance date, instruct the building Owner and his selected personnel in the operation of the sprinkler system. Include in the training the procedure to conduct quarterly main drain tests as required by NFPA 25. Special care shall be taken to make sure the building personnel will immediately recognize whether the main valve is in an open position, know how to drain the system, and know how to test the system. The building personnel shall also be made familiar with the existence and contents of the System Manual described in the Operation and Maintenance section of this

END OF SECTION 21



PARAGON STAR BLDG 2 / LOT 9

> FIRST PLAT, LOT 9 LEE'S SUMMIT, MO

Issued For: PERMIT

REVISIONS

No. Date Description

Project No.: 19050.01a

05.06.22

REGISTRATION



PROJECT TEAM

CHRISTOPHER J. CULP

ARCHITECT FINKLE+WILLIAMS ARCHITECTURE

CIVIL GBA

LANDSCAPE LAND 3

BSE STRUCTURAL

ENGINEERS

STRUCTURAL BSE STRUCTRAL ENGINEERS

FOUNDATIONS

PLUMBING HENDERSON ENGINEERS

MECHANICAL HENDERSON

ELECTRICAL HENDERSON ENGINEERS

CONTRACTOR GC

FIRE PROTECTION HENDERSON

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MO. CORPORATE NO: E-556D

EXPIRES 12/31/2022

SHEET TITLE

FIRE SPRINKLER SPECIFICATIONS

SHEET NUMBER

5/01