MECHANICAL/PLUMBING SYMBOL LIST

NOTE: THIS IS A MASTER SCHEDULE. NOT ALL SYMBOLS CONTAINED HEREIN MAY APPEAR ON THE DRAWINGS.

- ITEM TO BE REMOVED
- POINT OF CONNECTION/DISCONNECTION
- SHEET NOTE
- REVISION NUMBER
- EQUIPMENT MARK (TAG / UNIT)
- DIFFUSER TAG (TAG / CFM)
- ACCESS PANEL
- SUPPLY AIR DUCT UP/DOWN
- RETURN AIR DUCT UP/DOWN
- EXHAUST AIR DUCT UP/DOWN
- RETURN GRILLE
- EXHAUST GRILLE
- 4-WAY BLOW SUPPLY DIFFUSER
- 3-WAY BLOW SUPPLY DIFFUSER
- 2-WAY BLOW SUPPLY DIFFUSER
- 1-WAY BLOW SUPPLY DIFFUSER
- AIRFLOW DIRECTION
- ROUND DUCTWORK
- RECTANGULAR DUCTWORK
- ROUND FLEXIBLE DUCT
- SQUARE TO ROUND TRANSITION
- SINGLE LINE RIGID DUCT
- SINGLE LINE RIGID DUCT (ACOUSTICALLY LINED)
- DOUBLE LINE RIGID DUCT
- DOUBLE LINE RIGID DUCT (ACOUSTICALLY LINED)
- EXISTING DUCTWORK
- FIRE DAMPER
- SMOKE DAMPER
- FIRE/SMOKE DAMPER
- MOTORIZED DAMPER (OPPOSED BLADE TYPE)
- MOTORIZED DAMPER (PARALLEL BLADE TYPE)
- BACKDRAFT DAMPER
- MANUAL VOLUME DAMPER
- REMOTE VOLUME DAMPER
- SMOKE DETECTOR
- THERMOSTAT
- HUMIDISTAT
- SENSOR
- CARBON DIOXIDE SENSOR
- CARBON MONOXIDE SENSOR
- DOOR UNDERCUT
- CLEAN OUT
- WALL CLEAN OUT
- FLOOR CLEAN OUT
- GRADE CLEAN OUT
- FLOOR DRAIN
- FLOOR SINK
- FLOOR SINK W/ GRATE
- CHR — CHILLED WATER RETURN PIPING
- CHS — CHILLED WATER SUPPLY PIPING
- CR — CONDENSER WATER RETURN PIPING
- CS — CONDENSER WATER SUPPLY PIPING
- WATER METER

- HWR — HEATING WATER RETURN PIPING
- HWS — HEATING WATER SUPPLY PIPING
- RL — REFRIGERANT LIQUID PIPING
- RS — REFRIGERANT SUCTION PIPING
- A — COMPRESSED AIR LINES
- CD — CONDENSATE DRAIN PIPING
- PC — PUMPED CONDENSATE DRAIN PIPING
- D — DRAIN PIPING
- COLD WATER PIPING
- ICW — INDUSTRIAL COLD WATER PIPING
- ISCW — INDUSTRIAL SOFTENED COLD WATER PIPING
- SCW — SOFTENED COLD WATER PIPING
- F — FIRE PROTECTION PIPING
- HPG — HIGH PRESSURE GAS PIPING
- G — LOW PRESSURE GAS PIPING
- MPG — MEDIUM PRESSURE GAS PIPING
- GV — GAS VENT PIPING
- HOT WATER PIPING
- 140° — 140° HOT WATER PIPING
- HOT WATER RETURN PIPING
- TW — TEMPERED WATER PIPING
- ORD — OVERFLOW ROOF DRAIN PIPING
- RD — ROOF DRAIN PIPING
- AV — ACID VENT PIPING
- AW — ABOVE GROUND ACID WASTE PIPING
- AW — UNDERGROUND ACID WASTE PIPING
- VENT PIPING
- ABOVE GROUND WASTE PIPING
- UNDERGROUND WASTE PIPING
- GW — ABOVE GROUND GREASE WASTE PIPING
- GW — UNDERGROUND GREASE WASTE PIPING
- GW — ABOVE GROUND GREASE WASTE PIPING W/HEAT TRACE
- GW — UNDERGROUND GREASE WASTE PIPING W/HEAT TRACE
- CIRCUIT SETTER
- 2-WAY ELECTRONIC CONTROL VALVE
- 3-WAY ELECTRONIC CONTROL VALVE
- SOLENOID VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- GAS COCK
- BALL VALVE
- CHECK VALVE
- GATE VALVE
- HOSE END DRAIN VALVE
- PRESSURE REDUCING VALVE
- RELIEF VALVE
- TEMPERATURE PRESSURE RELIEF VALVE
- THERMOMETER
- PRESSURE GAUGE WITH GAUGE COCK
- MANUAL AIR VENT
- PRESSURE TEMPERATURE PORT
- Y-STRAINER WITH BLOWDOWN
- PIPE GUIDE
- UNION
- PIPE ANCHOR
- FLEXIBLE CONNECTOR
- PIPE CAP/STUB-OUT
- DIRECTION OF FLOW
- PIPE DOWN
- PIPE UP
- PIPE TEE UP
- PIPE TEE DOWN

MECHANICAL/PLUMBING ABBREVIATIONS

NOTE: THIS IS A MASTER SCHEDULE. NOT ALL ABBREVIATIONS CONTAINED HEREIN MAY APPEAR ON THE DRAWINGS.

AABC	AMERICAN AIR BALANCE COUNCIL
ACD	AUTOMATIC CONTROL DAMPER
AFF	ABOVE FINISHED FLOOR
AP	ACCESS PANEL
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATION, AND AIR CONDITIONING ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
AV	ACID VENT
AW	ACID WASTE
BFD	BACKFLOW PREVENTION DEVICE
BHP	BRAKE HORSE POWER
BTUH	BRITISH THERMAL UNIT PER HOUR
CD	CONDENSATE DRAIN
CFM	CUBIC FEET PER MINUTE
CHAR	CHARACTERISTICS
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CO	CLEANOUT
CR	CONDENSER WATER RETURN
CS	CONDENSER WATER SUPPLY
CW	COLD WATER
D	DRAIN
DB	DRY BULB TEMPERATURE
DDC	DIRECT DIGITAL CONTROL
DIA	DIAMETER
DN	DOWN
DX	DIRECT EXPANSION
(E)	EXISTING TO REMAIN
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EC	ELECTRICAL CONTRACTOR
EER	ENERGY EFFICIENCY RATIO
EFF	EFFICIENCY
ELEC	ELECTRICAL
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
°F	FAHRENHEIT
FCO	FLOOR CLEANOUT
FD	FIRE DAMPER
FPM	FEET PER MINUTE
FSD	FIRE/SMOKE DAMPER
G	GAS
GA	GAGE OR GAUGE
GAL	GALLONS
GCO	GRADE CLEANOUT
GI	GREASE INTERCEPTOR
GPF	GALLONS PER FLUSH
GPM	GALLONS PER MINUTE
GR	GLYCOL RETURN
GS	GLYCOL SUPPLY
GW	GREASE WASTE
HD	HEAD
HP	HORSEPOWER
HPG	HIGH PRESSURE GAS
HR	HOUR
HSPF	HEATING SEASONAL PERFORMANCE FACTOR
HW	HOT WATER
HWR	HEATING HOT WATER RETURN
HWS	HEATING HOT WATER SUPPLY
IBC	INTERNATIONAL BUILDING CODE
IE	INVERT ELEVATION
IMC	INTERNATIONAL MECHANICAL CODE
IPC	INTERNATIONAL PLUMBING CODE
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LWT	LEAVING WATER TEMPERATURE
MAX	MAXIMUM
MBH	ONE THOUSAND BTUH
MCA	MINIMUM CIRCUIT AMPS
MIN	MINIMUM
MOCP	MAXIMUM OVER CURRENT PROTECTION
MPG	MEDIUM PRESSURE GAS
MVD	MANUAL VOLUME DAMPER
N/A	NOT APPLICABLE
NC	NORMALLY CLOSED
NEBB	NATIONAL ENVIRONMENTAL BALANCING BUREAU
NEC	NATIONAL ELECTRIC CODE
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAT	OUTSIDE AIR TEMPERATURE
OBD	OPPOSED BLADE DAMPER
OED	OPEN END DUCT
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
PD	PRESSURE DROP
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
PSIG	POUNDS PER SQUARE INCH GAUGE
(R)	EXISTING TO BE RELOCATED
RA	RETURN AIR
RH	RELATIVE HUMIDITY
RL/S	REFRIGERANT LIQUID/SUCTION
RPM	REVOLUTIONS PER MINUTE
RPPA	REDUCED PRESSURE PRINCIPAL ASSEMBLY
RVD	REMOTE VOLUME DAMPER
SA	SUPPLY AIR
SD	SMOKE DAMPER
SEER	SEASONAL ENERGY EFFICIENCY RATIO
SOI	SAND OIL INTERCEPTOR
"SP	STATIC PRESSURE (INCHES OF)
SPECS	SPECIFICATIONS
SQ	SQUARE
SQFT	SQUARE FEET
SS	STAINLESS STEEL
T	TEMPERATURE
TAB	TEST AND BALANCE WORK AND REPORT
TSP	TOTAL STATIC PRESSURE
TW	TEMPERED WATER
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
UMC	UNIFORM MECHANICAL CODE
UON	UNLESS OTHERWISE NOTED
UPC	UNIFORM PLUMBING CODE
V	VENT
V/PH/HZ	VOLTAGE/PHASE/HERTZ
VFD	VARIABLE FREQUENCY DRIVE
VTR	VENT THROUGH ROOF
WB	WET BULB TEMPERATURE
WCO	WALL CLEANOUT
WG	WATER GAUGE
WMS	WIRE MESH SCREEN
(X)	EXISTING TO BE REMOVED

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HARD ROCK CASINO 4 - EXPANSION
CENTRAL PLANT ADDITION
777 WEST CHEROKEE STREET
CATOOSA, OK 74015

ISSUE DATE: 02-14-2018

REVISIONS:

#	DESCRIPTION	DATE

STAMP:

REGISTERED PROFESSIONAL ENGINEER — BENJAMIN W. YOUNG — 21808 — OKLAHOMA

FEB 14 2018

SHEET TITLE:

SYMBOL LIST AND ABBREVIATIONS

SHEET

MP0-0

MECHANICAL/PLUMBING SPECIFICATIONS

PART ONE - GENERAL

1. THE OWNER HAS CONTRACT LANGUAGE THAT NEEDS TO BE READ PRIOR TO BID SUBMISSION AS THERE ARE ITEMS THAT MAY SUPPLEMENT OR SUPERSEDE ITEMS NOTED HEREIN. THE OWNER'S CONTRACT DOCUMENTS HAS INFORMATION ON HOW WORK IS TO BE PERFORMED, HOW DOCUMENT SUBMITTALS ARE PROVIDED, RECORD DOCUMENTS ARE SUBMITTED, ETC. SEE THE ARCHITECTURAL DOCUMENTS FOR ADDITIONAL DIVISION 1 INFORMATION.
2. CODE USED IN DESIGN: IBC 2015, IMC 2015, IPC-2015, IECC-2006, IFGC 2015.
3. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE LATEST ADOPTED EDITIONS OF THE APPLICABLE INTERNATIONAL BUILDING CODE (IBC), LOCAL MECHANICAL CODE (UMC, IMC, ETC.), LOCAL PLUMBING CODE (UPC, IPC, ETC.), NATIONAL ELECTRIC CODES (NEC) AND ALL OTHER APPLICABLE FEDERAL, STATE, AND LOCAL REGULATIONS.
4. THE CONTRACTOR MUST ARRANGE A VISIT TO THE WORK SITE PRIOR TO BID SUBMISSION TO FULLY UNDERSTAND THE EXISTING CONDITIONS. THE DRAWINGS ARE DIAGRAMMATIC AND SHOW THE WORK INTENT BUT NOT NECESSARILY ALL EXISTING OBSTRUCTIONS, PIPE OR DUCT BENDS. DETERMINING SITE CONDITIONS AND ADJUSTING THE INSTALLATION IS THE RESPONSIBILITY OF THE CONTRACTOR
5. THE CONTRACTOR SHALL PROVIDE THE WORK SHOWN ON THE DRAWINGS AND SPECIFIED FOR THEIR INDIVIDUAL SECTIONS OF WORK. THE WORD "WORK" SHALL MEAN ALL LABOR, TRANSPORTATION, MATERIAL, EQUIPMENT, TOOLS, INSTALLATION, SUPERVISION AND ANY OTHER INCIDENTAL ITEMS OR SERVICES NECESSARY FOR THE PROPER INSTALLATION AND OPERATION OF THE COMPLETE SYSTEMS, WHICH SHALL BE PROVIDED WHETHER OR NOT SPECIFICALLY INDICATED OR NOTED.
6. ALL GENERAL CONDITIONS, SPECIAL REQUIREMENTS OR GENERAL REQUIREMENTS OF THE CONSTRUCTION SPECIFICATIONS ARE MADE PART OF THIS SPECIFICATION AND HAVE THE SAME FORCE AND AFFECT AS IF COMPLETELY REPRODUCED.
7. THE WORD "PROVIDE" SHALL MEAN FURNISH AND INSTALL, MAKE ALL FINAL CONNECTIONS AND LEAVE IN AN APPROVED COMPLETE OPERATING CONDITION.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PAYING ALL FEES AND OBTAINING ALL PERMITS AND INSPECTIONS REQUIRED FOR THE WORK.
9. THE CONTRACTOR SHALL CAREFULLY EXAMINE ALL CONTRACT DOCUMENTS. THE CONTRACTOR SHALL COORDINATE THE WORK WITH ALL OTHER TRADES INCLUDING, BUT NOT LIMITED TO, THE CONTRACT DOCUMENTS, SHOP DRAWINGS, ETC. FOR ALL GENERAL CONSTRUCTION, STRUCTURAL, MECHANICAL, ELECTRICAL AND SPECIALTY CONTRACTOR WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER FITTING OF MATERIAL INTO THE BUILDING AS PLANNED, WITHOUT INTERFERENCE WITH OTHER WORK, AND SHALL MAKE REASONABLE MODIFICATIONS IN THE LAYOUTS NEEDED TO PREVENT CONFLICT WITH OTHER TRADES, TO PROVIDE ACCESS AND FOR THE PROPER EXECUTION OF THE WORK.
10. DRAWINGS ARE DIAGRAMMATIC AND SCHEMATIC IN NATURE, AND INDICATE THE TYPE, SIZE, ARRANGEMENT AND LOCATION OF MATERIALS AND EQUIPMENT. WORK INCLUDES CERTAIN COMPONENTS, APPURTENANCES AND RELATED SPECIALTIES THAT MAY NOT BE SHOWN. CONTRACTOR SHALL PROVIDE ALL NECESSARY ITEMS TO COMPLETE THE WORK ACCORDING TO INDUSTRY STANDARDS. IT IS THE INTENT OF THE DRAWINGS AND SPECIFICATIONS TO CALL OUT FOR FINISHED WORK, TESTED AND READY FOR OPERATION. DO NOT SCALE DRAWINGS. ARRANGEMENT OF EQUIPMENT AND ROUTING OF PIPES AND DUCTWORK, ETC. INDICATED ON DRAWINGS SHALL BE ROUTED PLUMB AND AT RIGHT ANGLES TO BUILDING CONSTRUCTION AND MAY REQUIRE MODIFICATION DUE TO UNFORESEEN CONDITIONS AND REQUIRE ON SITE REVISIONS DURING CONSTRUCTION. (SEE ALSO "BIDDING").
11. ALL WORK REQUIRED FOR IDENTICAL/SIMILAR ITEMS SHOWN ON THE DRAWINGS SHALL BE PROVIDED, ALTHOUGH EACH SPECIFIC IDENTICAL/SIMILAR ITEM MAY NOT BE SHOWN IN DETAIL.
12. THE CONTRACTOR SHALL SUBMIT ELECTRONIC PDF SHOP DRAWINGS AND TECHNICAL DATA SHEETS FOR ALL EQUIPMENT AND MATERIALS SPECIFIED HEREIN TO THE ENGINEER. THE ENGINEER SHALL REVIEW SHOP DRAWINGS AND TECHNICAL DATA SHEETS FOR CONFORMANCE WITH THE CONTRACT DOCUMENTS AND ISSUE A WRITTEN ASSESSMENT TO THE OWNER PRIOR TO COMMENCEMENT OF WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ENGINEERING FEES NECESSARY TO CHANGE PERMIT DOCUMENTS BASED ON ALTERNATE SUBMITTAL PACKAGES/EQUIPMENT SUBSTITUTIONS.
13. ALL SUBSTITUTIONS SHALL BE SUBMITTED TO THE ENGINEER FOR CONSIDERATION PRIOR TO BIDDING. THE OWNER'S REPRESENTATIVE SHALL PREAPPROVE ANY PROPOSED SUBSTITUTION IN WRITING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING ALL REQUIREMENTS ASSOCIATED WITH SUBSTITUTED EQUIPMENT OR MATERIALS WITH OTHER BUILDING TRADES, INCLUDING ALL ELECTRICAL, STRUCTURAL, OR ARCHITECTURAL ELEMENTS. (SHOP DRAWING REVIEW DOES NOT RELIEVE THE CONTRACTOR FROM SUBSTITUTE EQUIPMENT COORDINATION REQUIREMENTS.) SUBSTITUTED EQUIPMENT, ANYTHING DIFFERENT FROM SPECIFIED ON THE DOCUMENTS, MUST BE IDENTIFIED AS SUCH DURING THE SUBMITTAL PROCESS. THE CONTRACTOR SHALL IDENTIFY AND ANNOTATE ALL REVISED REQUIREMENTS PER BUILDING TRADE ON THE SHOP DRAWINGS. THE CONTRACTOR SHALL ALSO IDENTIFY ALL COST DEBITS OR CREDITS IN WRITING FOR THE PROPOSED CHANGES PER BUILDING TRADE.
14. UPON COMPLETION OF CONSTRUCTION, THE CONTRACTOR SHALL SUPPLY THE ENGINEER WITH AN ELECTRONIC CAD AND PDF SET OF AS-BUILT DOCUMENTS ACCURATELY SHOWING THE MATERIALS AND EQUIPMENT AS INSTALLED.
15. ALL MATERIALS AND WORKMANSHIP SHALL BE GUARANTEED FOR A MINIMUM OF ONE (1) YEAR FROM DATE OF ACCEPTANCE BY OWNER. REFRIGERATION COMPRESSORS SHALL BE GUARANTEED FOR A MINIMUM OF FIVE (5) YEARS FROM DATE OF OWNER'S ACCEPTANCE. IN ADDITION, THE CONTRACTOR SHALL GUARANTEE THAT THE INSTALLATION WHEN OPERATED IN ACCORDANCE WITH THE CONTRACTOR'S INSTRUCTIONS WILL DEVELOP CAPACITY AND CHARACTERISTICS AS SPECIFIED AND WILL FULFILL EACH AND EVERY REQUIREMENT OF THE DRAWINGS AND SPECIFICATIONS. SHOULD THE INSTALLATION IN ANY WAY FAIL TO DO SO, THE CONTRACTOR WILL, WITHOUT DELAY OR WITHOUT COST TO THE OWNER, PROVIDE WHATEVER ADDITIONAL EQUIPMENT, MATERIAL, AND LABOR REQUIRED TO CORRECT THE DEFICIENCY AND COMPLY WITH THE REQUIREMENTS OF THE DRAWINGS AND SPECIFICATIONS.
16. CONTRACTOR SHALL CHECK AND VERIFY ALL SIZES, DIMENSIONS, AND CONDITIONS BEFORE STARTING ANY WORK. ANY DEVIATIONS OR PROBLEMS SHALL BE TRANSMITTED TO THE ENGINEER FOR REVIEW.
17. PROVIDE BASE AND COUNTER FLASHING FOR ITEMS PENETRATING THE ROOF OR EXTERIOR WALLS.
18. STARTERS, VFDs DISCONNECT SWITCHES AND CONTROLS FOR MOTORS IF NOT UNIT MOUNTED AND/OR SUPPLIED BY THE EQUIPMENT MANUFACTURER, UNLESS NOTED SPECIFICALLY OTHERWISE SHALL FOLLOW:
    - 18.1. VFDs TO BE SUPPLIED BY THE MECHANICAL CONTRACTOR AND INSTALLED BY THE ELECTRICAL CONTRACTOR. FINAL LOCATIONS COORDINATED WITH THE ENGINEER. WIRING BETWEEN THE VFD AND THE MOTOR SHALL BE SHIELDED POWER CABLE DESIGNED FOR VFD APPLICATIONS, GROUNDED AT BOTH ENDS.
    - 18.2. UNLESS NOTED OTHERWISE, LOOSE MOTOR STARTERS, COMBINATION STARTERS, DISCONNECT SWITCHES, MOTOR RATED SWITCHES, TOGGLE SWITCHES, ETC. TO BE SUPPLIED AND INSTALLED BY THE ELECTRICAL CONTRACTOR.
    - 18.3. CONTROL AND INTERLOCKING WIRING SHALL BE FURNISHED AND INSTALLED BY CONTRACTOR PERFORMING CONTROLS WORK. (SEE AUTOMATIC TEMPERATURE CONTROLS SECTION FOR ADDITIONAL INFORMATION WITH REGARD TO THIS WIRING RULE.)
19. ALL WORK SHOWN IS NEW UNLESS NOTED OTHERWISE.
20. MAINTAIN OCCUPANCY AND FIRE WALL SEPARATION INTEGRITY AS REQUIRED. REFER TO ARCHITECTURAL PLANS FOR LOCATIONS OF ALL OCCUPANCY/FIREWALL SEPARATIONS AND SPECIFIC DETAILS FOR CONSTRUCTION. PROVIDE ALL NECESSARY FIRE AND SMOKE FIRE DAMPERS, ACCESS DOORS, CAULKING, ETC. FOR APPROVED INSTALLATION.
21. IECC COMPLIANCE: THE CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH AND PERFORMING ALL REQUIREMENTS AND WORK SET FORTH IN THE IECC COMPLIANCE CERTIFICATE THAT IS INCLUDED IN THESE DOCUMENTS.

COORDINATION DRAWINGS

1. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR CREATING "ALL TRADES" COORDINATION DRAWINGS. THIS WORK APPLIES TO ABOVE CEILINGS, IN SHAFTS AND ON THE ROOF. THESE DRAWINGS ARE TO BE PREPARED IN 3D OR REVIT. 2D AUTOCAD DRAWINGS WILL BE AVAILABLE FROM THE DESIGN TEAM AND CAN BE UTILIZED TO ASSIST IN THE PREPARATION OF THE COORDINATION DRAWINGS. THESE DRAWINGS SHALL BE COMPLETED PRIOR TO WORK BEING INSTALLED IN THE FIELD FOR THE LOCATIONS NOTED ABOVE. AS-BUILT DOCUMENTS ARE NOT AVAILABLE FOR THE WORK LOCATION. THE CONTRACTOR WILL NEED TO PERFORM FIELD WORK TO LOCATE STRUCTURAL CONSTRAINTS AND EXISTING SERVICES THAT ARE REQUIRED TO REMAIN SO THAT ACCURATE DOCUMENTS CAN BE CREATED. THE ENGINEER WILL ASSIST WHERE NEEDED TO HELP IDENTIFY EQUIPMENT THAT NEEDS TO STAY WITHIN THE CEILING SPACE TO SERVICE OTHER SPACES. EACH TRADE INVOLVED IS TO PROVIDE THEIR DOCUMENTS, IN AUTOCAD FORMAT, TO THE MECHANICAL CONTRACTOR FOR INSERTION TO THE COMMON FILE. (DURING THE BID PROCESS THE MECHANICAL CONTRACTOR IS TO ENSURE THE GC IS AWARE OF THIS WORK WHERE THEY HAVE RESPONSIBLE CHARGE.) THE OWNER MAY PRE-PURCHASE THE SERVICES OF A FIRE SPRINKLER AGENCY, BUT THE INSTALLATION OF THE SPRINKLER PIPING WITH REGARD TO SCHEDULE, LOCATION AND INSTALLATION WILL FALL UNDER THE DIRECTION OF THE GC AND SPRINKLER PIPING MUST BE INCLUDED IN THE COORDINATION DOCUMENTS. AT A MINIMUM THE FOLLOWING TRADES ARE TO BE INVOLVED IN THE COORDINATION DRAWINGS: MECHANICAL, PLUMBING, ELECTRICAL, LOW VOLTAGE, BAS, SPRINKLER, CARPENTRY, ANY OTHER TRADE THAT WILL WORK IN THE AFFECTED AREAS.

BIDDING

1. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO SUBMITTING A BID TO BECOME FAMILIAR WITH THE EXISTING CONDITIONS. THE CONTRACTOR SHALL COMPARE THE WORK IDENTIFIED IN THE CONTRACT DOCUMENTS WITH THE EXISTING CONDITIONS. THE CONTRACTOR SHALL IDENTIFY AND NOTATE ALL WORK OR CONDITIONS THAT ARE DIFFERENT FROM THE CONTRACT DOCUMENTS OR THEIR INTENT. THE CONTRACTOR SHALL, UPON DISCOVERY, IMMEDIATELY NOTIFY AND REPORT, IN WRITING, ANY DISCREPANCIES TO THE ENGINEER. NO EXTRAS OR CHANGE ORDERS WILL BE ALLOWED FOR FAILURE TO PERFORM THE PRE-BID SITE VISIT.
2. BASE PROPOSAL ON MANUFACTURER NAMES LISTED UNLESS "OR EQUAL" IS INDICATED. PROVIDE SUBSTITUTION REQUESTS A MINIMUM OF FIVE (5) BUSINESS DAYS PRIOR TO BID DATE CLOSING TO ALLOW TIME FOR DUE CONSIDERATION OF PROPOSED ALTERNATE. DETERMINATION OF SUBSTITUTION OF EQUALITY RESTS SOLELY WITH THE ENGINEER.

PART TWO - PRODUCTS

HVAC EQUIPMENT

1. PROVIDE HVAC EQUIPMENT AS SPECIFIED AND/OR SCHEDULED HEREIN AND IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS. EQUIPMENT SHALL OPERATE ACCORDING TO THE MANUFACTURER'S "OWNER'S OPERATING AND MAINTENANCE MANUAL" TROUBLE-FREE PRIOR TO STARTING TEST AND BALANCE (TAB) WORK.

MECHANICAL PRODUCTS

1. CONTROL DAMPERS: LEAKAGE CLASS 1A/1. EQUAL TO RUSKIN CD-60 (CD-50 IN WET LOCATIONS)
2. PIPE HANGERS: PIPE SIZES 1/2" TO 1 1/2": MALLEABLE IRON, CARBON STEEL, ADJUSTABLE SWIVEL, SPLIT RING. PIPE SIZES OVER 2" (UNLESS NOTED OTHERWISE): CARBON STEEL, ADJUSTABLE, CLEVIS. PIPE SIZES CHILLED WATER 8" AND OVER, HEATING WATER 6" AND OVER, STEAM (SUPPLY & CONDENSATE) 4" AND OVER: ADJUSTABLE STEEL YOKE, CAST IRON ROLL, DOUBLE HANGER.
3. PIPING: HYDRONIC WATER PIPING (ABOVE GROUND) - SCHEDULE 40 STEEL (ASTM A53), MALLEABLE IRON OR FORGED STEEL WELDED TYPE FITTINGS, SCREWED OR WELDED JOINTS; OR TYPE L HARD DRAWN COPPER TUBING (ASTM B88), CAST BRASS OR SOLDER WROUGHT COPPER FITTINGS, SOLDER GRADE 95TA JOINTS. PIPING OVER 2" SHALL BE STEEL WITH WELDED JOINTS. EQUIPMENT DRAIN OVERFLOWS SHALL BE TYPE M HARD DRAWN COPPER.
4. VALVES: PROVIDE THE NAME OF MANUFACTURER AND GUARANTEED WORKING PRESSURE CAST OR STAMPED ON VALVE BODIES AND BE BY SINGLE MANUFACTURER FOR SIMILAR TYPE. ACCEPTABLE MANUFACTURERS: BRAY, MILWAUKEE, STOCKHAM, NIBCO, APOLLO.
5. PIPE INSULATION: GLASS FIBER INSULATION WITH A MAXIMUM K VALUE NOTED BELOW AT 75 DEGREES F. OUTDOOR INSULATION THICKNESS SHALL BE DOUBLE INDOOR THICKNESS WITH A MAXIMUM THICKNESS OF 3". INTERIOR APPLICATIONS SHALL HAVE KRAFT REINFORCED FOIL VAPOR BARRIER WITH ONE PIECE PREMOLDED PVC JACKETS FOR FITTINGS. EXTERIOR APPLICATIONS SHALL HAVE STUCCO EMBOSSED ALUMINUM JACKETS. ACCEPTABLE MANUFACTURERS: OWENS CORNING, CERTAINTEED, JOHNS MANVILLE, KNAUF.

FLUID TEMP	INSUL. CONDUCTIVITY	NOMINAL PIPE SIZE (IN)	
RANGE °F	BTU-IN/(HR-SQ.FT.-°F)	<1.5	1.5 & >
> 350	0.32	5	5
251-350	0.29	4	4.5
201-250	0.27	2.5	3
141-200	0.25	1.5	2
< 140	0.22	1	1.5

OUTER INSUL. DIAMETER	MINIMUM ALUMINUM JACKET THICKNESS (INCHES) RIGID INSULATION	NON-RIGID INSULATION
≤ 8"	0.016	0.016
> 8"-11"	0.016	0.020
> 11"-24"	0.016	0.024
> 24"-36"	0.020	0.032
> 36"	0.024	0.040

AUTOMATIC TEMPERATURE CONTROLS

1. THE MECHANICAL CONTRACTOR SHALL PROVIDE A COMPLETE SYSTEM OF AUTOMATIC TEMPERATURE CONTROLS INTEGRATED INTO THE EXISTING BUILDING AUTOMATION SYSTEM (BAS; BMS, ATC, DDC). THIS SYSTEM SHALL INCLUDE BUT NOT BE LIMITED TO: TEMPERATURE SENSORS, CONTROLLERS, TRANSFORMERS, EQUIPMENT INTERFACE DEVICES AND ALL REQUIRED RELAYS, WIRING AND CONDUIT - REGARDLESS OF VOLTAGE.
2. THE MECHANICAL CONTRACTOR SHALL PROVIDE AND INSTALL, IN ACCORDANCE WITH THE NEC AND THIS PROJECT ELECTRICAL SPECIFICATIONS, ALL CONDUIT, WIRE, JUNCTION BOXES, THERMOSTAT BACK BOXES AND CIRCUIT BREAKERS REQUIRED FOR A FULLY OPERATIONAL ATC SYSTEM. 120V POWER, IF NOT PROVIDED, SHALL BE OBTAINED FROM LOCATIONS PROVIDED ON THE ELECTRICAL DESIGN DOCUMENTS - IF NO INFORMATION IS PROVIDED THE CONTRACTOR MUST ISSUE AN RFI DURING THE BID PROCESS TO CLARIFY.
3. WHERE AN EXISTING OR NEW BAS SYSTEM IS UTILIZED THE CONTRACTOR SHALL PROVIDE A GUI PAGE FOR EACH SYSTEM. GRAPHICS MUST MATCH OR EXCEED THE EXISTING FOR DETAIL AND INFORMATION PROVIDED.
4. SUBMIT SHOP DRAWINGS OF TEMPERATURE CONTROL WIRING, LOCATION OF DEVICES AND INSTALLATION DATA FOR REVIEW PRIOR TO INSTALLATION.

PLUMBING EQUIPMENT

1. PROVIDE PLUMBING EQUIPMENT AS SPECIFIED AND/OR SCHEDULED HEREIN AND IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS. EQUIPMENT SHALL OPERATE ACCORDING TO THE MANUFACTURER'S "OWNER'S OPERATING AND MAINTENANCE MANUAL" TROUBLE FREE AND CONFORMING TO THE ONE-YEAR WARRANTEE.

PLUMBING PRODUCTS

1. DOMESTIC WATER PIPING:
    - 1.1. ABOVE GROUND: TYPE "L" COPPER (ASTM B-88), WROUGHT FITTINGS (ASME B16.22), JOINTS: ANSI/ASTM B32, SOLDER: 95/5 TIN/ANTIMONY, 0.2% MAX LEAD. (SADDLE TAPS, SHARKBITE, PROPRESS, EXTRUDED OUTLETS ("PULLED TEES") OR SIMILAR FITTINGS NOT PERMITTED UNLESS SPECIFICALLY APPROVED. SADDLE TAPS WHEN APPROVED UNDER EXTREME CIRCUMSTANCES TO BE POWERSTOP SADDLE BY POWERSEAL PIPELINE PRODUCTS CORP., MODEL 3425)
    - 1.2. UNDER GROUND/BELOW GRADE: PROTECTED FROM SOIL, TYPE "K" COPPER (ASTM B-88), HARD DRAWN, WROUGHT FITTINGS (ASME B16.22) JOINTS: AWS A5.8, BCuP SILVER BRAZE.
2. DOMESTIC WASTE & VENT PIPING MATERIALS:
    - 2.1. THIS PROJECT:

	CAST IRON	STAINLESS STEEL
WASTE	X	
WASTE BELOW GRADE		
VENT	X	
GW ABOVE GRADE	X	
GW BELOW GRADE		

    - 2.2. PVC MAY ONLY BE USED BELOW GRADE WHERE ACCEPTABLE SOIL CONDITIONS ARE CONFIRMED TO EXIST.
3. GAS PIPING: ABOVE GRADE SCHEDULE 40 BLACK IRON(ASME A-53), THREADED MALLEABLE FITTINGS INSIDE AND GALVANIZED FITTINGS AND PIPE WHERE EXPOSED, JOINT COMPOUND. PROVIDE ISOLATION VALVES AT ALL EQUIPMENT. BELOW GRADE GAS PIPING SHALL BE POLYETHYLENE (PE) GAS PIPING WITH BUTT FUSION JOINTS. PIPING SHALL BE LABELED GAS. GAS VALVE SHALL BE BRONZE BODY, BRONZE TAPERED PLUG, NON-LUBRICATED, TEFLON PACKING, THREADED ENDS.
4. PIPE INSULATION: ALL DOMESTIC COLD WATER PIPING (IN UNCONDITIONED SPACES ONLY) AND ALL DOMESTIC HOT WATER PIPING ABOVE GROUND SHALL BE INSULATED WITH 1" THICK FIBERGLASS PIPE INSULATION WITH ALL-SERVICE JACKET AND MAXIMUM K VALUE OF 0.27 AT 75°F. WHERE CLEARANCE LIMITATIONS PREVENT THE USE OF FIBERGLASS INSULATION, A MINIMUM 3/4" THICK CLOSED CELL NEOPRENE PIPE INSULATION MAY BE USED. WHERE THE CLIMATE DICTATES, COLD WATER PIPING, CONDENSATE DRAIN AND ROOF DRAIN PIPING TO BE INSULATED. PROVIDE METAL SADDLES AND RIGID INSULATION AT HANGERS WHERE SYSTEM WEIGHT COMPRESSES INSULATION. PROVIDE ADA COMPLIANT INSULATION ON EXPOSED UNDER SINK PIPING.
5. PIPE HANGERS: PIPE SIZES 1/2" TO 1 1/2": MALLEABLE IRON, CARBON STEEL, ADJUSTABLE SWIVEL, SPLIT RING. PIPE SIZES 2" TO 4": CARBON STEEL, ADJUSTABLE, CLEVIS. PIPE SIZES 6" AND OVER THAT ARE SUBJECT TO EXPANSION & CONTRACTION: ADJUSTABLE STEEL YOKE, CAST IRON ROLL, DOUBLE HANGER. SYSTEM LOAD (PIPE FULL OF DESIGN LIQUID OR GAS) ON HANGER MUST NOT EXCEED MORE THAN 85% OF HANGER CAPACITY.

TEST AND BALANCE (TAB)

1. THE CONTRACTOR IS RESPONSIBLE FOR ADJUSTING THE GPM FOR THE CHILLED AND HOT WATER - SEE DWGS FOR DIRECTION ARROW. IF NO DIRECTION ARROW IS ILLUSTRATED THE CONTRACTOR MUST DIRECT AN RFI TO THE ENGINEER TO OBTAIN PROPER THROW DIRECTIONS.
2. THE TEST AND AIR BALANCE (TAB) REPORT SHALL INCLUDE DESIGN AIR QUANTITIES AND AIR QUANTITIES AFTER ADJUSTMENTS. FURNISH OWNER'S REPRESENTATIVE WITH THREE (3) COPIES OF THE FINAL TAB REPORT.

M&P NOTES

1. DIELECTRIC FITTINGS SHALL BE USED WHEREVER DISSIMILAR METALS ARE JOINED.
2. PROVIDE ACCESS PANELS IN CEILINGS & WALLS TO ACCESS MECHANICAL/PLUMBING EQUIPMENT AND APPURTENANCES WHERE REQUIRED. IN HARD CEILINGS PROVIDE GFRG OR BAUCO•PLUS II ACESS PANELS.
3. PLUMBING FIXTURES: PROVIDE CHROME PLATED ANGLE STOPS WITH ESCUTCHEON PLATES AT PLUMBING FIXTURES. ALL PLUMBING FIXTURES SHALL COMPLY WITH LOCAL REGULATIONS AND ADOPTED WATER CONSERVATION CODES.
4. DISINFECT ALL POTABLE WATER SYSTEMS IN ACCORDANCE WITH PLUMBING CODE AND/OR, AWWA STANDARD. PROVIDE WRITTEN CONFIRMATION TO OWNERS REPRESENTATIVE THAT THIS WORK HAS BEEN COMPLETED.
5. GAUGES: TEMPERATURE: INTERIOR - WEISS VARI-ANGLE DIGITAL WITH 316 SS THERMOWELL, EXTERIOR WITH DCV-4 OUTDOOR WATERPROOF COVER. PRESSURE: WEISS DIGITAL DUGY3-xxx-2L (PG - RFI FOR RANGE PER APPLICATION)
6. GAS REGULATORS SUPPLIED SHALL BE OF THE "LOCK UP" TYPE AND SHALL HAVE A STRAINER INSTALLED BEFORE THE REGULATOR.
7. ALL EQUIPMENT SHALL BE RATED IN EXCESS OF THE AVAILABLE FAULT CURRENT AT THE POINT OF CONNECTION.

PART THREE - EXECUTION

1. THE CONTRACTOR SHALL PROVIDE ALL SLEEVES, OPENINGS, CUTTING AND PATCHING NECESSARY FOR THE INSTALLATION OF THE WORK. CUTTING AND PATCHING SHALL BE DONE BY WORKMEN SKILLED IN THE TRADES REQUIRED AND PAID BY THE CONTRACTOR REQUIRING THE WORK COMPLETED. SYSTEMS PASSING THROUGH WATER PROOFING OR DAMP PROOFING SHALL BE WATER TIGHT. SYSTEMS PASSING THROUGH FIRE RATED CONSTRUCTION SHALL BE FIRE PROOFED WITHER MATERIAL APPROVED FOR THE FIRE AND TEMPERATURE RATING OF THE ASSEMBLY AND U.L. LISTED. (IF THE ARCHITECT HAS NOT PROVIDED A STANDARD DRAWING/ASSEMBLY FOR AN APPLICATION AND ONE IS NOT AVALIABLE, THE CONTRACTOR IS RESPONSIBLE TO OBTAIN AN "ENGINEERING JUDGEMENT" AND ASSOCIATED DRAWING FOR THE APPLICATION.)
2. THE CONTRACTOR SHALL PROVIDE ALL RIGGING, HANDLING OF MATERIALS AND EQUIPMENT, AND THE NECESSARY PROTECTION FOR MATERIALS AND EQUIPMENT.
3. THE CONTRACTOR WILL PROTECT THE WORK AND MATERIAL AGAINST DIRT, THEFT, INJURY OR DAMAGE UNTIL ACCEPTED BY OWNER. ALL WORK SHALL BE TURNED OVER TO OWNER CLEAN AND IN NEW CONDITION.
4. WHERE FLOOR DRAINS OR FLOOR SINKS OR SIMILAR FIXTURES ARE INSTALLED IN FLOORS THAT ARE NOT SLAB-ON-GRADE, OR PIPE PASS THROUGH SAID FLOORS AND THE FLOOR IS A FIRE RATED ASSEMBLY, PER CODE, THE OPENING CREATED TO ACCEPT THE DRAIN AND THE DRAIN FITTING OR PIPING ASSEMBLY THROUGH THE FLOOR MUST USE A LISTED SYSTEM TO BE TEMPERATURE AND FIRE RATED TO MATCH THE RATING OF THE FLOOR (MIN 2 HOUR).
5. PROVIDE TRAP PRIMERS (OR TRAP GUARDS WHERE APPROVED) FOR FLOOR DRAINS, FLOOR SINKS AND OTHER DEVICES WHERE TRAP SEALS EXIST.
6. EACH CONTRACTOR SHALL PROVIDE ALL FOUNDATIONS, HANGERS, AND SUPPORTS FOR ALL EQUIPMENT SUPPLIED AND/OR INSTALLED UNDER THEIR WORK. ANY EQUIPMENT WITH MOVING PARTS SHALL BE PROVIDED WITH VIBRATION ISOLATION AND FLEXIBLE CONNECTIONS TO PIPING AND OR DUCTWORK IF APPLICABLE. MISCELLANEOUS STEEL AND ANCHORS REQUIRED FOR THE INSTALLATION OF THE CONTRACTORS EQUIPMENT IS THE RESPONSIBILITY OF THE CONTRACTOR AND THE RETENTION OF A STRUCTURAL ENGINEER OR OTHER DESIGN DISCIPLINE TO COMPLETE THE WORK IS THE RESPONSIBILITY OF THE CONTRACTOR. EG: THE USE OF CONCRETE ANCHORS WILL REQUIRE DOCUMENTATION APPROVAL FROM A STRUCTURAL ENGINEER RETAINED BY THE CONTRACTOR.
7. WHERE PIPES OR CONDUITS PASS THROUGH WALLS, FLOORS, OR CEILINGS IN FINISHED AREAS, THEY SHALL BE FURNISHED WITH ESCUTCHEON PLATES (COLOR PER ARCHITECT AND/OR INTERIOR DESIGNER).
8. PIPES AND/OR CONDUITS PASSING THROUGH WALL, FLOORS AND PARTITIONS SHALL BE PROVIDED WITH SLEEVES. SLEEVES PASSING THROUGH WATER PROOFING OR DAMP PROOFING SHALL BE WATER TIGHT. SLEEVES/PIPES PASSING THROUGH FIRE RATED CONSTRUCTION SHALL BE FIRE PROOFED WITH MATERIAL APPROVED FOR THE FIRE AND TEMPERATURE RATING OF THE ASSEMBLY AND U.L. LISTED. (IF THE ARCHITECT HAS NOT PROVIDED A STANDARD DRAWING/ASSEMBLY FOR AN APPLICATION AND ONE IS NOT AVALIABLE, THE CONTRACTOR IS RESPONSIBLE TO OBTAIN AN "ENGINEERING JUDGEMENT" AND ASSOCIATED DRAWING FOR THE APPLICATION.)
9. AT THE CONCLUSION OF THE JOB, EACH PIECE OF EQUIPMENT, VALVE, SWITCH, STARTER, PANEL, PIPE LINE, CONDUIT, DUCT, ETC., SHALL BE CLEARLY IDENTIFIED WHETHER EXPOSED OR CONCEALED, COVERED OR UNCOVERED. IN ACCORDANCE WITH OSHA AND ANSI REGULATIONS. IDENTIFY PIPES NEAR EACH VALVE WITH "BRANDY-PERMA' CODE PIPE TAPE" OR T. & B. WESTLINE "TEL-A-PIPE" INDICATING DIRECTION OF FLOW, SERVICE, ZONE, AND SIZE. TAPE SHALL BE APPLIED TO PIPE, CONDUIT, OR COVERING. VALVES, CONTROLS, AND DAMPERS SHALL BE IDENTIFIED BY 2-INCH LACQUERED BRASS TAGS WITH STAMPED LETTERS FASTENED WITH "S" HOOKS OR CHAINS. EQUIPMENT IS TO BE IDENTIFIED AS TO FUNCTION AND PURPOSE BY MEANS OF PERMANENTLY ATTACHED LAMINATED ENGRAVED PHENOLIC NAMEPLATES WITH BEVELED EDGES, AND WHITE LETTERS ON BLACK BACKGROUND. (NO ADHESIVE LABELS ALLOWED).
10. AT THE CONCLUSION OF THE WORK, ALL EQUIPMENT AND SYSTEMS SHALL BE BALANCED, ADJUSTED, AND TESTED TO PROVIDE A QUIET-OPERATING, STABLE, AND SAFELY OPERATING SYSTEM(S). DEMONSTRATE OPERATION OF ALL SYSTEMS TO THE OWNER'S DESIGNATED REPRESENTATIVE. THE TEST AND BALANCE WORK SHALL BE PERFORMED IN ACCORDANCE WITH NEBB OR AABC STANDARDS, BY INDEPENDENT, APPROVED, AND CERTIFIED TEST AND BALANCE PERSONNEL.
11. IN LOCATIONS WHERE SEISMIC DESIGN REQUIREMENTS EXIST, THE MECHANICAL/PLUMBING CONTRACTOR IS RESPONSIBLE FOR RETAINING AND PAYING FOR THE DESIGN SERVICES OF A STRUCTURAL ENGINEER TO CREATE THE DESIGN AND INSTALLATION DRAWINGS FOR MECHANICAL/PLUMBING SYSTEMS SEISMIC RESTRAINT SUPPORT, PER THE PROJECT BUILDING CODE. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT MECHANICAL SYSTEMS SHOP DRAWINGS BASED UPON MULTI DISCIPLINE COORDINATION. INCLUDED WITH THE SHOP DRAWING SUBMISSION SHALL BE SEISMIC RESTRAINT DRAWINGS NOTING WHERE SEISMIC SUPPORT IS REQUIRED. FOR EACH AREA NOTED NEEDING SEISMIC SUPPORT FOR THE MECHANICAL SYSTEMS, THERE SHALL BE A SEISMIC DRAWING DETAILING THE REQUIRED SUPPORT. THE SEISMIC SUPPORT DRAWINGS SHALL BE SIGNED AND SEALED BY A REGISTERED STRUCTURAL ENGINEER IN THE SAME STATE AS THE PROJECT. IN ADDITION TO THE PROJECT DESIGN TEAM REVIEW, THE SEISMIC SUPPORT DRAWINGS WILL BE ISSUED TO THE LOCAL BUILDING DEPARTMENT FOR REVIEW AS PART OF A DEFERRED SUBMITTAL FOR THE BUILDING DOCUMENTS. COMMENCEMENT OF CONSTRUCTION PRIOR TO BUILDING DEPARTMENT REVIEW IS AT THE CONTRACTOR'S RISK.
12. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL REFLECTED CEILING PLAN FOR EXACT LOCATION OF GRILLES, REGISTERS AND DIFFUSERS.
13. PIPE HANGERS: PIPE SIZES 1/2" TO 1 1/2" - 5'-0" MAX SPACING, 3/8" MIN. ROD DIAMETER; PIPE SIZES 2" TO 3" - 8'-0" MAX SPACING, 1/2" MIN. ROD DIAMETER; PIPE SIZES 4 TO 6"-10'-0" MAX SPACING, 5/8" MIN. ROD DIAMETER.
14. PROVIDE CLEAN OUTS IN SANITARY, WASTE AND DRAIN LINES AS SHOWN AND AS REQUIRED B

MODULAR CENTRAL PLANT SCHEDULE

MARK	MANUFACTURER	COMPONENTS						ELECTRICAL			WEIGHT	REMARKS
		CHILLER	CHW PUMPS	CW PUMPS	BOILER	HW PUMPS	EXPANSION TANK	V/PH/HZ	MCA	MOCP		
MCP 4	DAIKIN	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	460/3/60	1332	2151	274,102	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35
MCP 5	DAIKIN	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	460/3/60	1332	2151	274,102	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35

1. PROVIDE SINGLE POINT CONNECTION AT 460V. 3 PHASE.
2. PROVIDE COMPUTER TO MONITOR WITH PLANT WITH BATTERY BACKUP.
3. PROVIDE ALL RIGGING, INTERNAL PIPING, AND INTERNAL WIRING TO BE PERFORMED BY CONTRACTORS OF THE PLANT. MANUFACTURER TO PROVIDE INSTALLATION SUPERVISION.
4. CONTROLS CONTRACTOR WILL PROVIDE AND INSTALL CONTROLS AT TMI.
5. PROVIDE FREEZE-LESS HOSE BIB.
6. SINGLE POINT 460V-3-PHASE POWER CONNECTION WITH ALL REQUIRED TRANSFORMERS, WIRING, CONDUIT ETC TO SERVE ALL PACKAGED PLANT COMPONENTS.
7. INTERNAL PLANT PIPING SIZED FOR FUTURE EXPANSION OF 1 CHILLER AND BOILER TO MATCH EXISTING SIZES.
8. COOLING TOWER TO BE SHIPPED SEPARATELY AND INSTALLED BY MANUFACTURER.
9. MINIMUM QTY (10) GFI OUTLETS SPACED THROUGHOUT THE PACKAGED PLANT.
10. LABEL ALL WIRES AT BOTH ENDS.
11. REFRIGERANT LEAK DETECTION SYSTEM WITH VENTILATION FAN AND DAMPER, AUDIBLE ALARMS AND STROBES.
12. EXTERIOR EMERGENCY SHUTDOWN SWITCHES FOR BOILER AND CHILLER SYSTEMS.
13. EMERGENCY EYEWASH/SHOWER STATION AND CHEMICAL WATER TREATMENT AREA.
14. CONTRACTOR TO COORDINATE WITH OWNER FOR CHEMICAL WATER TREATMENT EQUIPMENT, CHEMICALS AND SERVICE FOR OPEN LOOP COOLING TOWERS.
15. EMERGENCY LIGHTS AND EXIT SIGNS AT EACH MAIN ENTRY DOOR.
16. ALL ACCESS DOORS TO BE PROVIDED WITH KEYED LOCKING HARDWARE.
17. PROVIDE EMERGENCY PANIC HARDWARE AT ALL DOORS TO ALLOW FOR EXIT WHEN DOOR IS LOCKED FROM OUTSIDE.
18. LABEL ALL ELECTRICAL, CONTROLS AND EQUIPMENT COMPONENTS WITH PERMANENT BLUE MECHANICALLY FASTENED PHENOLIC COATED NAMEPLATES.
19. PROVIDE ALL STAINLESS STEEL BOILER VENT MATERIAL REQUIRED TO COMPLETE INSTALLATION.
20. FACTORY TEST ALL ELECTRICAL, CONTROLS AND PIPING SYSTEMS PRIOR TO SHIPMENT.
21. PROVIDE INTERNAL FLUORESCENT LIGHTING FIXTURES.
22. PROVIDE FACTORY INSTALLED HEATING AND COOLING SYSTEMS TO CONDITION THE PACKAGED PLANT AND ELECTRICAL ROOMS.
23. PROVIDE MINIMUM 18"X18" STAINLESS STEEL FLOOR SINKS AND DRAINS WITH WALK-ON SAFETY GRATING AT ALL PUMPS, CHILLER HEADS, BOILERS, EMERGENCY EYEWASH LOCATIONS AND IN ANY OTHER AREA WHERE SPILLS MAY OCCUR.
24. ROUTE ALL AIR VENT AND PRESSURE RELIEF VALVE BLEED CONNECTIONS TO FLOOR DRAINS.
25. PROVIDE ALL PIPING SECTIONS WITH HIGH POINT TAPS WITH MANUAL VENTING BALL VALVES WITH HOSE END CAP.
26. PROVIDE CONTACTING MAKEUP WATER METERS FOR CHW, HW, AND CW SYSTEMS.
27. PROVIDE CORROSION COUPON RACKS FOR EACH SYSTEM CHW, HW AND CW.
28. PROVIDE CHEMICAL FILTER FEEDER - POT FEEDERS ON EACH CLOSED LOOP CHW AND HW.
29. PROVIDE VARIABLE PRIMARY CHW PIPING SYSTEM WITH MINIMUM FLOW BYPASS CONTROL VALVE.
30. PROVIDE MAKEUP WATER BACKFLOW PREVENTERS, PRV'S STRAINERS AND BYPASS QUICK FILL LINES FOR EACH SYSTEM.
31. ALL COMPONENT WIRING MUST BE ROUTED IN CONDUIT AND RACE WAYS.
32. PROVIDE MINIMUM 4" WALLS, FLOOR AND CEILING CONSTRUCTION.
33. PROVIDE 12 GA GALVANIZED TREADPLATE INTERNAL FLOORS.
34. PROVIDE 6" BY-PASS WITH 4" CONTROL VALVE. MINIMUM CHILLED WATER FLOW: 600 GPM
35. CONTRACTOR SHALL COORDINATE CHEMICAL TREATMENT WITH EXISTING CHAR CHEM CHEMICAL TREATMENT.

PACKAGED HEAT EXCHANGER SCHEDULE

MARK	MANUFACTURER	COMPONENTS							ELECTRICAL			WEIGHT (LBS)	REMARKS
		HCW PUMPS	RCP PUMPS	DHW HX'S	HW HX	CHW HX	EXPANSION TANK	AIR SEPARATOR	V/PH/HZ	MCA	MOCP		
PHX 1	TIGERFLOW	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	REFER TO SCHEDULE	460/3/60	95.1	125	21,500	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16

1. PROVIDE SINGLE POINT CONNECTION AT 460V. 3 PHASE.
2. PROVIDE COMPUTER TO MONITOR WITH PLANT WITH BATTERY BACKUP.
3. PROVIDE ALL RIGGING, INTERNAL PIPING, AND INTERNAL WIRING TO BE PERFORMED BY CONTRACTORS OF THE PLANT. MANUFACTURER TO PROVIDE INSTALLATION SUPERVISION.
4. CONTROLS CONTRACTOR WILL PROVIDE AND INSTALL CONTROLS AT ABS.
5. PROVIDE FREEZE-LESS HOSE BIB.
6. SINGLE POINT 460V-3-PHASE POWER CONNECTION WITH ALL REQUIRED TRANSFORMERS, WIRING, CONDUIT ETC TO SERVE ALL PACKAGED COMPONENTS.
7. MINIMUM QTY (1) GFI OUTLETS SPACED THROUGHOUT THE PACKAGED PLANT.
8. LABEL ALL WIRES AT BOTH ENDS.
9. LABEL ALL ELECTRICAL, CONTROLS AND EQUIPMENT COMPONENTS WITH PERMANENT BLUE MECHANICALLY FASTENED PHENOLIC COATED NAMEPLATES.
10. FACTORY TEST ALL ELECTRICAL, CONTROLS AND PIPING SYSTEMS PRIOR TO SHIPMENT.
11. PROVIDE EXTERNAL LIGHTING FIXTURES.
12. ROUTE ALL AIR VENT AND PRESSURE RELIEF VALVE BLEED CONNECTIONS TO ROOF DRAINS.
13. PROVIDE ALL PIPING SECTIONS WITH HIGH POINT TAPS WITH MANUAL VENTING BALL VALVES WITH HOSE END CAP.
14. PROVIDE CONTACTING MAKEUP WATER METERS FOR CHW, HW, AND CW SYSTEMS.
15. PROVIDE MAKEUP WATER BACKFLOW PREVENTERS, PRV'S STRAINERS AND BYPASS QUICK FILL LINES FOR EACH SYSTEM.
16. PROVIDE TIGERFLOW CONTROLLER AND ADD CONTROL POINTS TO BAS, FOR ABS TO READ POINTS.

BOILER SCHEDULE

MARK	MANUFACTURER MODEL	SYSTEM	INPUT (MBH)	OUTPUT (MBH)	GPM	EWT (°F)	LWT (°F)	EFF (%)	WATER CONNECTION SIZE	GAS CONNECTION SIZE	TURN DOWN	AIR INLET SIZE	AIR OUTLET SIZE	ELECTRICAL			OPERATING WEIGHT (LBS)	REMARKS
														MCA	MOCP	V/PH/Hz		
B 7	ATLAS	HEATING WATER	3,000	2,820	141	140	180	94	2 1/2"	1 1/4"	7.5:1	10"	12"	-	-	120/1/60	1,600	1, 2, 3, 4, 5, 6
B 8	ATLAS	HEATING WATER	3,000	2,820	141	140	180	94	2 1/2"	1 1/4"	7.5:1	10"	12"	-	-	120/1/60	1,600	1, 2, 3, 4, 5, 6

1. MOUNT BOILERS ON 4" THICK CONCRETE PAD.
2. PROVIDE ELECTRONIC LOW WATER CUT OFF WITH MANUAL RESET.
3. PROVIDE BACNET COMMUNICATION INTERFACE TO BAS.
4. PROVIDE A CONDENSATE NEUTRALIZATION SYSTEM, ROUTE DRAIN TO FLOOR SINK.
5. PROVIDE A DIRECT VENT FOR INTAKE AND EXHAUST PER MFGR. INTAKE MUST BE INSULATED.
6. PROVIDE SEPARATE GAS REGULATOR WITH VENT THROUGH ROOF.

WATER COOLED CHILLER SCHEDULE

MARK	MANUFACTURER MODEL	SERVICE	TYPE	NOMINAL CAPACITY (TONS)	REFRIGERANT TYPE	REFRIGERANT CHARGE (LBS)	EVAPORATOR DATA					CONDENSER DATA					ELECTRICAL					OPERATING WEIGHT (LBS)	MAX. UNIT FOOT PRINT (LxWxH)	REMARKS
							GPM	EWT (°F)	LWT (°F)	PRESS DROP (FT)	NUMBER OF PASSES	GPM	EWT (°F)	LWT (°F)	PRESS DROP (FT)	NUMBER OF PASSES	FULL LOAD KW/TON	NPLV	V/PH/HZ	MCA	MOCP			
CH E1	DAIKIN #WCS126M	HARD ROCK CASINO EXPANSION	CENTRIFUGAL	1000	R134a	1855	1652	58	42	10.3	2	3000	95	85	19.5	2	0.6350	0.37	460/3/60	1089	1522	13,500	171"X65"X102"	1,2,3,4,5,6,7,8,9,10,11,12,13,14
CH F1	DAIKIN #WCS126M	HARD ROCK CASINO EXPANSION	CENTRIFUGAL	1000	R134a	1855	1652	58	42	10.3	2	3000	95	85	19.5	2	0.6350	0.37	460/3/60	1089	1522	13,500	171"X65"X102"	1,2,3,4,5,6,7,8,9,10,11,12,13,14

1. PROVIDE 4" HOUSEKEEPING PAD.
2. UNIT SHALL COMPLY WITH ASHRAE 90.1-2010
3. PROVIDE ALLOWANCE FOR TWO POINT CUSTOMER WITNESS TEST: ZERO TOLERANCE, FULL LOAD KW/TON, FULL LOAD TONS, AND 30% LOAD AT COND. DESIGN CONDITIONS.
4. PROVIDE FACTORY MOUNTED AFD WITH AUXILARY CONTACTS INTERLOCKED WITH REFRIGERANT PURGE SYSTEM.
5. 980 GPM MINIMUM FLOW.
6. PROVIDE VFD.
7. AUTOMATIC HOT GAS BYPASS.
8. BAC NET COMMUNICATION.
9. V.F.D. WITH ACTIVE HARMONIC RECTIFIER. VFO VOLTAGE HARMONIC DISTORATION SHALL NOT EXCEED 3% AND HARMONIC CURRENT.
10. PROVIDE ISOLATION VALVE.
11. ISO PSIG WATER SIDE CONDENSER PRESSURE RATING.
12. SEMI THERMETIC COMPRESSOR MOTOR.
13. REFRIGERANT COOLED CFD.
14. 3-WAY HEAD PRESSURE CONTROL VALVE.

PLATE AND FRAME HEAT EXCHANGER - CHEROKEE TOWER

MARK	GENERAL DATA					HOT SIDE - EVAPORATOR					COLD SIDE - CONDENSER					OPERATING WEIGHT (LBS)	REMARKS
	MANUFACTURER MODEL	LOCATION	SERVICE	CAPACITY MBH	DESIGN PRESSURE (PSI)	GPM	EWT (°F)	LWT (°F)	PRESSURE DROP (PSI)	FOULING (%/FT2*HR*F/BTU)	GPM	EWT (°F)	LWT (°F)	PRESSURE DROP (PSI)	FOULING (%/FT2*HR*F/BTU)		
DHX 1	B&G AP19-DW	CHEROKEE TOWER	DOMESTIC HW	2,115.3	150	144.2	180	140	7.8	0.00001	50.0	55	140	1.21	0.00000	465	1, 2, 3, 4, 5
DHX 2	B&G AP19-DW	CHEROKEE TOWER	DOMESTIC HW	2,115.3	150	144.2	180	140	7.8	0.00001	50.0	55	140	1.21	0.00000	465	1, 2, 3, 4, 5
HX 1	B&G AP22	CHEROKEE TOWER	CONDENSER WATER LOOP/CHW	2,991.1	150	500.0	95	85	9.81	0.00001	372.3	42	58	4.02	0.00000	1,145	1, 2, 3, 4, 5

1. MOUNT ON 4" HOUSEKEEPING PAD.
2. PROVIDE MANUFACTURER RECOMMENDED CLEARANCES FOR ADDITION OF PLATES.
3. PLATES TO BE 304 STAINLESS STEEL.
4. EXTEND RODS FOR FUTURE EXPANSION.
5. PROVIDE ENCLOSURE WITH HEATING.

PLATE AND FRAME HEAT EXCHANGER - NORTH CENTRAL PLANT

MARK	GENERAL DATA					HOT SIDE - EVAPORATOR					COLD SIDE - CONDENSER					OPERATING WEIGHT (LBS)	REMARKS
	MANUFACTURER MODEL	LOCATION	SERVICE	CAPACITY MBH	DESIGN PRESSURE (PSI)	GPM	EWT (°F)	LWT (°F)	PRESSURE DROP (PSI)	FOULING (%/FT2*HR*F/BTU)	GPM	EWT (°F)	LWT (°F)	PRESSURE DROP (PSI)	FOULING (%/FT2*HR*F/BTU)		
PHX 1	KELVOIN NA10S BYF-150	NORTH CENTRAL PLANT	HARD ROCK	9,300.4	150	1240	60	45	3.43	0.00001	2400	42	50	9.99	0.00000	9,480	1, 2, 3, 4

1. MOUNT ON 4" HOUSEKEEPING PAD.
2. PROVIDE MANUFACTURER RECOMMENDED CLEARANCES FOR ADDITION OF PLATES.
3. PLATES TO BE 304 STAINLESS STEEL.
4. EXTEND RODS FOR FUTURE EXPANSION.

STORAGE TANK SCHEDULE

MARK	MANUFACTURER MODEL	CAPACITY (GAL.)	MOUNTING	OPERATING WEIGHT (LBS)	REMARKS
ST 1	LOCHINVAR RGA0650	650	FLOOR	7250	1, 2, 3, 4, 5

1. SEISMIC RETAINING STRAP.
2. ASME CONSTRUCTION (125 PSI WORKING PRESSURE).
3. GLASS LINED AND JACKETED WITH DRAIN CONNECTIONS, T&P RELIEF VALVE, AQUASTAT, AND MAGNESEUM ANODES.
4. PROVIDE INSULATION INTERNAL OR JACKET EQUAL TO R-12.5 OR BETTER.
5. MOUNT TANK ON 4" HIGH HOUSEKEEPING PAD.

EXPANSION TANK SCHEDULE

MARK	MANUFACTURER MODEL	TYPE	SERVICE	TANK VOLUME (GAL)	ACCEPTANCE VOLUME (GAL)	SIZE (IN)		ASME RATED PRESSURE (PSI)	SYSTEM TEMP (^F)		SYSTEM PRESSURE @ TANK (PSI)		OPERATING WEIGHT (LBS)	REMARKS
						DIA	HT/LEN		MIN.	MAX.	MIN.	MAX.		
ET 1	BELL & GOSSETT B-1000	BLADDER	HOTEL CONDENSER WATER	264	264	36	74	175	65	95	50	125	750	

AIR SEPARATOR SCHEDULE

MARK	MANUFACTURER MODEL	TYPE	SERVICE	GPM	CONNECTION SIZE (IN)	MAX PD (FT)	SIZE (IN)		OPERATING WEIGHT (LBS)	REMARKS
							DIA	HEIGHT		
AS 1	BELL & GOSSETT RL-6F	AIR	HOTEL CONDENSER WATER	850	6"	10	44	25 3/4	280	

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HARD ROCK CASINO 4 - EXPANSION
CENTRAL PLANT ADDITION
777 WEST CHEROKEE STREET
CATOOSA, OK 74015

ISSUE DATE: 02-14-2018

REVISIONS:

#	DESCRIPTION	DATE

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REGISTERED PROFESSIONAL ENGINEER
BENJAMIN W. YOUNG
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OKLAHOMA

FEB 14 2018

SHEET TITLE:

SCHEDULES

SHEET

MP0.2

HYDRONIC PUMP SCHEDULE

MARK	GENERAL DATA				GPM	HEAD (FT)	EEF (%)	NPSHR (FT)	IMPELLER SIZE (IN)	MOTOR				OPERATING WEIGHT (LBS) [NOTE "8"]	REMARKS
	MANUFACTURER MODEL	LOCATION	TYPE	SERVICE						BHP	HP	RPM	V/PH/HZ		
CHWP E1	ARMSTRONG 4300	CENTRAL PLANT	VERTICAL INLINE SPLIT	CHILLED WATER	1652	140	84.2	-	13.19	-	100	1689	460/3/60	-	1, 2, 3, 4, 5, 6, 8, 9
CHWP F1	ARMSTRONG 4300	CENTRAL PLANT	VERTICAL INLINE SPLIT	CHILLED WATER	1652	140	84.2	-	13.19	-	100	1689	460/3/60	-	1, 2, 3, 4, 5, 6, 8, 9
CWP E1	ARMSTRONG 4300	CENTRAL PLANT	VERTICAL INLINE SPLIT	CONDENSER WATER	3000	47	82.2	-	11.97	-	50	1182	460/3/60	-	1, 2, 3, 4, 5, 6, 8, 9
CWP F1	ARMSTRONG 4300	CENTRAL PLANT	VERTICAL INLINE SPLIT	CONDENSER WATER	3000	47	82.2	-	11.97	-	50	1182	460/3/60	-	1, 2, 3, 4, 5, 6, 8, 9
HWP 7	ARMSTRONG H-468	CENTRAL PLANT	VERTICAL INLINE SPLIT	HEATING WATER BOILER BUMP	141	35	78	-	6.75	-	1.5	1800	460/3/60	-	2, 3, 4, 5, 6, 8, 9
HWP 8	ARMSTRONG H-468	CENTRAL PLANT	VERTICAL INLINE SPLIT	HEATING WATER BOILER BUMP	141	35	78	-	6.75	-	1.5	1800	460/3/60	-	2, 3, 4, 5, 6, 8, 9
SHWP 3	BELL & GOSSETT E-80-3X3X9.5C	CENTRAL PLANT	VERTICAL INLINE SPLIT	HEATING WATER SECONDARY PUMP	500	50	80	-	-	-	10	3600	460/3/60	-	1, 2, 3, 4, 5, 6, 8, 9
HCWP 1	BELL & GOSSETT E-80SC-4X4X9.5B	CHEROKEE TOWER	VERTICAL INLINE SPLIT	HOTEL CONDENSER WATER	500	80	79.4	-	9.5	12.6	15	1800	460/3/60	-	1, 2, 3, 4, 5, 6, 7, 8, 9
HCWP 2	BELL & GOSSETT E-80SC-4X4X9.5B	CHEROKEE TOWER	VERTICAL INLINE SPLIT	HOTEL CONDENSER WATER	500	80	79.4	-	9.5	12.6	15	1800	460/3/60	-	1, 2, 3, 4, 5, 6, 7, 8, 9
DHWP 1	BELL & GOSSETT 60AB	CHEROKEE TOWER	VERTICAL INLINE SPLIT	DOMESTIC HOT WATER	40	35	80	-	-	-	1	-	460/3/60	-	2, 3, 4, 5, 6, 7, 8, 9
DHWP 2	BELL & GOSSETT 60AB	CHEROKEE TOWER	VERTICAL INLINE SPLIT	DOMESTIC HOT WATER	40	35	80	-	-	-	1	-	460/3/60	-	2, 3, 4, 5, 6, 7, 8, 9
RCP 1	BELL & GOSSETT 606T AB	CHEROKEE TOWER	INLINE	DOMESTIC HW RECIRC.	40	28	78	-	-	-	1	-	460/3/60	-	2, 3, 4, 5, 6, 8, 9

1. PROVIDE VFD.
2. MOTOR SHALL BE NON-OVERLOADING.
3. PROVIDE SUCTION INLET GUIDE.
4. PROVIDE OUTSIDE BALANCED SEALS.
5. PUMP RATED FOR 150 PSI DUTY.
6. PROVIDE PREMIUM EFFICIENT MOTOR.
7. FULLY REDUNDANT PUMPS TO OPERATE ON LEAD-LAG BASIS.
8. WEIGHT NOT LISTED, INCLUDED IN PUMP SKID.
9. PROVIDE WITH BALDOR MOTOR.

COOLING TOWER SCHEDULE

MARK	MANUFACTURER MODEL	TYPE	GPM	EAT (WB)	EWT (°F)	LWT (°F)	FANS		ELECTRICAL		OPERATING WEIGHT (LBS)	MAX DIM (LXWXH) (FT)	REMARKS
							NO.	CFM (TOTAL)	HP (EA)	V/PH/HZ			
CT E1	EVAPCO NC8912-VAS1	COUNTER-FLOW	3000	78	95	85	2	280,600	60	460/3/60	42,390	22'-4"X13'-9"X23'-6"	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
CT F1	EVAPCO NC8912-VAS1	COUNTER-FLOW	3000	78	95	85	2	280,600	60	460/3/60	42,390	22'-4"X13'-9"X23'-6"	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

1. PROVIDE 5 PROBE ELECTRIC WATER LEVEL CONTROL.
2. PROVIDE LOW SOUND FAN AND WATER SILENCERS.
3. PROVIDE ACCESS LADDER WITH SAFETY CAGE, PLATFORM, AND HANDRAIL.
4. PROVIDE VIBRATION CUT-OUT SWITCH.
5. PROVIDE HIGH EFFICIENCY INVERTER DUTY MOTOR AND VFD.
6. CONFIGURE AS A 3-CELL UNIT, DATA SHOWN IS PER CELL.
7. SINGLE INLET CONNECTION.
8. PROVIDE 2-12KW HEATERS PER CELL WITH UNIT MOUNTED DISCONNECT AND TRANSFORMER.
9. PROVIDE STAINLESS STEEL WATER TOUCH CONSTRUCTION.
10. PROVIDE EACH CELL WITH ITS OWN MOTOR DAVIT (LESS WINCH).
11. PROVIDE PREMIUM EFFICIENT MOTOR.

CENTRIFUGAL SEPARATOR SCHEDULE

MARK	MANUFACTURER MODEL	SERVICE	FLOW RATE (GPM)	ELECTRICAL		OPERATING WEIGHT (LBS)	REMARKS
				V/PH/HZ	HP		
CTS E1	J.L. WINGERT CO. #CT-0450	CT-E1	450	460/3/60	15	1200	1, 2, 3, 4, 5, 6, 7, 8, 9, 10
CTS F1	J.L. WINGERT CO. #CT-0450	CT-F1	450	460/3/60	15	1200	1, 2, 3, 4, 5, 6, 7, 8, 9, 10

1. AUTOMATIC PURGE WITH ELECTRICALLY ACTUACTED INDUSTRIAL BALL VALVE.
2. ADJUSTABLE PURGE TIMER.
3. PROVIDE INTERCONNECTING PIPING TO COOLING TOWER.
4. PUMP SHALL BE CLOSED COUPLED, END SUCTION CENTRIFUGAL PUMP.
5. SKID SHALL BE FUSION BONDED POLYESTER COATED CARBON STEEL.
6. PROVIDE CAST-IRON PRE-STRANER.
7. PROVIDE BASIN SWEEPER SYSTEM.
8. PROVIDE COMMUNICATION WITH BAS FOR REMOTE START AND STATUS.
9. PROVIDE PREMIUM EFFICIENT MOTOR.
10. PROVIDE HEAT TRACE AND INSULATION.

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FEB 14 2018

SHEET TITLE:

SCHEDULES

SHEET

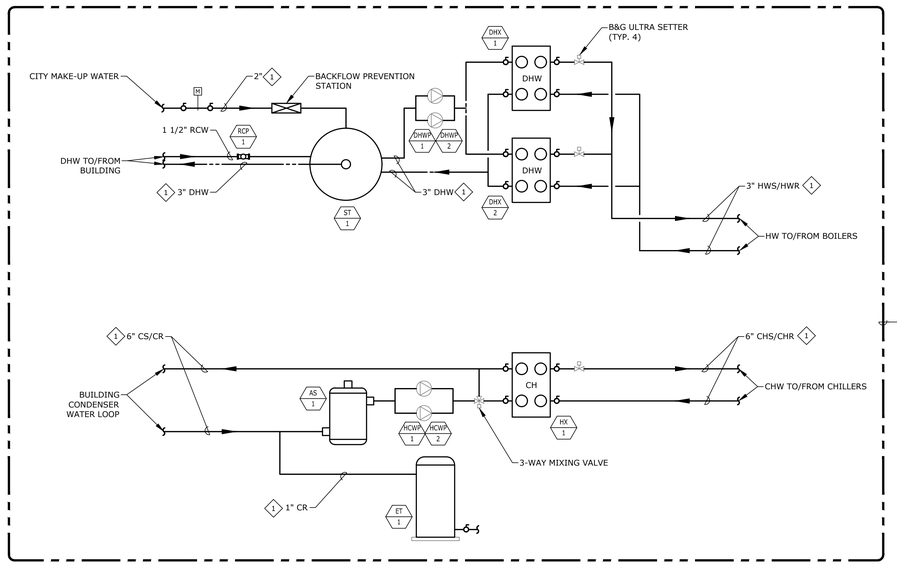
MP0.3

GENERAL NOTES:

1. ACCESS DOORS ARE REQUIRED FOR ALL DAMPERS INSTALLED ABOVE INACCESSIBLE CEILINGS. COORDINATE EXACT LOCATION OF ALL ACCESS DOORS WITH ARCHITECT PRIOR TO INSTALLATION.
2. VERIFY LOCATION OF ALL THERMOSTATS WITH ARCHITECT PRIOR TO INSTALLATION. MOUNT ALL THERMOSTATS @48" A.F.F. IN ACCORDANCE WITH ADA STANDARDS. PROVIDE LOCKING COVERS FOR T-STATS.
3. VERIFY AND COORDINATE FRAME AND BORDER TYPE REQUIREMENTS FOR AIR DEVICES WITH ARCHITECTURAL CEILING PLANS PRIOR TO ORDERING.
4. DUCT SIZES SHOWN ARE THE CLEAR INSIDE DIMENSIONS.
5. THE MECHANICAL CONTRACTOR SHALL VERIFY THE LOCATION OF ALL ROOF MOUNTED EQUIPMENT AND ROOF PENETRATIONS WITH ARCHITECT AND STRUCTURAL ENGINEER PRIOR TO COMMENCING WORK.
6. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HVAC EQUIPMENT AND DUCTWORK WITH OTHER TRADES PRIOR TO COMMENCING WORK.
7. ALL EXHAUST OUTLETS SHALL BE LOCATED MIN. OF 10'-0'' FROM ANY OUTSIDE AIR INTAKES.
8. THE CUTTING, NOTCHING AND BORING OF HOLES IN FLOOR JOIST AND WALL STUDS SHALL BE IN ACCORDANCE WITH THE LATEST APPROVED EDITION OF THE INTERNATIONAL BUILDING CODE.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING AS REQUIRED TO ACCOMMODATE HIS WORK.
10. REFER TO THE MECHANICAL DIAGRAMS THAT APPLY TO THE WORK ON THIS DRAWING. THESE DIAGRAMS PROVIDE GUIDANCE AS TO INSTALLATION INTENT AND DO NOT NECESSARILY SHOW ALL COMPONENTS REQUIRED.

SHEET NOTES:

1. PROVIDE 2" OF INSULATION WITH METAL JACKETING ON ALL EXTERIOR PIPING.



A MP0.4

CHEROKEE TOWER HYDRONIC AND DOMESTIC PACKAGED HEAT EXCHANGER DIAGRAM

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SHEET TITLE:

PIPING DIAGRAMS

SHEET

MP0.4

GENERAL NOTES:

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2. VERIFY LOCATION OF ALL THERMOSTATS WITH ARCHITECT PRIOR TO INSTALLATION. MOUNT ALL THERMOSTATS @48" A.F.F. IN ACCORDANCE WITH ADA STANDARDS. PROVIDE LOCKING COVERS FOR T-STATS.
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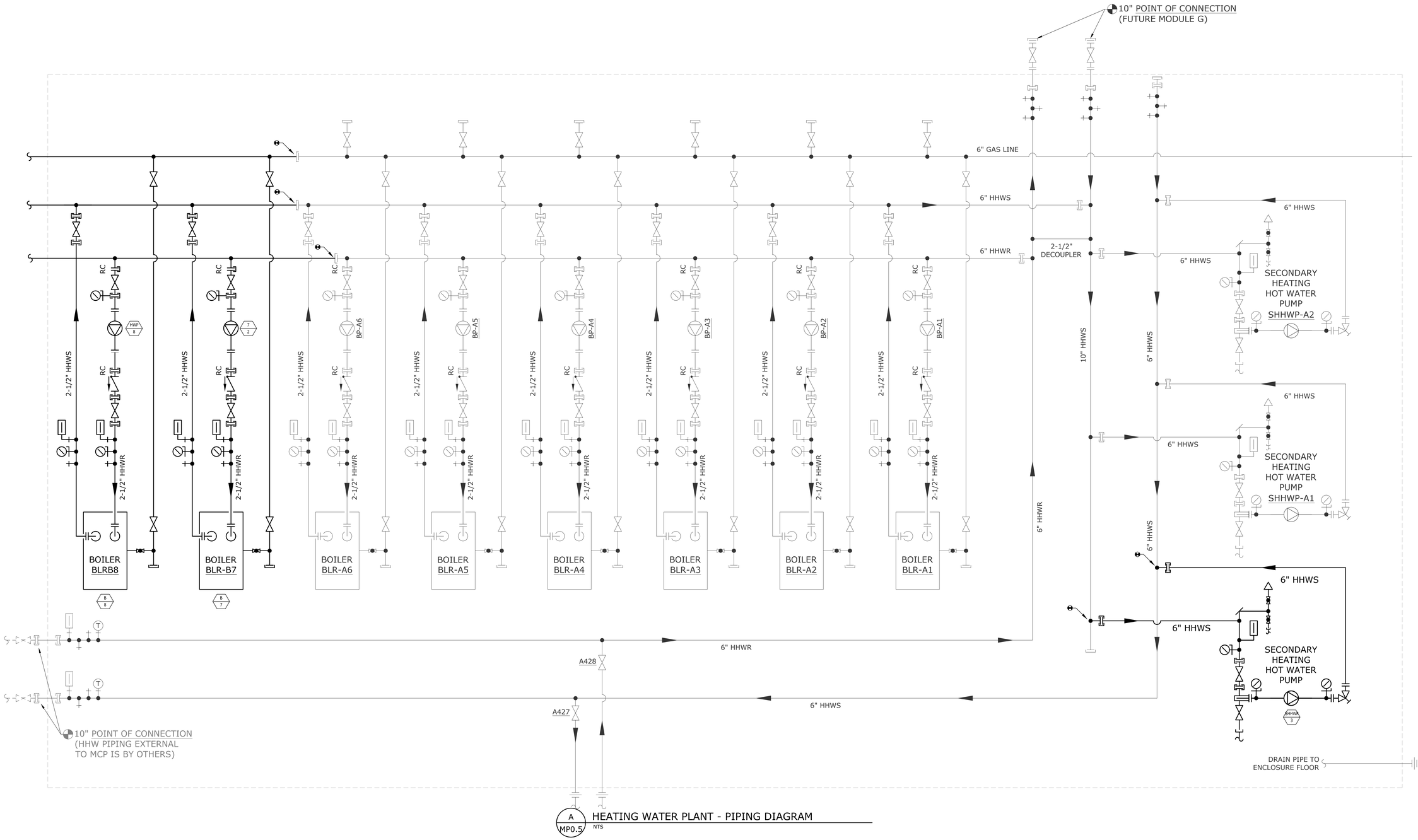

A MP0.5 HEATING WATER PLANT - PIPING DIAGRAM
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PIPING DIAGRAMS

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MP0.5

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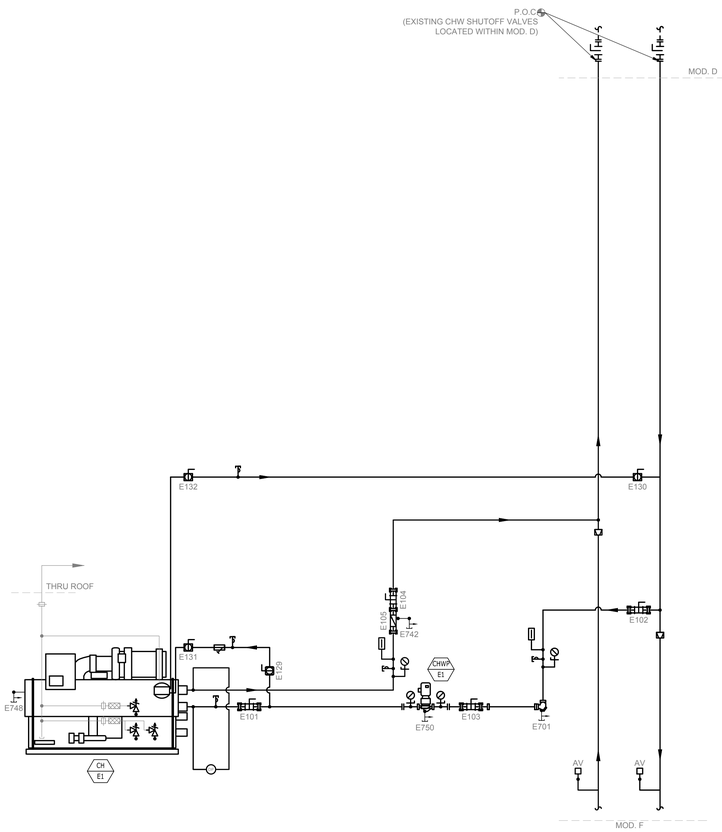

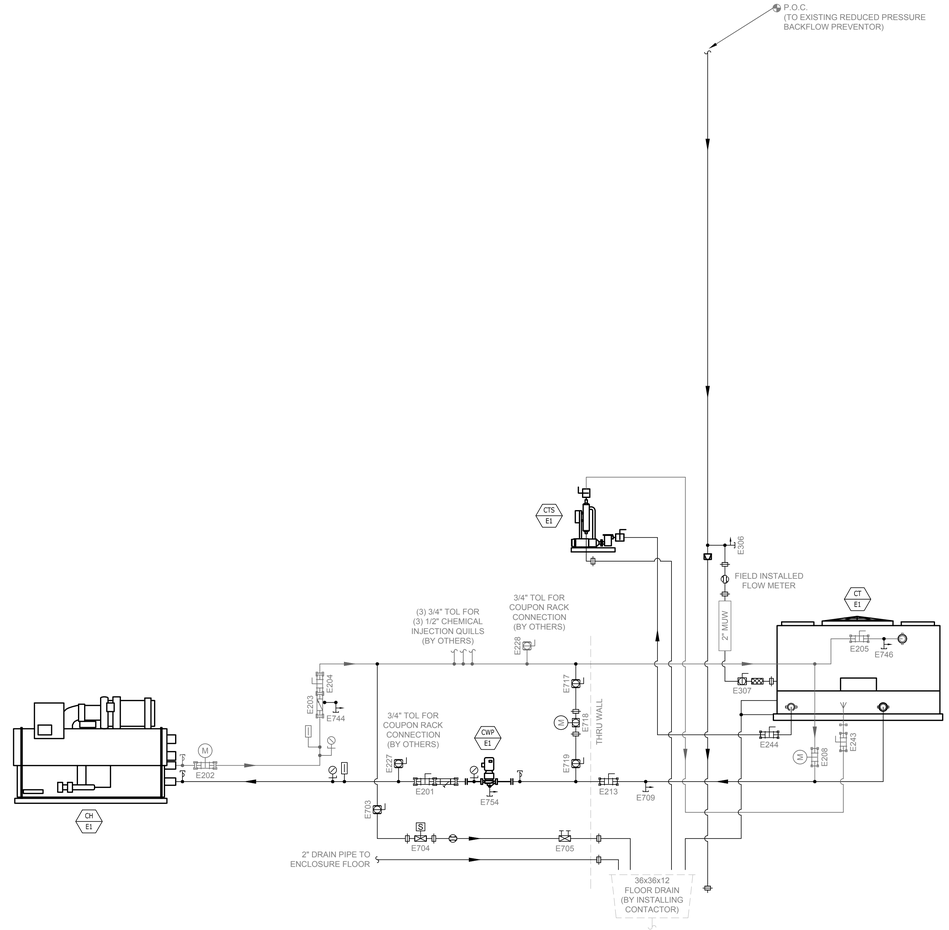

A / MP0.6 CHILLED WATER PLANT - MODULE E - PIPING DIAGRAM
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PIPING DIAGRAMS

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MP0.6

GENERAL NOTES:

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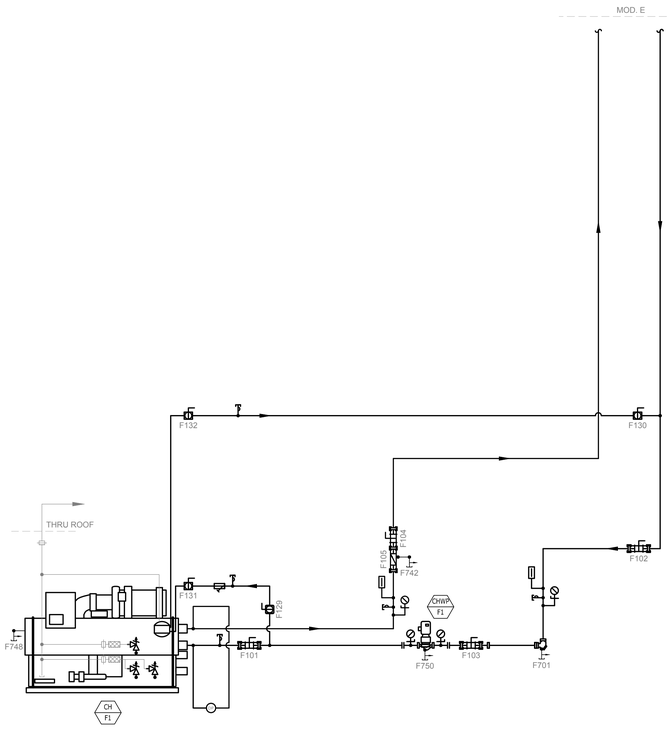

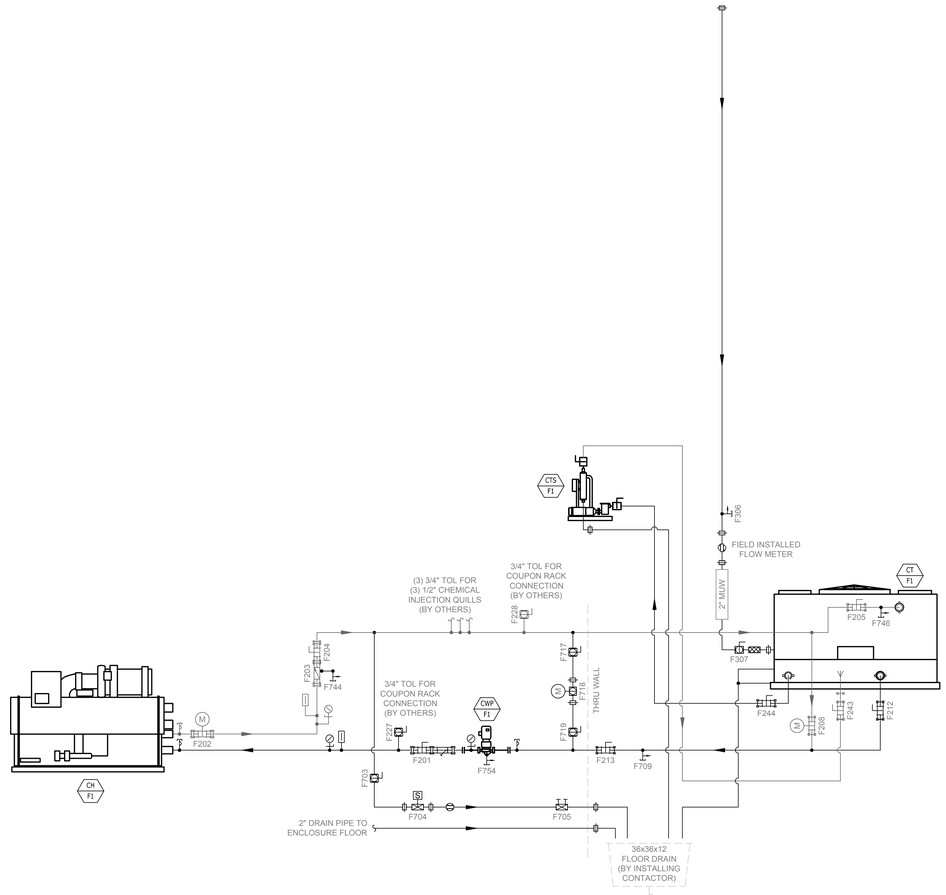

A MP0.7 CHILLED WATER PLANT - MODULE F - PIPING DIAGRAM
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PIPING DIAGRAMS

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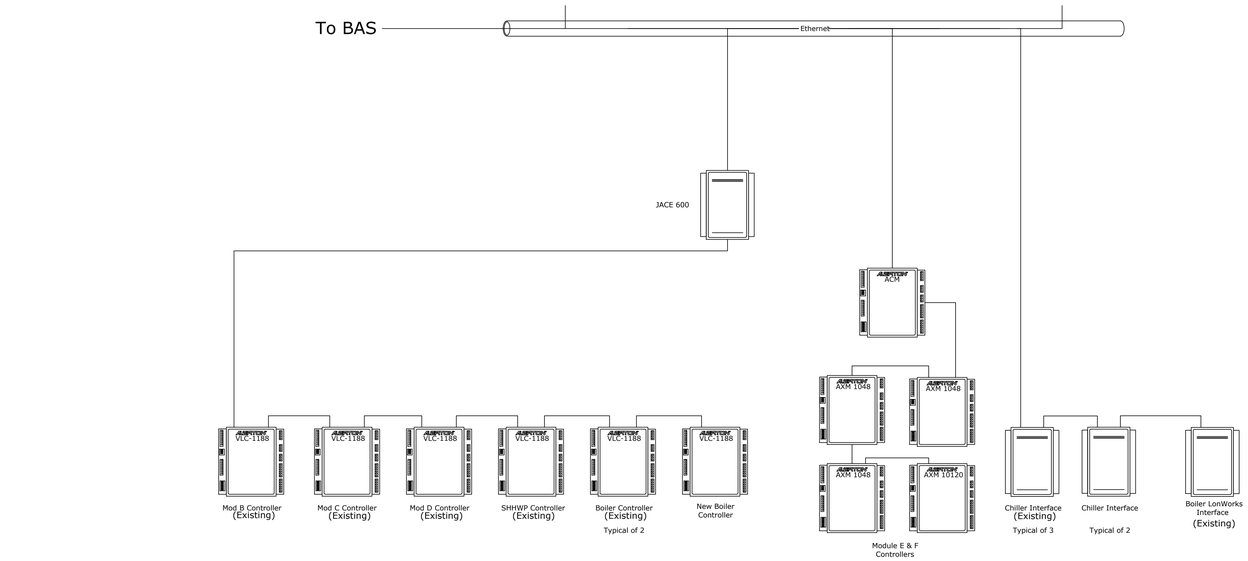
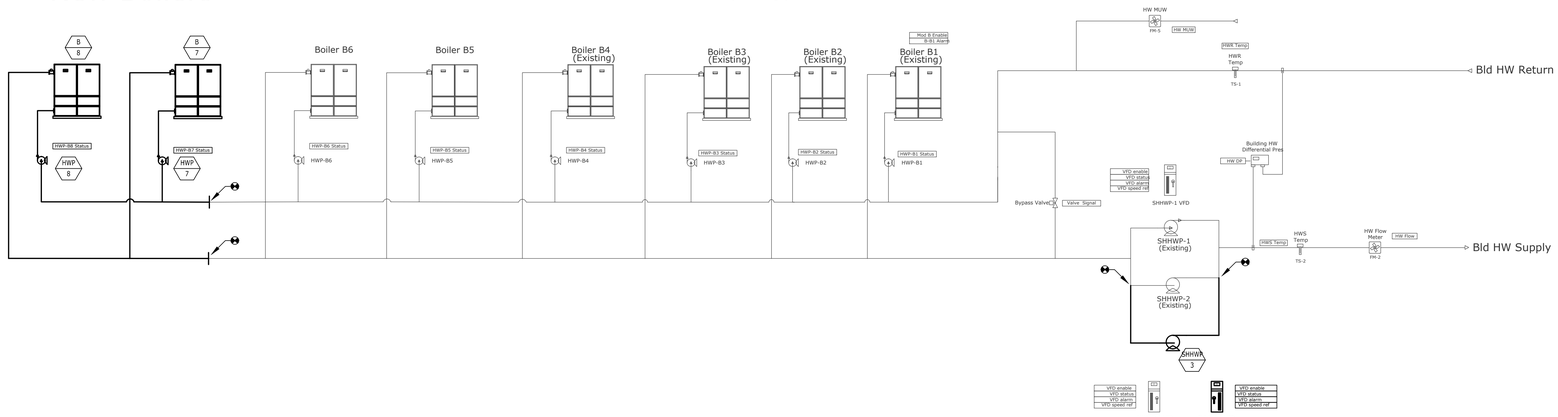
MP0.7

System Architecture

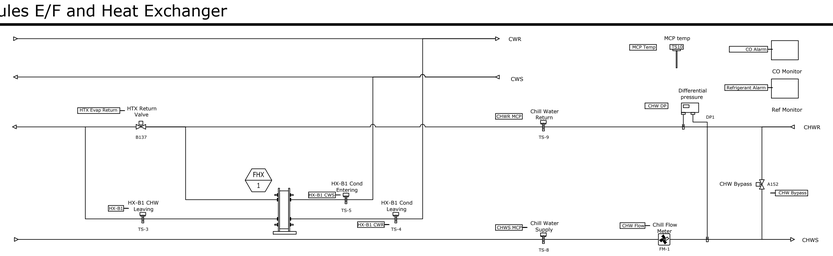


New Boilers

Module A
(Existing)



Controls Layout Modules E/F and Heat Exchanger



A MP0.8 CONTROLS
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CONTROLS

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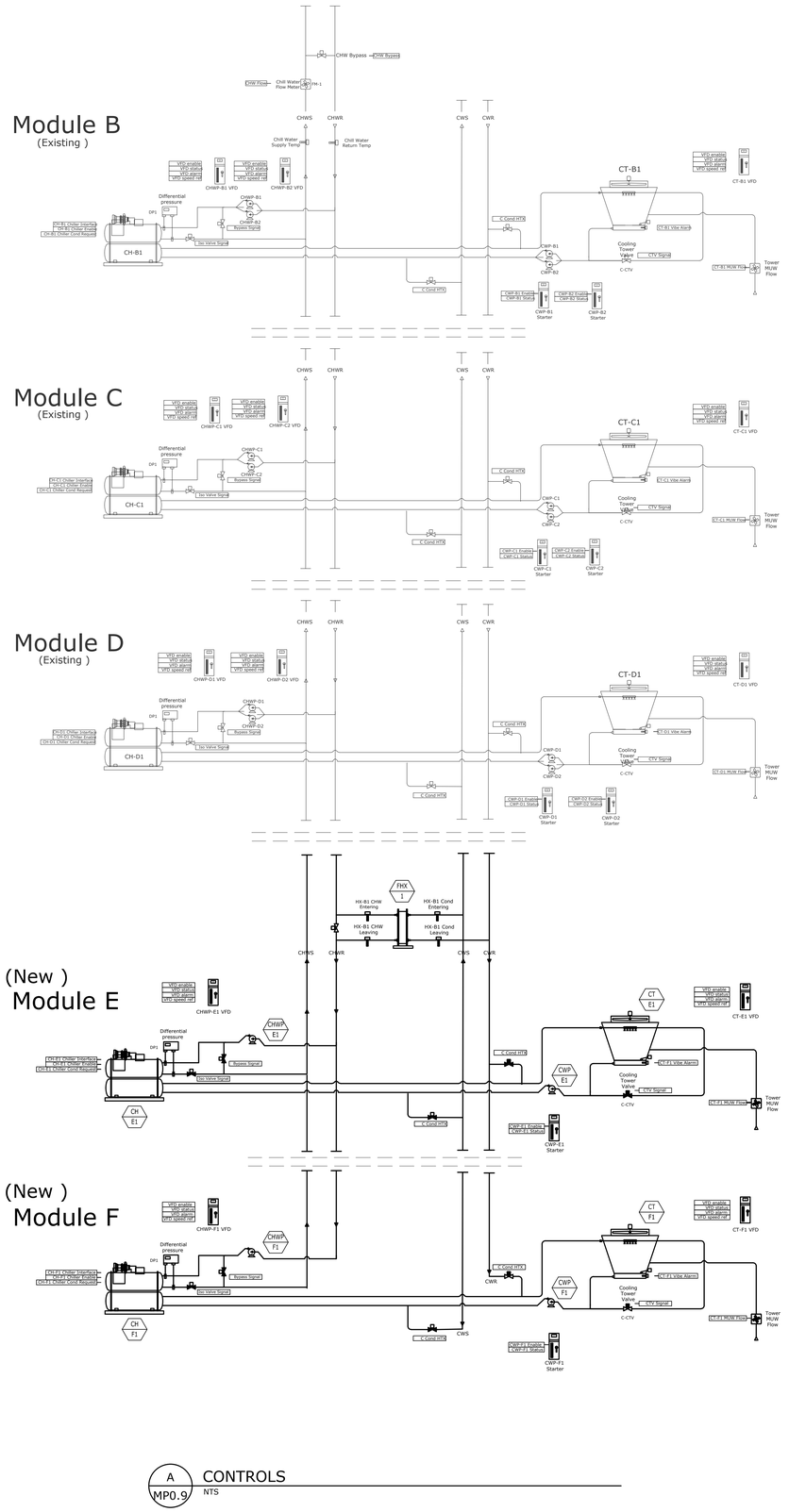
MP0.8



A MP0.9 CONTROLS
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CONTROLS

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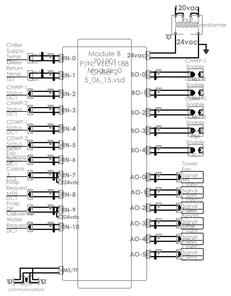
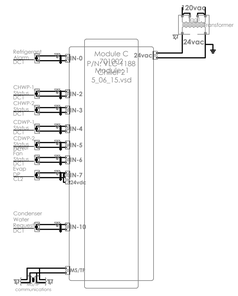
MP0.9

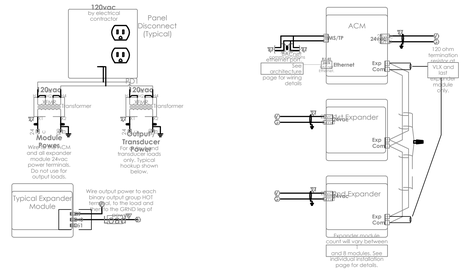
Module B Controller (Existing)



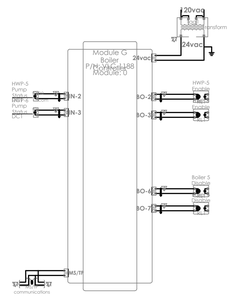
Module C Controller (Existing)



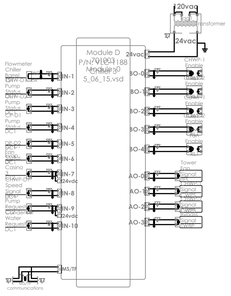
ACM / AXM Installation



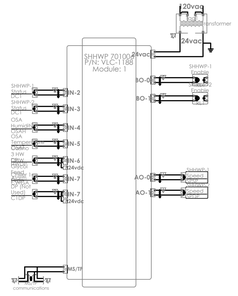
Module G Boiler Controller



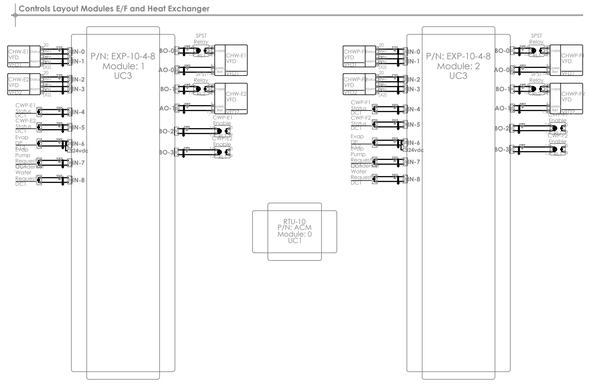
Module D Controller (Existing)



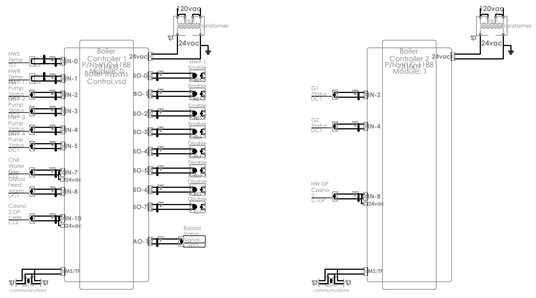
SHHWP Controller (Existing)



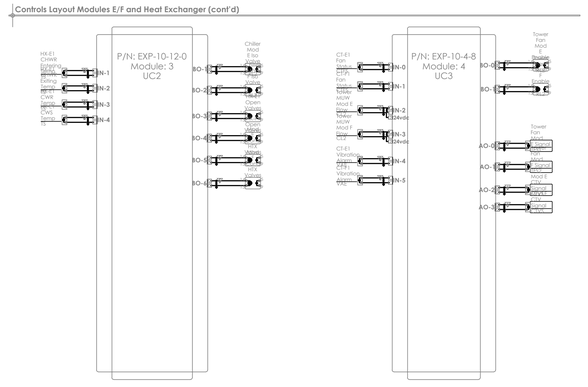
Controls Layout Modules E/F and Heat Exchanger



Boiler Controllers Module A (Existing)



Controls Layout Modules E/F and Heat Exchanger (cont'd)



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HARD ROCK CASINO 4 - EXPANSION
CENTRAL PLANT ADDITION
777 WEST CHEROKEE STREET
CATOOSA, OK 74015

ISSUE DATE: 02-14-2018

REVISIONS:

#	DESCRIPTION	DATE

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FEB 14 2018

SHEET TITLE:

CONTROLS

SHEET

MP0.10

MODULAR CENTRAL PLANT (MCP) SEQUENCE OF OPERATION

1. GENERAL

A. THE MODULAR CENTRAL PLANT (MCP) SHALL CONSIST OF TWO (5) CHILLER MODULES AND ONE (1) BOILER MODULE.

B. THE MCP CONTROLS SHALL INTERFACE WITH THE BUILDING AUTOMATION SYSTEM (BAS) THROUGH THE MCP CONTROLLER UTILIZING LONWORKS AND BACNET NETWORK PROTOCOL FOR COMMUNICATING ALL MAPPED POINTS AS NOTED ON THE MCP POINTS LIST. ALL MODULES SHALL BE CONTROLLED BY THE BAS CONTROL MODULE. EACH MODULE SHALL CONTAIN A MODULE CONTROLLER THAT SHALL CONTROL ALL EQUIPMENT WITHIN THE MODULE INDEPENDENTLY FROM ALL OTHER MODULES.

C. WHEN A START/STOP SIGNAL FOR CHILLED AND/OR HEATING HOT WATER IS RECEIVED FROM THE BAS, THE MCP CONTROLS SHALL OPERATE INTERNAL CHILLED AND HEATING HOT WATER EQUIPMENT PER THE FOLLOWING MCP SEQUENCE OF OPERATION.

2. MCP CHILLED WATER OPERATION - MULTIPLE CHILLER MODULES

A. THE MCP CONTROLLER SHALL STAGE UP AND DOWN CHILLER MODULES BASED ON BUILDING DEMAND FOR CHILLED WATER. CHILLER MODULES SHALL BE CONFIGURED TO ALLOW ANY CHILLER MODULE TO BE IN THE LEAD POSITION. AFTER A DURATION (TO BE DETERMINED) THE CHILLER MODULES SHALL SHIFT ONE POSITION IN ROTATION, THIS IS DONE TO EQUALIZE RUN TIME HOURS ON THE EQUIPMENT. IF ANY CHILLER MODULE IS IN AN ALARM CONDITION THE NEXT AVAILABLE CHILLER MODULE SHALL BE ENABLED. IF THE CHILLED WATER RETURN TEMPERATURE EXCEEDS 56° F (ADJUSTABLE) FOR 30 MINUTES (ADJUSTABLE), THE NEXT LAG CHILLER MODULE, NOT IN OPERATION, SHALL BE ENERGIZED. THERE SHALL BE A INTER-STAGE TIMER THAT LIMITS CHILLER MODULES TO A 45 MINUTE DELAY FOR EACH ADDITIONAL LAG CHILLER MODULE OPERATION.

B. THE SYSTEM SHALL MAINTAIN A 42° F CHILLED WATER SUPPLY SET POINT (ADJUSTABLE). THE SYSTEM WILL STAGE CHILLER MODULES UP TO THE MAXIMUM NUMBER OF MODULES BASED ON THE MCP CHILLED WATER RETURN TEMPERATURE. THIS PROCESS WILL CONTINUE UNTIL THE MAXIMUM NUMBER OF CHILLER MODULES IS REACHED OR THE MCP CHILLED WATER SUPPLY TEMPERATURE IS SATISFIED. THE SYSTEM WILL STAGE CHILLER MODULES IN DOWN IF THE CHILLED WATER RETURN TEMPERATURE DROPS BELOW 52° F (ADJUSTABLE) FOR 20 MINUTES (ADJUSTABLE). THIS PROCESS WILL CONTINUE UNTIL THE LEAD CHILLER MODULE ONLY, IS RUNNING.

3. MCP CHILLED WATER OPERATION - CHILLER MODULE

A. EACH CHILLER MODULE CONTAINS ONE CHILLER WITH VFD, TWO (2) CHILLED WATER PUMPS, TWO (2) CONDENSER WATER PUMPS, AND ONE (1) COOLING TOWER WITH ONE (1) VARIABLE SPEED FAN PER TOWER CELL. A MODULE CONTROLLER SHALL MONITOR EQUIPMENT WITHIN THE CHILLER MODULE, COMMUNICATING STATUS AND ALARM POINTS TO THE JACE. SHOULD THE MODULE CONTROLLER FAIL, THE CHILLER MODULE SHALL CONTINUE TO OPERATE IT THE LAST KNOWN STATE AND AN ALARM SHALL BE SENT TO THE JACE.

B. WHEN A CHILLER MODULE IS OPERATING, BOTH CHILLED WATER AND CONDENSER WATER PUMPS SHALL RUN SIMULTANEOUSLY. COOLING TOWER FAN SPEED SHALL MODULATE BASED ON CONDENSER WATER SUPPLY TEMPERATURE. EACH CHILLER MODULE HAS A MOTORIZED CONDENSER TOWER BY-PASS WATER VALVE THAT SHALL MODULATE BASED CHILLER CONDENSER ENTERING WATER TEMPERATURE.

C. CHILLER MODULE VARIABLE FLOW CHILLED WATER PUMPS AND CONSTANT FLOW CONDENSER WATER PUMPS SHALL START WHEN THE MODULE HAS BEEN COMMANDED TO START BY THE CHILLER MODULE CONTROLLER AND CONTINUE TO OPERATE FOR THREE MINUTES AFTER THE CHILLER HAS BEEN COMMANDED TO STOP. IF ANY PUMP FAILS TO PROVE STATUS THAT ENTIRE MODULE WILL BE ALARMED AND DISABLED, AND THE NEXT AVAILABLE, LAG CHILLER MODULE WILL BE REQUESTED. WITH THE LAG CHILLER MODULE IN OPERATION AND AFTER VISUAL INSPECTION/CLEARING OF THE CHILLER MODULE ALARM, IT IS DETERMINED THAT ONE (1) REDUNDANT PUMP OPERATION IS NECESSARY DUE TO BUILDING LOAD REQUIREMENTS, THE CHILLER MODULE SHALL BE PLACED INTO MANUAL OPERATION WITH SINGLE PUMP CHILLED WATER PUMP AND/OR CONDENSER WATER PUMP IN OPERATION.

D. THE INTEGRAL CHILLER CONTROLLER (MICROTECH II) SHALL START THE CHILLER AFTER PROVING EVAPORATOR AND CONDENSER WATER FLOWS. THE MICROTECH II SHALL MONITOR THE INCOMING CHILLED WATER RETURN TEMPERATURE AND VARY CHILLER MOTOR SPEED THROUGH THE CHILLER VFD AS NECESSARY TO MAINTAIN A CHILLED WATER SUPPLY TEMPERATURE OF 42° F (ADJUSTABLE).

E. WHEN THE LEAD CHILLER MODULE HAS BEEN COMMANDED TO START, THE CHILLED WATER PUMPS SHALL START VARIABLE FREQUENCY DRIVES (VFDS). THE MODULE CONTROLLER SHALL MODULATE THE PUMP SPEED WITH A DEDICATED VFD THROUGH A SIGNAL RECEIVED BY DIFFERENTIAL PRESSURE SENSORS LOCATED INSIDE CASINO 2 OR CASINO 3 (ADJUSTABLE) FROM THE BAS. VFD SHALL CONTROL TO BUILDING PRESSURE SETPOINT OF 20 PSI (ADJUSTABLE). SHOULD THE CHILLED WATER PUMP MOTOR FAIL, AN ALARM SHALL BE SENT TO THE BAS AND THE LAG CHILLER MODULE SHALL BE OPERATED TO MAINTAIN DESIGN CONDITIONS.

F. THE CHILLER MODULE CONTROLLER SHALL MONITOR CONDENSER WATER SUPPLY TEMPERATURE AND VARY THE COOLING TOWER FAN SPEED TO MAINTAIN 75°F (ADJUSTABLE) SET POINT. CONDENSER WATER SHALL BE CAPABLE OF BEING RESET BASED ON AN OUTDOOR WET-BULB RANGE. SHOULD THE CONDENSER WATER TEMPERATURE CONTINUE TO FALL BELOW THE CONDENSER WATER SET POINT, THE CHILLER MODULE CONTROLLER SHALL MODULATE THE COOLING TOWER BY-PASS VALVE AS NECESSARY TO MAINTAIN THE CONDENSER WATER TEMPERATURE TO MAINTAIN THE CONDENSER WATER ENTERING TEMPERATURE FOR THE CURRENT LOAD CONDITIONS. COOLING TOWER BASIN HEATER(S) SHALL OPERATE AS NECESSARY TO MAINTAIN COLD WATER SUMP TEMPERATURE OF 40° F. IF THE COOLING TOWER FAN FAILS TO PROVE STATUS, THE ENTIRE CHILLER MODULE WILL BE ALARMED AND DISABLED, AND THE NEXT AVAILABLE CHILLER MODULE WILL BE REQUESTED.

G. THE MICROTECH II SHALL MONITOR THE DIFFERENCE IN PRESSURE BETWEEN THE REFRIGERANT DISCHARGE AND SUCTION PRESSURES (LIFT) AND MODULATE THE CONDENSER LEAVING CHOKE VALVE AS NECESSARY TO MAINTAIN THE CONDENSER WATER TEMPERATURE FOR THE OPTIMUM LIFT SET POINT FOR THE CURRENT LOAD CONDITIONS.

4. WATERSIDE ECONOMIZER MODULES

A. GENERAL:

a. HEAT EXCHANGER MODULE

B. HEAT EXCHANGERS:

a. TYPICALLY, WATERSIDE ECONOMIZING SHALL BE DETERMINED OPTIMAL WHEN THE OUTDOOR DRY BULB TEMPERATURE IS 55°F (ADJUSTABLE) OR LESS AND WET BULB TEMPERATURE IS MORE THAN 10°F (ADJUSTABLE) BELOW CHILLED WATER SUPPLY TEMPERATURE SET POINT. THE DECISION FOR HEAT EXCHANGER (HEX) OPERATION CAN BE MANUALLY INITIATED BY THE FACILITY OPERATOR.

b. WATERSIDE ECONOMIZING REMAIN IN ECONOMIZER MODE UNTIL CONDITIONS WILL NO LONGER SUPPORT HEX CHILLED WATER SET POINT TEMPERATURE. HEX MODE SHALL HAVE MINIMUM ON/OFF TIMES TO MINIMIZE SHORT CYCLING CONDITIONS.

C. VALVE CONTROL:

a. DURING HEX MODE, THE WATERSIDE ECONOMIZER MODULATING DIVERTING VALVE LOCATED IN THE CHILLED WATER RETURN HEADER UPSTREAM OF THE CHILLER(S) SHALL CLOSE AND DIRECT CHILLED WATER RETURN THROUGH THE HEAT EXCHANGER. THE PLANT MODULE MCP CONTROLLER SHALL CLOSE THE CONDENSER WATER RETURN VALVE AND OPEN THE CONDENSER WATER RETURN VALVE AND THE CONDENSER WATER SUPPLY VALVE, ALLOWING CONDENSER WATER TO FLOW FROM THE CONDENSER WATER PUMP AND THROUGH THE HEAT EXCHANGER FROM THE COOLING TOWER WHILE BYPASSING THE CHILLER (ASSOCIATED CHILLER MODULE CHILLER SHALL NOT BE IN OPERATION). THE PLANT MCP CONTROLLER SHALL CLOSE THE CHILLED WATER RETURN VALVE AND OPEN THE CHILLER BYPASS VALVE, ALLOWING CHILLED WATER TO FLOW FROM THE CHILLED WATER PUMP TO THE CHILLED WATER SUPPLY HEADER WHILE BYPASSING THE CHILLER. PROCESS SHALL REVERSE WHEN EXITING HEAT EXCHANGER MODE.

D. HEAT EXCHANGER PUMPING:

a. THE MCP CONTROLLER SHALL ENERGIZE THE CONDENSER WATER PUMP OF ASSOCIATED CHILLER MODULE CONDENSER WATER SUPPLY SHALL BE PUMPED DIRECTLY TO THE HEAT EXCHANGER WHILE BYPASSING THE CHILLER.

E. COOLING TOWER OPERATION:

a. CHILLER MODULE MCP CONTROLLER SHALL VARY THE COOLING TOWER FAN SPEED TO MAINTAIN A CONDENSER WATER SUPPLY SET POINT. FAN SPEED SHALL BE ALLOWED TO INCREASE PROPORTIONALLY WITH CONDENSER WATER TEMPERATURE TO MAINTAIN ADEQUATE CAPACITY OF HEX MODE. TOWER BYPASS VALVE SHALL BE DISABLED DURING HEX MODE OPERATION.

5. MCP HEATING HOT WATER OPERATION - BOILER MODULE

A. THE BOILER MODULE CONTAINS FOUR (4) HEATING HOT WATER BOILERS, FOUR (4) BOILER WATER PUMPS AND TWO (2) SECONDARY HEATING HOT WATER PUMPS. THE BOILER MODULE CONTROLLER SHALL MONITOR EQUIPMENT WITHIN THE BOILER MODULE, COMMUNICATING STATUS AND ALARM POINTS TO THE JACE. SHOULD THE MODULE CONTROLLER FAIL, THE BOILER MODULE SHALL CONTINUE TO OPERATE IT THE LAST KNOWN STATE AND AN ALARM SHALL BE SENT TO THE JACE.

B. WHEN THE BOILER MODULE IS COMMANDED ON, THE MODULE CONTROLLER SHALL ENABLE THE LEAD BOILER AND ASSOCIATED LEAD BOILER WATER PUMP THROUGH THE MASTER BOILER CONTROL SYSTEM (BCS) THAT RESIDES INTERNAL WITH THE BOILERS. THE BCS SHALL STAGE ON/OFF BOILERS AND ASSOCIATED DEDICATED BOILER PUMPS AS NECESSARY TO MAINTAIN THE HEATING HOT WATER SUPPLY TEMPERATURE SET POINT OF 195° F (ADJUSTABLE).

4. HEATING HOT WATER SECONDARY PUMPS

A. WHEN THE MCP HAS BEEN COMMANDED TO START, THE MODULE CONTROLLER SHALL START THE SECONDARY PUMP(S). FOR 100% REDUNDANT SECONDARY PUMPS, THE LEAD SECONDARY PUMP (SELECTABLE) WILL OPERATE. THE SECONDARY PUMPS SHALL ROTATE LEAD POSITION ON A WEEKLY BASIS (ADJUSTABLE) TO EQUALIZE PUMP RUNTIME.

B. THE MODULE CONTROLLER SHALL MODULATE THE LEAD PUMP SPEED WITH A DEDICATED VFD THROUGH A SIGNAL RECEIVED BY DIFFERENTIAL PRESSURE SENSORS LOCATED INSIDE THE BUILDING FROM THE BAS.

C. FOR 100% REDUNDANT SECONDARY PUMPS, IF THE LEAD PUMP FAILS THE LAG PUMP WILL TURN ON. IF THE LEAD PUMP RUNS AT GREATER THAT 98% (ADJUSTABLE) FOR 5 MINUTES (ADJUSTABLE) THE LAG PUMP SHALL TURN ON AND BOTH PUMPS SHALL RAMP TOGETHER TO MAINTAIN PLANT DISCHARGE PRESSURE.

6. MCP HEATING HOT WATER OPERATION - FUTURE MULTIPLE BOILER MODULES

A. THE MCP CONTROLLER (JACE) SHALL STAGE UP AND DOWN BOILER MODULES BASED ON BUILDING DEMAND FOR HEATING HOT WATER. BOILER MODULE A WILL INITIALLY START IN THE LEAD POSITION, BOILER MODULE G (FUTURE) SHALL BE IN THE LAG POSITION (ADJUSTABLE). AFTER A DURATION (TO BE DETERMINED) THE BOILER MODULES SHALL SHIFT ONE POSITION IN ROTATION, THIS IS DONE TO EQUALIZE RUN TIME HOURS ON THE EQUIPMENT. IF ANY BOILER MODULE IS IN AN ALARM CONDITION THE NEXT AVAILABLE BOILER MODULE SHALL BE ENABLED. IF THE HEATING HOT WATER RETURN TEMPERATURE EXCEEDS FALLS BELOW 130° F (ADJUSTABLE), THE NEXT LAG BOILER MODULE, NOT IN OPERATION, SHALL BE ENERGIZED.

B. THE SYSTEM SHALL MAINTAIN A 180° F HEATING HOT WATER SUPPLY SET POINT (ADJUSTABLE). THE SYSTEM WILL STAGE BOILER MODULES UP TO THE MAXIMUM NUMBER OF MODULES BASED ON THE MCP HEATING HOT WATER SUPPLY TEMPERATURE. WHEN THE HEATING HOT WATER SUPPLY TEMPERATURE REACHES 5 DEG F (ADJUSTABLE) BELOW MCP SET POINT FOR 10 MINUTES (ADJUSTABLE) THE NEXT BOILER MODULE WILL BE ENABLED. THIS PROCESS WILL CONTINUE UNTIL THE MAXIMUM NUMBER OF BOILER MODULES IS REACHED OR THE MCP HEATING HOT WATER SUPPLY TEMPERATURE IS SATISFIED. THE SYSTEM WILL STAGE BOILER MODULES DOWN TO THE LEAD MODULE AS THE AVERAGE HEATING HOT WATER RETURN TEMPERATURE RISES ABOVE DESIGN TEMPERATURE PLUS A RESET OFFSET BASED ON THE NUMBER OF RUNNING BOILERS FOR 10 MINUTES (ADJUSTABLE).

7. MCP HVAC

EACH MODULE CONTAINS ONE (1) PACKAGED TERMINAL AIR CONDITIONING UNIT (PTAC) TO MAINTAIN TEMPERATURES BETWEEN 40°F AND 90°F WITHIN THE MCP ENCLOSURE.

8. REFRIGERANT AND CO ALARM PANEL

ONE (1) REFRIGERANT GAS (R-134A) LEAK AND CARBON MONOXIDE MONITORING AND ALARM SYSTEMS SHALL CONTINUALLY MONITOR AND ALARM SHOULD ALARM LEVEL SETPOINTS BE EXCEED WITHIN THE MCP IN ACCORDANCE WITH ASHRAE 15-2007. SHOULD THE SENSOR DETECT REFRIGERANT OR CO, THE MONITORING SYSTEMS SHALL OPEN THE MAKE-UP AIR LOUVER DAMPER, ACTIVATE THE MCP EXHAUST FAN, ALARM ALL HORN/STROBES AND SEND AN ALARM SIGNAL TO THE BAS.

A MP0.11 SEQUENCE OF OPERATION - CENTRAL PLANT
NTS

	MFG PLANT, ALL THE POINTS LISTED WILL BE DISPLAYED ON THE ABS BMS		AI	AO	DI	DO
	Chiller Capacity Limit (each)		X			
	Refrigerant Temp (each)		X			
	Compressor Run Hours (each)		X			
	Compressor Starts (each)		X			
	Condenser Pressure (each)		X			
	Evap Pressure (each)		X			
	Liquid Line Pressure (each)		X			
	Liquid Line Temperature (each)		X			
	Oil feed Temperature (each)		X			
	Oil Sump Pressure (each)		X			
	Oil Sump Temperature (each)		X			
	Suction Temperature (each)		X			
	Discharge Temperature (each)		X			
	Chiller Capacity (each)		X			
	Chiller Status (each)				X	
	Active Set point (each)			X		
	Tower Flow Switch Status (each)				X	
	Chilled Water flow Switch Status (each)				X	
	Condenser Water Flow Switch Status (each)				X	
	Cooling Tower Fan Speed (each)		X			
	Cooling Tower Command (each)					X
	Cooling Tower Fan Status (each)				X	
	Condenser Water Supply Temp (each)		X			
	Condenser Water Supply Set Point (each)			X		
	Condenser Water Pump Command (each)					X
	Condenser Water Pump Status (each)				X	
	Condenser Water Return Temperature (each)		X			
	Chilled Water Supply Temperature (each)		X			
	Chilled Water Return Temperature (each)		X			
	Chilled Water Pump Command (each)					X
	Chilled Water Pump Status (each)				X	
	Chilled Water Pump Speed (each)		X			
	Boiler Supply Temperature (each)		X			
	Boiler Return Temperature (each)		X			
	Boiler Circulating Pump Status (each)				X	
	Boiler Alarm Status (each)				X	
	Boiler Firing Rate (each)		X			
	Boiler Lockout Code (each)		X			
	Boiler Runtime (each)		X			
	Heat Exchanger 1 Chilled Water Supply		X			
	Heat Exchanger 1 Chilled Water Return		X			
	Heat Exchanger 1 Condenser Water Supply		X			
	Heat Exchanger 1 Condenser Water Return		X			
	Heat Exchanger Return Valve Position		X			

B MP0.11 MODULAR CENTRAL PLANT POINTS LIST
NTS

MODULAR HEAT EXCHANGER (PHX) SEQUENCE OF OPERATION

HEAT PUMP CONDENSER WATER:

THE LEAD CONDENSER WATER PUMP (HCWP 1&2) SHALL RUN CONTINUALLY AT A CONSTANT SPEED DETERMINED BY THE BALANCE CONTRACTOR. ANYTIME THE LEAD PUMP FAILS AS DETERMINED BY A CURRENT RELAY OR A FAULT FROM THE VARIABLE SPEED DRIVE THE LAG PUMP SHALL START AND AN ALARM SHALL BE SENT TO THE BMS. THE LEAD AND LAG PUMPS SHALL ALTERNATE EACH MONTH BASED ON RUNTIME HOURS TO ENSURE EQUAL USE. THE HEAT PUMP LOOP TEMPERATURE SHALL BE CONTROLLED BY COOLING THE LOOP WITH HEAT EXCHANGER (HX1) AND HEATING THE LOOP WITH EXISTING BOILERS AND PUMPS. CHILLED WATER IS ALWAYS AVAILABLE TO EXCHANGER (HX1). THE BMS SHALL ALARM ANYTIME THE SUPPLY WATER FEEDING EXCHANGER (HX1) RISES ABOVE 42°F (ADJUSTABLE). THE HEAT PUMP LOOP SHALL BE MAINTAINED AT A MAXIMUM TEMPERATURE OF 85°F (ADJUSTABLE) BY MODULATING THE PRESSURE INDEPENDENT CHILLED WATER CONTROL VALVE SERVING EXCHANGER (HX2). ALARM AT THE BMS ANY TIME THE LOOP TEMPERATURE RISES ABOVE 90°F (ADJUSTABLE). THE HEAT PUMP LOOP SHALL BE HEATED TO MAINTAIN THE MINIMUM TEMPERATURE OF 50°F (ADJUSTABLE). THE LOOP IS HEATED BY STARTING THE LEAD EXISTING BOILER AND PUMP AT A CONSTANT SPEED. ANYTIME THE LEAD PUMP FAILS AS DETERMINED BY A CURRENT RELAY OR A FAULT FROM THE VARIABLE SPEED DRIVE THE LAG PUMP SHALL START AND AN ALARM SHALL BE SENT TO THE BMS. THE LEAD AND LAG PUMPS SHALL ALTERNATE EACH MONTH BASED ON RUNTIME HOURS TO ENSURE EQUAL USE. ONCE THE LEAD PUMP IS STARTED THE PRESSURE INDEPENDENT CONTROL VALVE SERVING EXCHANGER (HX1) SHALL MODULATE TO MAINTAIN THE HEAT PUMP LOOP AT THE HEATING SET POINT. THE 3 WAY MIXING CONTROL VALVE SHALL BYPASS THE FLOW AROUND EXISTING BOILERS WHEN THE SYSTEM IS HEATING. EXCHANGER (HX1) SHALL NOT OPERATE AT THE SAME TIME. THE BMS SHALL ALARM ANYTIME THE SUPPLY WATER FEEDING EXCHANGER (HX1) FALLS BELOW 45°F (ADJUSTABLE).

DOMESTIC HOT WATER:

THE LEAD DOMESTIC WATER PUMP (DHWP1&2) SHALL RUN CONTINUALLY AT A CONSTANT SPEED DETERMINED BY THE BALANCE CONTRACTOR. ANYTIME THE LEAD PUMP FAILS AS DETERMINED BY A CURRENT RELAY OR A FAULT FROM THE VARIABLE SPEED DRIVE THE LAG PUMP SHALL START AND AN ALARM SHALL BE SENT TO THE BMS. THE LEAD AND LAG PUMPS SHALL ALTERNATE EACH MONTH BASED ON RUNTIME HOURS TO ENSURE EQUAL USE. THE DOMESTIC WATER TEMPERATURE IS MAINTAINED AT 115°F (ADJUSTABLE) BY MODULATING THE PRESSURE INDEPENDENT CONTROL VALVE SERVING EXCHANGER (DHX1&2). THE LEAD HEAT EXCHANGER SHALL OPERATE WITH ITS DOMESTIC WATER ISOLATION VALVE OPEN. ANYTIME THE LEAD EXCHANGER FAILS AS DETERMINED BY A SUPPLY WATER TEMPERATURE SENSOR AN ALARM SHALL BE SENT TO THE BMS. THE LEAD AND LAG EXCHANGER SHALL ALTERNATE EACH MONTH BASED ON RUNTIME HOURS TO ENSURE EQUAL USE. A HIGH LIMIT SUPPLY WATER TEMPERATURE SAFETY SHALL SHUT DOWN THE PUMPS, CLOSE THE PRIMARY HEATING VALVES AND ALARM AT THE BMS ANYTIME THE WATER TEMPERATURE RISES ABOVE 120°F (ADJUSTABLE).

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HARD ROCK CASINO 4 - EXPANSION
CENTRAL PLANT ADDITION
777 WEST CHEROKEE STREET
CATOOSA, OK 74015

ISSUE DATE: 02-14-2018

REVISIONS:

#	DESCRIPTION	DATE

STAMP:

REGISTERED PROFESSIONAL ENGINEER BENJAMIN W. KLUNE 21808 OKLAHOMA

FEB 14 2018

SHEET TITLE:

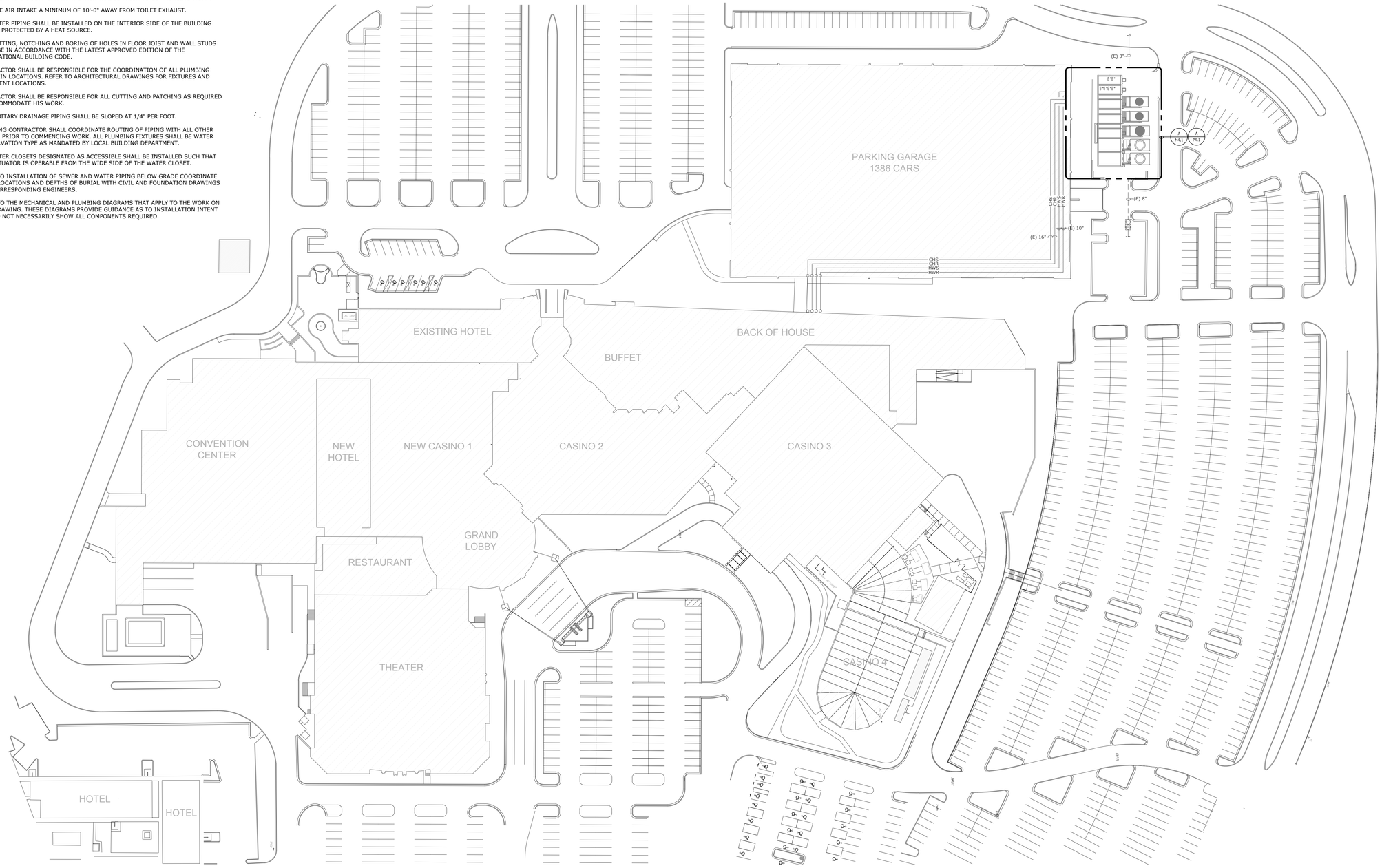
SEQUENCE OF OPERATION

SHEET

MP0.11

GENERAL NOTES:

1. REFER TO PLUMBING PLANS FOR SIZES AND ROUTING OF CONDENSATE DRAINS.
2. ACCESS DOORS ARE REQUIRED FOR ALL DAMPERS INSTALLED ABOVE INACCESSIBLE CEILINGS. COORDINATE EXACT LOCATION OF ALL ACCESS DOORS WITH ARCHITECT PRIOR TO INSTALLATION.
3. VERIFY LOCATION OF ALL THERMOSTATS WITH ARCHITECT PRIOR TO INSTALLATION. MOUNT ALL THERMOSTATS @48" A.F.F. IN ACCORDANCE WITH ADA STANDARDS.
4. VERIFY AND COORDINATE FRAME AND BORDER TYPE REQUIREMENTS FOR AIR DEVICES WITH ARCHITECTURAL CEILING PLANS PRIOR TO ORDERING.
5. DUCT SIZES SHOWN ARE THE CLEAR INSIDE DIMENSIONS.
6. THE MECHANICAL CONTRACTOR SHALL VERIFY THE LOCATION OF ALL ROOF MOUNTED EQUIPMENT AND ROOF PENETRATIONS WITH ARCHITECT AND STRUCTURAL ENGINEER PRIOR TO COMMENCING WORK.
7. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HVAC EQUIPMENT AND DUCTWORK WITH OTHER TRADES PRIOR TO COMMENCING WORK.
8. OUTSIDE AIR INTAKE A MINIMUM OF 10'-0" AWAY FROM TOILET EXHAUST.
9. ALL WATER PIPING SHALL BE INSTALLED ON THE INTERIOR SIDE OF THE BUILDING UNLESS PROTECTED BY A HEAT SOURCE.
10. THE CUTTING, NOTCHING AND BORING OF HOLES IN FLOOR JOIST AND WALL STUDS SHALL BE IN ACCORDANCE WITH THE LATEST APPROVED EDITION OF THE INTERNATIONAL BUILDING CODE.
11. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF ALL PLUMBING ROUGH-IN LOCATIONS. REFER TO ARCHITECTURAL DRAWINGS FOR FIXTURES AND EQUIPMENT LOCATIONS.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING AS REQUIRED TO ACCOMMODATE HIS WORK.
13. ALL SANITARY DRAINAGE PIPING SHALL BE SLOPED AT 1/4" PER FOOT.
14. PLUMBING CONTRACTOR SHALL COORDINATE ROUTING OF PIPING WITH ALL OTHER TRADES PRIOR TO COMMENCING WORK. ALL PLUMBING FIXTURES SHALL BE WATER CONSERVATION TYPE AS MANDATED BY LOCAL BUILDING DEPARTMENT.
15. ALL WATER CLOSETS DESIGNATED AS ACCESSIBLE SHALL BE INSTALLED SUCH THAT THE ACTUATOR IS OPERABLE FROM THE WIDE SIDE OF THE WATER CLOSET.
16. PRIOR TO INSTALLATION OF SEWER AND WATER PIPING BELOW GRADE COORDINATE EXACT LOCATIONS AND DEPTHS OF BURIAL WITH CIVIL AND FOUNDATION DRAWINGS AND CORRESPONDING ENGINEERS.
17. REFER TO THE MECHANICAL AND PLUMBING DIAGRAMS THAT APPLY TO THE WORK ON THIS DRAWING. THESE DIAGRAMS PROVIDE GUIDANCE AS TO INSTALLATION INTENT AND DO NOT NECESSARILY SHOW ALL COMPONENTS REQUIRED.



A MP1.0 MECHANICAL AND PLUMBING OVERVIEW PLAN
1" = 50'-0"

0' 25' 50' 100'

NORTH

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REGISTERED PROFESSIONAL ENGINEER
BENJAMIN W. KLUMB
21808
OKLAHOMA

FEB 14 2018

SHEET TITLE:

MECHANICAL AND PLUMBING OVERVIEW PLAN

SHEET

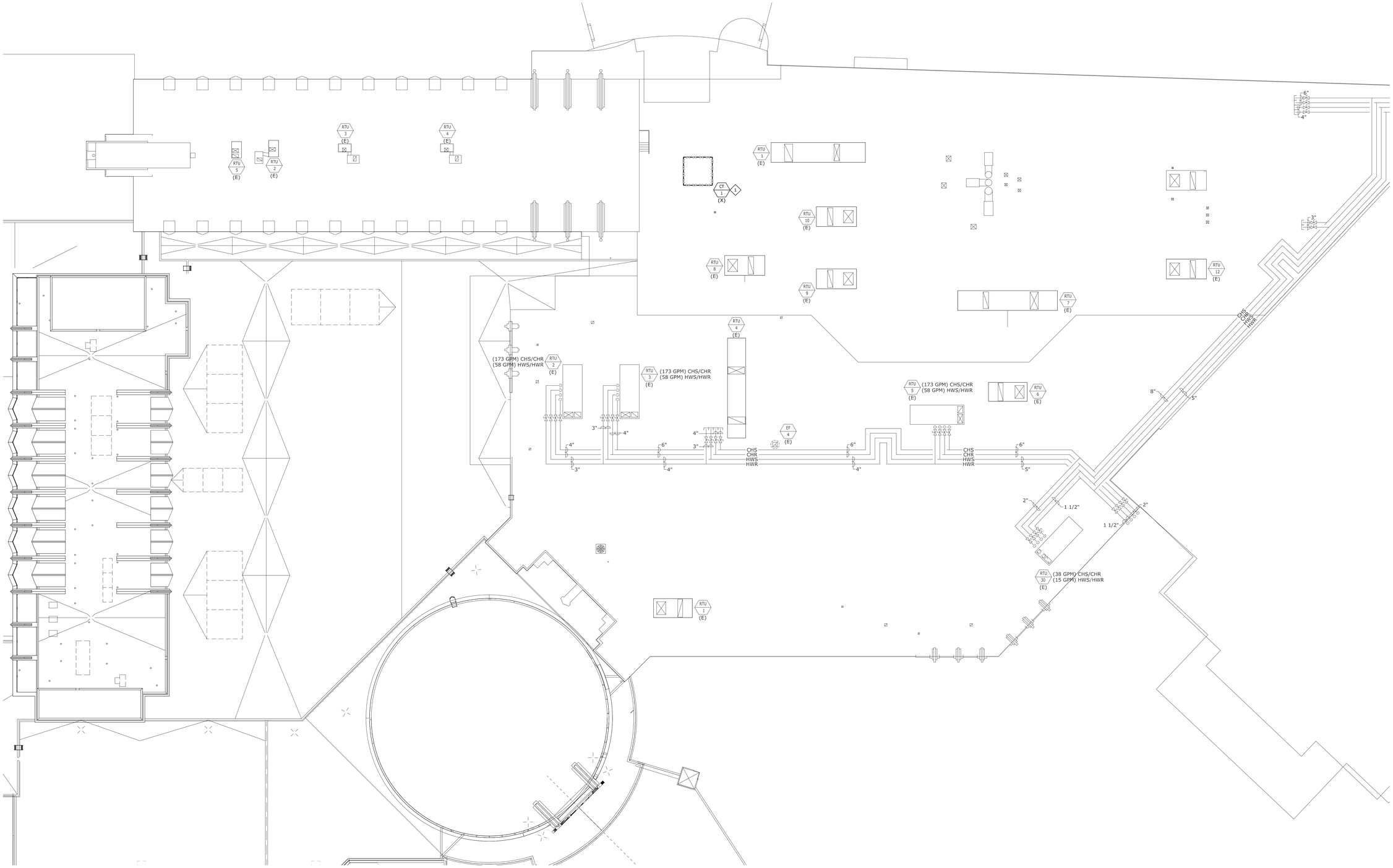
MP1.0

GENERAL NOTES:

1. DUCT SIZES SHOWN ARE THE CLEAR INSIDE DIMENSIONS.
2. THE MECHANICAL CONTRACTOR SHALL VERIFY THE LOCATION OF ALL ROOF MOUNTED EQUIPMENT AND ROOF PENETRATIONS WITH ARCHITECT AND STRUCTURAL ENGINEER PRIOR TO COMMENCING WORK.
3. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HVAC EQUIPMENT AND DUCTWORK WITH OTHER TRADES PRIOR TO COMMENCING WORK.
4. ALL EXHAUST OUTLETS SHALL BE LOCATED MIN. OF 10'-0" FROM ANY OUTSIDE AIR INTAKES.
5. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HYDRONIC PIPING WITH OTHER TRADES PRIOR TO COMMENCING WORK.
6. REFER TO THE MECHANICAL DETAILS THAT APPLY TO THE WORK ON THIS DRAWING. THESE DETAILS PROVIDE GUIDANCE AS TO INSTALLATION INTENT AND DO NOT NECESSARILY SHOW ALL COMPONENTS REQUIRED.

SHEET NOTES:

1. REMOVE EXISTING COOLING TOWER AND ASSOCIATED PIPING.



A MECHANICAL AND PLUMBING ROOF DEMOLITION PLAN
MPD5.1 1/16" = 1'-0"

NORTH

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HARD ROCK CASINO 4 - EXPANSION
CENTRAL PLANT ADDITION
777 WEST CHEROKEE STREET
CATOOSA, OK 74015

ISSUE DATE: 02-14-2018

REVISIONS:

#	DESCRIPTION	DATE

STAMP:

REGISTERED PROFESSIONAL ENGINEER
BENJAMIN W. CULLUM
21805
OKLAHOMA
FEB 14 2018

SHEET TITLE:

MECHANICAL AND PLUMBING ROOF DEMOLITION PLAN

SHEET

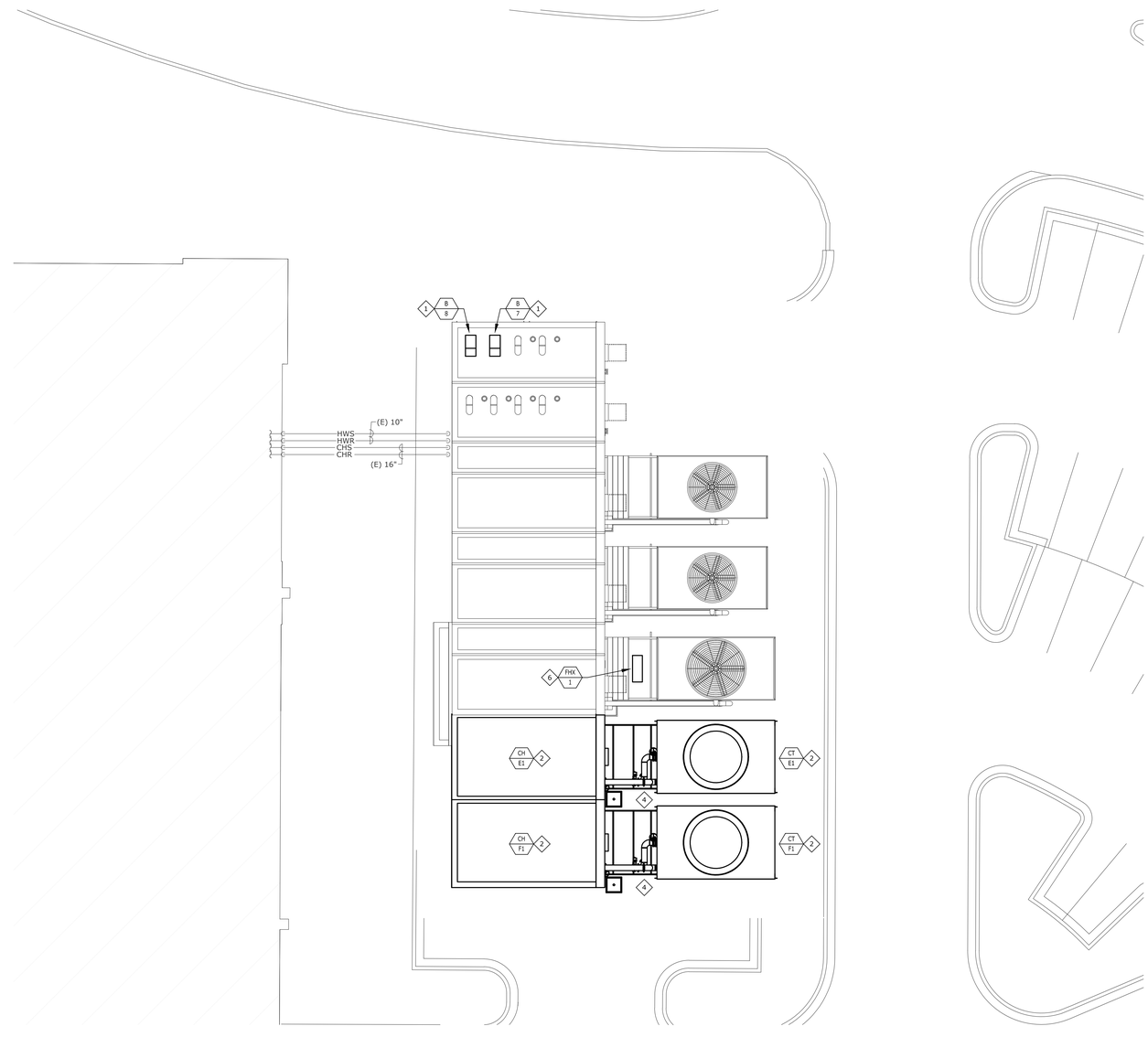
MPD5.1

GENERAL NOTES:

1. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HVAC EQUIPMENT AND DUCTWORK WITH OTHER TRADES PRIOR TO COMMENCING WORK.
2. THE CUTTING, NOTCHING AND BORING OF HOLES IN FLOOR JOIST AND WALL STUDS SHALL BE IN ACCORDANCE WITH THE LATEST APPROVED EDITION OF THE INTERNATIONAL BUILDING CODE.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING AS REQUIRED TO ACCOMMODATE HIS WORK.
4. REFER TO THE MECHANICAL DETAILS THAT APPLY TO THE WORK ON THIS DRAWING. THESE DETAILS PROVIDE GUIDANCE AS TO INSTALLATION INTENT AND DO NOT NECESSARILY SHOW ALL COMPONENTS REQUIRED.

SHEET NOTES:

1. ADD NEW BOILER INTO EXISTING PLANT. REMOVE MAIN GAS REGULATOR, PROVIDE NEW GAS REGULATOR FOR EACH BOILER.
2. CONTRACTOR TO FIELD VERIFY AND COORDINATE WITH STRUCTURAL PIERS PRIOR TO INSTALLATION.
3. REMOVE EXISTING GAS REGULATOR AND INSTALL STRAIGHT PIPING IN PLACE.
4. PROVIDE 2" OF INSULATION. HEAT TRACE WITH METAL JACKETING ON ALL EXPOSED PIPING.
5. PROVIDE A SEPARATE GAS REGULATOR AT EACH BOILER WITH VENT THROUGH ROOF.
6. PROVIDE PLATE-AND-FRAME HEAT EXCHANGER, PIPING, INSULATION, METAL JACKETING, AND STAND, AS REQUIRED FOR OUTDOOR USE.



A M4.1 ENLARGED MECHANICAL PLAN
3/32" = 1'-0"

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FEB 14 2018

SHEET TITLE:

ENLARGED MECHANICAL PLAN

SHEET

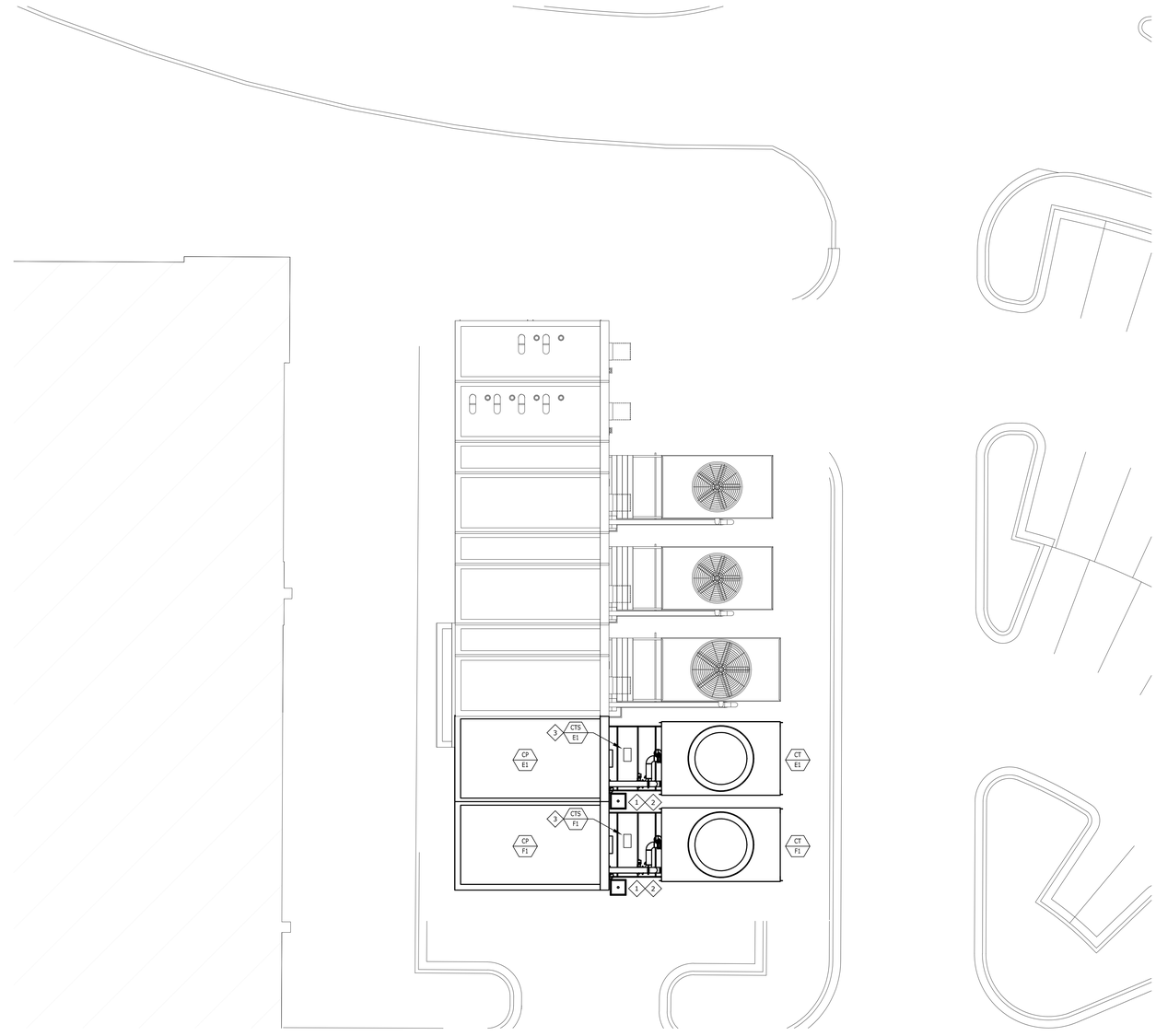
M4.1

GENERAL NOTES:

1. ALL WATER PIPING SHALL BE INSTALLED ON THE INTERIOR SIDE OF THE BUILDING.
2. THE CUTTING, NOTCHING AND BORING OF HOLES IN FLOOR JOIST AND WALL STUDS SHALL BE IN ACCORDANCE WITH THE LATEST APPROVED EDITION OF THE INTERNATIONAL BUILDING CODE.
3. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION OF ALL PLUMBING ROUGH-IN LOCATIONS. REFER TO ARCHITECTURAL DRAWINGS FOR FIXTURES AND EQUIPMENT LOCATIONS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CUTTING AND PATCHING AS REQUIRED TO ACCOMMODATE HIS WORK.
5. SANITARY DRAINAGE PIPING SHALL BE SLOPED: UNDER 3" AT 1/4" PER FOOT, 3" AND LARGER AT 1/8" PER FOOT.
6. PLUMBING CONTRACTOR SHALL COORDINATE ROUTING OF PIPING WITH ALL OTHER TRADES PRIOR TO COMMENCING WORK.
7. ALL PLUMBING FIXTURES SHALL BE WATER CONSERVATION TYPE AS MANDATED BY LOCAL BUILDING DEPARTMENT.
8. ALL WATER CLOSETS DESIGNATED AS ACCESSIBLE SHALL BE INSTALLED SUCH THAT THE ACTUATOR IS OPERABLE FROM THE WIDE SIDE OF THE WATER CLOSET.
9. PRIOR TO INSTALLATION OF SEWER AND WATER PIPING BELOW GRADE COORDINATE EXACT LOCATIONS AND DEPTHS OF BURIAL WITH CIVIL AND FOUNDATION DRAWINGS AND CORRESPONDING ENGINEERS.
10. REFER TO THE PLUMBING DIAGRAMS THAT APPLY TO THE WORK ON THIS DRAWING. THESE DIAGRAMS PROVIDE GUIDANCE AS TO INSTALLATION INTENT AND DO NOT NECESSARILY SHOW ALL COMPONENTS REQUIRED.

SHEET NOTES:

1. EXISTING 4'X4'X4' DRAINS TO REMAIN AS IS.
2. ROUTE COOLING TOWER BLOWDOWN TO EXISTING DRAIN.
3. PROVIDE 2" OF INSULATION WITH METAL JACKETING AND INSULATION FOR CENTRIFUGAL SEPARATOR.



A P4.1 ENLARGED PLUMBING PLAN
3/32" = 1'-0"

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OKLAHOMA

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SHEET TITLE:

ENLARGED PLUMBING PLAN

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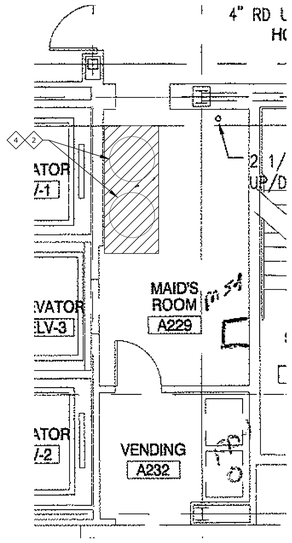
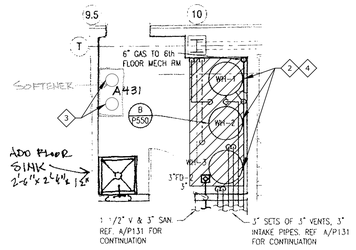
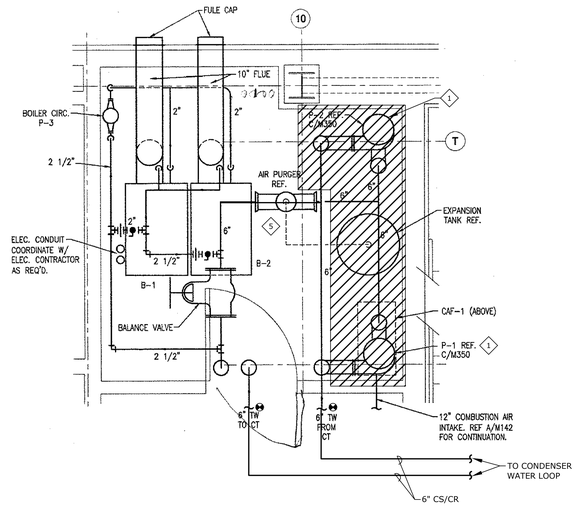
P4.1



A MP4.2 AREA "A" 2ND FLOOR MAID'S AND VENDING ROOMS
1/4" = 1'-0"
0' 1' 2' 4' 8'
NORTH



B MP4.2 ENLARGED WATER HEATER PLAN (4TH FLOOR)
1/4" = 1'-0"
0' 1' 2' 4' 8'
NORTH



C MP4.2 6TH FLOOR MECHANICAL ROOM
1/2" = 1'-0"
0' 1/2' 1' 2' 4'
NORTH

DEMOLITION NOTES:

1. EQUIPMENT AND PIPING LOCATIONS SHOWN FROM BEST AVAILABLE INFORMATION. CONTRACTOR SHALL FIELD VERIFY SIZES AND LOCATIONS.
2. EQUIPMENT THAT IS BEING REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE REMOVED FROM THE JOB SITE, EXCEPT EQUIPMENT SELECTED BY OWNER. OWNER SELECTED EQUIPMENT WILL BE TAGGED AND SHALL BE MOVED BY CONTRACTOR TO OWNER'S STORAGE ON SITE.
3. WHERE PIPING OR DUCTWORK IS TO BE CUT OFF AT A POINT, IT SHALL BE CAPPED OR BLANKED OFF AT THAT POINT. INSULATION ON REMAINING PIPE OR DUCT TO BE REPAIRED TO NEW CONDITION.
4. PIPING CONNECTED TO EQUIPMENT THAT IS BEING REMOVED SHALL BE CUT AND CAPPED IN WALLS, FLOORS OR CEILING SO AS NOT TO INTERFERE WITH NEW CONSTRUCTION OR EQUIPMENT.

SHEET NOTES:

1. REMOVE CONDENSER WATER PUMP AND ALL ASSOCIATED PIPING. CONTRACTOR SHALL COORDINATE WITH CNE PRIOR TO SHUT DOWN.
2. REMOVE WATER HEATERS, PUMPS, AND ALL ASSOCIATED PIPING. CONTRACTOR SHALL COORDINATE WITH CNE PRIOR TO SHUT DOWN.
3. WATER SOFTENERS SHALL REMAIN ON 4TH FLOOR.
4. REMOVE ALL WATER HEATER FLUE PIPING AND CAP AS REQUIRED. CONTRACTOR SHALL COORDINATE WITH CNE PRIOR TO SHUT DOWN.
5. PROVIDE NEW 6" CS/CR PIPING. ROUTE FROM EXISTING BOILERS TO CONDENSER WATER LOOP.

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ENLARGED MECHANICAL AND PLUMBING PLANS

SHEET

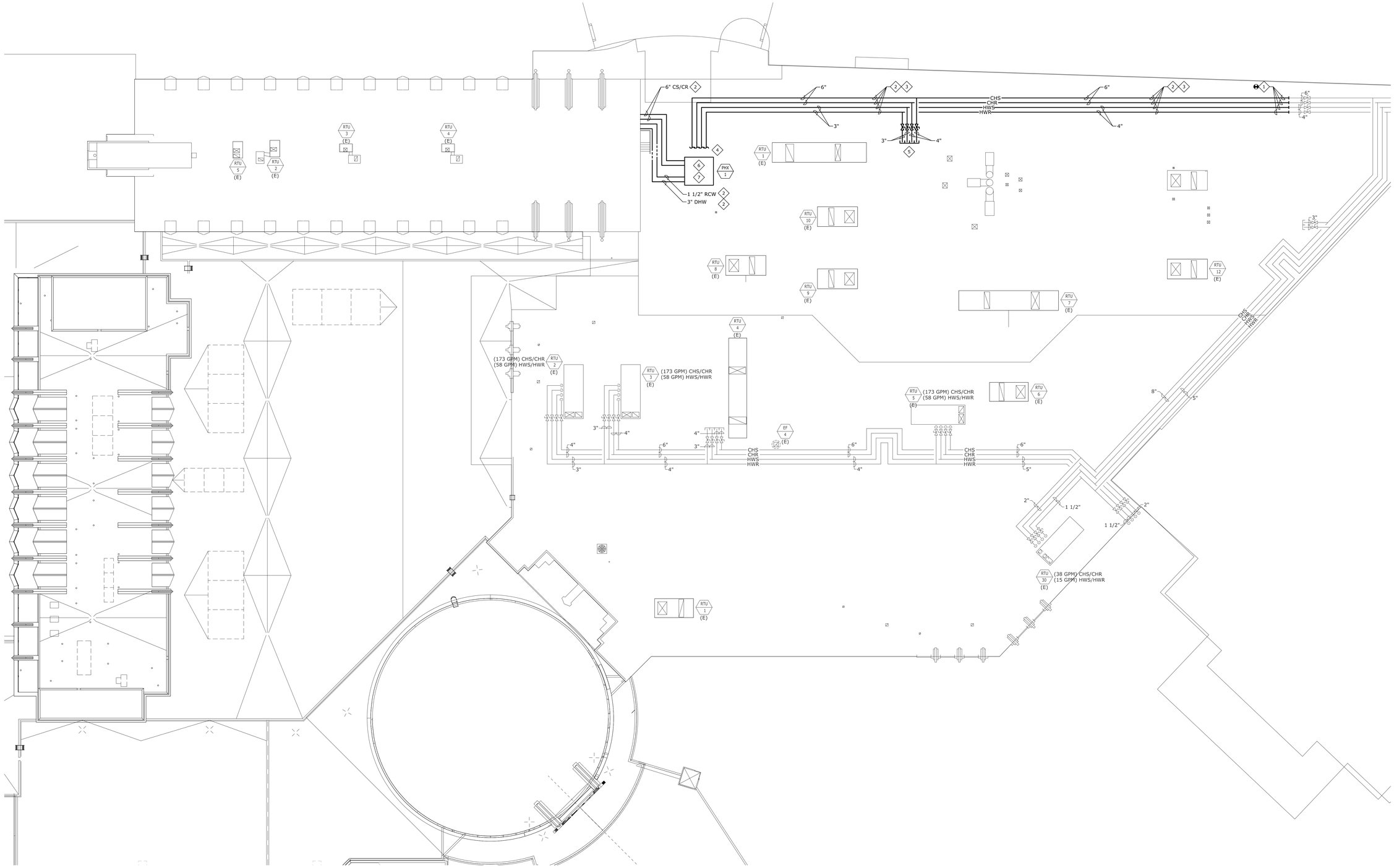
MP4.2

GENERAL NOTES:

1. DUCT SIZES SHOWN ARE THE CLEAR INSIDE DIMENSIONS.
2. THE MECHANICAL CONTRACTOR SHALL VERIFY THE LOCATION OF ALL ROOF MOUNTED EQUIPMENT AND ROOF PENETRATIONS WITH ARCHITECT AND STRUCTURAL ENGINEER PRIOR TO COMMENCING WORK.
3. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HVAC EQUIPMENT AND DUCTWORK WITH OTHER TRADES PRIOR TO COMMENCING WORK.
4. ALL EXHAUST OUTLETS SHALL BE LOCATED MIN. OF 10'-0" FROM ANY OUTSIDE AIR INTAKES.
5. THE MECHANICAL CONTRACTOR SHALL COORDINATE LOCATION AND ROUTING OF HYDRONIC PIPING WITH OTHER TRADES PRIOR TO COMMENCING WORK.
6. REFER TO THE MECHANICAL DETAILS THAT APPLY TO THE WORK ON THIS DRAWING. THESE DETAILS PROVIDE GUIDANCE AS TO INSTALLATION INTENT AND DO NOT NECESSARILY SHOW ALL COMPONENTS REQUIRED.

SHEET NOTES:

1. CONNECT NEW 6" CHS/SHR, 4" HWS/HWR INTO EXISTING 6" CHS/CHR, 4" HWS/HWR.
2. PROVIDE 2" INSULATION WITH METAL JACKETING.
3. PROVIDE AND MATCH EXISTING PIPE STANDS AS REQUIRED.
4. REFER TO SHEET MP0.4 FOR PIPING CONNECTIONS TO PHX-1
5. FUTURE 4" CHS/CHR, AND 3" HWS/HWR TAPS.
6. ROUTE 6" CS/CR, 3" DHW, AND 1 1/2" RCW PIPING TO NEW PHX-1.
7. CONNECT EXISTING 2" MAKE-UP WATER TO CONDENSER/DOMESTIC LOOP WITH ISOLATION VALVES, AND BACK FLOW PREVENTION STATION. RE-INSULATE AS REQUIRED.



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MP5.1 1/16" = 1'-0"

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MP5.1