



CALIFORNIA STATE UNIVERSITY, DOMINGUEZ HILLS

SOUTHERN CALIFORNIA EDISON NEW SERVICE SWITCHYARD & CORE CAMPUS ELECTRICAL INFRASTRUCTURE UPGRADE

PROJECT HISTORY

- The CSUDH 5000kVA transformers and indoor 12,000V switchgear, and SCE outdoor switchgear require replacement due to the existing switchgear's age and capacity limitations. Campus load growth will also exceed the rating of the existing Campus service transformers.
- The Cal State Dominguez Hills campus completed an infrastructure assessment in 2016. After completing the 2016 assessment, the Campus began a series of new projects on Campus including new buildings and a Central Plant electrification project. The result of these new projects was evaluated with respect to the 12kV system load growth and existing SCE service. It was determined that the new projects funded and planned would result in overloading the SCE service and 12kV system capacity and require investment in upgrades to the Campus 12kV system. In 2018 the AC Martin Campus Master Plan report was issued. The AC Martin report included an architectural plan with new buildings and phased development of the Core Campus.
- The CSUDH campus has an existing Central Plant that includes THREE, 1000 Ton York Centrifugal chillers and EIGHT, 2 MMBtu Aerco Condensing boilers. The campus has a central chilled water distribution and a heating hot water distribution system. Historically, heating hot water has been delivered to the campus buildings in the 160-180 deg. F range. During the last year, campus has successfully brought down the hot water distribution temperature to 140 deg. F and lower. Chilledwater is typically distributed to the buildings at 42 – 45 deg. F.
- Campus goal is to reduce the Green House Gas (GHG) footprint substantially through energyconservation, electrification of heating and use of renewable energy. This project entails development of Phase-1 of the campus electrification concept, with an estimated peak heating capacity of approximately 6.1 MMBth using heat pumps (in air source mode). For reference, it may be noted that the peak campus heating demand is over 13 MMBtuh. Depending on growthin loads and success of the electrification efforts, there could be expansion of this Phase 1 effortthrough Phase-2 ad Phase-3 at a later date as campus building development evolves.

PROJECT DESCRIPTION

- This project proposes to install a new 16.5kV SCE service feeder duct bank located in International Avenue and Birchknoll Drive to a new service switchyard to be constructed south of Student Housing Phase 3, west of Birchknoll Drive, north and Unity Drive and east of the Central Plant. The New Switchyard will include an outdoor SCE 16.5kV metering switchgear housed in a conditioned steel building with Customer main breaker and two feeder breakers. The 16.5kV service voltage will be stepped down to 12kV by two 7500kVA/10,000kVA transformers installed in the switchyard. The new 12,000V switchgear will be housed in a conditioned steel building and be configured main-tie-main with feeder breakers to supply campus 12kV loop feeders. The switchyard will include two solid dielectric switches to supply campus loads and the station power transformers. The switchgear building will include auxiliary equipment needed for operation, control, and communications. Devices required for future SCADA and microgrid controls will be included. A new duct bank will be installed from the switchyard to the existing Central Plant 12kV switchgear location. New cable will be installed to connect the new switchyard feeder breaker sources with the existing campus loads. The existing campus SCE service switchgear and transformers will be demolished after the loads are transferred.

Existing Campus



Avalon Boulevard

**StubHub
Center**

**Campus
Core**

**University
Village**

Victoria Street

Dominguez Hills Parkway West

Fancloiff

Birchknoll

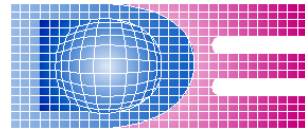
Central Avenue

Toro Center Drive

University Avenue



CSUDH – Central Plant Decarbonization (Heat Pump) Project



Digital Energy, Inc.

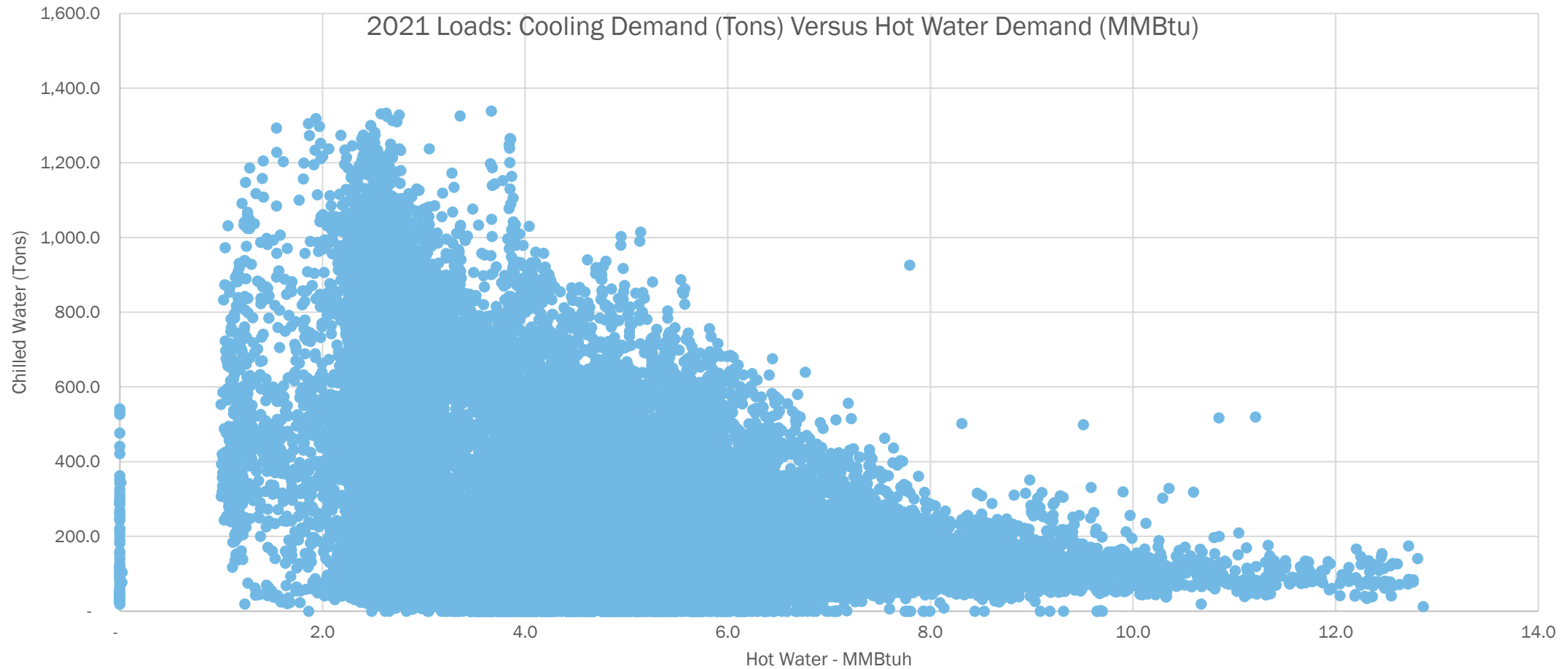
HEAT PUMP DESIGN BASIS

OCT 17, 2022

Central Plant Demand Profile

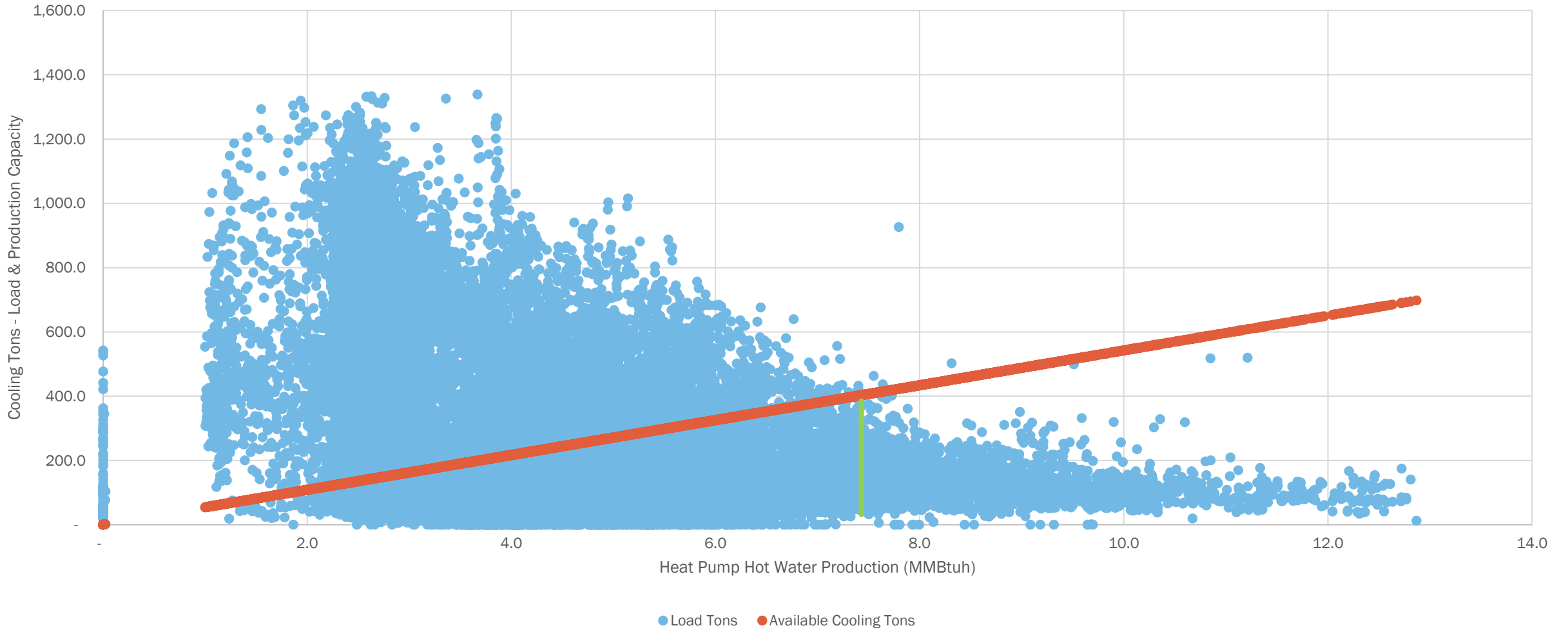
1. Existing Plant background
2. Heating and Cooling Load Profiles used for sizing heat Pumps
3. Layout
4. Major equipment
5. Summary of design features
6. Cost & Schedule
7. Equipment Pre-purchase strategy

Central Plant Demand Profile



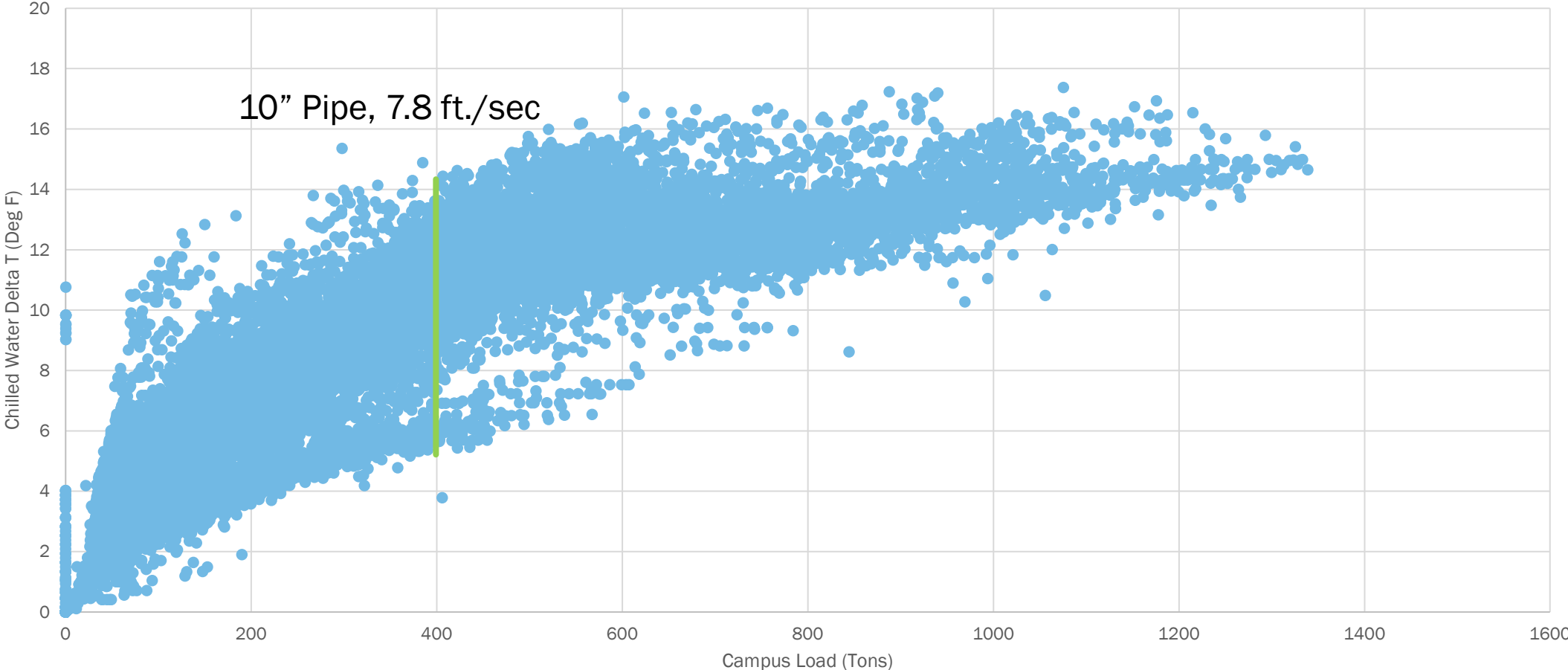
Heat Pump Available Cooling Capacity

Heat Pump: Available Cooling As A Function of Heating Output



Chilled water Delta-T

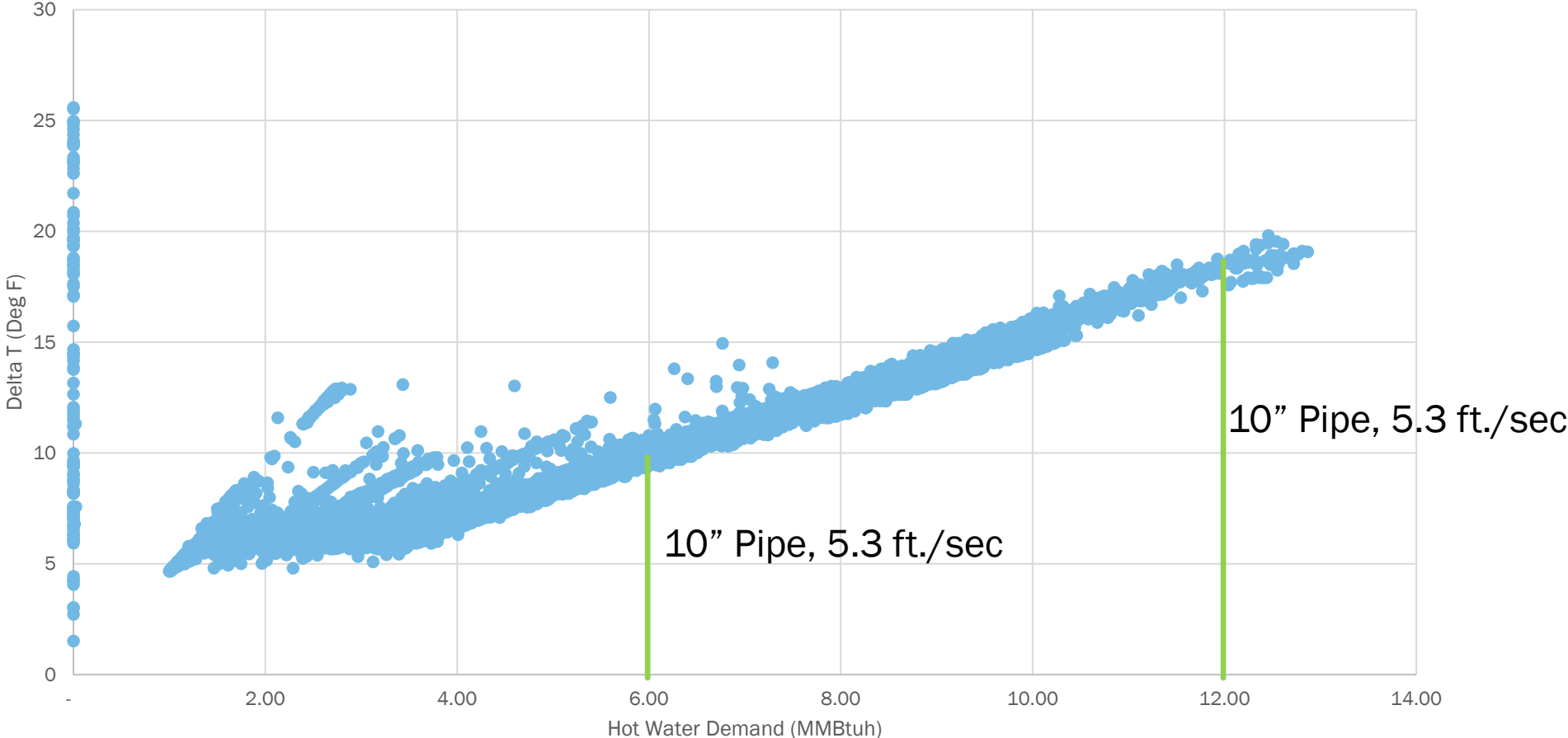
CHW Delta T



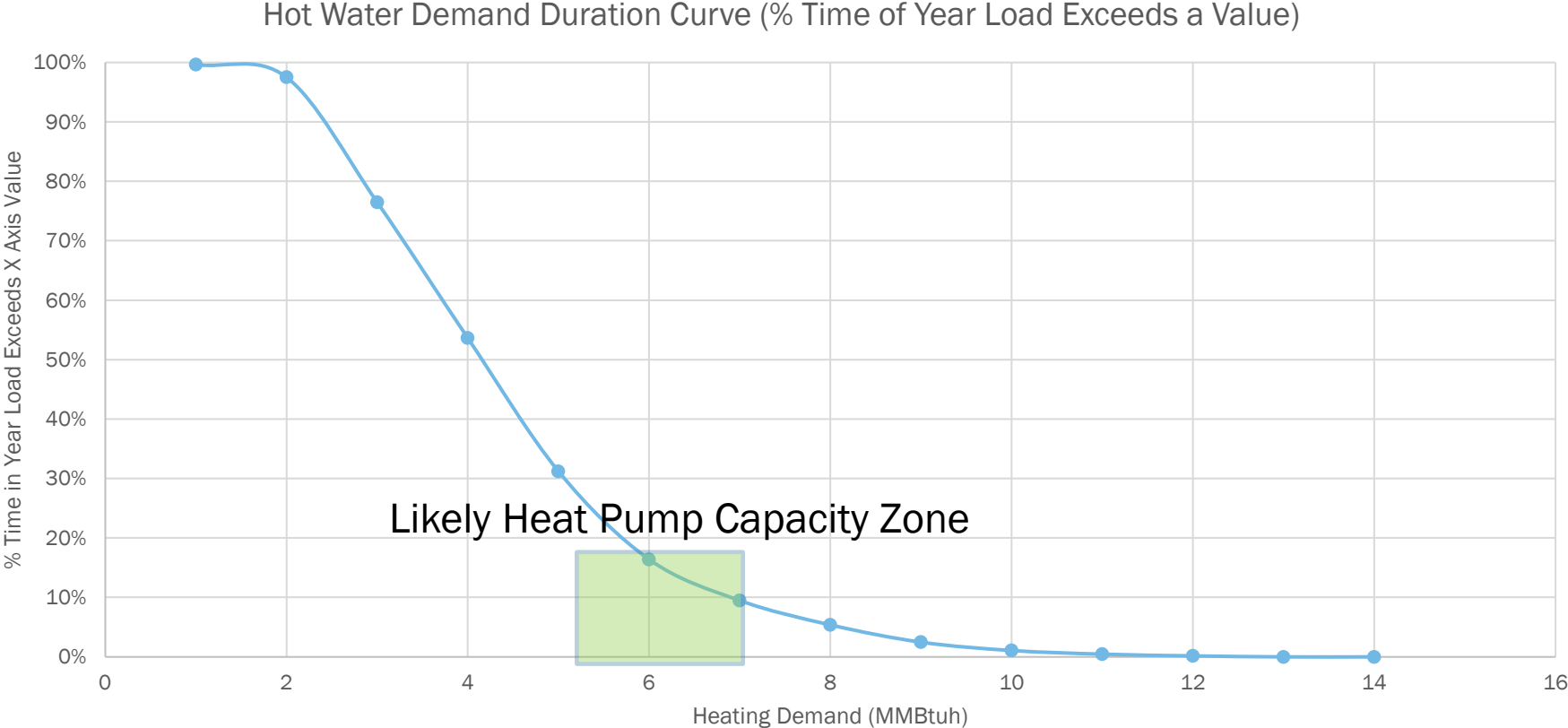
Hot Water Delta-T

Note: 34% of time Supply Temperature exceeds 135 deg F

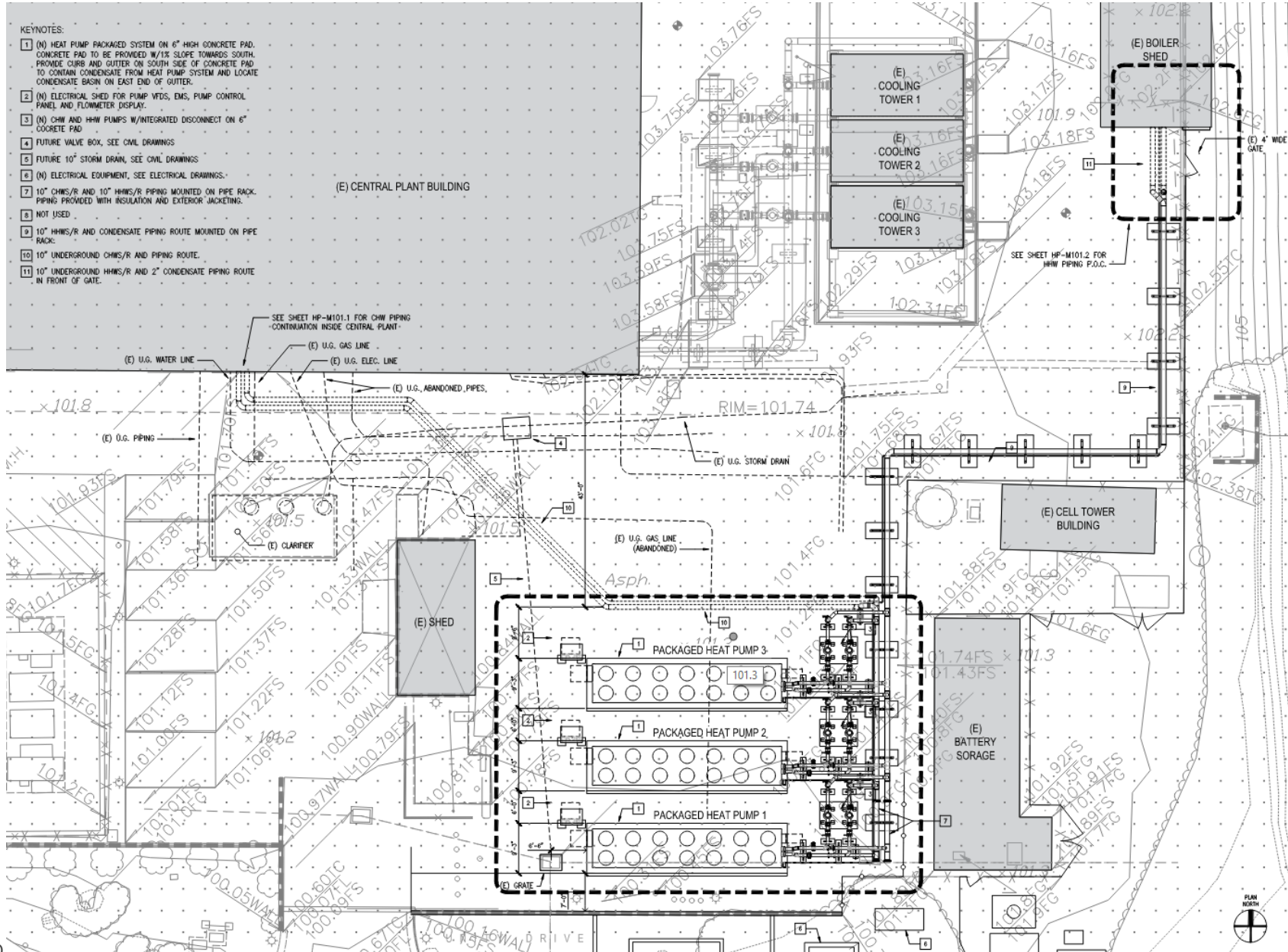
HW Delta T As a Function of Load



Heating Demand Time Duration Curve

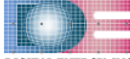


Site Prelim Layout



KEYNOTES:

- 1 (N) HEAT PUMP PACKAGED SYSTEM ON 6" HIGH CONCRETE PAD. CONCRETE PAD TO BE PROVIDED W/1% SLOPE TOWARDS SOUTH. PROVIDE CURB AND GUTTER ON SOUTH SIDE OF CONCRETE PAD TO CONTAIN CONDENSATE FROM HEAT PUMP SYSTEM AND LOCATE CONDENSATE BASIN ON EAST END OF GUTTER.
- 2 (N) ELECTRICAL SHED FOR PUMP VFDs, EMS, PUMP CONTROL PANEL AND FLOWMETER DISPLAY.
- 3 (N) CHW AND HHW PUMPS W/INTEGRATED DISCONNECT ON 6" CONCRETE PAD
- 4 FUTURE VALVE BOX, SEE CIVIL DRAWINGS
- 5 FUTURE 10" STORM DRAIN, SEE CIVIL DRAWINGS
- 6 (N) ELECTRICAL EQUIPMENT, SEE ELECTRICAL DRAWINGS.
- 7 10" CHWS/R AND 10" HHWS/R PIPING MOUNTED ON PIPE RACK. PIPING PROVIDED WITH INSULATION AND EXTERIOR JACKETING.
- 8 NOT USED
- 9 10" HHWS/R AND CONDENSATE PIPING ROUTE MOUNTED ON PIPE RACK.
- 10 10" UNDERGROUND CHWS/R AND PIPING ROUTE.
- 11 10" UNDERGROUND HHWS/R AND 2" CONDENSATE PIPING ROUTE IN FRONT OF GATE.



DIGITAL ENERGY, INC.
 Project Management
 Energy Engineering
 250 North Street, Suite 250
 Thousand Oaks, CA 91320
 www.digitalenergy.com
 Tel: (805) 974-7777

Project Title

**CENTRAL PLANT
HEAT PUMP ADDITION**

California State
University
Dominguez Hills

108 East Marina Street
Carson, CA 90747

Mechanical

Submittal Description	Date
75% SCHEMATIC DESIGN	6/17/2022
95% PRELIMINARY DESIGN	7/18/2022
100% PRELIMINARY DESIGN	8/22/2022

Designed: JA

Drawn: DE TEAM

Approved: JA

Date: SEPTEMBER 2, 2022

Submittal: 100% PRELIMINARY DESIGN

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

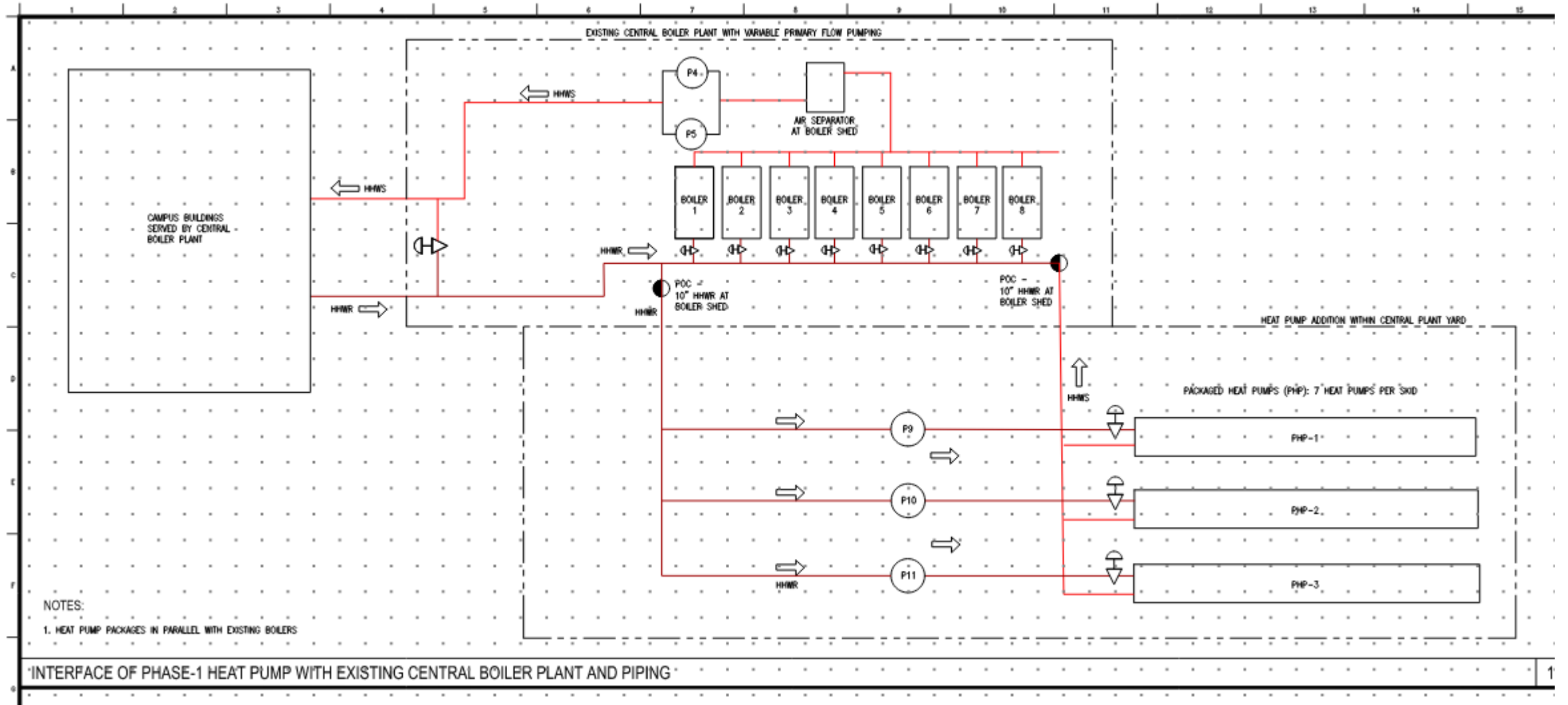
Sheet Title

**SITE PLAN
OVERALL**

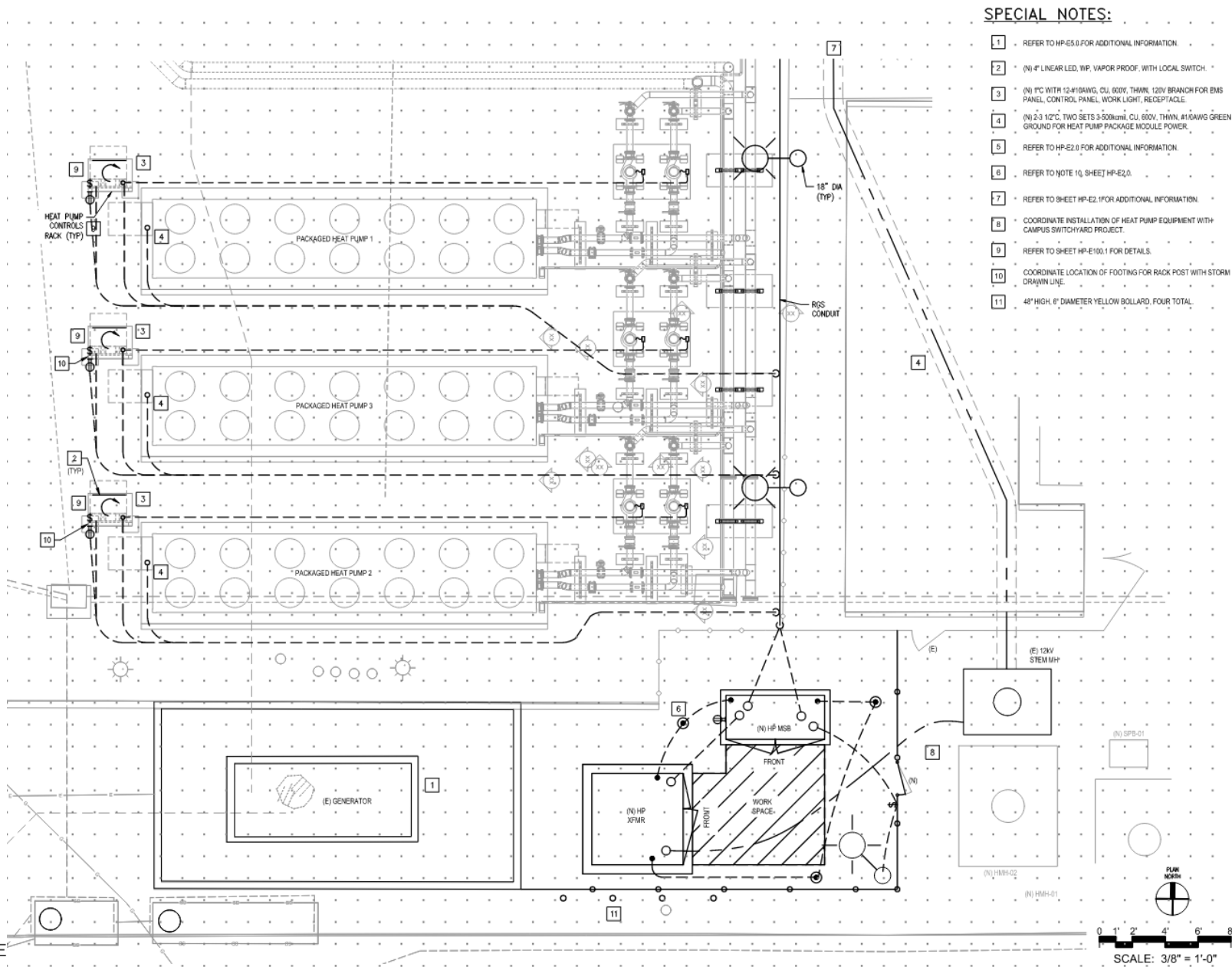
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HP-M2.0

Piping Scheme



Electrical Feed to New Equipment



SPECIAL NOTES:

- 1 REFER TO HP-E5.0 FOR ADDITIONAL INFORMATION.
- 2 (N) 4" LINEAR LED, WP, VAPOR PROOF, WITH LOCAL SWITCH.
- 3 (N) 1" C WITH 12-#16AWG, CU, 600V, THWN, 120V BRANCH FOR EMS PANEL, CONTROL PANEL, WORK LIGHT, RECEPTACLE.
- 4 (N) 2-3 12" C, TWO SETS 3-50#KCMIL, CU, 600V, THWN, #10AWG GREEN GROUND FOR HEAT PUMP PACKAGE MODULE POWER.
- 5 REFER TO HP-E2.0 FOR ADDITIONAL INFORMATION.
- 6 REFER TO NOTE (I), SHEET HP-E2.0.
- 7 REFER TO SHEET HP-E2.1 FOR ADDITIONAL INFORMATION.
- 8 COORDINATE INSTALLATION OF HEAT PUMP EQUIPMENT WITH CAMPUS SWITCHYARD PROJECT.
- 9 REFER TO SHEET HP-E100.1 FOR DETAILS.
- 10 COORDINATE LOCATION OF FOOTING FOR RACK POST WITH STORM DRAIN LINE.
- 11 48" HIGH, 6" DIAMETER YELLOW BOLLARD, FOUR TOTAL.



DIGITAL ENERGY, INC.
 Project Management
 Energy Engineering
 500 South Street, Suite 200
 Thousand Oaks, CA 91320
 www.digitalenergy.com
 Tel: (805) 374-1777

Project Title
**CENTRAL PLANT
 HEAT PUMP ADDITION**

California State
 University
 Dominguez Hills
 1506 East Victoria Street
 Carson, CA 90747

Division
P2S INC
 Long Beach | Los Angeles
 San Diego | San Jose
 p2s.com



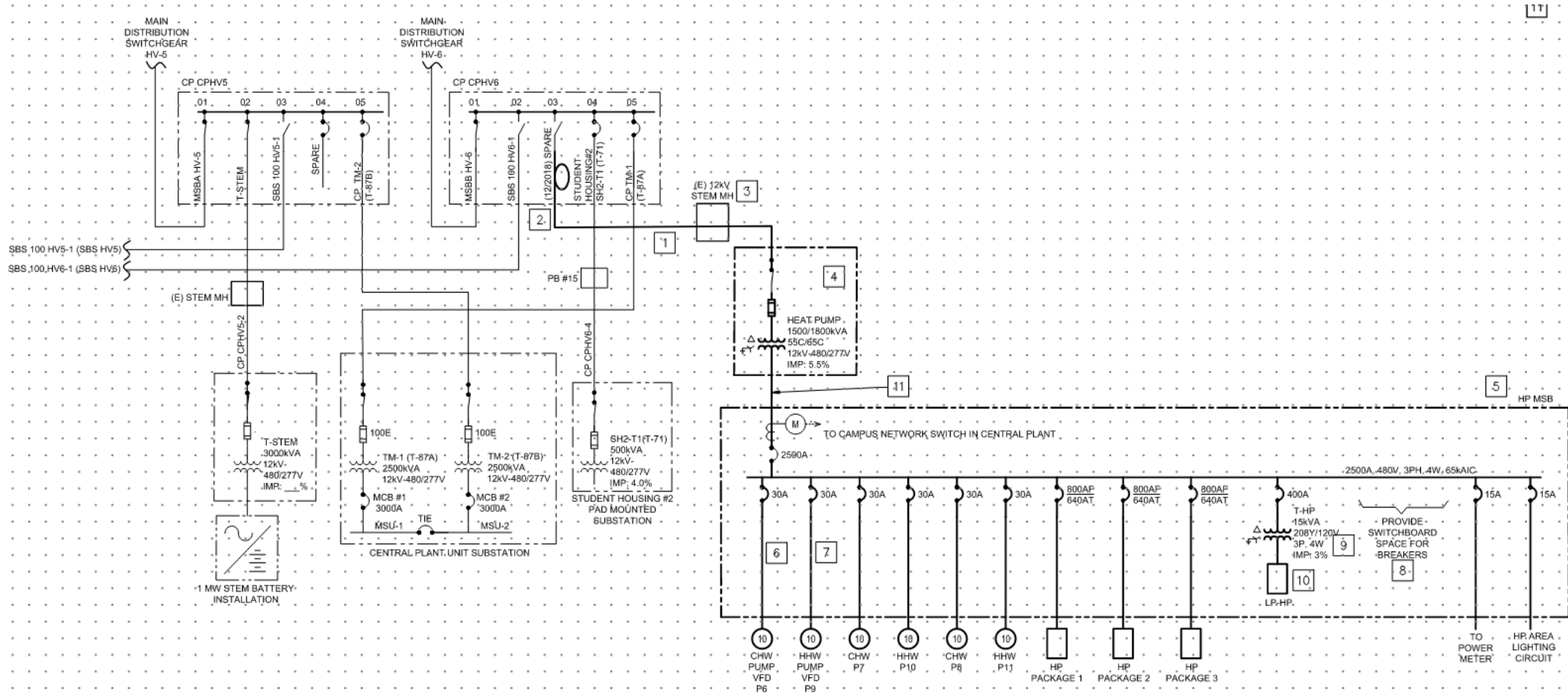
Submit Description	Date
75% SCHEMATIC DESIGN	6/17/2022
85% PD	7/28/2022
100% PRELIMINARY DESIGN	8/27/2022

Designed DE
 Drawn BR
 Approved DE
 Date JUNE 17, 2022
 Submit 75% SCHEMATIC DESIGN
 Scale 3/8" = 1'-0"
 Sheet Title

**SITE PLAN
 HEAT PUMP AREA**

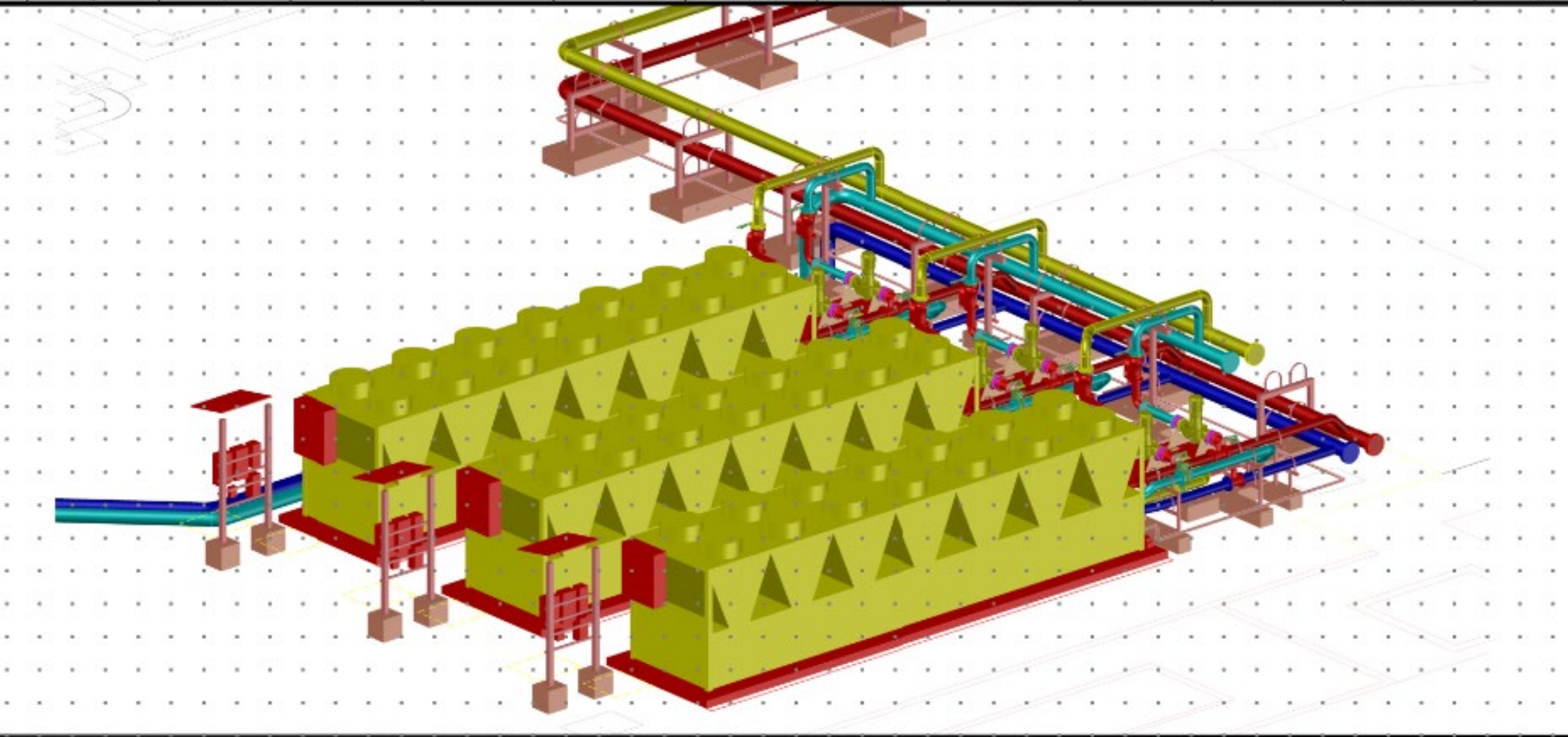
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Electrical Single line

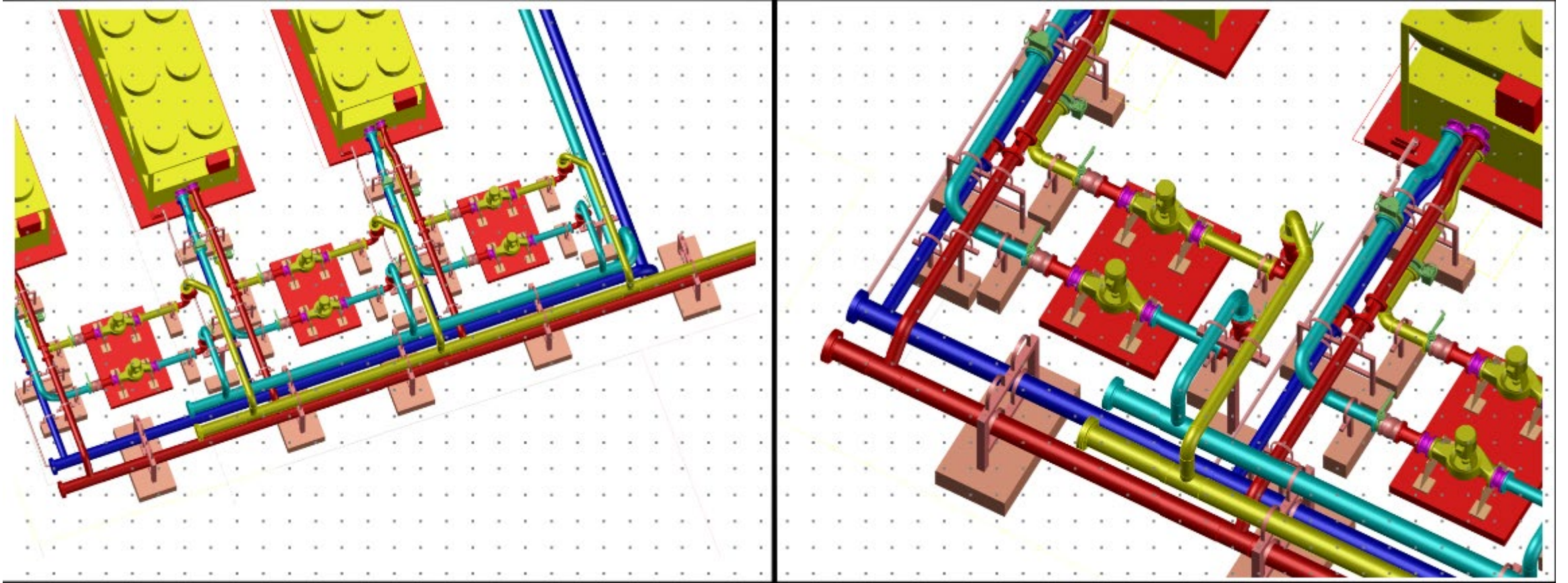


PARTIAL SINGLE-LINE FINAL

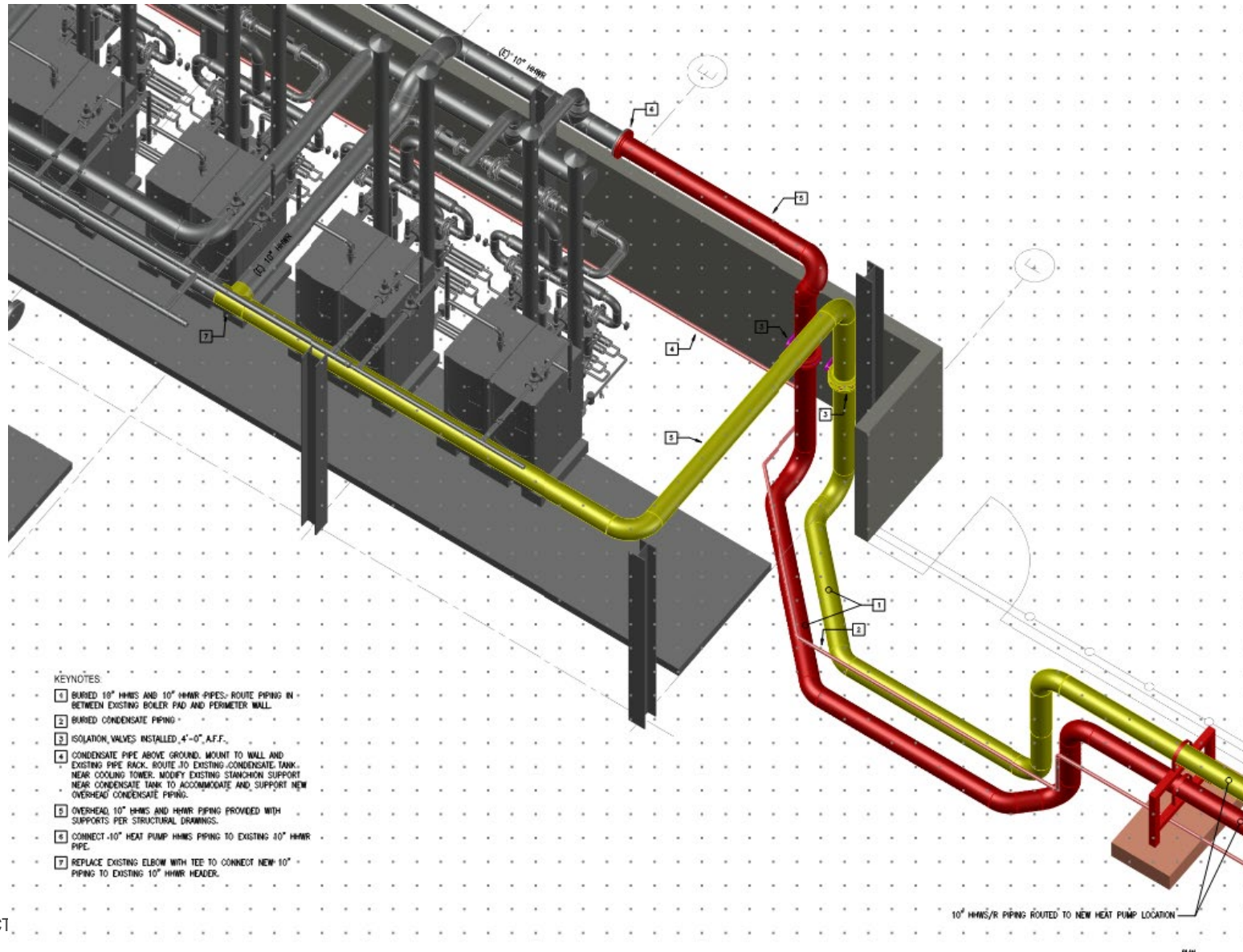
3-D Views



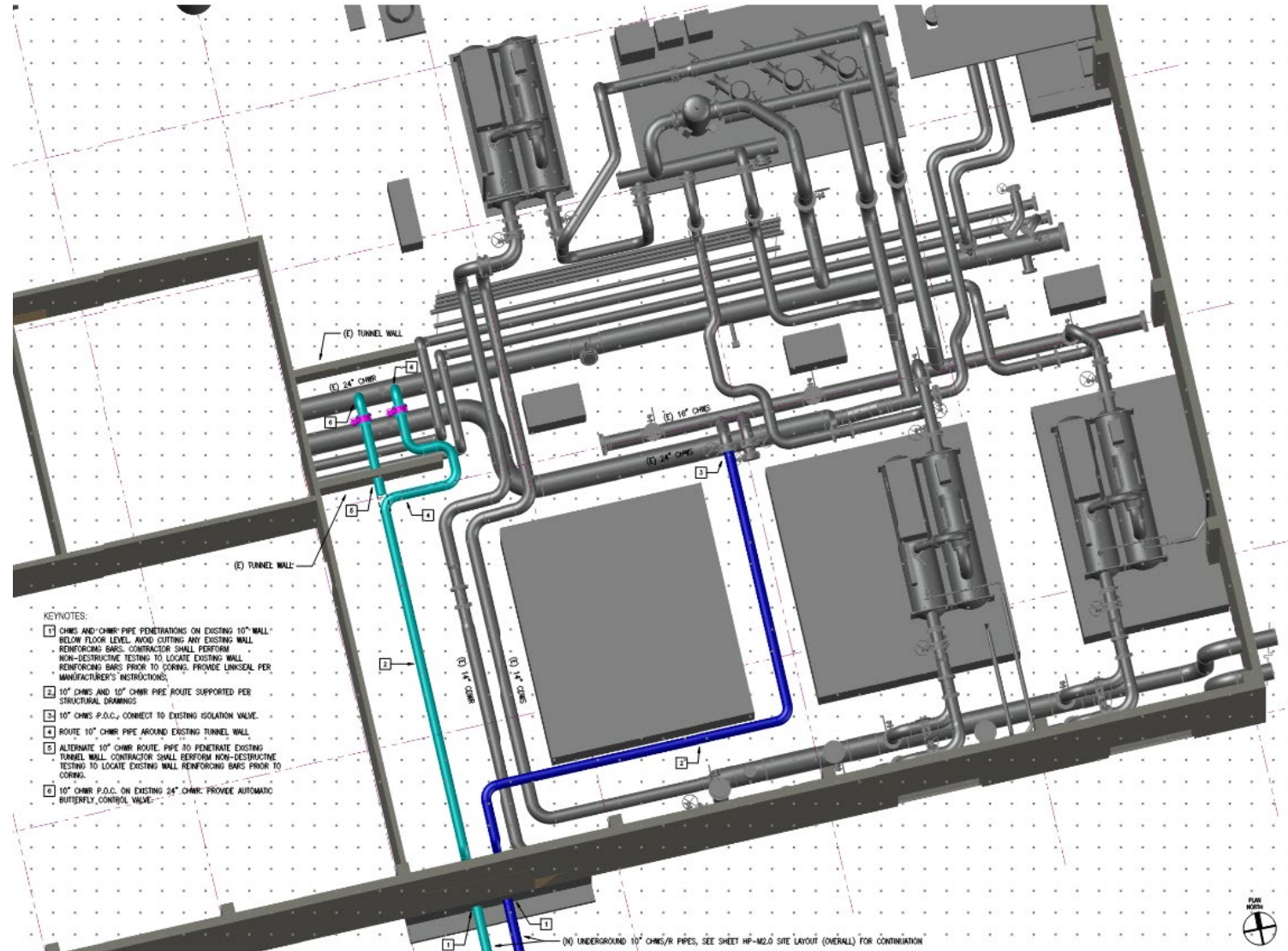
3-D Views



3-D Views



3-D Views



Product Design Basis

(Showing 7-modules/Package in table)

Based on (7) ARA030LNHC3EBAD2IB-DJCGCAIWCA---A operating

COOLING PERFORMANCE DATA											
Load	Cooling (tons)	Input kW	kW/Ton	EER	COP	Fan kW	Flow Rate (GPM)	Entering Temp. °F	Leaving Temp. °F	ΔP (ft H2O)	Ambient °F
100%	194.6	217.6	1.118	10.73	3.140	18.20	466.9	55.02	45.00	10.77	95.00

Based on (7) ARA030LNHC3EBAD2IB-DJCGCAIWCA---A operating

SIMULTANEOUS PERFORMANCE DATA											
Load	Cooling (tons)	Input kW	Heating (MBH)	kW/Ton	Heating & Cooling COP	Flow Rate (GPM)	Leaving Temp. °F	ΔP (ft H2O)	Cond Flow (GPM)	Leaving Temp. °F	ΔP (ft H2O)
100%	144.8	273.9	2672	1.892	4.720	347.2	45.00	10.77	534.4	142.0	12.00

Based on (7) ARA030LNHC3EBAD2IB-DJCGCAIWCA---A operating

HEATING PERFORMANCE DATA										
Load	Heating (MBH)	Input kW	Heating COP	Fan kW	Cond Flow (GPM)	Entering Temp. °F	Leaving Temp. °F	ΔP (ft H2O)	Ambient °F	
100%	2516	288.0	2.560	18.20	502.6	132.0	142.0	12.00	65.00	

Typical ARA 30 – 3 Module Package



Summary of Major Equipment

- 21, 30-Ton Modules packaged into 3-skids (1.0 MVA)
- 3, 10 HP VFD driven Hot water pumps
- 3, 10 HP VFD driven Chilled water pumps
- Net Electrical Installed Load Addition: 1.5 MVA 12 kV/480 V Transformer
- New 480V, 2500 Amp Switchboard
- 6-VFD's for Chilled water and hot water pumps

Need for Pre-Purchase Strategy

Its official; Price increase is here and a reality. Per Multistack this morning: Effective October 4th A price increase of 5% on the ARA project is in effect.

All quotations made on and after October 4, 2022 will be subject to the price increase. All orders quoted prior to October 4, 2022 must be entered and released to production by Friday, November 4, 2022 regardless of the dates noted on the face of the quotation. Orders not entered and released with proper documentation by the appropriate dates will be automatically subject to the price increase. This includes any order remaining in