

This drawing is the property of Peritus Engineers & Associates, Inc. and shall not be used or reproduced without their written permission.

© 2022 PERITUS ENGINEERS & ASSOCIATES, INC.

MATERIALS SPECIFICATIONS

PIPE AND TUBE

- A. STEEL PIPE: BLACK STEEL PIPE SCHEDULE 40 ASTM A53, A106 OR A120; ALL FLANGES 150 LB. STEEL CONFORMING TO ASTM NO. 181.
- B. GENERAL: PROVIDE DOMESTIC MANUFACTURED PIPE AND TUBE OF THE TYPE, JOINT TYPE, GRADE, SIZE AND WEIGHT (WALL THICKNESS OR CLASS) INDICATED FOR EACH SERVICE. WHERE TYPE, GRADE OR CLASS IS NOT INDICATED, PROVIDE PROPER SELECTION AS DETERMINED BY INSTALLER FOR INSTALLATION REQUIREMENTS, AND COMPLY WITH GOVERNING REGULATIONS AND INDUSTRY STANDARDS.
- C. JOINTS IN STEEL PIPE SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
- WELDED PIPING – JOINTS SHALL BE MADE AS SPECIFIED WITHIN.
- D. WELD PIPE JOINTS IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICE AND AS FOLLOWS:
- BLACK STEEL PIPE AND FITTINGS 2" & LARGER, EXCEPT CONNECTIONS TO EQUIPMENT, SHALL HAVE WELDED OR FLANGED JOINTS; PIPE SIZES 1-1/2" AND BELOW SHALL HAVE SCREWED JOINTS. WELDED FITTINGS SHALL BE USED IN ALL LINES 2" AND ABOVE.
 - THE ELECTRIC WELDING PROCESS SHALL BE USED, AND ALL WELDING MUST BE DONE IN ACCORDANCE WITH THE LATEST ACCEPTED STANDARDS.
 - ALL JOINTS MUST BE ABSOLUTELY TIGHT UNDER TEST AND OPERATING CONDITIONS; DEFECTIVE JOINTS MUST BE REMADE. AFTER COMPLETING A WELDED JOINT, IT SHALL BE MANDATORY FOR THE WELDER TO STAMP OR OTHERWISE IDENTIFY IT AS HIS WORK BY NUMBER, LETTER OR SYMBOL ASSIGNED TO HIM.
 - WELD PIPE JOINTS ONLY WHEN AMBIENT TEMPERATURE IS ABOVE 0 DEGREES F WHERE POSSIBLE.
 - BEVEL PIPE ENDS AT A 37.5-DEGREE ANGLE WHERE POSSIBLE, SMOOTH ROUGH CUTS, AND CLEAN TO REMOVE SLAG, METAL PARTICLES AND DIRT.
 - INSTALL WELDING RINGS FOR BUTTWELDED JOINTS.
 - USE PIPE CLAMPS OR TACK-WELD JOINTS WITH 1.0" LONG WELDS; 4 WELDS FOR PIPE SIZES TO 12".
 - BUILD UP WELDS WITH A STRINGER-BEAD PASS, FOLLOWED BY A HOT PASS, FOLLOWED BY A COVER OR FILLER PASS. ELIMINATE VALLEYS AT CENTER AND EDGES OF EACH WELD. WELD BY PROCEDURES WHICH WILL ENSURE ELIMINATION OF UNSOUND OR UNFUSED METAL, CRACKS, OXIDATION, BLOW-HOLES AND NON-METALLIC INCLUSIONS.
 - DO NOT WELD-OUT PIPING SYSTEM IMPERFECTIONS BY TACKWELDING PROCEDURES; RE-FABRICATE TO COMPLY WITH REQUIREMENTS.
 - INSTALL FORGED BRANCH CONNECTION FITTINGS WHEREVER BRANCH PIPE IS INDICATED OR INSTALL REGULAR "T" FITTING (AT CONTRACTOR'S OPTION).
 - SPRAY PAINT ALL WELDED CONNECTIONS WITH BLACK RUST PREVENTATIVE PAINT.
- E. FLANGED JOINTS: MATCH FLANGES WITHIN PIPING SYSTEM AND AT CONNECTIONS WITH VALVES AND EQUIPMENT. CLEAN FLANGE FACES AND INSTALL GASKETS. TIGHTEN BOLTS TO PROVIDE UNIFORM COMPRESSION OF GASKETS.
- F. COPPER TUBE: ASTM B88, TYPE (L) HARD-DRAWN TEMPER.
- G. FITTINGS FOR COPPER TUBE:

- CAST-BRONZE SOLDER-JOINT FITTINGS: ANSI NO. B16.18.
- WROUGHT-COPPER/BRONZE SOLDER-JOINT FITTINGS: ANSI NO. B16.22.
- COPPER-TUBE UNIONS: PROVIDE STANDARD PRODUCTS RECOMMENDED BY THE MANUFACTURER FOR USE IN THE SERVICE INDICATED.
- SOLDERED JOINTS IN COPPER TUBING SHALL BE IN ACCORDANCE WITH THE FOLLOWING:
 - PIPE SIZES 1-1/2" AND SMALLER – JOINTS SHALL BE MADE WITH A NON-CORROSIVE FLUX AND SOLDER COMPOSED OF 95% TIN AND 5% ANTIMONY. FLUX AND SOLDER TO BE LEAD FREE.
 - PIPE SIZES 2" AND LARGER – JOINTS SHALL BE MADE WITH A NON-CORROSIVE FLUX AND EITHER "SIL-PHOS", "EASY-FLO" OR "PHOS-COPPER". FLUX AND SOLDER TO BE LEAD FREE.
- SOLDER COPPER TUBE AND FITTING JOINTS WHERE INDICATED, IN ACCORDANCE WITH RECOGNIZED INDUSTRY PRACTICE. CUT TUBE ENDS SQUARELY, BEAM TO FULL INSIDE DIAMETER, AND CLEAN OUTSIDE OF TUBE ENDS AND INSIDE OF FITTINGS. APPLY SOLDER FLUX TO JOINT AREAS OF BOTH TUBES AND FITTINGS. INSERT TUBE FULL DEPTH INTO FITTINGS, AND SOLDER IN A MANNER WHICH WILL DRAW SOLDERED FULL DEPTH AND CIRCUMFERENCE OF JOINT. WIPE EXCESS SOLDER FROM JOINT BEFORE IT HARDENS.
- QUALITY ASSURANCE:
 - WELDING: QUALIFY WELDING PROCEDURES, WELDERS AND OPERATORS IN ACCORDANCE WITH ANSI B 31.1, PARAGRAPH 127.5, FOR SHOP AND PROJECT SITE WELDING OF PIPING WORK. CERTIFY WELDING OF PIPING WORK USING THE STANDARD PROCEDURE SPECIFICATIONS BY, AND WELDERS TESTED UNDER SUPERVISION OF, THE NATIONAL CERTIFIED PIPE WELDING BUREAU.
 - WELDING CERTIFICATIONS, PIPING WORK: SUBMIT WELDING CERTIFICATIONS TO ENGINEER OF RECORD PRIOR TO PERFORMING WORK.

PIPING HANGERS AND SUPPORTS

- A. GENERAL: EXCEPT AS OTHERWISE INDICATED, PROVIDE FACTORY-FABRICATED HORIZONTAL PIPING HANGERS AND SUPPORTS OF MSS TYPE AND SIZE INDICATED, BOLTS (IF ANY) AND WASHERS; COMPLY WITH MSS SP-58.
- ADJUSTABLE CLEWS HANGER: MSS TYPE 1, FABRICATED FROM STEEL. HANGER TO BE LARGE ENOUGH TO BE ON OUTSIDE OF PIPE INSULATION.
- B. VERTICAL-PIPING AND CLAMPS – GENERAL: EXCEPT AS OTHERWISE INDICATED, PROVIDE FACTORY-FABRICATED VERTICAL PIPING CLAMPS OF MSS TYPE AND SIZE INDICATED; COMPLY WITH MSS SP-58 AND MANUFACTURER'S PUBLISHED PRODUCT INFORMATION.
- TWO-BOLT RISER CLAMP: MSS TYPE 8.
- C. REFER TO DRAWING DETAILS FOR PIPING SUPPORTS.

PIPING VALVES

- A. GATE, BALL, BUTTERFLY AND CHECK VALVES TO BE INSTALLED AT ALL POINTS SPECIFIED AND INDICATED ON THE DRAWINGS. VALVES IN STEEL PIPE SIZE 2" AND UNDER SHALL BE SCREWED TYPE; SIZE 2-1/2" AND ABOVE, FLANGED TYPE.
- B. VALVES IN WATER (STEEL PIPE) SHALL BE RATED NO LESS THAN 150 POUNDS WORKING PRESSURE. VALVES SHALL BE STOCKHAM, MILWAUKEE OR HAMMOND IN ACCORDANCE WITH THE FOLLOWING TABLES:

- C. VALVES IN WATER LINES (COPPER PIPE) SHALL BE RATED NO LESS THAN 125 POUNDS WORKING PRESSURE. VALVES SHALL BE STOCKHAM, NIBCO, MILWAUKEE OR HAMMOND.
- D. BUTTERFLY VALVES: TO BE MILWAUKEE VALVE SERIES ML FOR "ON-OFF" OPERATION. VALVES SHALL BE CONSTRUCTED FOR A WORKING PRESSURE OF 150 PSI WITH BODIES OF CAST IRON, DISCS OF DUCTILE IRON, SHAFTS OF 17-4PH STAINLESS STEEL, SEATS AND O-RINGS TYPE E.P.D.M. ALL VALVES 6" AND GREATER TO HAVE GEAR DRIVE OPERATOR. ALL VALVES LOCATED 7'-0" ABOVE FINISH FLOOR TO HAVE GEAR DRIVE WITH CHAIN OPERATOR. CHAINS TO HAVE LENGTHS THAT WILL ALLOW OPERATION 6'-0" ABOVE FINISHED FLOOR. VALVES OF SIMILAR DESIGN AND EQUIVALENT CONSTRUCTION AS MANUFACTURED BY DEMCO, KEYSTONE OR NORRIS WILL BE ACCEPTABLE. ANY VALVE OFFERED SHALL BE LUG-BODY-DRILLED AND TAPPED.
- E. BALL VALVES:
- FOR PIPE SIZES 1" TO 3": THREE PIECE CARBON STEEL WITH SWING OUT ACCESSIBILITY, 150 PSI WORKING PRESSURE. SIMILAR TO APOLLO SERIES 82-100, THREADED FULL PORT.
 - FOR PIPE SIZED LESS THAN 1": USE SERIES 70-100.
 - COMPARABLE VALVES AS MANUFACTURED BY FLOWSET WILL BE ACCEPTABLE.
- F. DRAIN COCKS: TO BE WOLVERINE 1/2" NO. 667 W.S.A. WITH STUFFING BOX. COMPARABLE COCKS AS MANUFACTURED BY NIBCO OR CHICAGO FAUCET WILL BE ACCEPTABLE.

PIPE INSULATION

- A. AS DESIGNED BELOW SHALL BE INSULATED WITH ONE-PIECE MOLDED FIBROUS GLASS INSULATION (-60 TO 850 DEGREES F.) WITH PAPER FREE "ASJ MAX" JACKET DOUBLE SELF-SEALING LAP AND THICKNESS AS FOLLOWS:
- TOWER WATER SUPPLY AND RETURN PIPING OUTSIDE BUILDING.
 - ALL SIZES – 2" THICK
- B. INSULATION SHALL BE OWENS CORNING FIBERGLASS WITH PAPER-FREE JACKETING (ASJ MAX). SIMILAR INSULATION FROM LISTED MANUFACTURERS WILL BE CONSIDERED. INSULATION PROPERTIES TO INCLUDE, BUT NOT BE LIMITED TO, THE FOLLOWING:
- REINFORCED FOIL VAPOR BARRIER JACKETING.
 - JACKET TO HAVE FACTORY APPLIED DOUBLE PRESSURE SENSITIVE ADHESIVE.
 - SELF-SEALING BUTT STRIPS FOR CIRCUMFERENTIAL JOINTS.
 - UL LISTED.
 - PERMEANCE: 0.02 PERM/IN.
 - PUNCTURE RESISTANCE: 50 UNITS (ASTM D781)
 - THERMAL CONDUCTIVITY: 0.27 BTU .IN/HR ./FT. 2 DEG. F @ 150 DEG. F MEAN TEMPERATURE
- C. ON ALL PIPING EXPOSED OUTDOORS FINISH WITH ALUMINUM JACKET AS SPECIFIED HEREIN MAY BE USED.

TESTS

COOLING TOWER WATER PIPING SHALL BE HYDROSTATICALLY TESTED WITH WATER PRESSURE OF NOT LESS THAN 100 PSIG. CARE SHALL BE TAKEN TO AVOID PUTTING EXCESSIVE PRESSURES ON MECHANICAL SEALS, ACCESSORIES, SPECIALTIES, SAFETY DEVICES, ETC. WATER SYSTEM SHALL BE FILLED AND ALL AIR VENTED AT LEAST 24 HOURS BEFORE THE ACTUAL TEST PRESSURE IS APPLIED. TEST PRESSURE SHALL BE APPLIED, IF PRACTICAL, WHEN WATER AND AVERAGE AMBIENT TEMPERATURES ARE APPROXIMATELY EQUAL AND CONSTANT. TEST PRESSURE SHALL BE MAINTAINED FOR NOT LESS THAN TWO HOURS WITHOUT APPRECIABLE DROP AFTER THE FORCE PUMP HAS BEEN DISCONNECTED. LEAKS IN SCREWED FITTINGS SHALL BE CORRECTED BY REMAKING THE JOINTS. LEAKS IN WELDED JOINTS SHALL BE CUT OUT AND REWELDED.

TEST AND BALANCE

EXISTING COOLING TOWER WATERSIDE SYSTEM SHALL BE FLOW TESTED AND BALANCED BY NEBB CERTIFIED TEST AND BALANCE SUBCONTRACTOR. THIS INCLUDES NEW COOLING TOWER PUMPS SERVING EXISTING COOLING TOWER.

BUILDING AUTOMATION SYSTEM AND CONTROLS

THE EXISTING COOLING TOWER AND NEW TOWER PUMPS SHALL BE ENERGIZED, START/STOP, AND SEQUENCED BY THE EXISTING JOHNSON CONTROLS "JCI" BUILDING AUTOMATION SYSTEM. THE CONTROLS SUBCONTRACTOR SHALL UTILIZE THE EXISTING BUILDING AUTOMATION SYSTEM INFRASTRUCTURE. THE EXISTING CONTROL SIGNAL FROM THE EXISTING SKID PUMP PACKAGE SHALL BE USED TO START/STOP NEW OUTDOOR COOLING TOWER PUMPS. EACH NEW PUMP SHALL BE OPERATED WEEKLY ON A ROTATIONAL BASIS, IN ORDER TO ACHIEVE EQUAL OPERATING HOURS ON THE PUMPS.

PUMP SCHEDULE

PUMP No.	B & G MODEL No.	G.P.M. EA.	HEAD FT.	H.P. EA.	VOLTAGE	SUCTION DIFF.		REMARKS
						MODEL	PRESS. DRP.	
CTP-1	E1510-5EB-256T-L	800	65.0	20	460/3/60	HG-3Z	–	PRIMARY NOTES 1 – 6
CTP-2	E1510-5EB-256T-L	800	65.0	20	460/3/60	HG-3Z	–	STAND-BY NOTES 1 – 6

NOTES:

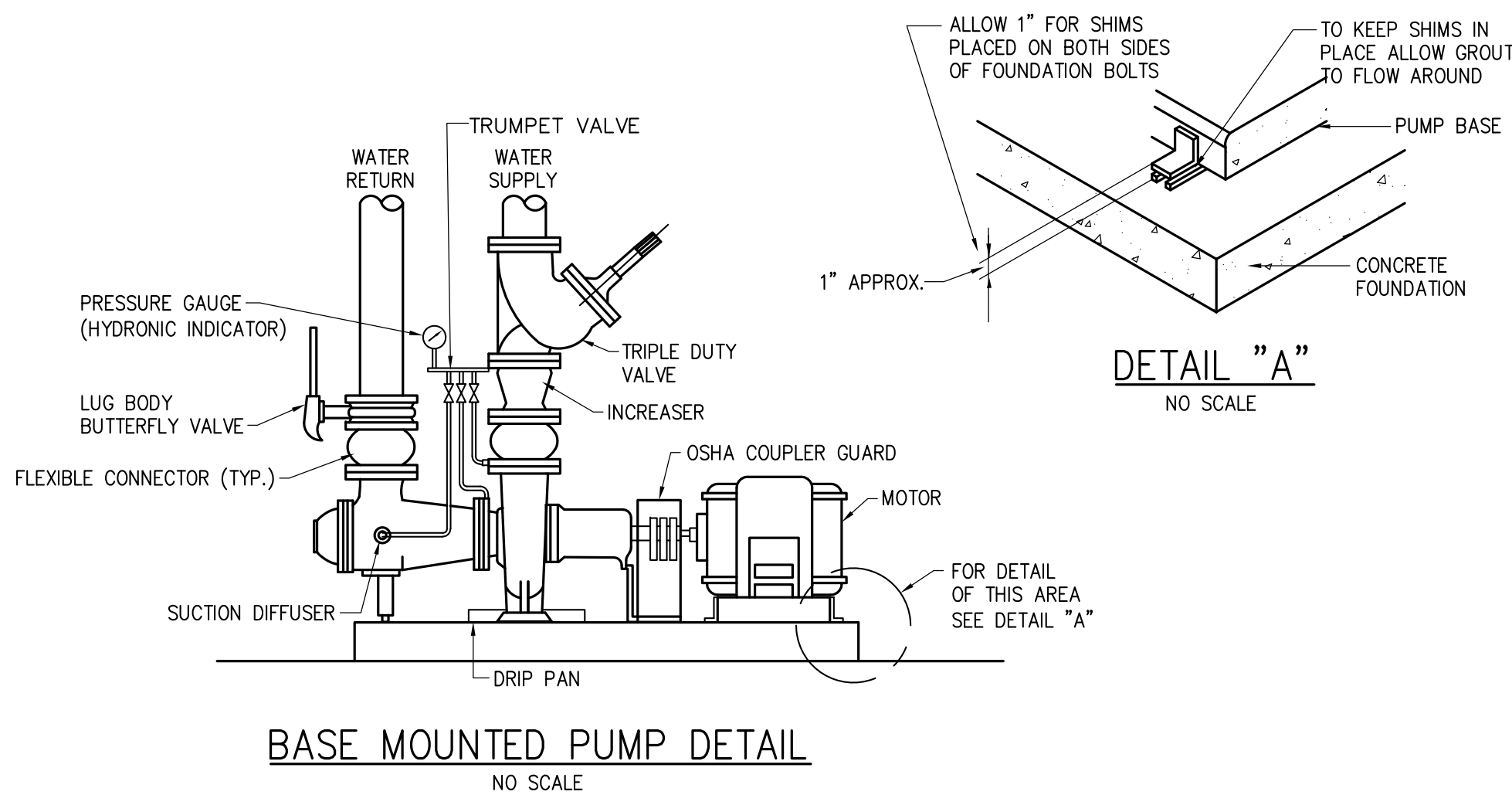
- PUMPS SHALL INCLUDE THE FOLLOWING: 1800 RPM, 256T FRAME, 9" IMPELLER, "BALDOR" TEPE NEMA PREMIUM EFF., SUPER-E WITH AEGIS SGR, INVERTER DUTY MOTOR.
- PROVIDE WITH 3DS-6S TRIPLE DUTY VALVE STRAIGHT PATTERN.
- PROVIDE WITH SMP6-SMP STAINLESS STEEL HOSE AND BRAID, 150# STEEL FLANGES – 6"x11".
- PROVIDE WITH SMP8-SMP STAINLESS STEEL HOSE AND BRAID, 150# STEEL FLANGES – 8"x12".
- PROVIDE WITH HFGK-1510L-004 "HYFAB" GAUGE KIT INCLUDING GAUGE PIPING AND ACCESSORIES TO INSTALL ON PUMP 1/4" GAUGE PORTS.
- PROVIDE ONE (1) "KECKLEY" NS-81FFS-C1250P34-FBI-GFV BASKET STRAINER (304 SS INTERNAL).

VARIABLE FREQUENCY DRIVE SCHEDULE

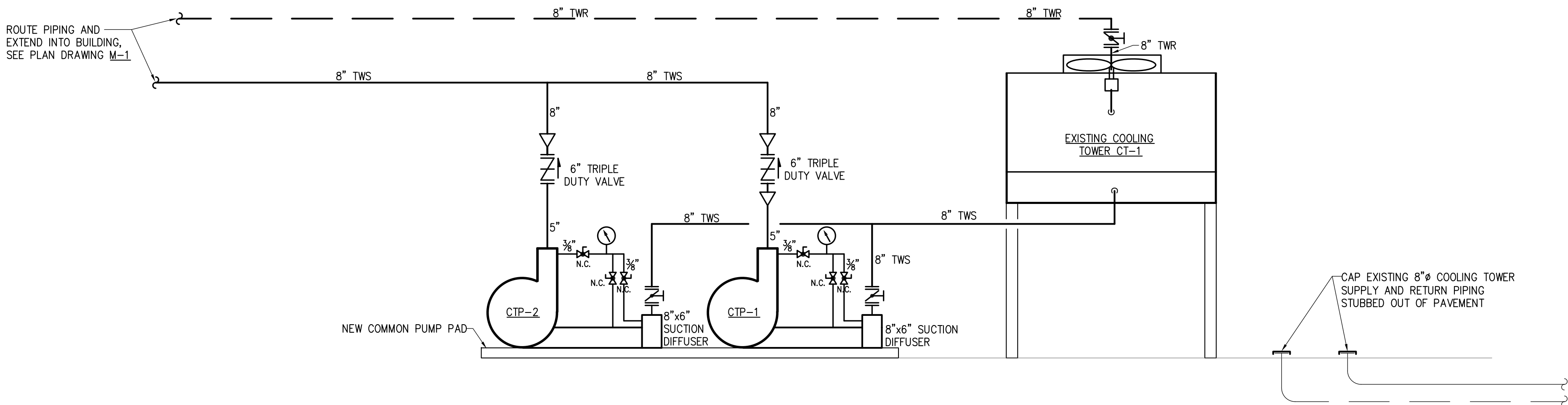
TAG	SERVICE	"DANFOSS" MODEL No.	H.P.	OUTPUT AMPS	VOLTAGE	REMARKS
VFD-1	CTP-1	FC-102 177U8545	20	27	460/3/60	NOTES 1-5
VFD-2	CTP-2	FC-102 177U8545	20	27	460/3/60	NOTES 1-5

NOTES:

- PROVIDE "BACNET" COMMUNICATION INTERFACE.
- NEMA 1 ENCLOSURE.
- UL LISTED.
- VERTICAL FUSED MAIN DISCONNECT BYPASS.
- 100KA SCCR



BASE MOUNTED PUMP DETAIL
NO SCALE



COOLING TOWER PIPING FLOW DIAGRAM

NO SCALE

ALL PIPING OUTSIDE AND AT TOWER TO BE ELECTRIC TAPE TRACED



Delivery Order No. P014-001
Cooling Tower Pumps & Piping Relocation
CENTENNIAL HALL - LANDER UNIVERSITY
Greenwood, South Carolina

SCHEDULES AND DETAILS

DESIGN SEM	/	DRAWN TCM
CHECKED JCP		
DATE 3/14/22		
JOB NO. PERITUS #211105		
SHEET		
M-2		
2 OF 2 SHEETS		