MARK MORRIS HIGH SCHOOL
CHILLER REPLACEMENT

FOR

LONGVIEW SCHOOL DISTRICT NO. 122

LONGVIEW, WASHINGTON

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PROJECT DESCRIPTION

LONGVIEW SCHOOL DISTRICT NO. 122 OWNS AND OPERATES MARK MORRIS HIGH SCHOOL AT 1602 MARK MORRIS CT. THE BUILDING WAS ORIGINALLY CONSTRUCTED IN 1967 WITH EXTENSIVE UPGRADES DONE TO THE MECHANICAL SYSTEMS IN 1989 AND 2005. THE EXISTING CHILLER IS PAST END OF LIFE AND WILL BE REPLACED WITH NEW EQUIPMENT PER THE DRAWINGS AND SPECIFICATIONS. ELECTRICAL SCOPE TO CONSIST OF PROVIDING NEW FEEDS TO MECHANICAL EQUIPMENT.

GENERAL NOTES TO BIDDERS

CONTRACTOR SHALL BE RESPONSIBLE FOR ALL BUILDING REPAIR AND RENOVATION AS REQUIRED TO ACCOMMODATE THE MECHANICAL AND ELECTRICAL WORK HEREIN. THIS INCLUDES BUT IS NOT LIMITED TO DRYWALL REPAIR AND PATCHING, CEILING REPAIR AND PATCHING, FLOORING REPAIR AND PATCHING, PAINTING, CLEANUP, ASPHALT/CONCRETE REPAIR, ETC. THE BUILDING & SITE SHALL BE RETURNED TO ITS EXISTING CONDITION UPON COMPLETION OF THE MECHANICAL AND ELECTRICAL WORK. REFER TO DIV 00 AND 01 SPECIFICATIONS FOR MORE INFORMATION.

BID BREAKDOWN

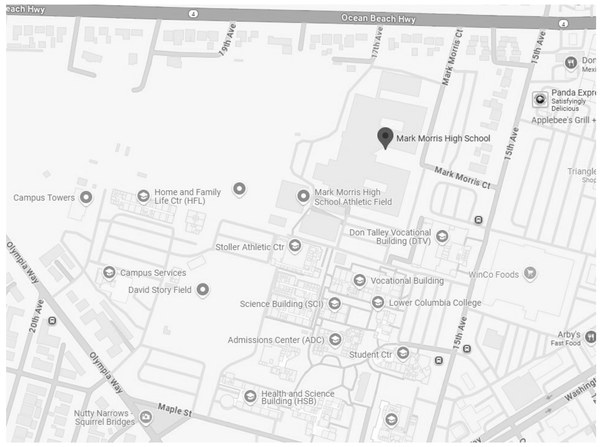
BASE BID: ALL SCOPE OF WORK ASSOCIATED WITH THE CHILLER REPLACEMENT. THIS INCLUDES THE NEW CHILLER, CONCRETE SLAB AND FENCE, NEW PIPING, NEW PUMPS, NEW TANKS, NEW AIR SEPARATOR, NEW ELECTRICAL FEEDS TO CHILLER.

BID ALTERNATE NO. 01: ALL SCOPE OF WORK ASSOCIATED WITH HV-08. THIS INCLUDES THE NEW COOLING COOILS, NEW SUPPLY FAN, CHILLED WATER PIPING CONNECTIONS, AND ELECTRICAL DISCONNECT/RECONNECT OF SUPPLY FAN.

ANY QUESTIONS OR DISCREPANCIES RELATED TO SCOPE DELINEATION BETWEEN BASE BID AND ALTERNATE BID SHALL BE CLARIFIED WITH THE OWNER AND ENGINEER PRIOR TO FINALIZING BIDS.

WASHINGTON STATE

VICINITY MAP



SITE MAP

TRUE NORTH

WINDSOR ENGINEERS
Ridgefield, WA
Duluth + Minneapolis, MN
WindsorEngineers.com
Project No: **24052**

MMHS - Chiller Replacement
1602 Mark Morris Ct, Longview, WA 98632

Revisions:

PROJECT ISSUE:
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PROJECT MANAGER:
DRAWN BY:
CHECKED BY:

COVER PAGE
GENERAL

G001

PIPE ACCESSORIES

- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE
- BALANCING VALVE
- MOTORIZED 2-WAY VALVE
- MOTORIZED 3-WAY VALVE
- GATE VALVE
- GLOBE VALVE
- LOCKED SHIELD VALVE
- PLUG VALVE
- PRESSURE REDUCING VALVE
- QUICK OPENING VALVE
- FLUID STRAINER
- HOSE BIBB

DUCT ACCESSORIES

- BDD — BACKDRAFT DAMPER
- FD — FIRE DAMPER
- FSD — FIRE SMOKE DAMPER
- SD — SMOKE DAMPER
- M — MOTORIZED DAMPER
- VD — VOLUME DAMPER

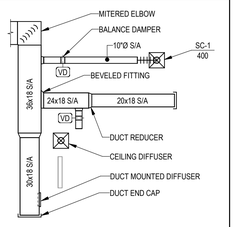
GENERAL SYMBOLS

- 1 — KEYNOTE
- A — REVISION TAG
- REVISION CLOUD
- X / XXX — DETAIL/PLAN CALLOUT
- N — NORTH ARROW
- MATCHLINE
- POINT OF CONNECTION
- POINT OF DEMOLITION
- CONTINUATION SYMBOL
- AREA TO BE DEMOLISHED
- AREA NOT IN CONTRACT

HVAC SYMBOLS & TAGS

- T — THERMOSTAT
- H — HUMIDISTAT
- TH — TEMPERATURE & HUMIDITY SENSOR
- HS — HUMIDITY SENSOR
- MS — MANUAL SWITCH
- S — SENSOR
- CO — CARBON MONOXIDE (CO) SENSOR
- CO2 — CARBON DIOXIDE (CO_2) SENSOR
- NO2 — NITROGEN DIOXIDE (NO_2) SENSOR
- DOOR UNDERCUT
- AHU-101 / TYPE / SIZE CFM — EQUIPMENT TAG
- DIFFUSER TAG

DUCTWORK LEGEND



DUCT SYSTEMS

DOWN	UP	
24x18 S/A	X	23 - SUPPLY AIR
24x18 S-O/A	X	23 - CONDITIONED OUTSIDE AIR
24x18 O/A	X	23 - OUTSIDE AIR
24x18 R/A	/	23 - RETURN AIR
24x18 T/A	/	23 - TRANSFER AIR
24x18 E/A	/	23 - EXHAUST AIR
24x18 L/A	/	23 - RELIEF AIR
24x18 G/A	/	23 - GREASE EXHAUST AIR
24x18 SE/A	/	23 - SMOKE EXHAUST AIR
24x18 FLUE	/	23 - FLUE GAS VENT
24"Ø O/A	⊗	23 - COMBUSTION AIR

PIPING SYSTEMS

- CHWR — CHILLED WATER RETURN
- CHWS — CHILLED WATER SUPPLY
- HWR — HEATING WATER RETURN
- HWS — HEATING WATER SUPPLY
- STM — STEAM
- REF — REFRIGERANT
- CD — CONDENSATE DRAIN

ABBREVIATIONS

Ø	ROUND	MBH	ONE THOUSAND BTU PER HOUR
AC	AIR CONDITIONING	MCF	ONE THOUSAND CUBIC FEET
ADD	ADDENDUM	MD	MOTORIZED DAMPER
AFF	ABOVE FINISHED FLOOR	MECH	MECHANICAL
AFUE	ANNUAL FUEL UTILIZATION EFFICIENCY	MFR	MANUFACTURER
ALT	ALTERNATE	MIN	MINIMUM
AP	ACCESS PANEL	MISC	MISCELLANEOUS
ARCH	ARCHITECT/ARCHITECTURAL	MUA	MAKE-UP/AIR
BFF	BELOW FINISHED FLOOR	NC	NOISE CRITERIA
BTU	BRITISH THERMAL UNITS	NC	NORMALLY CLOSED
BTUH	BRITISH THERMAL UNITS PER HOUR	NIC	NOT IN CONTRACT
CAP	CAPACITY	NO	NUMBER
CFM	CUBIC FEET PER MINUTE	NO	NORMALLY OPEN
CO	CLEAN OUT	NTS	NOT TO SCALE
D	DEGREE	O	OXYGEN
DB	DRY BULB	O/A	OUTSIDE AIR
DIA	DIAMETER	PD	PRESSURE DROP
DN	DOWN	PRESS	PRESSURE
EAT	ENTERING AIR TEMPERATURE	PRV	PRESSURE REDUCING VALVE
ELEC	ELECTRICAL	PSI	POUNDS PER SQUARE INCH
EQUIP	EQUIPMENT	PSIG	POUNDS PER SQUARE INCH GAUGE
EWC	ELECTRIC WATER COOLER	PWR	POWER
EWT	ENTERING WATER TEMPERATURE	(R)	RELOCATE
E/A	EXHAUST AIR	R/A	RETURN AIR
(E)	EXISTING	RCP	RADIANT CEILING PANEL
°F	DEGREES FAHRENHEIT	REC	RECESSED
FD	FIRE DAMPER	RED	REDUCER
FL	FLOOR	RH	RELATIVE HUMIDITY
FO	FUEL OIL	R/A	RELIEF AIR
FOV	FUEL OIL VENT	RM	ROOM
FOR	FUEL OIL RETURN	RPM	REVOLUTIONS PER MINUTE
FOS	FUEL OIL SUPPLY	SF	SQUARE FOOT
FPM	FEET PER MINUTE	S/A	SUPPLY AIR
FS	FLOOR SINK	SF	SQUARE FOOT
FT	FOOT/FEET	SD	SMOKE DAMPER
GAL	GALLON	SM	SURFACE MOUNT
GC	GENERAL CONTRACTOR	SP	STANDPIPE
GPM	GALLONS PER MINUTE	SP	STATIC PRESSURE
HP	HORSE POWER	STM	STEAM
ID	INDIRECT	T	THERMOSTAT
IN	INCH	TD	TEMPERATURE DROP
INV	INVERT	TEMP	TEMPERATURE
LB	POUND	TYP	TYPICAL
LB/HR	POUNDS PER HOUR	UG	UNDERGROUND
LAT	LEAVING AIR TEMPERATURE	VAC	VACUUM
LP	LOW PRESSURE	V	VENT
LPG	LIQUEFIED PETROLEUM GAS	VAV	VARIABLE AIR VOLUME
LVR	LOUVER	VENT	VENTILATION
LWT	LEAVING WATER TEMPERATURE	WB	WET BULB
M/A	MIXED AIR	(X)	DEMOLISH
MAX	MAXIMUM		

LIFE SAFETY NOTES

REFER TO LIFE SAFETY PLANS FOR LOCATIONS AND RATINGS OF WALL TYPES.

SMOKE PARTITION
SMOKE DAMPERS REQUIRED AT TRANSFER AIR OPENINGS ONLY.

FIRE BARRIERS (1-HR)
1.5-HR FIRE DAMPER REQUIRED AT TRANSFER AIR OPENINGS ONLY. DUCTS SHALL NOT PENETRATE EXIT PASSAGEWAY OR STAIRWAY ENCLOSURE.

SMOKE BARRIER (1-HR)
SMOKE DAMPERS REQUIRED AT ALL DUCT PENETRATIONS. TRANSFER AIR OPENINGS REQUIRE A 1.5-HR COMBINATION FIRE/SMOKE DAMPER.

FIRE BARRIER (2-HR)
1.5-HR FIRE DAMPER AT ALL DUCT PENETRATIONS.

FIRE/SMOKE BARRIER (2-HR)
1.5-HR COMBINATION FIRE/SMOKE DAMPERS ARE REQUIRED AT ALL DUCT PENETRATIONS.

SHAFT ENCLOSURES:
1.5-HOUR COMBINATION FIRE/SMOKE DAMPER IS REQUIRED AT EACH PENETRATION OF A SHAFT ENCLOSURE. IF THE SHAFT DOES NOT EXTEND ALL THE WAY TO THE BOTTOM OF THE BUILDING, PLACE A HORIZONTAL FIRE/SMOKE DAMPER AT THE FLOOR LEVEL WHERE THE DUCT EMERGES FROM THE BOTTOM OF THE SHAFT.

2021 WSEC NOTES

- C403.1.2: LOAD CALCULATIONS PERFORMED PER ASHRAE STD 183 OR EQUIVALENT, USING DESIGN PARAMETERS PER C302 AND APPENDIX C; INCLUDE LOAD ADJUSTMENTS TO ACCOUNT FOR ENERGY RECOVERY.
- C403.3.1: EQUIPMENT AND SYSTEM SIZING: OUTPUT CAPACITIES OF HEATING AND COOLING EQUIPMENT AND SYSTEMS ARE NO GREATER THAN THE SMALLEST AVAILABLE EQUIPMENT SIZE THAT EXCEEDS THE CALCULATED LOADS. NO EXCEPTIONS APPLIED.
- C403.3.2 ECONOMIZERS DO NOT INCREASE THE BUILDING HEATING ENERGY USAGE DURING NORMAL OPERATION.
- C403.4.2: AUTOMATIC SETBACK AND SHUTDOWN: INDICATE ZONE THERMOSTATIC CONTROLS CONFIGURED WITH REQUIRED AUTOMATIC SETBACK AND MANUAL OVERRIDE FUNCTIONS, SETBACK TEMPERATURES, AND CONTROL METHOD (AUTOMATIC TIME CLOCK OR 7 DAY PROGRAMMABLE CONTROLS).
- C403.4.2.3: OPTIMUM START AND STOP: INDICATE ALL HVAC SYSTEMS ARE PROVIDED WITH AUTOMATIC START AND STOP CONTROLS; INDICATE START CONTROLS ARE CONFIGURED TO ADJUST THE EQUIPMENT START TIME AS REQUIRED TO BRING EACH AREA SERVED UP TO DESIGN TEMPERATURE JUST PRIOR TO SCHEDULED OCCUPANCY; INDICATE STOP CONTROLS ARE CONFIGURED TO REDUCE HEATING SETPOINT AND INCREASE COOLING SETPOINT BY AT LEAST 2°F PRIOR TO SCHEDULED UNOCCUPIED PERIODS.
- C408: COMMISSIONING: A CERTIFIED COMMISSIONING PROFESSIONAL SHALL COMPLETE A COMMISSIONING PROCESS ON ALL MECHANICAL, REFRIGERATION, SERVICE WATER HEATING, ELECTRICAL POWER, LIGHTING, AND ENERGY METERING SYSTEMS IN ACCORDANCE WITH APPLICABLE PORTIONS OF WSEC C408. PROCESS SHALL INCLUDE:
  1. A COMMISSIONING PLAN IN ACCORDANCE WITH WSEC C408.1.2.
  2. SYSTEM BALANCING IN ACCORDANCE WITH WSEC C408.2.2
  3. FUNCTIONAL PERFORMANCE TESTING IN ACCORDANCE WITH WSEC C408.2.3
  4. A FINAL COMMISSIONING REPORT IN ACCORDANCE WITH WSEC C408.1.3.
  5. PROVIDING EVIDENCE SYSTEMS COMMISSIONED IN ACCORDANCE WITH WSEC C408.1.4.

MECHANICAL BASIS OF DESIGN

BUILDING DESCRIPTION
EXISTING SCHOOL BUILDING CONSISTING OF BRICK CONSTRUCTION. THE PROJECT IS LOCATED IN LONGVIEW, WA.

NOTABLE MECHANICAL DESIGN APPROACHES
INCLUDING BUT NOT LIMITED TO THE FOLLOWING:

WHOLE BUILDING COOLING SYSTEM:
- NEW CHILLER REPLACE EXISTING ONE AND PROVIDE COOLING WATER TO COOLING COILS IN AIR HANDLING UNITS.

HV-8 VENTILATION:
- NEW SUPPLY FAN ARRAY TO REPLACE EXISTING SUPPLY FAN.

CONTROLS:
- EXISTING ALERTON CONTROLS ARE TO BE MODIFIED TO ACCOMODATE NEW EQUIPMENT. CONTACT ENVIRONMENTAL CONTROLS CORP. FOR MORE DETAILS.

CODES AND STANDARDS
BUILDING MECHANICAL SYSTEMS ARE DESIGN IN ACCORDANCE WITH THE FOLLOWING CODES AND STANDARDS:
- 2021 INTERNATIONAL BUILDING CODE WITH WASHINGTON AMENDMENTS
- 2021 INTERNATIONAL MECHANICAL CODE WITH WASHINGTON AMENDMENTS
- 2021 WASHINGTON STATE ENERGY CODE
- 2021 UNIFORM PLUMBING CODE WITH WASHINGTON AMENDMENTS
- 2021 INTERNATIONAL FIRE CODE

HVAC DESIGN CRITERIA
KELSO/LONGVIEW, WA, USA (WMO: 727924)

ASHRAE FUNDAMENTALS 2021

ELEVATION: 6'
LAT: 46.11 N
LONG: 122.894 W

OUTDOOR DESIGN CONDITIONS

WINTER: 23.4°F DB (99.6%)
SUMMER: 94.0°F DB (0.4%)
70.6°F WB (0.4%)

INDOOR DESIGN CONDITIONS
ALL SPACES
COOLING: 75°F +/- 2°F
HEATING: 70°F +/- 2°F

VENTILATION CRITERIA
COMPLY WITH 2018 WASHINGTON STATE MECHANICAL CODE CHAPTER 4. RESIDENTIAL SPACES VIA 403.4, ALL OTHERS VIA 403.3.1.

EXHAUST CRITERIA (MINIMUM RATES)

PUBLIC RESTROOMS:	PER WATER CLOSET / URINAL AS PER IMC
RESIDENTIAL BATHROOMS:	50 CFM INTERMITTENT / 20 CFM CONTINUOUS
RESIDENTIAL LAUNDRY AREAS:	20 CFM CONTINUOUS
TRASH ROOMS:	1 CFM/FT²
PARKING GARAGE:	0.06 CFM/FT² MIN. / 0.75 CFM/FT² MAX.

BUILDING ENVELOPE

ROOF:	R-15.9 CI (U-0.063)
MASS WALLS:	R-6.6 CI (U-0.151)
ENTRANCE GLAZING:	U-0.63
OPERABLE GLAZING:	U-0.67
FIXED GLAZING:	U-0.57

DUCTWORK DESIGN CRITERIA
DUCT STATIC PRESSURE FRICTION LOSS SHALL NOT EXEED THE FOLLOWING:
- LOW PRESSURE SUPPLY: 0.08" W.C. PER 100 FEET
- MEDIUM PRESSURE SUPPLY: 0.1" W.C. PER 100 FEET
- LOW PRESSURE RETURN AND EXHAUST: 0.06" W.C. PER 100 FEET
- MECHANICAL ROOMS AND SHAFTS: 0.2" W.C. PER 100 FEET

SUPPLY, RETURN AND EXHAUST DUCT AIRFLOW VELOCITIES SHALL NOT EXCEED THE FOLLOWING:
- MAINS ABOVE CEILING: 1,750 FPM
- MAINS ABOVE OPEN OCCUPIED SPACES: 1450 FPM
- BRANCHES ABOVE OPEN OCCUPIED SPACES: 1150 FPM
- RUN-OUTS TO DIFFUSERS: 725 FPM
- IN SHAFTS: 2,500 FPM
- IN MECHANICAL ROOMS: 3,000 FPM

HVAC SHEET INDEX

GENERAL NOTES

1. REMOVE ALL UNUSED PIPING, DUCTWORK AND ACCESSORIES.
2. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING, PRIOR TO FINAL BID, ALL EXISTING CONDITIONS FOR PLUMBING AND MECHANICAL SYSTEMS WITHIN TENANT SPACE AND WITHIN CLOSE PROXIMITY OF TENANT SPACE.
3. THE MECHANICAL CONTRACTOR SHALL PERFORM SERVICE AND REPAIR ON THE EXISTING EQUIPMENT AND ITS ACCESSORIES AS FOLLOWS: CLEAN ALL COILS, REPLACE THE FILTERS AND BELTS, INSPECT, REPAIR, OR REPLACE ECONOMIZERS, DRIVES AND FAN BEARINGS, MOTORS, CONTROL COMPONENTS, VALVES AND ANY OTHER ITEMS NECESSARY FOR A COMPLETE AND PROPER OPERATING SYSTEM. PROVIDE ALL MATERIAL AND COMPONENTS AS NEEDED TO BRING THE UNITS TO FULL COMPLIANCE OF THE LANDLORD'S CRITERIA AND LOCAL AUTHORITY HAVING JURISDICTION.
4. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE GENERAL ARRANGEMENT OF SYSTEMS AND EQUIPMENT. FINAL LOCATIONS OF EQUIPMENT SHALL BE FIELD DETERMINED. ALL DISCREPANCIES IN THE DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IN WRITING PRIOR TO SUBMISSION.
5. COORDINATE INSTALLATION OF PIPING, DUCTWORK, CONDUIT, LIGHTS, CABLE TRAY, STRUCTURE, AND EQUIPMENT TO PREVENT CONFLICTS.
6. THE CONTRACTOR SHALL BE FAMILIAR WITH ALL THE CONDITIONS BOTH EXISTING AND THOSE ILLUSTRATED BY THESE DOCUMENTS AS WELL AS THOSE WHICH CAN BE REASONABLY ANTICIPATED INCLUDING, BUT NOT LIMITED TO ARCHITECTURAL, ELECTRICAL, VENTILATION, PLUMBING, AND OTHER SYSTEMS INVOLVED ON THIS PROJECT.
7. FINAL PRODUCT SHALL BE A COMPLETE AND FUNCTIONING SYSTEM, AND SHALL CONFORM TO ALL REQUIREMENTS OF APPLICABLE FEDERAL, STATE AND LOCAL CODES, INCLUDING BUT NOT LIMITED TO THE INTERNATIONAL BUILDING CODE AND INTERNATIONAL MECHANICAL CODE.
8. EQUIPMENT FOR OTHER DISCIPLINES MAY BE SHOWN FOR REFERENCE ONLY. REFER TO OTHER DISCIPLINES' DRAWINGS FOR MORE DETAIL REGARDING EQUIPMENT SPECIFICATIONS AND INFORMATION.
9. PLANS SHALL GOVERN IN MATTERS OF QUANTITY, SPECIFICATIONS SHALL GOVERN IN MATTERS OF QUALITY. IN CASE OF DISCREPANCY BETWEEN DRAWINGS AND SPECIFICATIONS, THE SPECIFICATIONS SHALL GOVERN. PLANS ARE TO BE TIED TO SPECIFICATIONS FOR A COMPLETE DESIGN PACKAGE. NOTIFY ENGINEER OF ANY DISCREPANCY BETWEEN DRAWINGS AND SPECIFICATIONS.
10. ANYTHING MENTIONED IN THE SPECIFICATIONS AND NOT SHOWN ON THE DRAWINGS, OR SHOWN ON THE DRAWINGS AND NOT MENTIONED IN THE SPECIFICATIONS, SHALL BE OF LIKE EFFECT AS IF SHOWN OR MENTIONED IN BOTH.
11. LOCATE EQUIPMENT REQUIRING ACCESS 2'-0" MAXIMUM ABOVE CEILING.
12. LOCATE DUCTWORK, PIPING AND MECHANICAL EQUIPMENT AWAY FROM THE SPACE ABOVE ELECTRICAL PANELS, TRANSFORMERS AND OTHER ELECTRICAL EQUIPMENT.
13. PROVIDE FIRE PROOFING FOR ALL PENETRATIONS OF FIRE RATED ASSEMBLIES. FIRE PROOFING MUST BE EQUIVALENT OR HIGHER TO THAT OF THE PENETRATED ASSEMBLY. REFER TO ARCHITECTURAL PLANS.
14. PROVIDE SLEEVES AND/OR OPENINGS TO RUN PIPES AND DUCTS THROUGH FOUNDATIONS, FLOORS, WALLS, AND ROOF. CONSULT STRUCTRAL ENGINEER OF RECORD FOR ALL STRUCTURAL PENETRATIONS. PROVIDE WATER-PROOFING AS NEEDED FOR ALL EXTERIOR PENETRATIONS.
15. ADJUST PIPING AND DUCTWORK SIZES TO PROPERLY CONNECT TO MECHANICAL EQUIPMENT.
16. PIPE AND DUCTWORK SIZES SHOWN SHALL BE CONTINUED IN THE DIRECTION OF FLOW UNTIL ANOTHER SIZE IS SHOWN.
17. FOR DETAILS, EQUIPMENT CONNECTIONS, DUCT AND PIPE SIZES NOT SHOWN ON THE SEGMENTS, REFER TO DETAILS, SCHEDULES, AND SPECIFICATIONS.
18. INSTALL ALL EQUIPMENT IN ACCORDANCE WITH THE RESPECTIVE MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS, AT A LEVEL OF QUALITY AND WORKMANSHIP CONSISTENT WITH THE SPECIFICATIONS.
19. LOCATIONS OF PIPING, DUCTWORK AND EQUIPMENT AS INDICATED ON THE DRAWINGS, ARE APPROXIMATE AND SUBJECT TO MINOR ADJUSTMENTS IN THE FIELD. WORK SHALL BE COORDINATED WITH ALL OTHER TRADES TO AVOID INTERFERENCE IN THE FIELD.
20. INSTALL EXPOSED PIPING AND DUCTWORK AS HIGH AS PRACTICAL IN ROOMS WITHOUT CEILINGS.
21. THE MECHANICAL CONTRACTOR SHALL PROVIDE AND INSTALL ALL NECESSARY CONDUIT, WIRING, CONTROLS, AND APPURTENANCES FOR A COMPLETE AND OPERABLE HVAC SYSTEM.
22. INSULATE DUCTWORK AND PIPING SYSTEMS TO MEET LOCAL ENERGY CODE REQUIREMENTS. INSULATION MATERIAL TO MEET FLAME SPREAD AN SMOKE DEVELOPMENT RATING OF 25/50 OR LESS. WHERE SYSTEMS ARE EXPOSED TO DAMAGE THE INSULATION SHALL BE PROTECTED WITH A SHEET METAL OR PLASTIC COVER. WHERE DUCTWORK IS INSTALLED EXPOSED TO THE OUTSIDE, INSULATION IS TO BE EXECUTED USING LINED DUCTWORK.
23. SEISMIC ANCHORAGE AND RESTRAINTS MUST BE COORDINATED WITH STRUCTURAL ENGINEER AND AUTHORITY HAVING JURISDICTION.
24. LOCATE THERMOSTATS AND TEMPERATURE SENSORS A MINIMUM OF 8" AWAY FROM LIGHT SWITCHES. MOUNTING HEIGHT SHALL BE PER ARCHITECT AND IN CONFORMANCE WITH ADA GUIDELINES.
25. CONTRACTOR SHALL PROVIDE AND INSTALL ALL CONTROL WIRING.
26. CONDENSATE DRAINS SHALL BE SUPPLIED FOR ALL COOLING AND GAS EQUIPMENT. CONTRACTOR SHALL ENSURE PROPER INSTALLATION AND DRAINAGE AS REQUIRED BY FEDERAL, STATE, AND LOCAL CODES. CONDENSATE PIPING SHALL BE SCHEDULE 40 PVC.
27. PROVIDE A 4" HOUSEKEEPING PAD FOR EACH PIECE OF FLOOR-MOUNTED MECHANICAL EQUIPMENT. COORDINATE SIZES WITH MECHANICAL EQUIPMENT SELECTED.
28. ALL SUPPLY, RETURN, AND EXHAUST DUCTWORK SHALL BE RATED FOR PRESSURE CLASS OF 2" W.G. UNLESS NOTED OTHERWISE.
29. CONTRACTOR SHALL BE REQUIRED TO REPLACE FILTERS ON HVAC EQUIPMENT AFTER ALL DUST PRODUCING CONSTRUCTION HAS BEEN COMPLETED AND PRIOR TO THE FINAL PUNCH.
30. REFER TO PIPING DRAWINGS FOR THERMOSTAT AND TEMPERATURE SENSOR LOCATIONS.
31. PROVIDE ACCESS PANELS FOR SERVICING, ADJUSTING, AND REPLACING EQUIPMENT. INCLUDING BUT NOT LIMITED TO DAMPERS AND VALVING.
32. THERMOSTATS TO BE PROGRAMMABLE, HAVE 5°F DEADBAND, AUTOMATIC TIME-CLOCK, 2-HOUR OCCUPANT OVERRIDE, 10-HOUR BACKUP, SETBACKS TO 55°F (HEATING) AND 85°F (COOLING).
33. CONTRACTOR TO PROVIDE OPERATION & MAINTENANCE MANUALS AND AS-BUILT DRAWINGS FOR NEW SYSTEMS AND EQUIPMENT WITHIN 90 DAYS OF COMPLETION

* NOTE *
ALL OF GENERAL NOTES ON THIS SHEET ARE TO BE APPLIED TO ALL OTHER DRAWINGS IN THIS SET. THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE USED IN THIS SET OF DRAWINGS.

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MMHS - Chiller Replacement

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Revisions:

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11/01/2024

PROJECT MANAGER: SW
DRAWN BY: JS
CHECKED BY: JN

MECHANICAL
COVER SHEET

M001

PUMP SCHEDULE

TAG	BASIS OF DESIGN		TYPE	WATER			SHUTOFF	IMPELLER			MOTOR			WEIGHT			NOTES
	MANUFACTURER	MODEL		TEMP RANGE	FLOW (GPM)	HEAD	HEAD	DIAMETER	RPM	BHP	HP	EFF	PEI		VOLTAGE	PHASE	
CHWP-1	TACO	3011D	BASE MOUNTED	45-55	342	180	187	6.9	3500	21.4	30	73.0%	0.95	527	208	3	1
CHWP-2	TACO	3011D	BASE MOUNTED	45-55	342	180	187	6.9	3500	21.4	30	73.0%	0.95	527	208	3	1
CHWP-3	TACO	3011D	BASE MOUNTED	45-55	342	180	187	6.9	3500	21.4	30	73.0%	0.95	527	208	3	1

NOTES:
1. PROVIDE WITH VFD.

AIR HANDLER: COOLING COIL

TAG	SERVICE	FIN HEIGHT	FIN LENGTH	ROWS / FPI	CAPACITY	AIR SIDE				WATER SIDE				NOTES
						AIRFLOW	EAT (DB / WB)	LAT (DB / WB)	STATIC PRESS.	FLOW (GPM)	EWT	LWT	HEAD LOSS	
CC-1A	HV-8	24 IN.	79 IN.	5/10	193 MBH	5800 CFM	80°F / 67°F	57°F / 56.3°F	0.48 IN. W.G.	25.6	45	60	9.57 FT	1,2,3
CC-1B	HV-8	24 IN.	79 IN.	5/10	193 MBH	5800 CFM	80°F / 67°F	57°F / 56.3°F	0.48 IN. W.G.	25.6	45	60	9.57 FT	1,2,3

NOTES:
1. COILS STACKED AND CONNECTED IN PARALLEL.
2. COILS TO BE SHORT ENOUGH TO FIT THROUGH 3FT X 3FT CHOKE POINT IN MECHANICAL ROOM ACCESS WALKWAY.
3. OUTER DIMENSIONS OF STACKED COILS TO BE 54 IN. TALL BY 82 IN. LONG TO MATCH INTERNAL DIMENSIONS OF HV-8 SUPPLY SECTION.

AIR COOLED CHILLER SCHEDULE

TAG	BASIS OF DESIGN		AREA SERVED	CHILLED WATER				COOLING CAPACITY	EER	COMPRESSOR		WEIGHT	ELECTRICAL				NOTES
	MANUFACTURER	MODEL		FLOW (GPM)	EWT	LWT	HEAD LOSS			TYPE	STAGES		MCA	MOCP	VOLTAGE	PHASE	
CH-1	SMARDT	AD120	CHWS/R LOOP	681.7	55	45	8.01 PSI	285 TONS	12.23	CENTRIFUGAL	VARIABLE	21615	458	500	480	3	1,2,3

NOTES:
1. ELECTRICAL TO PROVIDE TRANSFORMER TO ACCOMMODATE CONNECTION TO 208/3 POWER SUPPLY.
2. CONTACT ERIK TEYEMA AT JOHNSON BARROW (971-717-7123 ETEYEMA@JBARROW.COM) FOR MORE INFORMATION.
3. PROVIDE PREMIUM SOUND ATTENUATION PACKAGE.

FANS

TAG	LOCATION	BASIS OF DESIGN		SERVES	ARRANGEMENT	AIRFLOW	ESP (IN WG)	POWER BHP	FEI	ELECTRICAL					WEIGHT	NOTES
		MANUFACTURER	MODEL							FLA	MOCP	MCA	VOLT	PH		
SF-1	HV-8	Q-PAC	17000072	HV-8	2 FAN ARRAY	11600 CFM	2.3	7.42	1.19	11	35	25.18	208	3	250 LBS	1,2,3

NOTES:
1. PROVIDE ECM MOTOR WITH SPEED POTENTIOMETER DIAL.
2. CONTACT TYSON MCGRAW AT AIR REPS (503-544-9860 TYSONM@AIRREPS.COM) FOR MORE INFORMATION.
3. PROVIDE SEALED SHEET METAL FILLER AROUND PERIMETER OF NEW FAN ARRAY WITH OUTER DIMENSIONS OF 54 IN. TALL BY 82 IN. LONG TO MATCH INTERNAL DIMENSIONS OF HV-8 SUPPLY SECTION. SHEET METAL PIECES TO BE SIZED SMALL ENOUGH TO FIT THROUGH 3FT X 3FT CHOKE POINT IN MECHANICAL ROOM ACCESS WALKWAY.

TANK SCHEDULE

TAG	MANUFACTURER	MODEL	TYPE	TANK VOLUME	ACCEPTANCE VOLUME	MAX DESIGN PRESSURE (PSI)	CHARGED PRESSURE (PSI)	CONNECTION SIZE	SHIPPING WEIGHT	OPERATING WEIGHT	NOTES
ET-1	TACO	CA600-125A	BLADDER	158	158	30	17	1.5	460 LBS	1800 LBS	
BT-1	TACO	BTH0850	BUFFER	850	-	125	12	6"	1880 LBS	9000 LBS	

NOTES:

AIR SEPARATOR SCHEDULE

TAG	BASIS OF DESIGN		DESIGN FLOW RATE	CONNECTION SIZE	MAX. HEAD LOSS	DRY WEIGHT	NOTES
	MANUFACTURER	MODEL					
AS-1	TACO	4908ADH-150R	685	8"	1 FT	355 LBS	1,2

NOTES:
1. SHALL BE ASME RATED AND CONSTRUCTED WITH CARBON STEEL STRAINER SHALL BE 304 STAINLESS STEEL.
2. PROVIDE WITH FLANGE CONNECTIONS.

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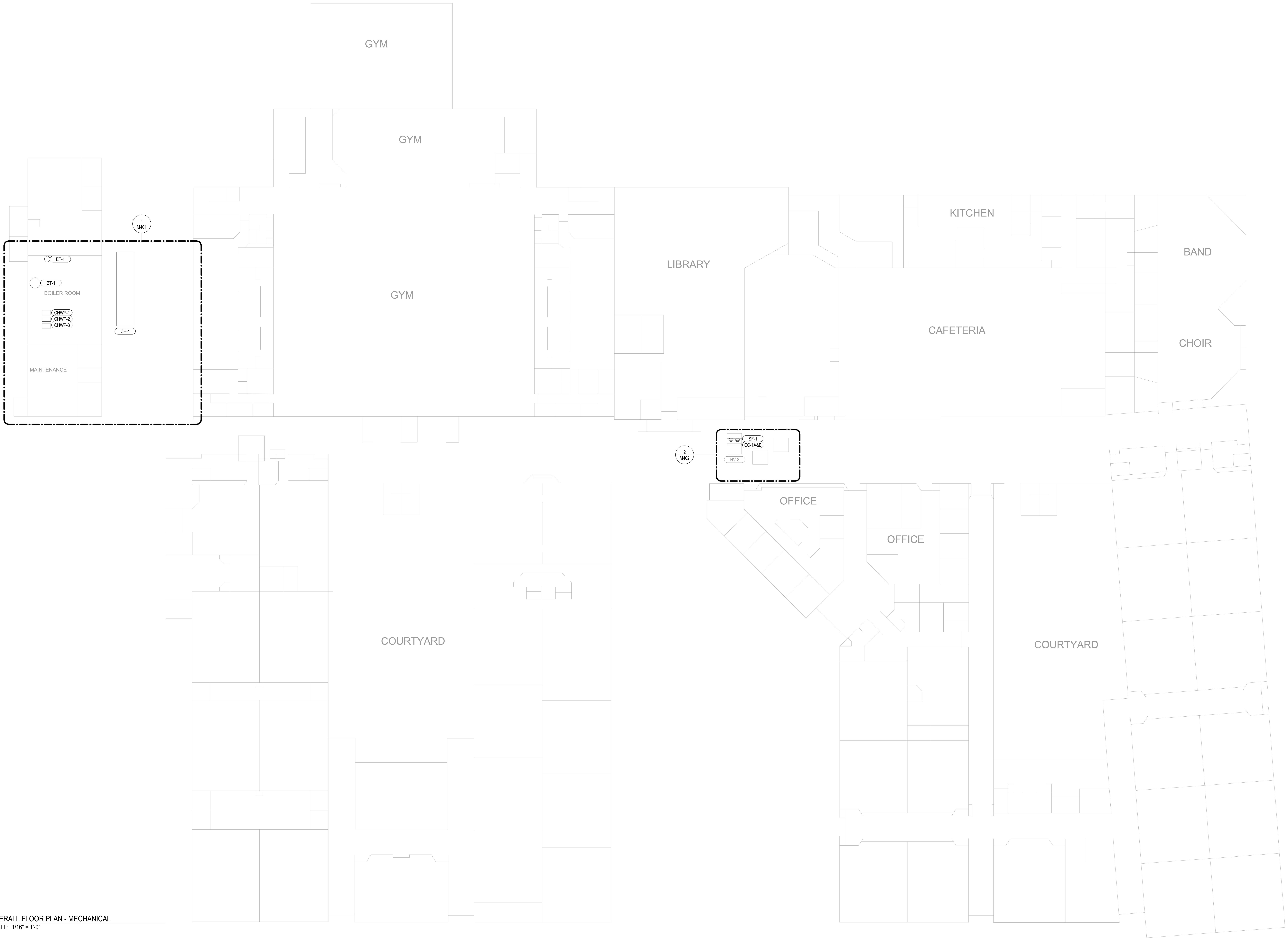
MECHANICAL SCHEDULES

M002



1 OVERALL FLOOR PLAN - MECHANICAL
SCALE: 1/16" = 1'-0"

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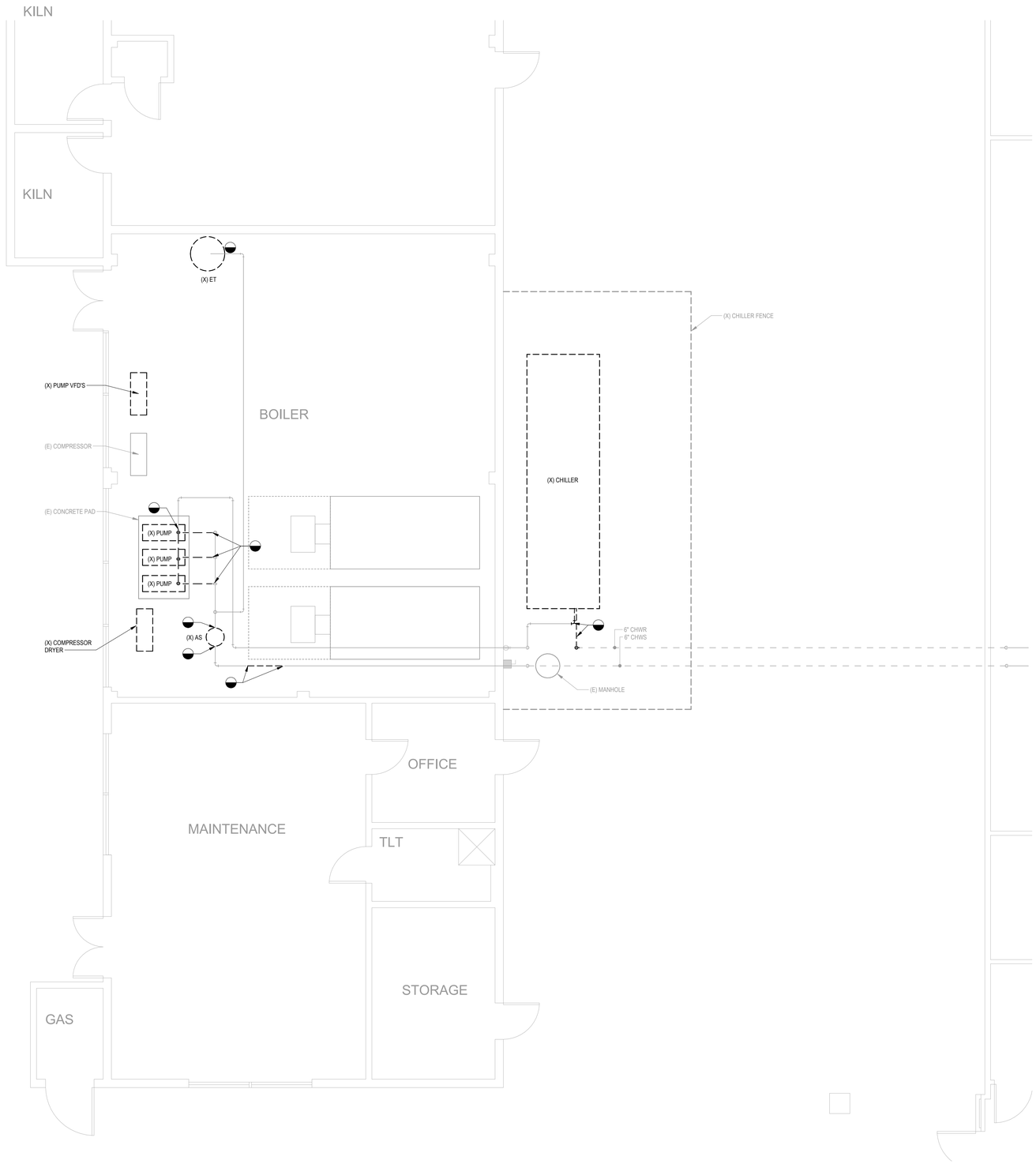
MECHANICAL
OVERALL FLOOR PLAN

M101

GENERAL NOTES:

A. DEMOLISH AND REMOVE ALL EXISTING PIPING AND EQUIPMENT WHERE INDICATED. PREPARE FOR INSTALLATION OF NEW EQUIPMENT AND PIPING.



1 BOILER ENLARGED PLAN - MECHANICAL DEMO
SCALE: 1/4" = 1'-0"

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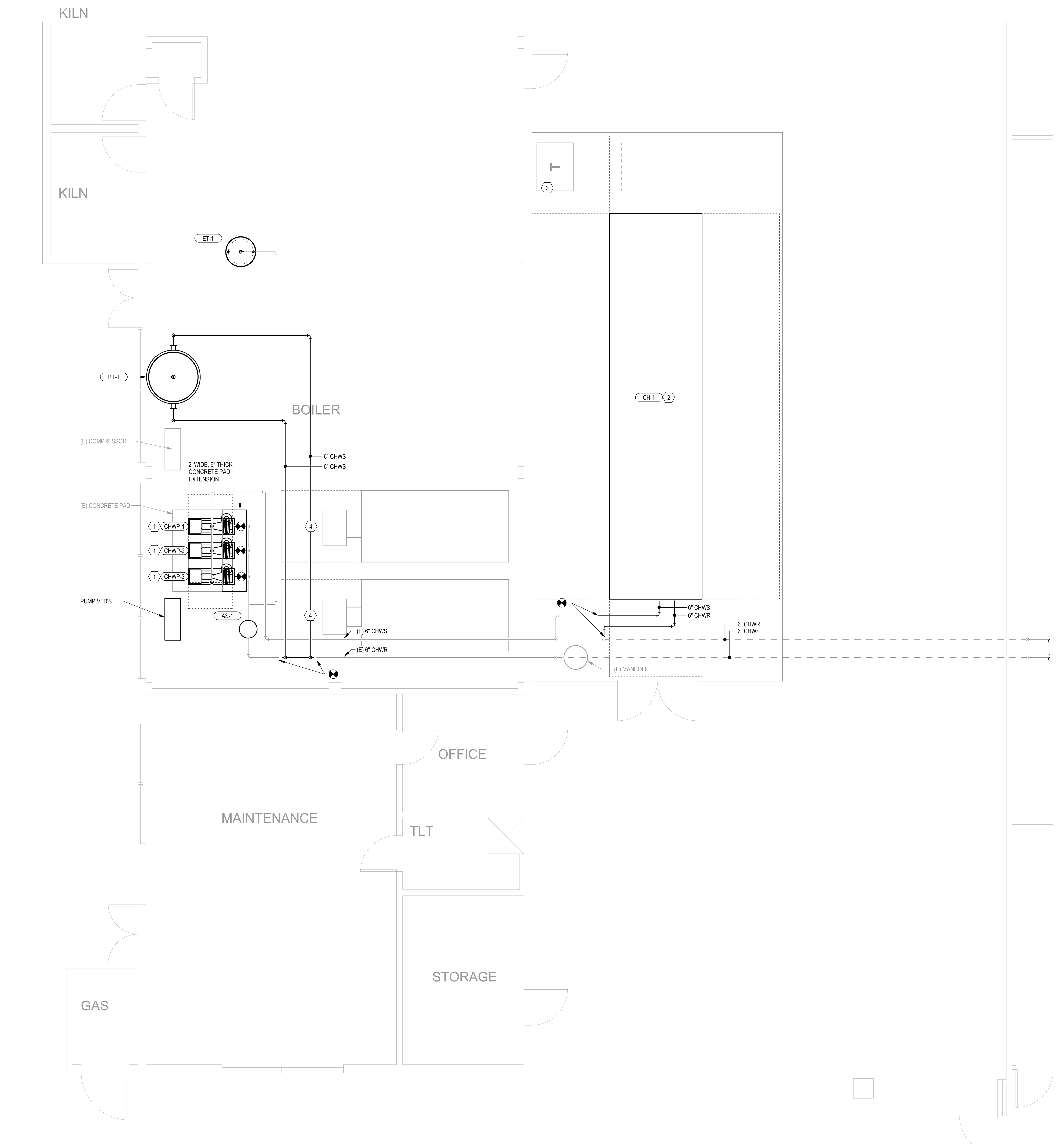
MECHANICAL
ENLARGED PLANS - DEMO

M400



1 BOILER ENLARGED PLAN - MECHANICAL
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

A. FIELD VERIFY EXISTING CONDITIONS PRIOR TO START OF ANY WORK. EXISTING EQUIPMENT, PIPING, AND CONNECTIONS ARE SHOWN FOR REFERENCE ONLY.
B. THE EXACT LOCATION OF EQUIPMENT ROUGH-INS SHALL BE VERIFIED WITH THE STAMPED APPROVED SHOP DRAWINGS PRIOR TO ANY FIELD INSTALLATION.
C. PIPING LAYOUT BASED ON AS-BUILT DRAWINGS FROM 2011 SET. CONTRACTOR TO CONFIRM ROUTING AND VALVING OF EXISTING SYSTEM PRIOR TO INSTALLATION OF CHILLER AND PUMPS.
D. SUPPORT ALL PIPING DIRECTLY TO STRUCTURE. DO NOT SUPPORT ANY PIPES FROM DUCTWORK, CONDUIT, OR OTHER PIPING ENCOUNTERED. IN GENERAL, HYDRONIC PIPING IS SHOWN RACKED DIED BY SIDE FOR CLARITY. MECHANICAL CONTRACTOR WILL BE RESPONSIBLE FOR COORDINATION PLANS OF PIPE ROUTING, (STACKED OR RACKED) THROUGHOUT BUILDING.
E. PROVIDE MANUAL AIR VENTS AT ALL HIGH POINTS IN THE PIPING SYSTEM.
F. PROVIDE DRAIN VALVES AT ALL LOW POINTS IN THE PIPING SYSTEM. PROVIDE SLEEVES AT EACH PENETRATION OF FIRE AND SMOKE RATED ASSEMBLIES AND SEAL WITH INTUMESCENT MATERIAL.
G. ANY MAJOR VENTILATION, HEATING WATER, OR CHILLED WATER OUTAGES REQUIRED TO COMPLETE THE WORK SHALL BE SCHEDULED TO MINIMIZE DISRUPTION. ALL OUTAGES SHALL BE COORDINATED WITH FACILITY STAFF AND A MINIMUM OF TWO (2) WEEKS NOTICE SHALL BE GIVEN.
H. CONTROLS CONTRACTOR TO PROVIDE ALL NECESSARY SENSORS, ACTUATORS, CONTROLLERS, LOW VOLTAGE TRANSFORMERS, AND ACCESSORIES FOR INTEGRATION OF NEW EQUIPMENT INTO THE EXISTING CONTROL SYSTEM.

KEYNOTES:

1 DEMOLISH EXISTING PUMP AND REPLACE WITH NEW SELECTIONS.
2 DEMOLISH EXISTING CHILLER AND REPLACE WITH NEW SELECTIONS.
3 CHILLER POWER TRANSFORMER, REFER TO ELECTRICAL PLANS FOR DETAILS.
4 MAINTAIN CLEARANCE REQUIREMENTS FOR EXISTING EQUIPMENT.

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MECHANICAL ENLARGED PLANS

M401

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GENERAL NOTES:

A. FIELD VERIFY EXISTING CONDITIONS PRIOR TO START OF ANY WORK. EXISTING EQUIPMENT, PIPING, AND CONNECTIONS ARE SHOWN FOR REFERENCE ONLY.
B. THE EXACT LOCATION OF EQUIPMENT ROUGH-INS SHALL BE VERIFIED WITH THE STAMPED APPROVED SHOP DRAWINGS PRIOR TO ANY FIELD INSTALLATION.
C. PIPING LAYOUT BASED ON AS-BUILT DRAWINGS FROM 2011 SET. CONTRACTOR TO CONFIRM ROUTING AND VALVING OF EXISTING SYSTEM PRIOR TO INSTALLATION OF CHILLER AND PUMPS.
D. SUPPORT ALL PIPING DIRECTLY TO STRUCTURE. DO NOT SUPPORT ANY PIPES FROM DUCTWORK, CONDUIT, OR OTHER PIPING ENCOUNTERED. IN GENERAL, HYDRONIC PIPING IS SHOWN RACKED DIED BY SIDE FOR CLARITY. MECHANICAL CONTRACTOR WILL BE RESPONSIBLE FOR COORDINATION PLANS OF PIPE ROUTING, (STACKED OR RACKED) THROUGHOUT BUILDING.
E. PROVIDE MANUAL AIR VENTS AT ALL HIGH POINTS IN THE PIPING SYSTEM.
F. PROVIDE DRAIN VALVES AT ALL LOW POINTS IN THE PIPING SYSTEM. PROVIDE SLEEVES AT EACH PENETRATION OF FIRE AND SMOKE RATED ASSEMBLIES AND SEAL WITH INTUMESCENT MATERIAL.
G. ANY MAJOR VENTILATION, HEATING WATER, OR CHILLED WATER OUTAGES REQUIRED TO COMPLETE THE WORK SHALL BE SCHEDULED TO MINIMIZE DISRUPTION. ALL OUTAGES SHALL BE COORDINATED WITH FACILITY STAFF AND A MINIMUM OF TWO (2) WEEKS NOTICE SHALL BE GIVEN.
H. CONTROLS CONTRACTOR TO PROVIDE ALL NECESSARY SENSORS, ACTUATORS, CONTROLLERS, LOW VOLTAGE TRANSFORMERS, AND ACCESSORIES FOR INTEGRATION OF NEW EQUIPMENT INTO THE EXISTING CONTROL SYSTEM.

KEYNOTES:

1 DEMOLISH EXISTING CENTRIFUGAL FAN AND MOTOR.
2 COOLING COIL TO BE ADDED TO UNIT UPSTREAM OF SUPPLY FAN. PROVIDE CONDENSATE DRAIN PAN AND ROUTE TO NEAREST FLOOR DRAIN. PROVIDE CONDENSATE RESERVOIR AND PUMP IF IT CANNOT BE GRAVITY DRAINED.
3 PRESERVE EXISTING AHU CABINET EXCEPT WHERE CASING PANELS ARE REQUIRED TO BE REMOVED FOR NEW WORK.
4 PROVIDE NEW FAN ARRAY AS SCHEDULED. PROVIDE NEW ACCESS PANELS AS NECESSARY FOR FAN MAINTENANCE.
5 PROVIDE NEW PIPING TO CONNECT EXISTING STUB OUTS TO NEW COOLING COILS.
6 PROVIDE SEALED SHEET METAL FILLER AROUND PERIMETER OF NEW FAN ARRAY.
7 PROVIDE FLOAT SWITCH IN COIL DRAIN PAN. FLOAT SWITCH SHALL MAKE CONTACT WHEN HIGH LEVEL OF CONDENSATE IS DETECTED AND SHALL ALARM BUILDING MANAGEMENT SYSTEM.
8 PROVIDE NEW AHU CABINET PANELS AS REQUIRED.
9 DEMOLISH EXISTING 2 IN. BYPASS AND REPLACE WITH NEW 4 IN. BYPASS. PROVIDE VARIABLE POSITION MOTORIZED CONTROL VALVE.

2 MECH ROOM 02 ENLARGED PLAN - MECHANICAL
SCALE: 3/8" = 1'-0"

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MMHS - Chiller Replacement

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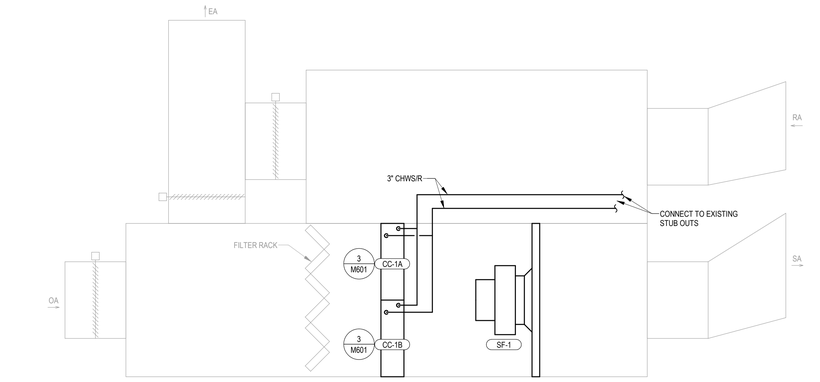
MECHANICAL
ENLARGED PLANS

M402



1 HV-8 DETAIL
SCALE: NO SCALE

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MECHANICAL
DETAILS

M501

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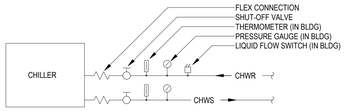
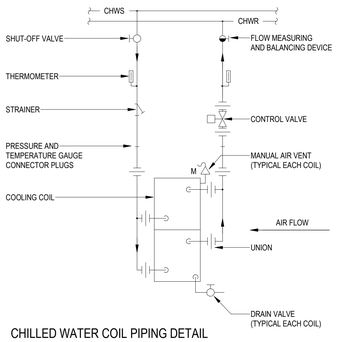
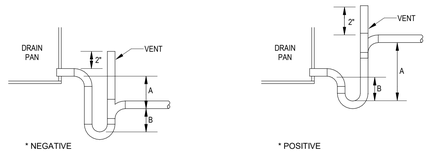


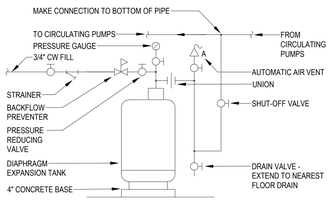
2 AIR COOLED WATER CHILLER PIPING DETAIL
NOT TO SCALE



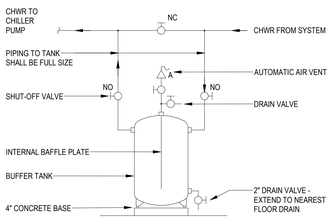
3 CHILLED WATER COIL PIPING DETAIL W/2-WAY VALVE - MULTIPLE
NOT TO SCALE



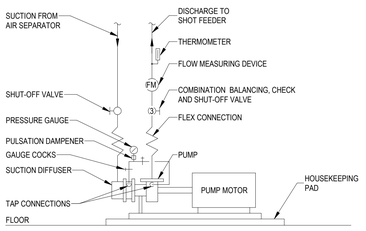
4 CONDENSATE DRAIN DETAIL
NOT TO SCALE



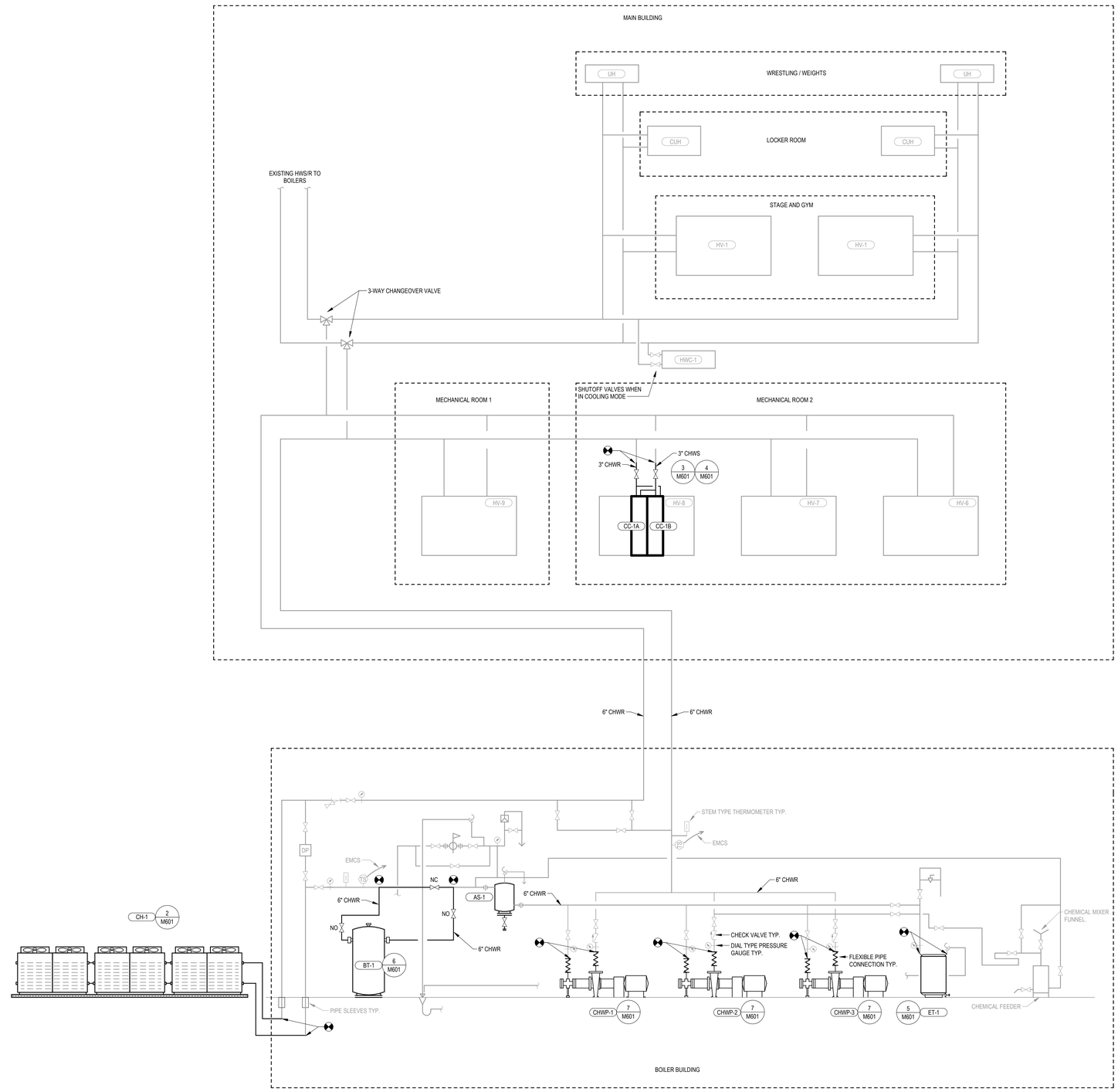
5 EXPANSION TANK PIPING DETAIL
NOT TO SCALE



6 BUFFER TANK PIPING DETAIL
NOT TO SCALE



7 PUMP DETAIL - BASE MOUNTED END SUCTION
NOT TO SCALE



1 CHILLER PIPING DIAGRAM
SCALE: NO SCALE

GENERAL NOTES:

A. PIPING DIAGRAM BASED ON AS-BUILT DRAWINGS FROM 2011 SET. CONTRACTOR TO CONFIRM ROUTING AND VALVING OF EXISTING SYSTEM PRIOR TO INSTALLATION OF CHILLER AND PUMPS.

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MMHS - Chiller Replacement

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MECHANICAL
PIPING DIAGRAM

M601

CHILLER SYSTEM (FC-1):

A. GENERAL:
1. THE 2-PIPE CHILLED WATER SYSTEM CONSISTS OF AN AIR-TO-WATER CHILLER AND 3 SYSTEM PUMPS WITH VFD'S.
2. THE CHILLER INTEGRAL CONTROLS OPERATE TO MAINTAIN THE CHILLED WATER SETPOINT. THE BAS INTEGRATES TO THE CHILLER CONTROLLER VIA A BACNET TCP/IP INTERFACE.
3. THE SYSTEM IS VARIABLE PRIMARY FLOW WITH 2-WAY VALVES ON THE HV UNIT COILS AND A BYPASS WITH MODULATING VALVE TO MAINTAIN CHILLER MINIMUM FLOW. THE PUMP VFD'S MODULATE TO MAINTAIN THE SYSTEM WATER DIFFERENTIAL SETPOINT.
4. THE CHILLED WATER SYSTEM SERVES AIR HANDLING UNITS: HV-1 (2), HV-6, HV-7, HV-8, AND HV-9, AS WELL AS TWO (2) UNIT HEATERS AND TWO (2) CABINET UNIT HEATERS WHICH WILL OPERATE IN COOLING MODE TO SERVE THE LOCKERS, WRESTLING, AND WEIGHT ROOMS. .

B. COOLING MODE:
1. WHEN ALL ASSOCIATED AIR HANDING UNITS REQUEST MECHANICAL COOLING, THE SYSTEM IS IN COOLING MODE.
2. IF ALL ASSOCIATED AIR HANDING UNIT CYCLE BACK HEATING MODE, THE CHILLER SYSTEM IS PUT ON STANDBY.

C. CHILLER SYSTEM ENABLE/DISABLE:
1. COOLING MODE – THE CHILLER SYSTEM IS ENABLED TO RUN IN THE COOLING MODE BASED ON THE FOLLOWING CONDITIONS:
   a. THE OUTSIDE AIR TEMPERATURE IS ABOVE 62˚F (ADJUSTABLE).
   b. UNITS ARE IN THE COOLING MODE AND THE COIL VALVE OF EITHER UNIT IS GREATER THAN 10% OPEN.
   c. THE MINIMUM ON TIME IS 30 MINUTES.
2. THE CHILLER SYSTEM IS DISABLED BY THE BAS BASED ON THE FOLLOWING CONDITIONS:
   a. THE COIL VALVE POSITION OF ALL ASSOCIATED UNITS IS LESS THAN 10% OPEN.

D. CHILLED WATER SETPOINT RESET:
1. CHILLED WATER TEMPERATURE RESET:
   a. THE MINIMUM CHILLED WATER TEMPERATURE SETPOINT IS 45˚F.
   b. THE MAXIMUM CHILLED WATER TEMPERATURE SETPOINT IS 55˚F.
   c. THE CHILLED WATER TEMPERATURE SETPOINT IS CALCULATED BY THE BAS AND REFERENCED TO THE HEAT PUMP CONTROLLER.
   d. THE INITIAL CHILLED WATER TEMPERATURE SETPOINT IS AT STARTUP IS 48˚F.
   e. THE RESET ROUTINE OPERATES AT A FREQUENCY OF ONCE EVERY 2 MINUTES.
   f. IF ANY ASSOCIATED COIL VALVE IS GREATER THAN 95% OPEN THE CHILLED WATER SETPOINT IS DECREASED BY 0.5˚F.
   g. IF ALL OF THE ASSOCIATED COIL VALVES ARE LESS THAN 75% OPEN THE CHILLED WATER SETPOINT IS INCREASED BY 0.5˚F.
   h. IF NEITHER CONDITION DESCRIBED BY "F" OR "G" IS TRUE, THE CHILLED WATER SETPOINT REMAINS AT THE PREVIOUS VALUE.
   i. IF THE CHILLED WATER TEMPERATURE RISES ABOVE ITS MAXIMUM SETPOINT OF 55 DEGREES FOR 15 MINUTES RESET GYM, LOCKERS, WRESTLING, AND WEIGHTS COOLING SETPOINTS UP TO 80 DEGREES FOR 2 HOURS.

E. CHILLER SYSTEM WATER PUMPS CHWP-1, CHWP-2, & CHWP-3:
1. GENERAL – CHWP-1, CHWP-2, AND CHWP-3 SERVE THE CHILLED WATER LOOP SYSTEM. THE PUMPS ARE PROVIDED WITH VFD'S FOR VARIABLE FLOW OPERATION. THE BAS PROVIDES HARDWIRED START/STOP AND SPEED MODULATION CONTROL AND MONITORS THE DRIVES VIA BACNET MS/TP. THE PUMPS OPERATE IN A LEAD/LAG/BACKUP FASHION.
2. THE SYSTEM IS DESIGNED AS A VARIABLE PRIMARY FLOW SYSTEM. HEAT PUMP MINIMUM FLOW IS MAINTAINED BY A BYPASS WITH A MODULATING VALVE.
3. PUMP START/STOP:
   a. THE LEAD PUMPS ARE STARTED THERE IS A REQUEST FOR HEATING OR CHILLED WATER AS DESCRIBED ABOVE.
   b. THE LEAD PUMP IS ROTATED ON A MONTHLY BASIS. THE ROTATION IS SCHEDULED AT 2:00 AM ON TUESDAY MORNING AND IS ADJUSTABLE AT THE OWS.
   c. MANUAL LEAD/LAG ROTATION IS PROVIDED AT THE OWS.
   d. IF THE LEAD PUMP FAILS THE FOLLOWING OCCURS:
      1. THE LEAD PUMP IS STOPPED.
      2. AN ALARM IS GENERATED AT THE BAS.
      3. THE LAG PUMP IS AUTOMATICALLY STARTED, IF NOT ALREADY RUNNING.
      4. A MANUAL RESET IS REQUIRED TO RESET THE ALARM. THE SYSTEM RESTARTS THE LEAD PUMP, IF AUTOMATIC ROTATION HAS NOT OCCURRED, AND RETURNS TO NORMAL OPERATION.
4. PUMP VFD SPEED MODULATION:
   a. THE CHILLER SYSTEM DIFFERENTIAL WATER PRESSURE IS MEASURED NEAR HV-6 AT THE EAST MECHANICAL ROOM #2.
   b. THE CHILLER WATER LOOP DIFFERENTIAL PRESSURE SETPOINT OF 12 PSI.
   c. THE MINIMUM SPEED OF A SINGLE PUMP VFD IS 20%.
   d. THE SPEED OF THE PUMP(S) IS MODULATED TO MAINTAIN THE WATER DIFFERENTIAL PRESSURE SETPOINT.
   e. IF THE LEAD PUMP IS AT 100% SPEED FOR 5 MINUTES, THE LAG PUMP IS STARTED AND BOTH PUMPS OPERATE IN UNISON.
   f. WHEN THE SPEED OF BOTH PUMPS IS LESS THAN 35% FOR 5 MINUTES, THE LAG PUMP IS STOPPED.
   g. THE VFD SPEED REFERENCE IS 0% WHEN THE PUMP IS OFF AND AT STARTUP. THE MAXIMUM SPEED IS LIMITED TO 50% FOR THE FIRST 3 MINUTES AFTER STARTUP TO PREVENT OVERSHOOTING THE DIFFERENTIAL SETPOINT.
5. FREEZE PROTECTION – THE LEAD SYSTEM PUMPS STARTS AND RUNS CONTINUOUSLY WHEN THE OUTSIDE AIR TEMPERATURE IS BELOW 35˚F. DURING FREEZE PROTECTION OPERATION WHEN THE HV UNITS ARE OFF, THE COIL VALVE FOR EACH UNIT IS MODULATED 25% OPEN AND THE BYPASS VALVE IS MODULATED TO MAINTAIN 45 GPM.

F. BYPASS VALVE:
1. GENERAL – A BYPASS PIPE BETWEEN THE CHILLER SYSTEM SUPPLY AND RETURN WITH A MODULATING CONTROL VALVE IS LOCATED NEAR HV-6 AT THE EAST MECHANICAL ROOM #2. THE PURPOSE OF THE BYPASS IS TO MAINTAIN MINIMUM FLOW FOR THE CHILLER.
2. CHILLER SYSTEM SUPPLY AND RETURN WATER FLOW IS MONITORED BY THE BAS.
3. WHEN THE CHILLER SYSTEM IS OFF, THE BYPASS VALVE IS MODULATED FULLY OPEN.
4. WHEN THE CHILLER SYSTEM PUMP(S) ARE OPERATING THE BYPASS VALVE IS MODULATED AS NECESSARY TO MAINTAIN A MINIMUM OF 257 GPM OF WATER FLOW AS MEASURED BY THE RETURN WATER FLOW METER. THE BYPASS VALVE IS FULLY CLOSED WHEN HV UNIT COIL DEMAND IS GREATER THAN THE MINIMUM FLOW SETPOINT.

G. CHILLER CONTROL:
1. CHILLER FC-1 IS A CHILLER THAT IS PROVIDED WITH A BACNET TCP/IP COMMUNICATION INTERFACE FOR INTEGRATION WITH THE BAS SYSTEM. THE CHILLER HAS INTEGRAL CONTROLS. THE BAS MONITORS THE UNIT, AND PROVIDES ENABLE/DISABLE AND SETPOINTS.
2. WHEN THE CHILLER SYSTEM IS ENABLED BY THE BAS AND THE SYSTEM PUMP IS CONFIRMED ON, THE CHILLER IS ENABLED TO RUN. THE CHILLER FACTORY CONTROLS OPERATE TO MAINTAIN THE CHILLED WATER SETPOINT THAT IS PROVIDED BY THE BAS.
3. WHEN THE CHILLER SYSTEM IS DISABLED BY THE BAS, THE CHILLER IS STOPPED AND THE CHILLER CONTINUES TO RUN FOR 5 ADDITIONAL MINUTES.

H. ALARMS AND SAFETIES:
1. COMMUNICATION FAILURE – IF COMMUNICATION WITH THE VLC, CHILLER CONTROLLER OR PUMP VFD'S IS LOST AN ALARM IS GENERATED BY THE BAS.
2. SYSTEM PUMPS CHWP-1, CHWP-2, & CHWP-3 – THE FOLLOWING ALARMS ARE PROVIDED BY THE BAS:
   a. FAILURE - THE BAS MONITORS THE STATUS OF EACH PUMP WITH A CURRENT SENSING SWITCH. IF THE OUTPUT AND STATUS FEEDBACK DO NOT MATCH, AN ALARM IS GENERATED AT THE BAS. A MANUAL RESET IS REQUIRED TO RESET THE ALARM.
   b. RUNNING IN HAND.
   c. RUNTIME EXCEEDED. STATUS RUNTIME EXCEEDS A USER ADJUSTABLE LIMIT.
   d. VFD FAULT AS MONITORED WITH BACNET MS/TP.
3. CHILLER FC-1 ALARMS:
   a. THE BAS MONITORS THE CHILLER INTEGRAL CONTROLLER VIA A BACNET TCP/IP COMMUNICATION INTERFACE.
   b. MODULE FAILURE – THE STATUS OF EACH MODULE IS MONITORED. IF THE MODULE IS COMMANDED ON, AND THE FEEDBACK IS OFF, AN ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE MODULE OPERATION RETURNS TO NORMAL.
   c. HAND OPERATION – AN ALARM IS GENERATED AT THE BAS IF THE CHILLER IS ON, BUT IT IS COMMANDED OFF. THE ALARM AUTOMATICALLY RESETS WHEN THE CHILLER OPERATION RETURNS TO NORMAL.
4. CHILLER SYSTEM WATER TEMPERATURE ALARMS – THE FOLLOWING ALARMS ARE PROVIDED AT THE BAS:
   a. HIGH PRIMARY CHILLED WATER SUPPLY TEMPERATURE – SUPPLY TEMPERATURE IS GREATER THAN 55˚F FOR GREATER THAN 2 MINUTES DURING COOLING.
   b. LOW PRIMARY CHILLED WATER SUPPLY TEMPERATURE – SUPPLY TEMPERATURE IS LESS THAN 40˚F FOR GREATER THAN 2 MINUTES DURING COOLING.
5. CHILLER SYSTEM PRESSURE ALARM:
   a. THE BAS MONITORS THE SYSTEM DIFFERENTIAL WATER PRESSURE NEAR HV-6 AT THE WEST MECHANICAL ROOM #2.
   b. HIGH DIFFERENTIAL WATER PRESSURE ALARM – IF THE SYSTEM DIFFERENTIAL WATER PRESSURE IS 25% HIGHER THAN SETPOINT FOR GREATER THAN 2 MINUTES, A HIGH PRESSURE ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE SYSTEM PRESSURE RETURNS TO NORMAL.
   c. LOW DIFFERENTIAL WATER PRESSURE ALARM – IF THE SYSTEM DIFFERENTIAL WATER PRESSURE IS 25% LESS THAN SETPOINT FOR GREATER THAN 2 MINUTES, A LOW PRESSURE ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE SYSTEM PRESSURE RETURN TO NORMAL.
6. RUN TIME – THE BAS RECORDS THE OPERATING TIME FOR THE CHILLER AND SYSTEM PUMPS.

VAV AIR HANDLING UNIT HV-8:

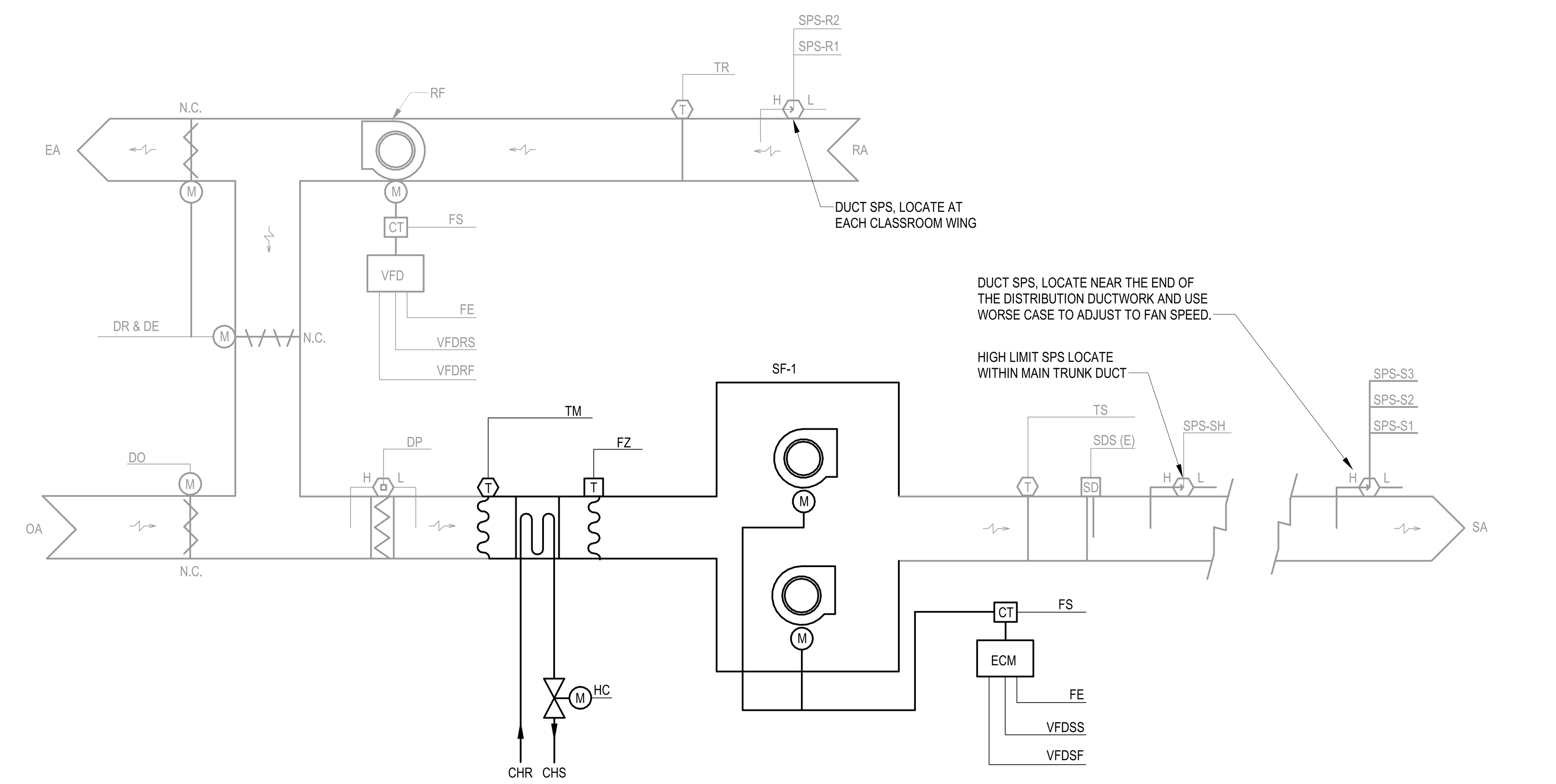
A. GENERAL – THE UNIT ARE EXISTING INDOOR VAV AIR HANDLING UNITS. THE UNITS HAVE SUPPLY AND RETURN FANS WITH VFD'S, CHILLED/HEATING WATER COILS (2-PIPE SYSTEM HEAT/COOL SYSTEM), AND OUTDOOR AIR ECONOMIZER DAMPERS. AN EXISTING APLC TUX CONTROLLER IS MODIFIED TO PROVIDE THE REQUIRE UPDATES FOR MONITORING AND CONTROL.

B. OCCUPIED MODE:
1. SUPPLY AND RETURN FAN – THE SUPPLY AND RETURN FANS RUN CONTINUOUSLY.
2. THE EXISTING VFD'S FOR THE SUPPLY AND RETURN FANS ARE REPLACED WITH NEW ABB DRIVES. HARDWIRE CONTROL OF THE VFD'S IS PROVIDED AND THE DRIVES ARE MONITORED VIA BACNET MS/TP.
3. SUPPLY FAN VFD CONTROL:
   a. THE MINIMUM ON/OFF TIME IS 5 MINUTES.
   b. THE SUPPLY FAN MINIMUM SPEED IS 30%.
   c. DUCT STATIC PRESSURE IS MONITORED BY THE BAS AT 2/3 THE LONGEST DUCT RUN.
   d. THE SUPPLY FAN SPEED IS MODULATED TO MAINTAIN THE DUCT STATIC PRESSURE SETPOINT. REFER TO BELOW FOR SUPPLY DUCT STATIC PRESSURE SETPOINT RESET DESCRIPTION.
4. RETURN FAN VFD CONTROL:
   a. THE MINIMUM ON/OFF TIME IS 5 MINUTES.
   b. THE RETURN FAN IS INTERLOCKED TO RUN WITH THE SUPPLY FAN.
   c. THE RETURN FAN MINIMUM SPEED IS 20%.
   d. THE SPEED OF THE RETURN FAN TRACKS THE SPEED OF THE SUPPLY FAN WITH A FIXED OFFSET. THE RETURN FAN SPEED IS NOT ALLOWED TO EXCEED THE SUPPLY FAN SPEED. THE MAXIMUM OFFSET IS - 15%. THE OFFSET IS SET AT 0% FOR THE INITIAL SETPOINT AT SYSTEM STARTUP.
5. SUPPLY DUCT STATIC SETPOINT RESET:
   a. THE SUPPLY DUCT STATIC PRESSURE SETPOINT IS CALCULATED BY THE BAS AND REFERENCED TO THE UNIT CONTROLLER.
   b. THE MINIMUM DUCT STATIC PRESSURE SETPOINT IS 0.5" WC AND THE MAXIMUM IS 2.0" WC.
   c. THE INITIAL DUCT STATIC PRESSURE SETPOINT WHEN THE UNIT ENTERS THE OCCUPIED MODE IS 1.0" WC.
   d. THE RESET ROUTINE OPERATES AT A FREQUENCY OF ONCE EVERY 5 MINUTES.
   e. ON ANY 2 TERMINAL UNIT INLET AIR DAMPERS AT GREATER THAN 95% OPEN THE DUCT STATIC PRESSURE SETPOINT IS INCREASED BY 0.1" WC.
   f. ON ALL TERMINAL UNIT INLET AIR DAMPERS LESS THAN 85% OPEN THE DUCT STATIC PRESSURE SETPOINT IS DECREASED BY 0.1" WC.
   g. IF NEITHER CONDITION DESCRIBED BY E) OR F) IS TRUE, THE DUCT STATIC PRESSURE SETPOINT REMAINS AT THE PREVIOUS VALUE.
   h. A MANUAL DESELECT BOX IS PROVIDED AT THE BAS TO EXCLUDE INDIVIDUAL TERMINAL UNITS FROM THE DUCT STATIC PRESSURE SETPOINT ROUTINE.
6. SUPPLY AIR TEMPERATURE RESET:
   a. THE INITIAL MODE AT UNIT STARTUP IS COOLING. THE UNIT CYCLES BETWEEN HEATING AND COOLING MODE AS DESCRIBED BELOW.
   b. HEATING MODE – IF GREATER THAN 75% OF THE RESPECTIVE TERMINAL UNITS HEATING VALVES ARE OPEN, THE HV UNIT IS IN THE HEATING MODE.
      1. THE SUPPLY AIR TEMPERATURE SETPOINT IS RESET BY THE BAS AND REFERENCED TO THE UNIT CONTROLLER.
      2. THE SUPPLY AIR TEMPERATURE SETPOINT IS RESET BETWEEN A MINIMUM OF 65˚F AND A MAXIMUM OF 85˚F. THE INITIAL SETPOINT WHEN THE HV ENTERS THE HEATING MODE IS 70˚F.
      3. THE RESET ROUTINE OPERATES AT A FREQUENCY OF ONCE EVERY 5 MINUTES.
      4. IF ANY 2 TERMINAL UNIT SPACE TEMPERATURES ARE MORE THAN 1˚F BELOW THEIR OCCUPIED HEATING SETPOINT, THE SUPPLY AIR TEMPERATURE SETPOINT IS INCREASED BY 0.5˚F.
      5. IF ALL TERMINAL SPACE TEMPERATURES ARE ABOVE THEIR OCCUPIED HEATING SETPOINT, THE SUPPLY AIR TEMPERATURE IS DECREASED BY 0.5˚F.
   c. COOLING MODE – IF LESS THAN 25% OF THE RESPECTIVE TERMINAL UNITS HEATING VALVES ARE OPEN, THE HV UNIT IS IN THE COOLING MODE. THE SUPPLY AIR TEMPERATURE IS RESET AS FOLLOWS:
      1. THE SUPPLY AIR TEMPERATURE SETPOINT IS RESET BY THE BAS AND REFERENCED TO THE UNIT CONTROLLER.
      2. THE SUPPLY AIR TEMPERATURE SETPOINT IS RESET BETWEEN A MINIMUM OF 55˚F AND A MAXIMUM OF 65˚F. THE INITIAL SETPOINT WHEN THE HV ENTERS THE COOLING MODE IS 60˚F.
      3. THE RESET ROUTINE OPERATES AT A FREQUENCY OF ONCE EVERY 5 MINUTES.
      4. IF ANY 2 TERMINAL UNIT SPACE TEMPERATURES ARE 1˚F ABOVE THEIR OCCUPIED COOLING SETPOINT, THE SUPPLY AIR TEMPERATURE SETPOINT IS DECREASED BY 0.5˚F.
      5. IF ALL TERMINAL SPACE TEMPERATURES ARE BELOW THEIR OCCUPIED COOLING SETPOINT, THE SUPPLY AIR TEMPERATURE IS INCREASED BY 0.5˚F.
   d. A MANUAL DESELECT BOX IS PROVIDED AT THE BAS TO EXCLUDE INDIVIDUAL TERMINAL UNITS FROM THE SUPPLY AIR TEMPERATURE RESET ROUTINE.
7. OUTSIDE AIR ECONOMIZER:
   a. THE ECONOMIZER SECTION CONSISTS OF A RETURN, EXHAUST AND OUTSIDE AIR DAMPER. THE OUTSIDE AND EXHAUST AIR DAMPERS ARE NORMALLY OPEN, AND THE RETURN AIR DAMPER IS NORMALLY CLOSED. THE DAMPERS OPERATE IN PARALLEL WITH EACH OTHER AND IN THE OPPOSITE DIRECTION.
   b. THE MINIMUM OUTSIDE AIR DAMPER POSITION IS 20%.
   c. THE ECONOMIZER CYCLE IS ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS LESS THAN THE RETURN AIR TEMPERATURE.
   d. WHEN THE ECONOMIZER CYCLE IS ENABLED THE ECONOMIZER DAMPERS MODULATE TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT.
   e. THE ECONOMIZER CYCLE IS DISABLED WHEN THE OUTSIDE AIR TEMPERATURE IS GREATER THAN THE RETURN AIR TEMPERATURE FOR 5 MINUTES. WHEN THE ECONOMIZER IS DISABLED THE ECONOMIZER DAMPERS MODULATE TO MINIMUM POSITION.
   f. THE ECONOMIZER IS RE-ENABLED WHEN THE OUTSIDE AIR TEMPERATURE IS 2˚F LESS THAN THE RETURN AIR TEMPERATURE FOR 5 MINUTES.
   g. THE OUTSIDE AND EXHAUST AIR DAMPER IS CLOSED, AND THE RETURN AIR DAMPER IS OPEN WHEN THE AHU IS OFF.
   h. FREEZE PROTECTION:
      1. IF THE SUPPLY FAN IS RUNNING AND THE MIXED AIR TEMPERATURE DROPS BELOW 40˚F, THE OUTSIDE AIR DAMPER IS CLOSED AND AN ALARM IS GENERATED AT THE BAS.
      2. THE ALARM IS LATCHING AND A MANUAL RESET AT THE BAS IS REQUIRED TO RESET THE ALARM.
8. COOLING COIL VALVE:
   a. A NEW COOLING COIL AND 2-WAY CONTROL VALVE IS ADDED TO EACH UNIT. THE SYSTEM IS A 2-PIPE COOLING SYSTEM THAT IS SERVED BY A NEW CHILLER.
   b. THE COOLING MODE IS DETERMINED ABOVE IN THE SUPPLY AIR TEMPERATURE RESET SECTION.
   c. COOLING MODE:
      1. THE COIL VALVE IS CLOSED IF THE HEAT PUMP SUPPLY WATER TEMPERATURE IS GREATER THAN 65˚F.
      2. THE COIL VALVE MODULATES IN SEQUENCE WITH THE ECONOMIZER DAMPERS TO MAINTAIN THE SUPPLY AIR TEMPERATURE SETPOINT.
      3. CHILLED WATER COOLING AND ECONOMIZER COOLING ARE NOT ALLOWED SIMULTANEOUSLY UNLESS THE ECONOMIZER IS FULLY OPEN. NOTE: IF THE POSITION OF THE ECONOMIZER DAMPER IS IN MANUAL OVERRIDE, CHILLED WATER COOLING IS ALLOWED.
   d. THE COIL VALVE IS CLOSED WHEN THE AHU IS OFF.

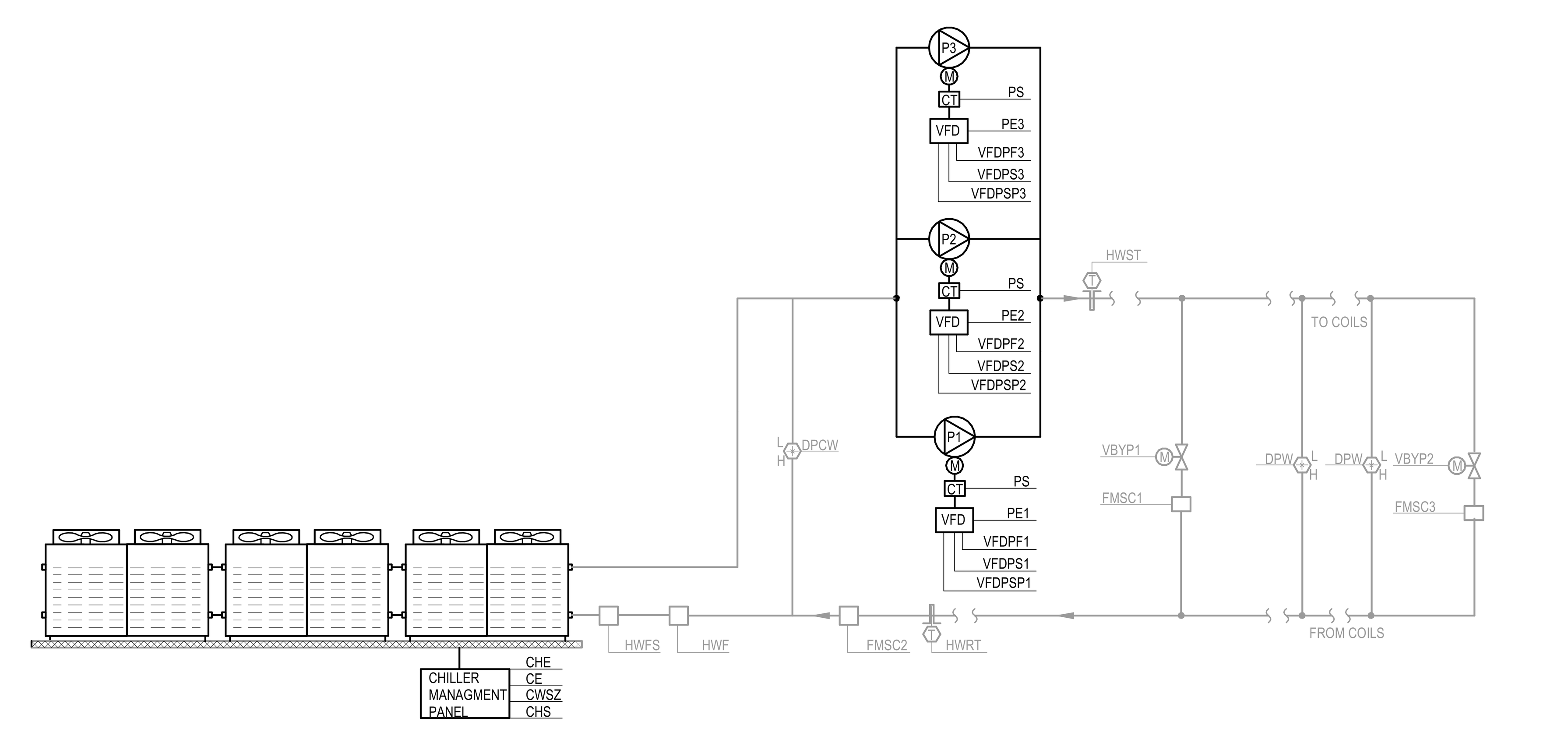
C. UNOCCUPIED MODE:
1. THE SUPPLY AND RETURN FAN IS OFF, THE COIL VALVE IS CLOSED, THE OUTSIDE AND EXHAUST AIR DAMPERS ARE CLOSED, AND THE RETURN AIR DAMPER IS OPEN.
2. NIGHT LOW LIMIT:
   a. THE HV WILL START WHEN ANY 2 TERMINAL UNIT SPACE TEMPERATURES DROP BELOW THEIR UNOCCUPIED SPACE HEATING SETPOINT.
   b. IN THE UNOCCUPIED HEATING MODE THE SUPPLY AND RETURN FANS RUN CONTINUOUSLY, THE ECONOMIZER DAMPER REMAINS CLOSED, AND THE HEATING COIL VALVE IS MODULATED TO MAINTAIN 85˚F SUPPLY AIR TEMPERATURE SETPOINT.
   c. THE UNIT RUNS CONTINUOUSLY UNTIL THE TERMINAL UNIT WITH THE LOWEST SPACE TEMPERATURE IS 5˚F ABOVE ITS UNOCCUPIED HEATING SETPOINT.
3. NIGHT HIGH LIMIT:
   a. THE HV WILL START WHEN ANY 2 TERMINAL UNIT SPACE TEMPERATURES RISE ABOVE THEIR UNOCCUPIED SPACE COOLING SETPOINT.
   b. THE HV OPERATES IN THE OCCUPIED MODE AS DESCRIBED ABOVE WITH THE EXCEPTION THAT THE ECONOMIZER MINIMUM POSITION IS 0%. THE ECONOMIZER IS ENABLED IN THIS MODE IF CONDITIONS ALLOW.
   c. THE HV RUNS CONTINUOUSLY UNTIL THE TERMINAL UNIT WITH THE HIGHEST SPACE TEMPERATURE IS 5˚F BELOW ITS UNOCCUPIED COOLING SETPOINT.

A. OPTIMAL START MODE – THE OPTIMUM START PROGRAM DETERMINES THE AMOUNT OF TIME (2 HOUR MAXIMUM, ADJUSTABLE) BEFORE THE OCCUPIED START TIME THAT THE UNIT NEEDS TO START TO BRING THE SPACE TEMPERATURE UP TO THE OCCUPIED HEATING SETPOINT; OR DOWN TO THE OCCUPIED COOLING SETPOINT BY THE OCCUPANCY TIME. THE CALCULATION IS BASED ON HISTORICAL DATA, WHICH IS A FUNCTION OF OUTSIDE AIR TEMPERATURE, SPACE TEMPERATURE AND THE TIME TO RAISE THE SPACE TEMPERATURE.
1. WARM-UP MODE:
   a. THE CONTROL VALVES SERVING FAN POWERED TERMINAL UNIT HEATING COILS OPEN UP TO SUPPLY HEAT.
   b. THE UNIT IS STARTED AND OPERATES IN THE OCCUPIED MODE AS DESCRIBED ABOVE WITH THE EXCEPTION THAT THE ECONOMIZER IS DISABLED AND THE OUTSIDE AIR DAMPER IS CLOSED. THE ECONOMIZER IS ENABLED WHEN OCCUPANCY TIME IS REACHED.
2. COOL-DOWN MODE:
   a. THE CHILLER SYSTEM IS STARTED IF NECESSARY TO PROVIDE MECHANICAL COOLING. IN COOL- DOWN MODE THE SUPPLY WATER TEMPERATURE SETPOINT IS A FIXED 45˚F.
   b. THE UNIT IS STARTED AND OPERATES IN THE OCCUPIED MODE AS DESCRIBED ABOVE.

B. ALARMS AND SAFETIES:
1. COMMUNICATION LOSS – IF COMMUNICATION TO THE VLC, OR SUPPLY OR RETURN FAN VFD IS LOST AN ALARM IS GENERATED BY THE BAS.
2. SUPPLY/RETURN FAN FAILURE – THE BAS MONITORS THE SUPPLY AND RETURN FAN VFD'S WITH A CURRENT SWITCH AND THE FAULT STATUS THROUGH BACNET MS/TP. IF A VFD FAILURE OF EITHER FAN IS DETECTED THE UNIT IS STOPPED AND AN ALARM IS GENERATED AT THE BAS. A MANUAL RESET IS REQUIRED TO RESTART THE UNIT.
3. SUPPLY DUCT STATIC PRESSURE ALARM:
   a. THE BAS MONITORS THE SUPPLY DUCT STATIC PRESSURE AT 2/3 THE LONGEST SUPPLY DUCT RUN.
   b. HIGH ALARM – IF THE SUPPLY DUCT STATIC PRESSURE IS 25% GREATER THAN SETPOINT FOR 2 MINUTES, AN ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE DUCT STATIC PRESSURE RETURNS TO NORMAL.
   c. LOW ALARM – IF THE SUPPLY DUCT STATIC PRESSURE IS 25% LESS THAN SETPOINT FOR 2 MINUTES, AN ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE DUCT STATIC PRESSURE RETURNS TO NORMAL.
4. FREEZE PROTECTION – THE UNIT IS PROVIDED WITH A MANUAL RESET LOW LIMIT THERMOSTAT DOWNSTREAM OF THE HEATING COIL. THE TRIP SETPOINT IS 38˚F AND IS LOCALLY ADJUSTABLE AT THE THERMOSTAT. WHEN THE LOW LIMIT THERMOSTAT TRIPS THE FOLLOWING OCCURS:
   a. AN ALARM IS GENERATED AT THE BAS.
   b. THE SUPPLY AND RETURN FANS ARE SHUTDOWN. THE THERMOSTAT IS HARDWIRED DIRECTLY TO THE VFD'S FOR SHUTDOWN.
   c. THE OUTSIDE AND EXHAUST AIR DAMPERS ARE CLOSED, AND THE RETURN AIR DAMPER IS OPEN.
   d. THE UNIT RETURNS TO NORMAL OPERATION WHEN THE LOW LIMIT THERMOSTAT IS RESET.
5. DUCT SMOKE DETECTORS – A DUCT SMOKE DETECTOR IS MOUNTED IN THE COMMON SUPPLY AIR DUCT. UPON DETECTION OF SMOKE THE FOLLOWING OCCURS:
   a. AN ALARM IN GENERATED AT THE BAS.
   b. THE SUPPLY AND RETURN FANS ARE SHUTDOWN. FAN SHUTDOWN IS HARDWIRED DIRECTLY TO THE VFD'S.
   c. THE COIL VALVE IS CLOSED; UNLESS OPEN FOR FREEZE PROTECTION.
   d. THE OUTSIDE AND RELIEF AIR DAMPERS ARE CLOSED, AND THE RETURN DAMPER IS OPEN.
   e. THE DUCT DETECTOR MUST BE RESET TO RESTART THE UNIT. THE UNIT WILL AUTOMATICALLY RETURN TO NORMAL OPERATION AFTER THE DUCT DETECTOR IS RESET.
6. FILTER STATUS:
   a. THE BAS MONITORS THE STATUS OF THE FILTER WITH AN AUTOMATIC RESET DIFFERENTIAL PRESSURE SWITCH ACROSS THE FILTER.
   b. AN ALARM IS GENERATED AT THE BAS WHEN THE FILTER SWITCH IS TRIPPED. THE ALARM AUTOMATICALLY RETURNS TO NORMAL WHEN THE FILTER SWITCH RESETS.
7. MIXED AIR TEMPERATURE:
   a. THE BAS MONITORS THE OUTSIDE/RETURN AIR MIXED TEMPERATURE WITH AN AVERAGING TEMPERATURE SENSOR.
   b. HIGH ALARM – IF THE SUPPLY FAN IS RUNNING, AND THE MIXED AIR TEMPERATURE EXCEEDS 90˚F FOR 2 MINUTES, AN ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE TEMPERATURE RETURNS TO NORMAL.
   c. LOW ALARM – IF THE SUPPLY FAN IS RUNNING, AND THE MIXED AIR TEMPERATURE DROPS BELOW 45˚F OR 2 MINUTES, AN ALARM IN GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE TEMPERATURE RETURNS TO NORMAL.
8. RETURN AIR TEMPERATURE:
   a. THE BAS MONITORS THE RETURN AIR TEMPERATURE AT THE COMMON RETURN AIR DUCT.
   b. HIGH ALARM – IF THE SUPPLY FAN IS RUNNING, AND THE RETURN AIR TEMPERATURE EXCEEDS 80˚F FOR 2 MINUTES, AN ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE TEMPERATURE RETURNS TO NORMAL.
   c. LOW ALARM – IF THE SUPPLY FAN IS RUNNING, AND THE RETURN AIR TEMPERATURE DROPS BELOW 65˚F FOR 2 MINUTES, AN ALARM IN GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE TEMPERATURE RETURNS TO NORMAL.
9. SUPPLY AIR TEMPERATURE:
   a. THE BAS MONITORS THE SUPPLY AIR TEMPERATURE AT THE COMMON SUPPLY AIR DUCT.
   b. HIGH ALARM – IF THE SUPPLY FAN IS RUNNING, AND THE SUPPLY AIR TEMPERATURE EXCEEDS 120˚F FOR 2 MINUTES, AN ALARM IS GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE TEMPERATURE RETURNS TO NORMAL.
   c. LOW ALARM – IF THE SUPPLY FAN IS RUNNING, AND THE SUPPLY AIR TEMPERATURE DROPS BELOW 50˚F FOR 2 MINUTES, AN ALARM IN GENERATED AT THE BAS. THE ALARM AUTOMATICALLY RESETS WHEN THE TEMPERATURE RETURNS TO NORMAL.



1 HV-8 CONTROL DIAGRAM
NOT TO SCALE



2 CHILLED WATER SYSTEM
NOT TO SCALE

GENERAL NOTES:

A. CONTROL DIAGRAMS AND SEQUENCES BASED ON AS-BUILT DRAWINGS FROM 2011 SET. CONTROLS CONTRACTOR TO CONFIRM ACCURACY AND EFFICACY OF DIAGRAMS AND SEQUENCES.

WINDSOR ENGINEERS
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Project No: **24052**

MMHS - Chiller Replacement
1602 Mark Morris Ct, Longview, WA 98632

Revisions:

PROJECT ISSUE:
CONSTRUCTION DOCUMENTS

ISSUE DATE:
11/01/2024

PROJECT MANAGER: SW
DRAWN BY: JS
CHECKED BY: JN

MECHANICAL SEQUENCE OF OPERATIONS

M602

Autodesk Docs://24052 Mark Morris HS/ME24 MMHS Chiller Replacement.rvt
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TECHNOLOGY DEVICE ROUGH-IN SCHEDULE

DEVICE	BACK BOX	MUD RING	CONDUIT	NOTES
TELECOM OUTLET	4"SQ, 2-1/8"D	1-GANG	1"	1
TV OUTLET	4"SQ, 2-1/8"D	1-GANG	1"	1
A/V OUTLET	4-11/16"SQ	2-GANG	1-1/4"	1,2
SECURITY DEVICE	4"SQ, 2-1/8"D	1-GANG	3/4"	1,2

*ALL ROUGH-INS ARE TYPICAL UNO ON PLANS

NOTES:
1. USE PLASTIC BUSHING AT CONDUIT TERMINATION IN ACCESSIBLE SPACE.
2. REFER TO ROUGH-IN DETAILS FOR MORE INFORMATION.
3. FOR DWELLING UNITS ONLY, PROVIDE CABLE RACEWAY TO ACCESSIBLE CEILING SPACE NOT REQUIRED.

TECHNOLOGY SYMBOLS LEGEND

- (XX) — TELECOMMUNICATIONS OUTLET, PROVIDE BACKBOX AND CONDUIT/PULL STRING TO ACCESSIBLE SPACE. (XX) = QUANTITY OF CABLES
- W — WIRELESS ACCESS POINT, PROVIDE BACKBOX AND CONDUIT/PULL STRING TO ACCESSIBLE SPACE.
- T — CABLE TV OUTLET, PROVIDE BACKBOX AND CONDUIT/PULL STRING TO ACCESSIBLE SPACE.
- AV — AUDIO/VISUAL OUTLET, PROVIDE BACKBOX AND CONDUIT/PULL STRING TO ACCESSIBLE SPACE.

SECURITY DEVICES SYMBOLS LEGEND

- CR — CARD READER, PROVIDE BACK BOX AND CONDUIT ROUGH-IN
- DC — DOOR CONTACT, PROVIDE CONDUIT ROUGH-IN
- ES — ELECTRIC STRIKE, PROVIDE CONDUIT ROUGH-IN
- MD — MOTION DETECTOR, PROVIDE BACK BOX AND CONDUIT TO ACCESSIBLE SPACE
- TE — TELEPHONE ENTRY SYSTEM, PROVIDE BACK BOX AND CONDUIT ROUGH-IN
- PUSH BUTTON / DOOR OPERATOR

FIRE ALARM DEVICES SYMBOLS LEGEND

- S — 120V DWELLING UNIT SMOKE DETECTOR
- S(C) — 120V DWELLING UNIT COMBINATION CARBON MONOXIDE/SMOKE DETECTOR
- M — 120V MAGNETIC DOOR HOLD

EQUIPMENT NAMING LEGEND

TYPICAL PANELBOARD CONVENTION

EXAMPLE: 4NM-1A-2

LINE-LINE VOLTAGE* (4)
- 4 = 480V
- 2 = 208V

POWER BRANCH (N)
- N = NORMAL
- S = STANDBY, LEGALLY REQ. SB
- E = LIFE SAFETY

BUILDING SYSTEM (M)
- R = RECEPTACLE LOADS
- L = LIGHTING SYSTEMS
- M = MECHANICAL SYSTEMS
- W = WATER SYSTEMS
- T = TELECOM SYSTEMS

LEVEL: P1, 1, 2... (1)

SECTOR INDICATOR (A)
- A = SECTOR A
- B = SECTOR B

 # IN SERIES** (2)

MAIN DIST. EQUIPMENT MAY OMIT BUILDING SYSTEM, LEVEL, SECTOR, ETC. FOR NAMING SIMPLIFICATION.

EXAMPLE: 4MDP-R

LINE-LINE VOLTAGE* (4)

EQUIPMENT (MDP)
- MDP = MAIN DIST. PANEL
- SDP = SUB DIST. PANEL
- X = XFMR
- SE = SERVICE ENTRANCE

SERVICE*** (R)
- R = RESIDENTIAL SERVICE
- H = HOUSE SERVICE
- EV = EV SERVICE

POWER BRANCH** (-)

NOTES:
* USED WHEN MULTIPLE L-L VOLTAGES ARE PRESENT.
** OMITTED AS NEEDED FOR SIMPLIFICATION.
*** USED ONLY ON MULTI-SERVICE PROJECTS

POWER DEVICE SYMBOLS LEGEND

COMMON DEVICES
- SIMPLEX RECEPTACLE
- DUPLEX RECEPTACLE
- QUADPLEX RECEPTACLE
- SPECIAL PURPOSE RECEPTACLE, VERIFY NEMA CONFIGURATION
- * INDICATES ABOVE COUNTER OR NON-STANDARD HEIGHT FOR ALL WALL DEVICES. REFER TO ARCHITECTUAL / INTERIOR ELEVATIONS FOR EXACT LOCATION, UNO.
- REMOTE GFCI DEVICE
- EQUIPMENT CONNECTION, SEE SCHEDULES
- MOTOR CONNECTION
- $ — POWER DEVICE SWITCH, SEE PLANS FOR ADDITIONAL INFORMATION.
- DISCONNECT SWITCH
- DISCONNECT: F = FUSED, B = BREAKER
- JUNCTION BOX
- JUNCTION BOX WITH POWER OR DATA WHIP, SEE PLANS
- LINE VOLTAGE THERMOSTAT

IN-CEILING DEVICES
- DUPLEX RECEPTACLE ON CEILING
- DOUBLE DUPLEX RECEPTACLE ON CEILING
- SPECIAL PURPOSE RECEPTACLE ON CEILING, VERIFY NEMA CONFIGURATION

IN-FLOOR DEVICES
- DUPLEX FLOOR RECEPTACLE — FB = FLOORBOX
- DUPLEX FLOOR RECEPTACLE — PT = POKE-THROUGH, FF = FURNITURE FEED
- COMBINATION FLOORBOX, REFER TO SCHEDULE FOR POWER, DATA, AND AV SCOPE
- FB1 — NUMBER INDICATES SCHEDULED ENCLOSURE TYPE. REFER TO SCHEDULE FOR ADDITIONAL INFO.

DEVICE TYPE / WIRING KEY

17 G * E — CIRCUIT NUMBER; DEVICE TYPE INDICATOR; ABOVE COUNTER / NON-STANDARD HEIGHT; SHADING INDICATES SWITCHING OR CONTROL, SEE PLANS; CIRCUITING INDICATOR, MAY BE REPLACED WITH CIRCUIT NUMBER CALLOUT IN FINAL CONSTRUCTION DOCUMENTS.

LETTER INDICATOR KEY

CIRCUITING:	DEVICE TYPE:
E = EMERGENCY	B = INTEGRAL USB
U = UPS	G = GFCI
S = STANDBY	W = WEATHER PROOF GFCI
C = CRITICAL	T = ISOLATED GND
D = DED. CKT	

GENERAL SYMBOLS

- 1 — KEYNOTE
- 1/A1 — REVISION TAG
- REVISION CLOUD
- X / XXX — DETAIL/PLAN CALLOUT
- N — NORTH ARROW
- MATCHLINE
- CONTINUATION SYMBOL

ELECTRICAL TAGS

- MECHANICAL EQUIPMENT TAG. EQUIP. SPECIFIED BY DIV 21, 22, OR 23.
- XX-XX — BUILDING EQUIPMENT TAG. EQUIP. NOT SPECIFIED BY DIV 21, 22, OR 23.
- UNIT XX / DP12-XX — DWELLING UNIT CALLOUT TAG W/ UNIT TYPE AND CIRCUIT NUMBER
- XXX — DWELLING UNIT CIRCUIT TAG

ONE-LINE SYMBOLS LEGEND

- CIRCUIT BREAKER
- BUS DUCT PLUG-IN CIRCUIT BREAKER
- FUSED SWITCH
- CURRENT TRANSFORMERS
- GROUND CONNECTION
- CONDUIT CONTINUATION
- CONDUIT CAP
- XXXX — FEEDER CALLOUT
- SPD — SURGE PROTECTIVE DEVICE
- AUTOMATIC TRANSFER SWITCH
- T — TRANSFORMER
- M — ELECTRICITY METER
- G — GENERATOR

LIGHTING SYMBOLS LEGEND

NOTE: SHADED LUMINAIRE INDICATES EMERGENCY POWER
- RECESSED DOWNLIGHT - ROUND/SQUARE
- SURFACE DOWNLIGHT - ROUND/SQUARE
- PENDANT OR FLUSH MOUNT LUMINAIRE
- LINEAR RECESSED LUMINAIRE
- LINEAR SURFACE LUMINAIRE
- LINEAR PENDANT LUMINAIRE
- LINEAR WALL LUMINAIRE
- LINEAR STRIP LUMINAIRE
- CONTINUOUS TAPE OR UNDERCABINET LUMINAIRE
- RECESSED HEAT LAMP
- RECESSED 2x2 LUMINAIRE
- RECESSED 2x4 LUMINAIRE
- SURFACE OR PENDANT 2x2 LUMINAIRE
- SURFACE OR PENDANT 2x4 LUMINAIRE
- WALL MOUNTED LUMINAIRE
- RECESSED STEP LIGHT
- GROUND MOUNT FLOOD
- POLE MOUNTED AREA LUMINAIRE
- BOLLARD OR POST TOP LUMINAIRE
- EMERGENCY BUGEYE
- EXIT SIGN, SHADING INDICATES FACES, ARROWS PER PLAN

TYPICAL LUMINAIRE LABELING
- R / A-12 / B — LUMINAIRE TYPE; PANEL & CIRCUIT; SWITCH INDICATOR

LIGHTING CONTROLS SYMBOLS LEGEND

NOTE: ANY COMBINATION OF LETTERS MAY APPLY TO A SWITCH FOR MULTIPLE FUNCTIONS.
- $ — SWITCH
- $S — STANDARD SWITCH W/ SWITCHING SUBSCRIPT
- $3 — 3-WAY SWITCH
- $4 — 4-WAY SWITCH
- $L — LOW VOLTAGE SWITCH
- $L# — LOW VOLTAGE SWITCH PER SCHEDULE
- $O — OCCUPANCY SENSOR SWITCH
- $K — KEYED SWITCH
- $D — DIMMER SWITCH
- $T — TIMER SWITCH
- OS — OCCUPANCY SENSOR CEILING MOUNT
- PC — PHOTOCELL CEILING MOUNT
- OS — OCCUPANCY SENSOR WALL MOUNT
- PC — PHOTOCELL WALL MOUNT

ABBREVIATIONS

A	AMPERES
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AFF	ABOVE FINISHED FLOOR
AIC	AMPERE INTERRUPTING CAPACITY
AL	ALUMINUM
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
A/V	AUDIO VISUAL
BKR	BREAKER
C	CONDUIT
CKT	CIRCUIT
CO	CONDUIT ONLY
CU	COPPER
CLG	CEILING
CT	CURRENT TRANSFORMER
DAS	DISTRIBUTED ANTENNA SYSTEM
DIA.	DIAMETER
(E)	EXISTING
EGC	EQUIPMENT GROUNDING CONDUCTOR
ERRCS	EMERGENCY RESPONDER RADIO COVERAGE
F	FUSE
FACP	FIRE ALARM CONTROL PANEL
FC	FOOT CANDLE
FLA	FULL LOAD AMPERES
FSD	FIRE SMOKE DAMPER
FTL	FEED-THRU LUGS
GEC	GROUNDING ELECTRODE CONDUCTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFPE	GROUND FAULT PROTECTION OF EQUIPMENT
HP	HORSEPOWER
IDF	INTERMEDIATE DISTRIBUTION FRAME
IG	ISOLATED GROUND
KCMIL	THOUSAND CIRCULAR MIL
KVA	KILOVOLT-AMP
KW	KILOWATT
LTG	LIGHTING
MCA	MINIMUM CIRCUIT AMPERES
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDF	MAIN DISTRIBUTION FRAME
MDP	MAIN DISTRIBUTION PANEL
MDU	MEDIA DISTRIBUTION UNIT
MIN	MINIMUM
MLO	MAIN LUG ONLY
MOCP	MAXIMUM OVERCURRENT PROTECTION
MTS	MANUAL TRANSFER SWITCH
(N)	NEW
NAC	NOTIFICATION APPLIANCE CIRCUIT
OC	ON CENTER
P	POLE
PH	PHASE
PNL	PANEL
PWR	POWER
(R)	RELOCATE
ROW	RIGHT-OF-WAY
S	SWITCH
SDP	SUB-DISTRIBUTION PANEL
SIM	SIMILAR
SPD	SURGE PROTECTIVE DEVICE
TR	TAMPER RESISTANT
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTABLE POWER SUPPLY
V	VOLTS
VA	VOLT-AMPERES
VFD	VARIABLE FREQUENCY DRIVE
W	WIRE
WP	WEATHERPROOF
(X)	DEMOLISH
XFMR	TRANSFORMER

TYPICAL DEVICE MOUNTING HEIGHTS

RECEPTACLES	+18" AFF
RECEPTACLES, ABOVE COUNTER MAX.	+6" ABOVE COUNTER, +46" AFF COORDINATE WITH CASEWORK
PHONE/DATA/CATV OUTLET	+18" AFF
SWITCHES	+46" AFF
THERMOSTATS	+46" AFF
CARD READERS	+46" AFF
PANELBOARDS	+72" TO TOP OR PER NEC 404.8
RESIDENTIAL PANEL	+48" TO HIGHEST OPERABLE CONTROL
CONTROL PANELS	+72" TO TOP

NOTES:
1. MEASUREMENTS ARE TYPICAL UNO ON PLANS
2. MEASUREMENTS ARE TO CENTER OF BOX UNO
3. COMPLY WITH ALL ADA ACCESSIBILITY GUIDELINES

EQUIPMENT SYMBOLS LEGEND

- UTILITY METER
- EQUIPMENT CABINET AS NOTED
- ELECTRIC WALL HEATER
- BRANCH PANEL RECESSED
- BRANCH PANEL SURFACE
- T — TRANSFORMER
- EQUIPMENT ENCLOSURE, SEE PLAN NOTES AND NAMING CONVENTIONS FOR DESCRIPTION

GENERAL PROJECT NOTES

1. COMPLETED INSTALLATION SHALL COMPLY WITH NEC AND ALL LOCAL LAWS, ORDINANCES, AND REGULATIONS.
2. PLANS ARE DIAGRAMMATIC IN NATURE TO COMMUNICATE SCOPE OF WORK AND GENERAL INTENT. CONTRACTOR SHALL PROVIDE ALL FITTINGS, BOXES, AND APPURTENANCES NECESSARY FOR A COMPLETE AND OPERABLE ELECTRICAL SYSTEM.
3. EQUIPMENT FOR OTHER DISCIPLINES MAY BE SHOWN FOR REFERENCE ONLY. REFER TO OTHER DISCIPLINES' DRAWINGS FOR MORE DETAIL REGARDING EQUIPMENT SPECIFICATIONS AND INFORMATION.
4. PLANS SHALL GOVERN IN MATTERS OF QUANTITY, SPECIFICATIONS SHALL GOVERN IN MATTERS OF QUALITY. IN CASE OF DISCREPANCY BETWEEN DRAWINGS AND SPECIFICATIONS, THE SPECIFICATIONS SHALL GOVERN. PLANS ARE TO BE TIED TO SPECIFICATIONS FOR A COMPLETE DESIGN PACKAGE.
5. ANYTHING MENTIONED IN THE SPECIFICATIONS AND NOT SHOWN ON THE DRAWINGS, OR SHOWN ON THE DRAWINGS AND NOT MENTIONED IN THE SPECIFICATIONS, SHALL BE OF LIKE EFFECT AS IF SHOWN OR MENTIONED IN BOTH.
6. WIRE SIZE AND QUANTITIES ARE NOT GENERALLY INDICATED ON PLANS. FOR A TYPICAL 20A/1P CIRCUIT BREAKER, PROVIDE (3) #12 CU CONDUCTORS (PHASE, NEUTRAL, GROUND). FOR A TYPICAL 20A/2P CIRCUIT BREAKER, PROVIDE (3) #12 CU CONDUCTORS (PHASE, PHASE, GROUND). FOR A TYPICAL 20A/3P CIRCUIT BREAKER, PROVIDE (4) #12 CU CONDUCTORS (THREE PHASES PLUS GROUND).
7. TO COMPENSATE FOR VOLTAGE DROP, ON 20A, 120V CIRCUITS: OVER 100 FEET, PROVIDE #10 AWG, OVER 150 FEET, PROVIDE #8 AWG. ON 20A, 277V CIRCUITS: OVER 250 FEET, PROVIDE #10 AWG.
8. CIRCUIT NUMBERS ARE GENERALLY INDICATED AS XX-##. WHERE (XX) INDICATES PANEL NAME AND (##.) INDICATES THE CIRCUIT NUMBER. IN SOME CASES THE PANEL MAY BE COMMON TO A LARGE AREA, AND THE CIRCUIT NUMBER ONLY MAY BE CALLED OUT ON THE PLANS.
9. MAINTAIN AT LEAST 12" SEPARATION BETWEEN POWER AND COMMUNICATIONS WIRING ROUTED PARALLEL. SMALLER SEPARATION MAY BE ALLOWED WHEN CROSSING.
10. PROVIDE FIRE STOPPING FOR ALL PENETRATIONS OF FIRE RATED ASSEMBLIES. FIRE PROOFING MUST BE EQUIVALENT OR HIGHER TO THAT OF THE PENETRATED ASSEMBLY.
11. MAINTAIN 24" SEPARATION BETWEEN DEVICES IN FIRE-RATED WALLS. PROVIDE FIRE-RATED BOXES OR "PUTTY PADS" AS REQUIRED TO MAINTAIN FIRE RATING.
12. ELECTRICAL EQUIPMENT IS DESIGNED BASED ON A SPECIFIC MANUFACTURER. VERIFY FINAL CLEARANCES AND SPACE REQUIREMENTS WITH EQUIPMENT SUBMITTALS. THE CONTRACTOR IS RESPONSIBLE FOR ANY REDESIGN OR RELOCATION OF EQUIPMENT IF APPROVED EQUIPMENT DOES NOT MATCH BASIS OF DESIGN.
13. PROVIDE 4" HIGH CONCRETE "HOUSEKEEPING PADS" FOR FREE STANDING AND FLOOR MOUNTED ELECTRICAL EQUIPMENT.
14. ALL CONDUIT ROUTING SHALL FOLLOW BUILDING LINES WHERE POSSIBLE. COORDINATE ROUTING WITH ARCHITECTURAL ELEMENTS. ALL ROUTING OF EXPOSED CONDUITS SHALL BE APPROVED BY THE ARCHITECT.
15. CONSULT STRUCTURAL ENGINEER OF RECORD FOR ALL STRUCTURAL PENETRATIONS.

* NOTE *
ALL OF GENERAL NOTES ON THIS SHEET ARE TO BE APPLIED TO ALL OTHER DRAWINGS IN THIS SET. THE SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY OR MAY NOT BE USED IN THIS SET OF DRAWINGS.

ELECTRICAL SHEET LIST

PERMIT SCOPE OF WORK

THE ELECTRICAL CONTRACTOR SHALL APPLY FOR A PERMIT WITH L&I. SUBMIT PLANS FOR REVIEW, PAY PLAN REVIEW FEES, AND COORDINATE WITH THE ENGINEER OF RECORD FOR ANY NECESSARY REVISIONS TO THE PERMIT DRAWINGS.

WINDSOR ENGINEERS
Ridgefield, WA
Duluth + Minneapolis, MN
WindsorEngineers.com
Project No: 24052

STATE OF WASHINGTON — 22013615 — REGISTERED PROFESSIONAL ENGINEER — 11/01/2024

MMHS - Chiller Replacement

1602 Mark Morris Ct, Longview, WA 98632

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ELECTRICAL
COVER SHEET

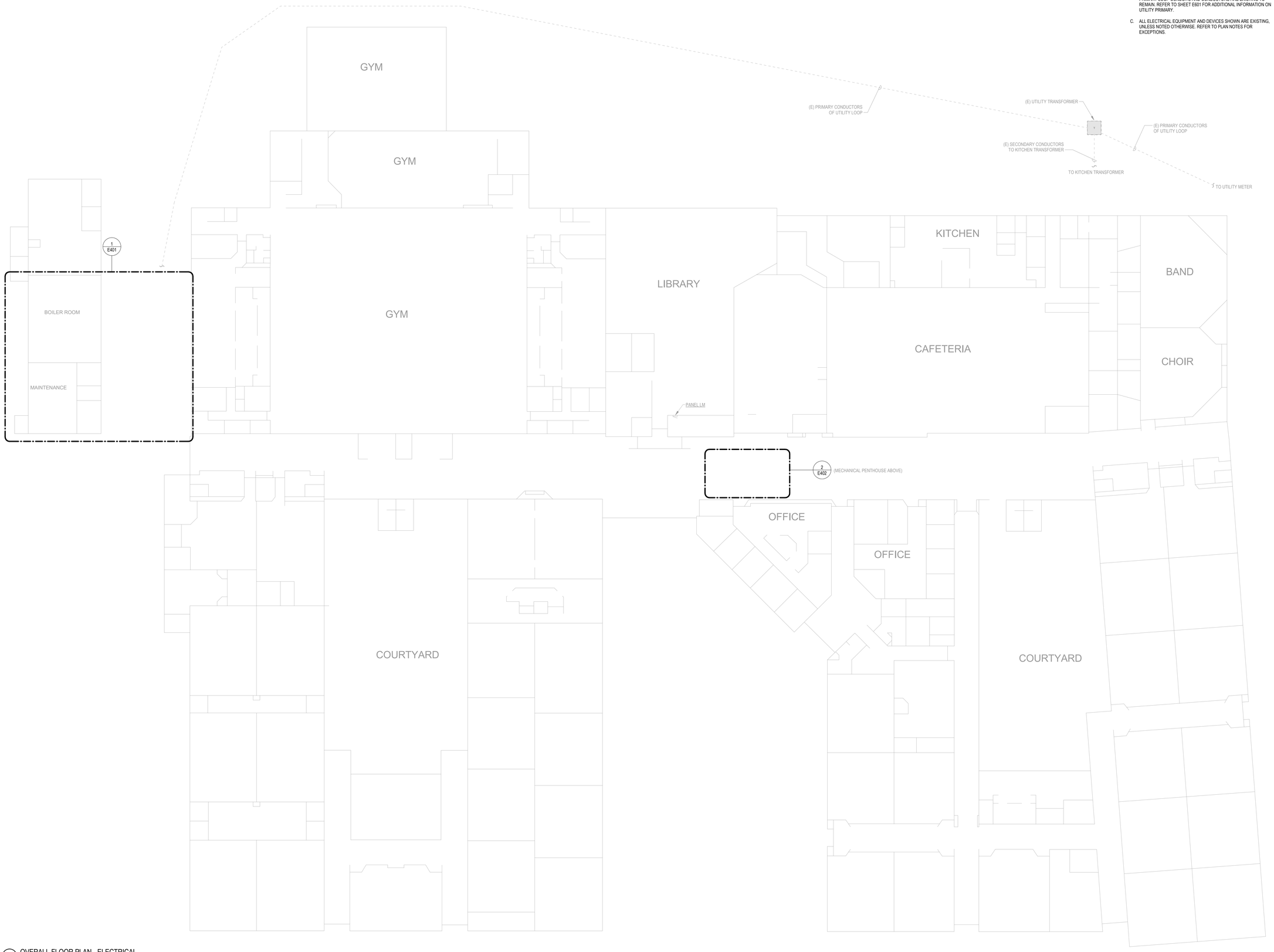
E001

GENERAL POWER NOTES:

A. DRAWINGS ARE DIAGRAMATIC TO CONVEY DESIGN INTENT AND SHALL NOT BE USED FOR EXACT DIMENSIONS, UNLESS DIMENSIONS ARE PROVIDED.

B. EXISTING UTILITY PRIMARY LOOP SHOWN FOR REFERNCE ONLY. PRIMARY LOOP CONDUITS AND CONDUCTORS ARE EXISTING TO REMAIN. REFER TO SHEET E601 FOR ADDITIONAL INFORMATION ON UTILITY PRIMARY.

C. ALL ELECTRICAL EQUIPMENT AND DEVICES SHOWN ARE EXISTING, UNLESS NOTED OTHERWISE. REFER TO PLAN NOTES FOR EXCEPTIONS.



1 OVERALL FLOOR PLAN - ELECTRICAL
SCALE: 1/16" = 1'-0"

N

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Project No: **24052**

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REGISTERED PROFESSIONAL ENGINEER
11/01/2024

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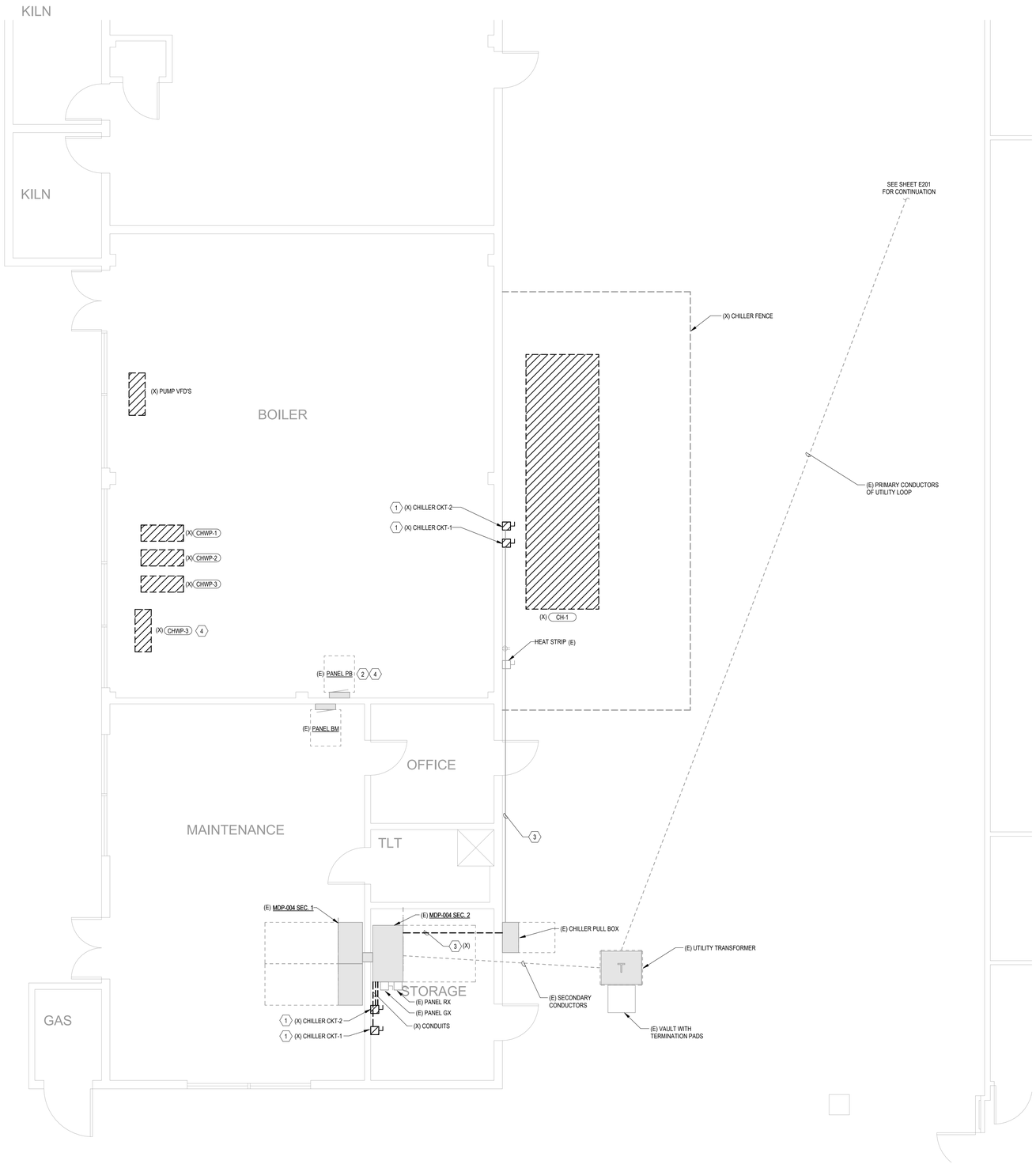
ELECTRICAL
SITE PLAN

E201



1 BOILER ENLARGED PLAN - POWER - DEMOLITION
SCALE: 1/4" = 1'-0"

GENERAL POWER NOTES

A. EQUIPMENT IS SHOWN FOR GENERAL DEMOLITION INTENT AND ARE BASED ON AS-BUILT DOCUMENTATION AND FIELD OBSERVATION. VERIFY ALL EXISTING FIELD CONDITIONS AND IMPACTS TO EXISTING TO REMAIN SYSTEMS PRIOR TO WORK.

B. DRAWINGS ARE DIAGRAMATIC TO CONVEY DESIGN INTENT AND SHALL NOT BE USED FOR EXACT DIMENSIONS, UNLESS DIMENSIONS ARE PROVIDED.

C. MECHANICAL EQUIPMENT IS PROVIDED BY OTHER DIVISIONS, AND IS SHOWN IN PLANS FOR DIVISION 26 REFERENCE. REFER TO MECHANICAL EQUIPMENT CONNECTION SCHEDULE FOR CONNECTION CHARACTERISTICS, INSTALLATION NOTES, AND DETAILS.

D. HALF-TONE LINEWORK SHOW EXISTING TO REMAIN ELEMENTS. DASHED LINEWORK SHOW DEMOLISHED ELEMENTS.

KEYNOTES:

1 DISCONNECT AND DEMOLISH EXISTING DISCONNECT. RETURN BACK TO OWNER.
2 DISCONNECT AND DEMOLISH CONDUCTORS AND CONDUIT TO EXISTING 40A 3P BREAKERS FOR EXISTING "PUMP VFD" 1,2 AND 3. BREAKERS TO BE TURNED OFF. PANEL SCHEDULE TO BE NOTED AS "SPARE" AT EACH BREAKER PLACEMENT.
3 EXISTING CONDUITS TO BE DEMOLISHED. DEMOLISH EXISTING FEEDER FEEDING EXISTING CHILLER. REFER TO SHEET E402 FOR NEW CONDUCTOR AND CONDUIT SCOPE.
4 DISCONNECT AND DEMOLISH CONDUCTORS AND CONDUIT TO EXISTING BREAKER FOR EXISTING AIR COMPRESSOR DRYER. BREAKER TO BE SWITCHED TO THE OFF POSITION. PANEL SCHEDULE TO BE NOTED AS "SPARE".

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ELECTRICAL
ENLARGED PLANS - DEMOLITION

E401

MECHANICAL AND PLUMBING EQUIPMENT CONNECTION SCHEDULE

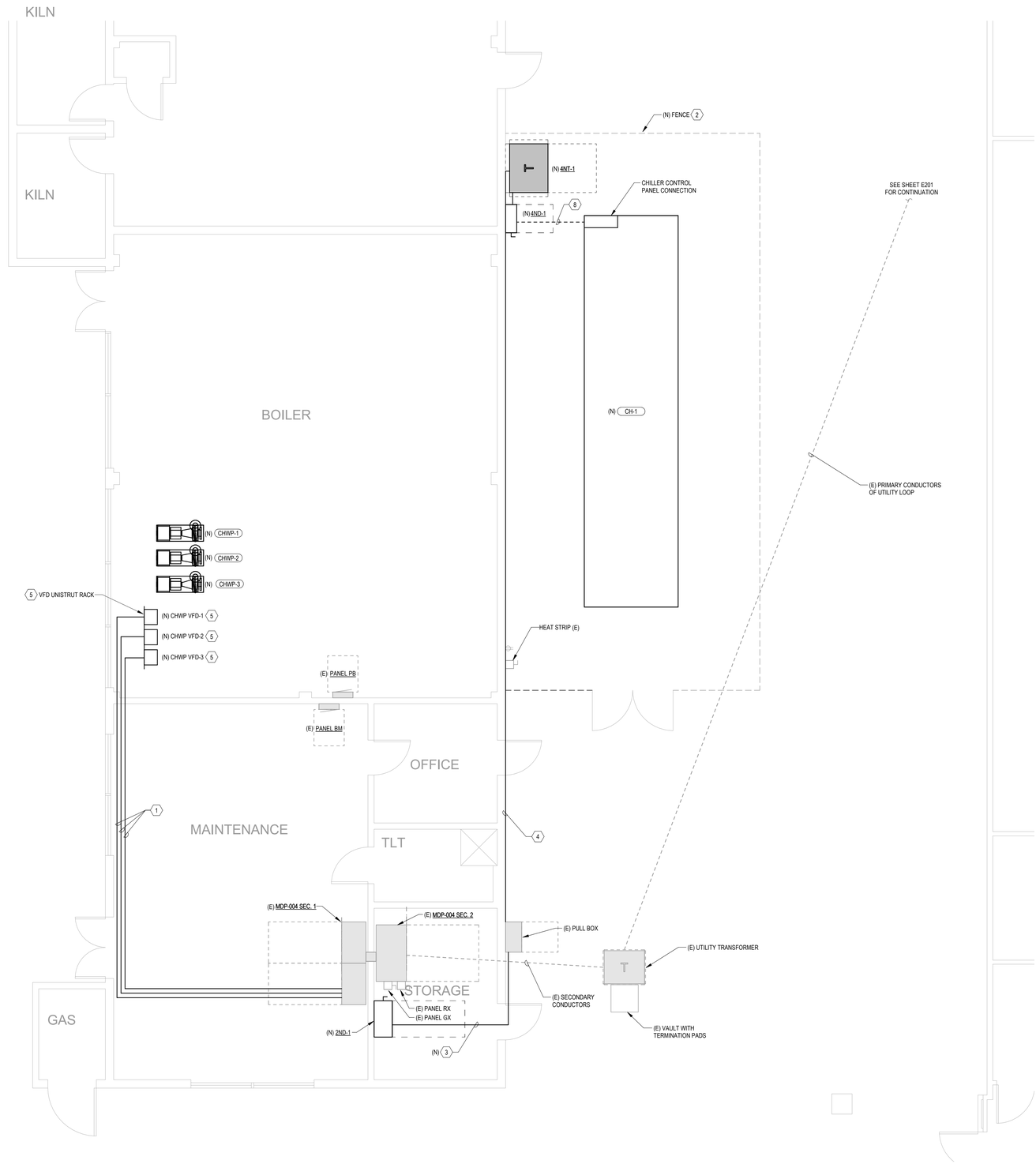
GENERAL MECHANICAL & PLUMBING EQUIPMENT SCHEDULE NOTES:

A. LOADS FOR EQUIPMENT LISTED ARE BASIS OF DESIGN LOADS ONLY. CONTRACTOR IS RESPONSIBLE FOR COORDINATING EXACT REQUIREMENTS WITH APPROVED SUBMITTALS FOR DIVISION 23.
B. PROVIDE DISCONNECTING MEANS IF REQUIRED PER NEC FOR ALL MECHANICAL EQUIPMENT (MAY NOT BE SHOWN ON PLANS). PROVIDE FUSED DISCONNECTS FOR MOTOR OVERLOAD PROTECTION PER NEC 430.32, UNLESS MOTOR HAS INTEGRAL OVERLOAD PROTECTION.
C. FEEDER REFERS TO FEEDER SCHEDULE ON DRAWING E601.

EQUIPMENT CONNECTION NOTES:

1. REFER TO ONELINE ON E601 FOR CIRCUITING INFORMATION.
2. MODIFY FEEDER WIRING AS NEEDED TO ACCOMMODATE NEW EQUIPMENT.
3. PROVIDE NEW FUSE SIZE AS SHOWN IN MOCP COLUMN FOR EXISTING LOCAL DISCONNECT. EXISTING BREAKER IN PANEL SERVING EQUIPMENT TO REMAIN.

TAG	EQ DESCRIPTION	LOCATION	LOAD TYPE	VOLTAGE	PHASE	LOAD (VA)	FLA	MCA	FEEDER	MOCP	DISC DIV	PANEL	NOTES
CH-1	CHILLER	LEVEL 1	M	480 V	3	304619 VA	366.4 A	458.0 A	5003	500 A	26	4NT-1	1
CHWP-1	CHILLED HOT WATER PUMP	BOILER ROOM	M	208 V	3	31703 VA	88.0 A	110.0 A	1253	125 A	26	MDP-004 SEC. 1	1
CHWP-2	CHILLED HOT WATER PUMP	BOILER ROOM	M	208 V	3	31703 VA	88.0 A	110.0 A	1253	125 A	26	MDP-004 SEC. 1	1
CHWP-3	CHILLED HOT WATER PUMP	BOILER ROOM	M	208 V	3	31703 VA	88.0 A	110.0 A	1253	125 A	26	MDP-004 SEC. 1	1
HV-8/SF-1	SUPPLY FAN	MECHANICAL ROOM #2	M	208 V	3	9072 VA	25.2 A	31.5 A	503	35 A	26	PANEL LM	2,3



1 BOILER ENLARGED PLAN - POWER - NEW
SCALE: 1/4" = 1'-0"

GENERAL POWER NOTES

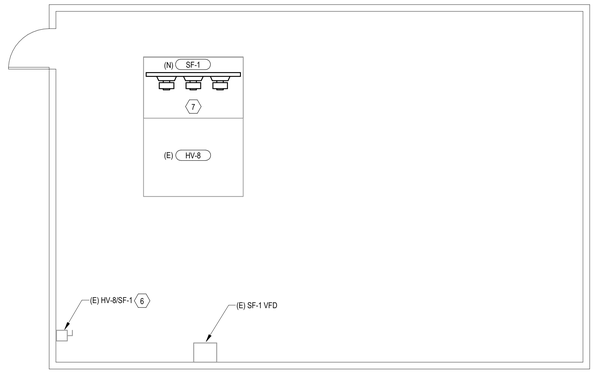
A. DRAWINGS ARE DIAGRAMATIC TO CONVEY DESIGN INTENT AND SHALL NOT BE USED FOR EXACT DIMENSIONS, UNLESS DIMENSIONS ARE PROVIDED.

B. MECHANICAL EQUIPMENT IS PROVIDED BY OTHER DIVISIONS, AND IS SHOWN IN PLANS FOR DIVISION 26 REFERENCE. REFER TO MECHANICAL EQUIPMENT CONNECTION SCHEDULE FOR CONNECTION CHARACTERISTICS, INSTALLATION NOTES, AND DETAILS.

C. HALF-TONE LINEWORK SHOW EXISTING TO REMAIN ELEMENTS. BOLD LINEWORK SHOW NEW ELEMENTS.

KEYNOTES:

1 ROUTE CONDUIT FOR EACH CHWP OVERHEAD. FOLLOW BUILDING LINES WHEREVER POSSIBLE.
2 NEW FENCING FOR CHILLER ENCLOSURE. FENCE PROVIDED BY OTHERS.
3 NEW CONDUITS TO BE ROUTED BETWEEN 2ND-1 AND EXISTING PULL BOX. ROUTE CONDUITS ALONG SIDEWALL TO MATCH EXISTING.
4 UTILIZED EXISTING CONDUITS TO ROUTE NEW FEEDER FROM EXISTING PULL BOX TO 4NT-1. PROVIDE ADDITIONAL CONDUITS AS NEEDED. REFER TO ONELINE ON SHEET E601 FOR CONDUCTOR AND CONDUIT SIZES AND QUANTITIES.
5 REPURPOSE EXISTING UNISTRUT RACK FOR CHWP VFD'S. VFD'S PROVIDED DIV 23 INSTALLED BY DIV 26.
6 EXISTING DISCONNECT TO REMAIN. EXISTING FUSES TO BE DEMOLISHED AND REPLACED WITH NEW 35A FUSES.
7 SF-1 IN HV-8 TO BE REPLACED. DISCONNECT POWER TO EXISTING EQUIPMENT, ALLOW MECHANICAL TO INSTALL NEW EQUIPMENT, RECONNECT POWER TO NEW EQUIPMENT. EXTEND/MODIFY WIRING AS NEEDED TO ACCOMMODATE NEW EQUIPMENT. REFER TO MECHANICAL AND PLUMBING CONNECTION SCHEDULE FOR SYSTEM CHARACTERISTICS. REFER TO MECHANICAL DRAWINGS FOR ADDITIONAL INFORMATION.
8 CONDUITS FROM 4ND-1 GOING TO CHILLER CONTROL PANEL TO BE RAN UNDERGROUND.



2 MECH ROOM 02 ENLARGED PLAN - POWER
SCALE: 1/4" = 1'-0"

WINDSOR ENGINEERS
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DEAN WANTZ — STATE OF WASHINGTON — 22013515 — REGISTERED PROFESSIONAL ENGINEER
11/01/2024

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ELECTRICAL
ENLARGED PLANS - NEW

E402

FEEDER SCHEDULE (CU & AL)

FEEDER AMPACITY	# OF SETS	PHASE AND NEUTRAL CONDUCTORS		GROUND		RACEWAY
		CONDUCTORS	MAT.	CONDUCTOR	MAT.	
20	1	#12	CU	#12	CU	3/4"
30	1	#10	CU	#10	CU	3/4"
40	1	#8	CU	#10	CU	3/4"
50	1	#6	CU	#10	CU	1"
60	1	#4	CU	#10	CU	1-1/4"
70	1	#4	CU	#8	CU	1-1/4"
80	1	#3	CU	#8	CU	1-1/4"
90	1	#2	CU	#8	CU	1-1/2"
100	1	#1	CU	#8	CU	1-1/2"
110	1	#1/0	AL	#6	CU	2"
125	1	#2/0	AL	#6	CU	2"
150	1	#3/0	AL	#6	CU	2"
175	1	#4/0	AL	#6	CU	3"
200	1	250 KCM	AL	#6	CU	3"
225	1	300 KCM	AL	#4	CU	3"
250	1	350 KCM	AL	#4	CU	3"
300	1	500 KCM	AL	#4	CU	4"
350	2	#4/0	AL	#3	CU	3"
400	2	250 KCM	AL	#3	CU	3"
450	2	300 KCM	AL	#2	CU	3"
500	2	350 KCM	AL	#2	CU	3"
600	2	500 KCM	AL	#1	CU	4"
800	3	400 KCM	AL	#1/0	CU	3"
1000	4	350 KCM	AL	#2/0	CU	3"
1200	4	500 KCM	AL	#3/0	CU	4"
1600	6	400 KCM	AL	#4/0	CU	4"
2000	8	350 KCM	AL	250 KCM	CU	4"
2500	10	350 KCM	AL	350 KCM	CU	4"
3000	10	500 KCM	AL	400 KCM	CU	4"
4000	12	600 KCM	AL	500 KCM	CU	4"

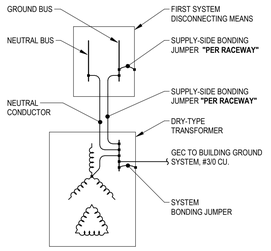
NOTE: PROVIDE GROUND CONDUCTOR WITH ALL FEEDERS EXCEPT SERVICE ENTRANCE CONDUCTORS.

FEEDER SCHEDULE KEY:

(YYY#X) YYY = FEEDER AMPACITY

= PROVIDE QUANTITY OF CURRENT CARRYING CONDUCTORS

"X" = REFER TO TRANSFORMER SCHEDULE FOR GEC AND BONDING.

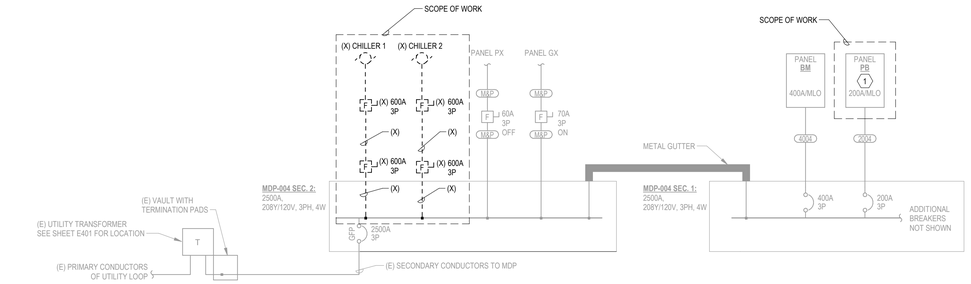


3 TRANSFORMER GROUNDING DIAGRAM
NOT TO SCALE

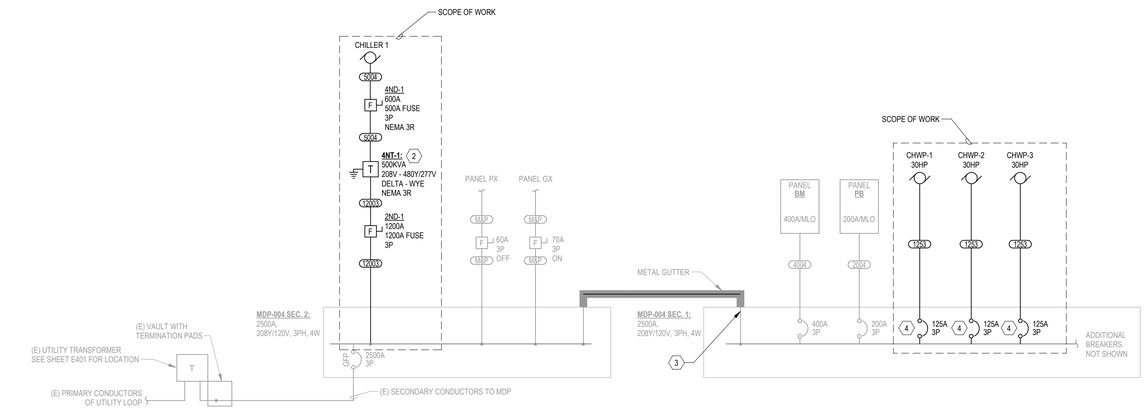
LOAD CALCULATION AT MDP (2500A RATED)

30-DAY METERING DEMAND HIGHEST AVERAGE	69.7	kVA
DEMAND @ 125% (NEC 220.87)	117.52*	kVA
ADDED MECHANICAL LOAD	445.1	kVA
NEW TOTAL PANEL LOAD	562.6	kVA
NEW TOTAL PANEL LOAD (A) @ 208V	1562	A

* THIS NUMBER ALSO FACTORS IN A SEASONAL CORRECTION FACTOR OF 1.35



2 ONE-LINE DIAGRAM - ELECTRICAL - DEMOLITION
SCALE: NOT TO SCALE



1 ONE-LINE DIAGRAM - ELECTRICAL - NEW
NOT TO SCALE

GENERAL SHEET NOTES

A. FOR ALL BREAKERS RATED 1200A OR HIGHER, PROVIDE ERMS SWITCH WITH LOCAL STATUS INDICATOR, OR OTHERWISE COMPLY WITH THE REQUIREMENTS OF NEC 240.87.
B. HALF-TONE LINEWORK SHOW EXISTING TO REMAIN ELEMENTS. DASHED LINEWORK SHOW DEMOLISHED ELEMENTS. BOLD LINEWORK SHOW NEW ELEMENTS.

KEYNOTES:

1 DISCONNECT AND DEMOLISH FEEDER TO EXISTING 40A 3P BREAKERS FOR EXISTING "PUMP VFD" 1,2 AND 3. BREAKERS TO BE TURNED OFF. PANEL SCHEDULE TO BE NOTED AS "SPARE" AT EACH BREAKER PLACEMENT.
2 TRANSFORMER PROVIDED BY DIV 26, INSTALLED BY DIV 26. BASIS OF DESIGN FOR TRANSFORMER IS SQUARE D. SHOULD THE CONTRACTOR SUBMIT A SUBSTITUTION WITH AN ALTERNATIVE TRANSFORMER, APPROVAL MUST BE OBTAINED FROM THE ENGINEER PRIOR TO INSTALLATION.
3 POINT WHERE CT WAS CONNECTED FOR 30-DAY METERING. REFER TO LOAD CALCULATION FOR ADDITIONAL INFORMATION.
4 NEW SPECIFIED BREAKERS FOR SQUARE D DISTRIBUTION BOARD ARE BASED ON SQUARE D QDA MCCB I-LINE TYPE BREAKERS AS THE BASIS OF DESIGN. SHOULD THE CONTRACTOR SUBMIT A SUBSTITUTION WITH AN ALTERNATIVE BREAKER, APPROVAL MUST BE OBTAINED FROM THE ENGINEER PRIOR TO INSTALLATION.

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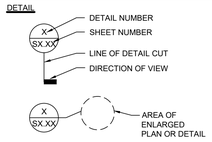
ELECTRICAL
ONE-LINE DIAGRAM

E601

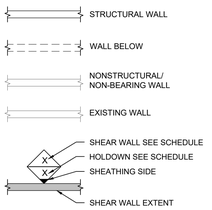
ABBREVIATIONS

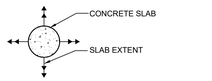
NO or #	NUMBER	2L	DOUBLE ANGLE
AB	ANCHOR BOLT	L	ANGLE
ADDL	ADDITIONAL	LB or LBS	POUND OR POUNDS
ADH	ADHESIVE	*ld*	DEVELOPMENT LENGTH
ADJ	ADJACENT	*ldb*	HOOK DEVELOPMENT LENGTH
AGGR	AGGREGATE	LFRS	LATERAL FORCE RESISTING SYSTEM
AHR	ANCHOR	LLH	LONG LEG HORIZONTAL
ALUM	ALUMINUM	LLV	LONG LEG VERTICAL
ALT	ALTERNATE	LOC	LOCATION
APPROX	APPROXIMATE	LONG	LONGITUDINAL
ARCH	ARCHITECTURAL	LPT	LOW POINT
AVG	AVERAGE	*ls*	LAP SPLICE LENGTH
AWG	AMERICAN WIRE GAUGE	LT	LIGHT
BTWN	BETWEEN	LVL	LAMINATED VENEER LUMBER
BF	BRACED FRAME	LSL	LAMINATED STRAND LUMBER
BLDG	BUILDING	LWC	LIGHT WEIGHT CONCRETE
BLKG	BLOCKING	MAX	MAXIMUM
BM or BMS	BEAM or BEAMS	MB	MACHINE BOLT
BN	BOUNDARY NAILING	MC	MISCELLANEOUS CHANNEL
BOT	BOTTOM	MECH	MECHANICAL
B/	BOTTOM OF	MEP	MECHANICAL, ELECTRICAL AND PLUMBING
BRG	BEARING	MEZZ	MEZZANINE
BS	BOTH SIDES	MF	MOMENT FRAME
C	CHANNEL	MFR	MANUFACTURER
CG	CENTER OF GRAVITY	MIN	MINIMUM
CGS	CENTER OF GRAVITY OF STRAND	MISC	MISCELLANEOUS
CIP	CAST-IN-PLACE	MTD	MOUNTED
CJ	CONSTRUCTION JOINT	MTL	METAL
CJP	COMPLETE JOINT PENETRATION	N	NORTH
CL	CENTERLINE	NF	NEAR FACE
CLG	CEILING	NIC	NOT IN CONTRACT
CLR	CLEAR	NOM	NOMINAL
CMU	CONCRETE MASONRY UNIT	NS	NEAR SIDE
COL or COLS	COLUMN OR COLUMNS	NTS	NOT TO SCALE
CONC	CONCRETE	NWC	NORMAL WEIGHT CONCRETE
CONN	CONNECTION	OC	ON CENTER
CONSTR	CONSTRUCTION	OD	OUTSIDE DIAMETER
CONT	CONTINUOUS	OPNG	OPENING
CLT	CROSS-LAMINATED TIMBER	OPP	OPPOSITE
CSK	COUNTERSINK	OSB	ORIENTED STRAND BOARD
CTR	CENTER	OWSJ	OPEN WEB STEEL JOIST
CVN	CHARPY V-NOTCH	PAF	POWDER ACTUATED FASTENER
d	PENNY (NAIL SIZE)	PC or PCS	PIECE OR PIECES
DBA	DEFORMED BAR ANCHOR	PEF	PANEL EDGE FASTENERS
DBL	DOUBLE	PERP	PERPENDICULAR
DBM	DROP BEAM	PJP	PARTIAL JOINT PENETRATION
DEG	DEGREE	PL	PLATE
DEMO	DEMOLITION	PLYWD	PLYWOOD
DET or DETS	DETAIL OR DETAILS	PMGT	PRE-MANUFACTURED GIRDER TRUSS
DF	DOUGLAS FIR-LARCH	PMT	PRE-MANUFACTURED TRUSS
DIA	DIAMETER	PR	PAIR
DIAG	DIAGONAL	PLF	POUNDS PER LINEAR FOOT
DIM or DIMS	DIMENSION or DIMENSIONS	PSF	POUNDS PER SQUARE FOOT
DIST	DISTANCE	PSI	POUNDS PER SQUARE INCH
DK or DKG	DECK or DECKING	PSL	PARALLEL STRAND LUMBER
DN	DOWN	PT	PRESERVATIVE TREATED or POST-TENSIONED
DO	DITTO	PVC	POLYVINYL CHLORIDE
DWL or DWLS	DOWEL or DOWELS	R	RADIUS
DWG or DWGS	DRAWING or DRAWINGS	REBAR	REINFORCING BAR
(E)	EXISTING	REF	REFERENCE
EA	EACH	REINF	REINFORCED or REINFORCING
EF	EACH FACE	REQD	REQUIRED
EJ	EXPANSION JOINT	REQS	REQUIREMENTS
EL	ELEVATION	RET	RETURN
EMBED	EMBEDMENT	REV	REVISE or REVISION
EN	EDGE NAILING	RO	ROUGH OPENING
EOR	ENGINEER OF RECORD	RSJ	ROLLED STEEL JOIST
EOS	EDGE OF SLAB	(S)	SIMPSON
EQ	EQUAL	SA	SEE ARCHITECTURAL DRAWINGS
EQUIP	EQUIPMENT	SCHED	SCHEDULE
ES	EACH SIDE	SECT	SECTION
EV	EVERY	SFRS	SEISMIC FORCE RESISTING SYSTEM
EW	EACH WAY	SHT	SHEET
EXP	EXPANSION	SHTHG	SHEATHING
EXT	EXTERIOR	SIM	SIMILAR
FBM	FLUSH BEAM	SL	SLOPE
FDN	FOUNDATION	SMF	STEEL MOMENT FRAME
FF	FAR FACE	SMS	SHEET METAL SCREW
FIN	FINISH	SOG	SLAB ON GRADE
FINF	FINISHED FACE	SPEC or SPECS	SPECIFICATION OR SPECIFICATIONS
FIN FLR	FINISH FLOOR	SQ	SQUARE
FINNOS	FOR INFORMATION NOT NOTED OR SHOWN	SS	STAINLESS STEEL
FLR or FLRS	FLOOR or FLOORS	STAG	STAGGERED
FN	FIELD NAILING	STD	STANDARD
FO	FACE OF	STIF	STIFFENER
FOC	FACE OF CONCRETE	STL	STEEL
FOS	FACE OF STUDS	STRUCT	STRUCTURAL
FP	FIREPROOFING	STS	SELF TAPPING SCREW
FRP	FIBER REINFORCED POLYMER	SUB	SUBSTITUTE
FRT	FIRE RETARDANT TREATED	SUSP	SUSPENDED
FS	FAR SIDE	SW	SHEAR WALL
FT	FOOT or FEET	T&B	TOP AND BOTTOM
FTG or FTGS	FOOTING or FOOTINGS	T&G	TONGUE AND GROOVE
GA	GAUGE	TEMP	TEMPORARY
GALV	GALVANIZED	THK	THICK
GLB	GLUED-LAMINATED BEAM	THD	THREAD or THREADED
GR	GRADE	THRU	THROUGH
GRND	GROUND	TJI	WOOD I-JOIST OR TRUSS JOIST
GSN	GENERAL STRUCTURAL NOTES	T/	TOP OF
GT	GIRDER TRUSS	TYP	TYPICAL
GYP BD	GYPSUM BOARD	UNO	UNLESS NOTED OTHERWISE
HDG	HOT-DIPPED GALVANIZED	URM	UN-REINFORCED MASONRY
HDR	HEADER	VERT	VERTICAL
HK or HKS	HOOK or HOOKS	VIF	VERIFY IN FIELD
HLDN	HOLDOWN	W or WF	WIDE FLANGE
HORIZ	HORIZONTAL	W/	WITH
HP	HIGH POINT	WHS	WELDED HEADED STUD
HSB	HIGH STRENGTH BOLTS	W/O	WITHOUT
HSS	HOLLOW STRUCTURAL SECTION	WP	WORK POINT
HT	HEIGHT	WT	WEIGHT or WIDE TEE
ID	INSIDE DIAMETER	XS	EXTRA STRONG
INFO	INFORMATION	XXS	DOUBLE EXTRA STRONG
INT	INTERIOR		
JST or JSTS	JOIST or JOISTS		
JT	JOINT		

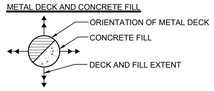
SYMBOLS

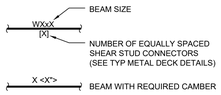
DETAIL


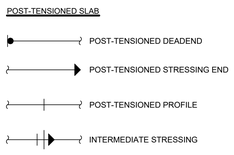
ELEVATION MARKER


WALLS


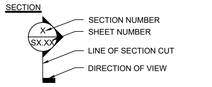
CONCRETE SLAB


METAL DECK AND CONCRETE FILL


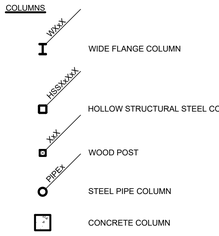
BEAMS


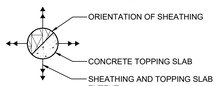
POST-TENSIONED SLAB


ELEVATION


SECTION


OPENING


COLUMNS


TOPPING SLAB OVER SHEATHING


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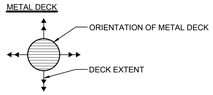
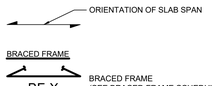
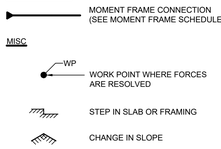


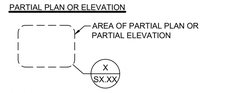
STRUCTURAL SLAB ORIENTATION


BRACED FRAME

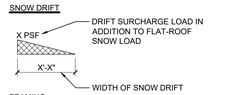

MOMENT FRAME


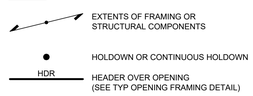
MISC

GRID LINES

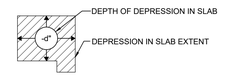

PARTIAL PLAN OR ELEVATION


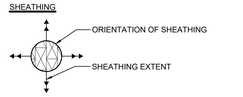
SHORING

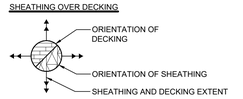

SNOW DRIFT


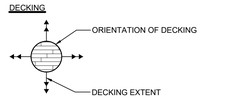
FRAMING


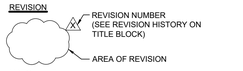
FOOTING

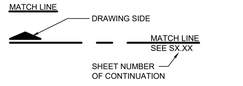

FLOOR DEPRESSIONS


SHEATHING


SHEATHING OVER DECKING


DECKING


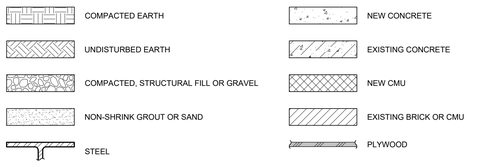
REVISION


MATCH LINE


ENTITY ABBREVIATIONS

ACI	AMERICAN CONCRETE INSTITUTE
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APA	AMERICAN PLYWOOD ASSOCIATION
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWPA	AMERICAN WOOD PROTECTION ASSOCIATION
AWPB	AMERICAN WOOD PRESERVERS BUREAU
AWS	AMERICAN WELDING SOCIETY
IAPMO	INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS
IBC	INTERNATIONAL BUILDING CODE
ICC	INTERNATIONAL CODE COUNCIL
MIA	MASONRY INSTITUTE OF AMERICA
PTI	POST-TENSIONING INSTITUTE

HATCHES



PLAN TO SCHEDULE ABBREVIATIONS

SX	SEE DIAPHRAGM SHEATHING SCHEDULE FOR REQUIREMENTS
JX	SEE JOIST SCHEDULE FOR REQUIREMENTS
BX	SEE BEAM SCHEDULE FOR REQUIREMENTS
CX	SEE COLUMN SCHEDULE FOR REQUIREMENTS
FX	SEE FOOTING SCHEDULE FOR REQUIREMENTS

SHEET INDEX

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DATE SIGNED: 10/30/2024

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Revisions:

PROJECT ISSUE:
CONSTRUCTION DOCUMENTS

ISSUE DATE:
11/01/2024

PROJECT MANAGER:
DRAWN BY: M.ORAW
CHECKED BY:

ABBREVIATIONS, SYMBOLS, HATCHES, AND SHEET INDEX

S000

GENERAL

1. MATERIALS AND WORKMANSHIP SHALL CONFORM TO REQUIREMENTS OF CONSTRUCTION DOCUMENTS, AND THE FOLLOWING:
   - 2021 INTERNATIONAL BUILDING CODE (IBC)
   - ASCE/SEI 7-16 ASCE MINIMUM DESIGN LOADS AND ASSOCIATED CRITERIA FOR BUILDINGS AND OTHER STRUCTURES (ASCE)

   REFERENCE TO CODES, RULES, REGULATIONS, STANDARDS, MANUFACTURER'S INSTRUCTIONS OR REQUIREMENTS OF REGULATORY AGENCIES IS TO LATEST PRINTED EDITION OF EACH IN EFFECT AT DATE OF CONSTRUCTION DOCUMENTS, UNLESS CODE REFERENCE DATE IS SPECIFICALLY SHOWN.
2. GENERAL NOTES SUPPLEMENT REQUIREMENTS OF PROJECT SPECIFICATIONS. IN CASE OF CONFLICT BETWEEN PLANS AND SPECIFICATIONS, CONTACT ENGINEER OF RECORD.
3. DRAWINGS INDICATE GENERAL AND TYPICAL DETAILS OF CONSTRUCTION. WHERE CONDITIONS ARE NOT SPECIFICALLY INDICATED, BUT ARE OF SIMILAR CHARACTER TO DETAILS SHOWN, USE SIMILAR DETAILS OF CONSTRUCTION, SUBJECT TO REVIEW BY ENGINEER OF RECORD.
4. INFORMATION SHOWN ON DRAWINGS RELATED TO EXISTING CONDITIONS REPRESENT PRESENT KNOWLEDGE WITHOUT GUARANTEE OF ACCURACY. REPORT CONDITIONS THAT CONFLICT WITH CONTRACT DOCUMENTS TO ENGINEER OF RECORD. DO NOT DEVIATE FROM CONSTRUCTION DOCUMENTS WITHOUT WRITTEN DIRECTION FROM ENGINEER OF RECORD.
5. DO NOT SCALE DRAWINGS. CONTRACTOR IS RESPONSIBLE FOR COORDINATING WORK OF ALL TRADES AND CHECKING DIMENSIONS. NOTIFY ENGINEER OF RECORD OF ANY DISCREPANCIES AND RESOLVE BEFORE PROCEEDING.
6. CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING A SAFE PLACE TO WORK AND MEETING REQUIREMENTS OF ALL APPLICABLE JURISDICTIONS. EXECUTE WORK TO ENSURE THE SAFETY OF PERSONS AND ADJACENT PROPERTY AGAINST DAMAGE BY FALLING DEBRIS AND OTHER HAZARDS IN CONNECTION WITH WORK. PROVIDE MEASURES NECESSARY TO PROTECT STRUCTURE DURING CONSTRUCTION. SUCH MEASURES INCLUDE, BUT MAY NOT BE LIMITED TO, BRACING AND SHORING FOR LOADS DURING CONSTRUCTION. ADEQUATELY BRACE STRUCTURE AND ALL STRUCTURAL COMPONENTS AGAINST WIND, EARTH, AND SEISMIC FORCES UNTIL THE PERMANENT LATERAL-FORCE RESISTING SYSTEMS HAVE BEEN INSTALLED. RETAIN A LICENSED CIVIL ENGINEER TO DESIGN BRACING, SHORING, ETC. SITE VISITS BY ENGINEER OF RECORD DO NOT INCLUDE OBSERVATION OF SHORING, PROTECTION, ETC. LISTED ABOVE.
7. APPLY, PLACE, ERECT, OR INSTALL ALL PRODUCTS AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS.
8. ELEMENTS SHOWN, BUT NOTED AS "BY OTHERS", ARE FOR COORDINATION PURPOSES ONLY AND HAVE NOT BEEN DESIGNED BY THE ENGINEER OF RECORD.

DESIGN CRITERIA

1. GRAVITY DESIGN DATA:

FLOOR LIVE LOAD (ASCE TABLE 4.3-1):	
LIGHT STORAGE	125 PSF
SNOW LOAD:	
GROUND SNOW LOAD, P_g:	20 PSF (ASCE 7.2)
FLAT-ROOF SNOW LOAD, P_f:	25 PSF (ASCE 7.3)
SNOW EXPOSURE FACTOR, C_e:	1.0 (ASCE TABLE 7.3-1)
IMPORTANCE FACTOR, I_s:	1.0 (ASCE TABLE 1.5-2)
THERMAL FACTOR, C_t:	1.0 (ASCE TABLE 7.3-2)
SLOPE FACTOR, C_s:	1.0 (ASCE 7.4 AND TABLE 7.4-1)

2. WIND DESIGN DATA:

BASIC DESIGN WIND SPEED, V:	97 MPH (IBC 1609.3.1)
ASD WIND SPEED, V_{asd} =V√0.6:	75 MPH (IBC EQUATION 16-33)
RISK CATEGORY:	II (ASCE TABLE 1.5-1)
WIND EXPOSURE:	SURFACE ROUGHNESS B (ASCE 26.7.2) (N/S AND E/W DIRECTIONS) EXPOSURE B (ASCE 26.7.3) (N/S AND E/W DIRECTIONS)
EXTERNAL PRESSURE COEFFICIENTS, GCr:	1.9 (ASCE TABLE 29.4-2)

3. EARTHQUAKE DESIGN DATA:

RISK CATEGORY:	II (ASCE TABLE 1.5-1)
SEISMIC IMPORTANCE FACTOR, I_e:	1.00 (ASCE TABLE 1.5-2)
MAPPED SPECTRAL RESPONSE ACCELERATION PARAMETERS, S_S/S_1:	0.900/0.436
SITE CLASS:	D – STIFF SOIL (ASCE 20.3 AND TABLE 20.3-1)
DESIGN SPECTRAL RESPONSE ACCELERATION PARAMETER, S_{DS}:	0.720
SEISMIC DESIGN CATEGORY:	D (ASCE 11.6)
RESPONSE MODIFICATION COEFFICIENT(S), R:	3.0 (N/S AND E/W DIRECTIONS) (ASCE TABLE 12.2-1)
ANALYSIS PROCEDURE USED:	SEISMIC DEMAND FOR NONSTRUCTURAL PROCEDURE (ASCE 13.3)

4. GEOTECHNICAL DESIGN DATA:

FOUNDATIONS:	
ALLOWABLE SOIL PRESSURE, D+SL	1,500 PSF (IBC TABLE 1806.2)
ALLOWABLE SOIL PRESSURE, D+L+E/1.4	2,000 PSF (IBC 1806.1/1605.3.2)
COEFFICIENT OF FRICTION	0.25 (IBC TABLE 1806.2)
LATERAL BEARING PRESSURE (PASSIVE SOIL RESISTANCE)	100 PSF/FT (IBC TABLE 1806.2)

5. SPECIAL LOAD DESIGN DATA:

EQUIPMENT:	SEE PLAN

DEFERRED SUBMITTAL DOCUMENTS

1. DEFERRED SUBMITTAL ITEMS PER SECTION 107.3.4.1 OF THE IBC SHALL BE SUBMITTED TO ENGINEER OF RECORD. ALL DEFERRED SUBMITTALS SHALL INCLUDE CALCULATIONS, ERECTION DRAWINGS, DETAILS, AND BE STAMPED BY A REGISTERED DESIGN PROFESSIONAL IN THE PROJECT STATE AND SHALL BE THEIR SOLE RESPONSIBILITY INCLUDING, BUT NOT LIMITED TO, DESIGN, COORDINATION, DIMENSIONS AND INTENDED PURPOSE. DEFERRED SUBMITTAL ITEMS SHALL INCLUDE A QUALITY ASSURANCE PLAN AS REQUIRED BY CHAPTER 17 OF THE IBC. REVIEW BY ENGINEER OF RECORD SHALL BE GENERAL CONFORMANCE TO DESIGN LOADING CRITERIA CONSTRUCTION ON DRAWINGS AND SPECIFICATIONS.
2. PRE-ENGINEERED STAIRS, CLADDING, AND OTHER NONSTRUCTURAL COMPONENTS DESIGNED BY OTHERS SHALL NOT INDUCE TORSIONAL FORCES. TORSIONAL BRACING SHALL BE DESIGNED BY COMPONENT ENGINEER AND INCLUDED IN DEFERRED SUBMITTAL FOR REVIEW BY ENGINEER OF RECORD.
3. DRAWINGS, SEALED BY A LICENSED STRUCTURAL ENGINEER IN THE SPECIFIED PROJECT STATE, SHALL BE SUBMITTED TO THE ENGINEER OF RECORD AND BUILDING OFFICIAL FOR REVIEW AND APPROVAL PRIOR TO FABRICATION OR CONSTRUCTION FOR:
   - A. FENCES AND GATE MEMBERS AND CONNECTIONS
   - B. FALL RESTRAINT APPARATUS AND STRUCTURE CONNECTION
   - C. LATERAL BRACING AND ANCHORAGE OF MECHANICAL AND ELECTRICAL EQUIPMENT

SUBMITTAL AND DEFERRED SUBMITTAL SCHEDULE

UNLESS SPECIFIED IN THE PROJECT SPECIFICATIONS, ARCHITECTURAL DRAWINGS, OR OWNER/CONTRACTOR CONTRACT, THE FOLLOWING SUBMITTAL SCHEDULE REQUIREMENTS SHALL BE USED FOR SUBMITTALS LISTED ON THE STRUCTURAL DRAWINGS. NOTIFY ENGINEER OF RECORD OTHER PROJECT DOCUMENTS DIFFER FROM FOLLOWING SUBMITTAL REQUIREMENTS AND WILL NOT BE USED TO DEVELOP SUBMITTAL SCHEDULE.

CONTRACTOR SHALL SUBMIT A SCHEDULE OF SUBMITTALS AT THE LATEST, FIVE (5) BUSINESS DAYS BEFORE 1ST SUBMITTAL IS DUE, ARRANGED IN CHRONOLOGICAL ORDER BY DATES REQUIRED BY CONSTRUCTION SCHEDULE. INCLUDE TIME REQUIRED FOR ENGINEERING REVIEW, ORDERING, MANUFACTURING, FABRICATION, LOCAL JURISDICTION REVIEW AND DELIVERY WHEN ESTABLISHING DATES. INCLUDE ADDITIONAL TIME REQUIRED FOR MAKING CORRECTIONS OR MODIFICATIONS TO SUBMITTALS NOTED BY THE ENGINEER OF RECORD AND ADDITIONAL TIME FOR HANDLING AND REVIEWING RESUBMITTALS REQUIRED BY THOSE CORRECTIONS.

TIME FOR REVIEW SHALL COMMENCE ON ENGINEER OF RECORD'S RECEIPT OF SUBMITTAL. NO EXTENSION TIME SHALL BE AUTHORIZED AS A RESULT OF CONTRACTORS FAILURE TO TRANSMIT SUBMITTALS FAR ENOUGH IN ADVANCE TO MEET THE CONSTRUCTION SCHEDULE. SUBMITTAL PROCESSING TIME SHALL ADHERE TO THE FOLLOWING:

1. INITIAL REVIEW SHALL ALLOW 10 BUSINESS DAYS FOR EACH SUBMITTAL. ALLOW ADDITIONAL TIME IF COORDINATION WITH SUBSEQUENT SUBMITTALS IS REQUIRED. ENGINEER OF RECORD WILL ADVISE CONTRACTOR WHEN A SUBMITTAL BEING PROCESSED MUST BE DELAYED FOR COORDINATION.
2. RESUBMITTAL REVIEW, IF NECESSARY, SHALL BE IN THE SAME MANNER AS INITIAL SUBMITTAL. ANY SUBMITTAL BEYOND ONE RESUBMITTAL MAY REQUIRE COORDINATION MEETING WITH THE PROJECT TEAM.
3. IF SIX (6) OR MORE SUBMITTALS IN ONE (1) DAY, OR TWENTY (20) OR MORE SUBMITTALS ARE ANTICIPATED IN ONE (1) WEEK, THE ENGINEER OF RECORD'S REVIEW TIME STATED ABOVE MAY BE EXTENDED AS NECESSARY TO PERFORM PROPER REVIEW. CONTRACTOR SHALL INDICATE THE PRIORITIZED SCHEDULE OF SUBMITTALS.

REINFORCING STEEL (CAST-IN-PLACE CONCRETE)

1. REFERENCE STANDARDS (CURRENTLY ADOPTED EDITIONS)
   - A. ACI 301 "STANDARD SPECIFICATIONS FOR STRUCTURAL CONCRETE", SECTION 3 "REINFORCEMENT AND REINFORCEMENT SUPPORTS".
   - B. ACI SP-66 "ACI DETAILING MANUAL" INCLUDING ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT".
   - C. CRSI MSP-1 "MANUAL OF STANDARD PRACTICE".
   - D. ANSI/AWS D1.4 "STRUCTURAL WELDING CODE - REINFORCING STEEL".
   - E. IBC CHAPTER 19, "CONCRETE".
   - F. ACI 318 AND ACI 318R. "BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE".
   - G. ACI 315 "DETAILS AND DETAILING OF CONCRETE REINFORCEMENT"
2. PROVIDE REINFORCING SHOWN OR NOTED IN CONTINUOUS LENGTHS AS LONG AS PRACTICABLE.
3. TERMINATE REINFORCING STEEL WITH STANDARD HOOKS, UNLESS NOTED OTHERWISE.
4. ACCURATELY POSITION, SUPPORT, AND SECURE REINFORCEMENT FROM DISPLACING DUE TO FORMWORK, CONSTRUCTION, OR CONCRETE PLACEMENT OPERATIONS. LOCATE AND SUPPORT REINFORCING WITH METAL CHAIRS, RUNNERS, BOLSTERS, SPACERS, AND HANGERS AT A MAXIMUM 3'-0" OC SPACING.
5. SPLAY REINFORCING AROUND OPENINGS AT A RATIO OF 1 SPLAY TO 6 LENGTH, UNLESS NOTED OTHERWISE.
6. REINFORCING SHALL CONFORM TO THE FOLLOWING:

LOCATION	TYPE
ALL LOCATIONS, UNLESS NOTED OTHERWISE	ASTM A615, 60 KSI
SMOOTH DOWELS	ASTM A36, 36 KSI
WELDED WIRE FABRIC	ASTM A185, 70 KSI
REINFORCING #8 AND LARGER, REINFORCING TO BE WELDED, SHEAR WALLS, MOMENT FRAMES, AND COLUMNS	ASTM A706, 60 KSI
SMOOTH STEEL WIRE FOR SPIRALS	ASTM A82, 70 KSI

7. LAP SPLICES SHALL CONFORM TO THE FOLLOWING:

LAP SPLICE LENGTHS FOR BARS IN WALLS, SLABS AND FOOTINGS (f'c= 3,000 PSI)								
BAR SIZE	0.75" COVER		1.50" COVER		2.00" COVER		3.00" COVER	
	TOP	OTHER	TOP	OTHER	TOP	OTHER	TOP	OTHER
#3	17"	13"	17"	13"	17"	13"	17"	13"
#4	28"	22"	23"	17"	23"	17"	23"	17"
#5	41"	32"	28"	22"	28"	22"	28"	22"
#6	56"	43"	34"	26"	34"	26"	34"	26"

8. CONCRETE FOOTINGS DESIGNED WITH COMPRESSIVE STRENGTH, f'c=2,500 PSI, THEREFORE NO SPECIAL INSPECTION REQUIRED. (IBC 1705.3)

CAST-IN-PLACE CONCRETE

1. REFERENCE STANDARDS (CURRENTLY ADOPTED EDITIONS)
   - A. ALL CONCRETE SHALL BE MIXED AND PLACED IN ACCORDANCE WITH ACI 318.
   - B. ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE".
   - C. IBC CHAPTER 19 "CONCRETE".
2. CONCRETE IS REINFORCED AND CAST-IN-PLACE, UNLESS NOTED OTHERWISE. WHERE REINFORCING IS NOT SPECIFICALLY SHOWN OR WHERE DETAILS ARE NOT GIVEN, PROVIDE REINFORCING SIMILAR TO THAT SHOWN FOR SIMILAR CONDITIONS, SUBJECT TO REVIEW BY THE OWNER'S REPRESENTATIVE AND ENGINEER OF RECORD. SUBSTITUTION OF SHOTCRETE FOR CAST-IN-PLACE CONCRETE IS NOT ACCEPTABLE.
3. WHERE CONCRETE IS CAST AGAINST EXISTING, INCLUDING CONSTRUCTION JOINTS, ROUGHEN CONTACT SURFACES TO ¼" AMPLITUDE WITH LIGHT SANDBLASTING OR OTHER MEANS AND CLEAN OF LAITANCE, FOREIGN MATTER, AND LOOSE PARTICLES. PREPARE AS SATURATED SURFACE DRY.
4. EMBEDDED ANCHORS, STRAPS AND OTHER HARDWARE SHALL BE FIRMLY SUPPORTED AND TIED SECURELY INTO PLACE PRIOR TO POURING OF CONCRETE. PLACEMENT MAY ONLY BE "WET SET" WITH CONTINUOUS SPECIAL INSPECTION AND VIBRATION TO ENSURE FULL CONTACT OF CONCRETE.
5. CONCRETE COVER SHALL CONFORM TO THE FOLLOWING:

CONCRETE EXPOSURE	MEMBER	REINFORCEMENT	SPECIFIED COVER
CAST AGAINST PERMANENTLY IN CONTACT WITH GROUND	ALL	ALL	3"
EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	ALL	#5 BAR, W31 OR D31 WIRE, AND SMALLER	1½"
		#6 THROUGH #18 BARS	2"
NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	SLAB, JOISTS, AND WALLS	#11 BAR AND SMALLER	¾"
		#14 THROUGH #18 BARS	1½"
	BEAMS, COLUMNS, PEDESTALS, AND TENSION TIES	REINFORCEMENT, STIRRUPS, TIES, SPIRALS, AND HOOPS	1½"
ALL	ALL	EMBEDDED BOLTS AND BETWEEN PARALLEL BARS	1"

6. CONCRETE MIX AND STRENGTH SHALL CONFORM TO THE FOLLOWING:

USE	28 DAYS STRENGTH (f'c)	MAX W/C RATIO NON-AIR ENTRAINED	MAX W/C RATIO AIR ENTRAINED	MIN CEMENT CONTENT
ALL USES, UNLESS NOTED OTHERWISE	3,000 PSI	0.55	0.46	470 LBS

CONCRETE MIX REQUIREMENTS:
   - A. ROUGH AGGREGATE SIZE FOR SLAB ON GRADE SHALL BE 1" MINUS FOR SLABS LESS THAN 5" THICK AND 1½" MINUS FOR SLABS 5" AND THICKER.
   - B. ADD SUPPLEMENTARY CEMENTITIOUS MATERIAL TO SLAB ON GRADE AND EXPOSED WALL CONCRETE MIXES. DO NO ADD SUPPLEMENTARY CEMENTITIUOS MATERIAL TO AIR ENTRAINED MIXES. PROVIDE BETWEEN 10 PERCENT AND 20 PERCENT REPLACEMENT OF THE TOTAL WEIGHT OF CEMENTITIOUS MATERIALS. INCLUDE THIS MATERIAL IN WATER CEMENT RATIO. SUPPLEMENTARY CEMENTITIOUS MATERIAL TO BE SLAG OR FLY ASH. SLAG TO MEET ASTM C989 GROUND GRANULATED BLAST-FURNACE SLAG ADDED PER ASTM C595. FLY ASH TO MEET ASTM C618 WITH LOSS ON IGNITION TO BE 3 PERCENT OR LESS. SUPPLEMENTARY CEMENTITIOUS MATERIAL MAY BE ADDED TO OTHER CONCRETE MIXES AND INCLUDED IN WATER CEMENT RATIO BUT IS NOT TO BE USED AS PERT OF THE MINIMUM CEMENT. SUPPLEMENTARY MATERIAL NOT TO EXCEED 20 PERCENT OF TOTAL WEIGHT OF CEMENTITIOUS MATERIALS UNLESS SPECIFICALLY APPROVED, AND SPECIAL TESTING IS PROVIDED BY CONTRACTOR TO CONSIDER LATE STRENGTH DEVELOPMENT AND FINISHING. SILICA FUME BY ASTM C1240.
   - C. DESIGN SLUMP SHALL BE A MINIMUM OF 3" AND MAXIMUM OF 9". FIELD VARIATION FROM SLUMP +½" TO -1". WHEN CONCRETE IS TO BE PUMPED ADD PLASTICIZERS AND PROVIDE A NEW MIX DESIGN TO INCREASE SLUMP TO A PUMPABLE MIX. DO NOT ADD WATER AT THE JOBSITE UNLESS AUTHORIZED BY CONCRETE SUPPLIER.
   - D. AIR ENTRAINMENT SHALL BE PER ACI AT ALL EXTERIOR SLABS AND FLAT WORK.
   - E. ADMIX SHALL BE WATER REDUCING ADMIX (POZZOLITH/POLYHEED/RHEOBUILD OR EQUAL).
   - F. ALL ADMIXTURES ARE TO BE FROM THE SAME MANUFACTURER UNLESS EVIDENCE IS SUBMITTED VERIFYING COMPATIBILITY OF MULTIPLE SOURCE ADMIXTURES.

7. SLAB-ON-GRADE CONSTRUCTION JOINTS:
   - A. CONTRACTOR TO PROVIDE CONSTRUCTION JOINTS AT 12'-0" OC MAXIMUM UNLESS NOTED OTHERWISE, SEE TYPICAL CONCRETE SLAB ON GRADE DETAIL FOR REQUIREMENTS. SUBMIT ALTERNATE JOINT LOCATIONS, OR JOINTS NOT SHOWN, TO ENGINEER OF RECORD FOR REVIEW AND APPROVAL PRIOR TO PROCEEDING.
   - B. BREAK BOND BETWEEN NEW AND PREVIOUSLY POURED SLAB BY SPRAYING OR PAINTING EXPOSED SIDE OF KEY WITH CURING COMPOUND OR FORM OIL.
   - C. LONG STRIP CONSTRUCTION METHOD SHALL BE USED FOR ALL SLAB-ON-GRADE, UNLESS APPROVED BY ENGINEER OF RECORD.
   - D. SUBGRADE SHALL BE FREE OF STANDING WATER AT TIME OF CONCRETE PLACEMENT.
8. SLAB-ON-GRADE CONTROL JOINTS:
   - A. MAKE SAW CUTS AS SOON AS SLAB CAN SUPPORT WEIGHT OF WORKERS AND EQUIPMENT WITHOUT DAMAGE TO SLAB FINISH, AND CUTS CAN BE MADE WITHOUT DAMAGE TO THE CONCRETE. MAKE TRIAL CUTS AS REQUIRED.
   - B. JOINTS TO BE THOROUGHLY CLEANED PRIOR TO FILLING. PROVIDE FILLER MATERIAL IN ACCORDANCE WITH SPECIFICATIONS AND APPLY STRICTLY IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
   - C. FILLER MATERIAL SHALL BE APPLIED WHEN SLAB IS UNDER PERMANENT TEMPERATURE CONTROL, SUCH AS AT THE COMPLETION OF THE BUILDING SHELL. WHENEVER POSSIBLE, IF PERMANENT TEMPERATURE CONTROL IS NOT ESTABLISHED, A MIN OF 90 DAYS AFTER COMPLETION OF SLAB CONSTRUCTION SHALL ELAPSE PRIOR TO APPLYING JOINT FILLER.

POST-INSTALLED ANCHORS

1. INSTALL POST-INSTALLED ANCHORS ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
2. PROVIDE SPECIAL INSPECTION ACCORDING TO REQUIRED SPECIAL INSPECTIONS AND TESTS SECTION AND TABLES.
3. PROVIDE STAINLESS STEEL ANCHOR FOR EXTERIOR USE OR WHEN EXPOSED TO WEATHER. PROVIDE GALVANIZED CARBON STEEL ANCHOR AT ALL OTHER LOCATIONS, UNLESS NOTED OTHERWISE.
4. LOCATE REINFORCEMENT AND CONFIRM FINAL ANCHOR LOCATIONS PRIOR TO FABRICATING PLATES, MEMBERS, OR OTHER STEEL ASSEMBLIES ATTACHED WITH POST-INSTALLED ANCHORS.
5. IF REINFORCEMENT IS ENCOUNTERED DURING DRILLING, ABANDON AND SHIFT HOLE LOCATION TO AVOID REINFORCEMENT. PROVIDE A MINIMUM OF 2 ANCHOR DIAMETERS OR 1", WHICHEVER IS LARGER, OF SOUND CONCRETE BETWEEN ANCHOR OR DOWEL AND THE ABANDONED HOLE. FILL ABANDONED HOLE WITH NON-SHRINK GROUT. IF ANCHOR OR DOWEL MAY NOT BE SHIFTED AS NOTED ABOVE, ENGINEER OF RECORD SHALL DETERMINE A NEW LOCATION.
6. REMOVE GREASE, OIL, RUST, AND OTHER LAITANCE FROM ANCHOR OR DOWELS PRIOR TO INSTALLATION.
7. INSTALL ANCHOR OR DOWELS NO SOONER THAN 21 DAYS AFTER CONCRETE PLACEMENT.
8. INSERT ANCHOR OR DOWEL IN HOLE WITH A TWISTING MOTION TO REQUIRED EMBEDMENT DEPTH. DO NOT PUMP ANCHOR OR DOWEL IN AND OUT OF HOLE.
9. WEDGE ANCHOR OR DOWEL TIGHT AND CENTERED IN HOLE UNTIL ADHESIVE SETS.

PRODUCT APPROVALS

1. FOR ITEMS IN CONSTRUCTION DOCUMENTS NOT NOTED WITH A SPECIFIC PRODUCT TYPE OR MANUFACTURER, THE CONTRACTOR SHALL PROVIDE THE PRODUCT SPECIFIED IN TABLE BELOW.
2. THE FOLLOWING PRODUCTS SHALL BE INSTALLED PER REQUIREMENTS OF REFERENCED PRODUCT APPROVALS BELOW, UNLESS NOTED OTHERWISE.
3. AT CONTRACTOR'S OPTION, PRODUCTS MAY BE SUBSTITUTED FOR LIKE PRODUCT PER SCHEDULE BELOW IF APPROVED BY THE ENGINEER OF RECORD.

ITEM	APPROVED PRODUCTS	ACCEPTED EVALUATION REPORT
EXPANSION ANCHOR TO CONCRETE	HILTI KWIK BOLT TZ2 SIMPSON STRONG-BOLT 2	ESR-4266 ESR-3037/ER-240
ADHESIVE ANCHOR TO CONCRETE	HILTI HIT-RE 500 V3 SIMPSON SET-3G EPOXY HILTI HIT-HY 200 ITW RED HEAD A7+ DEWALT AC200+ DEWALT AC100+ GOLD DEWALT PURE 110+	ESR-3814 ESR-4057 ESR-3187 ESR-3903 ESR-4027 ESR-2582 ESR-3298
SCREW ANCHOR TO CONCRETE	SIMPSON TITEN HD SCREW ANCHOR HILTI KH-EZ	ESR-2713 ESR-3027 ESR-3027

STRUCTURAL STEEL

1. REFERENCE STANDARDS (CURRENTLY ADOPTED EDITIONS)
   - A. AISC "MANUAL OF STEEL CONSTRUCTION - ALLOWABLE STRESS DESIGN".
   - B. AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDING AND BRIDGES".
   - C. RCSC "SPECIFICATION FOR STRUCTURAL JOINTS USING ASTM A325 OR A490 BOLTS".
   - D. AWS D1.1 "STRUCTURAL WELDING CODE - STEEL".
   - E. AWS D1.6 "STRUCTURAL WELDING CODE - STAINLESS STEEL".
2. STRUCTURAL STEEL TO CONFORM TO THE FOLLOWING, UNLESS NOTED OTHERWISE:

SECTIONS	TYPE
ROLLED SHAPES	
WIDE FLANGES	ASTM A992
CHANNELS, ANGLES, AND OTHER	ASTM A36
PLATES	
BASE PLATES	ASTM A36
GUSSET PLATES	ASTM A572 GRADE 50
BEAM SHEAR CONNECTION PLATES	ASTM A36
COLUMN CONTINUITY PLATES	ASTM A572 GRADE 50
BEAM STIFFENER PLATES	ASTM A36
DECK CLOSURE PLATES	ASTM A36
OTHER	ASTM A36
PIPE	ASTM A53 GRADE B
HOLLOW STRUCTURAL SECTION (HSS)	ASTM A500 GRADE B
STAINLESS STEEL SHAPES, PLATES AND BARS RODS, NUTS, WASHERS AND BOLTS	ASTM A276
CONNECTORS AND STUDS	
HIGH STRENGTH BOLTS	A325
MACHINE BOLTS (HEX HEAD)	ASTM A307
ANCHOR RODS	ASTM F1554 GRADE 36
THREADED AND HANGER ROD	ASTM A36
WELDED SHEAR CONNECTORS	ASTM A108 GRADE 1015 THROUGH 1020
WELDED THREADED STUDS	ASTM A108 GRADE 1015 THROUGH 1020
NUTS FOR BOLTS AND MACHINE BOLTS	ASTM A563 GRADE DH
HARDENED WASHERS	ASTM F436
UN-HARDENED WASHERS	ASTM F844
PLAIN WASHERS	ANSI B18.22.1
BEVELED WASHERS	ANSI B18.23.1

3. HOT DIP GALVANIZE IN ACCORDANCE WITH ASTM A123 AND ASTM A153, CLASS C, STRUCTURAL STEEL AND FASTENERS THAT ARE PERMANENTLY EXPOSED TO THE WEATHER. REPAIR GALVANIZING AFTER WELDING IN ACCORDANCE WITH ASTM A780 TO ACHIEVE ORIGINAL GALVANIZING THICKNESS.
4. STRUCTURAL STEEL AND CONNECTIONS EXPOSED TO VIEW IN COMPLETED STRUCTURES ARE TO BE DESIGNATED ARCHITECTURALLY EXPOSED STRUCTURAL STEEL (AESS).
5. PROVIDE NATURAL CAMBER UP, UNLESS NOTED OTHERWISE, EXCEPT AT CANTILEVERS. AT CANTILEVERS PROVIDE CAMBER SUCH THAT TIP OF CANTILEVER IS ABOVE FINAL ELEVATION.
6. SPLICE MEMBERS ONLY WHERE INDICATED.
7. CONNECT ALL MEMBERS WITH HIGH-STRENGTH BOLTS AND CONFORM TO THE FOLLOWING:
   - A. BEARING TYPE CONNECTIONS:
   - B. PROVIDE TYPE N BOLTS AT ALL LOCATIONS NOT NOTED ON DRAWINGS AS TYPE SC.
   - C. PROVIDE HARDENED WASHERS UNDER ELEMENTS TO BE TIGHTENED. PROVIDE NUTS & WASHERS IN ACCORDANCE W/ THE STRUCTURAL STEEL MEMBER TABLE.
   - D. TIGHTEN BOLTS TO A SNUG TIGHT CONDITION.
   - E. SLIP CRITICAL CONNECTIONS (TYPE SC):
   - F. PROVIDE LOAD-INDICATING BOLT ASSEMBLIES. INSTALL ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
   - G. IN LIEU OF LOAD-INDICATING BOLTS, PROVIDE STANDARD TYPE ASTM A325 SC BOLTS (CLASS A) WITH LOAD-INDICATING WASHERS. WASHERS TO CONFORM WITH ASTM F959.
   - H. FULLY TENSION TYPE SC BOLTS.
   - I. REMOVE ALL PAINT AT SLIP-CRITICAL BOLT CONTACT SURFACES AND PROVIDE CLASS A FAYING SURFACE.
   - J. DO NOT WELD HIGH-STRENGTH BOLTS.
8. ALL BOLT HOLES TO BE STANDARD SIZED HOLES, UNLESS NOTED OTHERWISE.
9. PROVIDE BEVELED WASHERS AT BOLT HEADS OR NUTS BEARING ON SLOPING SURFACES.
10. CONTRACTOR TO DESIGN AND PROVIDE ERECTION AIDS (BOLTS, CLIPS, SHIMS, SEATS, ETC) REQUIRED TO FACILITATE CONSTRUCTION.
11. APPLY BITUMINOUS ASPHALT COATING TO ALL BURIED STEEL ELEMENTS.

FOUNDATION AND SITE WORK

1. LOCATE BOTTOM OF FOOTINGS AT A MINIMUM OF 1'-6" BELOW FINISH GRADE AT EXTERIOR LOCATIONS AND 1'-0" BELOW FINISH GRADE AT INTERIOR LOCATIONS, UNLESS NOTED OTHERWISE.
2. REMOVE STANDING WATER AND DISTURBED SOIL FROM EXCAVATION PRIOR TO PLACEMENT OF CONCRETE.
3. MECHANICALLY COMPACT BACKFILLS TO 95 PERCENT OF MODIFIED PROCTOR IN LIFTS OF 8" IN MAXIMUM HEIGHT. PROVIDE COMPACTION IN ACCORDANCE WITH THE ASTM D698 TEST METHOD AND VERIFY ADEQUACY WITH RANDOM FIELD DENSITY TESTS. COMPACT STRUCTURAL FILL TO 90 PERCENT RELATIVE COMPACTION WITHIN 5'-0" OF RETAINING WALLS WITH LIGHTWEIGHT, HANDHELD EQUIPMENT AND EXERCISE CARE TO AVOID DAMAGE TO WALLS.
4. CONTRACTOR RESPONSIBLE FOR EXCAVATION INCLUDING LAGGING, SHORING, UNDERPINNING, AND PROTECTION OF EXISTING STRUCTURES. LOCATE AND PROTECT EXISTING UTILITIES. REMOVE ABANDONED FOOTINGS, UTILITIES, ETC. THAT INTERFERE WITH CONSTRUCTION. IF BURIED STRUCTURES ARE FOUND AND NOT INDICATED, NOTIFY ENGINEER OF RECORD.
5. SUBGRADE BELOW FOOTINGS AND SLAB SHALL BE 4" MIN CLEAN COMPACTED 3/4" MINUS GRAVEL PLACED ON UNDISTURBED SOIL, UNLESS NOTED OTHERWISE.

FORMWORK (CAST-IN-PLACE CONCRETE)

1. REFERENCE STANDARDS (CURRENTLY ADOPTED EDITIONS)
   - A. ACI 301 SECTION 2 "FORMWORK AND ACCESSORIES".
2. PROVIDE POUR POCKETS IN FORMS AND AROUND MEMBERS AS REQUIRED TO PREVENT AIR POCKETS OR HONEYCOMB.
3. PROVIDE CURING WHERE FORMS ARE REMOVED IN LESS THAN 7 DAYS INCLUDING, BUT NOT LIMITED TO WALLS, COLUMNS, AND ELEVATED STRUCTURAL SLABS.
4. REMOVE FORMS AND SHORES IN ACCORDANCE WITH THE FOLLOWING:

LOCATION	REMOVE FORMS NO SOONER THAN
FOOTINGS	48 HOURS

REQUIRED SPECIAL INSPECTIONS AND TESTS

1. PROVIDE SPECIAL INSPECTION, SPECIAL TESTING, REPORTING AND COMPLIANCE PROCEDURES ACCORDING TO CHAPTER 17 OF THE IBC.
2. SPECIAL INSPECTOR SHALL DEMONSTRATE COMPETENCE AND RELEVANT EXPERIENCE OR TRAINING QUALIFICATIONS TO THE SATISFACTION OF BUILDING OFFICIAL, FOR INSPECTION OF THE PARTICULAR TYPE OF CONSTRUCTION OR OPERATION IN QUESTION.
3. PRIOR TO BEGINNING OF CONSTRUCTION, REVIEW SPECIAL INSPECTION REQUIREMENTS WITH ARCHITECT, ENGINEER, BUILDING OFFICIAL, GENERAL CONTRACTOR, AND SPECIAL INSPECTOR.
4. DUTIES OF THE SPECIAL INSPECTOR INCLUDE, BUT ARE NOT LIMITED TO:
   - A. OBSERVE WORK FOR CONFORMANCE WITH APPROVED PERMIT DRAWINGS AND SPECIFICATIONS. BRING DISCREPANCIES TO IMMEDIATE ATTENTION OF GENERAL CONTRACTOR FOR CORRECTION, THEN, IF UNCORRECTED, TO THE ENGINEER OF RECORD AND BUILDING OFFICIAL.
   - B. FURNISH INSPECTION REPORTS FOR EACH INSPECTION TO ARCHITECT, ENGINEER, BUILDING OFFICIAL, AND GENERAL CONTRACTOR IN A TIMELY MANNER.
   - C. SUBMIT A FINAL REPORT STATING WHETHER WORK REQUIRING SPECIAL INSPECTION WAS INSPECTED AND WHETHER WORK IS IN CONFORMANCE WITH APPROVED PERMIT DRAWINGS AND SPECIFICATIONS.
5. DUTIES OF THE GENERAL CONTRACTOR INCLUDE, BUT ARE NOT LIMITED TO:
   - A. NOTIFY SPECIAL INSPECTOR THAT WORK IS READY FOR INSPECTION NO LESS THAN 24 HOURS PRIOR TO INSPECTION BEING REQUIRED.
   - B. MAINTAIN ACCESS AND EXPOSURE TO WORK REQUIRING SPECIAL INSPECTION UNTIL IT HAS BEEN OBSERVED AND INDICATED TO BE IN CONFORMANCE BY SPECIAL INSPECTOR AND APPROVED BY BUILDING OFFICIAL.
   - C. PROVIDE SPECIAL INSPECTOR ACCESS TO APPROVED PERMIT DRAWINGS AND SPECIFICATIONS AT JOB SITE.
   - D. MAINTAIN JOB SITE COPIES OF ALL REPORTS SUBMITTED BY SPECIAL INSPECTOR.
6. IF INITIAL TESTS OR INSPECTIONS REVEAL ANY PORTION OF WORK DOES NOT COMPLY WITH THE CONSTRUCTION DOCUMENTS, ADDITIONAL TESTS, INSPECTIONS, AND NECESSARY REPAIRS SHALL BE MADE AT THE CONTRACTORS EXPENSE.
7. SPECIAL INSPECTION FREQUENCY DEFINITIONS:
   - A. CONTINUOUS SPECIAL INSPECTION (C): SPECIAL INSPECTOR SHALL OBSERVE WORK REQUIRING SPECIAL INSPECTION AT ALL TIMES.
   - B. PERIODIC SPECIAL INSPECTION (P): SPECIAL INSPECTOR SHALL BE PRESENT IN AREA OF WORK INTERMITTENTLY AND AT COMPLETION AS REQUIRED TO CONFIRM WORK REQUIRING SPECIAL INSPECTION IS IN CONFORMANCE.

TABLE 2 — REQUIRED STRUCTURAL SPECIAL INSPECTIONS

SYSTEM or MATERIAL	INSPECTION				REMARKS
	FREQUENCY		CODE or STANDARD REFERENCE	IBC CODE REF	
	C	P			
POST INSTALLED ANCHORS					
INSPECTION OF ANCHORS INSTALLED IN HARDENED CONCRETE		X	ICC EVALUATION REPORT ACI 318: 3.8.6, 8.1.3, 21.1.8	1909.1 1705.1.1 TABLE 1705.3	SPECIAL INSPECTIONS APPLY TO ANCHOR PRODUCT NAME, TYPE, AND DIMENSIONS, HOLE DIMENSIONS, COMPLIANCE WITH DRILL BIT REQUIREMENTS, CLEANLINESS OF THE HOLE AND ANCHOR, ADHESIVE EXPIRATION DATE, ANCHOR/ADHESIVE INSTALLATION, ANCHOR EMBEDMENT, AND TIGHTENING TORQUE

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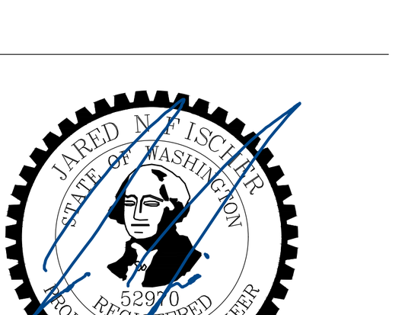

DATE SIGNED: 10/30/2024

MMHS - Chiller Replacement
1602 Mark Morris Ct, Longview, WA 98632

Revisions:

PROJECT ISSUE: **CONSTRUCTION DOCUMENTS**
ISSUE DATE: 11/01/2024
PROJECT MANAGER:
DRAWN BY: M-DRAW
CHECKED BY:

GENERAL STRUCTURAL NOTES AND SPECIAL INSPECTION TABLES

S001

1 OVERALL FLOOR PLAN - MECHANICAL
SCALE: 1/16"=1'-0"

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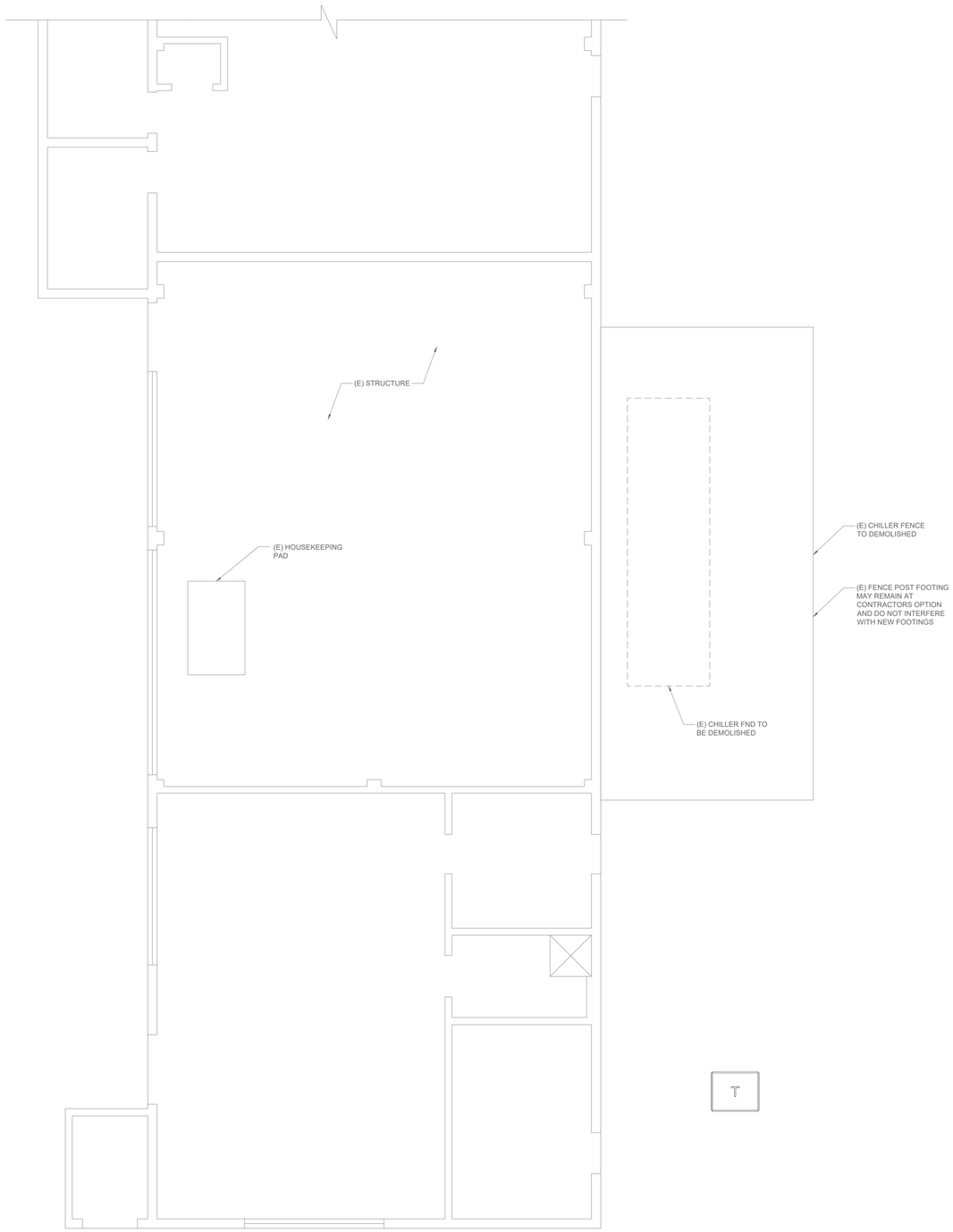
DRAWN BY: M-DRAW
CHECKED BY:

OVERALL FLOOR PLAN - MECHANICAL

S101

Autodesk Docs://24052 Mark Morris HS/MEP&I MMHS Chiller Replacement.rvt
10/1/2024 2:45:11 PM



1 DEMO STRUCTURAL PLAN
SCALE: 1/4"=1'-0"

STRUCTURAL PLAN NOTES:

1. REFER TO ARCHITECTURAL AND CIVIL DRAWINGS FOR ALL DIMENSIONS AND ALL ITEMS REQUIRED TO BE COORDINATED WITH THIS WORK, BUT NOT SHOWN ON THESE DRAWINGS.
2. LOCATE TOP OF FOOTINGS AT A MINIMUM OF 6" BELOW FINISH GRADE AT EXTERIOR LOCATIONS, UNO.
3. REFER TO S0 SHEETS FOR ABBREVIATIONS, SYMBOLS, HATCHES AND SHEET INDEX, GENERAL STRUCTURAL NOTES, AND SPECIAL INSPECTIONS AND TEST TABLES.

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DATE SIGNED: 10/30/2024

MMHS - Chiller Replacement

1602 Mark Morris Ct, Longview, WA 98632

Revisions:

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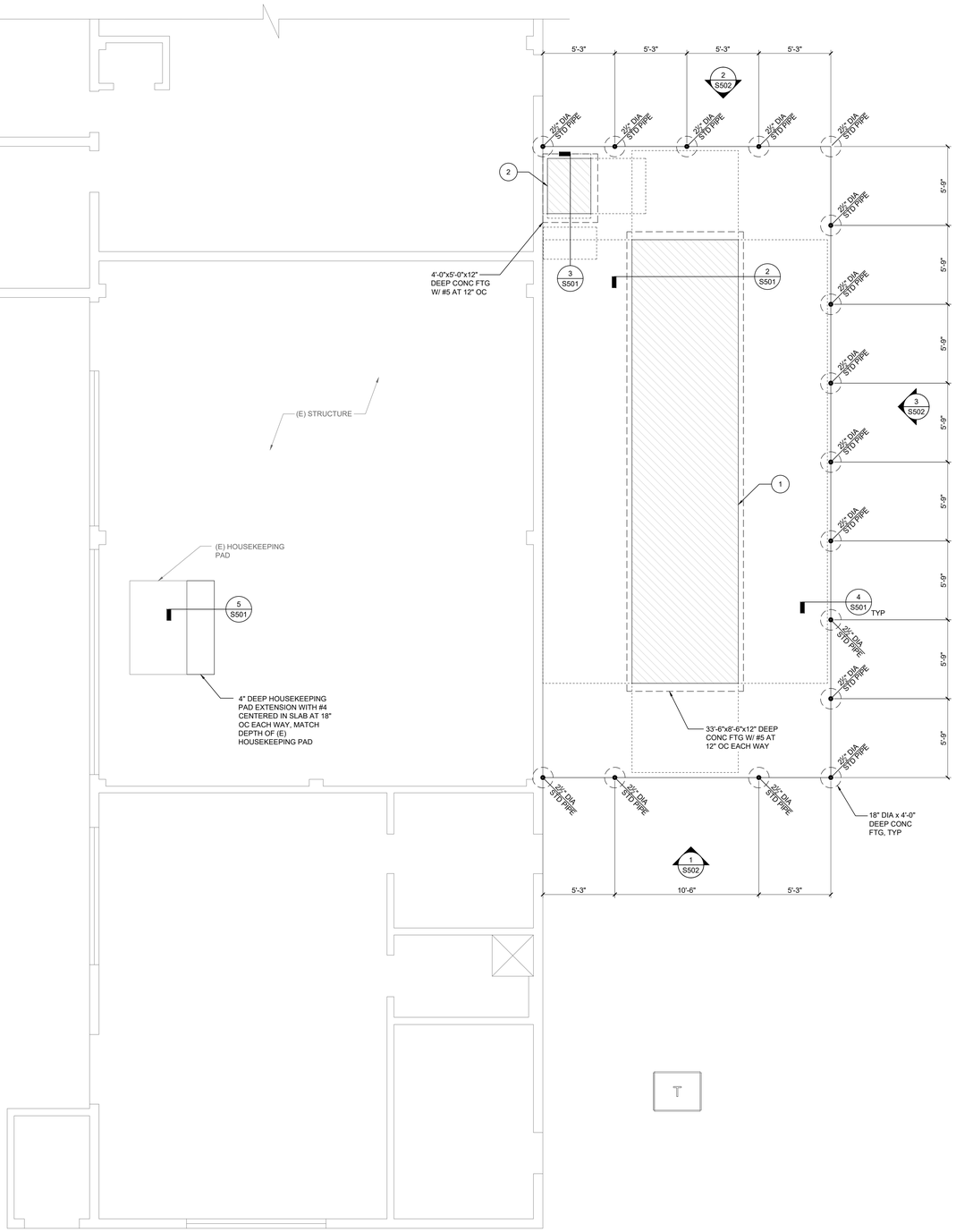
ISSUE DATE:
11/01/2024

PROJECT MANAGER:
DRAWN BY: M-DRAW
CHECKED BY:

DEMO STRUCTURAL PLAN

S400



1 BOILER ENLARGED STRUCTURAL FOUNDATION PLAN
SCALE: 1/4"=1'-0"

STRUCTURAL PLAN NOTES:

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2. LOCATE TOP OF FOOTINGS AT A MINIMUM OF 6" BELOW FINISH GRADE AT EXTERIOR LOCATIONS, UNO.
3. REFER TO S0 SHEETS FOR ABBREVIATIONS, SYMBOLS, HATCHES AND SHEET INDEX, GENERAL STRUCTURAL NOTES, AND SPECIAL INSPECTIONS AND TEST TABLES.

KEYED NOTES:

1. INDICATES NEW AIR-COOLER CHILLER (21615 LBS), SEE MEP AND CIVIL FOR ADDITIONAL INFORMATION.
2. INDICATES NEW TRANSFORMER (2750 LBS), SEE MEP AND CIVIL FOR ADDITIONAL INFORMATION.

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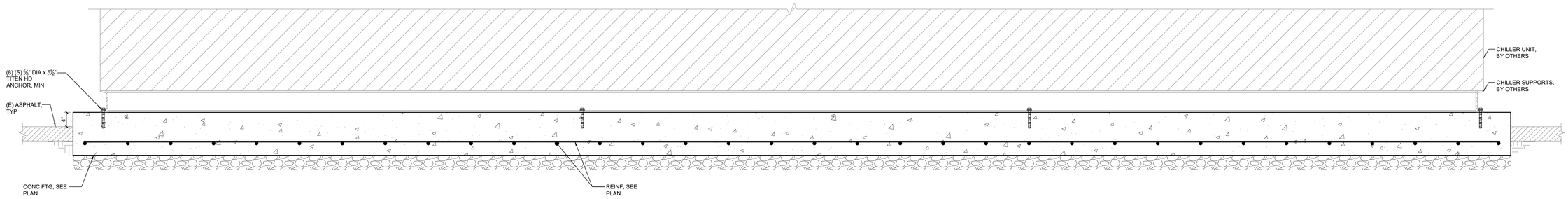
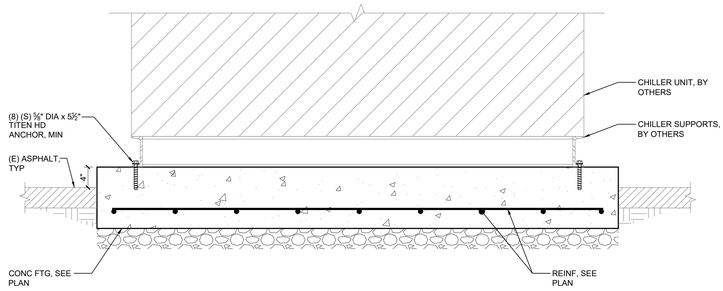
BOILER ENLARGED STRUCTURAL FOUNDATION PLAN

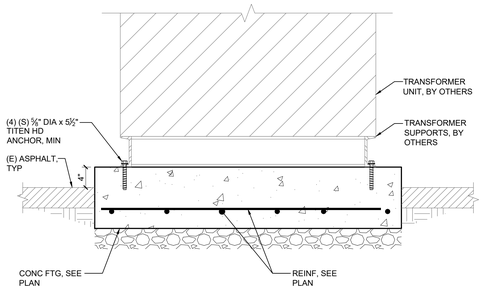
S401



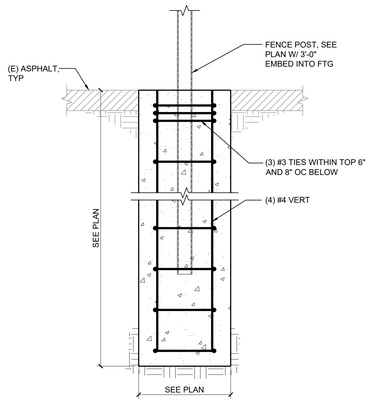
1 CHILLER UNIT FTG (LONGITUDINAL)
SCALE: 1"=1'-0"



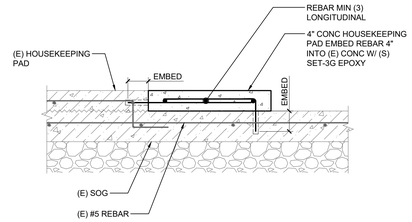
2 CHILLER UNIT FTG (LATITUDINAL)
SCALE: 1"=1'-0"



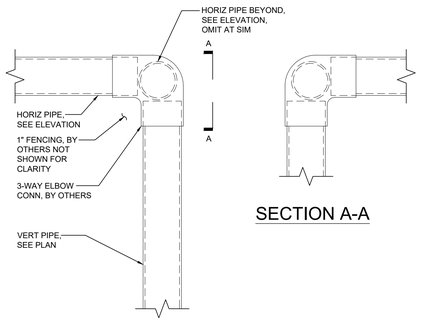
3 TRANSFORMER UNIT FTG
SCALE: 1"=1'-0"



4 FENCE POST FTG
SCALE: 1"=1'-0"

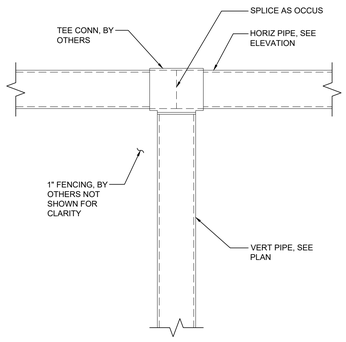


5 EXTENDED HOUSEKEEPING PAD
SCALE: 1"=1'-0"



NOTE:
FENCE AND GATE SPECIFIC MEMBERS AND CONNECTION BY OTHERS.

6 3-WAY ELBOW PIPE CONNECTION
SCALE: 3"=1'-0"



NOTE:
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7 TEE PIPE CONNECTION
SCALE: 3"=1'-0"

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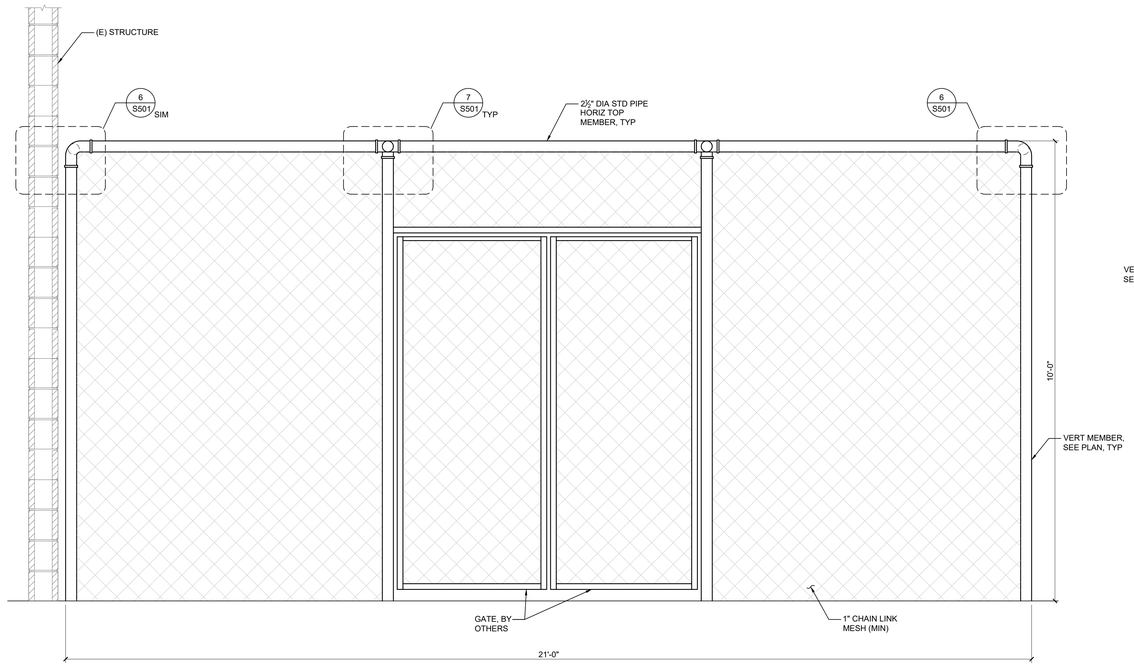
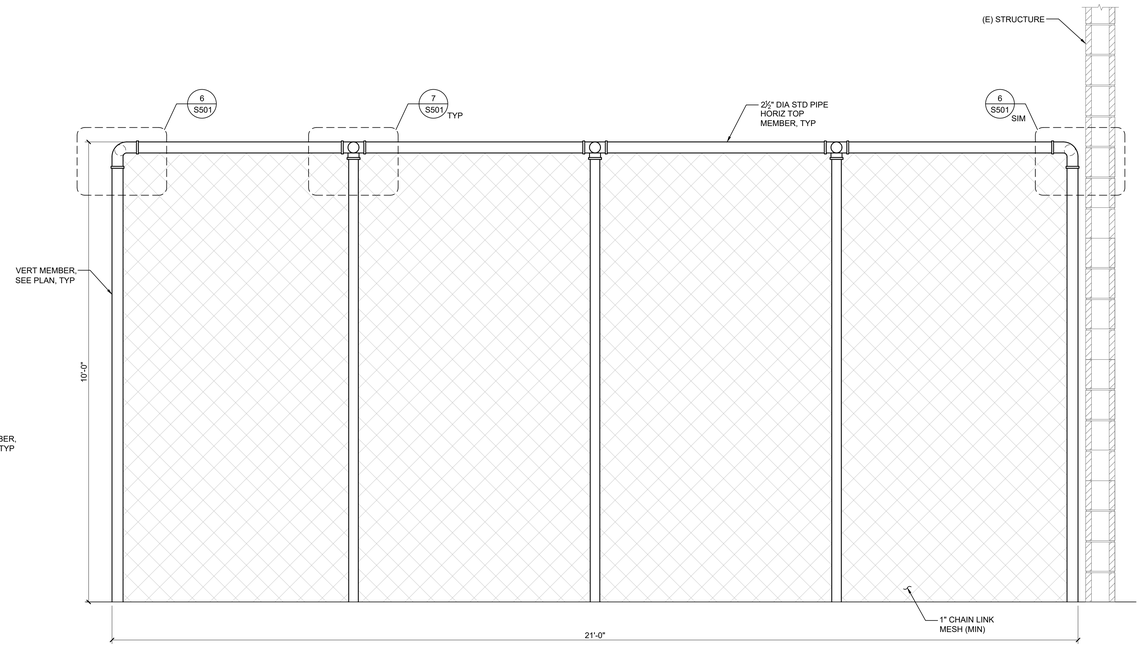
DETAILS

S501



NOTE:
FENCE AND GATE SPECIFIC MEMBERS AND CONNECTION BY OTHERS.

1 PLAN SOUTH (LOOKING NORTH)
SCALE: 3/4"=1'-0"



NOTE:
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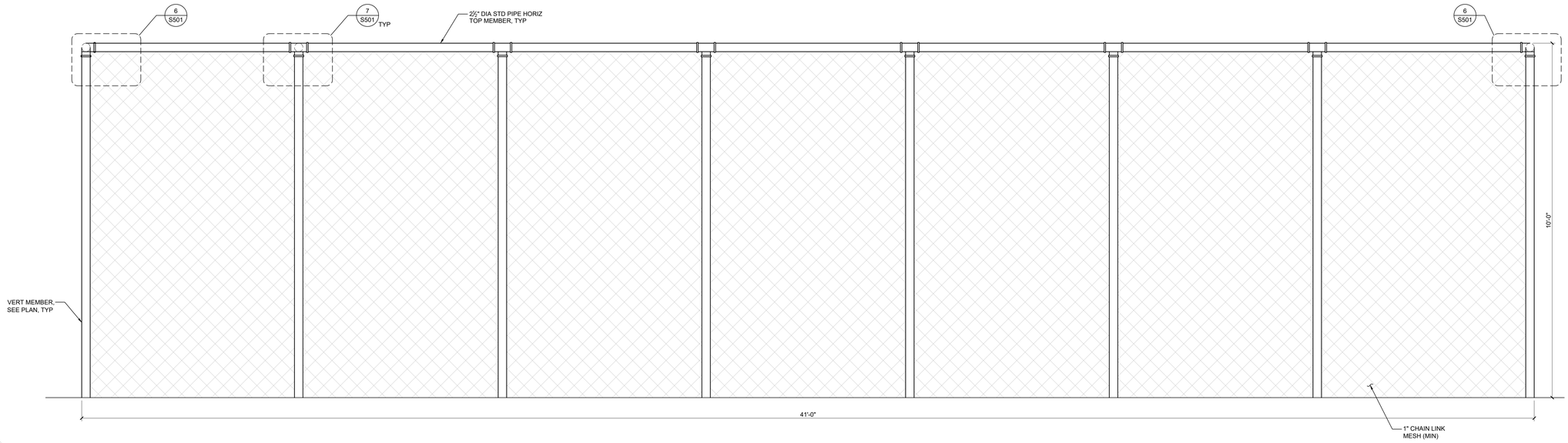
2 PLAN NORTH (LOOKING SOUTH)
SCALE: 3/4"=1'-0"



NOTE:
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3 PLAN EAST (LOOKING WEST)
SCALE: 3/4"=1'-0"

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ELEVATIONS

S502