University of Washington Medical Center
S1 Cooling Towers Replacement
Project No. :207839
Conservation Services Proposal

SEATTLE, WASHINGTON

MARCH 25, 2022

FOR THE LIFE OF YOUR BUILDING

Project Contacts

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Terminology

0.1 ESCO Terminology

Throughout this Conservation Services Proposal and Detailed Audit, we use Facility Improvement Measure (FIM) and Resource Conservation Measure (RCM) interchangeably.

Contents

Executive Summary

OUTCOME SNAPSHOT

This project represents an excellent opportunity to significantly improve facilities while saving energy and trimming utility spending. McKinstry looks forward to making this project a success.

McKinstry estimates these **savings** if proposed facility improvement measures (FIMs) are installed:

$2,500
Operations & maintenance costs/year

51,181
Guaranteed kWh/year

Carbon dioxide emissions reductions would equal:

10
Acres of trees planted

83,326
lbs. CO_2/year

1.1 Overview

McKinstry has completed an extensive study and investigation of energy upgrades for the S1 Cooling Towers at University of Washington Medical Center (UWMC). Our Energy Services Proposal presents a holistic project solution for improving the overall facility efficiency and operation. Our proposed solutions will result in lower utility use and cost along with improved building system performance and occupant productivity.

1.2 Current Situation

CHALLENGES

The UWMC will also be losing its Dept of Ecology Permit to use Lake Water to help provide cooling to the facility. Running the three chillers will not be possible with existing cooling towers. The Cooling Towers are beyond their useful life, require frequent repairs are currently operated at reduced condenser water flow to avoid water spill.

GOALS

Maximize the cooling tower capacity in the available mechanical yard footprint. Connect the Chiller CH-1 condenser loop to the Cooling towers instead of Lake Water. Improve equipment serviceability.

1.3 Solutions

02.01 S1 COOLING TOWERS REPLACEMENT

Replace (3) existing S1 cooling towers serving the S1 chiller plant. The new cooling towers will be sized to operate the existing S1 chillers without the lake water for condenser loop. Replace the old leaking constant speed condenser pumps with new variable speed pumps sized for the new piping and cooling tower. Existing condenser piping has connections to lake water piping at multiple points and a mix of manual and automated valves for operation. Modify necessary condenser water piping to connect to the new cooling towers while maintaining existing lake water piping in the mechanical room.

1.4 Summary of Benefits

FINANCIAL BENEFITS

Section 4 of this document provides a detailed look at the project financials. Including sales tax and prior to any utility incentives, the final project cost is $3,474,950. The annual energy savings are $4,284. Operational and maintenance savings have been included in the cash flows - these projections are based on reduced repair costs and future avoided capital expenditures and represent $2,500 in annual savings. The estimated utility rebates for the project are $21,061.

Executive Summary

COMPANY AT-A-GLANCE

- Established 1960
- Over 2,200 employees
- 23 offices
- 55+ Professional Engineers
- 80+ LEED Accredited Professionals

MCKINSTRY EXPERIENCE

$20 million	Customer utility savings guaranteed
$100 million	Grants & rebates secured for clients
636 million	Kilowatt hours saved
453 thousand	Metric tons of CO_2 saved
91 million	Gas Therms saved

CO_2 emission reductions resulting from McKinstry projects have environmental impacts equal to:

3,167 acres	Forest acres saved from destruction
51.5 million	Gallons of gas not used
83+ thousand	Cars taken off the road
40+ thousand	Homes taken off the power grid

ENVIRONMENTAL BENEFITS

By taking the necessary steps to reduce energy consumption through the implementation of the various facility improvement measures detailed in this report, University of Washington Medical Center will attain the savings outlined in the outcome snapshot on the left. This is equivalent to:

- 4 average-sized homes being removed from the power grid; or
- 1,042 light bulbs (13.5 Watt LED) not energized; or
- 141,231 miles not driven by an average size vehicle.

1.5 McKinstry Differentiators

COMPANY OVERVIEW

McKinstry has over 60 years of experience assessing and improving facilities in the Pacific Northwest. With more than 1,500 successful energy and facility improvement projects completed in the past 25 years, McKinstry has the expertise to offer comprehensive solutions to University of Washington Medical Center. McKinstry is more than just another energy services company, we believe in serving as your trusted advisor "*For the Life of Your Building.*"

MCKINSTRY APPROACH ADVANTAGES

- Vendor- and product-neutral for truly consultative role
- Transparent pricing
- Total cost of ownership consideration
- No "shared savings" model

Scope of Work

2.1 ESCO Services

McKinstry will include the following services related to this project:

1. Operation training: McKinstry will provide training of building staff during construction and a minimum of 8 hours of training.
2. Equipment Maintenance: McKinstry will provide no equipment maintenance or repairs after the warranty period. Following the completion of the installation and Owner acceptance of the Equipment, the Owner shall provide all necessary service, repairs, and adjustments to the Equipment so that the Equipment will perform in the manner and to the extent set forth in the proposal. McKinstry shall have no obligation to service or maintain the Equipment after the warranty period.
3. Warranty: McKinstry will warrant equipment for one year following Notice of Substantial Completion. All equipment warranties will be executed for benefit of Owner and included in O&M manuals at completion of project.

2.2 Hazardous Waste

Hazardous Waste other than PCB lighting ballasts: Should the project require removal or disposal of hazardous material; the Owner will subcontract to a qualified contractor for removal and the Owner will perform the disposal. As hazardous materials have not been identified during the Detailed Audit, these costs are not included in the guaranteed maximum cost. The Owner agrees and acknowledges that it has not relied on or employed McKinstry to analyze or identify the presence of any hazardous substance on the Owner's premises. The cost of hazardous material abatement and disposal is not included in this proposal.

2.3 Design Deliverables

Table 2.1 Design Deliverables indicates the proposed specifications and design drawings that will be produced.

2.4 Quality Assurance & Control

The key to McKinstry's approach to construction is the ability to define the desired outcomes of our clients and provide a process that assures these outcomes will be met. While our experienced and capable staff is the key ingredient to achieve this, we've put in place a system of Quality Assurance/Quality Control to provide additional measure of discipline to our project delivery. The following outlines the specific measures we see as being applicable to your project and our team approach with your company.

DESIGN COORDINATION AND INTERFACE WITH OTHER TEAM MEMBERS AND DISCIPLINES:

Our staff and process is designed to deliver the highest quality of communication and content to our design and construction team members. This includes scope means and methods, spatial coordination, and other digital communication. We institute design discipline and trade coordination processes at regular intervals in our operation to ensure that a coordinated and comprehensive product is produced for the project in its entirety. Our experience in managing complex relationships between mechanical systems, construction, structural, electrical, architectural, and other disciplines has shown us that we can anticipate and solve problems in the "paper" stage of the project. This effort results in lowering cost and increasing final product for our customers.

PROJECT COMMISSIONING AND CLOSE-OUT:

Our dedicated commissioning team, which maintains involvement in the entire design build process, is in charge of developing complete project startup and commissioning programs. In addition, our commissioning team is responsible for scheduling various components of this with the proper representatives to complete this comprehensive project closeout process. This includes integration with our construction administration activities from our design team, a thorough integration with the balancing and start-up activities, an exhaustive fault test and dynamic commissioning program.

McKinstry's Construction Management Team will be providing Operations and Maintenance manuals per the Owner's Standards.

2.5 Project Schedule

The following preliminary schedule lists several design and construction milestone for the project. McKinstry will develop a detailed schedule outlining all the various construction and closeout tasks associated with the project after the design has been completed and approved. See the proposed project schedule on the following page.

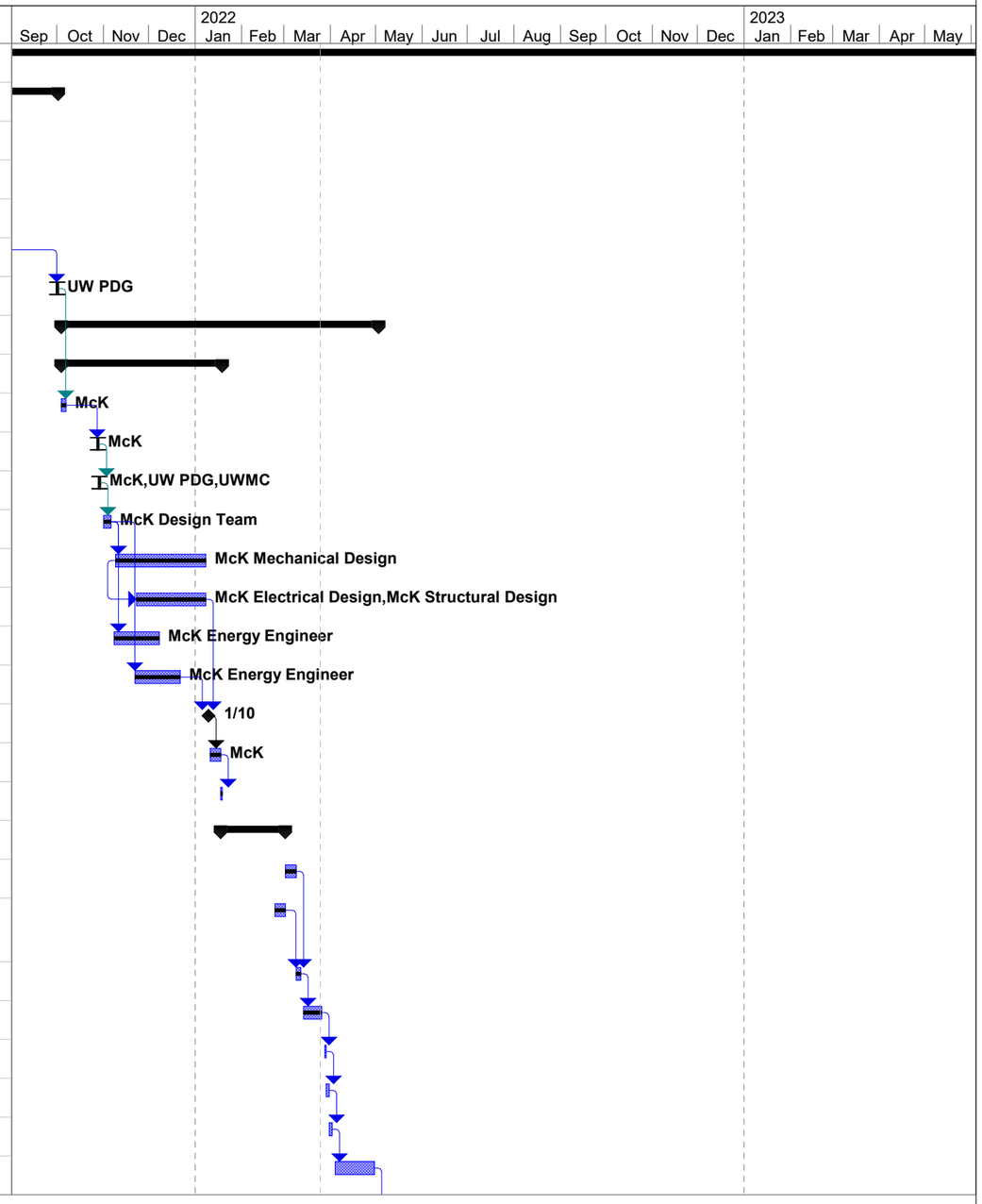
University of Washington
Table 2.1
Design Deliverables

Project Name:	University of Washington Medical Center - S1 Cooling Towers Replacement, Conservation Services Proposal				Project Number:	UW Project # 207839				
Document Requirements Checklist 50% Review					**Document Requirements Checklist Construction Docs**					
Legend:	Done, Not Done, Not Applicable (NA), To Be Determined (TBD)									
		Sheets Required		**Sheet Location**	**Status**			**Sheets Required**		**Sheet Location**	**Status**
Specifications											
1	None, submit proposed equipment cut sheets : Cooling Towers, Pumps, VFDs.	TBD				1	None, submit proposed equipment cut sheets : Cooling Towers, Pumps, VFDs.	TBD			
2	Specifications on drawings	TBD				2	Specifications on drawings	TBD			
Demolition											
1	HVAC and Electrical Demolition sheets set up. Sample demolition nomenclature.	TBD				1	HVAC and Electrical Demolition sheets set up. Sample demolition nomenclature.	TBD			
Structural											
1	Submit Preliminary	TBD				1	Submit Final	TBD			
Plumbing and Piping											
1	Piping System diagram, plan drawings.	TBD				1	Piping System diagram, plan drawings.	TBD			
HVAC											
1	Sequence of Operation	TBD				1	Sequence of Operation	TBD			
Electrical											
1	Electrical - VFD and Panel Locations Identified	TBD				1	Electrical - VFD and Panel Locations Identified	TBD			
2	Electrical One-Line	TBD				2	Electrical One-Line	TBD			
Controls											
1	None	TBD				1	Control plans, network diagram, devices, sequence of operations	TBD			

Legend:
Not Applicable (NA), Done, Not Done, Hospital Standard, Noted, To Be Determined (TBD)

UWMC S1 COOLING TOWERS PRELIMINARY SCHEDULE
Fri 3/25/22

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	% Complete
1		**UWMC S1 Cooling Towers**	**1116 days**	**Wed 1/15/20**	**Fri 5/31/24**		**10%**
2		**Pre-Detailed Audit**	**440 days**	**Wed 1/15/20**	**Fri 10/1/21**		**100%**
3		Detailed Audit (DA) Proposal	1 day	Wed 1/15/20	Wed 1/15/20		100%
4		Proposal Review	1 wk	Thu 1/16/20	Wed 1/22/20	3	100%
5		DA Contract Preparation	1 wk	Thu 1/23/20	Wed 1/29/20	4	100%
6		McKinstry and Client to Sign Contracts	2 wks	Thu 1/30/20	Wed 2/12/20	5	100%
7		DA Notice to Proceed	1 day	Fri 10/1/21	Fri 10/1/21	6	100%
8		**Detailed Audit (DA)**	**147 days**	**Mon 10/4/21**	**Mon 5/2/22**		**77%**
9		**Cooling Tower Replacement**	**73 days**	**Mon 10/4/21**	**Tue 1/18/22**		**100%**
10		Schedule Internal and Client Kickoff Meetings	3 days	Mon 10/4/21	Wed 10/6/21	7	100%
11		Internal Kickoff Meeting	1 day	Thu 10/28/21	Thu 10/28/21	10	100%
12		Client Kickoff Meeting	1 day	Fri 10/29/21	Fri 10/29/21	11	100%
13		Site Walks - Mech, Elec, Struc	5 days	Mon 11/1/21	Fri 11/5/21	12	100%
14		Mech Scope Development	40 days	Tue 11/9/21	Fri 1/7/22	13	100%
15		Elec and Structural Scope Development	30 days	Tue 11/23/21	Fri 1/7/22	14SS+2 wks	100%
16		BAS Review, Trending. Logging	20 days	Mon 11/8/21	Tue 12/7/21	13	100%
17		Energy Savings Calcs	20 days	Mon 11/22/21	Tue 12/21/21	13FS+10 days	100%
18		Scopes/Savings Due for Internal Review	1 day	Mon 1/10/22	Mon 1/10/22	15,17	100%
19		Scope/Savings Internal Review	5 days	Tue 1/11/22	Mon 1/17/22	18	100%
20		Client M&V Workshop	1 day	Tue 1/18/22	Tue 1/18/22	19	100%
21		**Budgeting**	**31 days**	**Tue 1/18/22**	**Tue 3/1/22**		**29%**
29		Compile Project	5 days	Wed 3/2/22	Tue 3/8/22	28	100%
30		Complete Risk Review Workbook - Energy, Mech, Elec, Struc, Estim, CM	5 days	Wed 2/23/22	Tue 3/1/22	28FF	100%
31		Risk Reviews	3 days	Wed 3/9/22	Fri 3/11/22	30,29	100%
32		Prepare Pre-final Presentation	10 days	Mon 3/14/22	Fri 3/25/22	31	100%
33		**Pre-final Presentation**	1 day	Mon 3/28/22	Mon 3/28/22	32	0%
34		Client provides Final CSP Direction	2 days	Tue 3/29/22	Wed 3/30/22	33	0%
35		Deliver CSP	2 days	Thu 3/31/22	Fri 4/1/22	34	0%
36		Construction Contract Processing	20 days	Mon 4/4/22	Fri 4/29/22	35	0%



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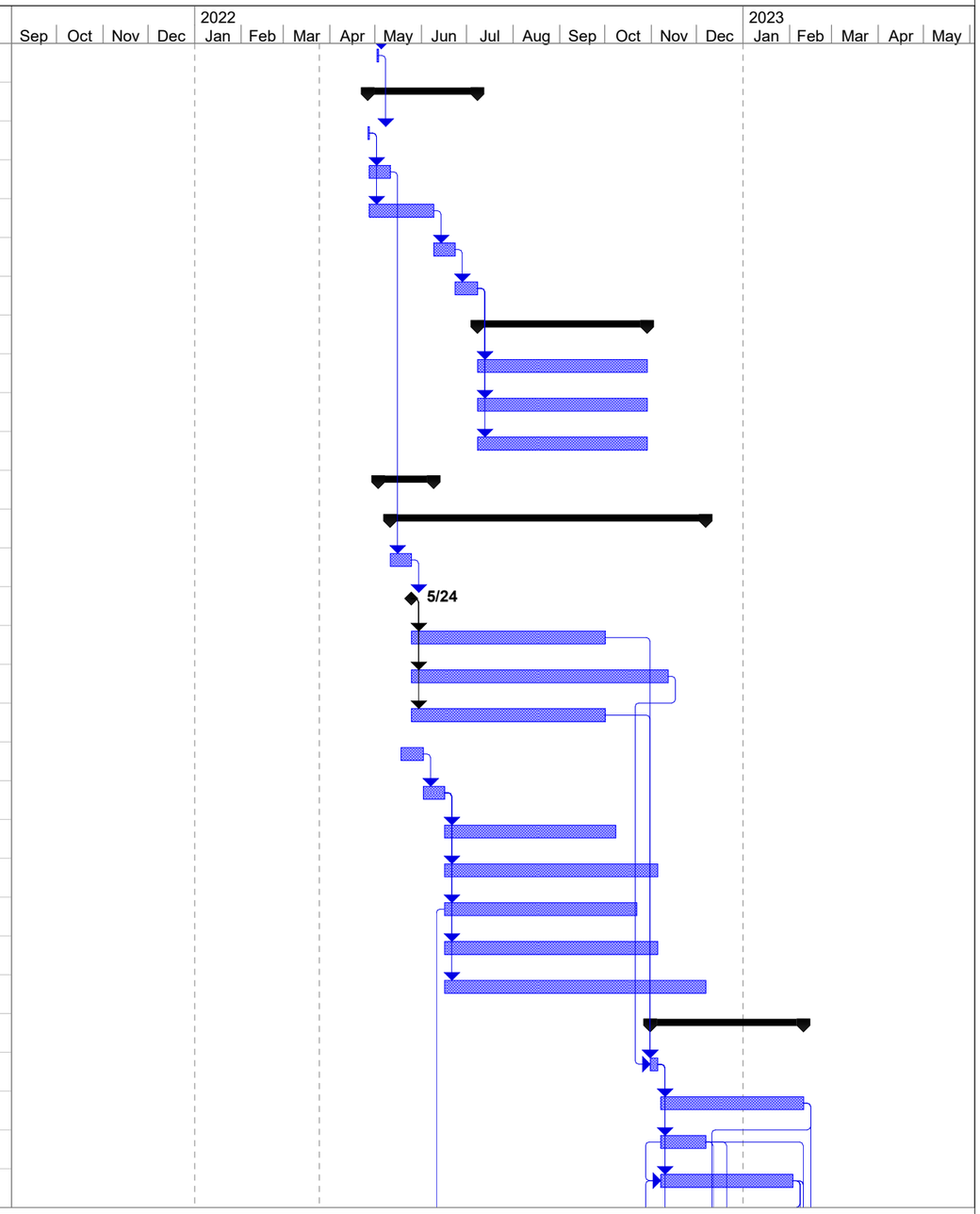
Task		Project Summary		Inactive Task		Duration-only		Finish-only	
Split		External Tasks		Inactive Milestone		Manual Summary Rollup		Progress	
Milestone		External Milestone		Inactive Summary		Manual Summary		Deadline	
Summary		Inactive Task		Manual Task		Start-only			

UWMC S1 COOLING TOWERS PRELIMINARY SCHEDULE
Fri 3/25/22

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	% Complete
37		**Executed Contract**	1 day	Mon 5/2/22	Mon 5/2/22	36	0%
38		**Design**	**51 days**	**Tue 4/26/22**	**Thu 7/7/22**		**0%**
39		Design Kickoff	1 day	Tue 4/26/22	Tue 4/26/22	37FS-5 days	0%
40		Finalize Equipment Selection, Request Submittals	2 wks	Wed 4/27/22	Tue 5/10/22	39	0%
41		Develop Design Drawings - 90%	30 days	Wed 4/27/22	Wed 6/8/22	39	0%
42		Client Review	10 days	Thu 6/9/22	Wed 6/22/22	41	0%
43		Complete Permit Set	10 days	Thu 6/23/22	Thu 7/7/22	42	0%
44		**Permitting**	**80 days**	**Fri 7/8/22**	**Fri 10/28/22**		**0%**
45		Mechanical	16 wks	Fri 7/8/22	Fri 10/28/22	43	0%
46		Electrical	16 wks	Fri 7/8/22	Fri 10/28/22	43	0%
47		Controls	16 wks	Fri 7/8/22	Fri 10/28/22	43	0%
48		**Contracting / Job Startup**	**26 days**	**Tue 5/3/22**	**Wed 6/8/22**		**0%**
55		**Submittals, Procurement and Fabrication**	**145 days**	**Wed 5/11/22**	**Tue 12/6/22**		**0%**
56		UWMC Submittal Review and Approval	2 wks	Wed 5/11/22	Tue 5/24/22	40	0%
57		Issue PO	0 days	Tue 5/24/22	Tue 5/24/22	56	0%
58		Cooling Towers Procurement	18 wks	Wed 5/25/22	Fri 9/30/22	57	0%
59		Pumps Procurement	24 wks	Wed 5/25/22	Fri 11/11/22	57	0%
60		VFD Procurement	18 wks	Wed 5/25/22	Fri 9/30/22	57	0%
61		Subcontractor Submittals - Prepare and Submit	2 wks	Wed 5/18/22	Wed 6/1/22	50	0%
62		Subcontractor Submittals - UW Review and Approval	2 wks	Thu 6/2/22	Wed 6/15/22	61	0%
63		Controls Materials Procurement	16 wks	Thu 6/16/22	Fri 10/7/22	62	0%
64		Structural Steel Procurement	20 wks	Thu 6/16/22	Fri 11/4/22	62	0%
65		Mechanical Materials Procurement	18 wks	Thu 6/16/22	Fri 10/21/22	62	0%
66		Electrical Materials Procurement	20 wks	Thu 6/16/22	Fri 11/4/22	62	0%
67		Roofing Material Procurement	6 mons	Thu 6/16/22	Tue 12/6/22	62	0%
68		**Construction**	**70 days**	**Mon 10/31/22**	**Thu 2/9/23**		**0%**
69		Mobilization	1 wk	Mon 10/31/22	Fri 11/4/22	60FS-10 days,	0%
70		GC	13 wks	Mon 11/7/22	Thu 2/9/23	69	0%
71		Demo	4 wks	Mon 11/7/22	Tue 12/6/22	69	0%
72		Mechanical	12 wks	Mon 11/7/22	Thu 2/2/23	69,71SS	0%



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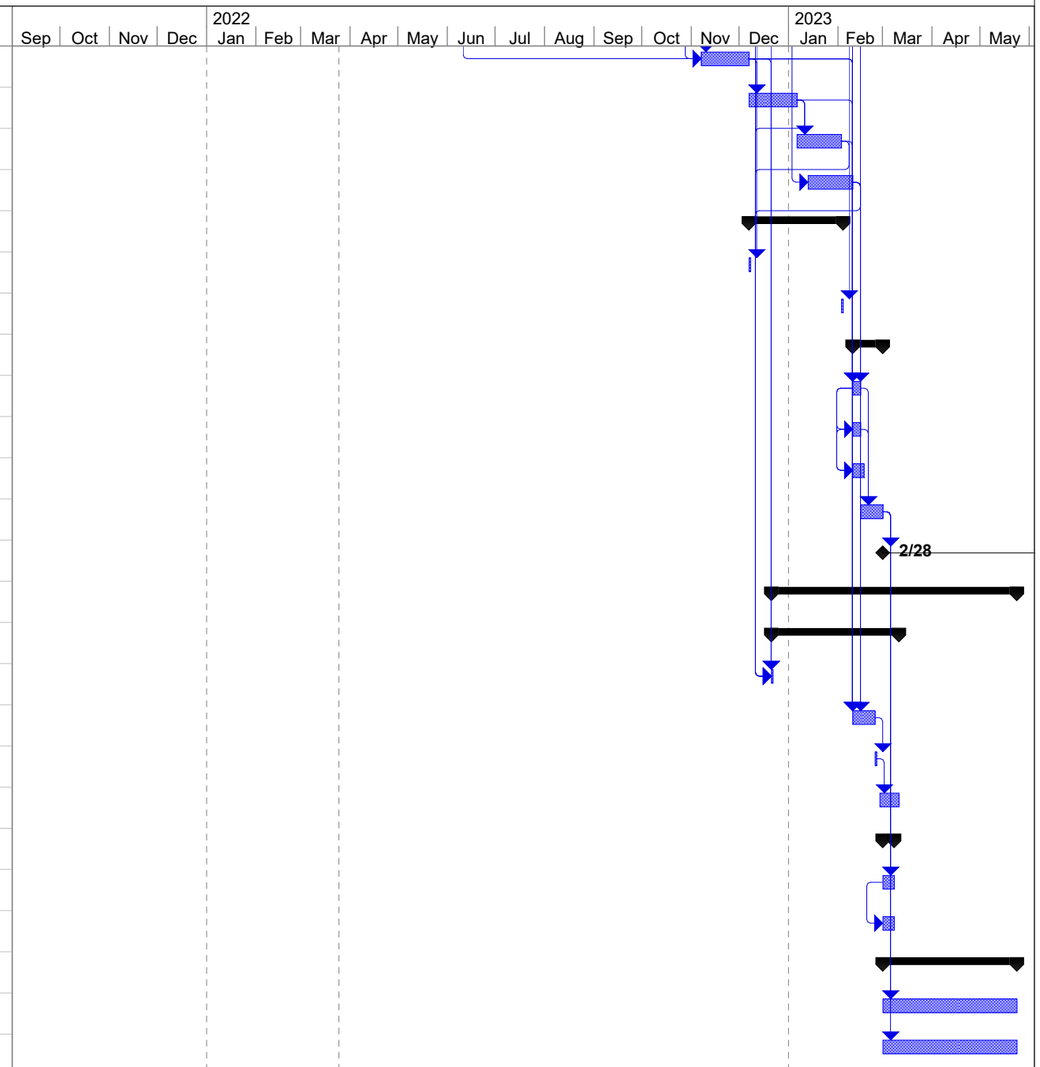
Task	Project Summary	Inactive Task	Duration-only	Finish-only
Split	External Tasks	Inactive Milestone	Manual Summary Rollup	Progress
Milestone	External Milestone	Inactive Summary	Manual Summary	Deadline
Summary	Inactive Task	Manual Task	Start-only	

UWMC S1 COOLING TOWERS PRELIMINARY SCHEDULE
Fri 3/25/22

ID	Task Mode	Task Name	Duration	Start	Finish	Predecessors	% Complete
73		Electrical	4 wks	Mon 11/7/22	Tue 12/6/22	72SS,65SS,69	0%
74		Structural	4 wks	Wed 12/7/22	Thu 1/5/23	71	0%
75		Roofing	4 wks	Fri 1/6/23	Thu 2/2/23	74	0%
76		Controls	4 wks	Fri 1/13/23	Thu 2/9/23	72FS-3 wks	0%
77		**Third Party and AHJ inspections**	**41 days**	**Wed 12/7/22**	**Fri 2/3/23**		**0%**
78		City/State Electrical Final	1 day	Wed 12/7/22	Wed 12/7/22	73	0%
79		Mechanical Final	1 day	Fri 2/3/23	Fri 2/3/23	72	0%
80		**Startup / Cx**	**13 days**	**Fri 2/10/23**	**Tue 2/28/23**		**0%**
81		Cooling Tower	3 days	Fri 2/10/23	Tue 2/14/23	72,73,76	0%
82		Pumps	3 days	Fri 2/10/23	Tue 2/14/23	81SS	0%
83		Controls	5 days	Fri 2/10/23	Thu 2/16/23	81SS,82SS	0%
84		Startup / Cx Complete	10 days	Wed 2/15/23	Tue 2/28/23	81,82	0%
85		Project Substantial Completion / NCES	0 days	Tue 2/28/23	Tue 2/28/23	84	0%
86		**Punchlist / Training / Closeout**	**108 days**	**Wed 12/21/22**	**Tue 5/23/23**		**0%**
87		**Punchlist**	**56 days**	**Wed 12/21/22**	**Fri 3/10/23**		**0%**
88		Designer 50% Walk	1 day	Wed 12/21/22	Wed 12/21/22	70FS-35 days,	0%
89		Designer Final Punch Walk	10 days	Fri 2/10/23	Thu 2/23/23	71,70,72,73,74	0%
90		Owner / Contractor Punch Walk	1 day	Fri 2/24/23	Fri 2/24/23	89	0%
91		Punchlist Corrections	10 days	Mon 2/27/23	Fri 3/10/23	90	0%
92		**Training**	**5 days**	**Wed 3/1/23**	**Tue 3/7/23**		**0%**
93		Cooling Tower	5 days	Wed 3/1/23	Tue 3/7/23	84	0%
94		Pumps	5 days	Wed 3/1/23	Tue 3/7/23	93SS	0%
95		**Closeout**	**60 days**	**Wed 3/1/23**	**Tue 5/23/23**		**0%**
96		Compile O&M Materials From Subcontractors	60 days	Wed 3/1/23	Tue 5/23/23	84	0%
97		Finalize Contracts and Retention	60 days	Wed 3/1/23	Tue 5/23/23	84	0%
98		**Measurement & Verification**	**40 days**	**Fri 4/5/24**	**Fri 5/31/24**		**0%**
99		Evaluate Operating Conditions, BAS Trends	4 wks	Fri 4/5/24	Thu 5/2/24	85FS+14 mons	0%
100		Prepare and Submit Report	4 wks	Fri 5/3/24	Fri 5/31/24	99	0%



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Split		External Tasks		Inactive Milestone		Manual Summary Rollup		Progress	
Milestone		External Milestone		Inactive Summary		Manual Summary		Deadline	
Summary		Inactive Task		Manual Task		Start-only			

Detailed Scope of Work

FIM ID # 19532
02.01 S1 Cooling Towers Replacement
University of Washington Med Center

GENERAL

Replace (3) existing S1 cooling towers serving the S1 chiller plant. The new cooling towers will be sized to operate the existing S1 chillers without the lake water for condenser loop. Replace the old leaking constant speed condenser pumps with new variable speed pumps sized for the new piping and cooling tower. Existing condenser piping has connections to lake water piping at multiple points and a mix of manual and automated valves for operation. Modify necessary condenser water piping to connect to the new cooling towers while maintaining existing lake water piping in the mechanical room.

SCOPE OF WORK INCLUDES

1. General
2. Equipment Furnished by ESCO
   - A. CT-1
   - B. CT-2
   - C. CT-3
   - D. CP-1
   - E. CP-2
   - F. CP-3
3. Mechanical
   - A. Demo
     - 1) Mechanical contractor to safe off all equipment and piping (mechanical piping and plumbing piping) for the (3) S1 cooling towers and (3) pumps to be removed by demolition contractor.
     - 2) Mechanical contractor to drain and isolate adjacent Montlake Yard condenser water system to complete work.
   - B. New Work
     - 1) Cooling Towers
       - i. Install three (3) new cooling towers CT-1, CT-2, and CT-3 in approximate location of demolished towers. Full list of options shown in equipment schedule. The new cooling tower ships in two sections and will be connected in the field. Section weights noted in equipment cutsheet.
     - 2) Pumps
       - i. Install three (3) new condenser water pumps CP-1, CP-2, and CP-3. Refer equipment schedule. Motors to have SGS shaft grounding rings. Pump motors shall be rated for outdoor operation.
       - ii. New Pump frame shall be mounted on the concrete base.
     - 3) Piping
       - i. Furnish and install CWS and CWR as shown in sketches
       - ii. CWS and CWR piping shall be Schedule 40 black steel painted gray to match existing.
       - iii. Inlet piping of each tower to have PT port and thermometer. Outlet piping of each tower to have PT port and thermometer.
       - iv. Provide (2) connection ports, one on supply header and one on return header piping for connection to Nalco System. Ports to be ¾" or larger and include isolation valves. Piping from the connection port to Nalco Controller will be performed by Nalco.
     - 4) Plumbing
       - i. Reconnect cooling tower make-up water lines. Furnish and install new piping as necessary to reconnect.
       - ii. Reconnect cooling tower overflow and drain lines. Furnish and install new piping as necessary to reconnect.
       - iii. Make-up and drain sub-metering (per Seattle Public Utilities requirements)
         - (a) Furnish and install (1) 2.5" Badger make-up water meter with dual output.
         - (b) Furnish and install (1) 4" Badger electromagnetic water meter for drain (includes blowdown, drain, and overflow) (120V)
         - (c) Include necessary Itron ERT transmitter for each meter. ERT location will be per coordination with Seattle Public Utilities.
     - 5) Mechanical contractor to test, flush and fill the new system.
     - 6) Water Treatment
       - i. Coordinate with UWMC water treatment vendor, Nalco.
     - 7) Misc.
       - i. Insulation
         - (a) CW piping, interior: None (per existing)

(b) CW piping, exterior: None (per existing)
(c) DCW, exterior (make-up): 1" MPI insulation with jacketing to match existing
(d) Above values per McKinstry piping insulation specification matrix (based on WSEC and Seattle Energy Code, IECC 2018)

8) Mechanical contractor responsible for roof penetration cutting, re-use, and sealing
9) Piping and equipment labeling per owner design standards.

4. Demolition
   A. Demolition contractor will be responsible for the removal of cooling towers, pumps, and piping. McKinstry Essention will be responsible for providing a crane for the removal of main equipment to be coordinated with demolition contractor. Mechanical subcontractors will be responsible for safe off and cap.
   B. Cooling Towers
      1) Remove (3) existing cooling towers CT-1, CT-2, and CT-3. Include controls appurtenances.
   C. Pumps
      1) Remove (3) existing condenser water pumps CP-2, CP-3, and CP-8. Include controls and appurtenances.
   D. Mechanical Piping
      1) Demo 8" CWS, 14" CWS, 8" CWR, and 14" CWR as indicated. Includes lines in exterior mechanical yard and interior chiller room as shown in sketches. Roof penetration locations to be re-used.
      2) Demo and cap 8" and 12" CWS and CWR lines interconnecting with adjacent cooling tower yard back to adjacent cooling tower yard as shown in sketches.
   E. Plumbing
      1) Demo cooling tower make-up water line (~2") back as required to remove cooling towers. New cooling towers will re-use existing line.
      2) Demo cooling tower overflow and drain lines (~2") back as required to remove cooling towers. New cooling towers will re-use existing lines.
   F. Water Treatment Equipment To Be Removed
      1) Remove (1) side stream filtration skid in mechanical yard adjacent to CT-1.
      2) Remove (2) non-chemical water treatment systems on 8" CW piping (Dolphin or similar). Locations noted in sketches.
5. Acoustical
   A. Inlet and outlet attenuators are to be provided and sound levels are not to exceed those provided in equipment cutsheets.
   B. Cooling tower fan speed to be limited during nighttime hours to meet City of Seattle sound ordinance.
6. Controls
   A. Refer to attached points list. (Existing vs. new vs. virtual)
   B. Cooling towers and condenser pumps to be fully controlled by JCI Building Management System.
   C. Controls contractor to provide BMS programming to accomplish unit staging, temperature control, temperature reset, nighttime fan speed setbacks/limits
      1) Staging of cooling towers and pump operation shall account for:
         i. Minimum required flow at individual cooling tower (50% of design)
         ii. Minimum required flow at individual chiller condenser barrel
         iii. Minimum pump speed
   D. Controls contractor to perform necessary changes to the Chiller Plant sequence to use cooling towers during normal operation instead of lake water piping.

7. Electrical
   A. Demo
      1) Cooling Tower Fans
         i. Disconnect (3) existing cooling towers fans CT-1, CT-2, and CT-3. Reuse existing conduit/raceway, conductors shall be demolished back to switchboard
         ii. Demolish (3) VFDs and disconnects.
      2) Condenser Water Pumps
         i. Disconnect (3) existing condenser water pumps CP-2, CP-3, and CP-8. Reuse existing conduit/raceway, wire shall be demolished back to switchboard.
         ii. Retain and reuse (3) power factor correcting capacitors. Demolish disconnects.
      3) Refer to attached drawings for more details.
   B. New Work
      1) Cooling Towers Fans
         i. Furnish and install conductors from switchboard to (3) new cooling towers CT-1, CT-2, and CT-3 in approximate location of demolished towers. See plans for conductor and raceway size.
         ii. Furnish and install (6) new NEMA 3R 65k AIC rated Danfoss VFDs with integral 30A disconnect and bypass.

2) Condenser Water Pumps
   i. Furnish and install wire from switchboard to (3) condenser water pumps CP-1, CP-2, and CP-3. 1 1/4" 3#4,1#6G
   ii. Furnish and install (3) new NEMA 3R 65k AIC rated Danfoss VFDs with integral 60A disconnect and bypass, connected to existing power factor correcting capacitors.
3) Refer to attached drawings for associated switchboard electrical connection to motors.
4) Provide 120V power to the new drain flow meter.
5) Furnish and install 120V wiring from vendor-provided power distribution panel to cooling tower accessories - water level control, vibration cutoff switch, motor heater for reach cooling tower. Each run is less than
6) Vendor-provided power distribution panel that servers cooling tower accessory loads to have SCCR rating of 100kA.

8. Vibration Isolation
   A. Existing cooling towers and condenser water pumps do not have spring isolation or inertia bases. These are not necessary for the new equipment.
9. Structural
   A. Existing roof framing has been verified with preliminary equipment selection; existing roof framing is adequate for new units incoming load without triggering structural upgrade, existing roof framing will be confirmed at a future date with final equipment.
   B. Cooling Tower CT-1, 2, 3:
      1) Provide seismic and wind attachment connection to steel frame. Reuse existing steel base framing.
      2) Provide additional steel beams to accommodate new CT footprint. See the structural sketch for added info including steel beam size and quantities. Extension of steel frame on the plan south side only.
   C. Pumps CP-1, 2, 3
      1) Provide roofed-in structural sleeper to support pumps; final plan location to be determined by structural.
      2) Provide hold-down and shear connections at wood sleeper attaching to existing concrete over metal deck,
      3) Provide roofing at sleeper locations (by others).
   D. Rooftop Mechanical pipe: Total number of pipe support to be determined by in final design.
      1) Routing under CT steel base frame:
         i. Provide gravity hanger with welded Anvil fig 66 to the bottom of steel beam.
      2) New routing around the CT:
         i. Provide support with pipe stanchions and steel angle as required for elevated pipe matching to the existing pipe support.
      3) Existing pipe routing:
         i. Re-use existing pipe support.
   E. Chiller room mechanical pipe:
      1) Provide seismic bracing for all MP that triggers seismic bracing per structural code, ASCE 7-16, chapter. Pipe support will be exempt from seismic bracing if pipe will be hung less than 12" below from concrete composite slab above.
      2) Provide Mech pipe gravity hanger per Mech code.
      3) Provide seismic bracing for all mech pipe longer than 15ft.
      4) Provide seismic bracing with McKinstry pipe support standard kit; detail will be provided in final design.
   F. Special inspection:
      1) Post installs concrete anchors special periodic inspection
10. Roofing
   A. Reuse existing roofing, provide repairs, flashing as necessary for the mechanical and electrical scopes.
   B. Demo
      1) Pipe penetrations and equipment support connections to roof as required
   C. New Work
      1) See mechanical scope for pipe penetration work
      2) New pump equipment support connection points per structural scope.
11. Chemical Treatment – Nalco to perform under existing UWMC Service Contract.
   A. S1 Cooling Towers Condenser Loop
      1) Disconnect the Nalco controller and associated treatment lines prior to demo.
      2) Reconnect the Nalco Controller and associated treatment lines to new connection ports in the new condenser supply and return piping. Furnish and install new piping, treatment lines as necessary. Existing controller to be reused.
      3) Balance the condenser loop chemistry for the new cooling tower system.
      4) Coordinate with Mechanical and Demo contractor.
   B. Montlake Cooling Towers Condenser Loop

1) Mechanical contractor to perform drain down and fill of the condenser loop. Existing Nalco controller and piping connection will remain as-is.
2) Balance the condenser loop chemistry after the loop is refilled.
3) Coordinate with Mechanical contractor.

12. Testing, Adjusting, and Balancing (TAB)
    A. Pre-TAB
        1) CWS and CWR flow rates and temperatures
        2) Chiller condenser barrel pressure drop
    B. For each of (3) new cooling towers
        1) Fan/VFD speeds
        2) Tower flow rate
        3) Tower entering/leaving temperature
    C. For each of (3) new CW pumps
        1) Pressure
        2) Speed
        3) Flow rate
13. Commissioning
    A. Perform commissioning as required by Seattle Energy Code.
    B. Perform PTP and FPT of the new cooling towers, condenser pumps and associated controls.
    C. Verify trending specified in the M&V plan are implemented.
14. Training
    A. McKinstry will provide necessary training to the facilities staff on the new system design, intent and operation.

Roofing Upgrade

1. Roofing
    A. Demo existing roofing to the deck. Install new SBS Modified Bituminous Roofing System including insulation and membranes.
    B. New roofing to match existing thickness.
    C. Include necessary metal flashing, walk pads to mechanical equipment.

Install new Packaged Separator System

1. Equipment Furnished by ESCO
    A. (1) Centrifugal separator system (pump, separator, collection basin, controls) for basin sweeper duty.
    B. Flow rate 400 gpm, 15 HP motor
    C. Model LAKOS TCX-0400-SRV or Puroflux PF-63-040B.
2. Mechanical
    A. Install (1) separator system, assume location in mechanical room with piping up to towers. McKinstry will coordinate with UWMC Facilities and UW Engineering to identify system location during design.
    B. Mechanical to furnish and install piping from (1) skid to each cooling tower. Connect the piping to exterior connection point of the cooling tower manufacturer provided basin sweeper piping interior to tower. 4" discharge from system, 2.5" branches to towers. 3" suction from towers, 6" suction to system. Piping is Schedule 40 black steel, uninsulated.
    C. Provide necessary new roof penetrations (4" and 6").
3. Controls
    A. Refer to attached points list
    B. Provide necessary wiring and programming to enable the separator if one or more cooling tower is operating
4. Electrical
    A. Perform 30-day metering on panel MCC-SC00-E01, shutdown of associated panel required for current transformer installation. Shutdown by UWMC.
    B. Furnish and install new 30 Amp breaker in switchboard MCC-SC00-E01.
    C. Furnish and install new 3#10 & 1#10G conductor and 3/4" rigid conduit.
    D. Furnish and install 30A fused maintenance disconnect next to equipment.
5. TAB
    A. Perform TAB of the new system to confirm that basin sweeper system and condenser water system meet designated flow rates at all combinations of tower operation.
6. Commissioning
    A. Perform PTP and FPT of the controls associated with the new separator.
    B. Verify trending specified in the M&V plan are implemented.

Detailed Scope of Work

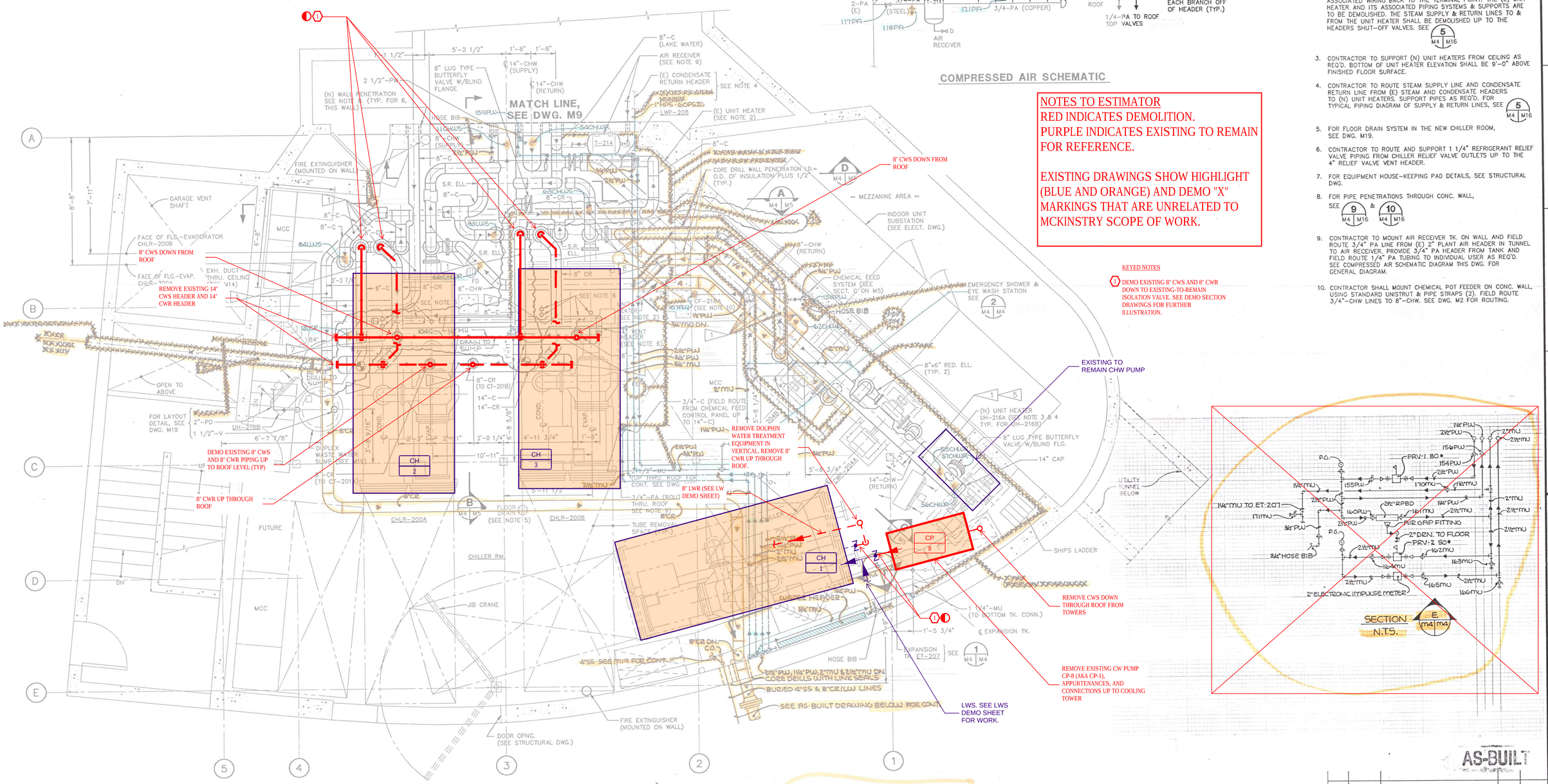
CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. During pre-construction McKinstry will submit a testing request to UWMC based on area of impact. Sampling, testing and abatement if necessary will be performed by UWMC.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above. At this point, all other related equipment that has been inspected is operating properly.
   A. Existing chillers and chilled water loop will remain as existing. Replacement or repair is not included.
   B. Existing lake water piping in the chiller room will remain as-existing. This piping serves the lake water pump (LWP-8) in the chiller room that is used for power plant emergency water supply. This pump and associated piping will remain as existing. The lake water pumping station and piping to/from the chiller room will remain as-existing.
   C. Electrical switchgear in the chiller room and adjoining space will remain as-is.
   D. Existing interconnection between S1 and Montlake cooling towers is not functional and per UWMC Facilities.
3. McKinstry will work with SDCI to for exclusion on operating temperature. Seattle Energy Code specifies 86°F entering temperature, but this does not apply for replacement of existing capacity where there are space restrictions.
4. All work will be performed on weekday during regular hours. Exception to this crane pick for removal and install of the cooling towers will be performed on Saturdays.
5. The project will be implemented over Fall-Winter duration (mid-October through mid-March) when the S1 chiller plant is shutdown for winter. The chiller plant will not be available for operation during construction. Temporary or back-up chiller plant equipment are not included.
6. UWMC Facilities will shutdown, drain and isolate the existing cooling towers; de-energize connected equipment and breaker prior to start of construction.
7. UWMC Facilities will re-energize the connected equipment and breaker prior to start-up of new equipment. McKinstry will coordinate the start-up of new system and then turn it over to UWMC to enable as needed for cooling.
8. McKinstry and UWMC Facilities will coordinate project impacts from extreme weather conditions.
9. Closure of NE Columbia Rd will be required to facilitate crane pick of existing and new equipment. Refer to included laydown plan for details. McKinstry will coordinate in advance the schedule, impact area and expected care/equipment weights with UWMC.
10. Existing condenser water pumps are located above the chiller room roof and are mounted on concrete base without spring isolations or inertia bases. The mechanical yard is not connected to any occupied space. Per coordination with UWMC Facilities, there are no existing vibration or noise concerns for the chiller room and spring isolation/ inertia bases are not necessary for the condenser pumps and cooling towers.
11. The cooling towers have stainless steel basin and other galvanized surfaces in contact with water have Thermosetting Hybrid Polymer coating. Passivation is not required per Manufacturer recommendations.
12. The existing cooling towers do not include basin heaters and heat trace for the piping. The towers will be shutdown and drained for winter (per discussion with owner). Basin heaters for new cooling towers and heat race for outdoor piping is not necessary and not included for the new cooling towers.
13. UWMC shall perform electrical shutdowns and re-energizations necessary construction. McKinstry will coordinate in advance the panels, breakers, duration of the shutdown and lock-out tag-out process. Based on above scopes, switchboards E909A and E909B will be required to be shutdown.
14. 30-day metering will be required for the new Separator System. This will require shutdown of switchgear MCC-SC00-E01 for install and removal of energy meters. Shutdown is anticipated in Spring – Summer while the chiller plan is operating. McKinstry will coordinate the 30-day metering with UWMC Facilities. The switchgear serves the chiller plant.
15. The existing interconnection piping between the S1 and Montlake cooling towers do not have isolation valves other than control valves at the cooling tower. Shutdown and drain down of the Montlake condenser loop will be required. Per discussion with UWMC Facilities, McK shall coordinate the shutdown and drain down in advance.
16. McKinstry will coordinate the deduct metering application with Seattle Public Utilities. UWMC/UW shall provide service meter information and complete application forms and pay any fees SPU requires (billed directly to the account).
17. Upgrades or repair to fire alarm and fire sprinkler system is required and not included in the scope.
18. Excludes new structural reinforcement for roof deck due to new penetrations or expansion of existing penetrations. Documents supplied by UWMC indicate that the reinforcing steel is a 12” mesh. The largest penetrations will involve 10” CW pipe running through existing penetrations for 8” CW pipe, or new penetrations for 10” CW pipe. Mechanical design will coordinate with existing structural conditions to avoid the reinforcing steel mesh.
19. Existing (1) side steam filter/separator is de-energized and not in use. This will be demolished. Existing Dolphin system in condenser piping are not operational and will be demolished. The new separator system has no footprint available in the mechanical yard. A location in the chiller room will be identified during design phase in coordination with UWMC Facilities and UW Engineering. The project include preliminary scope and budget allowance to implement the scope. Final design, scope and pricing to be determined during design phase.
20. Chemical treatment scope will be implemented by UWMC’s chemical treatment vendor, Nalco under the existing service contract. McKinstry shall provide budget estimates for the scope and coordinate the scope with Nalco.
21. The mechanical yard has high voltage electrical infrastructure. Installing code required roof insulation will raise the roof thickness. The scope incudes only new roofing to match existing insulation thickness and excludes upgrading the roof to

code required insulation. During design, McKinstry will work with SDCI for variance on the code required insulation.

22. Repairs to roof decking, rood parapet walls, louvers is not included in the scope.
23. The height of new cooling towers will exceed the height of the existing mechanical yard wall. This will make the new cooling towers visible from outside. The mechanical yard wall will remain as existing, changes to the wall or increasing the wall height is not included in the scope.
24. Proposed laydown area plan in included in the scope of work. McKinstry will coordinate with UWMC Facilities on review and approval of the plan. Any fees associated with the use of laydown area is included as a budget allowance.
25. Per existing as-built drawings, the roof reinforcing steel is a 12" mesh. The largest penetrations will involve 10" CW pipe running through existing penetrations for 8" CW pipe, or new penetrations for 10" CW pipe. Impact to the reinforcing steel is not expected and the scope does not include new structural reinforcement for roof deck.

MECH - DEMO



COMPRESSED AIR SCHEMATIC

NOTES TO ESTIMATOR

RED INDICATES DEMOLITION.
PURPLE INDICATES EXISTING TO REMAIN FOR REFERENCE.

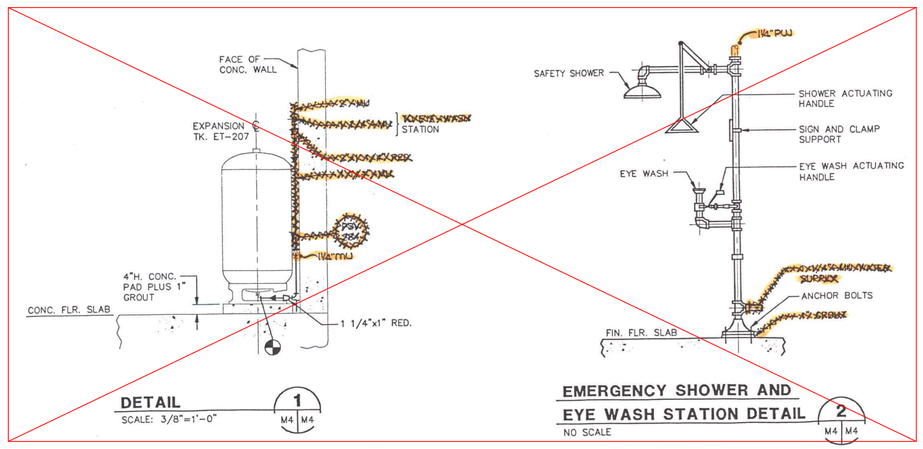
EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

KEYED NOTES

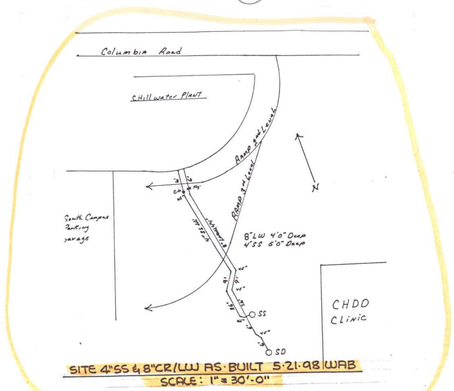
1. DEMO EXISTING 8" CWS AND 8" CWR DOWN TO EXISTING-TO-REMAIN ISOLATION VALVE. SEE DEMO SECTION DRAWINGS FOR FURTHER ILLUSTRATION.

NOTES:

1. SEE GENERAL NOTES ON DWG. M1.
2. CONTRACTOR TO DEMOLISH THE (E) UNIT HEATER AND ITS ASSOCIATED WIRING BACK TO THE TERMINAL POINT. THE (E) UNIT HEATER AND ITS ASSOCIATED PIPING SYSTEMS & SUPPORTS ARE TO BE DEMOLISHED. THE STEAM SUPPLY & RETURN LINES TO & FROM THE UNIT HEATER SHALL BE DEMOLISHED UP TO THE HEADERS SHUT-OFF VALVES. SEE 5 M4 M16
3. CONTRACTOR TO SUPPORT (N) UNIT HEATERS FROM CEILING AS REQ'D. BOTTOM OF UNIT HEATER ELEVATION SHALL BE 9'-0" ABOVE FINISHED FLOOR SURFACE.
4. CONTRACTOR TO ROUTE STEAM SUPPLY LINE AND CONDENSATE RETURN LINE FROM (E) STEAM AND CONDENSATE HEADERS TO (N) UNIT HEATERS. SUPPORT PIPES AS REQ'D. FOR TYPICAL PIPING DIAGRAM OF SUPPLY & RETURN LINES, SEE 5 M4 M16
5. FOR FLOOR DRAIN SYSTEM IN THE NEW CHILLER ROOM, SEE DWG. M19.
6. CONTRACTOR TO ROUTE AND SUPPORT 1 1/4" REFRIGERANT RELIEF VALVE PIPING FROM CHILLER RELIEF VALVE OUTLETS UP TO THE 4" RELIEF VALVE VENT HEADER.
7. FOR EQUIPMENT HOUSE-KEEPING PAD DETAILS, SEE STRUCTURAL DWG.
8. FOR PIPE PENETRATIONS THROUGH CONC. WALL, SEE 9 M4 M16 & 10 M4 M16
9. CONTRACTOR TO MOUNT AIR RECEIVER TK. ON WALL AND FIELD ROUTE 3/4" PA LINE FROM (E) 2" PLANT AIR HEADER IN TUNNEL TO AIR RECEIVER. PROVIDE 3/4" PA HEADER FROM TANK AND FIELD ROUTE 1/4" PA TUBING TO INDIVIDUAL USER AS REQ'D. SEE COMPRESSED AIR SCHEMATIC DIAGRAM THIS DWG. FOR GENERAL DIAGRAM.
10. CONTRACTOR SHALL MOUNT CHEMICAL POT FEEDER ON CONC. WALL, USING UNISTRUT & PIPE STRAPS (2). FIELD ROUTE 3/4"-CHW LINES TO 8"-CHW. SEE DWG. M2 FOR ROUTING.



PLAN
SCALE: 3/8"=1'-0"



AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
1	12-31-97	ADDED CHILLER PUMPOUT COMP.		CEM
0	5-12-97	ISSUED FOR BID		

PB PARSONS BRINCKERHOFF
PB ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR PLAN

ROBERT E. FISHMAN STATE OF WASHINGTON 9029237 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

8'-3/4"
GRAPHIC SCALE
3/8" = 1'-0"
0 1 2 3 4 5 6 7 8

DR.	LW	APPROVED	DATE	DRAWING NO.	REV
DES.	FY			M4	1
CHK.	CM	PRINCIPAL IN CHARGE	DATE	SHEET	OF

BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

212-M- 25 AB

NONE

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MICROFILMED

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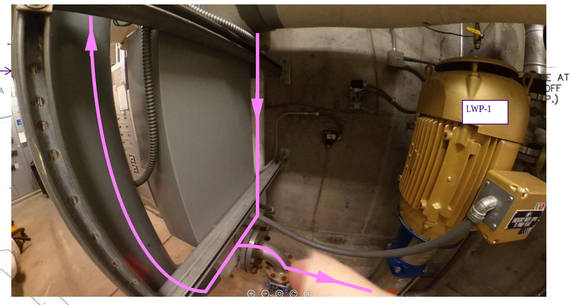
MECH - DEMO

THIS IS THE 'BYPASS' LAKE WATER LINE, LABELED LWR

THIS IS THE LWS THAT GOES TO THE CHILLER CWS

EXISTING TO REMAIN LWP-1, EMERGENCY LAKE WATER SUPPLY TO POWER PLANT.



EXISTING 8" LWS AND LWR (TYP)

MATCH LINE, SEE DWG. M9

DEMO 8" LWR AS NEEDED TO INSTALL NEW ISOLATION VALVE

8" CWR UP THROUGH ROOF (SEE CW DEMO SHEET)

8" CWS (SEE CW DEMO SHEET)

DEMO 8" LWS IN VERTICAL TO FACILITATE INSTALLATION OF ISOLATION VALVE

EXISTING 8" LWR IN VERTICAL

NOTES TO ESTIMATOR

RED INDICATES DEMOLITION.
PURPLE INDICATES EXISTING TO REMAIN FOR REFERENCE.

EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

PROJECT-SPECIFIC ABBREV.

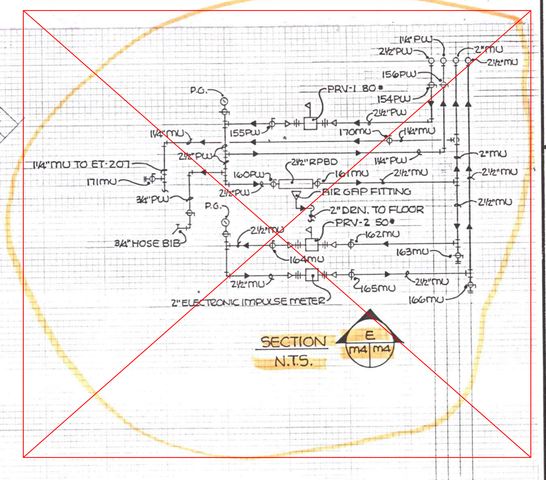
LWS: LAKE WATER SUPPLY. THIS IS WATER FROM THE LAKE THAT IS PIPED TO CWS.
LWR: LAKE WATER RETURN. THIS IS THE LWS AFTER IT PASSES THROUGH THE CHILLER CONDENSER THAT GOES TO LAKE / DRAIN, OR THE LAKE WATER THAT BYPASSES THE CHILLERS

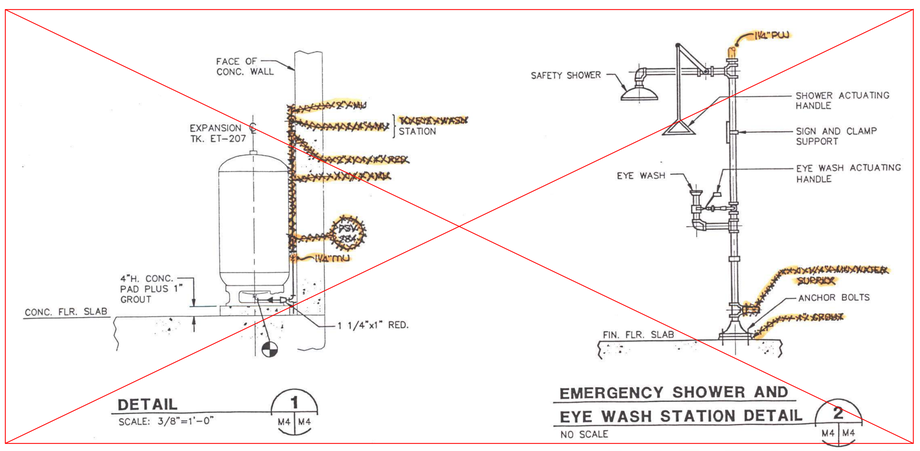
KEYED NOTES

1. CLOSE LW ISOLATION VALVE

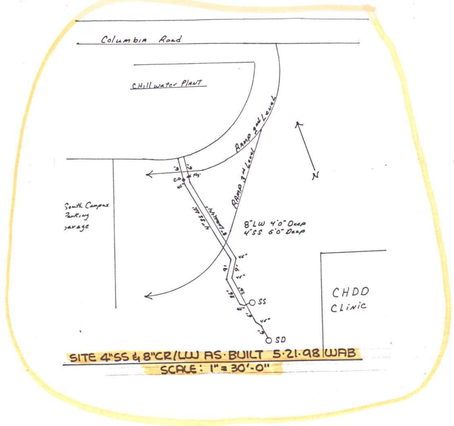
TYPICAL PIPING DIAGRAM OF SUPPLY & RETURN LINES, SEE 5 M4 | M16

5. FOR FLOOR DRAIN SYSTEM IN THE NEW CHILLER ROOM, SEE DWG. M19.
6. CONTRACTOR TO ROUTE AND SUPPORT 1 1/4" REFRIGERANT RELIEF VALVE PIPING FROM CHILLER RELIEF VALVE OUTLETS UP TO THE 4" RELIEF VALVE VENT HEADER.
7. FOR EQUIPMENT HOUSE-KEEPING PAD DETAILS, SEE STRUCTURAL DWG.
8. FOR PIPE PENETRATIONS THROUGH CONC. WALL, SEE 9 M4 | M16 & 10 M4 | M16
9. CONTRACTOR TO MOUNT AIR RECEIVER TK. ON WALL AND FIELD ROUTE 3/4" PA LINE FROM (E) 2" PLANT AIR HEADER IN TUNNEL TO AIR RECEIVER. PROVIDE 3/4" PA HEADER FROM TANK AND FIELD ROUTE 1/4" PA TUBING TO INDIVIDUAL USER AS REQ'D. SEE COMPRESSED AIR SCHEMATIC DIAGRAM THIS DWG. FOR GENERAL DIAGRAM.
10. CONTRACTOR SHALL MOUNT CHEMICAL POT FEEDER ON CONC. WALL, USING STANDARD UNISTRUT & PIPE STRAPS (2). FIELD ROUTE 3/4"-CHW LINES TO 8"-CHW. SEE DWG. M2 FOR ROUTING.





PLAN
SCALE: 3/8"=1'-0"



AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
1	12-31-97	ADDED CHILLER PUMPOUT COMP.		Cbrr
0	5-12-97	ISSUED FOR BID		

PB PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR PLAN

ROBERT E. FISHMAN — STATE OF WASHINGTON — 0029237 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

DR.	LW	APPROVED	DATE	DRAWING NO.	REV
DES.	FY			M4	1
CHK.	CM	PRINCIPAL IN CHARGE	11/4/97 DATE	SHEET	OF

GRAPHIC SCALE
3/8" = 1'-0"
8'-3/4"

BLDG. NO.: 182/E12
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

212-M- 25 AB

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MECH - DEMO

Base Bid - Demo Work

REMOVE EXISTING 8" CWS AND CWR DOWN THROUGH ROOF

REMOVE EXISTING 14" CWS HEADER

NOTE: LWS AND LWR CONNECTIONS REMOVED FROM CH-3 AT SOME POINT IN THE PAST

EXISTING TO REMAIN LWR PIPING

EXISTING TO REMAIN CWS AND CWR CONNECTION TO EXISTING CHILLER

EXISTING TO REMAIN LWS PIPING

DEMO 8" CWS AND CWR BACK TO EXISTING ISOLATION VALVE. TYP OF (3) CHILLERS. WORK FOR (1) CHILLER SHOWN FOR REFERENCE.

NOTES TO ESTIMATOR
RED INDICATES DEMOLITION.
PURPLE INDICATES EXISTING TO REMAIN.

EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

PROJECT-SPECIFIC ABBREV.

LWS: LAKE WATER SUPPLY. THIS IS WATER FROM THE LAKE THAT IS PIPED TO CWS.
LWR: LAKE WATER RETURN. THIS IS THE LWS AFTER IT PASSES THROUGH THE CHILLER CONDENSER THAT GOES TO LAKE / DRAIN, OR THE LAKE WATER THAT BYPASSES THE CHILLERS

1 ADDENDUM 1 - 02/02/2022

SECTION A (M4 | M5)
SCALE: 3/8"=1'-0"

SECTION B (M4 | M5)
SCALE: 3/8"=1'-0"

CT201B CT201A
ROOF
3/8" OD TUBING (TYP.)
* CONTROLLER
CHP'S
120V-1PH.
15 GALLON CHLORINE DIOXIDE
15 GALLON SLUDGE DISPERSANT
30 GALLON CONTAINMENT TANK

* CONTROLLER PROGRAMMED TO INJECT APPX. 1 GALLON OF CHLORINE DIOXIDE AND 1 QUART OF SLUDGE DISPERSANT DIRECTLY INTO COOLING TOWER SUMPS AT 9:00AM EVERY MONDAY AND FRIDAY DURING CHILLER OPERATIONAL SEASONS. JCI CONTROL SYSTEM TO CYCLE CONDENSER WATER PUMPS AND AUTOMATIC VALVES FOR CHEMICAL MIXING.

COOLING TOWER SUMP CHEMICAL TREATMENT
N.T.S.

DISCONNECT EXISTING CHEMICAL TREATMENT AND RECONNECT ON COMPLETION OF WORK, TYP.

TYP. 8" BRANCH-OFF SECTION

SECTION C (M4 | M5)
SCALE: 3/8"=1'-0"

NOTE:
CONTRACTOR SHALL INSTALL CHEMICAL FEED TKS. IN FIBER-GLASS CONTAINMENT AND SHALL BE HELD TIGHTLY W/ANGLE BRACKETS. BOLT ANGLE BRACKETS TO CONC. FLR. SLAB W/CONC. EXPANSION BOLT. ALL 1/4"-CF TUBINGS SHALL BE FIELD ROUTED FROM CHP'S TO INJECTION POINTS. CHEMICAL FEED PUMPS & CONTROL PANELS SHALL BE MOUNTED ON CONC. WALL W/UNISTRUT. SEE CHEMICAL FEED SCHEMATIC ON DWG. M20 FOR ROUTING.

SECTION D (M4 | M5)
SCALE: 3/8"=1'-0"

GRAPHIC SCALE
3/8" = 1'-0"
7'-11 1/2"
0 1 2 3 4 5 6 7 8

ROBERT E. FISHMAN — STATE OF WASHINGTON — 0029237 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		Cmy

PB PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR SECTIONS AND DETAILS

DR.	DC	APPROVED	5/1/97	DRAWING NO.	REV
DES.	FY		DATE	M5	0
CHK.	CM	PRINCIPAL IN CHARGE	5/1/97 DATE	SHEET	OF

BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

212-M- 26 AB

May 06, 1997 - 08:55:00 - SK

MICROFILMED

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MECH - DEMO

NOTES:

1. SEE GENERAL NOTES ON DWG M1.
2. FOR ROOF AREA DRAINAGE SYSTEMS, COOLING TOWER OVERFLOW AND DRAIN ROUTING SYSTEMS, SEE DWG. M19.
3. FOR ROOF SLAB PENETRATION AND HOUSE-KEEPING PAD DETAILS, SEE ARCHITECTURAL DWG. A2.2.
4. THE CONTRACTOR SHALL COORDINATE WITH OTHER DISCIPLINES – STRUCTURAL AND ARCHITECTURAL TO FINALIZE THE LOCATIONS OF ROOF SLAB PENETRATIONS. SEE STRUCTURAL DWG. S5.

NOTES TO ESTIMATOR
RED INDICATES DEMOLITION. PURPLE INDICATES EXISTING TO REMAIN.

EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

REMOVE EXISTING SIDE STREAM CENTRIFUGAL FILTER SKID, PVC PIPING, AND APPURTENANCES

EXISTING ELECTRICAL EQUIPMENT

REMOVE NON-CHEMICAL WATER TREATMENT SYSTEM IN VERTICAL.

REMOVE EXISTING CWS AND CWR PIPING DOWN TO BELOW ROOF LEVEL (TYP)

REMOVE EXISTING CONDENSER WATER PUMP AND APPURTENANCES (TYP 2)

REMOVE EXISTING 14" CWS HEADER UNDERNEATH COOLING TOWERS

REMOVE EXISTING COOLING TOWER AND APPURTENANCES

REMOVE 10" CWS CONNECTION UNDERNEATH COOLING TOWERS

REMOVE 8" CWS DOWN THROUGH ROOF

REMOVE 8" CWR VERTICAL RISE TO CT-1 EQUIPMENT CONNECTION

REMOVE 8" CWR DOWN TO ROOF

REMOVE 8" CWS RUNNING UNDER TOWER

REMOVE INTERCONNECTION PIPING AND EQUALIZING LINE. SEE INTERCONNECT DEMO PLAN FOR SPECIFICS.

AS-BUILT

ROOF PLAN
SCALE: 3/8"=1'-0"

GRAPHIC SCALE
3/8" = 1'-0"
8'-1/2"
0 1 2 3 4 5 6 7 8

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		CMW

PB PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
ROOF PLAN

DR. LW
DES. FY
CHK. CM

APPROVED DATE 5/7/97
PRINCIPAL IN CHARGE DATE 4/7/97

DRAWING NO. M6
REV 0
SHEET OF

BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

ROBERT E. FISHMAN STATE OF WASHINGTON 16093 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

212-M-_27 AB

N:\UWC\13428

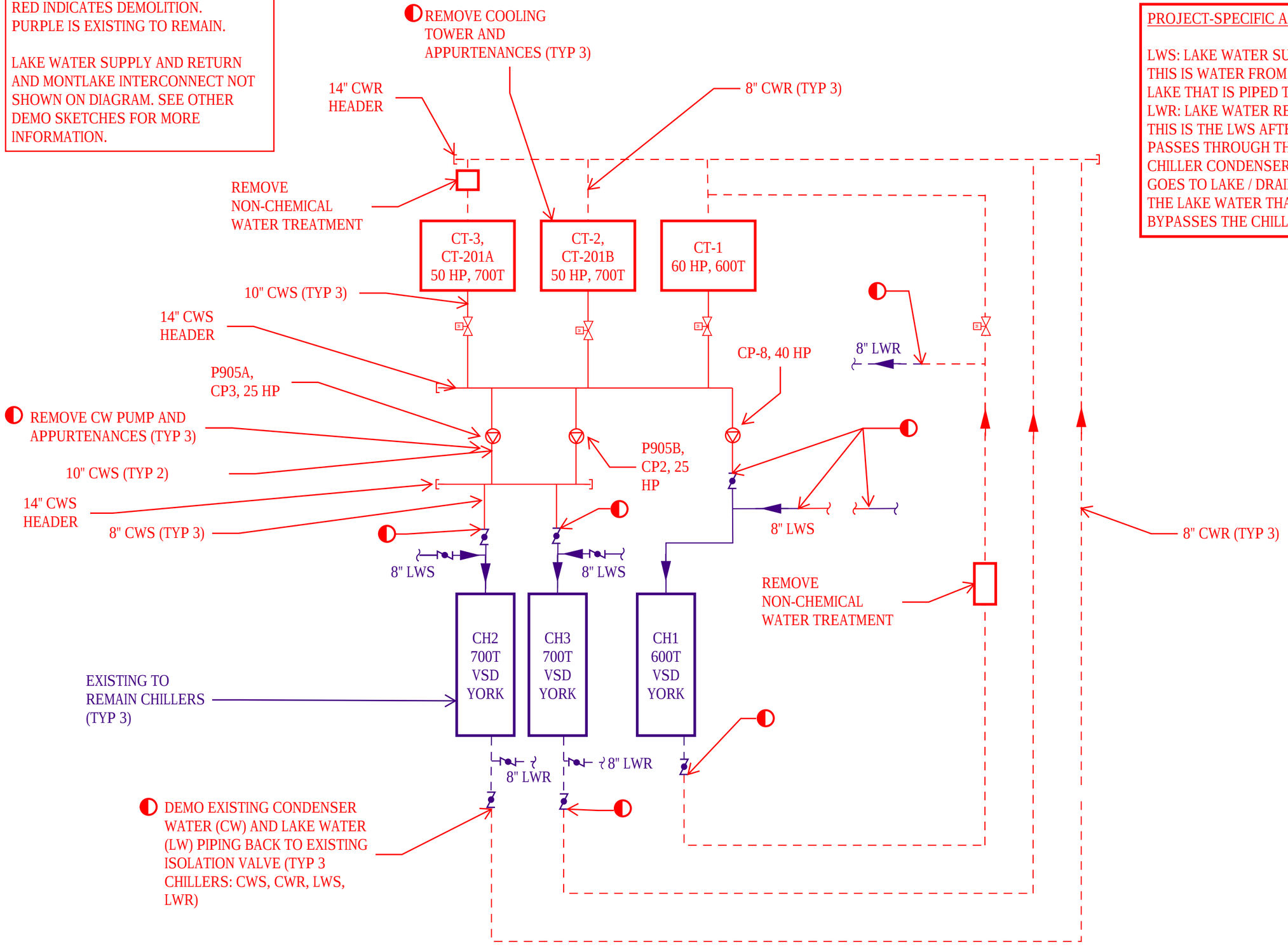
NONE

NOTE TO ESTIMATOR
RED INDICATES DEMOLITION.
PURPLE IS EXISTING TO REMAIN.

LAKE WATER SUPPLY AND RETURN AND MONTLAKE INTERCONNECT NOT SHOWN ON DIAGRAM. SEE OTHER DEMO SKETCHES FOR MORE INFORMATION.

PROJECT-SPECIFIC ABBREV.

LWS: LAKE WATER SUPPLY. THIS IS WATER FROM THE LAKE THAT IS PIPED TO CWS.
LWR: LAKE WATER RETURN. THIS IS THE LWS AFTER IT PASSES THROUGH THE CHILLER CONDENSER THAT GOES TO LAKE / DRAIN, OR THE LAKE WATER THAT BYPASSES THE CHILLERS



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PROJECT:

PROJECT NAME

PROJECT ADDRESS

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED:	DSG
DRAWN:	DWN
CHECKED:	CHK
JOB NO:	JOB NUMBER

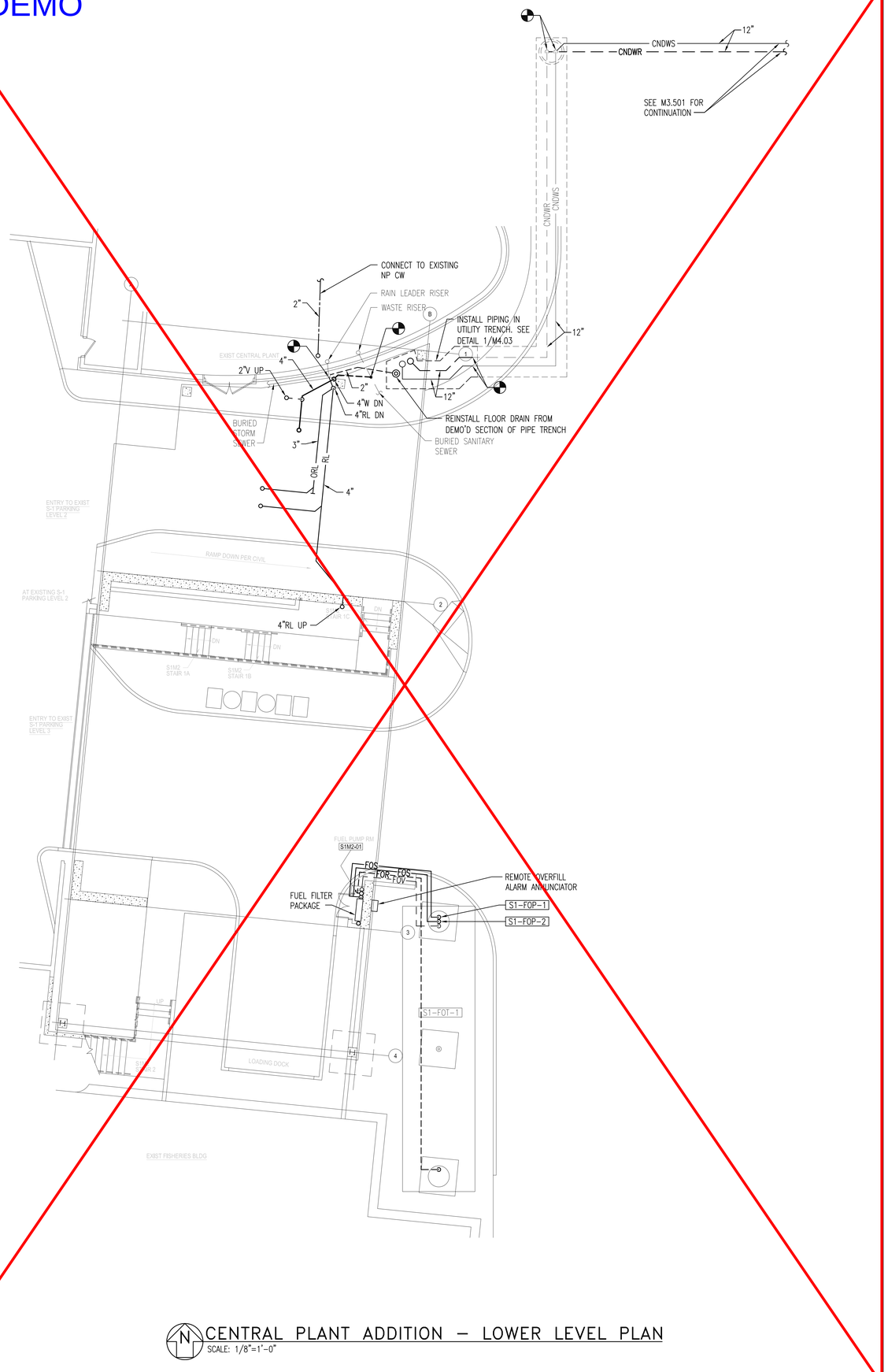
SHEET TITLE:

SYSTEM DIAGRAM DEMO

SHEET NUMBER:

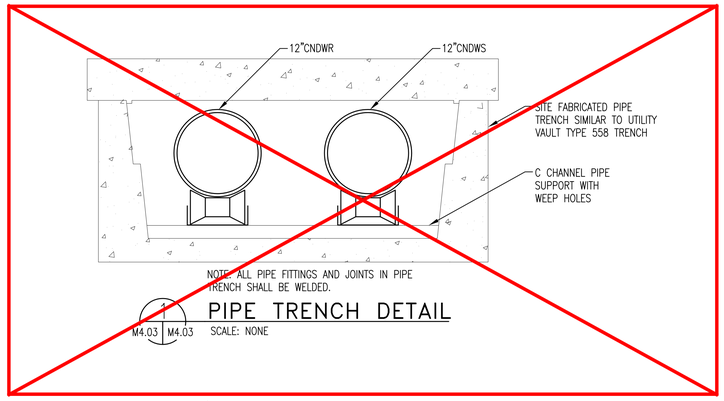
M000

MECH - DEMO



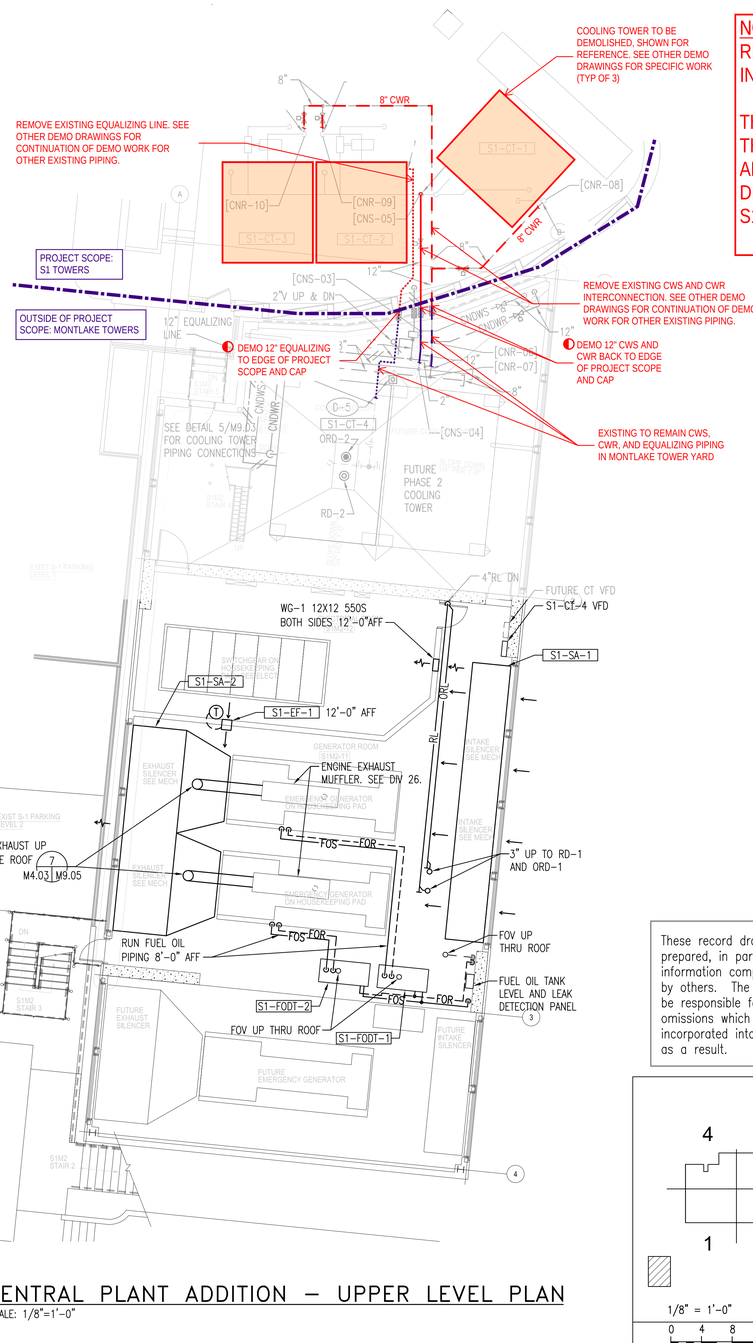
CENTRAL PLANT ADDITION – LOWER LEVEL PLAN

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



PIPE TRENCH DETAIL

SCALE: NONE



CENTRAL PLANT ADDITION – UPPER LEVEL PLAN

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

NOTES TO ESTIMATOR

RED INDICATES DEMOLITION. PURPLE INDICATES EXISTING TO REMAIN.

THIS SHEET SHOWS DEMO SPECIFIC TO THE INTERCONNECT WITH THE ADJACENT MONTLAKE YARD. SEE OTHER DEMO DRAWINGS FOR FULL SCOPE OF S1 DEMOLITION WORK.

nbbj
223 YALE AVENUE NORTH
SEATTLE WASHINGTON 98109
PHONE 206 223 5555
FAX 206 223 5000

UWMC EXPANSION PROJECT

UW CPO PROJECT #201385.00
CONSTRUCTION DOCUMENTS
201385.00

UNIVERSITY OF WASHINGTON MEDICAL CENTER
UW Medicine

RECORD DOCUMENTS

ISSUE

MARK	DATE	DESCRIPTION
-	11/30/2012	RECORD DOCUMENTS

REV	DATE	DESCRIPTION

DRAWN BY: IR
PROJ. ENG.: CB

PROJ. NO: 100273.00
DATE: 07/14/09

DWG.
PARTIAL PLANS CENTRAL PLANT ADDITION

DWG.
M4.03

1/8" = 1'-0"

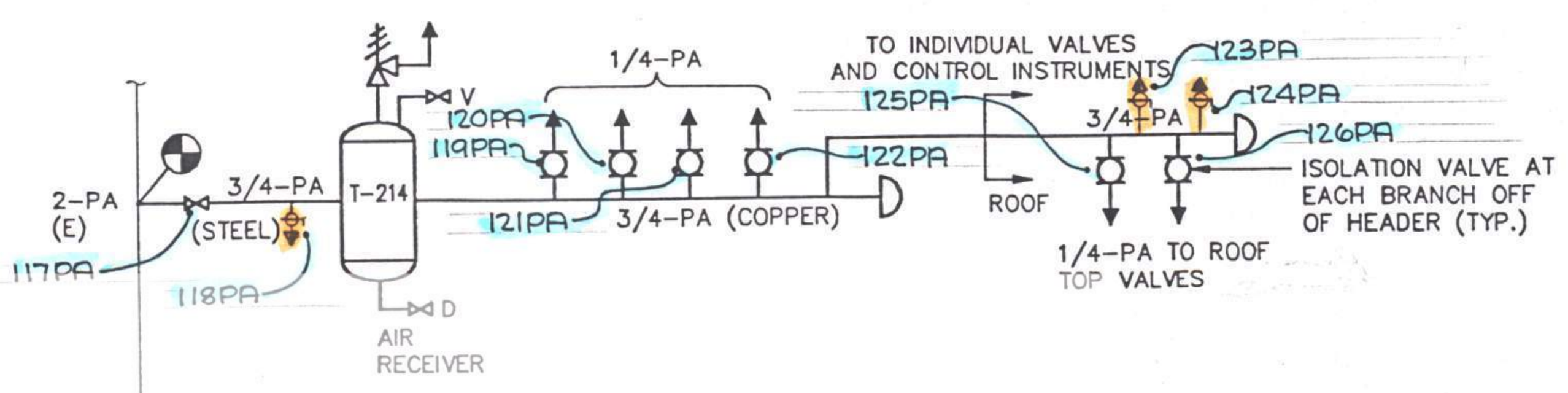
These record drawings have been prepared, in part, on the basis of information compiled and furnished by others. The Engineer will not be responsible for any errors or omissions which have been incorporated into this document as a result.

MECH - NEW

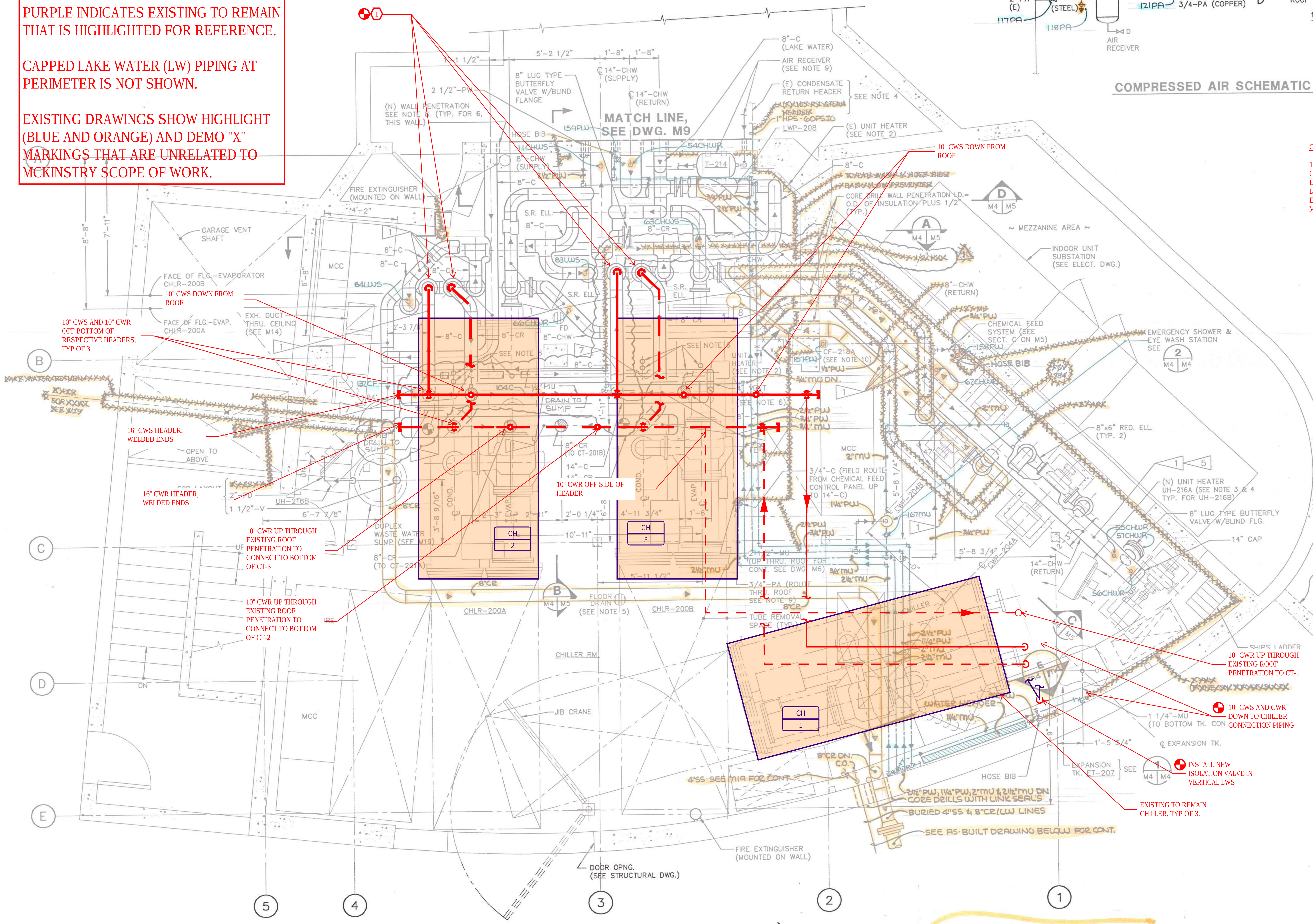
NOTES TO ESTIMATOR
RED INDICATES NEW WORK.
PURPLE INDICATES EXISTING TO REMAIN THAT IS HIGHLIGHTED FOR REFERENCE.

CAPPED LAKE WATER (LW) PIPING AT PERIMETER IS NOT SHOWN.

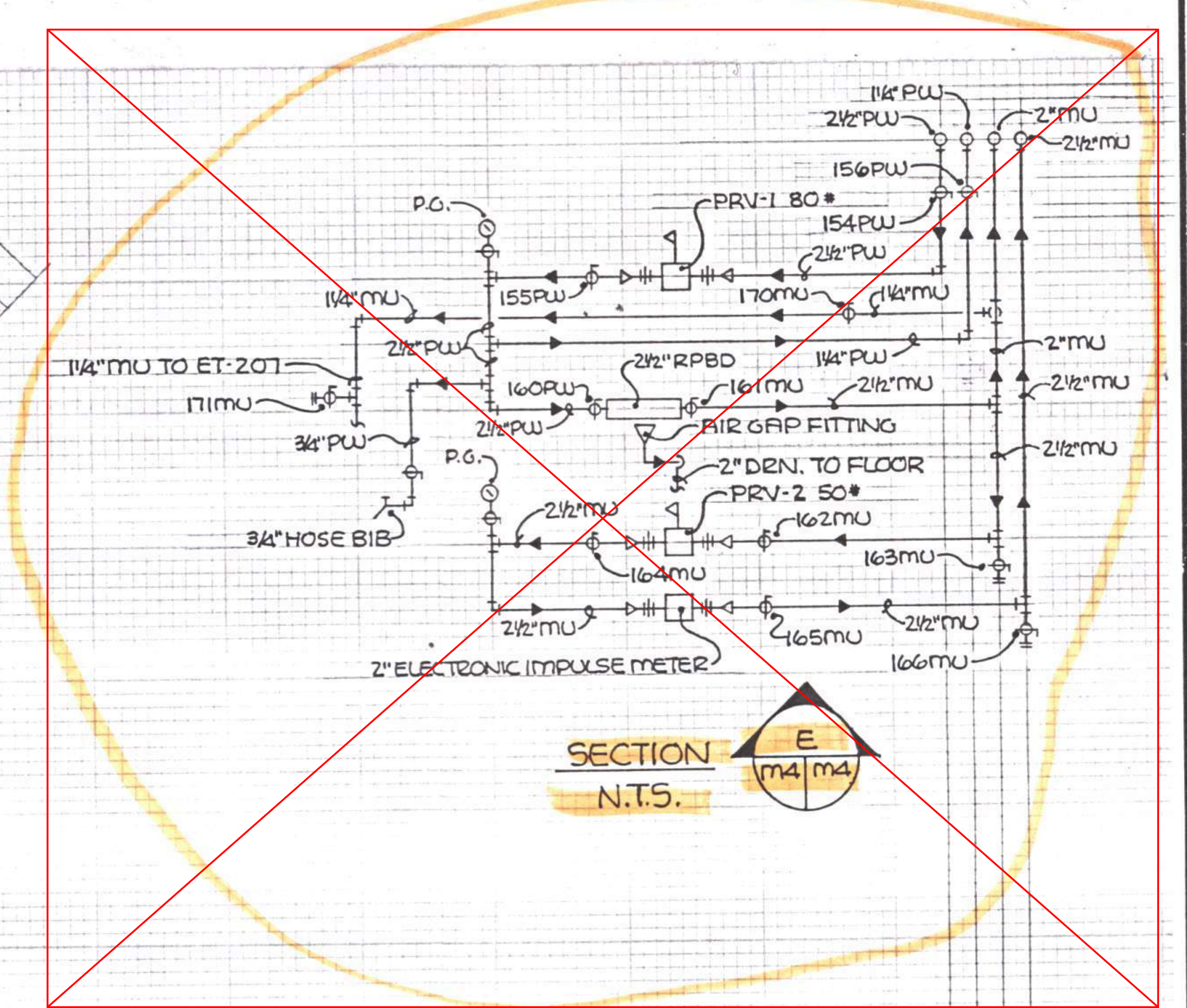
EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.



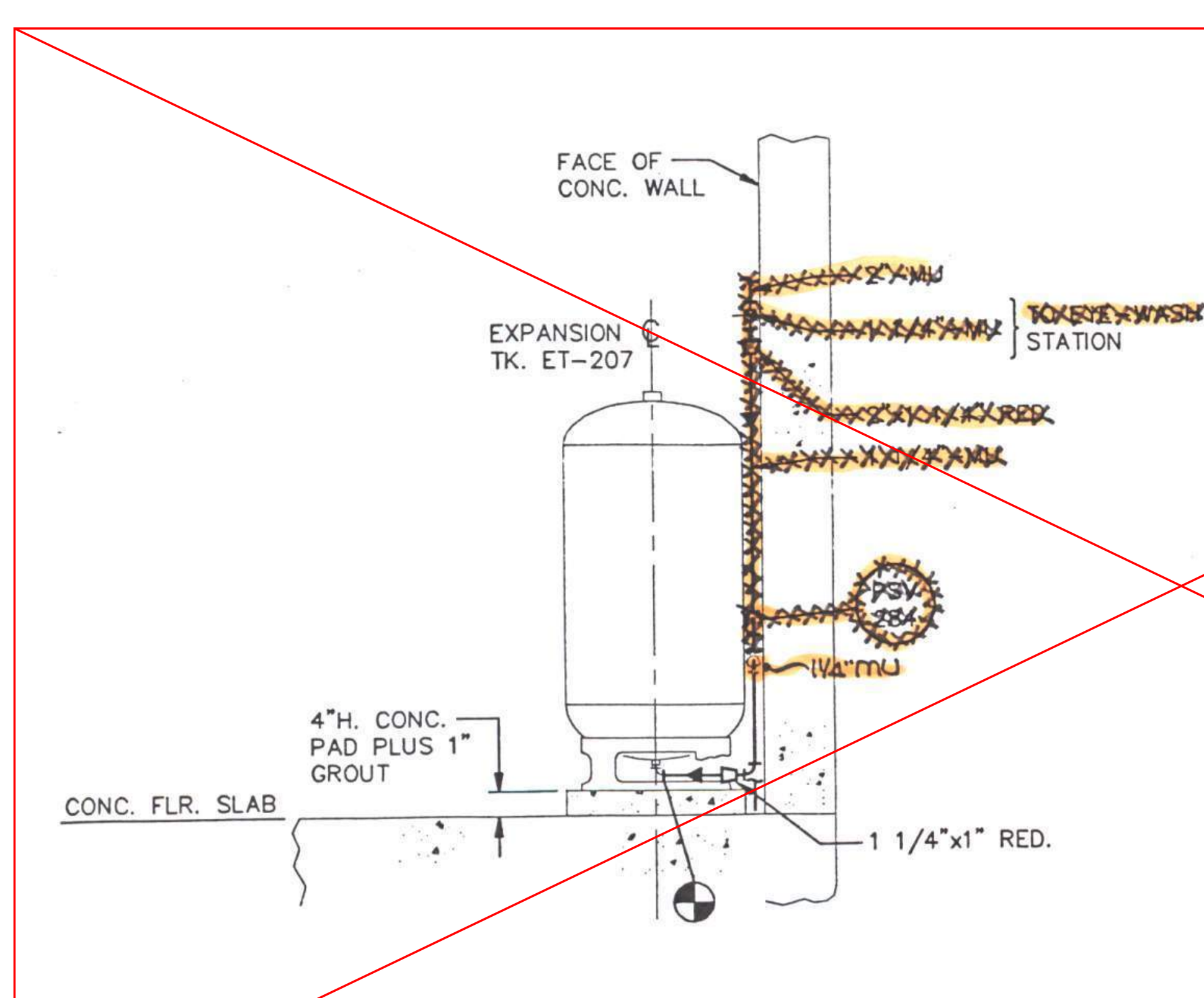
COMPRESSED AIR SCHEMATIC



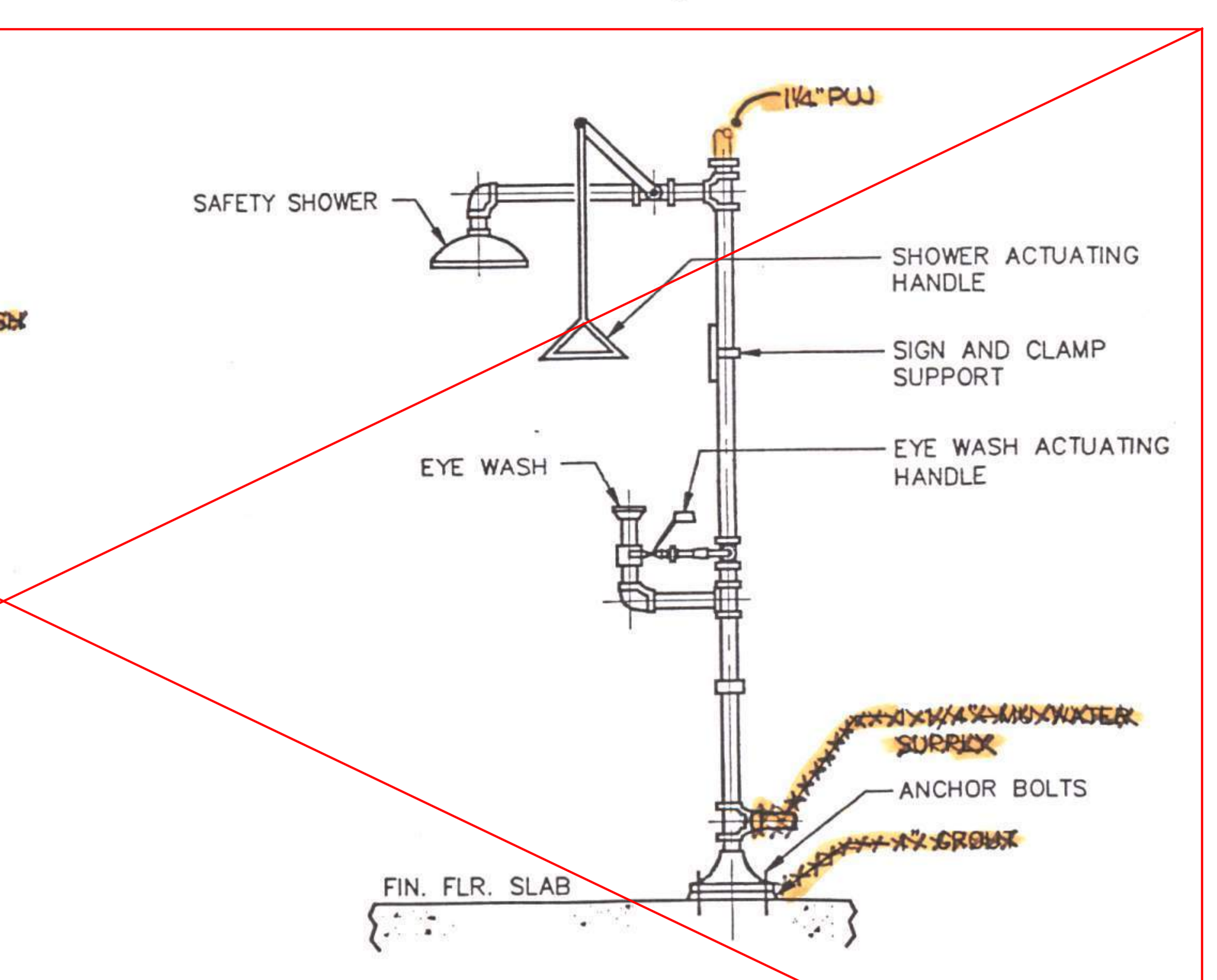
PLAN
SCALE: 3/8"=1'-0"



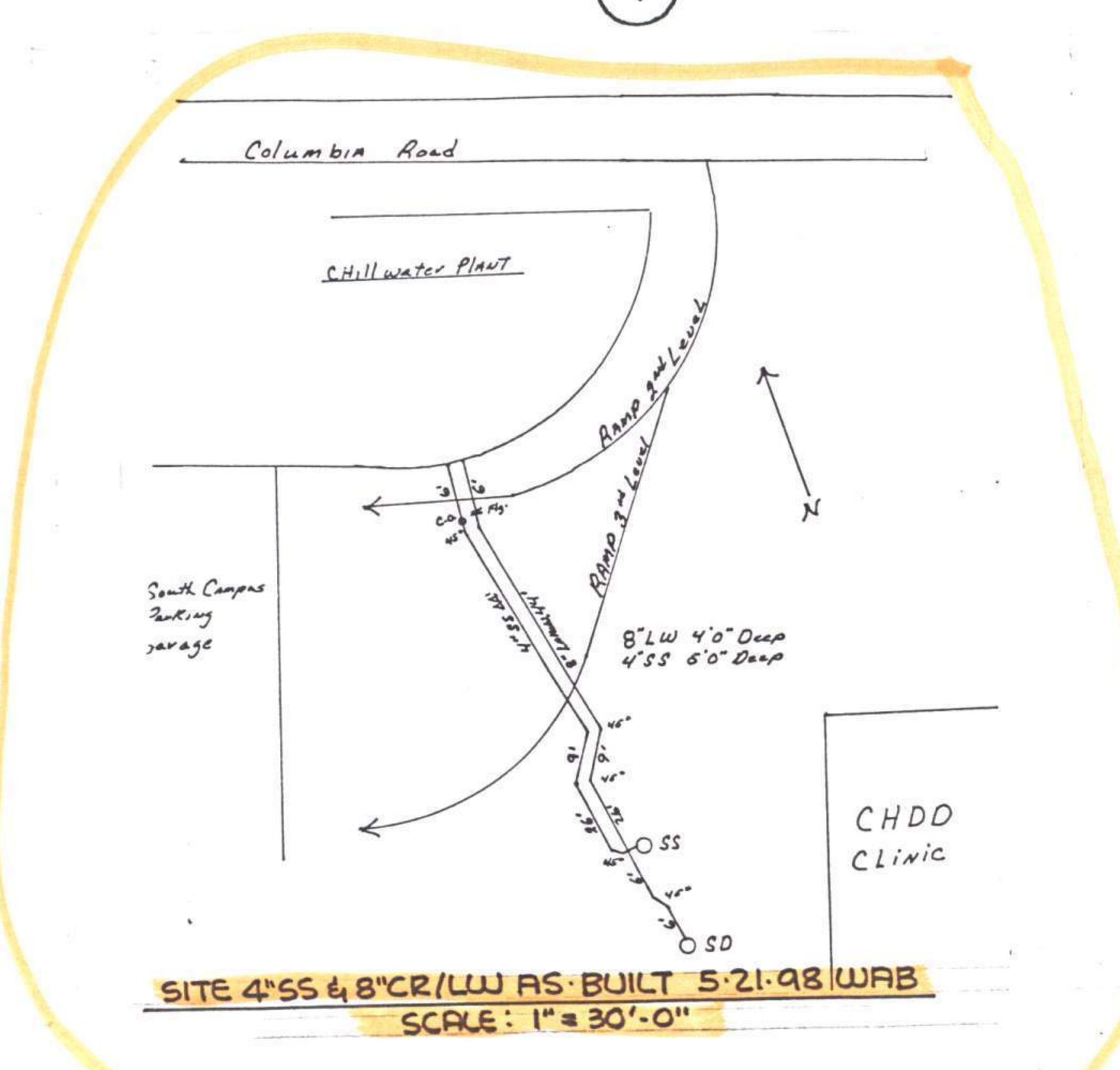
SECTION E M4 M4
N.T.S.



DETAIL 1 M4 M4
SCALE: 3/8"=1'-0"



EMERGENCY SHOWER AND EYE WASH STATION DETAIL 2 M4 M4
NO SCALE



GRAPHIC SCALE
3/8" = 1'-0"

NOTES:

1. SEE GENERAL NOTES ON DWG. M1.
2. CONTRACTOR TO DEMOLISH THE (E) UNIT HEATER AND ITS ASSOCIATED WIRING BACK TO THE TERMINAL POINT. THE (E) UNIT HEATER AND ITS ASSOCIATED PIPING SYSTEMS & SUPPORTS ARE TO BE DEMOLISHED. THE STEAM SUPPLY & RETURN LINES TO & FROM THE UNIT HEATER SHALL BE DEMOLISHED UP TO THE HEADERS SHUT-OFF VALVES. SEE 5 M4 M16
3. CONTRACTOR TO SUPPORT (N) UNIT HEATERS FROM CEILING AS REQ'D. BOTTOM OF UNIT HEATER ELEVATION SHALL BE 9'-0" ABOVE FINISHED FLOOR SURFACE.
4. CONTRACTOR TO ROUTE STEAM SUPPLY LINE AND CONDENSATE RETURN LINE FROM (E) STEAM AND CONDENSATE HEADERS TO (N) UNIT HEATERS. SUPPORT PIPES AS REQ'D. FOR TYPICAL PIPING DIAGRAM OF SUPPLY & RETURN LINES, SEE 5 M4 M16
5. FOR FLOOR DRAIN SYSTEM IN THE NEW CHILLER ROOM, SEE DWG. M19.
6. CONTRACTOR TO ROUTE AND SUPPORT 1 1/4" REFRIGERANT RELIEF VALVE PIPING FROM CHILLER RELIEF VALVE OUTLETS UP TO THE 4" RELIEF VALVE VENT HEADER.
7. FOR EQUIPMENT HOUSE-KEEPING PAD DETAILS, SEE STRUCTURAL DWG.
8. FOR PIPE PENETRATIONS THROUGH CONC. WALL, SEE 9 M4 M16 & 10 M4 M16
9. CONTRACTOR TO MOUNT AIR RECEIVER TK. ON WALL AND FIELD ROUTE 3/4" PA LINE FROM (E) 2" PLANT AIR HEADER IN TUNNEL TO AIR RECEIVER. PROVIDE 3/4" PA HEADER FROM TANK AND FIELD ROUTE 1/4" PA TUBING TO INDIVIDUAL USER AS REQ'D. SEE COMPRESSED AIR SCHEMATIC DIAGRAM THIS DWG. FOR GENERAL DIAGRAM.
10. CONTRACTOR SHALL MOUNT CHEMICAL POT FEEDER ON CONC. WALL, USING STANDARD UNISTRUT & PIPE STRAPS (2). FIELD ROUTE 3/4"-CHW LINES TO 8"-CHW. SEE DWG. M2 FOR ROUTING.

GENERAL NOTES

1. MECHANICAL CONTRACTOR TO COORDINATE PIPING RUNS WITH ELECTRICAL CONTRACTOR VFD LOCATIONS TO ENSURE REQUIRED ELECTRICAL CLEARANCE IS MAINTAINED.

KEYED NOTES

(1) NEW 10" CWS AND 10" CWR DOWN TO EXISTING CW ISOLATION VALVE.

AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
1	12-31-97	ADDED CHILLER PUMPOUT COMP.		CEM
0	5-12-97	ISSUED FOR BID		

PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR PLAN

ROBERT E. FISHMAN, STATE OF WASHINGTON, REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

DR. LW
DES. FY
CHK. CM
APPROVED Colin L. McRae DATE 1/5/98
PRINCIPAL IN CHARGE DATE 1/5/98
DRAWING NO. M4
REV 1
SHEET OF
BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

NONE

N:\UWC\13428

212-M-_25 AB

MICROFILMED

MECH - NEW

NOTES TO ESTIMATOR
RED INDICATES NEW WORK.
PURPLE INDICATES EXISTING TO REMAIN THAT IS HIGHLIGHTED FOR REFERENCE.

EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

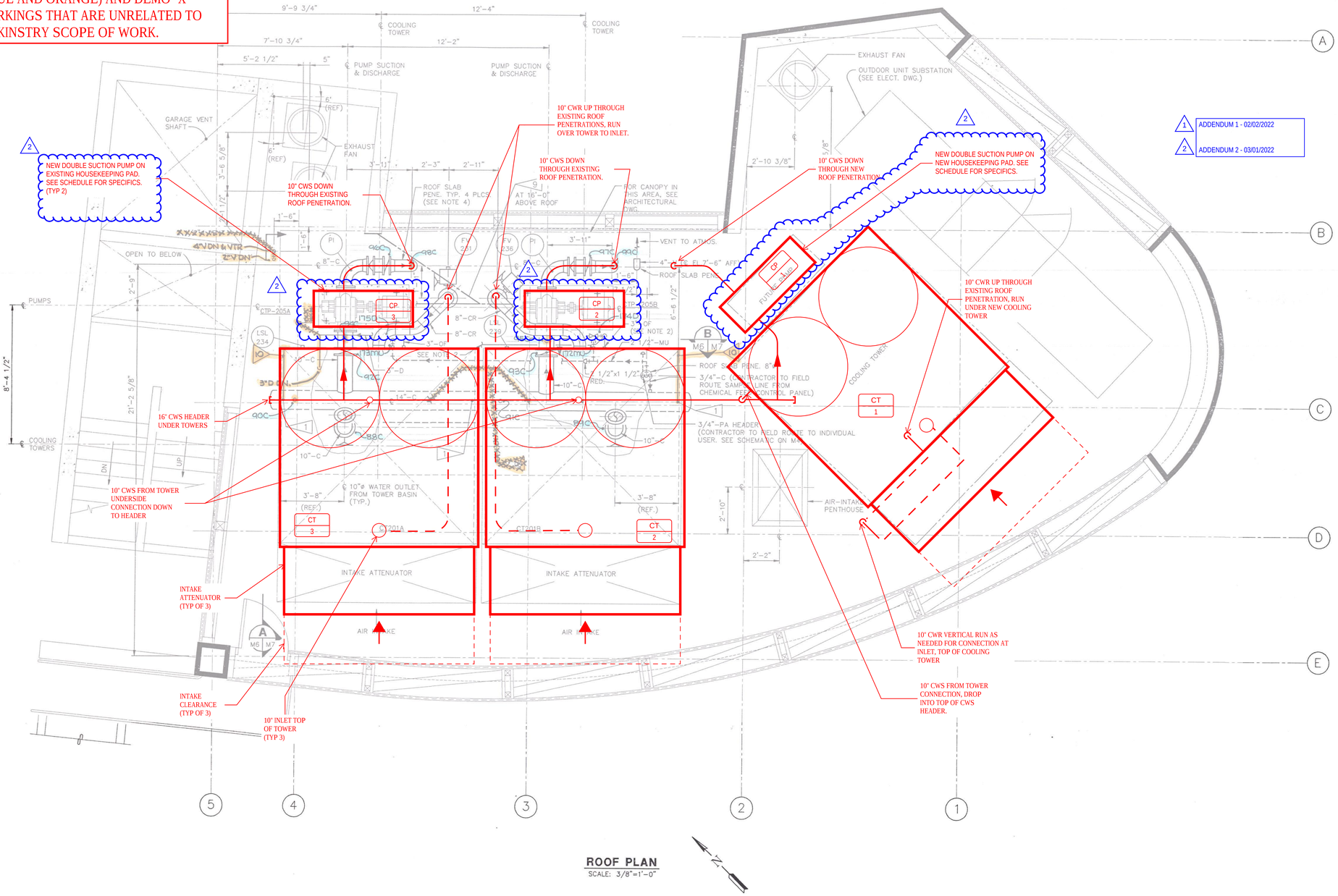
GENERAL NOTES

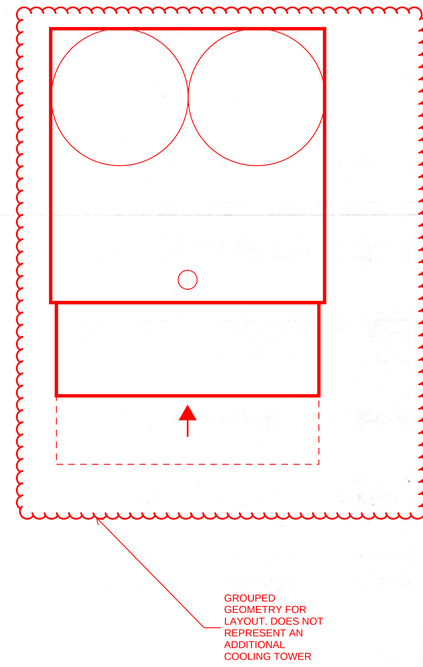
1. MECHANICAL CONTRACTOR TO COORDINATE PIPING RUNS WITH ELECTRICAL CONTRACTOR VFD LOCATIONS TO ENSURE REQUIRED ELECTRICAL CLEARANCE IS MAINTAINED.

NOTES:

1. SEE GENERAL NOTES ON DWG M1.
2. FOR ROOF AREA DRAINAGE SYSTEMS, COOLING TOWER OVERFLOW AND DRAIN ROUTING SYSTEMS, SEE DWG. M19.
3. FOR ROOF SLAB PENETRATION AND HOUSE-KEEPING PAD DETAILS, SEE ARCHITECTURAL DWG. A2.2.
4. THE CONTRACTOR SHALL COORDINATE WITH OTHER DISCIPLINES – STRUCTURAL AND ARCHITECTURAL TO FINALIZE THE LOCATIONS OF ROOF SLAB PENETRATIONS. SEE STRUCTURAL DWG. S5.

1 ADDENDUM 1 - 02/02/2022
2 ADDENDUM 2 - 03/01/2022





ROOF PLAN
SCALE: 3/8"=1'-0"

8'-1/2"
GRAPHIC SCALE
3/8" = 1'-0"
0 1 2 3 4 5 6 7 8

AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		CMW

PB PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
ROOF PLAN

DR. LW
DES. FY
CHK. CM
APPROVED DATE 5/7/97
PRINCIPAL IN CHARGE DATE 5/7/97
DRAWING NO. M6
REV 0
SHEET OF

BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

ROBERT E. FISHMAN STATE OF WASHINGTON 10209 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

212-M-_27 AB

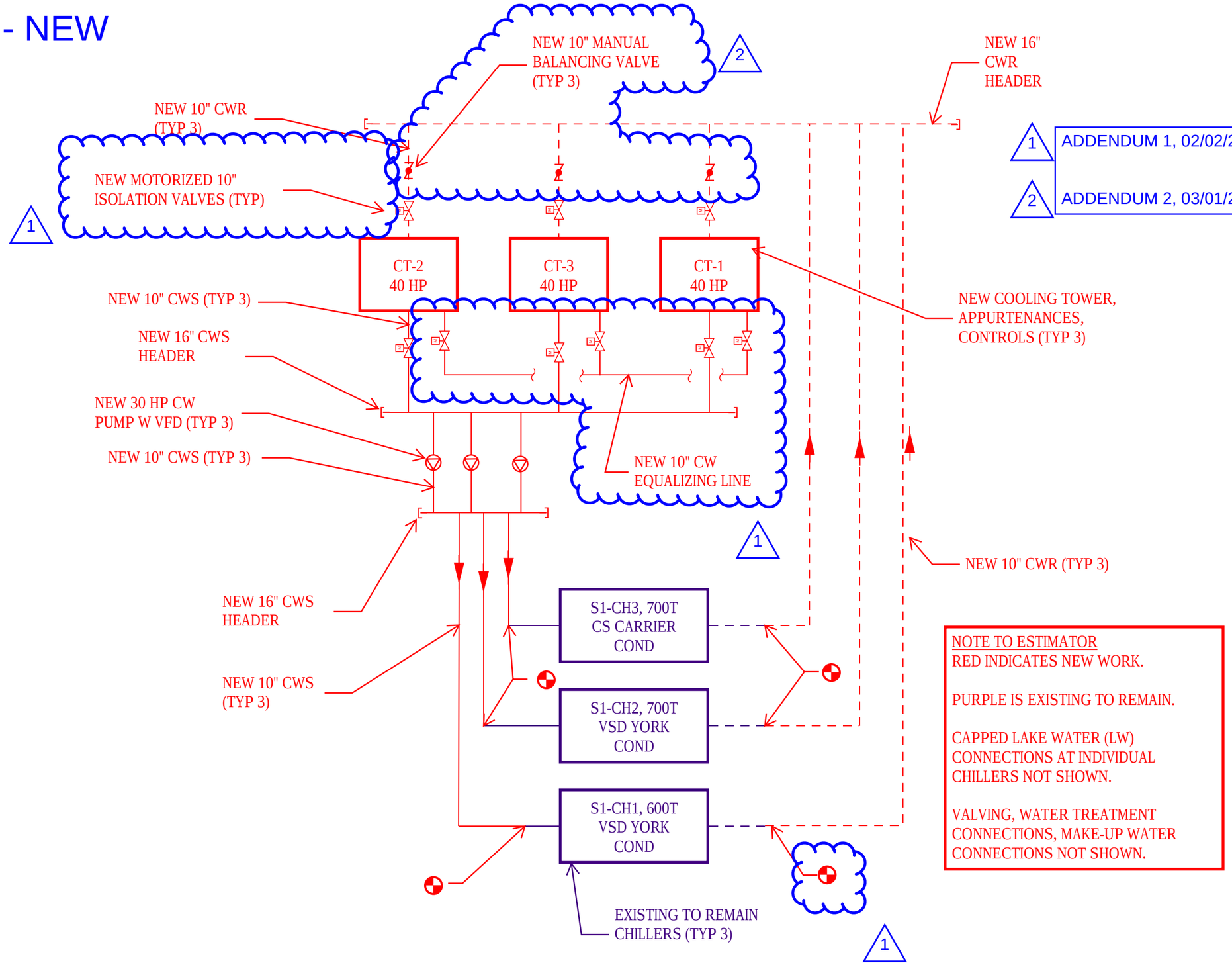
MICROFILMED

N:\UWC\13428

NONE

Page 26

MECH - NEW



1	ADDENDUM 1, 02/02/2022
2	ADDENDUM 2, 03/01/2022

NOTE TO ESTIMATOR
RED INDICATES NEW WORK.

PURPLE IS EXISTING TO REMAIN.

CAPPED LAKE WATER (LW) CONNECTIONS AT INDIVIDUAL CHILLERS NOT SHOWN.

VALVING, WATER TREATMENT CONNECTIONS, MAKE-UP WATER CONNECTIONS NOT SHOWN.

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PROJECT:

PROJECT NAME

PROJECT ADDRESS

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED:	DSG
DRAWN:	DWN
CHECKED:	CHK
JOB NO:	JOB NUMBER

SHEET TITLE:

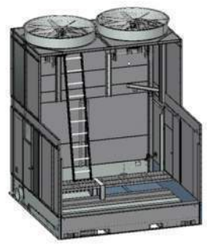
SYSTEM DIAGRAM NEW WORK

SHEET NUMBER:

M000

Internal Walkway and Ladder - OPTIONAL

When this option is selected BAC provides (1) inclined ladder per fan motor. The ladder ships loose for field installation. The ladder is placed at the walkway and enables access to the mechanical equipment. This option is selectable for all units where the motors would not be reachable from the walkway (fill heights 07 and greater).

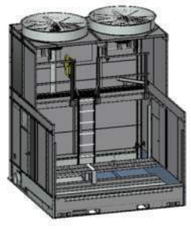


FOR REFERENCE. SEE SCHEDULE FOR DESIRED OPTIONS.

S1500 internal walkway and ladder option (2nd ladder not shown).

Internal walkway, Ladder and Service Platform w/Safety Gate - OPTIONAL

When this option is selected BAC provides an upper level internal service platform. The internal service platform is available for all units with 09 fill height and greater. The internal platform base ships factory installed; the handrail system requires field installation.

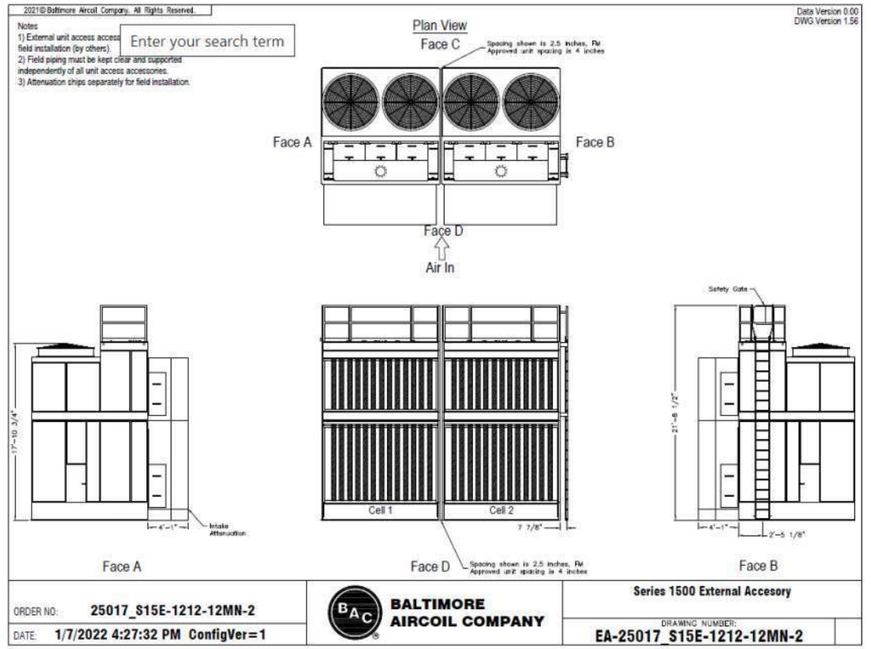


FOR REFERENCE. SEE SCHEDULE FOR DESIRED OPTIONS.

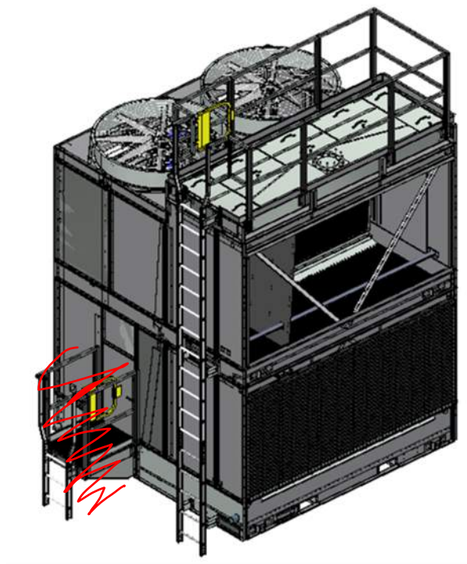
S1500 Internal walkway, ladder, and service platform w/safety gate.

S1500 Internal walkway, ladder, and service platform w/safety gate.

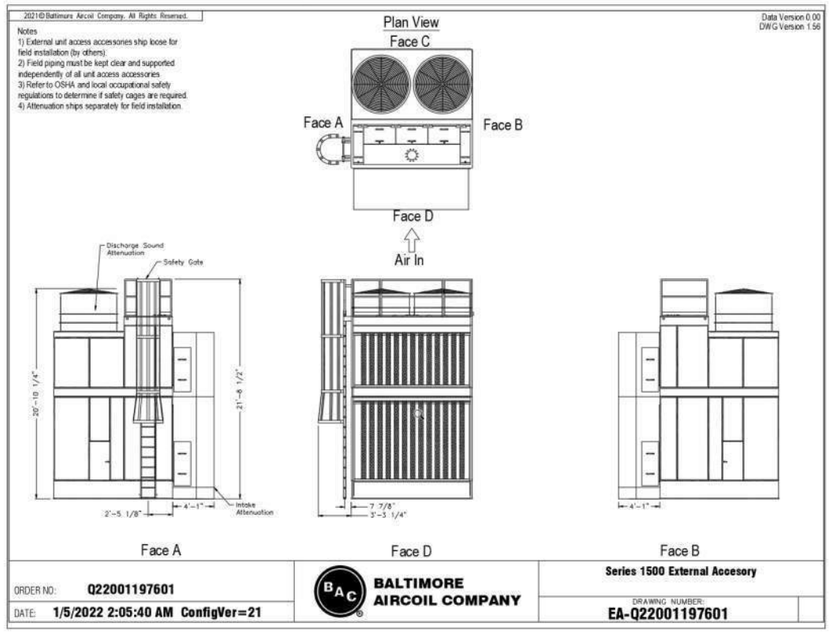
MECH - NEW



ACCESS OPTION FOR CT-2 AND CT-3
- ONE LADDER ON PLAN EAST SIDE TO ACCESS CATWALK SPANNING BOTH TOWERS
- LADDER TO HAVE SAFETY CAGE (NOT SHOWN HERE)



ACCESS OPTION FOR CT-1, 3D
- ONE LADDER, PLAN WEST
- SAFETY CAGE NOT SHOWN
- ACCESS TO INCLUDE SIDE LADDER, DOES NOT INCLUDE SIDE PLATFORM & RAILING



ACCESS OPTION FOR CT-1
- ONE LADDER ON PLAN WEST SIDE TO ACCESS CATWALK FOR TOWER
- SAFETY CAGE SHOWN

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206-762-331

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PROJECT:

UWMC S1 COOLING TOWERS

PROJECT ADDRESS

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED:	DSG
DRAWN:	DWN
CHECKED:	CHK
JOB NO:	JOB NUMBER

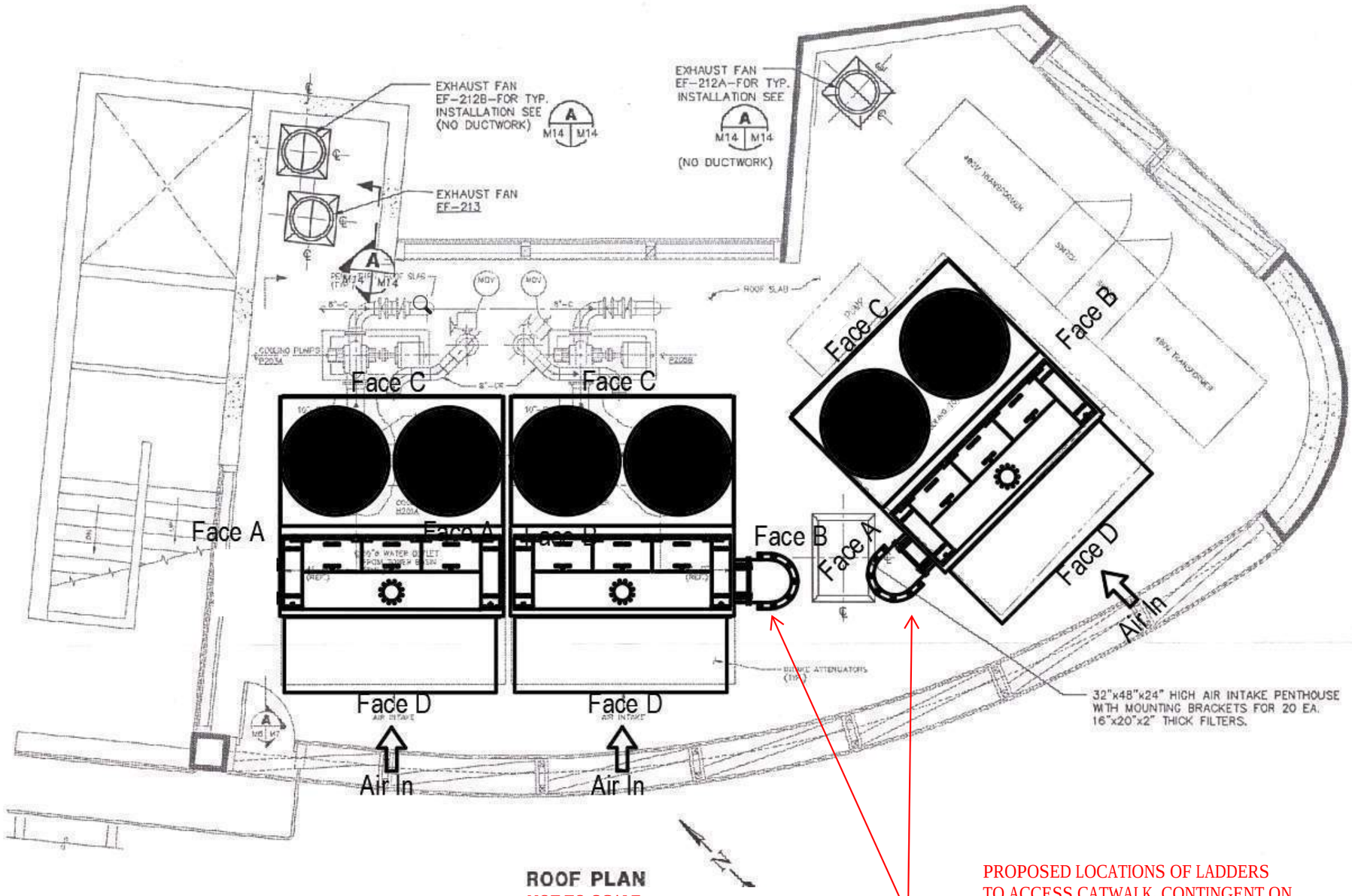
SHEET TITLE:

MAINTENANCE ACCESS OPTIONS

SHEET NUMBER:

M000

MECH - NEW



ROOF PLAN
NOT TO SCALE

PROPOSED LOCATIONS OF LADDERS TO ACCESS CATWALK. CONTINGENT ON REROUTING PIPING. (EXISTING INTAKE IS 24" HIGH AND DOES NOT INTERFERE WITH SAFETY CAGE)

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PROJECT:

UWMC S1 COOLING TOWERS

PROJECT ADDRESS

ISSUES:

NO	DATE	DESCRIPTION

DESIGNED:	DSG
DRAWN:	DWN
CHECKED:	CHK
JOB NO:	JOB NUMBER

SHEET TITLE:

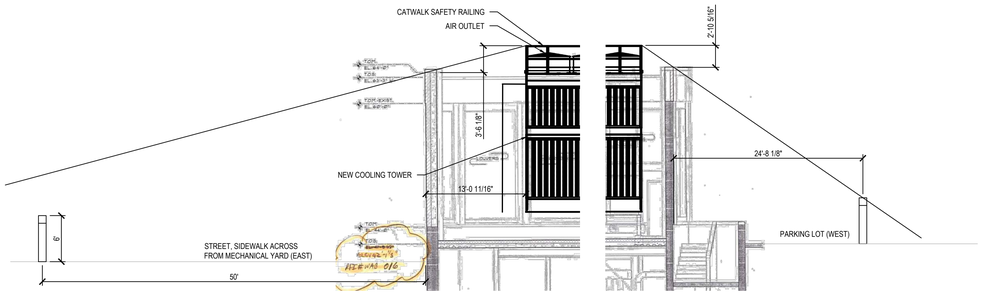
LAYOUT WITH MAINT ACCESS

SHEET NUMBER:

M000

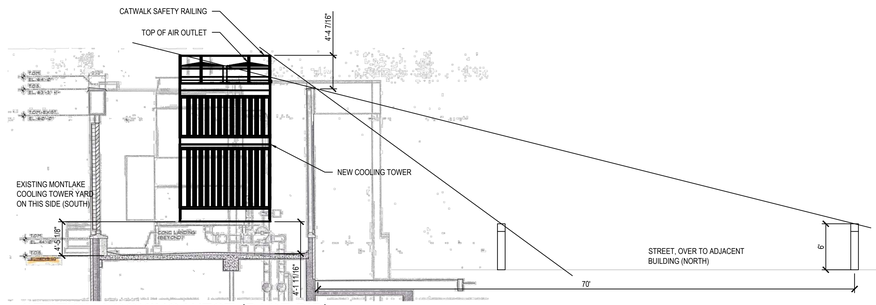
MECH - NEW

FOR REFERENCE ONLY



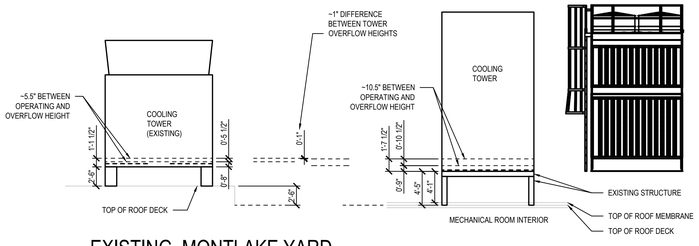
SECTION LOOKING SOUTH (BASE BID)

1/8" = 1'-0"



SECTION LOOKING WEST (BASE BID)

1/8" = 1'-0"

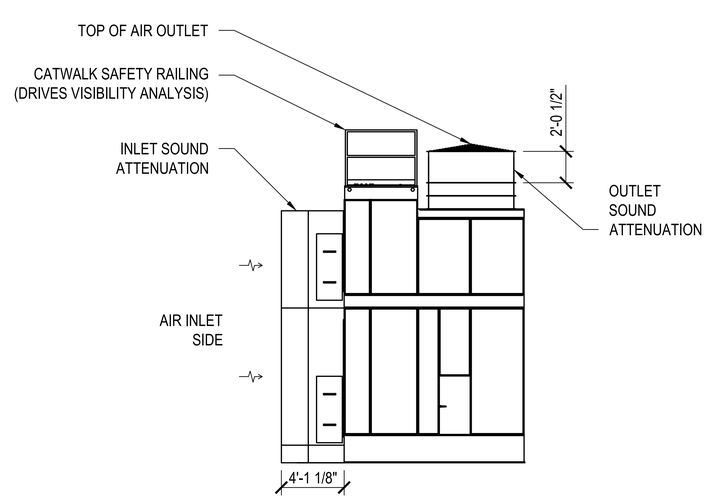


EXISTING, MONTLAKE YARD
(MARLEY NC8409)

PROPOSED, S1 MECH YARD
(BAC 1500 1212-12MN)

COMPARISON OF BASIN OPERATING ELEVATIONS AND DEPTHS (BASE BID)

1/8" = 1'-0"

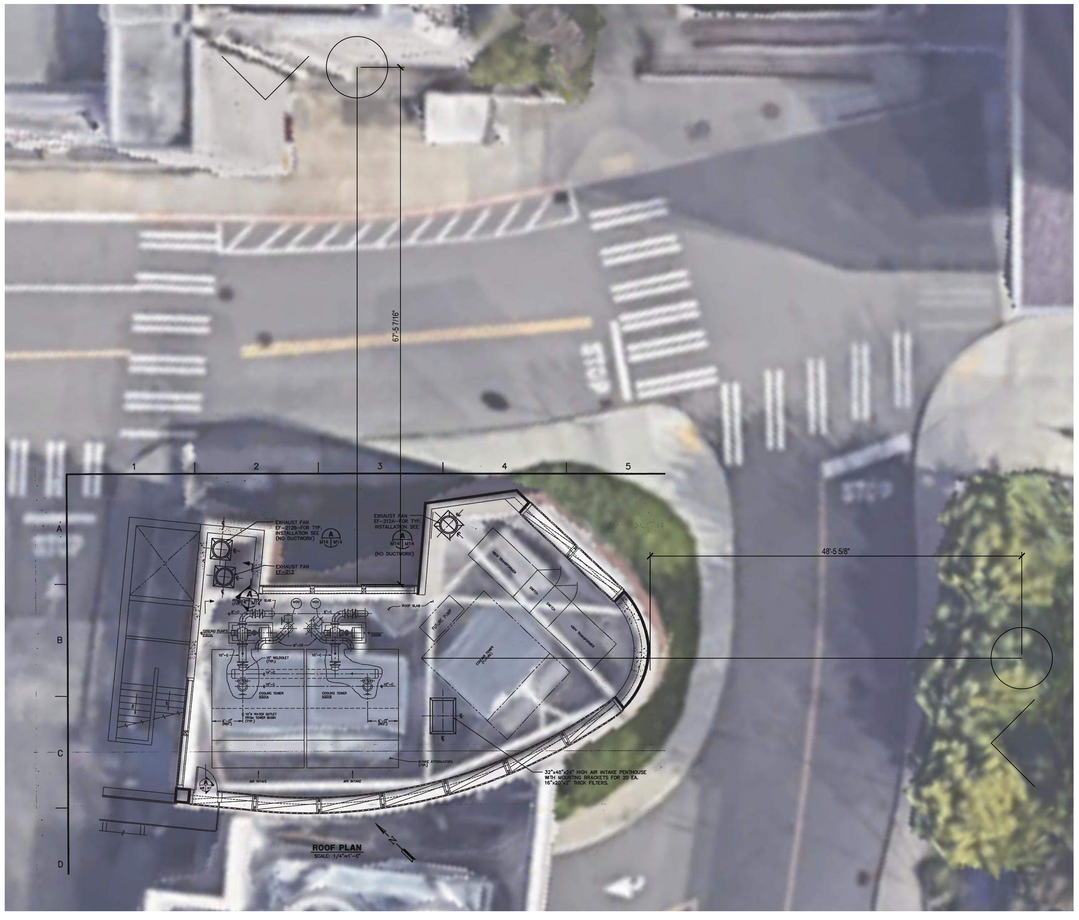


COOLING TOWER SIDE VIEW (NOT BID SPECIFIC)

1/8" = 1'-0"

NOTES

1. SKETCHES ARE SHOWN OVER EXISTING DRAWINGS.
2. TOWER GEOMETRY IS SHOWN SIMPLIFIED FOR ILLUSTRATION (NOT ROTATED, CATWALK DRIVING THE VISIBILITY ANALYSIS)
3. OPTIONS SHOWN ARE FACTORY-PROVIDED
4. NOT ALL SUPPORTING STRUCTURE SHOWN



LOCATION PLAN (NOT BID SPECIFIC)

1/8" = 1'-0"

E946A (VFD202A) BREAKER – 400AF/250AT	5
E946B (VFD202B) BREAKER – 400AF/250AT	6

7 E950A (VFD201A) BREAKER – 100AF/100AT	8 E950B (VFD201B) BREAKER – 100AF/100AT
9 E950C* (VFD201C) 3 POLE – 100AF SPACE	10 E948 (VFD208) BREAKER – 100AF/20AT
11 E946A (CHLR 200A) BREAKER – 100AF/15AT	12 E946B (CHLR 200B) BREAKER – 100AF/15AT
13 E946C* (CHLR 200B) 3 POLE – 100AF SPACE	14 3 POLE – 100AF SPACE
15 E949 (MPC E951) BREAKER – 2P, 100AF/20AT	16 3 POLE – 100AF SPACE

ELEC - NEW

COOLING TOWER FIM (GMAX)
NEW WORK
OVERALL LOAD REDUCTION

NOTES:

1. ASTERISK (*) INDICATES FUTURE EQUIPMENT.

ELEVATION

5 E946A (VFD202A) BREAKER – 400AF/250AT	
6 E946B (VFD202B) BREAKER – 400AF/250AT	
7 E950A (VFD201A) BREAKER – 100AF/100AT	8 E950B (VFD201B) BREAKER – 100AF/100AT
9 E950C* (VFD201C) 3 POLE – 100AF SPACE	10 E948 (VFD208) BREAKER – 100AF/20AT
11 E946A (CHLR 200A) BREAKER – 100AF/15AT	12 E946B (CHLR 200B) BREAKER – 100AF/15AT
13 E946C* (CHLR 200B) 3 POLE – 100AF SPACE	14 3 POLE – 100AF SPACE
15 E949 (MPC E951) BREAKER – 2P, 100AF/20AT	16 3 POLE – 100AF SPACE

PANEL PDP945 LAYOUT

NOT TO SCALE

PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

SINGLE LINE DIAGRAM
AND PANEL LAYOUT – 480V

DR. SK | DES. RL | CHK. KM | 7/7/97 | 7/7/97

DRAWING NO. E3 | REV 0

BLDG. NO.: 182
BLDG. ID: UMC
PROJECT NO.: 1890

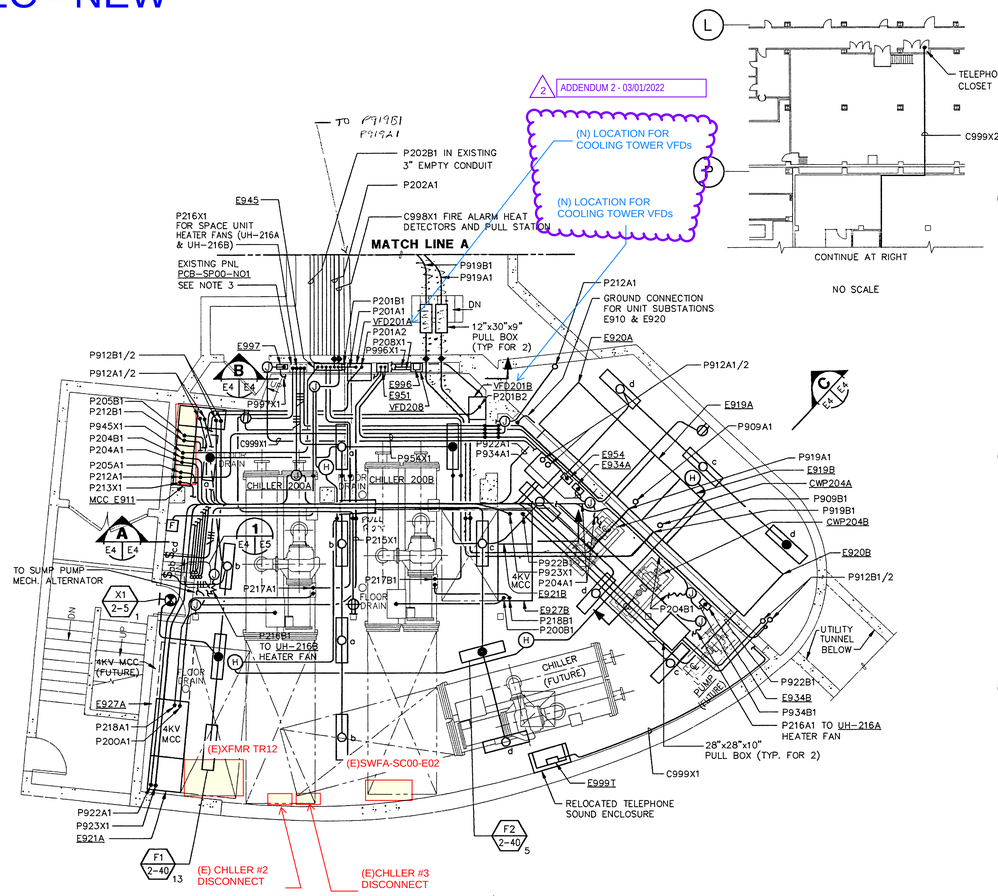
EXPIRES 08-02-97

UWC 13428

212-E-26 R

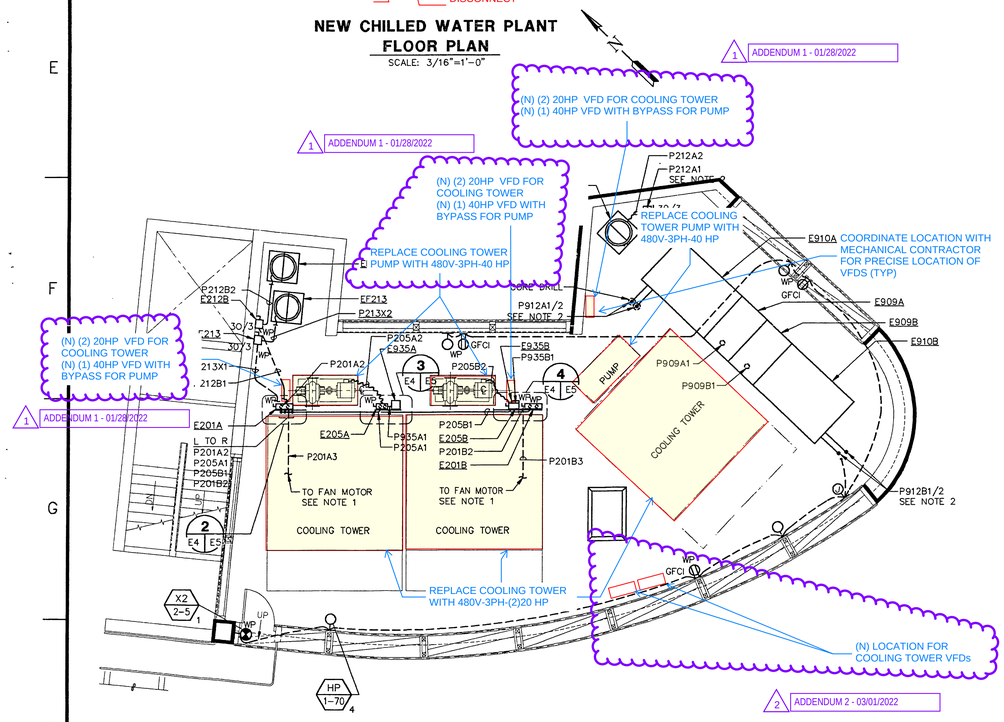
May 06, 1997 – 09:38:40 – SK

ELEC - NEW



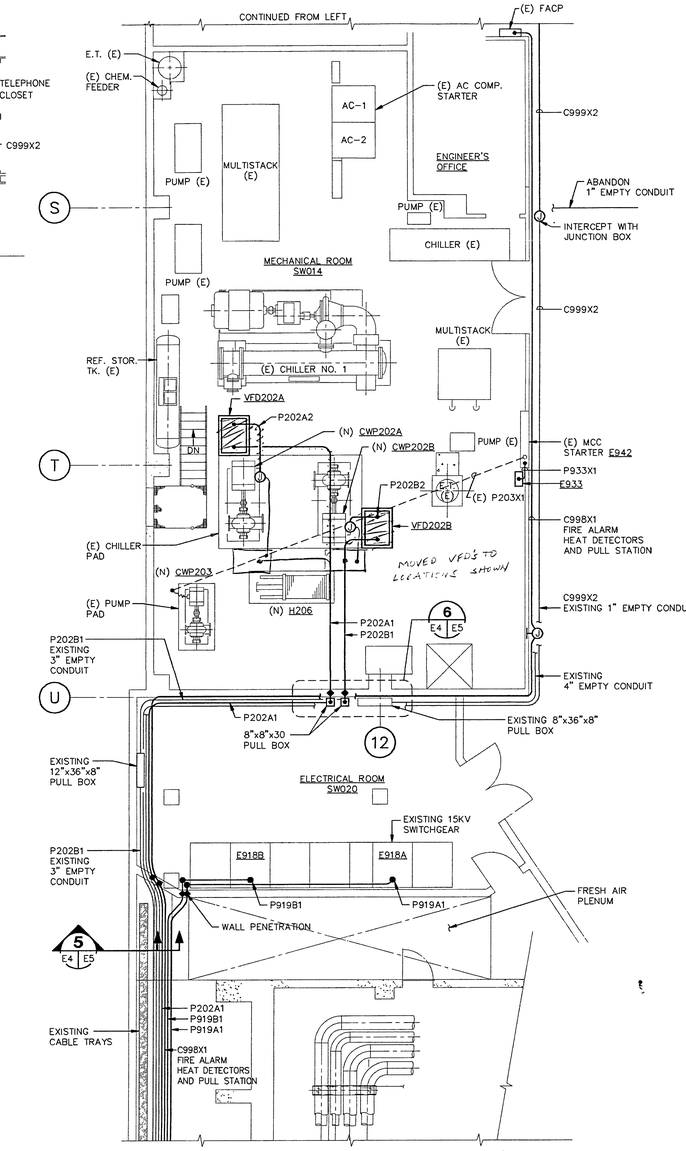
NEW CHILLED WATER PLANT FLOOR PLAN

SCALE: 3/16"=1'-0"



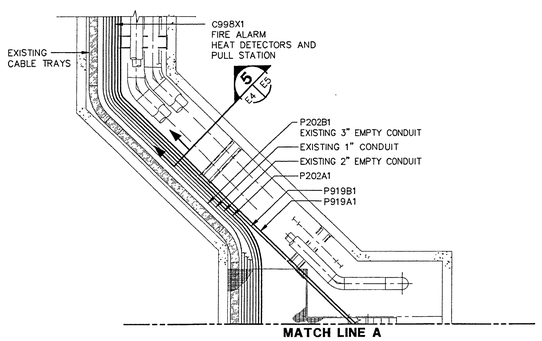
NEW CHILLED WATER PLANT ROOF PLAN

SCALE: 3/16"=1'-0"



PACIFIC TOWER MECHANICAL ROOM - PARTIAL PLAN - LEVEL MINUS ONE

SCALE: 3/16"=1'-0"



UTILIDOR PARTIAL PLAN

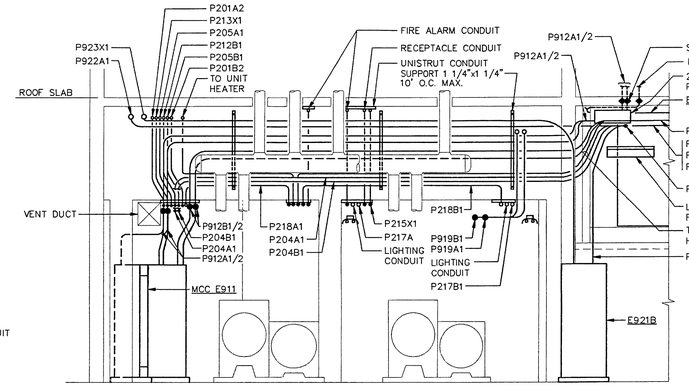
SCALE: 3/16"=1'-0"

NOTES:

1. REFER TO MECHANICAL PLAN FOR THE EXACT LOCATION OF POWER SERVICE ENTRANCE TO COOLING TOWER FAN MOTOR.
2. REFER TO DWG. NO. A2.2 AND M16 FOR SEALING CONDUIT PENETRATION DETAIL ON WALL AND FLOOR SLAB.
3. REFER TO DWG. NO. E5 FOR (E) PANELBOARD PCB-SP00-NO-1 NEW LOAD SCHEDULE. PANELBOARD WAS PCB-SP02-NO-1.

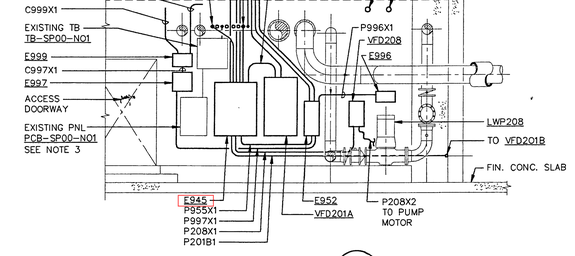
LIGHTING FIXTURE SCHEDULE

F1 2-40	FLUORESCENT, INDUSTRIAL TYPE, 2-40W LAMP, RAPID START, COOL WHITE, WHITE ENAMEL REFLECTOR, SURFACE MOUNTED, 120V.
F2 2-40	SIMILAR TO F1 BUT WITH 90 MINUTES, MINIMUM BATTERY POWER PACK.
HP 1-70	OUTDOOR TYPE WALL PACK, WALL MOUNTED, 70W HPS, ONE PIECE INJECTION MOLDED FRONT COVER/REFRACTOR, UV STABILIZED POLYCARBONATE, SEALED AND GASKETED, 120V.
X1 2-5	EXIT LIGHT, COMPACT FLUORESCENT LAMPS, 2-5W WITH 90 MINUTES, MINIMUM BATTERY POWER PACK, WALL AND SURFACE MOUNTED, 120V.
X2 2-5	SIMILAR TO X1 BUT WEATHERPROOF.



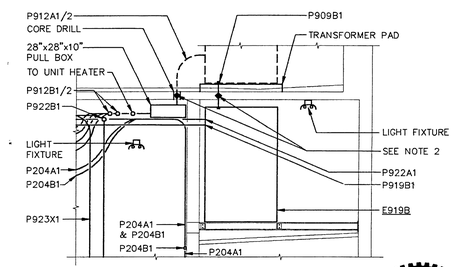
SECTION A

SCALE: 1/4"=1'-0"



SECTION B

SCALE: 1/4"=1'-0"



SECTION C

SCALE: 1/4"=1'-0"

GRAPHIC SCALE

1/4" = 1'-0" 0 1 2 4 6 8 10 12

3/16" = 1'-0" 0 1 2 4 6 8 10 12 14 16

ALL ELECTRICAL MATERIALS & EQUIPMENT SHALL BE LISTED BY APPROVED TESTING LABORATORIES AND APPROVED BY THE ELECTRICAL DIVISION OF THE DEPT OF CONSTRUCTION AND LAND USE.
SUBJECT TO FINAL APPROVAL OF FIELD INSPECTOR

751948

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		

PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

ELECTRICAL PLANS AND SECTIONS

DR.	SK	DRAWING NO.	REV
DES.	TYS	E4	0
CHK.	BL	SHEET	OF

APPROVED DATE 5/1/97
PRINCIPAL IN CHARGE DATE 5/1/97

JENS ERGINSON STATE OF WASHINGTON 23600 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 08-02-97

BLDG. NO.: 182
BLDG. ID: UMC
PROJECT NO.: 1890
FILE NO.:

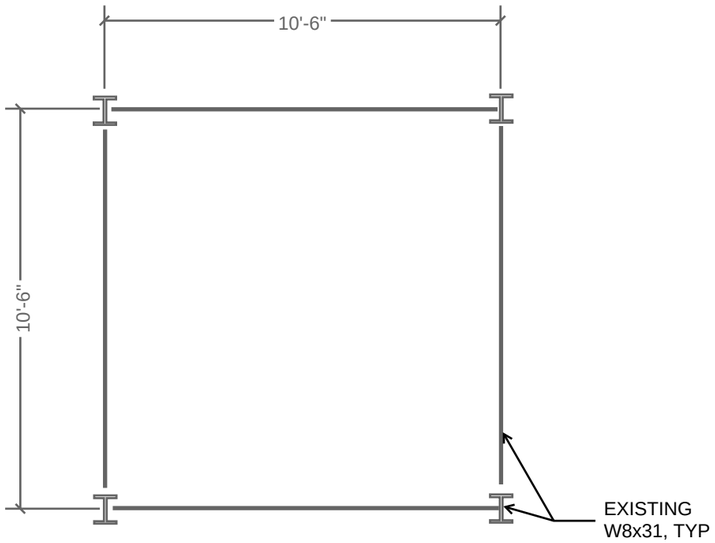
\\UWC\13428

212-E-27R

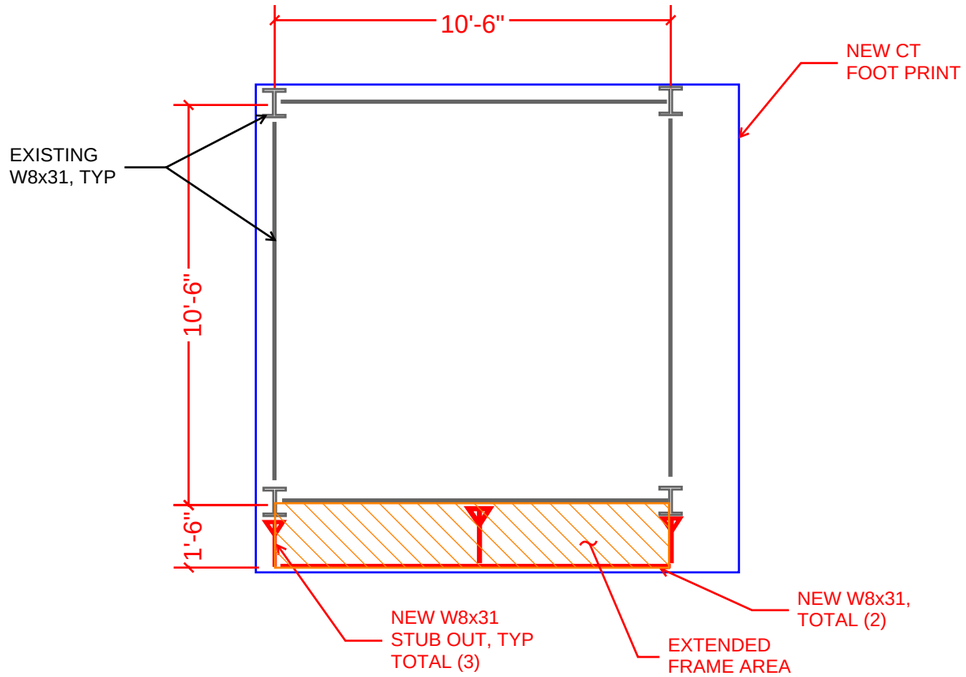
NONE

May 07, 1997 - 09:41:41 - SK

STRUC - NEW



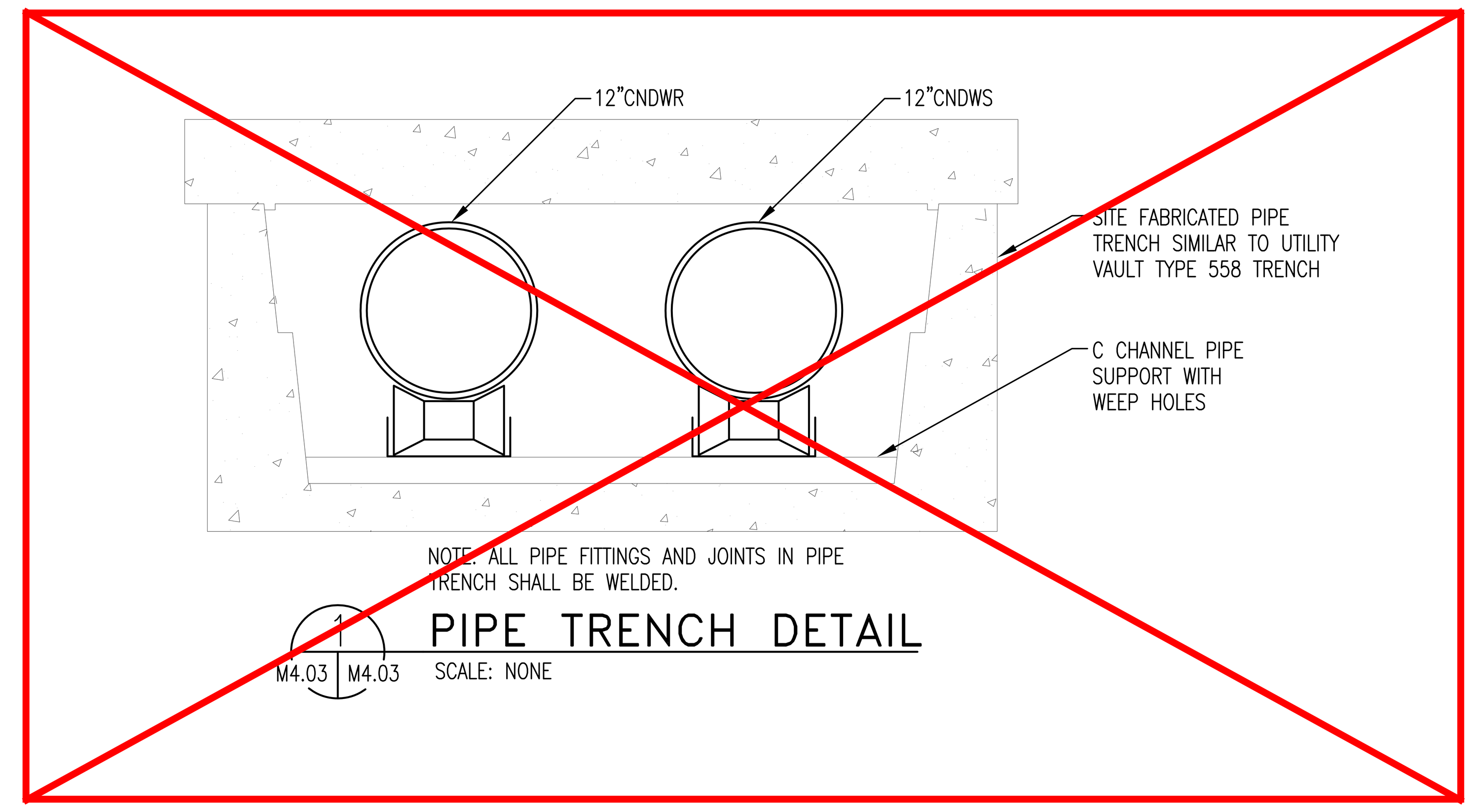
EXISTING PARTIAL PLAN DETAIL



NEW PARTIAL PLAN DETAIL

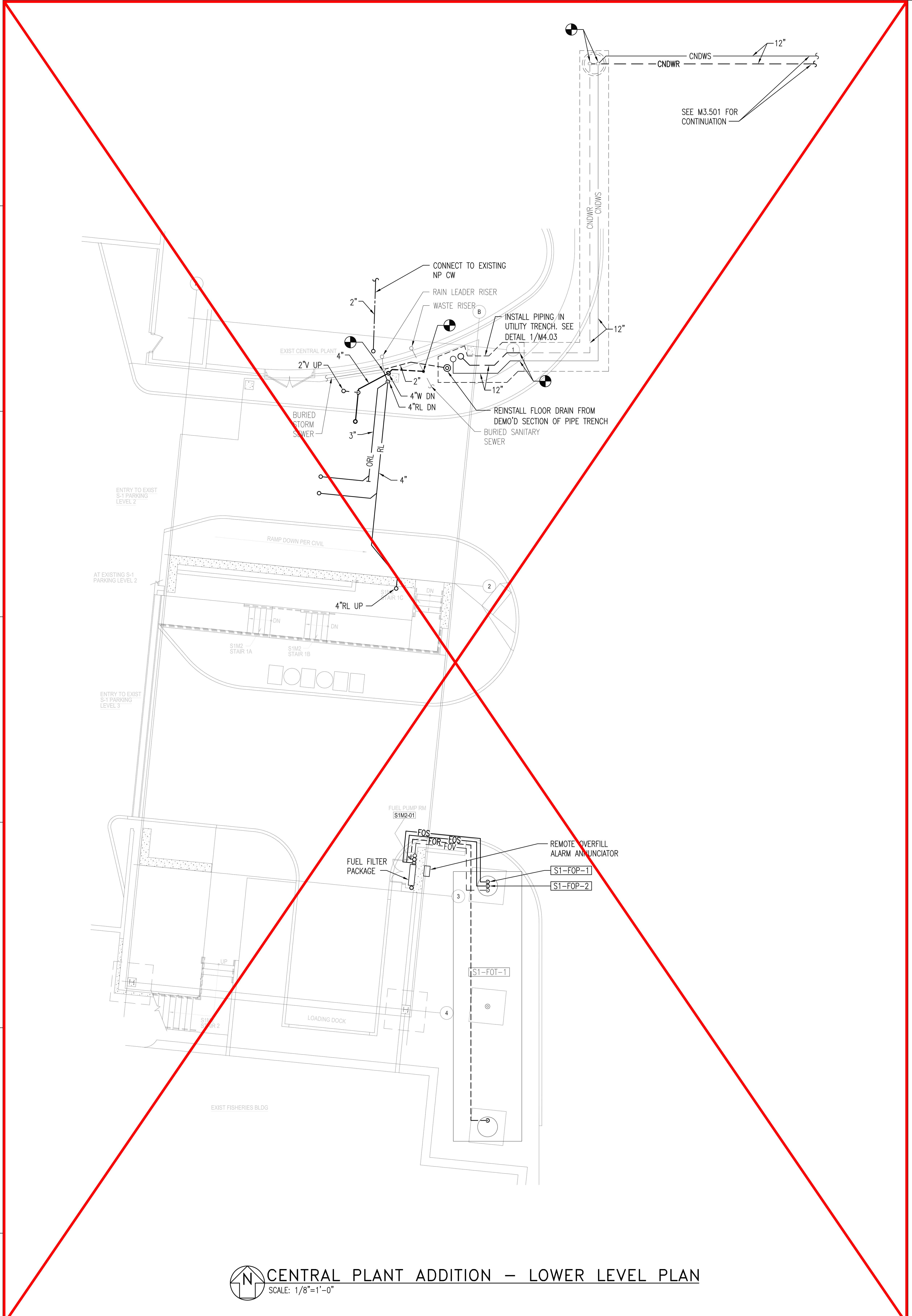
NEW STEEL WT = 600#
CONTINGENCY = 30%
TOTAL NEW STEEL WT = 780# PER CT

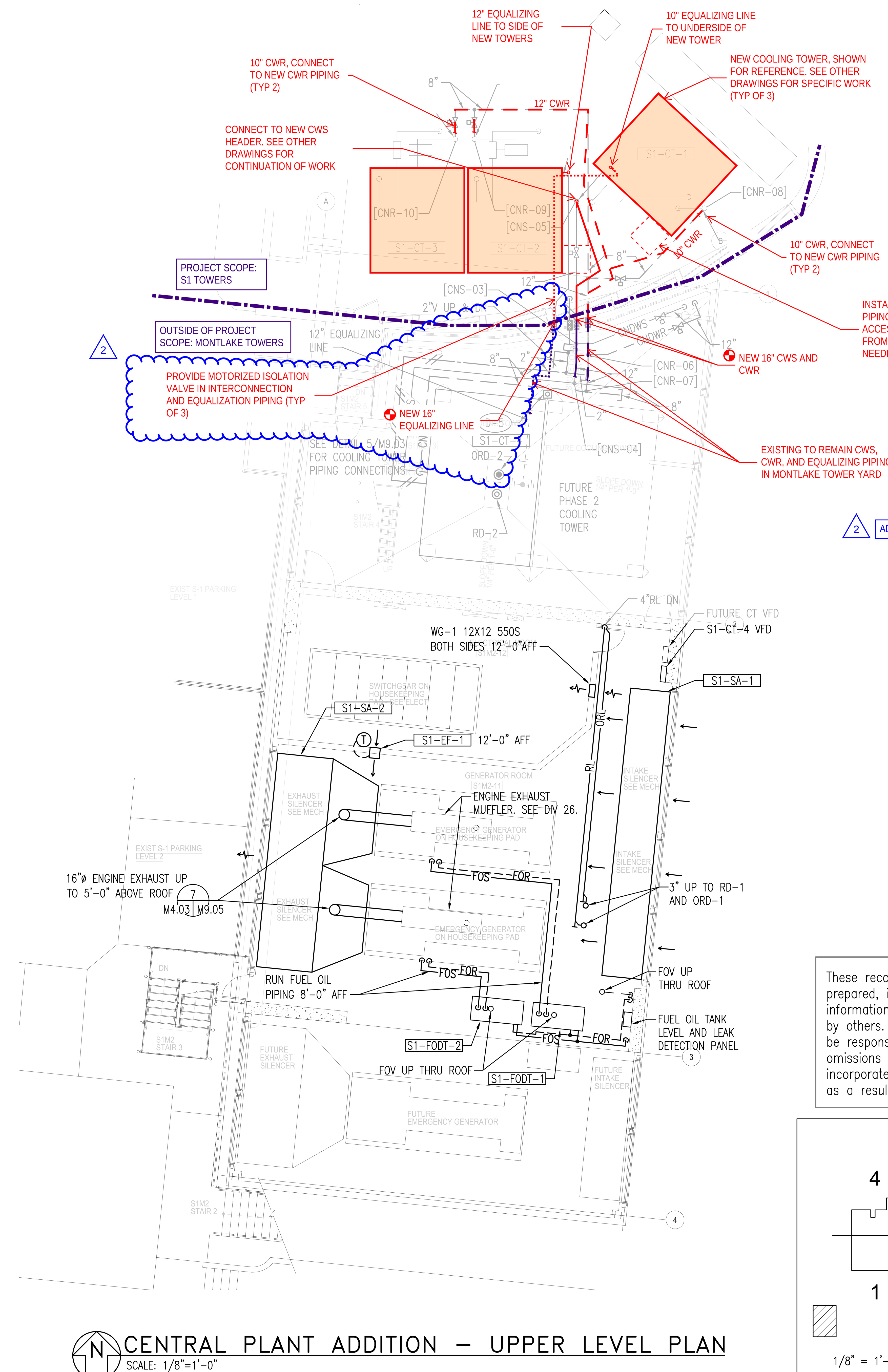
ALT - 3 MECH - NEW



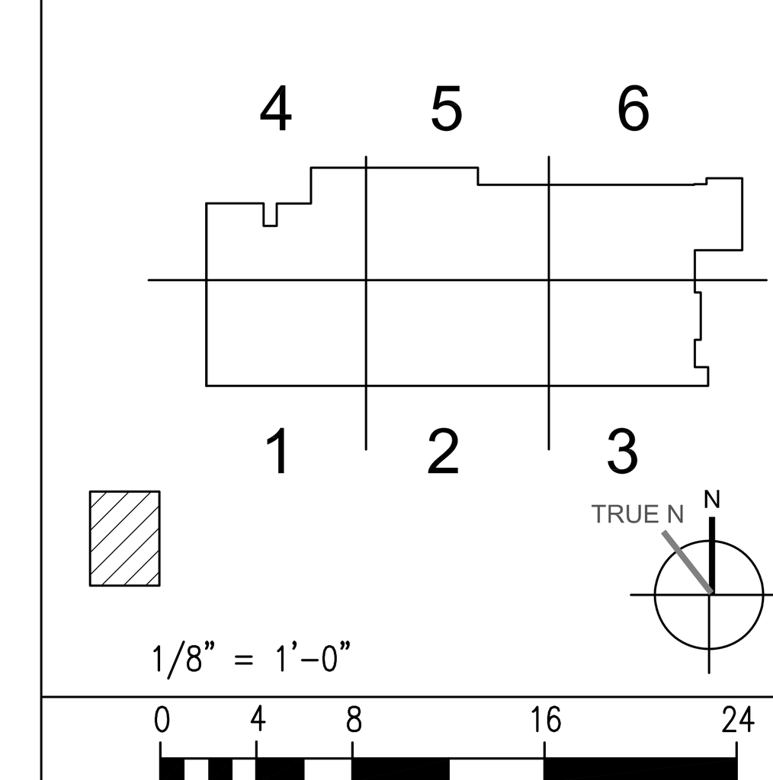
NOTES TO ESTIMATOR
RED INDICATES NEW WORK. PURPLE INDICATES EXISTING TO REMAIN.

THIS SHEET SHOWS NEW WORK SPECIFIC TO THE INTERCONNECT WITH THE ADJACENT MONTLAKE YARD. SEE OTHER DRAWINGS FOR FULL SCOPE OF S1 NEW WORK.





These record drawings have been prepared, in part, on the basis of information compiled and furnished by others. The Engineer will not be responsible for any errors or omissions which have been incorporated into this document as a result.



nbbj
223 YALE AVENUE NORTH
SEATTLE WASHINGTON 98109
PHONE 206 223 5555
FAX 206 223 5000

UWMC EXPANSION PROJECT

UW CPO PROJECT
#201385.00
CONSTRUCTION DOCUMENTS
201385.00

UNIVERSITY OF WASHINGTON MEDICAL CENTER
UW Medicine

RECORD DOCUMENTS

ISSUE

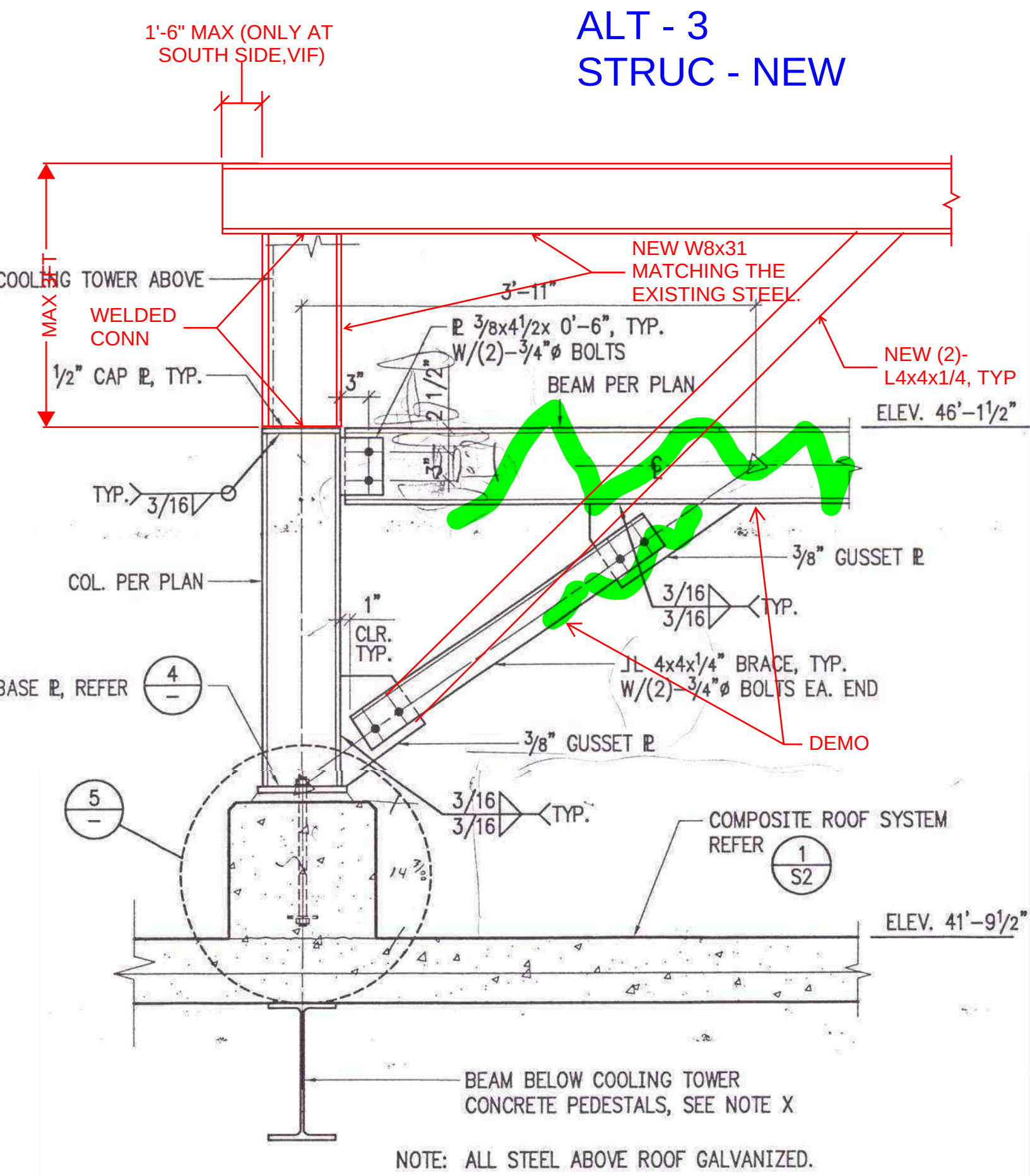
MARK	DATE	DESCRIPTION
–	11/30/2012	RECORD DOCUMENTS

DRAWN BY: IR
PROJ. ENG.: CB
PROJ. NO: 100273.00
DATE: 07/14/09

DWG.
PARTIAL PLANS CENTRAL PLANT ADDITION

DWG.
M4.03

ALT - 3
STRUC - NEW



McKinstry
For The Life Of Your Building

1 ADDENDUM 1, 02/02/2022

Project Name: UWMC Phase 5
https://mckinstry871.sharepoint.com/sites/GFN_DEE/Shared Documents/UWMC S1 Cooling Towers/[MES Coordination Matrix - UWMC S1 Towers.xlsx]MES Coordination Table
2/2/2022 15:06

Project Number: 203474
FIM No: 19532
FIM Name: S1 Cooling Towers Replacement (GMAX) and S1 Chillers Replacement (ROM)
Location: UWMC Medical Center Central Plant [47.64895739621886, -122.30849645309132]
Project Phase: GMAX
Purpose: Main MEPS coordination tool for early in a project when Mechanical Equipment Schedules have not yet been created. Also for Energy projects during the IGA phase. Once it is completed for a deliverable, a copy of the tab should be created. Original tab shall serve as record of deliverable. New tab shall be used as the starting point for the next deliverable.

Background of this version: Foundation was 09/28/21 version. 10/3/21 modifications by Dan: Combined features of 09/24/21 and 09/28/21 versions.

GENERAL / EXISTING EQUIPMENT INFORMATION

GENERAL				EXISTING EQUIPMENT INFORMATION: MECHANICAL														STRUCTURAL				ELECTRICAL					
EXISTING EQUIPMENT TAG	NEW EQUIPMENT TAG	DESCRIPTION	LOCATION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAPACITY (MBH)	SUPPLY CFM	OA CFM	TSP	GPM	WPD (FT HD)	APD (IN H2O)	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)	DIMENSIONS (LxWxH)	WEIGHT (LBS)	CONNECTION TYPE (SPRING/EXISTING)	STRUCTURAL SUPPORT NOTES	VOLTAGE / POLES	HP	FLA	KVA	MCA	MOCP
S1-CT-1		VFD COOLING TOWER	S1 MECHANICAL YARD	EVAPCO	LSTA 10-125	W027102	9,000				1,800.000			68 (WBT)		95	85	12x13.5x19.5	17,363			480/3	60.0	77.0	64.0		
S1-CT-2		VFD COOLING TOWER	S1 MECHANICAL YARD	EVAPCO	LSTA 10-122	97-7762/63W	10,125				1,350.000			68 (WBT)		100	85	12x13.5x18.5	16,833			480/3	50.0	65.0	54.0		
S1-CT-3		VFD COOLING TOWER	S1 MECHANICAL YARD	EVAPCO	LSTA 10-122	97-7762/63W	10,125				1,350.000			68 (WBT)		100	85	12x13.5x18.5	16,833			480/3	50.0	65.0	54.0		
CP-1 (P8)		COND WATER PUMP	S1 CHILLER ROOM	TACO	KS8011AE2MCA471M	26,793,372					1,710.000	70										480/3	40.0	52.0	43.2		
CP-2 (CWP-205A)		COND WATER PUMP	S1 MECHANICAL YARD	PACO	29-60152-350501-1873EF	97A8174001-B					1,350.000	50										480/3	25.0	34.0	28.3		
CP-3 (CWP-205B)		COND WATER PUMP	S1 MECHANICAL YARD	PACO	29-60152-358501-1873EF	97A0174001-A					1,350.000	50										480/3	25.0	34.0	28.3		

NEW EQUIPMENT INFORMATION

EXISTING EQUIPMENT TAG	MECHANICAL: MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAPACITY (MBH)	SUPPLY CFM	OA CFM	TSP	GPM	WPD (FT HD)	APD (IN H2O)	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)	STRUCTURAL: DIMENSIONS (LxWxH)	WEIGHT (LBS)	CONNECTION TYPE (RIGID/SPRING)	STRUCTURAL SUPPORT NOTES
S1-CT-1	BAC	S15E-1212-12MN		13,035.75				1738.100	18.04		68 (WBT)		100	85	L x W x H 11' 11.75" x 11' 10" x 18' 10.50" (w/o attenuators)	23,703		
S1-CT-2	BAC	S15E-1212-12MN		13,035.75				1738.100	18.04		68 (WBT)		100	85	L x W x H 11' 11.75" x 11' 10" x 18' 10.50" (w/o attenuators)	23,703		
S1-CT-3	BAC	S15E-1212-12MN		13,035.75				1738.100	18.04		68 (WBT)		100	85	L x W x H 11' 11.75" x 11' 10" x 18' 10.50" (w/o attenuators)	23,703		
CP-1 (P8)	BELL AND GOSSETT	e-HSC 8x10x9.5						1750.000	55.00									
CP-2 (CWP-205A)	BELL AND GOSSETT	e-HSC 8x10x9.5						1750.000	55.00									
CP-3 (CWP-205B)	BELL AND GOSSETT	e-HSC 8x10x9.5						1750.000	55.00									

EXISTING EQUIPMENT TAG	ELECTRICAL INFORMATION: EQUIPMENT TYPE	VOLTAGE / POLES	NEUTRAL REQUIRED	HP	FLA	MCA	MOCP	KVA	ALTERNATE POWER	DISCONNECT PROVISIONS: TYPE	LOCATION	FURNISH / INSTALL	CONTROL PROVISIONS: TYPE	FURNISH / INSTALL	SIGNAL FROM	SIGNAL VOLTAGE	RACEWAY FURNISH / INSTALL	WIRING FURNISH / INSTALL	SMOKE DETECTOR	MIN. SCCR	NOTES
S1-CT-1	NSM	480/3		2x 20									VFD								FURNISH WITH FACTORY OPTIONS: STAINLESS STEEL HOT WATER BASIN, STAINLESS STEEL COLD WATER BASIN, INLET AND OUTLET SOUND ATTENUATION, WHISPER QUIET FAN, EXTERNAL CATWALK, EXTERNAL LADDER WITH SAFETY CAGE TO ACCESS EXTERNAL CATWALK, EXTERNAL LADDER TO REACH UNIT ACCESS DOOR (LOW), INTERNAL LADDERS (1 PER MOTOR, 2 TOTAL), BOTTOM OR FACE C EXTERNAL EQUALIZER LINE CONNECTION, BASIN SWEEPER PIPING EXCLUDE: BASIN HEATERS
S1-CT-2	NSM	480/3		2x 20									VFD								FURNISH WITH FACTORY OPTIONS: STAINLESS STEEL HOT WATER BASIN, STAINLESS STEEL COLD WATER BASIN, INLET AND OUTLET SOUND ATTENUATION, WHISPER QUIET FAN, EXTERNAL CATWALK, EXTERNAL LADDER WITH SAFETY CAGE TO ACCESS EXTERNAL CATWALK, EXTERNAL LADDER TO REACH UNIT ACCESS DOOR (LOW), INTERNAL LADDERS (1 PER MOTOR, 2 TOTAL), BOTTOM OR FACE C EXTERNAL EQUALIZER LINE CONNECTION, BASIN SWEEPER PIPING EXCLUDE: BASIN HEATERS, FLUME BOX
S1-CT-3	NSM	480/3		2x 20									VFD								FURNISH WITH FACTORY OPTIONS: STAINLESS STEEL HOT WATER BASIN, STAINLESS STEEL COLD WATER BASIN, INLET AND OUTLET SOUND ATTENUATION, WHISPER QUIET FAN, EXTERNAL CATWALK, EXTERNAL LADDER TO REACH UNIT ACCESS DOOR (LOW), BOTTOM OR FACE C EXTERNAL EQUALIZER LINE CONNECTION, BASIN SWEEPER PIPING EXCLUDE: BASIN HEATERS, FLUME BOX, EXTERNAL LADDER WITH SAFETY CAGE NOTE: CATWALK ON CT-3 SHALL CONNECT WITH CATWALK ON CT-2 AS A FACTORY OPTION. CT-3 WILL THEREFORE NOT REQUIRE A LADDER TO ACCESS CATWALK
CP-1 (P8)	SM			40.0									VFD								MOTORS SHALL BE INVERTER DUTY, TEFC FURNISH WITH: INLET SCREEN, MASON INDUSTRIES INERTIA BASE W/ SPRING ISOLATORS
CP-2 (CWP-205A)	SM			40.0									VFD								MOTORS SHALL BE INVERTER DUTY, TEFC FURNISH WITH: INLET SCREEN, MASON INDUSTRIES INERTIA BASE W/ SPRING ISOLATORS
CP-3 (CWP-205B)	SM			40.0									VFD								MOTORS SHALL BE INVERTER DUTY, TEFC FURNISH WITH: INLET SCREEN, MASON INDUSTRIES INERTIA BASE W/ SPRING ISOLATORS

1

1

CT-1

BALTIMORE AIRCOIL COMPANY

Submittal Data Form

2-28-2022

Sold To :
MCKINSTRY COMPANY
Mickinstry Company
4800 Denver Avenue South
Attn: Mark Kipfer - PO14363133
Seattle, WA 98134
United States

Project: UWMC S-1
Purchase Order No:
Engineer:
BAC Order # Q22001197601
Configuration Version: 30
Representative: AIR REPS, LLC

All Information is per Unit

Quantity: 2 Model S15E-1212-12MN/W COOLING TOWER

Certified Capacity: 2030.00 USGPM of water from 94.49°F to 83.86°F at 68.00°F entering air wet bulb.

Fan Motor(s): Two (2) 20 HP fan motor(s): Totally Enclosed, Air Over (TEAO),
1 Speed/1 Winding - Premium Efficiency (Inverter Duty), suitable for 460 volt, 3 phase,
60 hertz electrical service and Space Heater.
Drives are based on 0 inches ESP.

NOTE: Inverter Duty fan motors, furnished in accordance with NEMA Standard Mg.1 -- Part 31, are required for applications using variable frequency drives for fan motor control.

Submittal Information		Equipment Summary
BAC Terms and Conditions of Sale		Induced Draft, Crossflow Cooling Tower
Mechanical Specifications		Quality Assurance - ISO 9001 Compliant
Submittal Drawings/Diagrams		Unit Energy Efficiency per ASHRAE Standard 90.1-2016
		CTI Certified Thermal Performance
UP-Q22001197601	Unit Print	Steel Panels and Structural Members are Constructed of Galvanized Steel Protected with a Thermosetting Hybrid Polymer and a Type 304 Stainless Steel Hot and Welded Cold Water Basin
SS-Q22001197601	Unit Support	Whisper Quiet Fans
CG-Q22001197601	Center of Gravity	Galvanized Steel Fan Guard
BC-Q22001197601	Bottom Connections	PVC Fill & Drift Eliminators
EW-Q22001197601	EWLC Wiring	Structure Designed in accordance with the 2012 IBC
VL-Q22001197601	VCOS Location	Top Inlet Connections
VW-Q22001197601	VCOS Wiring	Pump Suction Connection
EA-Q22001197601	External Access	Bottom Equalizer
IA-Q22001197601	Internal Access	Electric Water Level Control Package with High & Low Level Alarm
SW-Q22001197601	Space Heater Wiring	PVC Basin Sweeper Piping System
		Electronic Vibration Cutout Switch
		Galvanized Intake Sound Attenuators Protected with a Thermosetting Hybrid Polymer.
		Sound Attenuators on Air Discharge Encased in Galvanized Steel protected by a Thermosetting Hybrid Polymer
		Hot Water Basin Handrails with Access Ladder, Safety Cage and Safety Gate
		Access Door Platform with Aluminum Ladder, Safety Gate
		Internal Walkway, Ladder, Safety Gate and Service Platform with Galvanized Steel Supports Protected by a Thermosetting Hybrid Polymer

THANK YOU FOR YOUR BUSINESS!
Rigging and Installation Instructions, as well as Operating and Maintenance Instructions are available at www.baltimoreaircoil.com

BALTIMORE AIRCOIL COMPANY

Mechanical Specifications

2-28-2022

Customer: MCKINSTRY COMPANY
Project: UWMC S-1
Purchase Order No:
Engineer:
BAC Order # Q22001197601

All Information is per Unit

Quantity: 2 Model S15E-1212-12MN/W COOLING TOWER

Unit Type:

Factory fabricated, induced draft, crossflow cooling tower with vertical discharge.

Quality Assurance:

Each unit is manufactured under closely-controlled conditions using standardized parts to ensure each unit is built precisely to the same high-quality design and construction standards. The design, manufacture, and business processes of Baltimore Aircoil Company are ISO 9001 compliant.

Unit Efficiency:

The unit(s) will comply with the energy efficiency requirements established by ASHRAE Standard 90.1-2016.

CTI Certification:

The thermal performance of this BAC unit has been certified through performance tests conducted by the Cooling Technology Institute in accordance with their standard STD-201 RS. Your equipment may be selected for factory-testing to verify CTI certified performance. Such certification by an independent third party assures engineers and users that the published thermal capacities accurately reflect the actual unit performance. CTI certification eliminates the additional costs of on-site, individual unit testing, oversizing the equipment or operating cost penalties from deficient equipment.

Materials of Construction:

All structural steel components are constructed from G-235 (Z700 metric) hot-dip galvanized steel protected with a thermosetting hybrid polymer. The areas of the cold water basin in contact with the water will be constructed of Type 304 stainless steel. All factory seams in the cold water basin will be welded to ensure watertight construction and shall be warranted against leaks for a period of five (5) years from date of shipment. Cold water basin includes a depressed section with drain/clean-out connection and the area under the fill sections is sloped toward the depressed section for easy cleaning. Hot water distribution basins are gravity type constructed of heavy gauge, Type 304 stainless steel. The unit is supplied with a weir dam in each hot water basin to accommodate water flow rates down to 50% of the design flow. Polypropylene metering orifices are provided to assure even distribution of water over the wet deck surface. Heavy gauge, Type 304 stainless steel covers are furnished to prevent the accumulation of debris and algae in the hot water distribution basins.
The thermosetting hybrid polymer applied by Baltimore Aircoil Company consists of: 1) G-235 (Z700 metric) hot-dip galvanized steel components 2) parts prepared in a four-step (clean, pretreat, rinse, dry) process 3) electrostatically sprayed thermosetting hybrid polymer, fuse bonded to the hot-dip galvanized substrate during a thermally activated curing stage 4) quality assurance inspection program including 23 steps throughout polymer application and unit fabrication.

Fan Type:

The unit is supplied with Whisper Quiet Fans to reduce sound levels. The fan is driven by the BALTIDRIVE Power Train. This drive system consists of cast aluminum sheaves located on minimum shaft centerline distances. A premium efficient fan motor provides maximum performance and is backed by BAC's comprehensive 5-year motor and fan drive warranty.

Fan Guard:

A heavy gauge, hot-dip galvanized steel wire fan guard is provided over the fan cylinder. The fan guard is shipped loose for field installation.

Fill:

The BACross® Fill and integral drift eliminators are formed from self-extinguishing (per ASTM D-568) polyvinyl chloride (PVC), having a flame spread rating of 5 per ASTM Standard E84-77a, and are impervious to rot, decay, and fungus or biological attack. The fill is elevated above the

cold water basin floor to facilitate cleaning. This fill is suitable for a maximum entering water temperature of 130°F (54.44°C). The eliminators are designed to effectively strip entrained moisture from the leaving airstream with a minimum of air resistance.

Equipment Structure:

The structure of this equipment has been designed, tested and independently certified in accordance with the wind and seismic load requirements of the 2012 International Building Code (IBC) and ASCE/SEI 7-10. Seismic qualification is based on tri-axial shake-table testing conducted at an independent test laboratory in accordance with the ICC-ES Acceptance Criteria AC 156, "Acceptance Criteria for Seismic Qualification By Shake-Table Testing of Nonstructural Components and Systems." For more information and specific wind and seismic load capacity ratings, please see the Certificate of Wind and Seismic Load Capacity.

Water Inlet(s):

Hot water inlet flange pattern connection, suitable for ASME Class 150 flat face flanges, located at the top of the designated cell(s).

Water Outlet(s):

A pipe stub connection(s) of a metal compatible with the cold water basin material and appropriately sized for design flow is provided. Please see the submittal package for the connection type, size and location. Also included is a large area, lift out strainer which matches the cold water basin material of construction and has perforated openings sized smaller than the water distribution nozzle orifices. Strainer includes anti-vortexing baffle to prevent air entrainment.

Equalizer Connection:

The unit will be provided with a bottom equalizer connection. Please see the submittal drawing package for the size and location of the connection.

Basin Water Level Control:

Probe-type electric water level control package including solid-state relay, electrode head, stainless steel electrodes, and a solenoid valve in the make-up water connection. The electrodes are make-up on, make-up off, high level alarm, low level alarm, and ground. Field wiring is by others.

Basin Sweeper Piping:

Polyvinyl chloride (PVC) sump sweeper piping is included in the cold water basin. Supply and return connections are provided for connecting to a user supplied filtration system. 20 psig (135 kPa) pressure is required at the water inlet.

Vibration Cutout Switch:

Fan system is provided with a vibration cutout switch to limit damage to the unit in the event of a high vibration condition. The vibration switch is solid state with a frequency range of 2 to 1,000 Hz (120 to 60,000 RPM), a velocity set point of 0.1 to 1.5 In./Sec., and a time delay adjustable from 2 to 15 seconds. Input power required is 110 V, 50/60 Hz, 3 Watts plus alarm current. Alarm or shutdown switch is rated at 5 Amperes, 110 VAC TRIAC. Field wiring is by others.

Air Intake Option:

Sound attenuators are provided for the air intake. The intake attenuators consist of fiberglass acoustical baffles encased in G-235 (Z700 metric) hot-dip galvanized steel protected with a Thermosetting Hybrid Polymer.

Air Discharge Option:

Sound attenuators are provided for the air discharge. The discharge attenuators consist of fiberglass acoustical lining encased in a G-235 (Z700 metric) hot-dip galvanized steel straight discharge hood(s) protected by a Thermosetting Hybrid Polymer. A heavy gauge, 1" X 1", hot-dip galvanized steel screen is provided over the galvanized steel discharge sound attenuator.

Hot Water Basin Handrail and Ladder Package:

Reinforced galvanized steel hot water basin covers, an aluminum ladder, galvanized steel safety cage, galvanized steel safety gate, and 1-1/2" (38 mm) x 1-1/2" (38mm) square hot dip galvanized steel tube safety railing are provided to allow access to the top of the unit and enabling inspection to the spray distribution. Field assembly and installation is by others. This option meets pertinent OSHA standards.

Access Door Platform:

An external service platform(s) with aluminum access ladder(s), glavanized safety gate and 1-1/2" (38 mm) x 1-1/2" (38mm) square hot dip galvanized steel tube safety railing complying with OSHA standards and regulations provides safe and convenient access to the access door when the equipment is installed above grade. The structure is constructed of galvanized steel. Field installation is by others.

Internal Access Option:

The unit has access doors on both ends, a service platform with galvanized steel supports protected by a Thermosetting Hybrid Polymer, an internal aluminum ladder with galvanized steel supports protected by a Thermosetting Hybrid Polymer, a galvanized steel hinged safety gate and

an internal walkway matching the unit material of construction enabling maintenance of the mechanical equipment. All components meet pertinent OSHA standards. Field assembly and installation required.

MCKINSTRY NOTE:
VFDs PROVIDED BY ELECTRICAL CONTRACTOR AS NOTED IN SKETCHES AND SCOPE OF WORK DOCUMENT.

Control Panel Includes:

Scope of work:

1) Provide NEMA 4 enclosure and back panel with air circulation fan and thermostat.
2) Provide control transformer for 120V loads and main disconnect switch for incoming power.
3) Install NEMA 3R hoods over circulation fan and exhaust grill.
4) ~~Provide fusing and output terminals for two customer provided 20HP @480V VFD's.~~
5) ~~Provide control contactor, fusing and output terminals for one 12kw @ 480V Basin Heater.~~
6) Provide Basin Heater auxiliary contacts for VFD interlock.
7) ~~Provide VFD running contact for Basin Heater interlock.~~
8) Provide relay and VFD programming for Motor Heater.
9) Provide circuitry for Heater On dry contacts, ~~VFD start input from building automation~~, low alarm dry contacts and indicator light, high alarm dry contacts and indicator light, Water Level Control On/Off switch, and electronic vibration cut-out as detailed on the schematic drawing provided.
10) Provide schematic diagram.
11) Provide fusing for 100KAIC SCCR rating.
12) Provide UL508A certification of panel.

Clarifications:

1) All work specified above to be performed during the hours of 7:00 am – 3:30 pm, Monday through Friday
2) This proposal shall remain in effect for sixty days, after which time it is subject to our review.
3) All prices are plus Washington State Sales Tax, if applicable.

Exclusions:

1) Incoming power overcurrent protection provided by others.
2) Installation, startup, programming, commissioning, by others.
3) Submittals, O&M's, and any other documentation except as provided above by others.

BALTIMORE AIRCOIL COMPANY

Terms and Conditions of Sale

Pricing: Prices set forth in Seller's quotation shall remain firm for thirty (30) days. Within such period, the quotation shall convert into an order provided that all of the following have occurred: (1) Buyer submits either a purchase order or a copy of Seller's quotation displaying an authorized signature of Buyer within that thirty (30)-day period; (2) Buyer provides a release for fabrication; and (3) Buyer requests a shipment date that is no later than twelve (12) weeks from the date of Buyer's submission of a purchase order or signed quotation. In the event Buyer's requested shipment date is later than twelve (12) weeks beyond such submission date, Seller's price in effect twelve (12) weeks prior to such shipment date shall apply. In the event that Buyer requests for its convenience that Seller delay delivery of products subject to an order beyond the scheduled shipment date, pricing shall be subject to the same adjustment.

Payments: Terms of payment shall be net cash in thirty (30) days from date of invoice, subject to Seller's prior credit approval. If the Buyer shall fail to make any payments in accordance with the terms and conditions of sale, the Seller, in addition to its other rights and remedies but not in limitation thereof, may, at its option, without prior notice, cancel this order as to any undelivered products or defer shipments or deliveries hereunder, or under any other agreement between Buyer and Seller, except upon Seller's receipt of cash before shipment or such security as Seller considers satisfactory. Seller reserves the right to impose an interest charge (not exceeding the lawful maximum) on the balance of each invoice not paid on its due date for the period from the due date to the date of receipt of payment by Seller. In the event Buyer's failure to make timely payments to Seller results in Seller incurring additional costs, including but not limited to collection expenses and attorneys' fees, said costs shall be added to the amount due Seller from Buyer. Buyer shall have no right to any discount or retainage and shall not withhold payment as a set-off on Seller's invoice in any amount.

Taxes: Unless listed on the front (reverse) side of this document, prices do not include any federal, state or local sales, use or value-added taxes payable in connection with this order. All such taxes shall be paid by Buyer. Buyer shall indemnify Seller from and against such taxes, plus interest and penalties thereon, including, but not limited to, tax, interest and penalties resulting from a failure to collect such taxes because of Seller's reliance upon an invalid exemption certificate provided to Seller.

Allocation of Risk: Deliveries shall be considered made Ex-works BAC Factory. At such time, title to the goods and all risk of loss, or damage shall pass to Buyer.

Force Majeure: Seller shall under no circumstances be liable for any loss or damage resulting from delay or failure in the performance of its obligations under this contract to the extent that such performance is delayed or prevented by: fires, floods, war, terrorist activities, riots, strikes, freight embargoes or transportation delays, shortage of labor, inability to secure fuel, material, supplies or power at current prices, or on account of shortages thereof; acts of God or of the public enemy; any existing or future laws or acts of the federal, state or local government (including specifically, but not exclusively, any orders, rules or regulations issued by any official or agency of any such government) affecting the conduct of Seller's business with which Seller in its judgment and discretion deems it advisable to comply as a legal or patriotic duty, or to any case beyond the Seller's reasonable control.

Warranties: Seller warrants that the equipment sold under this contract shall be free from defects in material and workmanship for a period of twelve (12) months from the date of equipment startup or eighteen (18) months from the date of shipment, whichever occurs first. The following original equipment components only are warranted against defects in materials and workmanship for a period of five (5) years from date of shipment: fans, fan shafts, fan motors, bearings, sheaves, gearboxes, driveshafts, couplings, and mechanical equipment support. Details of option-specific warranties follow:

Welded 304 Stainless Steel Cold Water Basins are warranted against leaks for a period of five (5) years from date of shipment. Only leaks from the factory seams of the cold water basin are covered; this warranty does not apply to cold water basin field connections, field installed options or modifications by others.

Original Equipment Fan Motors are warranted against defects in materials and workmanship for a period of seven (7) years from date of shipment when space heaters are field-wired at time of initial installation per the motor nameplate.

Replacement Parts provided by Seller under its original equipment warranty obligations are warranted against defects in materials and workmanship for a period of twelve (12) months from date of shipment or until expiration of their original warranty, whichever occurs first. Parts purchased after expiration of the original equipment warranty are warranted against defects in materials and workmanship for a period of twelve (12) months from date of shipment.

Written notice of any defect shall be given to Seller immediately upon discovery by Buyer, and shall fully describe the claimed defect. Defective parts shall be repaired or replaced F.O.B. point of shipment, provided that inspection by Seller verifies the claimed defect(s). This shall be Buyer's exclusive remedy. **This warranty does not cover the costs of removing, shipping or reinstalling the equipment. Repairs made without the prior written approval of Seller shall void all warranties covering material and workmanship.** Any descriptions of the product(s) in the contract are for the sole purpose of identification and do not constitute a warranty. In the interest of product improvement, Seller reserves the right to change specifications and product design without incurring any liability therefore. The foregoing express warranties or those set forth elsewhere on this document are the only warranties of Seller applicable to the product(s) sold under this contract. **All other warranties, whether verbal or written, and all warranties implied by law, including any warranties of merchantability or fitness for a particular purpose, are hereby excluded. Failure on the part of Buyer or of other parties to properly maintain the product(s) sold under this contract, or the operation of such product(s), by Buyer and/or other parties under conditions more severe than those for which such product(s) were designed, shall void all warranties covering materials and workmanship. Seller's warranties do not apply to defects in product(s) for which payment in full has not been received by Seller, and said warranties do not cover normal wear and tear or the erosion, corrosion and/or deterioration of the product(s) from unusual causes. No warranties by Seller shall apply to accessories manufactured by others,** inasmuch as they are warranted separately by their respective manufacturers, except as stated above. Buyer

assumes liability for and shall bear the costs of compliance with all laws, regulations, codes standards or ordinances applicable to the location, operation and maintenance of the product(s) sold under this contract, including those requirements pertaining to the distances between such product(s) and air-conditioning system duct intakes. No representative or agent of Seller is authorized to enlarge upon the express warranties of Seller.

Cancellation/Changes/Returns: Cancellation of or changes in any order by Buyer shall not be effective without Buyer's notice thereof received, agreed to, and confirmed in writing by Seller. If Seller, in its absolute discretion, approves Buyer's cancellation of an order, Buyer agrees to pay a reasonable cancellation charge. Seller's prior written consent must be obtained before Buyer returns any products, and when so returned will be subject to a handling charge and transportation costs payable by Buyer.

Liability/Indemnification: Seller shall not be liable for any damages caused by delay in delivery of the products. Buyer shall hold harmless and indemnify Seller from and against all liability, claims, losses, damages, and expenses (including attorneys' fees) for personal injury and property damage arising out of Buyer's improper unloading, handling, or use of the products subject to this order, and for Buyer's infringement of another's property rights. The Seller's maximum liability from any causes whatsoever, whether in breach of contract, tort (including negligence), strict liability, or otherwise, shall not exceed the contract price. Neither Buyer nor Seller shall in any event be liable to the other, whether such liability arises out of breach of contract, tort (including negligence), strict liability or any other cause or form of action, for any consequential, special, indirect or incidental damages, including but not limited to loss of actual or anticipated profits or loss of use arising out of this contract, other than such damages resulting from the willful misconduct of Buyer or Seller.

Storage: In the event that Buyer is unable to accept delivery of goods and the Seller is required to hold goods beyond two (2) working days from fabrication completion, a storage fee equal to the greater of $200/day or 0.20% of the total order value/day will be assessed by Seller for every day beyond two (2) working days from fabrication date which it is required to store goods on behalf of Buyer. Storage will be assessed monthly and will need to be paid in full prior to a new shipment date being scheduled.

Government Contracts: If Buyer's purchase order is for products to be used in the performance of a U.S. Government contract, those clauses of applicable procurement regulations mandatorily required by federal law to be included in U.S. Government subcontracts shall be incorporated herein by reference.

Export Transactions: Buyer shall comply with all applicable export laws and regulations of the U.S. Government, and shall hold harmless and indemnify Seller from and against all liability, damages, and expenses (including attorneys' fees) incurred by Seller as a result of Buyer's violation of any U.S. Government export and/or international antiboycott laws or regulations. Buyer certifies that it will be the recipient of the products to be delivered by seller. Buyer acknowledges that products are subject to export/import control laws of various countries, including the Export Administration Regulations of the United States. Products sold by seller cannot be transferred, sold or re-exported to any party on the Entity List or Restricted Persons list of the US Department of Commerce Bureau of Industry and Security, any party designated by the US Treasury Department Office of Foreign Asset Control and any party debarred or sanctioned for proliferation or terrorism reasons by the US State Department.

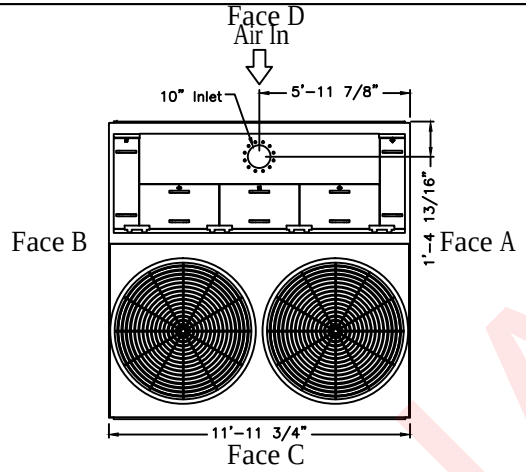
Agreement of Sale: Buyer's order is accepted on the terms and conditions stated herein and Seller's acceptance of Buyer's order is expressly made conditional upon Buyer's assent to such terms and conditions, including any of Seller's terms and conditions which may be additional to or different from those contained in Buyer's purchase order or otherwise. Such assent shall be deemed to have been given unless written notice of objection to any such terms and conditions (including inconsistencies between Buyer's purchase order and this acceptance) is given by Buyer to Seller promptly upon receipt of this acknowledgment. Any agreement or understanding, oral or written, which modifies or waives the terms and conditions herein (whether contained in Buyer's purchase order or other documentation) shall be deemed material and shall be rejected unless hereafter agreed to in writing and signed by Seller's authorized officer. Waiver by Seller of any breach or default hereunder shall not be deemed a waiver by Seller of any other or subsequent breach or default which may thereafter occur. Neither the rights nor the obligations of either Buyer or Seller are assignable without the prior written consent of the other party. This agreement of sale and all rights and obligations of Buyer and Seller shall be governed by and construed in accordance with the laws of the State of Maryland.

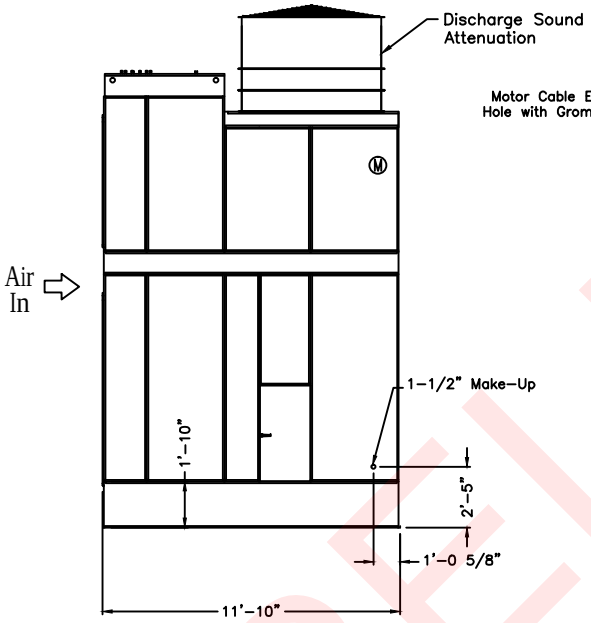
Electronic copy of the latest version is available online at http://baltimoreaircoil.com/english/terms. (Revised – **11/05/2021**)

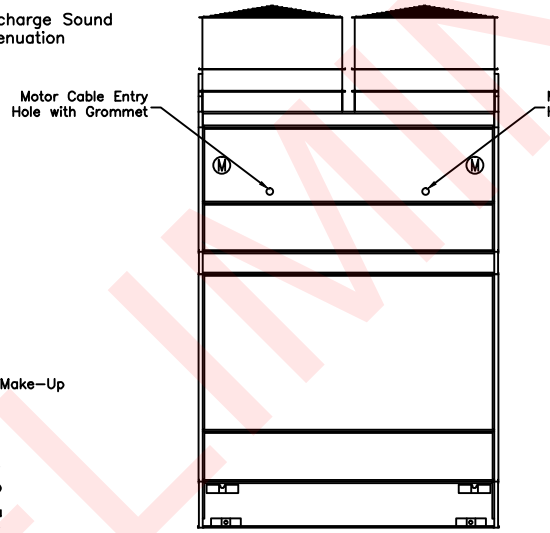
CT-1

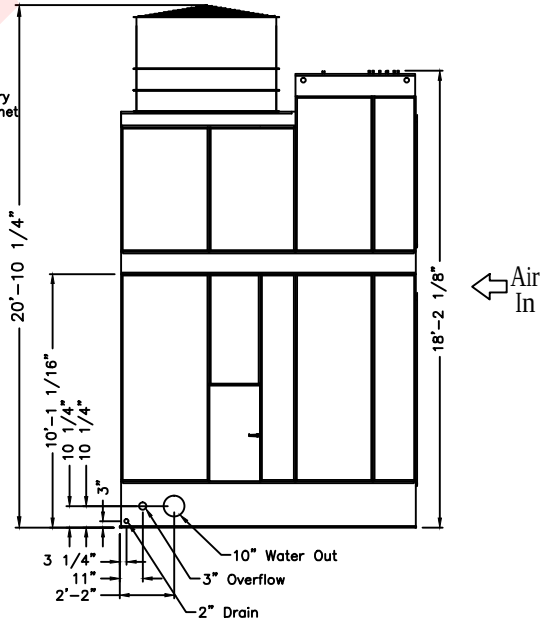
Data Version 0.00
DWG Version 1.72

Notes
1) All dimensions are in feet and inches. Weights are in pounds and include options and accessories.
2) Unless otherwise indicated, pan connections 3" and smaller are MPT. Pan Connections 4" and larger are grooved to suit a mechanical coupling and beveled for welding. The inlet is a studded bolt circle designed to mate with an ASME class 150 flat face flange with studs straddling transverse and longitudinal centerlines. The flat face flange and full face gasket are to be furnished by others for mating with the unit. Make-Up connection is FPT.
3) Field piping should be fabricated at time of installation. Pre-fabrication of pipe work is not recommended.
4) Do not support piping from unit connections. All necessary piping supports to be supplied by others.
5) For weight loadings and support requirements, refer to the suggested unit support drawing.
6) The area above the fan discharge must be unobstructed.
7) Due to height limitations on truck shipments, some items shown may ship loose for field installation.
8) Dimension to the top of the fan guard reflect all additional cowl extensions.
9) Conduit must be water tight and pitched downward to allow condensation to drain away from fan motor conduit box. Therefore, do not run the conduit through fan deck.









Model Number	Shipping Weight	Operating Weight	Heaviest Section
S15E-1212-12MN/W	14374	23878	5784

RIGHT HAND

ORDER NO: Q22001197601

DATE: 2/28/2022 6:27:32 PM ConfigVer=30

BALTIMORE AIRCOIL COMPANY

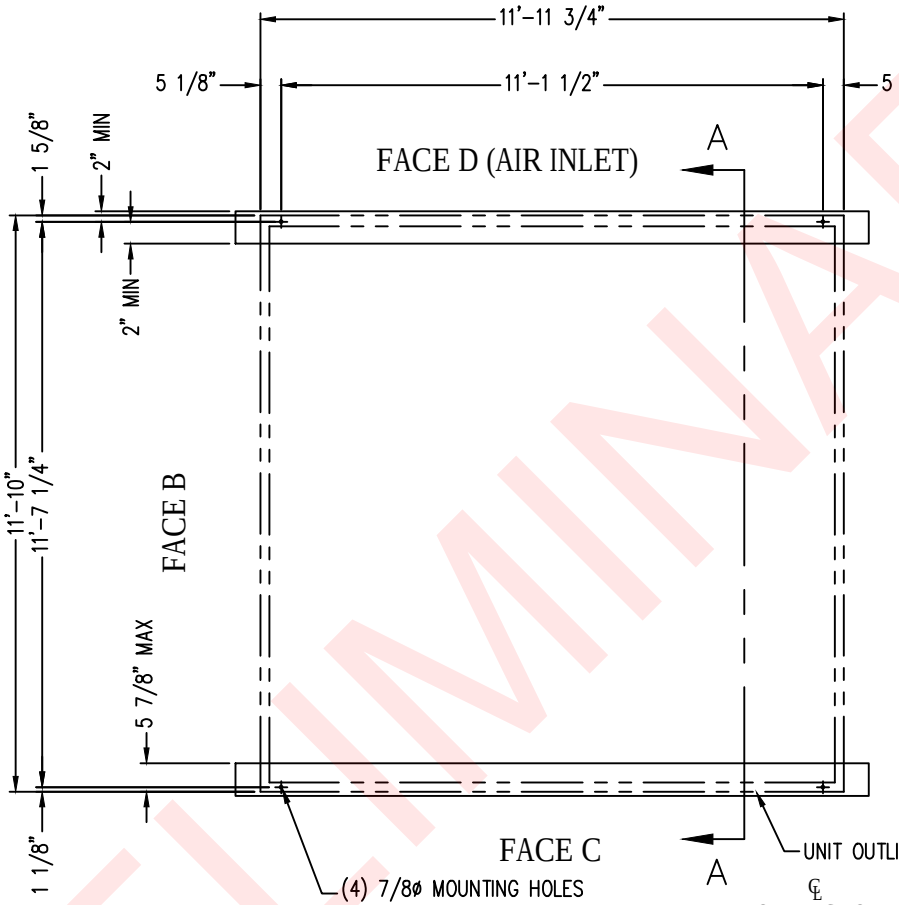
Series 1500 Single Cell Unit Print

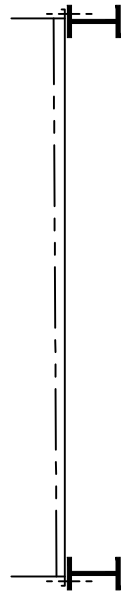
DRAWING NUMBER: UP-Q22001197601

Data Version 1.08
DWG Version 1.20

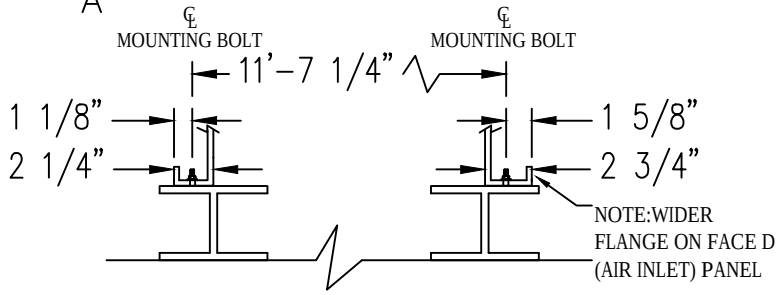
Notes
1) Each beam should be designed, as a minimum, for 65% of the total unit operation weight applied as a uniformly distributed load.
2) All dimensions are in feet and inches. Weights are in pounds and include options and accessories.
3) Operating weight and weight loading are for units with water level in basin at overflow.
4) Unit support beams and anchor bolts to be designed and furnished by others.
5) Support beams must be flush and level at top.

PLAN VIEW





FACE B ELEVATION



SECTION "A-A"

PLAN "A" STEEL

Model Number	Shipping Weight	Operating Weight	Heaviest Section
S15E-1212-12MN/W	14374	23878	5784

ORDER NO: Q22001197601

DATE: 2/28/2022 6:27:53 PM ConfigVer=30

BALTIMORE AIRCOIL COMPANY

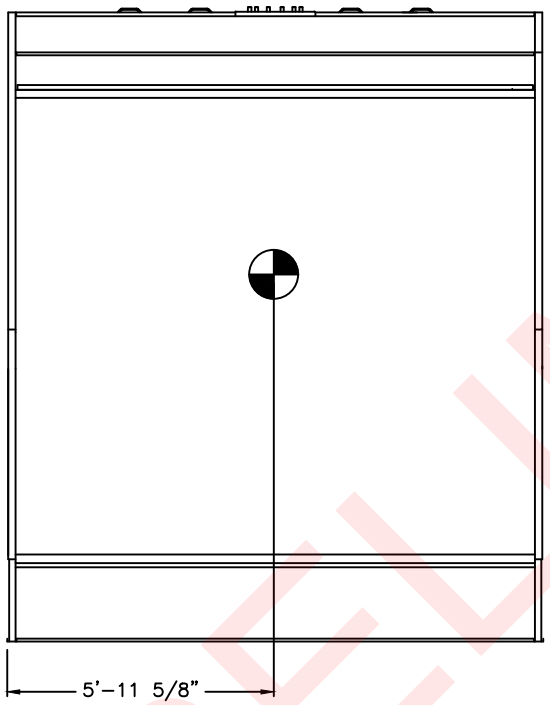
Single Cell Unit Support

DRAWING NUMBER:
SS-Q22001197601

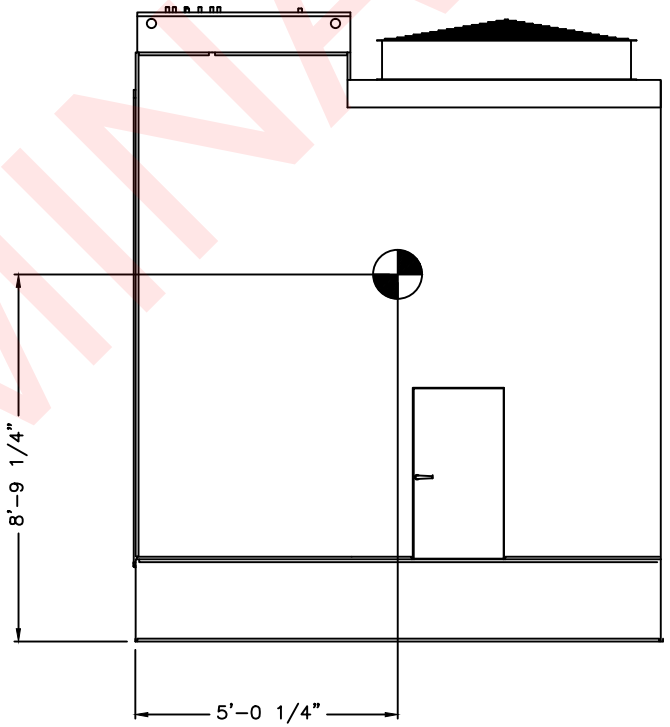
Notes

1) Drawings are not to scale.

2) Accessory weights shown above are included in the total unit Operating, Shipping and Heaviest Section values located on the Unit Print and Unit Support drawings. Ladder and cage weights are not shown above but are included in the totals. These accessories ship loose for field assembly and installation.



Face D
(Air Intake Side)

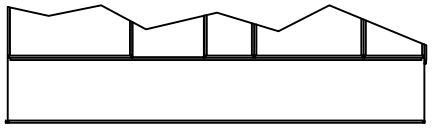


Face B

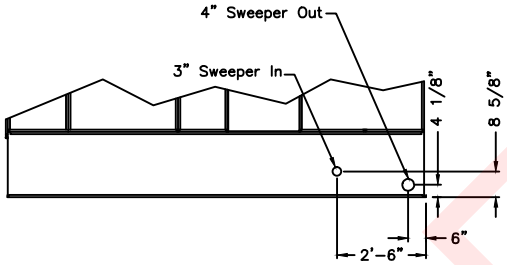
ORDER NO: Q22001197601	BALTIMORE AIRCOIL COMPANY	Series 1500 Center of Gravity
DATE: 2/28/2022 6:33:50 PM ConfigVer=30		DRAWING NUMBER: CG-Q22001197601

Notes

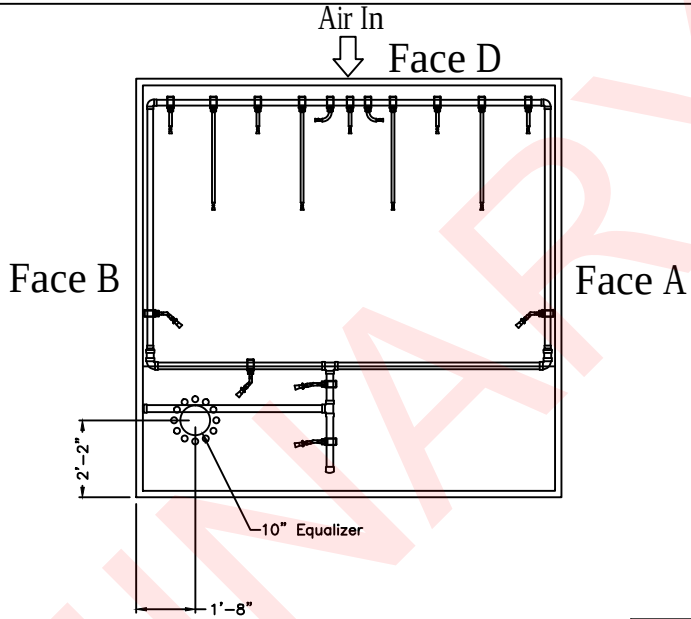
Data Version 0.00
DWG Version 1.96



Face A

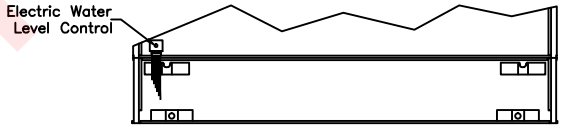


Face B



Face C

SWEEPER PIPING FLOW RATES	
DESIGN PRESSURE	DESIGN FLOW RATE PER CELL
20 psi	117 GPM



Face C

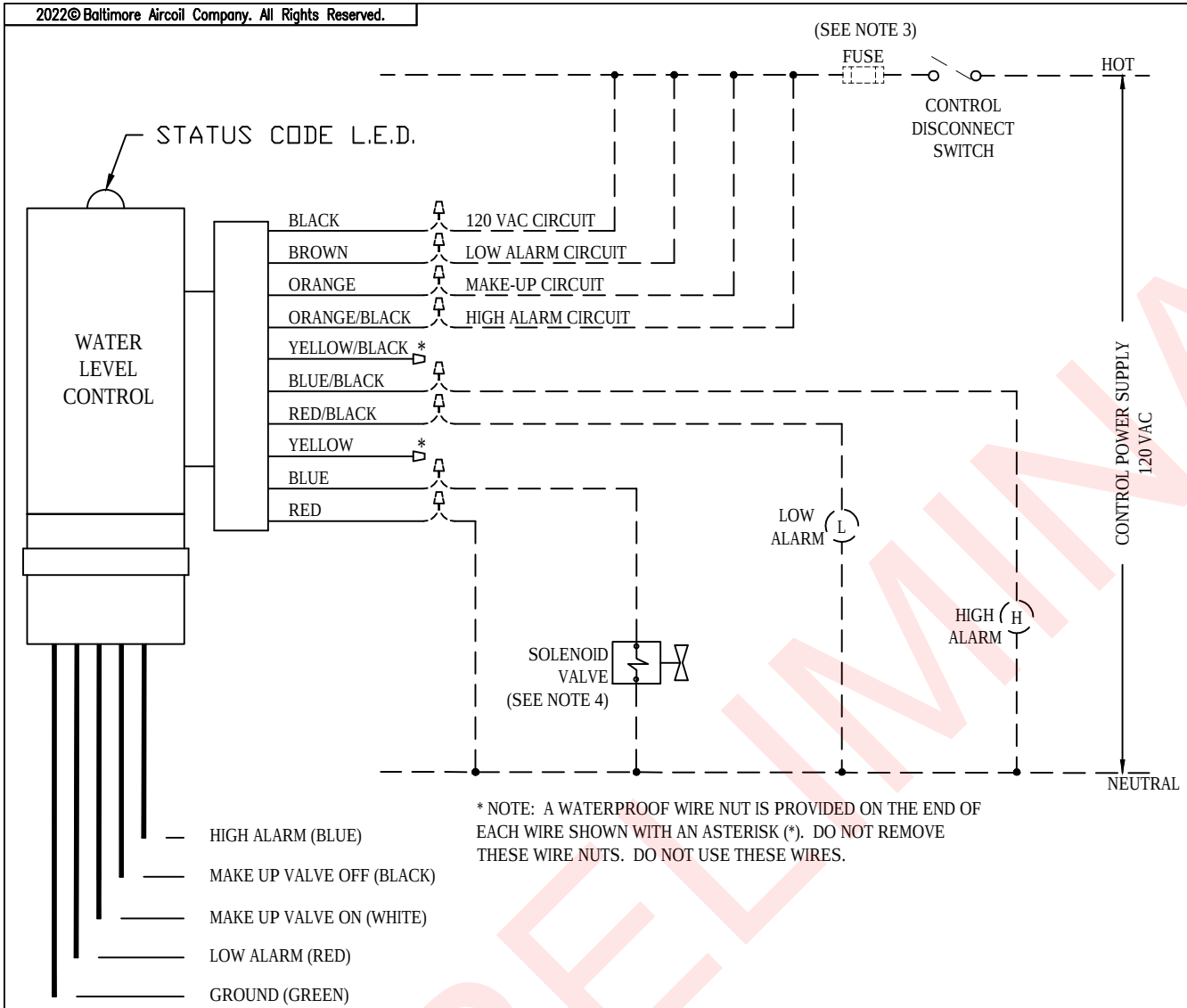
ORDER NO: Q22001197601

DATE: 2/28/2022 6:33:34 PM ConfigVer=30

BALTIMORE AIRCOIL COMPANY

Single Cell Basin Connections

DRAWING NUMBER: BC-Q22001197601



* NOTE: A WATERPROOF WIRE NUT IS PROVIDED ON THE END OF EACH WIRE SHOWN WITH AN ASTERISK (*). DO NOT REMOVE THESE WIRE NUTS. DO NOT USE THESE WIRES.

NOTES:

1. WIRING AND COMPONENTS INDICATED BY DASHED LINES ARE TO BE SUPPLIED BY FIRMS OTHER THAN BAC. ALL WIRING MUST COMPLY WITH APPLICABLE CODES AND ORDINANCES.
2. THE WATER LEVEL CONTROL BOARD IS WIRED IN THE INVERSE MODE SO THAT THE SOLENOID MAKE-UP VALVE WILL CLOSE IF THERE IS A LOSS OF POWER TO THE CONTROL BOARD. WHEN THE WATER LEVEL RISES TO THE BOTTOM OF THE MAKE-UP VALVE OFF PROBE AND MAINTAINS CONTACT FOR AT LEAST 6 SECONDS, THE CONTROL DE-ENERGIZES THE VALVE. THE VALVE REMAINS DE-ENERGIZED UNTIL THE WATER LEVEL RECEDES BELOW THE BOTTOM OF THE MAKE-UP VALVE ON PROBE AND REMAINS AT THAT LEVEL FOR AT LEAST 6 SECONDS. THE CONTROL THEN ENERGIZES THE VALVE.
3. ANY INCOMING POWER SOURCE MUST HAVE A 3A FUSE FOR COMPONENT PROTECTION. USING A FUSE OVER 3A WILL VOID BAC WARRANTY.
4. THE SOLENOID ACTUATED MAKE-UP VALVE IS RATED AT 6.1 WATTS, 16 VA HOLDING, 30 VA INRUSH.
5. THE NORMALLY CLOSED SOLENOID VALVE HAS A SLOW CLOSING FEATURE WHICH MINIMIZES WATER HAMMER AND IS DESIGNED TO OPERATE AT MAKE-UP WATER LINE PRESSURES OF 10 TO 125 PSIG. TO FURTHER MINIMIZE THE POTENTIAL FOR WATER HAMMER, MAKE-UP WATER LINE PRESSURES AT THE HIGHER END OF THE RANGE SHOULD BE AVOIDED, AND MAKE-UP PIPING SHOULD BE WELL SUPPORTED.
6. ~~INTERLOK IMMERSION HEATERS WITH CIRCULATING PUMP TO DE-ENERGIZE HEATERS WHEN PUMP IS RUNNING.~~
7. CONTROL THERMOSTAT IS TO BE SET FOR 40ÁF. DO NOT SET THERMOSTAT LOWER THAN 40ÁF.
8. A STRAINER IS REQUIRED BEFORE THE SOLENOID MAKE-UP VALVE

L.E.D. STATUS CODES:

1. L.E.D. ON STEADY:
INDICATES NORMAL OPERATION
2. STEADY ONE SECOND FLASHING:
DIRTY PROBES - OVERRIDES ALL OTHER STATUS CODES
3. TWO FLASHES AND OFF FOR 5 SECONDS:
MAKE-UP ON FOR MORE THAN 1 HOUR
4. THREE FLASHES AND OFF FOR 5 SECONDS:
SHORTED OR HIGH CONDUCTIVITY WATER
5. FOUR FLASHES AND OFF FOR 5 SECONDS:
SHORT FILL CYCLE - WHITE PROBE IS DIRTY OR NONFUNCTIONAL
6. L.E.D. DOES NOT COME ON AFTER POWER UP OR RESETTING POWER: INDICATES UNIT INOPERATIVE

ORDER NO: Q22001197601

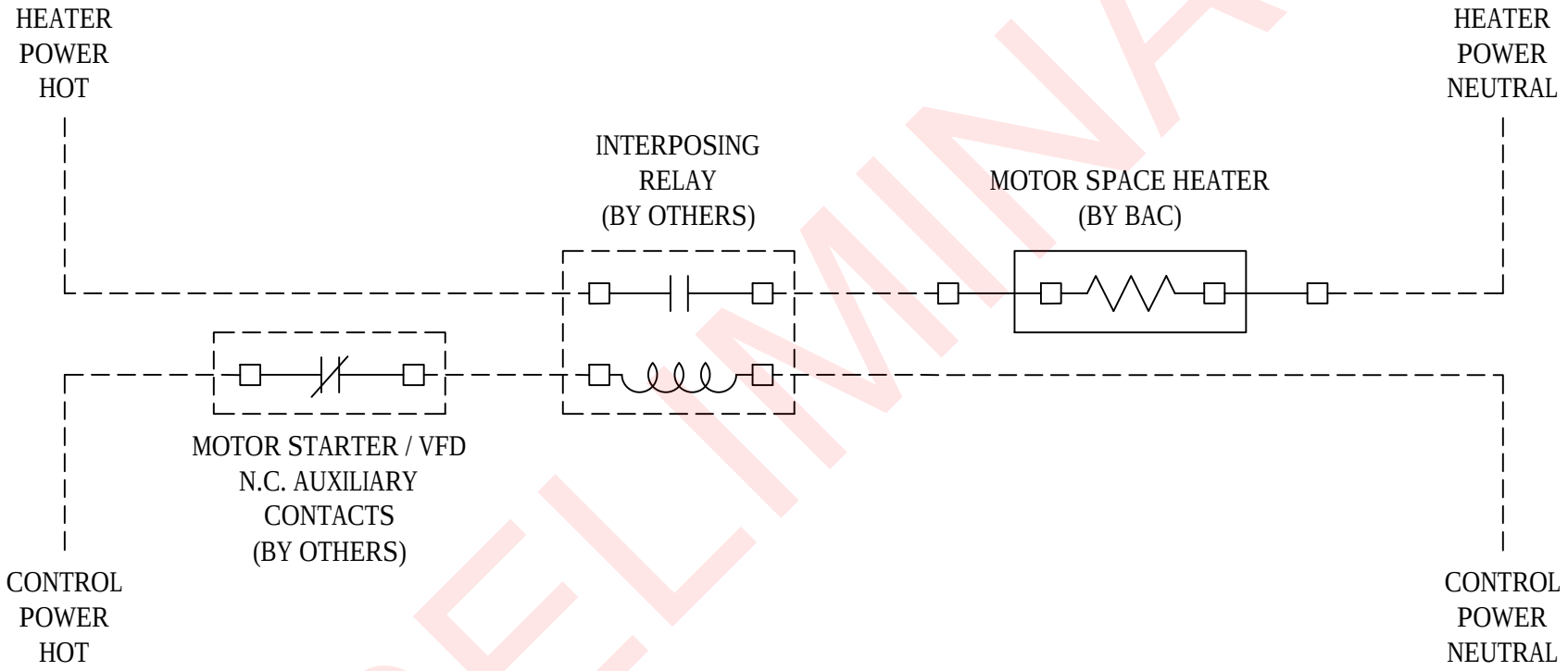
DATE: 2/28/2022 6:38:42 PM ConfigVer=30

BALTIMORE AIRCOIL COMPANY

EWLC Wiring
High & Low Alarm

DRAWING NUMBER:
EW-Q22001197601

Notes
1) Motor Heater should only be energized when the fan is stopped (0% fan speed).
2) Interposing relay must be sized per the heater power consumption.
3) Heater sizes shown below are maximum values. Refer to the motor nameplate for final power requirements.
4) General heater wiring details shown, see diagram on motor for specific details.
5) All wiring must comply with all codes and standards applicable for the installed jurisdiction, which may include requirements for additional disconnects, over current protection, and/or other safety devices.
6) Dashed lines represent field supplied wiring.
7) Space heater wiring leads may be located in either the main outlet box, or an auxiliary box if so equipped.



For units that ship from the US, heaters are 110-120 VAC/ 50 or 60 Hz based on motor configuration.
For units that ship from China, heaters are 200-240 VAC/ 50 or 60 Hz based on motor configuration.

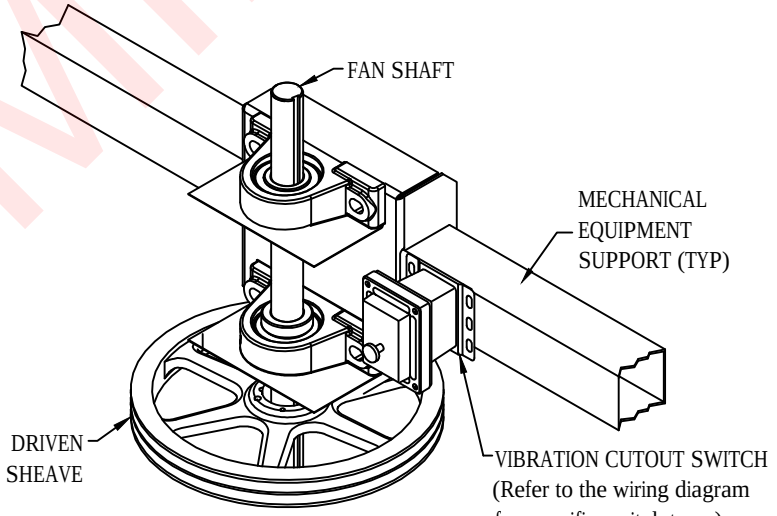
ORDER NO: Q22001197601	BALTIMORE AIRCOIL COMPANY	Fan Motor Space Heater Wiring Schematic - General
DATE: 2/28/2022 6:34:03 PM ConfigVer=30		DRAWING NUMBER: SW-Q22001197601

OPERATING INSTRUCTIONS:
Follow the installation drawings and wiring diagram to ensure the proper operation of the vibration switch. Direct any questions to your local BAC Representative.

NOTE:
Moisture inside the switch can lead to switch failure. Care must be taken when replacing the cover on the vibration switch to ensure that the proper watertight seal is obtained.

CAUTION:
Before performing any maintenance, adjustment or inspection of the switch, make certain that all power has been disconnected and locked in the off position.

SWITCH LOCATION

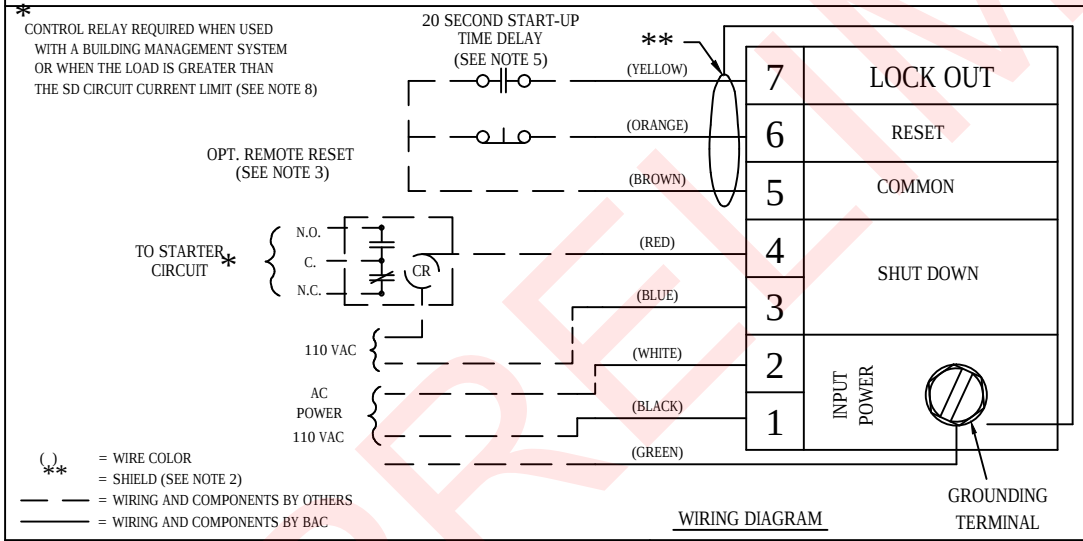


NOTES:

1. THE VIBRATION CUTOUT SWITCH TIME DELAY AND VIBRATION LEVELS HAVE BEEN FACTORY SET AT TYPICAL VALUES FOR EVAPORATIVE COOLING EQUIPMENT. SHOULD ADJUSTMENT FROM THESE SETTINGS BE NECESSARY, PLEASE REFER TO THE OPERATING INSTRUCTIONS. (DRAWINGS BAC-10876, BAC-10877, BAC-10878, OR BAC-11489).
2. THE VIBRATION SWITCH IS SHIPPED FROM THE FACTORY WITH SHIELDED POWER CABLE PRE-WIRED INSIDE THE SWITCH FOR CONNECTION TO WIRING IN A JUNCTION BOX (BY OTHERS) OUTSIDE THE UNIT. THE WIRES FROM TERMINALS 5, 6, AND 7 ARE ENCLOSED IN A SHIELD. IF EXTERNAL WIRING FOR START-UP DELAY OR REMOTE RESET IS USED (BY OTHERS), IT MUST BE SHIELDED AND THE SHIELD CONNECTED TO THE BAC SUPPLIED SHIELD. THIS SHIELD WIRE SHOULD NOT BE GROUNDED AT THE JUNCTION BOX.
3. IF A REMOTE RESET (R/R) IS DESIRED, A MOMENTARY NORMALLY CLOSED (N/C) CONTACT MUST BE PROVIDED BY OTHERS. THE REMOTE RESET IS ACTIVATED BY MOMENTARILY OPENING THE CONTACT BETWEEN TERMINALS 5 AND 6. AS SUPPLIED FROM THE FACTORY, TERMINALS 5 AND 6 ARE CONNECTED BY A WIRE NUT FOR LOCAL RESET.
4. THE SHUTDOWN (SD) RELAY IS FACTORY SET IN THE N/C POSITION. THE SD RELAY CAN BE FIELD ADJUSTED TO NORMALLY OPEN (N/O) BY MEANS OF A SLIDE SWITCH LOCATED UNDER THE TERMINAL STRIP INSIDE SWITCH ENCLOSURE. (SEE SHUTDOWN CIRCUIT CURRENT LIMIT NOTE).
5. THE VIBRATION SWITCH HAS A FIXED 20 SECOND START-UP TIME DELAY CAPABILITY. WHEN THE SWITCH IS WIRED SUCH THAT AC POWER IS ALWAYS APPLIED TO THE SWITCH, THE 20 SECOND TIME DELAY CAN BE ACTIVATED BY MEANS OF A MOMENTARY CONTACT CLOSURE BETWEEN TERMINALS 5 AND 7. THIS CONTACT CAN BE ACHIEVED BY A ONE SHOT RELAY(BY OTHERS) WIRED WITH THE STARTER CIRCUIT AS SHOWN. ALTERNATELY, WHEN THE VIBRATION SWITCH IS WIRED IN SUCH A WAY THAT THE SWITCH IS ONLY POWERED WHEN THE STARTER CIRCUIT IS POWERED, THE 20 SECOND TIME DELAY IS AUTOMATICALLY ACTIVATED WHEN THE POWER IS APPLIED TO THE SWITCH.
6. THE RUNNING TIME DELAY IS FACTORY SET AT 3 SECONDS AND CAN BE FIELD ADJUSTED FROM 1 TO 7 SECONDS. FOR FURTHER DETAILS SEE TIME DELAY SECTION OF THE OPERATING INSTRUCTIONS. 7. THE LIGHT-EMITTING DIODE (LED) IS ILLUMINATED WHEN THE VIBRATION LEVEL IS ABOVE THE TRIP SETTING. THE LED WILL REMAIN ILLUMINATED UNTIL THE UNIT VIBRATION LEVEL DROPS BELOW THE TRIP POINT.
8. A CONTROL RELAY IS REQUIRED IF THE SWITCH IS USED AS INPUT TO A BUILDING MANAGEMENT SYSTEM (N/O TRIAC CURRENT LEAKAGE IS 1 mA). THE RELAY COIL CURRENT MUST BE GREATER THAN 50 mA CONTINUOUS. A CONTROL RELAY IS ALSO REQUIRED FOR STARTER LOADS GREATER THAN 5 AMPS CONTINUOUS, 50 AMPS PEAK FOR 16 mS.
9. IF DESIRED, A SINGLE POLE, DOUBLE THROW CLASS C RELAY (1 POLE N/O, 1 POLE N/C) CAN BE USED IN THE SHUTDOWN CIRCUIT TO POWER AN ALARM (BY OTHERS) TO PROVIDE AN AUDIBLE OR VISUAL INDICATION OF VIBRATION TRIP AS WELL AS SHUTTING DOWN THE MOTOR.

WIRING OF VIBRATION CUTOUT SWITCHES ON UNITS WITH MULTIPLE MOTORS OR CUTOUT SWITCHES:

VIBRATION CUTOUT SWITCHES SHOULD BE WIRED TO SHUT OFF ALL MOTORS ON THE ASSOCIATED FAN DRIVE SYSTEM. THIS MAY REQUIRE WIRING MULTIPLE CUTOUT SWITCHES TO SHUT OFF A SINGLE MOTOR OR WIRING A SINGLE CUTOUT SWITCH TO SHUT OFF MULTIPLE MOTORS. CONTACT YOUR CONTROLS INTEGRATOR FOR DETAILS ON HOW TO WIRE MULTIPLE SWITCHES.

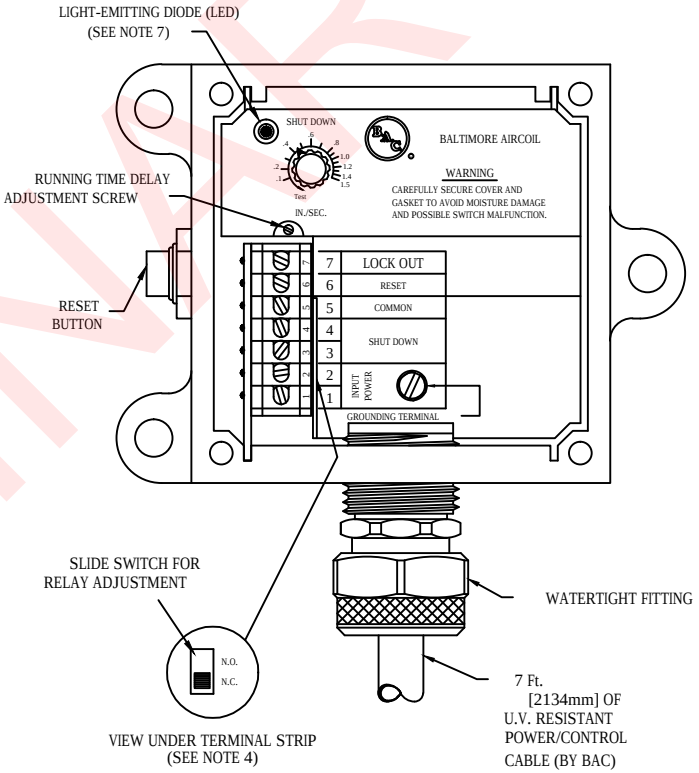


WIRING DIAGRAM

ELECTRONIC VIBRATION CUTOUT SWITCH

(W/WEATHER-PROOF COVER REMOVED)

(INTERNAL FACTORY PRE-WIRING NOT SHOWN FOR CLARITY)



SHUT DOWN CIRCUIT CURRENT LIMIT

THE SHUTDOWN RELAY IS RATED AT 5 AMPS CONTINUOUS, 50 AMPS PEAK FOR 16ms AT 110 VAC .

BEFORE PERFORMING ANY MAINTENANCE, ADJUSTMENT OR INSPECTION OF THE SWITCH, MAKE CERTAIN THAT ALL POWER HAS BEEN DISCONNECTED AND LOCKED IN THE OFF POSITION.

ORDER NO: Q22001197601

DATE: 2/28/2022 6:39:01 PM ConfigVer = 30

BALTIMORE AIRCOIL COMPANY

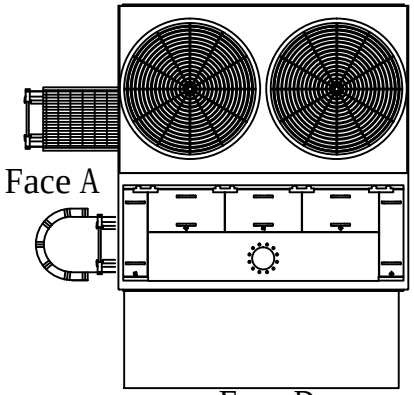
Electronic VCOS Wiring
Shut Off with Remote/Local Reset & Delay (110 VAC)

DRAWING NUMBER:
VW-Q22001197601

Data Version 0.00
DWG Version 1.56

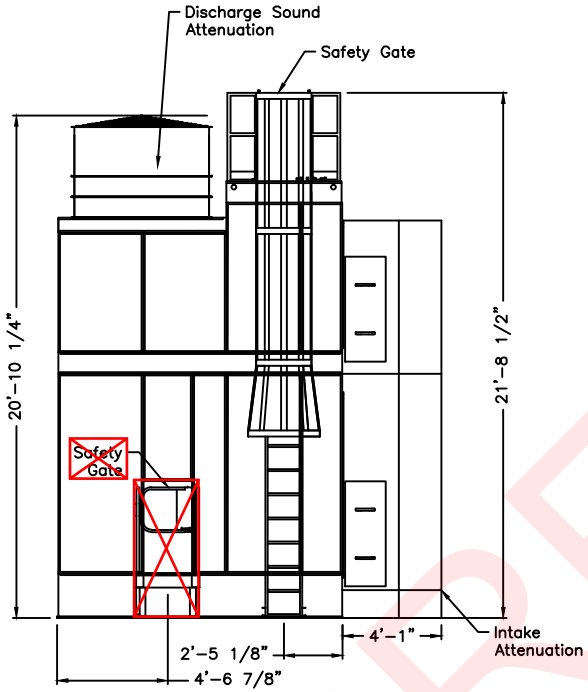
Notes
1) External unit access accessories ship loose for field installation (by others).
2) Field piping must be kept clear and supported independently of all unit access accessories.
3) Refer to OSHA and local occupational safety regulations to determine if safety cages are required.
4) Attenuation ships separately for field installation.

Plan View

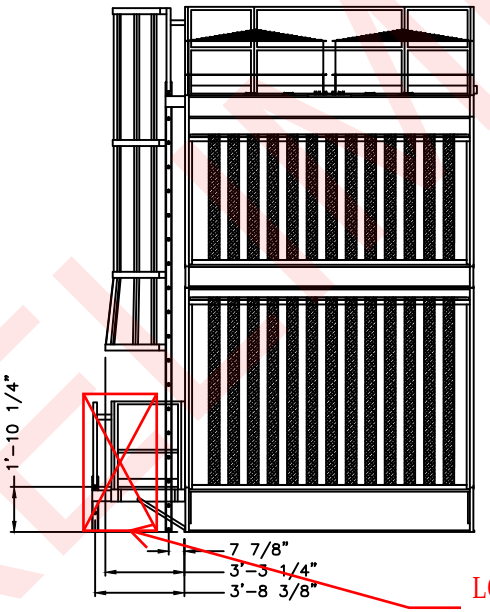


Air In

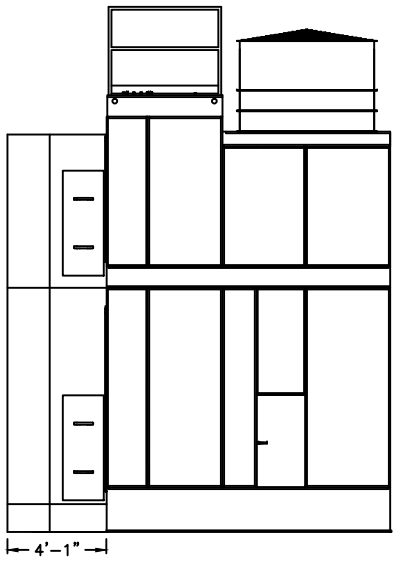
NOTE:
LOWER LEVEL LADDER, PLATFORM, AND GATE WILL NOT BE FURNISHED BY BAC.



Face A



Face D

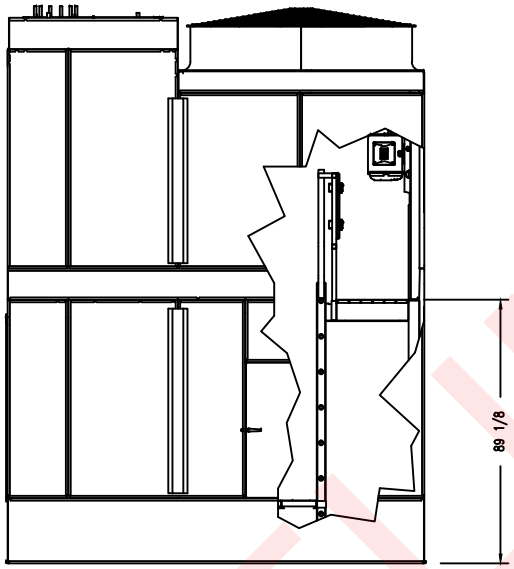


Face B

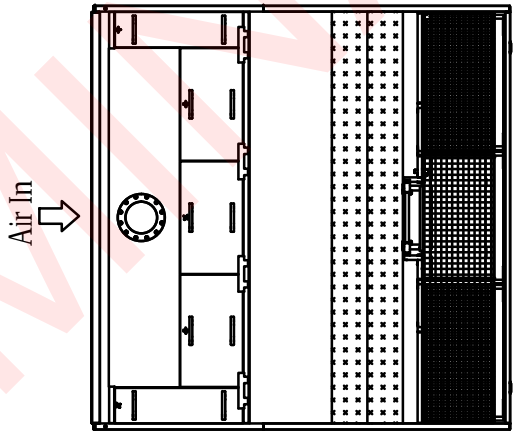
LOWER ACCESS SAFETY GATE AND LADDER NOT PROVIDED BY BAC

ORDER NO: Q22001197601	BALTIMORE AIRCOIL COMPANY	Series 1500 External Accesory
DATE: 2/28/2022 6:31:03 PM ConfigVer=30		DRAWING NUMBER: EA-Q22001197601

Notes
1) Service ladder, platform and accessories ship loose for field installation (by others).



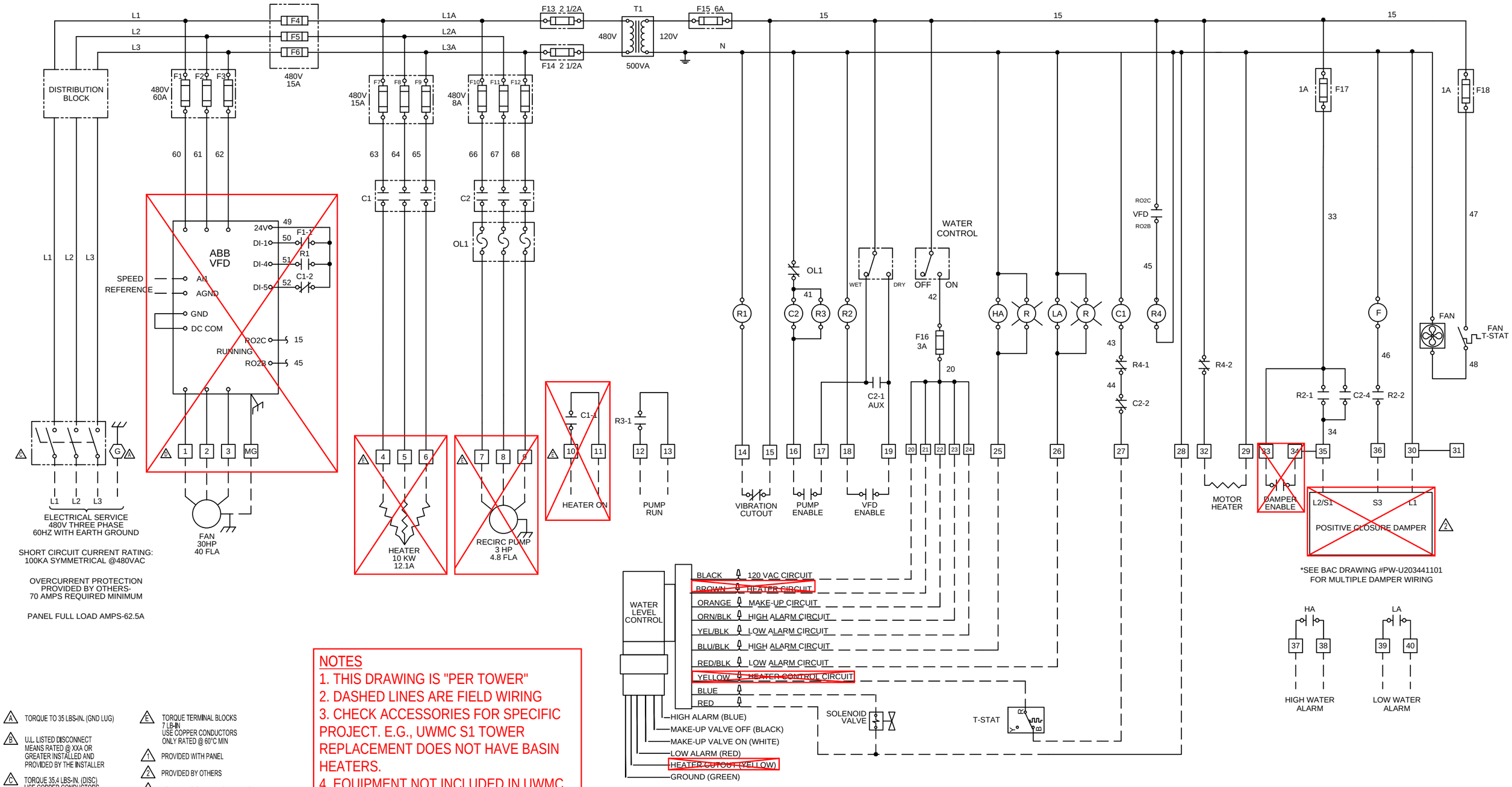
Face B



Plan View

ORDER NO: Q22001197601	BALTIMORE AIRCOIL COMPANY	Internal Access
DATE: 2/28/2022 6:38:26 PM ConfigVer=30		DRAWING NUMBER: IA-Q22001197601

THIS IS AN EXAMPLE PROVIDED BY AIRREPS TO MCKINSTRY FOR ELECTRICAL SCOPE UNDERSTANDING.
THIS IS BEING PROVIDED FOR REFERENCE, WITH A GOOD FAITH ATTEMPT TO NOTE ITEMS NOT INCLUDED IN THE UWMC S1 PROJECT. THIS IS NOT REPRESENTATIVE OF FINAL DESIGN.



NOTES
1. THIS DRAWING IS "PER TOWER"
2. DASHED LINES ARE FIELD WIRING
3. CHECK ACCESSORIES FOR SPECIFIC PROJECT. E.G., UWMC S1 TOWER REPLACEMENT DOES NOT HAVE BASIN HEATERS.
4. EQUIPMENT NOT INCLUDED IN UWMC S1 TOWER GMAX IS CROSSED OUT

A TORQUE TO 35 LBS-IN. (GND LUG)
B U.L. LISTED DISCONNECT MEANS RATED @ XXA OR GREATER INSTALLED AND PROVIDED BY THE INSTALLER
C TORQUE 35.4 LBS-IN. (DISC) USE COPPER CONDUCTORS ONLY RATED @ 60°C MIN
D TORQUE TERMINAL BLOCKS 10.6 LB-IN USE COPPER CONDUCTORS ONLY RATED @ 60°C MIN
E TORQUE TERMINAL BLOCKS 7 LB-IN USE COPPER CONDUCTORS ONLY RATED @ 60°C MIN
1 PROVIDED WITH PANEL
2 PROVIDED BY OTHERS
3 USE 18 AWG SHIELDED/PLENUM CABLE
FIELD WIRE BY OTHERS
THIS PANEL ENCLOSURE IS RATED NEMA 3R TO PRESERVE RATING USE NEMA 3R CONDUIT ENTRY HUBS

REVISIONS
A AS BUILT
2.
3.
4.
5.

AIR REPS LLC

DESIGNER	TOM GIBELYOU
DRAWN	TOM GIBELYOU
DATE	7/7/20
JOB NAME	COOLER TOWER CONTROL PANEL
PANEL SHOP:	CUSTOM ELECTRIC & CONTROLS
JOB #	20-071

CT-2 + CT-3

BALTIMORE AIRCOIL COMPANY

Submittal Data Form

3-1-2022

Sold To :
MCKINSTRY COMPANY
Mickinstry Company
4800 Denver Avenue South
Attn: Mark Kipfer - PO14363133
Seattle, WA 98134
United States

Project: UWMC S-1
Purchase Order No:
Engineer:
BAC Order # Q22001197603
Configuration Version: 35
Representative: AIR REPS, LLC

All Information is per Unit

Quantity: 1 Model S15E-1212-12MN-2/W COOLING TOWER

Certified Capacity: 3476.20 USGPM of water from 100.00°F to 85.00°F at 68.00°F entering air wet bulb.

Fan Motor(s): Four (4) 20 HP fan motor(s): Totally Enclosed, Air Over (TEAO),
1 Speed/1 Winding - Premium Efficiency (Inverter Duty), suitable for 460 volt, 3 phase,
60 hertz electrical service and Space Heater with Shaft Grounding Ring(s).
Drives are based on 0 inches ESP.

NOTE: Inverter Duty fan motors, furnished in accordance with NEMA Standard Mg.1 -- Part 31, are required for applications using variable frequency drives for fan motor control.

Submittal Information		Equipment Summary
BAC Terms and Conditions of Sale		Induced Draft, Crossflow Cooling Tower
Mechanical Specifications		Quality Assurance - ISO 9001 Compliant
Submittal Drawings/Diagrams		Unit Energy Efficiency per ASHRAE Standard 90.1-2016
		CTI Certified Thermal Performance
UP-Q22001197603	Unit Print	Steel Panels and Structural Members are Constructed of Galvanized Steel Protected with a Thermosetting Hybrid Polymer and a Type 304 Stainless Steel Hot and Welded Cold Water Basin
SS-Q22001197603	Unit Support	Whisper Quiet Fans
CG-Q22001197603	Center of Gravity	Galvanized Steel Fan Guard
BC-Q22001197603	Bottom Connections	PVC Fill & Drift Eliminators
EW-Q22001197603	EWLC Wiring	Structure Designed in accordance with the 2012 IBC
VL-Q22001197603	VCOS Location	Top Inlet Connections
VW-Q22001197603	VCOS Wiring	Bottom Outlet Pump Suction Connection
EA-Q22001197603	External Access	Bottom Equalizer
IA-Q22001197603	Internal Access	Less Flume Box
SW-Q22001197603	Space Heater Wiring	Electric Water Level Control Package with High & Low Level Alarm for Independent Cell Operation
		PVC Basin Sweeper Piping System
		Electronic Vibration Cutout Switch
		Galvanized Intake Sound Attenuators Protected with a Thermosetting Hybrid Polymer.
		Sound Attenuators on Air Discharge Encased in Galvanized Steel protected by a Thermosetting Hybrid Polymer
		Hot Water Basin Handrails with Access Ladder, Safety Cage and Safety Gate
		Internal Walkway, Ladder, Safety Gate and Service Platform with Galvanized Steel Supports Protected by a Thermosetting Hybrid Polymer

THANK YOU FOR YOUR BUSINESS!
Rigging and Installation Instructions, as well as Operating and Maintenance Instructions are available at www.baltimoreaircoil.com

BALTIMORE AIRCOIL COMPANY

Mechanical Specifications

3-1-2022

Customer: MCKINSTRY COMPANY
Project: UWMC S-1
Purchase Order No:
Engineer:
BAC Order # Q22001197603

All Information is per Unit

Quantity: 1 Model S15E-1212-12MN-2/W COOLING TOWER

Unit Type:

Factory fabricated, induced draft, crossflow cooling tower with vertical discharge.

Quality Assurance:

Each unit is manufactured under closely-controlled conditions using standardized parts to ensure each unit is built precisely to the same high-quality design and construction standards. The design, manufacture, and business processes of Baltimore Aircoil Company are ISO 9001 compliant.

Unit Efficiency:

The unit(s) will comply with the energy efficiency requirements established by ASHRAE Standard 90.1-2016.

CTI Certification:

The thermal performance of this BAC unit has been certified through performance tests conducted by the Cooling Technology Institute in accordance with their standard STD-201 RS. Your equipment may be selected for factory-testing to verify CTI certified performance. Such certification by an independent third party assures engineers and users that the published thermal capacities accurately reflect the actual unit performance. CTI certification eliminates the additional costs of on-site, individual unit testing, oversizing the equipment or operating cost penalties from deficient equipment.

Materials of Construction:

All structural steel components are constructed from G-235 (Z700 metric) hot-dip galvanized steel protected with a thermosetting hybrid polymer. The areas of the cold water basin in contact with the water will be constructed of Type 304 stainless steel. All factory seams in the cold water basin will be welded to ensure watertight construction and shall be warranted against leaks for a period of five (5) years from date of shipment. Cold water basin includes a depressed section with drain/clean-out connection and the area under the fill sections is sloped toward the depressed section for easy cleaning. Hot water distribution basins are gravity type constructed of heavy gauge, Type 304 stainless steel. The unit is supplied with a weir dam in each hot water basin to accommodate water flow rates down to 50% of the design flow. Polypropylene metering orifices are provided to assure even distribution of water over the wet deck surface. Heavy gauge, Type 304 stainless steel covers are furnished to prevent the accumulation of debris and algae in the hot water distribution basins.
The thermosetting hybrid polymer applied by Baltimore Aircoil Company consists of: 1) G-235 (Z700 metric) hot-dip galvanized steel components 2) parts prepared in a four-step (clean, pretreat, rinse, dry) process 3) electrostatically sprayed thermosetting hybrid polymer, fuse bonded to the hot-dip galvanized substrate during a thermally activated curing stage 4) quality assurance inspection program including 23 steps throughout polymer application and unit fabrication.

Fan Type:

The unit is supplied with Whisper Quiet Fans to reduce sound levels. The fan is driven by the BALTIDRIVE Power Train. This drive system consists of cast aluminum sheaves located on minimum shaft centerline distances. A premium efficient fan motor provides maximum performance and is backed by BAC's comprehensive 5-year motor and fan drive warranty.

Fan Guard:

A heavy gauge, hot-dip galvanized steel wire fan guard is provided over the fan cylinder. The fan guard is shipped loose for field installation.

Fill:

The BACross® Fill and integral drift eliminators are formed from self-extinguishing (per ASTM D-568) polyvinyl chloride (PVC), having a flame spread rating of 5 per ASTM Standard E84-77a, and are impervious to rot, decay, and fungus or biological attack. The fill is elevated above the

cold water basin floor to facilitate cleaning. This fill is suitable for a maximum entering water temperature of 130°F (54.44°C). The eliminators are designed to effectively strip entrained moisture from the leaving airstream with a minimum of air resistance.

Equipment Structure:

The structure of this equipment has been designed, tested and independently certified in accordance with the wind and seismic load requirements of the 2012 International Building Code (IBC) and ASCE/SEI 7-10. Seismic qualification is based on tri-axial shake-table testing conducted at an independent test laboratory in accordance with the ICC-ES Acceptance Criteria AC 156, "Acceptance Criteria for Seismic Qualification By Shake-Table Testing of Nonstructural Components and Systems." For more information and specific wind and seismic load capacity ratings, please see the Certificate of Wind and Seismic Load Capacity.

Water Inlet(s):

Hot water inlet flange pattern connection, suitable for ASME Class 150 flat face flanges, located at the top of the designated cell(s).

Water Outlet(s):

The unit is provided with a bolt hole pattern(s) for mating with an ASME Class 150 flat face flange. The bolt hole pattern is located in the depressed area of the cold water basin and appropriately sized for design flow. The flat face flange, full face gasket, and hardware are supplied and installed by others. Also included is a large area, lift out strainer which matches the cold water basin material of construction and has perforated openings sized smaller than the water distribution nozzle orifices. Strainer includes anti-vortexing baffle to prevent air entrainment. Please see the submittal package for the connection size.

Equalizer Connection:

The unit will be provided with a bottom equalizer connection. Please see the submittal drawing package for the size and location of the connection.

Flume Box Options:

The unit(s) are provided less flume box.

Basin Water Level Control:

Each cell is provided with a probe-type electric water level control package including solid-state relay, electrode head, stainless steel electrodes, and a solenoid valve in the make-up water connection. The electrodes are make-up on, make-up off, high level alarm, low level alarm, and ground. Field wiring is by others.

Basin Sweeper Piping:

Polyvinyl chloride (PVC) sump sweeper piping is included in the cold water basin. Supply and return connections are provided for connecting to a user supplied filtration system. 20 psig (135 kPa) pressure is required at the water inlet.

Vibration Cutout Switch:

Fan system is provided with a vibration cutout switch to limit damage to the unit in the event of a high vibration condition. The vibration switch is solid state with a frequency range of 2 to 1,000 Hz (120 to 60,000 RPM), a velocity set point of 0.1 to 1.5 In./Sec., and a time delay adjustable from 2 to 15 seconds. Input power required is 110 V, 50/60 Hz, 3 Watts plus alarm current. Alarm or shutdown switch is rated at 5 Amperes, 110 VAC TRIAC. Field wiring is by others.

Air Intake Option:

Sound attenuators are provided for the air intake. The intake attenuators consist of fiberglass acoustical baffles encased in G-235 (Z700 metric) hot-dip galvanized steel protected with a Thermosetting Hybrid Polymer.

Air Discharge Option:

Sound attenuators are provided for the air discharge. The discharge attenuators consist of fiberglass acoustical lining encased in a G-235 (Z700 metric) hot-dip galvanized steel straight discharge hood(s) protected by a Thermosetting Hybrid Polymer. A heavy gauge, 1" X 1", hot-dip galvanized steel screen is provided over the galvanized steel discharge sound attenuator.

Hot Water Basin Handrail and Ladder Package:

Reinforced galvanized steel hot water basin covers, an aluminum ladder, galvanized steel safety cage, galvanized steel safety gate, and 1-1/2" (38 mm) x 1-1/2" (38mm) square hot dip galvanized steel tube safety railing are provided to allow access to the top of the unit and enabling inspection to the spray distribution. Field assembly and installation is by others. This option meets pertinent OSHA standards.

Internal Access Option:

The unit has access doors on both ends, a service platform with galvanized steel supports protected by a Thermosetting Hybrid Polymer, an internal aluminum ladder with galvanized steel supports protected by a Thermosetting Hybrid Polymer, a galvanized steel hinged safety gate and

an internal walkway matching the unit material of construction enabling maintenance of the mechanical equipment. All components meet pertinent OSHA standards. Field assembly and installation required.

BALTIMORE AIRCOIL COMPANY

Terms and Conditions of Sale

Pricing: Prices set forth in Seller's quotation shall remain firm for thirty (30) days. Within such period, the quotation shall convert into an order provided that all of the following have occurred: (1) Buyer submits either a purchase order or a copy of Seller's quotation displaying an authorized signature of Buyer within that thirty (30)-day period; (2) Buyer provides a release for fabrication; and (3) Buyer requests a shipment date that is no later than twelve (12) weeks from the date of Buyer's submission of a purchase order or signed quotation. In the event Buyer's requested shipment date is later than twelve (12) weeks beyond such submission date, Seller's price in effect twelve (12) weeks prior to such shipment date shall apply. In the event that Buyer requests for its convenience that Seller delay delivery of products subject to an order beyond the scheduled shipment date, pricing shall be subject to the same adjustment.

Payments: Terms of payment shall be net cash in thirty (30) days from date of invoice, subject to Seller's prior credit approval. If the Buyer shall fail to make any payments in accordance with the terms and conditions of sale, the Seller, in addition to its other rights and remedies but not in limitation thereof, may, at its option, without prior notice, cancel this order as to any undelivered products or defer shipments or deliveries hereunder, or under any other agreement between Buyer and Seller, except upon Seller's receipt of cash before shipment or such security as Seller considers satisfactory. Seller reserves the right to impose an interest charge (not exceeding the lawful maximum) on the balance of each invoice not paid on its due date for the period from the due date to the date of receipt of payment by Seller. In the event Buyer's failure to make timely payments to Seller results in Seller incurring additional costs, including but not limited to collection expenses and attorneys' fees, said costs shall be added to the amount due Seller from Buyer. Buyer shall have no right to any discount or retainage and shall not withhold payment as a set-off on Seller's invoice in any amount.

Taxes: Unless listed on the front (reverse) side of this document, prices do not include any federal, state or local sales, use or value-added taxes payable in connection with this order. All such taxes shall be paid by Buyer. Buyer shall indemnify Seller from and against such taxes, plus interest and penalties thereon, including, but not limited to, tax, interest and penalties resulting from a failure to collect such taxes because of Seller's reliance upon an invalid exemption certificate provided to Seller.

Allocation of Risk: Deliveries shall be considered made Ex-works BAC Factory. At such time, title to the goods and all risk of loss, or damage shall pass to Buyer.

Force Majeure: Seller shall under no circumstances be liable for any loss or damage resulting from delay or failure in the performance of its obligations under this contract to the extent that such performance is delayed or prevented by: fires, floods, war, terrorist activities, riots, strikes, freight embargoes or transportation delays, shortage of labor, inability to secure fuel, material, supplies or power at current prices, or on account of shortages thereof; acts of God or of the public enemy; any existing or future laws or acts of the federal, state or local government (including specifically, but not exclusively, any orders, rules or regulations issued by any official or agency of any such government) affecting the conduct of Seller's business with which Seller in its judgment and discretion deems it advisable to comply as a legal or patriotic duty, or to any case beyond the Seller's reasonable control.

Warranties: Seller warrants that the equipment sold under this contract shall be free from defects in material and workmanship for a period of twelve (12) months from the date of equipment startup or eighteen (18) months from the date of shipment, whichever occurs first. The following original equipment components only are warranted against defects in materials and workmanship for a period of five (5) years from date of shipment: fans, fan shafts, fan motors, bearings, sheaves, gearboxes, driveshafts, couplings, and mechanical equipment support. Details of option-specific warranties follow:

Welded 304 Stainless Steel Cold Water Basins are warranted against leaks for a period of five (5) years from date of shipment. Only leaks from the factory seams of the cold water basin are covered; this warranty does not apply to cold water basin field connections, field installed options or modifications by others.

Original Equipment Fan Motors are warranted against defects in materials and workmanship for a period of seven (7) years from date of shipment when space heaters are field-wired at time of initial installation per the motor nameplate.

Replacement Parts provided by Seller under its original equipment warranty obligations are warranted against defects in materials and workmanship for a period of twelve (12) months from date of shipment or until expiration of their original warranty, whichever occurs first. Parts purchased after expiration of the original equipment warranty are warranted against defects in materials and workmanship for a period of twelve (12) months from date of shipment.

Written notice of any defect shall be given to Seller immediately upon discovery by Buyer, and shall fully describe the claimed defect. Defective parts shall be repaired or replaced F.O.B. point of shipment, provided that inspection by Seller verifies the claimed defect(s). This shall be Buyer's exclusive remedy. **This warranty does not cover the costs of removing, shipping or reinstalling the equipment. Repairs made without the prior written approval of Seller shall void all warranties covering material and workmanship.** Any descriptions of the product(s) in the contract are for the sole purpose of identification and do not constitute a warranty. In the interest of product improvement, Seller reserves the right to change specifications and product design without incurring any liability therefore. The foregoing express warranties or those set forth elsewhere on this document are the only warranties of Seller applicable to the product(s) sold under this contract. **All other warranties, whether verbal or written, and all warranties implied by law, including any warranties of merchantability or fitness for a particular purpose, are hereby excluded. Failure on the part of Buyer or of other parties to properly maintain the product(s) sold under this contract, or the operation of such product(s), by Buyer and/or other parties under conditions more severe than those for which such product(s) were designed, shall void all warranties covering materials and workmanship. Seller's warranties do not apply to defects in product(s) for which payment in full has not been received by Seller, and said warranties do not cover normal wear and tear or the erosion, corrosion and/or deterioration of the product(s) from unusual causes. No warranties by Seller shall apply to accessories manufactured by others,** inasmuch as they are warranted separately by their respective manufacturers, except as stated above. Buyer

assumes liability for and shall bear the costs of compliance with all laws, regulations, codes standards or ordinances applicable to the location, operation and maintenance of the product(s) sold under this contract, including those requirements pertaining to the distances between such product(s) and air-conditioning system duct intakes. No representative or agent of Seller is authorized to enlarge upon the express warranties of Seller.

Cancellation/Changes/Returns: Cancellation of or changes in any order by Buyer shall not be effective without Buyer's notice thereof received, agreed to, and confirmed in writing by Seller. If Seller, in its absolute discretion, approves Buyer's cancellation of an order, Buyer agrees to pay a reasonable cancellation charge. Seller's prior written consent must be obtained before Buyer returns any products, and when so returned will be subject to a handling charge and transportation costs payable by Buyer.

Liability/Indemnification: Seller shall not be liable for any damages caused by delay in delivery of the products. Buyer shall hold harmless and indemnify Seller from and against all liability, claims, losses, damages, and expenses (including attorneys' fees) for personal injury and property damage arising out of Buyer's improper unloading, handling, or use of the products subject to this order, and for Buyer's infringement of another's property rights. The Seller's maximum liability from any causes whatsoever, whether in breach of contract, tort (including negligence), strict liability, or otherwise, shall not exceed the contract price. Neither Buyer nor Seller shall in any event be liable to the other, whether such liability arises out of breach of contract, tort (including negligence), strict liability or any other cause or form of action, for any consequential, special, indirect or incidental damages, including but not limited to loss of actual or anticipated profits or loss of use arising out of this contract, other than such damages resulting from the willful misconduct of Buyer or Seller.

Storage: In the event that Buyer is unable to accept delivery of goods and the Seller is required to hold goods beyond two (2) working days from fabrication completion, a storage fee equal to the greater of $200/day or 0.20% of the total order value/day will be assessed by Seller for every day beyond two (2) working days from fabrication date which it is required to store goods on behalf of Buyer. Storage will be assessed monthly and will need to be paid in full prior to a new shipment date being scheduled.

Government Contracts: If Buyer's purchase order is for products to be used in the performance of a U.S. Government contract, those clauses of applicable procurement regulations mandatorily required by federal law to be included in U.S. Government subcontracts shall be incorporated herein by reference.

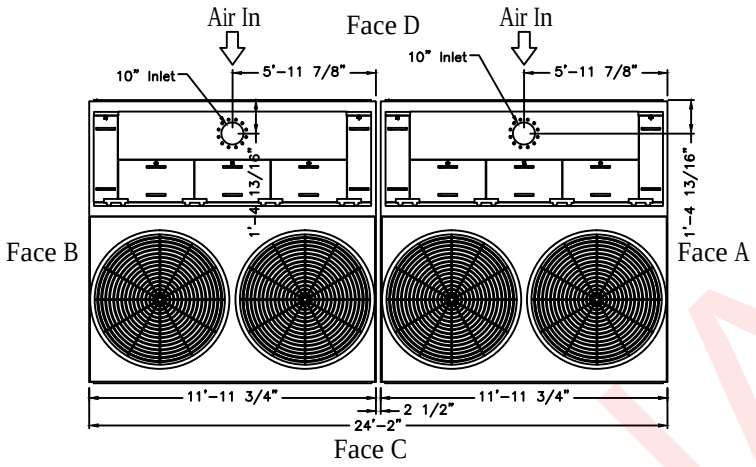
Export Transactions: Buyer shall comply with all applicable export laws and regulations of the U.S. Government, and shall hold harmless and indemnify Seller from and against all liability, damages, and expenses (including attorneys' fees) incurred by Seller as a result of Buyer's violation of any U.S. Government export and/or international antiboycott laws or regulations. Buyer certifies that it will be the recipient of the products to be delivered by seller. Buyer acknowledges that products are subject to export/import control laws of various countries, including the Export Administration Regulations of the United States. Products sold by seller cannot be transferred, sold or re-exported to any party on the Entity List or Restricted Persons list of the US Department of Commerce Bureau of Industry and Security, any party designated by the US Treasury Department Office of Foreign Asset Control and any party debarred or sanctioned for proliferation or terrorism reasons by the US State Department.

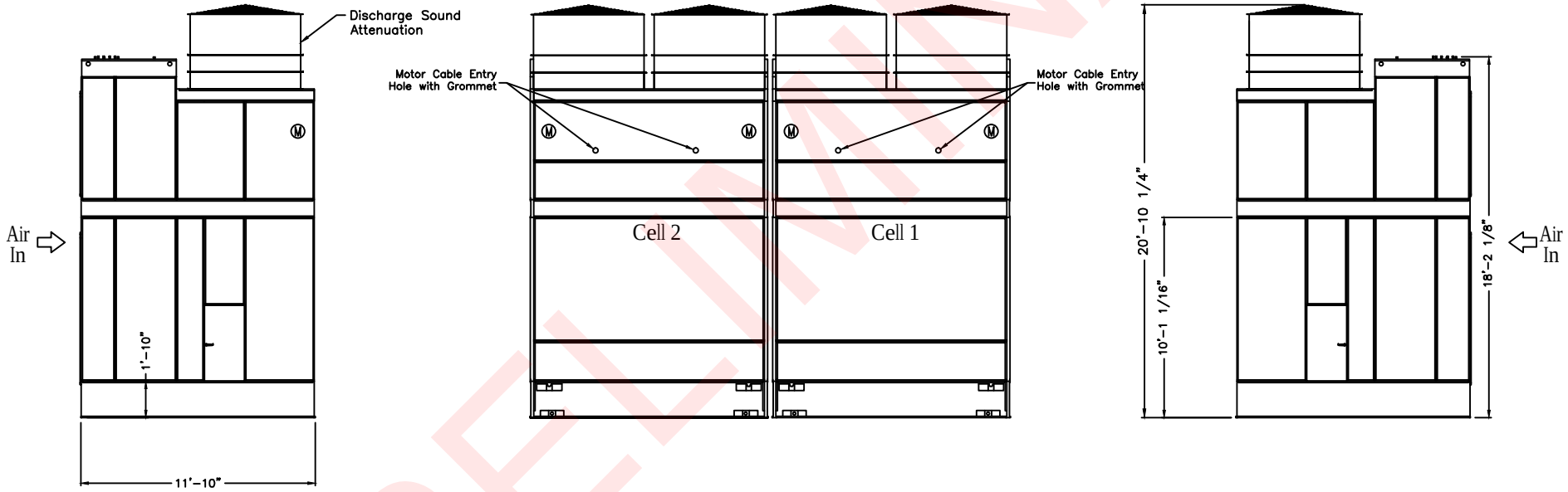
Agreement of Sale: Buyer's order is accepted on the terms and conditions stated herein and Seller's acceptance of Buyer's order is expressly made conditional upon Buyer's assent to such terms and conditions, including any of Seller's terms and conditions which may be additional to or different from those contained in Buyer's purchase order or otherwise. Such assent shall be deemed to have been given unless written notice of objection to any such terms and conditions (including inconsistencies between Buyer's purchase order and this acceptance) is given by Buyer to Seller promptly upon receipt of this acknowledgment. Any agreement or understanding, oral or written, which modifies or waives the terms and conditions herein (whether contained in Buyer's purchase order or other documentation) shall be deemed material and shall be rejected unless hereafter agreed to in writing and signed by Seller's authorized officer. Waiver by Seller of any breach or default hereunder shall not be deemed a waiver by Seller of any other or subsequent breach or default which may thereafter occur. Neither the rights nor the obligations of either Buyer or Seller are assignable without the prior written consent of the other party. This agreement of sale and all rights and obligations of Buyer and Seller shall be governed by and construed in accordance with the laws of the State of Maryland.

Electronic copy of the latest version is available online at http://baltimoreaircoil.com/english/terms. (Revised – **11/05/2021**)

Data Version 0.00
DWG Version 1.72

Notes
1) All dimensions are in feet and inches. Weights are in pounds and include options and accessories.
2) Unless otherwise indicated, pan connections 3" and smaller are MPT. Pan Connections 4" and larger are grooved to suit a mechanical coupling and beveled for welding. The inlet is a studded bolt circle designed to mate with an ASME class 150 flat face flange with studs straddling transverse and longitudinal centerlines. The flat face flange and full face gasket are to be furnished by others for mating with the unit. Make-Up connection is FPT.
3) Field piping should be fabricated at time of installation. Pre-fabrication of pipe work is not recommended.
4) Do not support piping from unit connections. All necessary piping supports to be supplied by others.
5) For weight loadings and support requirements, refer to the suggested unit support drawing.
6) The area above the fan discharge must be unobstructed.
7) Due to height limitations on truck shipments, some items shown may ship loose for field installation.
8) Dimension to the top of the fan guard reflect all additional cowl extensions.
9) Conduit must be water tight and pitched downward to allow condensation to drain away from fan motor conduit box. Therefore, do not run the conduit through fan deck.





Model Number	Shipping Weight	Operating Weight	Heaviest Section
S15E-1212-12MN-2/W	28398	47406	6675

RH&LH

ORDER NO: Q22001197603

DATE: 3/1/2022 1:15:51 PM ConfigVer=35

BALTIMORE AIRCOIL COMPANY

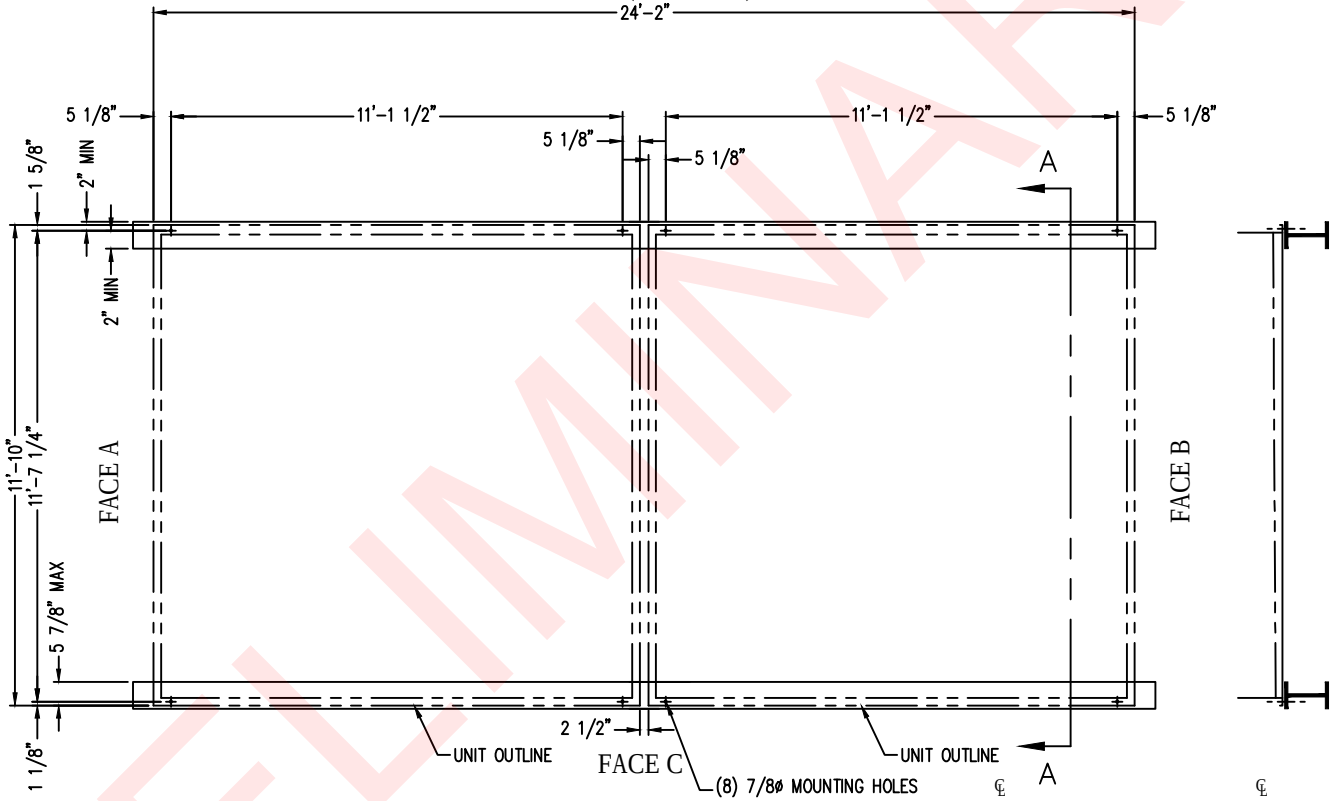
Series 1500 2 Cell Unit Print

DRAWING NUMBER:
UP-Q22001197603

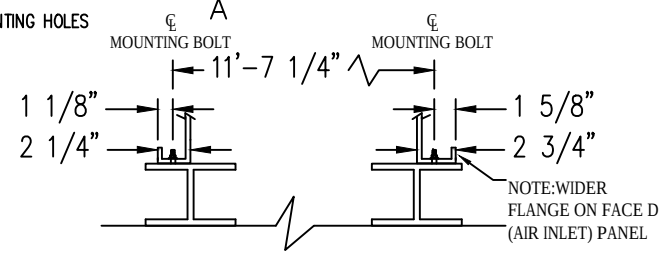
Data Version 1.08
DWG Version 1.20

Notes
1) Each beam should be designed, as a minimum, for 65% of the total unit operation weight applied as a uniformly distributed load.
2) All dimensions are in feet and inches. Weights are in pounds and include options and accessories.
3) Operating weight and weight loading are for units with water level in basin at overflow.
4) Unit support beams and anchor bolts to be designed and furnished by others.
5) Support beams must be flush and level at top.

PLAN VIEW
FACE D (AIR INLET)



FACE B ELEVATION



SECTION "A-A"

PLAN "A" STEEL

Model Number	Shipping Weight	Operating Weight	Heaviest Section
S15E-1212-12MN-2/W	28398	47406	6675

ORDER NO: Q22001197603

DATE: 3/1/2022 1:16:13 PM ConfigVer=35

BALTIMORE AIRCOIL COMPANY

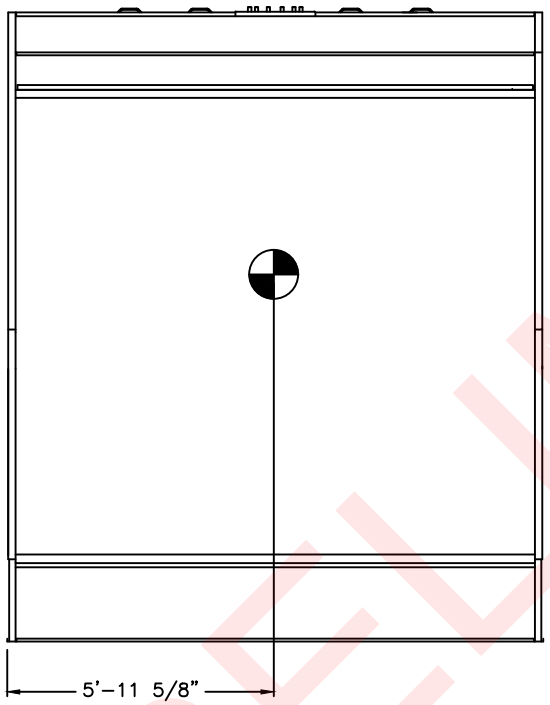
Two Cell Unit Support

DRAWING NUMBER:
SS-Q22001197603

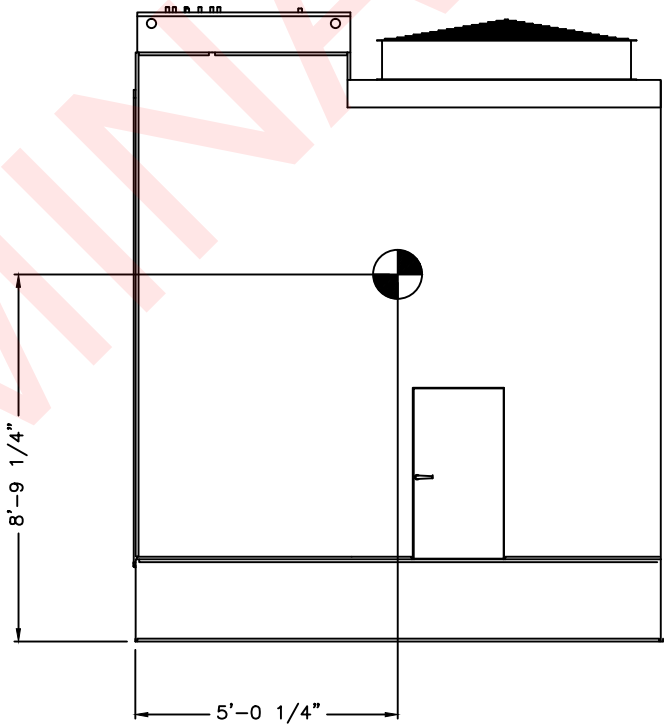
Notes

1) Drawings are not to scale.

2) Accessory weights shown above are included in the total unit Operating, Shipping and Heaviest Section values located on the Unit Print and Unit Support drawings. Ladder and cage weights are not shown above but are included in the totals. These accessories ship loose for field assembly and installation.



Face D
(Air Intake Side)

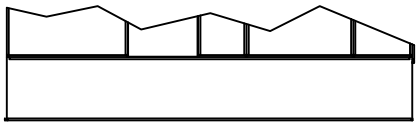


Face B

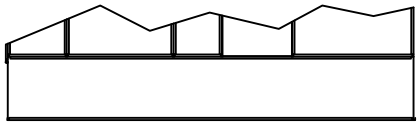
ORDER NO: Q22001197603	BALTIMORE AIRCOIL COMPANY	Series 1500 Center of Gravity
DATE: 3/1/2022 1:24:34 PM ConfigVer=35		DRAWING NUMBER: CG-Q22001197603

Data Version 0.00
DWG Version 1.96

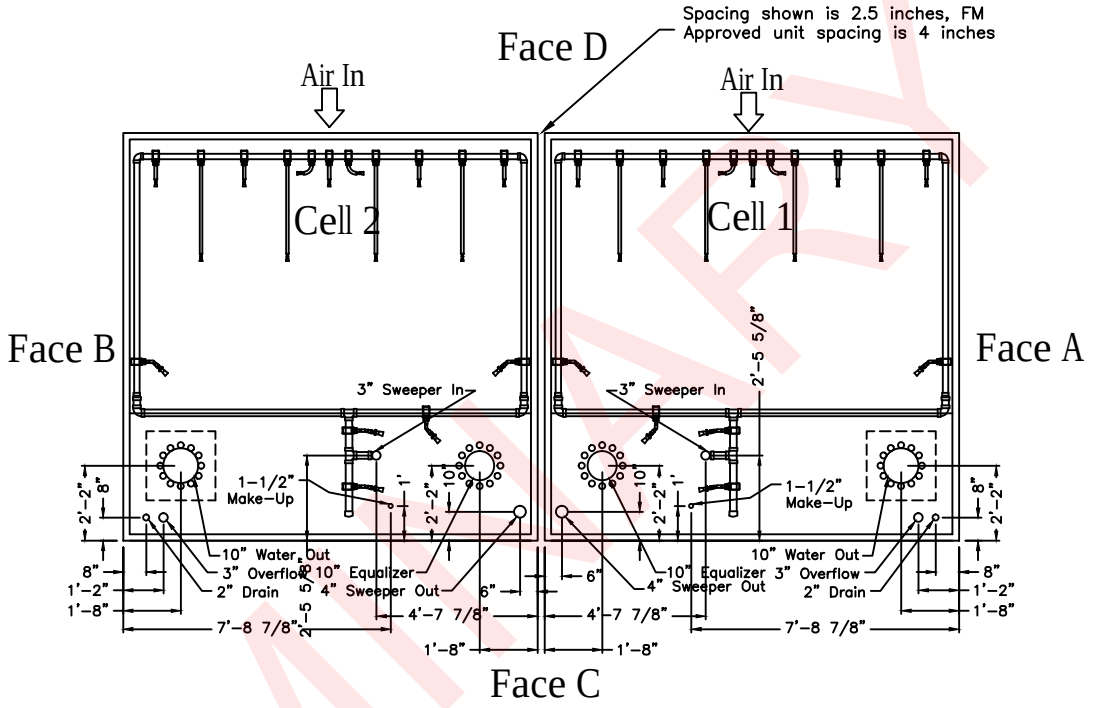
Notes
1) Drawings are not to scale.
2) Unless otherwise indicated, connections 3" and smaller are MPT. Connections 4" and larger are grooved to suit a mechanical coupling and beveled for welding.
3) Field piping should be fabricated at time of installation. Pre-fabrication of pipe work is not recommended.
4) Do not support piping from unit connections. All necessary piping supports to be supplied by others.
5) Bolt hole patterns are drilled to mate with an ASME Class 150 flat face flange with holes straddling transverse and longitudinal centerlines. The flat face flange and full face gasket are to be furnished by others for mating with the unit.
6) Field piping should be fabricated at time of installation. Pre-fabrication of pipe work is not recommended.

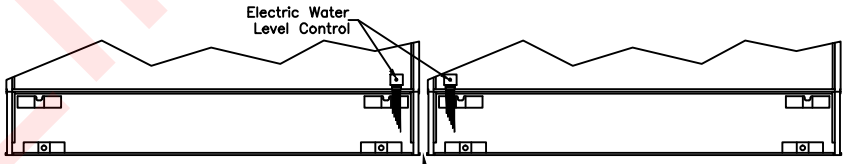


Face A



Face B





Face C

Spacing shown is 2.5 inches, FM Approved unit spacing is 4 inches

SWEEPER PIPING FLOW RATES	
DESIGN PRESSURE	DESIGN FLOW RATE PER CELL
20 psi	117 GPM

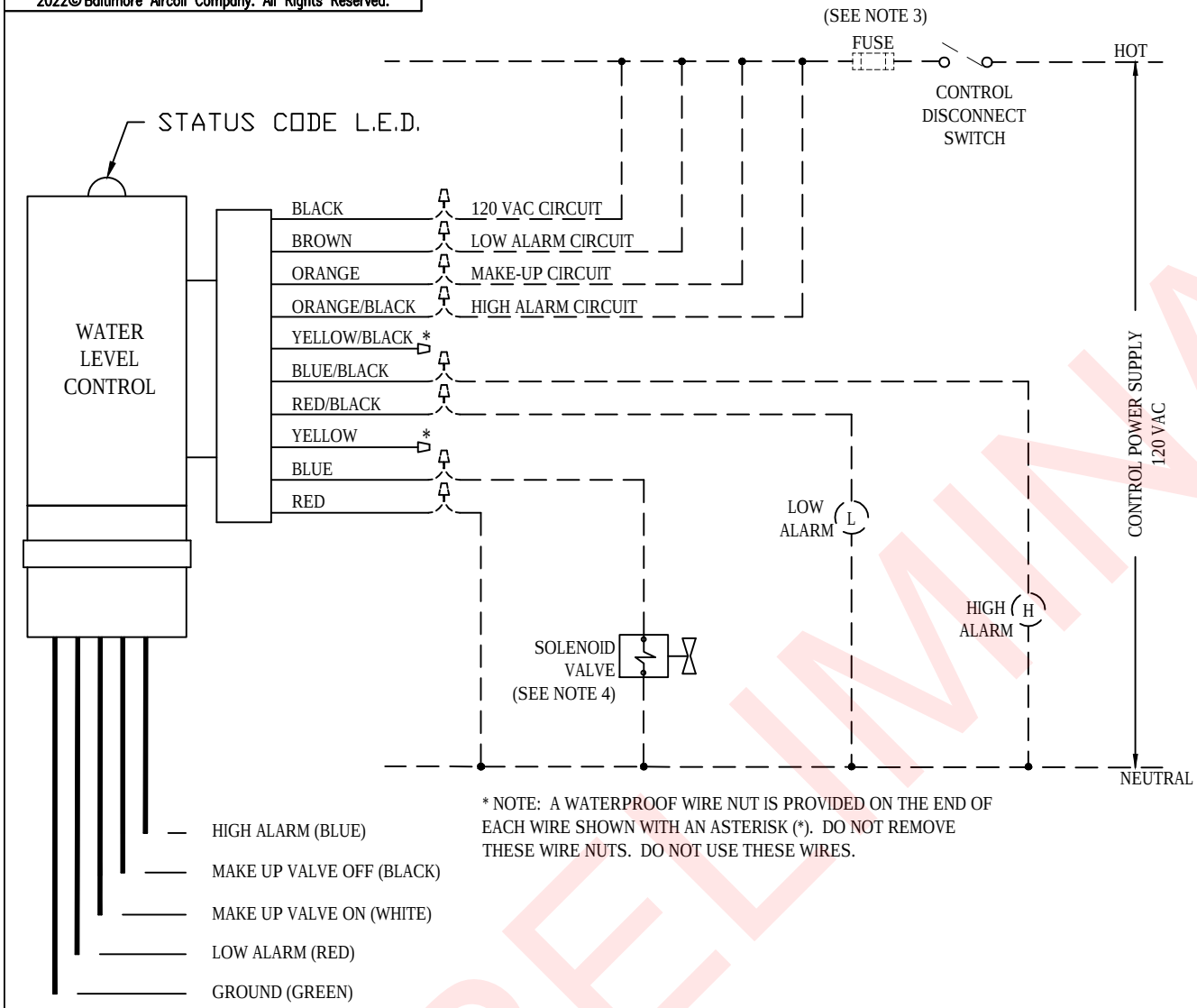
ORDER NO: Q22001197603

DATE: 3/1/2022 1:19:41 PM ConfigVer=35

BALTIMORE AIRCOIL COMPANY

Two Cell Basin Connections

DRAWING NUMBER:
BC-Q22001197603



* NOTE: A WATERPROOF WIRE NUT IS PROVIDED ON THE END OF EACH WIRE SHOWN WITH AN ASTERISK (*). DO NOT REMOVE THESE WIRE NUTS. DO NOT USE THESE WIRES.

NOTES:

1. WIRING AND COMPONENTS INDICATED BY DASHED LINES ARE TO BE SUPPLIED BY FIRMS OTHER THAN BAC. ALL WIRING MUST COMPLY WITH APPLICABLE CODES AND ORDINANCES.

2. THE WATER LEVEL CONTROL BOARD IS WIRED IN THE INVERSE MODE SO THAT THE SOLENOID MAKE-UP VALVE WILL CLOSE IF THERE IS A LOSS OF POWER TO THE CONTROL BOARD. WHEN THE WATER LEVEL RISES TO THE BOTTOM OF THE MAKE-UP VALVE OFF PROBE AND MAINTAINS CONTACT FOR AT LEAST 6 SECONDS, THE CONTROL DE-ENERGIZES THE VALVE. THE VALVE REMAINS DE-ENERGIZED UNTIL THE WATER LEVEL RECEDES BELOW THE BOTTOM OF THE MAKE-UP VALVE ON PROBE AND REMAINS AT THAT LEVEL FOR AT LEAST 6 SECONDS. THE CONTROL THEN ENERGIZES THE VALVE.

3. ANY INCOMING POWER SOURCE MUST HAVE A 3A FUSE FOR COMPONENT PROTECTION. USING A FUSE OVER 3A WILL VOID BAC WARRANTY.

4. THE SOLENOID ACTUATED MAKE-UP VALVE IS RATED AT 6.1 WATTS, 16 VA HOLDING, 30 VA INRUSH.

5. THE NORMALLY CLOSED SOLENOID VALVE HAS A SLOW CLOSING FEATURE WHICH MINIMIZES WATER HAMMER AND IS DESIGNED TO OPERATE AT MAKE-UP WATER LINE PRESSURES OF 10 TO 125 PSIG. TO FURTHER MINIMIZE THE POTENTIAL FOR WATER HAMMER, MAKE-UP WATER LINE PRESSURES AT THE HIGHER END OF THE RANGE SHOULD BE AVOIDED, AND MAKE-UP PIPING SHOULD BE WELL SUPPORTED.

6. ~~INTERLOK IMMERSION HEATERS WITH CIRCULATING PUMP TO DE-ENERGIZE HEATERS WHEN PUMP IS RUNNING.~~

7. CONTROL THERMOSTAT IS TO BE SET FOR 40ÁF. DO NOT SET THERMOSTAT LOWER THAN 40ÁF.

8. A STRAINER IS REQUIRED BEFORE THE SOLENOID MAKE-UP VALVE

L.E.D. STATUS CODES:

1. L.E.D. ON STEADY:
INDICATES NORMAL OPERATION
2. STEADY ONE SECOND FLASHING:
DIRTY PROBES - OVERRIDES ALL OTHER STATUS CODES
3. TWO FLASHES AND OFF FOR 5 SECONDS:
MAKE-UP ON FOR MORE THAN 1 HOUR
4. THREE FLASHES AND OFF FOR 5 SECONDS:
SHORTED OR HIGH CONDUCTIVITY WATER
5. FOUR FLASHES AND OFF FOR 5 SECONDS:
SHORT FILL CYCLE - WHITE PROBE IS DIRTY OR NONFUNCTIONAL
6. L.E.D. DOES NOT COME ON AFTER POWER UP OR RESETTING POWER: INDICATES UNIT INOPERATIVE

ORDER NO: Q22001197603

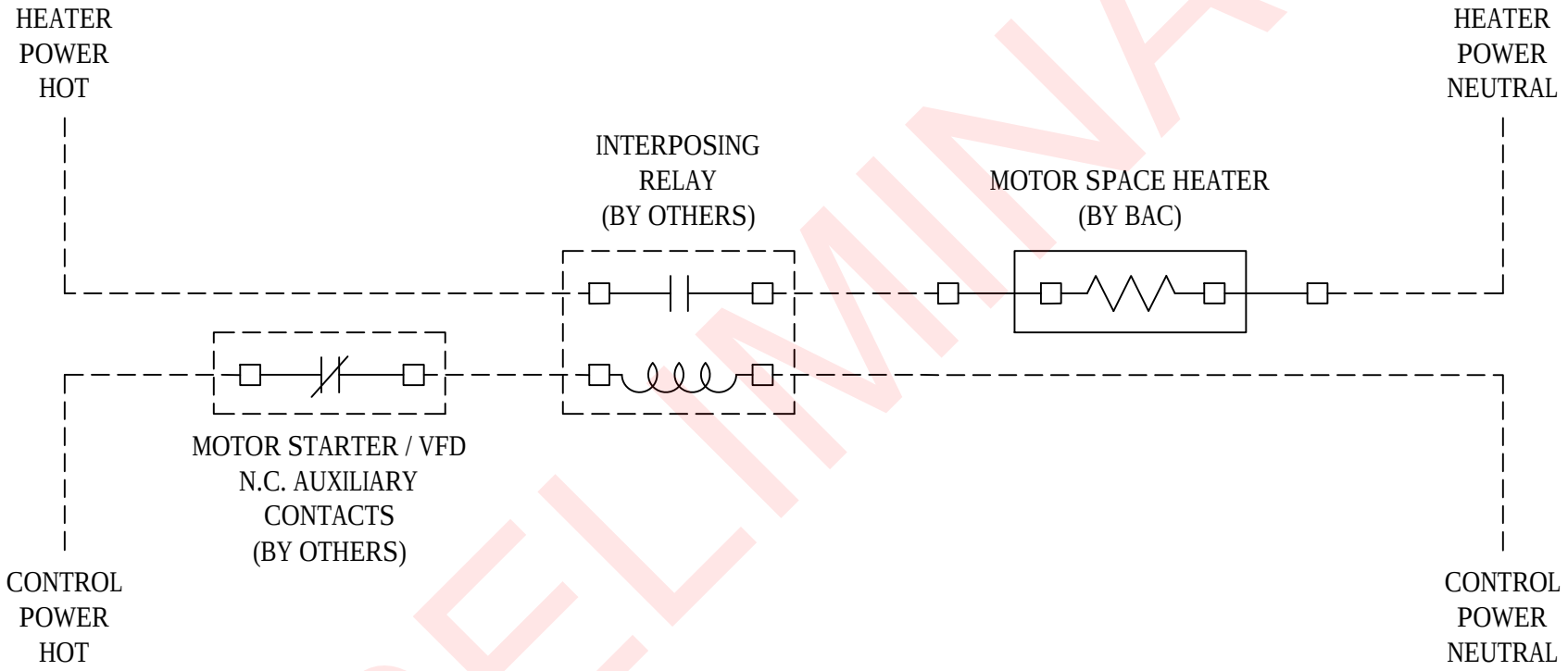
DATE: 3/1/2022 1:30:12 PM ConfigVer=35

BALTIMORE AIRCOIL COMPANY

EWLC Wiring
High & Low Alarm

DRAWING NUMBER:
EW-Q22001197603

Notes
1) Motor Heater should only be energized when the fan is stopped (0% fan speed).
2) Interposing relay must be sized per the heater power consumption.
3) Heater sizes shown below are maximum values. Refer to the motor nameplate for final power requirements.
4) General heater wiring details shown, see diagram on motor for specific details.
5) All wiring must comply with all codes and standards applicable for the installed jurisdiction, which may include requirements for additional disconnects, over current protection, and/or other safety devices.
6) Dashed lines represent field supplied wiring.
7) Space heater wiring leads may be located in either the main outlet box, or an auxiliary box if so equipped.



For units that ship from the US, heaters are 110-120 VAC/ 50 or 60 Hz based on motor configuration.
For units that ship from China, heaters are 200-240 VAC/ 50 or 60 Hz based on motor configuration.

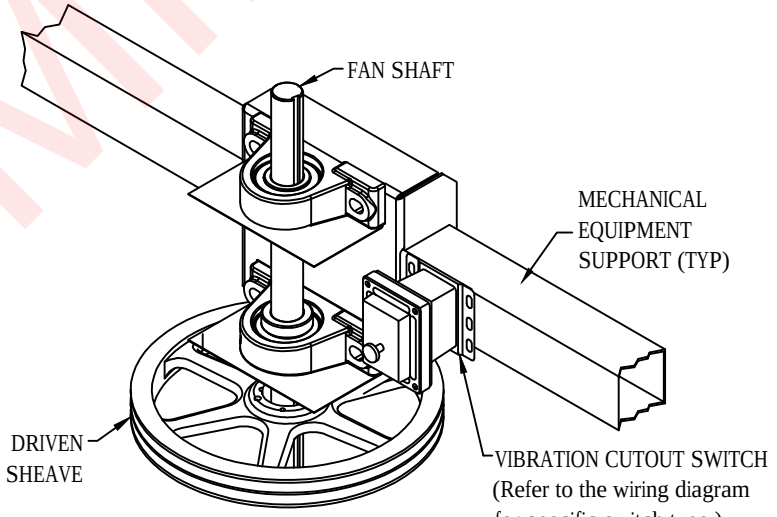
ORDER NO: Q22001197603	BALTIMORE AIRCOIL COMPANY	Fan Motor Space Heater Wiring Schematic - General
DATE: 3/1/2022 1:24:48 PM ConfigVer=35		DRAWING NUMBER: SW-Q22001197603

OPERATING INSTRUCTIONS:
Follow the installation drawings and wiring diagram to ensure the proper operation of the vibration switch. Direct any questions to your local BAC Representative.

NOTE:
Moisture inside the switch can lead to switch failure. Care must be taken when replacing the cover on the vibration switch to ensure that the proper watertight seal is obtained.

CAUTION:
Before performing any maintenance, adjustment or inspection of the switch, make certain that all power has been disconnected and locked in the off position.

SWITCH LOCATION

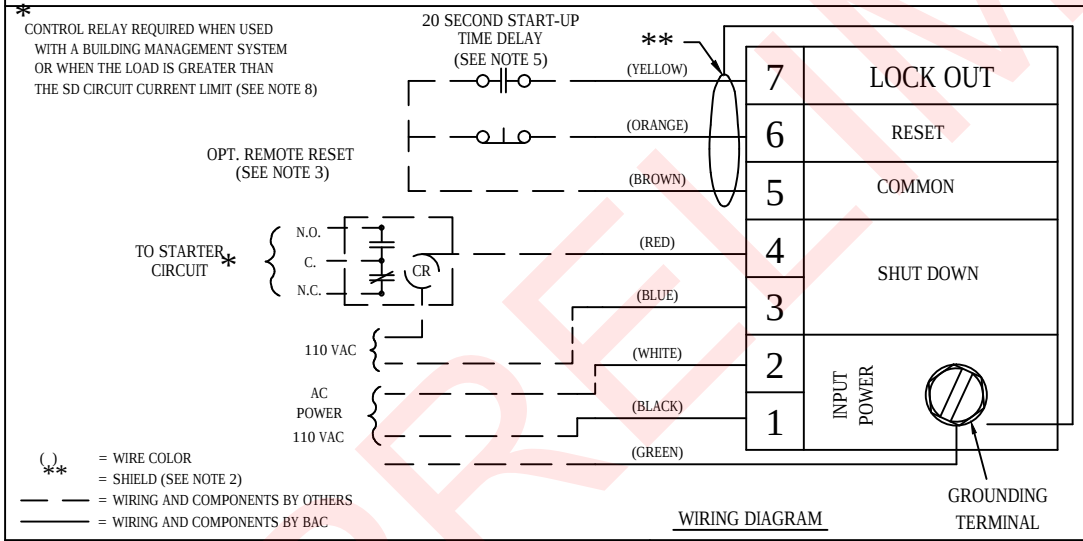


NOTES:

1. THE VIBRATION CUTOUT SWITCH TIME DELAY AND VIBRATION LEVELS HAVE BEEN FACTORY SET AT TYPICAL VALUES FOR EVAPORATIVE COOLING EQUIPMENT. SHOULD ADJUSTMENT FROM THESE SETTINGS BE NECESSARY, PLEASE REFER TO THE OPERATING INSTRUCTIONS. (DRAWINGS BAC-10876, BAC-10877, BAC-10878, OR BAC-11489).
2. THE VIBRATION SWITCH IS SHIPPED FROM THE FACTORY WITH SHIELDED POWER CABLE PRE-WIRED INSIDE THE SWITCH FOR CONNECTION TO WIRING IN A JUNCTION BOX (BY OTHERS) OUTSIDE THE UNIT. THE WIRES FROM TERMINALS 5, 6, AND 7 ARE ENCLOSED IN A SHIELD. IF EXTERNAL WIRING FOR START-UP DELAY OR REMOTE RESET IS USED (BY OTHERS), IT MUST BE SHIELDED AND THE SHIELD CONNECTED TO THE BAC SUPPLIED SHIELD. THIS SHIELD WIRE SHOULD NOT BE GROUNDED AT THE JUNCTION BOX.
3. IF A REMOTE RESET (R/R) IS DESIRED, A MOMENTARY NORMALLY CLOSED (N/C) CONTACT MUST BE PROVIDED BY OTHERS. THE REMOTE RESET IS ACTIVATED BY MOMENTARILY OPENING THE CONTACT BETWEEN TERMINALS 5 AND 6. AS SUPPLIED FROM THE FACTORY, TERMINALS 5 AND 6 ARE CONNECTED BY A WIRE NUT FOR LOCAL RESET.
4. THE SHUTDOWN (SD) RELAY IS FACTORY SET IN THE N/C POSITION. THE SD RELAY CAN BE FIELD ADJUSTED TO NORMALLY OPEN (N/O) BY MEANS OF A SLIDE SWITCH LOCATED UNDER THE TERMINAL STRIP INSIDE SWITCH ENCLOSURE. (SEE SHUTDOWN CIRCUIT CURRENT LIMIT NOTE).
5. THE VIBRATION SWITCH HAS A FIXED 20 SECOND START-UP TIME DELAY CAPABILITY. WHEN THE SWITCH IS WIRED SUCH THAT AC POWER IS ALWAYS APPLIED TO THE SWITCH, THE 20 SECOND TIME DELAY CAN BE ACTIVATED BY MEANS OF A MOMENTARY CONTACT CLOSURE BETWEEN TERMINALS 5 AND 7. THIS CONTACT CAN BE ACHIEVED BY A ONE SHOT RELAY(BY OTHERS) WIRED WITH THE STARTER CIRCUIT AS SHOWN. ALTERNATELY, WHEN THE VIBRATION SWITCH IS WIRED IN SUCH A WAY THAT THE SWITCH IS ONLY POWERED WHEN THE STARTER CIRCUIT IS POWERED, THE 20 SECOND TIME DELAY IS AUTOMATICALLY ACTIVATED WHEN THE POWER IS APPLIED TO THE SWITCH.
6. THE RUNNING TIME DELAY IS FACTORY SET AT 3 SECONDS AND CAN BE FIELD ADJUSTED FROM 1 TO 7 SECONDS. FOR FURTHER DETAILS SEE TIME DELAY SECTION OF THE OPERATING INSTRUCTIONS. 7. THE LIGHT-EMITTING DIODE (LED) IS ILLUMINATED WHEN THE VIBRATION LEVEL IS ABOVE THE TRIP SETTING. THE LED WILL REMAIN ILLUMINATED UNTIL THE UNIT VIBRATION LEVEL DROPS BELOW THE TRIP POINT.
8. A CONTROL RELAY IS REQUIRED IF THE SWITCH IS USED AS INPUT TO A BUILDING MANAGEMENT SYSTEM (N/O TRIAC CURRENT LEAKAGE IS 1 mA). THE RELAY COIL CURRENT MUST BE GREATER THAN 50 mA CONTINUOUS. A CONTROL RELAY IS ALSO REQUIRED FOR STARTER LOADS GREATER THAN 5 AMPS CONTINUOUS, 50 AMPS PEAK FOR 16 mS.
9. IF DESIRED, A SINGLE POLE, DOUBLE THROW CLASS C RELAY (1 POLE N/O, 1 POLE N/C) CAN BE USED IN THE SHUTDOWN CIRCUIT TO POWER AN ALARM (BY OTHERS) TO PROVIDE AN AUDIBLE OR VISUAL INDICATION OF VIBRATION TRIP AS WELL AS SHUTTING DOWN THE MOTOR.

WIRING OF VIBRATION CUTOUT SWITCHES ON UNITS WITH MULTIPLE MOTORS OR CUTOUT SWITCHES:

VIBRATION CUTOUT SWITCHES SHOULD BE WIRED TO SHUT OFF ALL MOTORS ON THE ASSOCIATED FAN DRIVE SYSTEM. THIS MAY REQUIRE WIRING MULTIPLE CUTOUT SWITCHES TO SHUT OFF A SINGLE MOTOR OR WIRING A SINGLE CUTOUT SWITCH TO SHUT OFF MULTIPLE MOTORS. CONTACT YOUR CONTROLS INTEGRATOR FOR DETAILS ON HOW TO WIRE MULTIPLE SWITCHES.

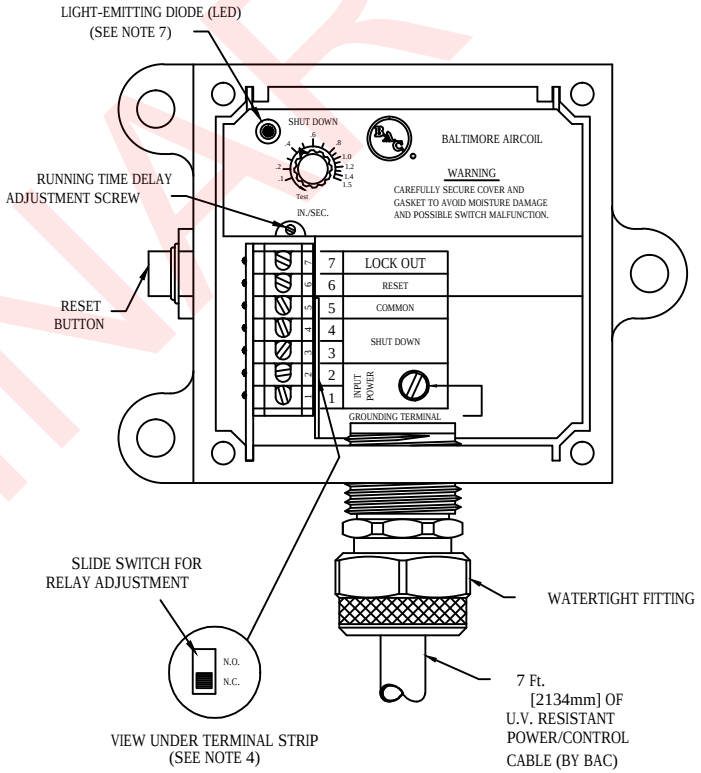


WIRING DIAGRAM

ELECTRONIC VIBRATION CUTOUT SWITCH

(W/WEATHER-PROOF COVER REMOVED)

(INTERNAL FACTORY PRE-WIRING NOT SHOWN FOR CLARITY)



SHUT DOWN CIRCUIT CURRENT LIMIT

THE SHUTDOWN RELAY IS RATED AT 5 AMPS CONTINUOUS, 50 AMPS PEAK FOR 16ms AT 110 VAC .

BEFORE PERFORMING ANY MAINTENANCE, ADJUSTMENT OR INSPECTION OF THE SWITCH, MAKE CERTAIN THAT ALL POWER HAS BEEN DISCONNECTED AND LOCKED IN THE OFF POSITION.

ORDER NO: Q22001197603

DATE: 3/1/2022 1:30:32 PM ConfigVer=35

BALTIMORE AIRCOIL COMPANY

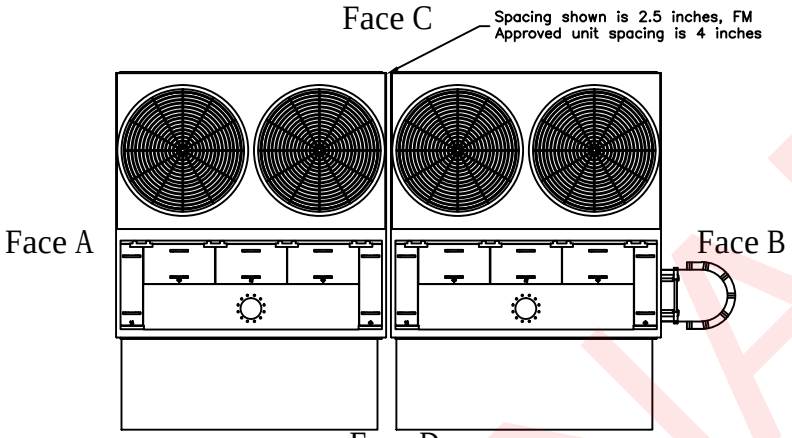
Electronic VCOS Wiring
Shut Off with Remote/Local Reset & Delay (110 VAC)

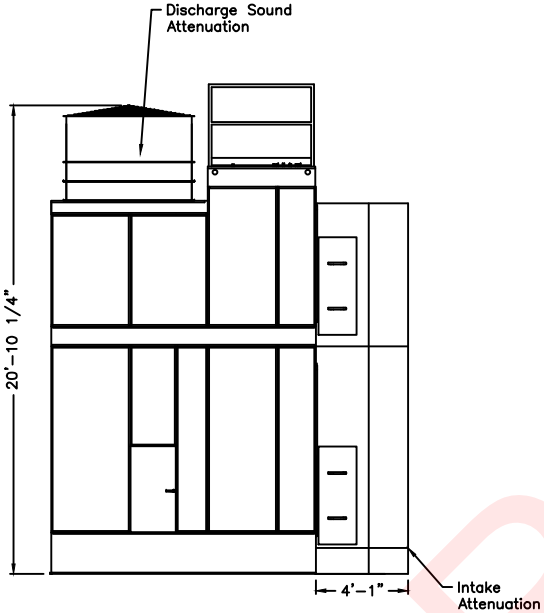
DRAWING NUMBER:
VW-Q22001197603

Data Version 0.00
DWG Version 1.56

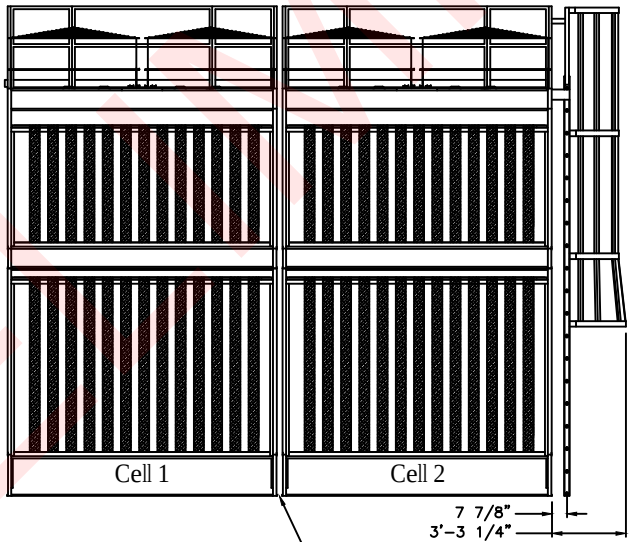
Notes
1) External unit access accessories ship loose for field installation (by others).
2) Field piping must be kept clear and supported independently of all unit access accessories.
3) Refer to OSHA and local occupational safety regulations to determine if safety cages are required.
4) Attenuation ships separately for field installation.

Plan View

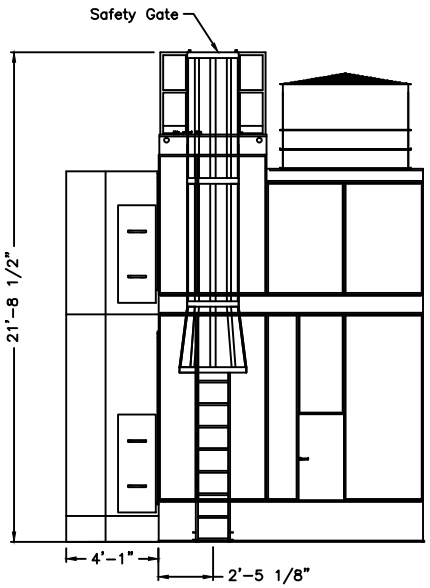




Face A



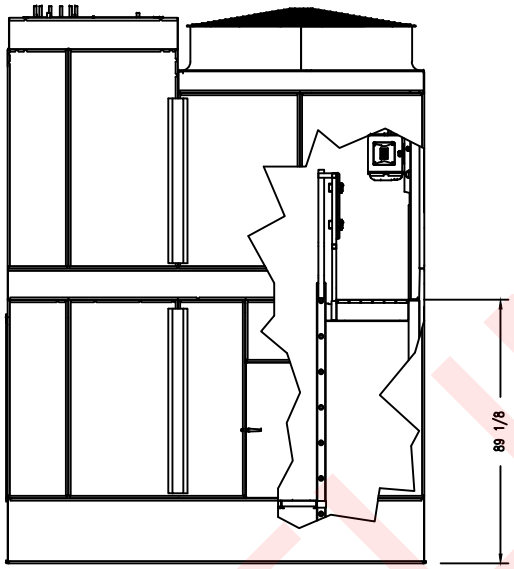
Face D



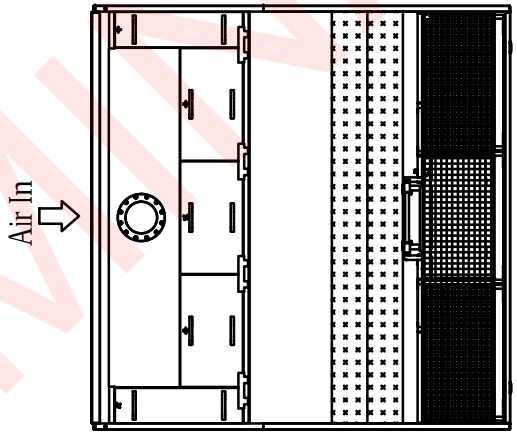
Face B

ORDER NO: Q22001197603	BALTIMORE AIRCOIL COMPANY	Series 1500 External Accesory
DATE: 3/1/2022 1:24:17 PM ConfigVer=35		DRAWING NUMBER: EA-Q22001197603

Notes
1) Service ladder, platform and accessories ship loose for field installation (by others).



Face B



Plan View

ORDER NO: Q22001197603	BALTIMORE AIRCOIL COMPANY	Internal Access
DATE: 3/1/2022 1:29:56 PM ConfigVer = 35		DRAWING NUMBER: IA-Q22001197603

Bell & Gossett
a xylem brand

Submittal

Job/Project:	**Representative:** Columbia Hydronics Corporation	
ESP-Systemwize: WIZE-30EFAD **Created On:** 01/27/2022	**Phone:** 360-883-2600	
Location/Tag: CP-1, CP-2, CP-3	**Email:** sales@columbiahydronics.com	
Engineer:	**Submitted By:**	**Date:**
Contractor:	**Approved By:**	**Date:**

Double Suction Split Case Pump

Series: e-HSC

Model: 8x10x9.5

Features & Design

- Ease of Serviceability
- Improved Efficiency
- Extended bearing and seal life
- ANSI/OSHA Coupling Guard

The Bell & Gossett Series e-HSC horizontal split case in-line pump provides engineers, contractors and building owners a more powerful, serviceable, and efficient solution for a wide range of critical HVAC applications

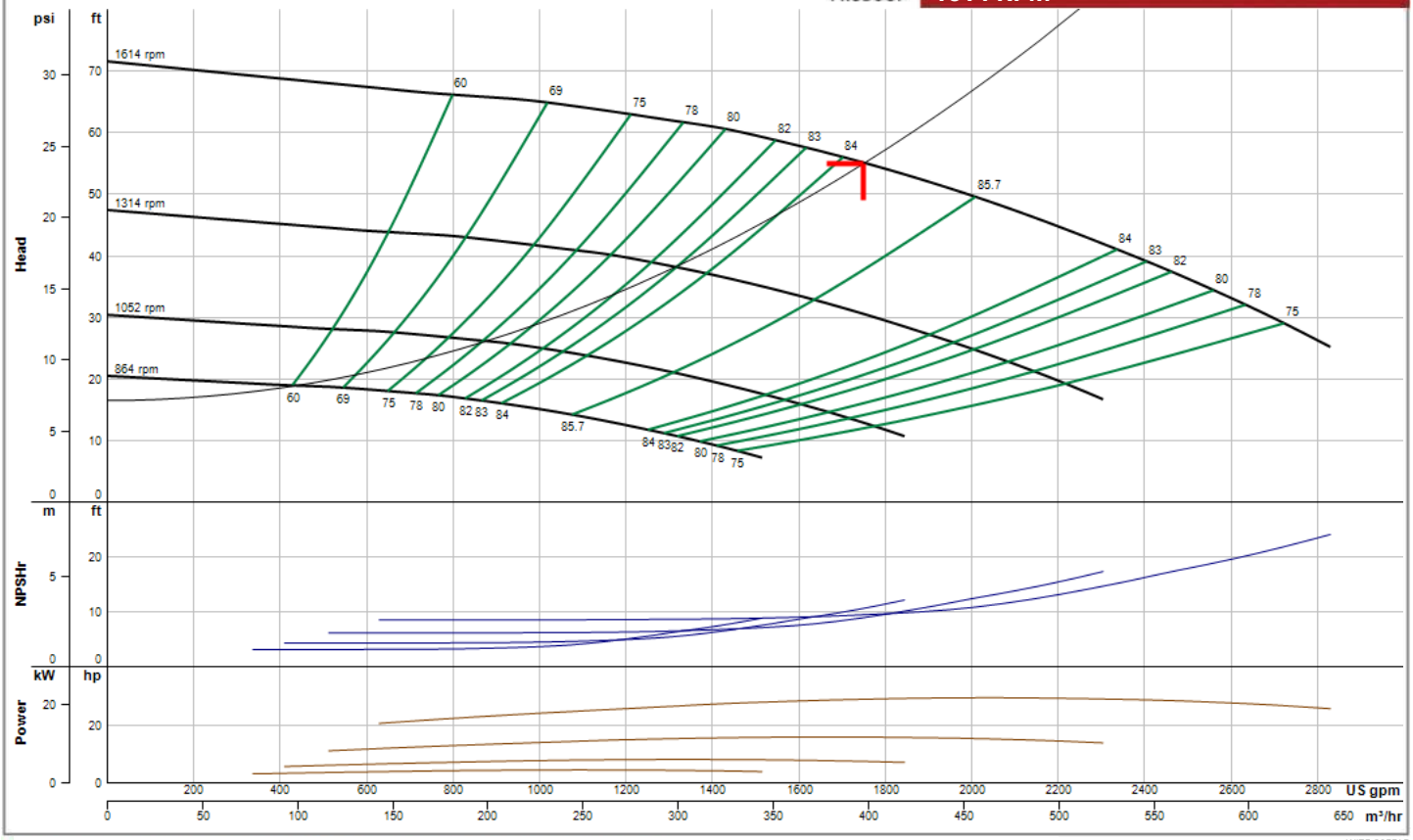
Pump Selection Summary

Duty Point Flow	1750 US gpm
Duty Point Head	55 ft
Control Head	16.5 ft
Duty Point Pump Efficiency	84.3 %
Part Load Efficiency Value (PLEV)	77.4 %
Impeller Diameter	9.449 in
Motor Power	40 hp
Duty Point Power	28.8 bhp
Motor Speed	1800 rpm
RPM @ Duty Point	1614 rpm
NPSHr	9.57 ft
Minimum Shutoff Head	71.6 ft
Minimum Flow at RPM	703 US gpm
Flow @ BEP	2008 US gpm
Fluid Temperature	68 °F
Fluid Type	Water
Weight *(approx. - consult rep for exact)*	1541 lbs
Pump Floor Space Calculation	23.03 ft²

Performance Curve

PREMIUM EFFICIENCY PRODUCT

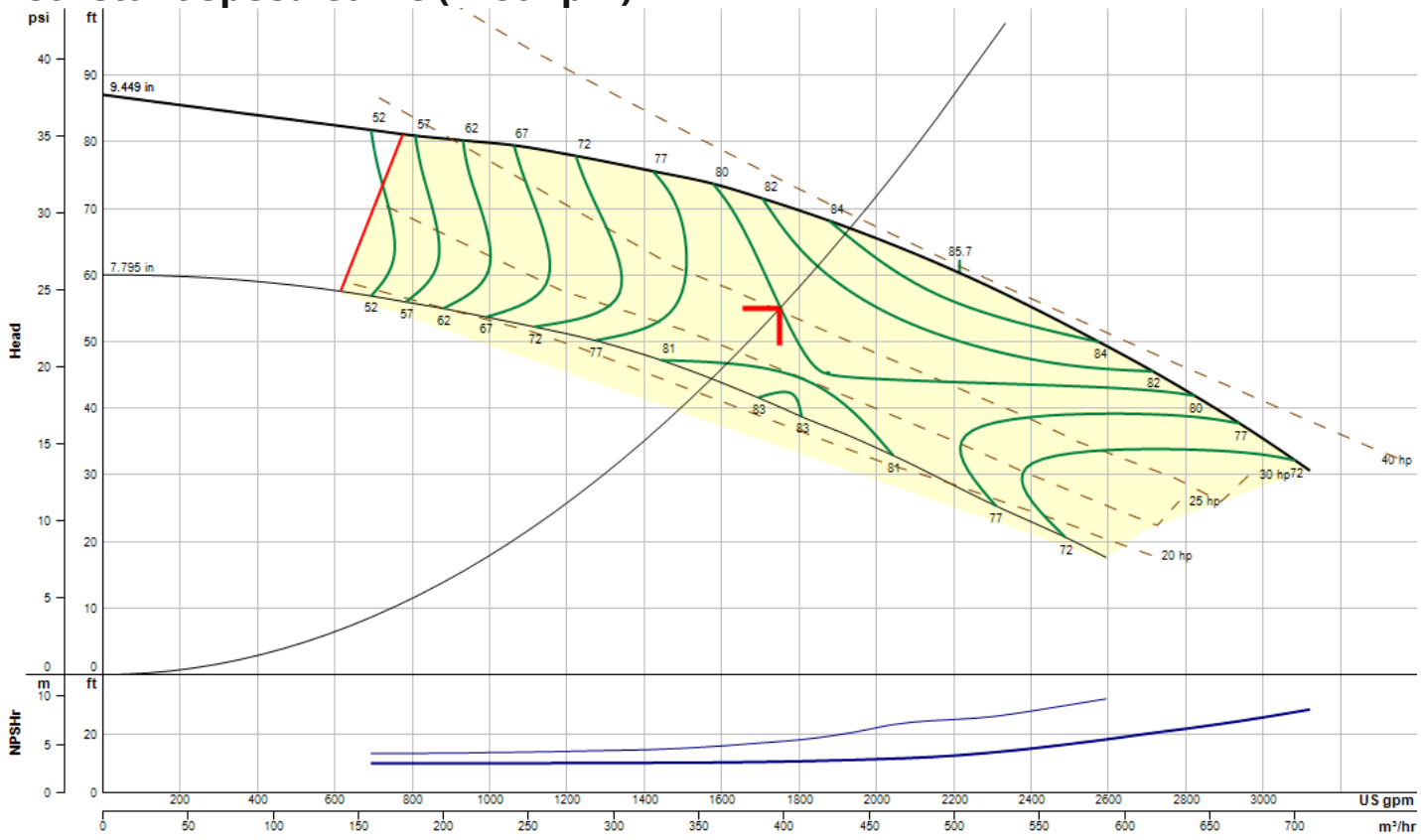
e-HSC
8x10x9.5
1614 RPM



Performance curve meets 14.6 / ISO 9906 acceptance criteria | Available Phase: 3, Available Voltage(s) [V]: 200, 230/460, 575

WIZE-30EFAD

Constant Speed Curve (1780 rpm)

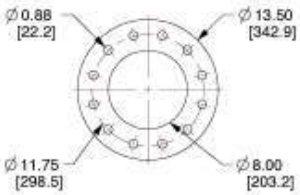


Operating Point

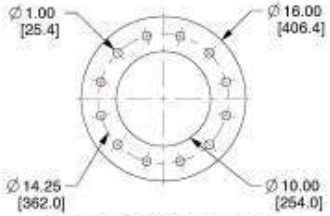
Flow: 1751 US gpm **Head:** 55 ft **Speed:** 1614 **Efficiency:** 84.3% **Point BHP:** 28.8 **End Of Curve:** 61.9%

Maximum Duty Point (at rated motor speed)

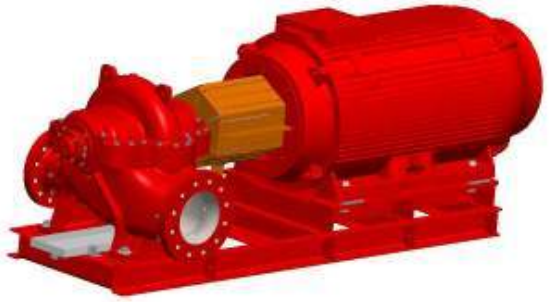
Flow: 1931 US gpm **Head:** 66.9 ft **Speed:** 1780 **Efficiency:** 84.3% **Point BHP:** 38.6 **NOL Flow:** 2215 US gpm **Runout Flow:** 3121 US gpm **NOL (BHP):** 39.3

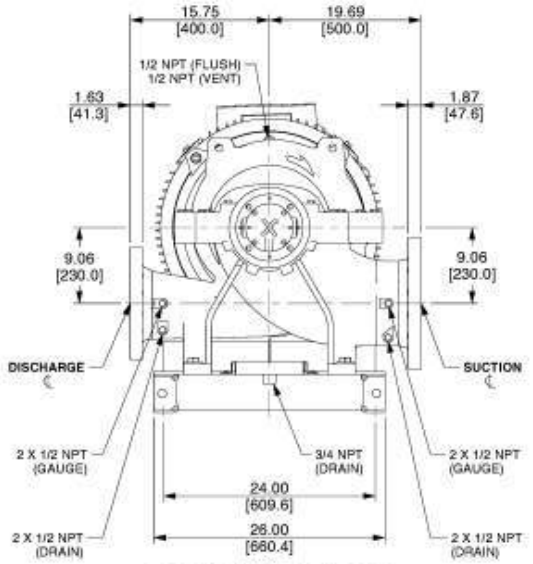


Ø8 DISCHARGE FLANGE
ANSI COMPATIBLE 125#
8 HOLES EVENLY SPACED

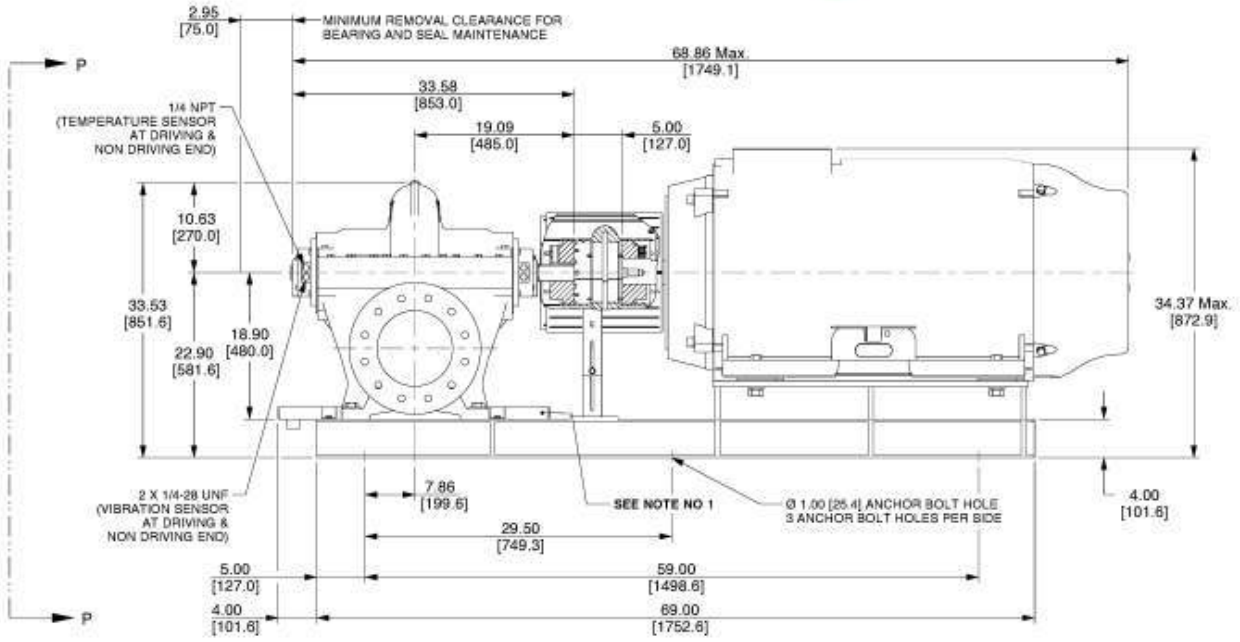


Ø10 SUCTION FLANGE
ANSI COMPATIBLE 125#
12 HOLES EVENLY SPACED





LEFT HAND ROTATION
VIEWED FROM PUMP END



NOTES:
1) DRIP PAN IS OPTIONAL.
2) THIRD ANGLE PROJECTION.

Bell & Gossett
a xylem brand

8200 N. Austin Ave.
Morton Grove, IL 60053, USA

Dimensions are subject to change

Not to be used for construction unless certified

BG-e-HSC_8X10X9.5_324T_LHR_SPACER

Series e-HSC Double Suction Centrifugal Pumps - Base Mounted

Motor Frame: 324T | Rotation: LHR

Coupler: SPACER | ANSI Compatible: 125#

Dimensions : INCH [MM]	Scale : N.T.S.	Approval :

Materials of Construction

	Standard	Optional Material Configurations
Casing Assembly	Cast Iron (ASTM A48 NO.35/)	Ductile Iron (ASTM A536 65-45-12)
Casing Gasket (Suction)	Fiber (non-asbestos)	
Casing Gasket (Discharge)	Fiber (non-asbestos)	
Shaft	Stn. Steel 420	Duplex 2205
Bearing Housings	Cast Iron (ASTM A48 NO.35)	
Bearings	Steel	
Stuffing Boxes	Cast Iron (ASTM A48 NO.35)	
Lip Seals	Rubber (NBR)	
Mechanical Seals	Carbon, SiC, EPDM	
Bolts	Steel	
Pipe Plugs	Steel	
Key, Impeller	Steel	
Key, Coupling	Steel	
"O" Rings	Rubber (FKM)	
Casing Wear Rings*	Bronze (lead free)	Stainless Steel 420[1], Stainless Steel Duplex,[1] Nitronic 60[1]
Impeller Wear Rings*	Stn. Steel 304 (CF8)	Stainless Steel 316, Bronze, Cast Iron[1]
Bearing Glands	Cast Iron (ASTM A48 NO.35)	
Tapered Pins	Steel	
Impeller	Stn. Steel 304 (CF8)	Stainless Steel 316, Bronze, Cast Iron[1]
Retaining Ring (Impeller)	Stn. Steel 304 (CF8)	
Shoulder Rings	Steel	

*Denotes optional part with a standard material configuration

[1]Optional material with long lead times

Baseframe & Coupling Guard

Baseframe	Grouted, Formed steel frame, Jacking screws
Coupling Guard	ANSI/OSHA Compliant, Scratch resistant power coating
Drip Pan (optional)	Galvanized steel

Mechanical Seals

MR1 Metric Metal Pusher Seal

Balanced high pressure execution

175 to 580 psi (12-40 bar)[1]

-4°F to 250°F temperature range

MR2 Metric Rubber Bellow Seal

Standard option unbalanced execution

Up to 175 psi (12 bar)[1]

-4°F to 250°F temperature range

MR1/MR2 Material Configurations

1. Carbon/SiliconCarbide/EPDM[2,3]
2. SiliconCarbide/SiliconCarbide/EPDM[4]
3. Carbon/SiliconCarbide/FKM[4]
4. SiliconCarbide/SiliconCarbide/FKM[4]

Notes:

[1]Denotes mechanical seal pressure

[2]Standard material configuration for MR2 seal type

[3]Standard material configuration for MR1 seal type

[4]Low lead time optional material configuration

e-HSC Pump Technical Overview

Casing Operating Pressures

Cast Iron: 175 psi [12 bar]

Ductile Iron: 400 & 450 psi [28 & 31 bar][2]

Fluid Temperature Range

Standard Offering: -4 to 250°F [-20 to 121°C]

Optional Offering: -4 to 300°F [-20 to 149°C]

Flange Specifications

ASME/ANSI B16.1, 125/250#

DIN 16/25/40, EN 1092[3]

[2]Limited offering

[3]Optional drilling specification

PF-63 SERIES
150 PSI PACKAGE RECOVERY SYSTEM

FEATURES

- **Available in flow rates from 50 to 1,200 GPM.**
- **Standard unit equipped with PF-61 series separator.**
- **Recovery vessel - 304 stainless steel construction, stainless steel support basket, 25 micron bag, swing type eye-bolt cover, pressure differential gauge, manual air relief valve, flow controller and isolation ball valves.**
- **Cast iron bronze fitted, close-coupled end suction centrifugal pump with TEFC motor.**
- **Cast iron pre-strainer with removable SST basket.**
- **Control Panel - NEMA 4X cabinet with door disconnect switch, motor short circuit/overload protection and pump HOA switch.**
- **Skid - fusion bonded polyester coated carbon steel.**
- **Sch. 80 PVC interconnecting piping.**
- **Options: Auto purge, dry contact alarm for recovery vessel, removable dome, 22 1/2° profile separator.**

APPLICATION

PUROFLUX's PF-63 package recovery systems are designed specifically to remove dirt, sand, silt, precipitates, and suspended solids from process fluids. The PF-63 system utilizes a constant purge. Purge solids will be captured by the recovery vessel and clean fluid returned to the system inlet, eliminating liquid loss. The PF-63 recovery systems will remove unwanted contaminates resulting in increased system efficiency and decreased operating costs.

TYPICAL APPLICATIONS INCLUDE:

- Cooling Towers
- Food Industries
- Aquatic Exhibits
- Irrigation Systems
- Well Water
- Waste Water Discharge
- Potable Water
- Fish Hatcheries
- Industrial Processes
- Automotive Processes
- Chemical Processes
- Car Washes

RELIABILITY

The PF-63 package systems are designed to withstand the harshest environments and deliver long lasting reliability. Puroflux utilizes its extensive engineering background in process filtration / separation to provide simple, reliable systems that require minimal maintenance.

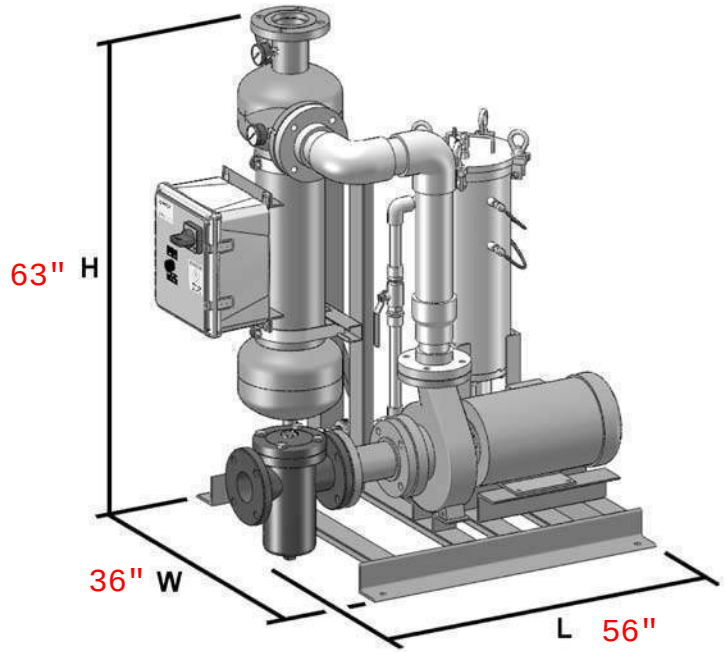
SERVICE

Technical field service representatives are available to provide guidance for application, installation and repair in both domestic and international markets.

AFFORDABILITY

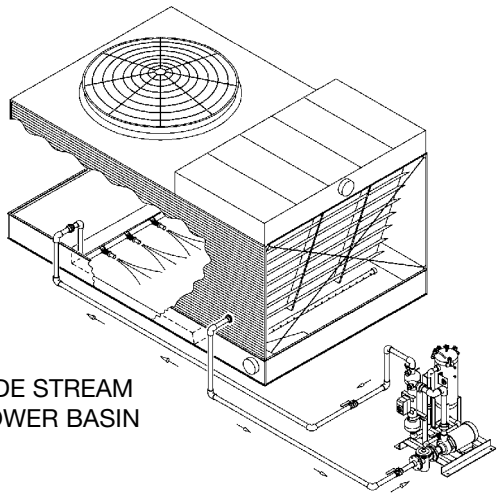
PUROFLUX's PF-63 package recovery system is an affordable alternative to other comparable types of filtration, and with its low initial investment, offers a quick return on investment.

PF-63 SERIES - 150 PSI PACKAGE RECOVERY SYSTEM

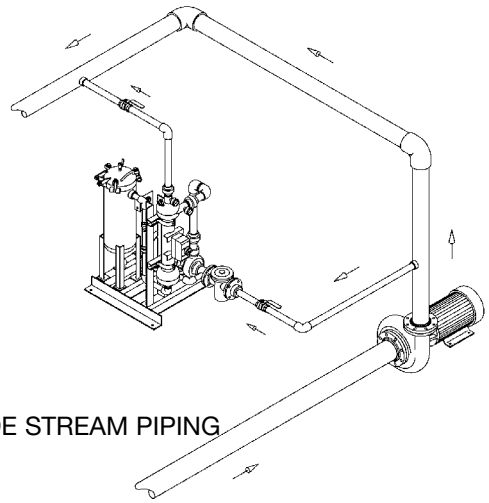


MODEL	FLOW RATE	MOTOR	CONNECTION		VOLUME	DIMENSIONS			WEIGHT, LBS	
Number	GPM	HP	Inlet	Outlet	Gallons	L	H	W	Shipping	Oper.
PF-63-012	50	2	2” flng	1.25” mpt	8	35”	42”	28”	370	438
PF-63-015	80	3	2” flng	1.5” mpt	8	35”	42”	28”	372	440
PF-63-020	110	5	3” flng	2” mpt	13	41”	50”	34”	530	640
PF-63-025	160	5	3” flng	2.5” mpt	14	41”	50”	34”	640	752
PF-63-030	220	7.5	3” flng	3” flng	15	41”	51”	34”	689	809
PF-63-040A	330	10	4” flng	4” flng	26	56”	63”	36”	850	1067
PF-63-040B	400	10	4” flng	4” flng	26	56”	63”	36”	970	1198
PF-63-050	600	15	6” flng	5” flng	36	61”	75”	42”	1350	1822
PF-63-060A	900	20	6” flng	6” flng	53	61”	88”	46”	1757	2197
PF-63-060B	1200	25	8” flng	6” flng	53	67”	88”	46”	1873	2317
Consult factory for higher flow rate packages.										

TYPICAL INSTALLATION



SIDE STREAM
TOWER BASIN



SIDE STREAM PIPING

PUROFLUX
CORPORATION
FILTRATION AND CONTROL SYSTEMS

(805) 579-0216 Fax: 579-6005
website: www.puroflux.com • e-mail: sales@puroflux.com

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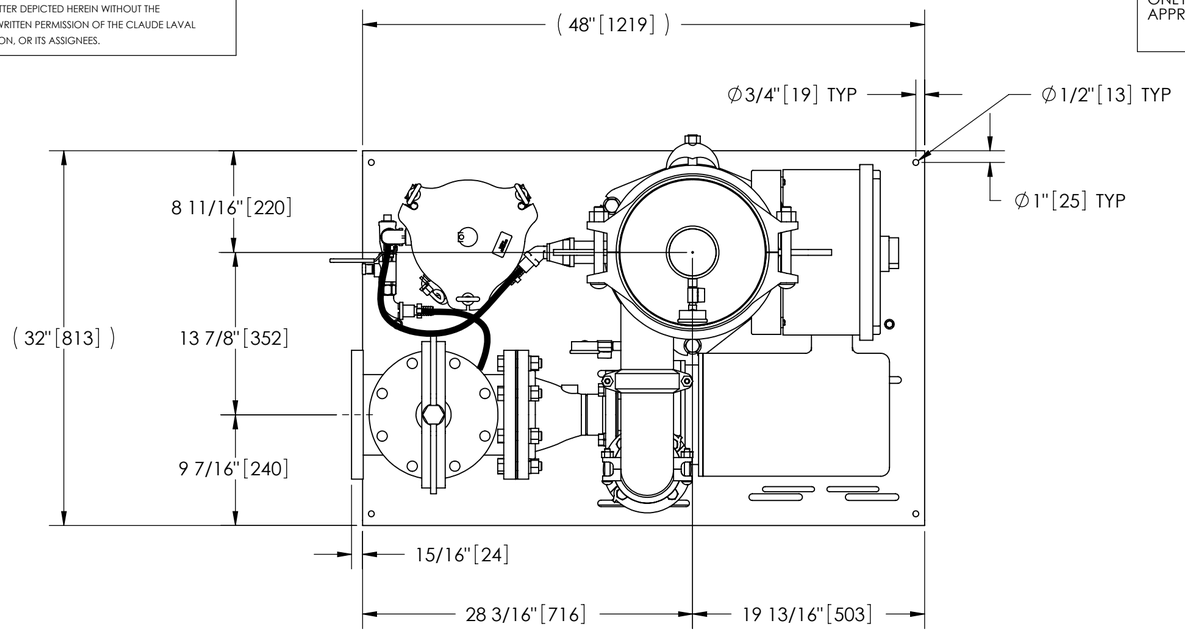
REVISION HISTORY				
ZONE	REV	DESCRIPTION	DATE	APPROVED



TOP VIEW

SUBMITTAL DRAWING

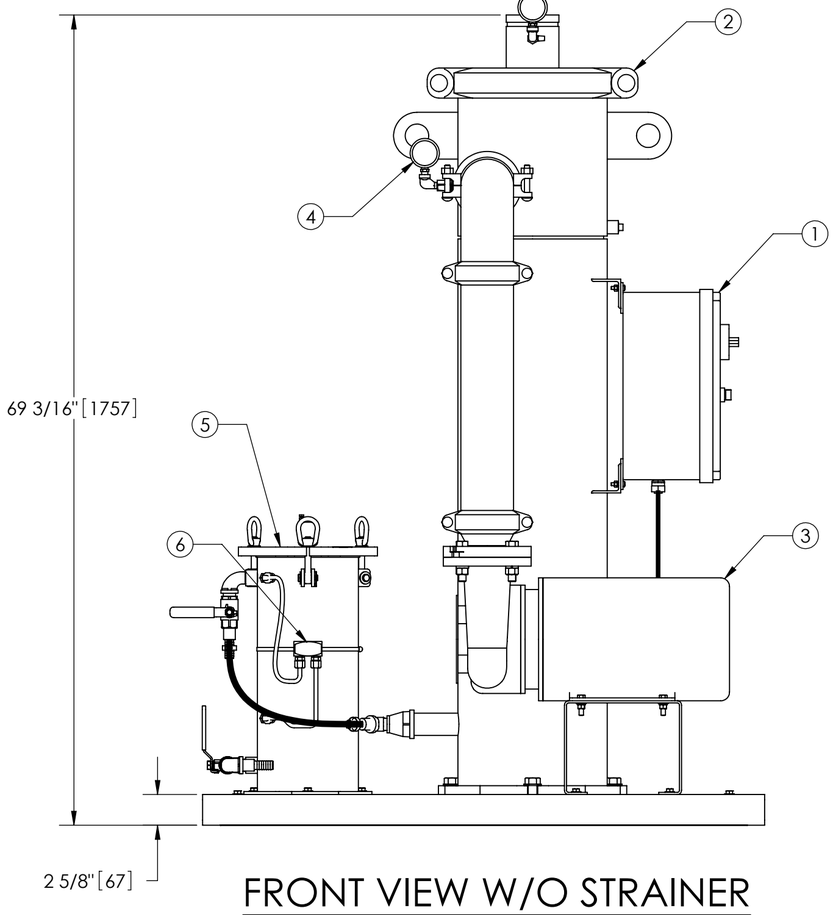
This drawing is submitted for spatial consideration only. Do not pre-plumb to these dimensions.

NOTES:

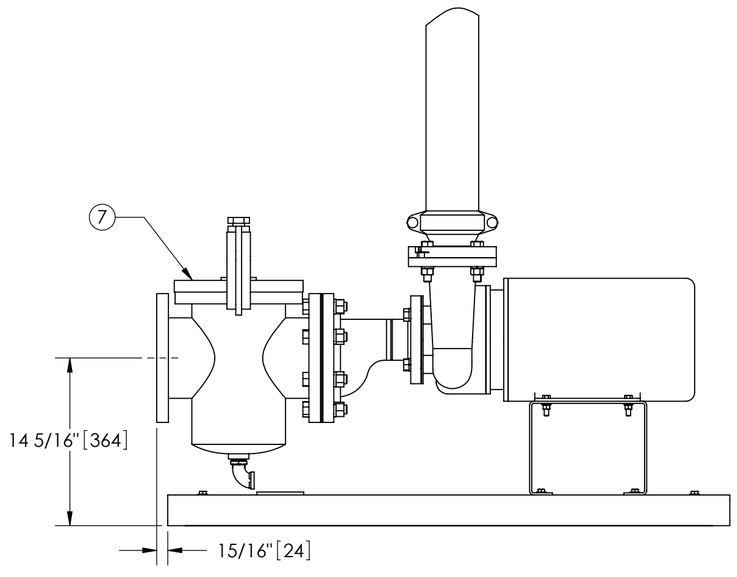
1. INLET IS 6" PIPE (125# ANSI FLANGED).
2. OUTLET IS 4" PIPE (GROOVED).
3. PURGE OUTLET IS 1-1/2" PIPE.
4. MAXIMUM PRESSURE: 150 psi (10.3 bar).
5. MAXIMUM TEMPERATURE: 100ºF (37.8ºC).
6. SPECIFIED FLOWRATE OF 400 gpm (91 m³/hr).
7. FINISH: AS ASSEMBLED.
8. POWER REQUIREMENT: 460V, 3PH, 60Hz.
9. NEMA 4X MOTOR STARTER ENCLOSURE WITH SAFETY DISCONNECT AND H.O.A. SWITCH.
10. APPROXIMATE DRY WEIGHT: 1067 lbs (485 kg).
11. INLET/OUTLET VALVE KIT, MODEL TCV-0400 RECOMMENDED.
12. MINIMUM PIPE FROM TOWER BASIN TO TC SYSTEM IS 6" PIPE.
13. FLOODED SUCTION REQUIRED.

COMPONENT LIST:

① ELECTRICAL CONTROL BOX 460V 60Hz W/120V TRANSFORMER.
② SEPARATOR: HTX-0285-TC.
③ PUMP: 15 HP CENTRIFUGAL, 3500 rpm, 460V, 60Hz.
④ INLET/OUTLET PRESSURE GAUGES: 0-100 psi, GLYCERIN-FILLED.
⑤ PURGE EQUIPMENT: SRV-816.
⑥ DIFFERENTIAL PRESSURE INDICATOR: (AVAILABLE WITH DRY CONTACT-MODEL DHE-15-S. ORDER SEPARATELY).
⑦ BASKET STRAINER.



FRONT VIEW W/O STRAINER



FRONT VIEW PUMP & STRAINER

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN: INCHES [mm] TOLERANCES ARE: FRACTIONS ± 1/2" DECIMALS .XX ± .01 .XXX ± .005 .XXXX ± .0005 ANGLES ± 1/4°	ENGINEERED FOR: STANDARD		CLAUDE LAVAL CORP. FRESNO, CALIFORNIA 93727 WWW.LAKOS.COM — LAVAL UNDERGROUND SURVEYS
DO NOT SCALE DRAWING	APPROVALS	DATE	TITLE: TCX-0400-SRV, TC SYSTEM, SWEEPER HTX-0285, 460V 60HZ DELUXE
MATERIAL: PER LAKOS SPEC	DRAWN: TOM C./HSK	5/17/05	
FINISH: AS ASSEMBLED	ENGR: HSK	9/13/05	SIZE: C — MODEL NO. — DWG NO.: 115430 — REV.: F
	MFG: -	-	SCALE: 1:10 — EST. WT.: 1067 lb — SHEET: 1 OF 1
	WORK ORDER	QTY.	

DWG NO. 115430 SH 1 REV. F

UWMC 51 COOLING TOWER REPLACEMENT, COOLING TOWER AND CW PUMPS
3/1/2022

1. **NETWORK POINTS SHALL REQUIRE MAPPING OF VIRTUAL POINTS AVAILABLE VIA THE BACNET CONNECTION**
2. **MONITOR POINTS LISTED BELOW GRAPHICALLY ON THE BAS OPERATOR WORKSTATION.**
3. **TRENDED POINTS SHALL HAVE THE SAME START TIME.**
4. **THE TRENDED DURATION SHALL BE EVERY 15 MINUTES (ADJ).**

2 ADDENDUM 2 - 03/01/2022

			Temperature Control Vendor				Non-Temperature Control Vendor		Temperature Control Commissioning Vendor				
POINT DESCRIPTION	**EXISTING POINT**	**NEW POINT**	**AI**	**AO**	**DI**	**DO**	**VP**	**NETWORK**	**Actuators**	**Valves**	**Dampers**	**Sensors**	**NOTES**
CLG TOWERS - WATER LEVEL ALARM		3			1								
CLG TOWERS - CWR TEMPERATURE	1		1										TREND
CLG TOWERS - CWS TEMPERATURE	1		1										
CLG TOWERS - COOLING TOWER INLET TEMPERATURE		3	1										TREND
CLG TOWERS - COOLING TOWER CONTROL VALVE		9				1							TREND
CLG TOWERS - VFD ENABLE/DISABLE		6				1							TREND
CLG TOWERS - VFD SPEED		6		1									TREND
CLG TOWERS - VFD ALARM		6			1								
CLG TOWERS - COOLING TOWER OUTLET TEMPERATURE		3	1										TREND
CLG TOWERS - AMBIENT TEMPERATURE	1		1										
CLG TOWERS - AMBIENT RELATIVE HUMIDITY	1		1										
CLG TOWERS - VFD NIGHTTIME LIMIT SETPOINT		6					1						LIMIT VFD SPEED X%, DAILY SCHEDULE
CW PUMPS - PUMP STATUS		3			1								TREND
CW PUMPS - VFD ENABLE/DISABLE		3				1							TREND
CW PUMPS - VFD SPEED		3		1									TREND
CW PUMPS - VFD ALARM		3			1								
CW PUMPS - SYSTEM DIFFERENTIAL PRESSURE		3	1										TREND
MAKE-UP WATER METER - FLOW		1	1										TREND
MAKE-UP WATER METER - CONSUMPTION (TOTALIZED FLOW)		1					1						TREND
DRAIN METER - FLOW		1	1										TREND
DRAIN METER - CONSUMPTION (TOTALIZED FLOW)		1					1						TREND
[ADD ALT 4] CLG TOWER FILTRATION SKID - ENABLE/DISABLE		1				1							TREND
[ADD ALT 4] CLG TOWER FILTRATION SKID - STATUS		1			1								TREND
[ADD ALT 4] CLG TOWER FILTRATION SKID - ALARM					1								
[ADD ALT 3] CLG TOWER INTERCONNECTION PIPING VALVES		3				1							TREND
TOTAL (NEW)			11	9	16	22	8	0	0	0	0	0	

NOTES:
Total quantity of new physical points = 58 2
New and/or replacement actuators furnished and installed by control contractor.
New and/or replacement valves and dampers furnished by control contractor and installed by mech. contractor.

Preliminary Construction Sequencing Narrative

SUMMARY

This narrative provides a preliminary summary of the sequencing for this project during the construction phase. During the pre-construction phase a more detailed project schedule will be developed and shared with UWMC.

SEQUENCING NARRATIVE

Phase 1 Mobilization:
- *UWMC to drain-down and isolate the Cooling Towers s prior to work starting.*
- McKinstry sets-up site facilities, lay-down area and dumpster.

Phase 2 Demo:
- UWMC to de-energize the Cooling Towers and Pumps.
- Disconnect and make-safe old CT-1,2,3 and CP-1,2,3.
- Disconnects individual CT from each other to allow for hoisting.
- Disconnects steel reinforcement member at CT-1 (east tower); reinstalls after new CT-1 installed.
- Crane existing CT-1,2,3 (Anticipating one Saturday mobilization)
- Completes remaining demo.

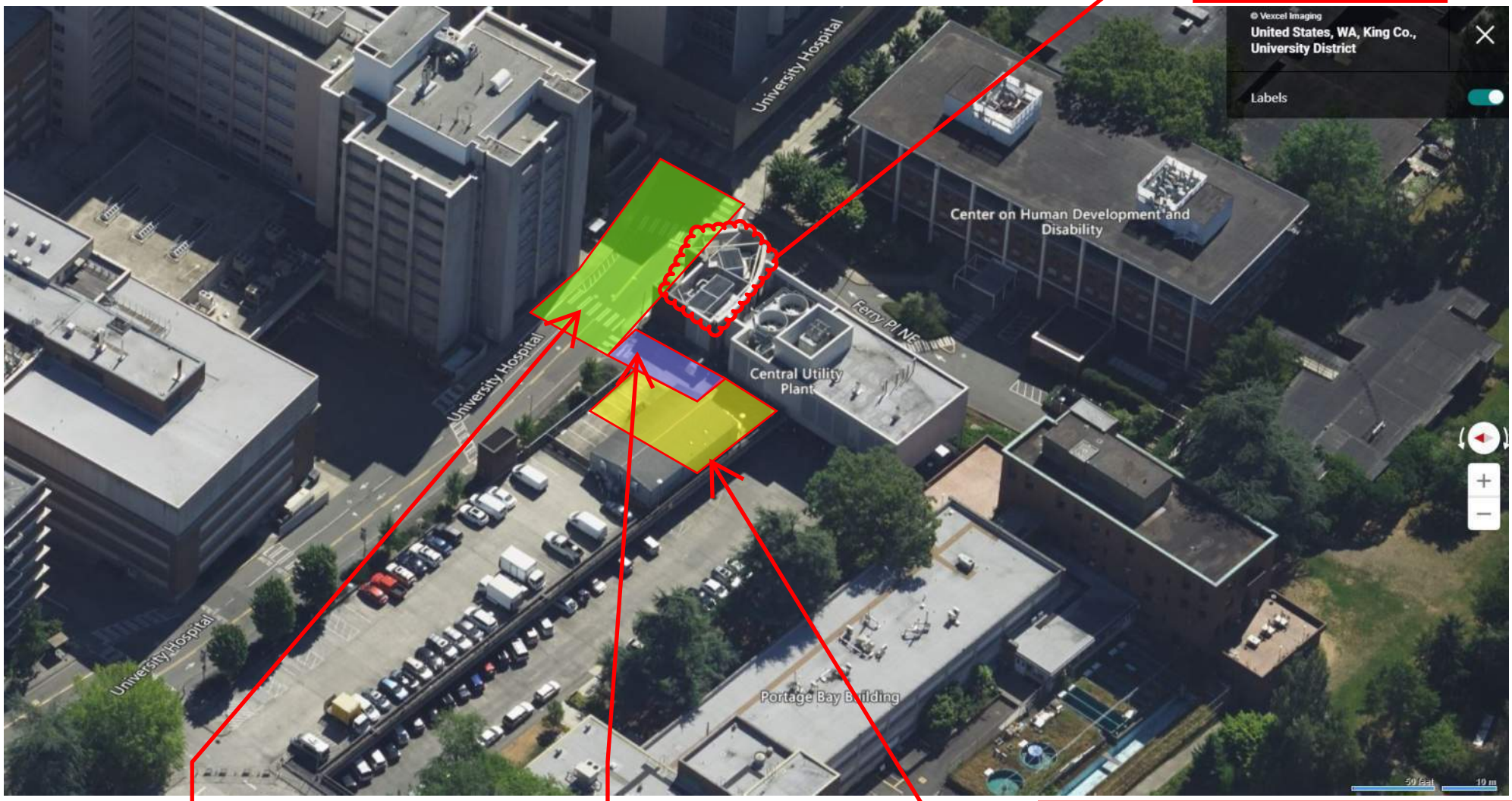
Phase 3- Structural Steel Modification and MEP Rough-in
- Performs steel frame base scope and Alt#3 modifications if contracted.
- Rough-in piping and electrical.
- Complete roofing tie-ins

Phase 4 - Alternate #2 (if contract scope)
- Complete re-roofing scope.
- *Anticipating 7 calendar days of no-work after roofing scope is completed, to allow new roofing material to set. This is weather dependent.*

Phase 5- New Equipment Installation
- CT-1,2,3 set into place (Anticipating one Saturday mobilization)
- CP-1,2,3 installed
- Perform final connections to equipment
- Complete insulation, system test, flush and fill
- Reconnect and start-up Nalco chemical treatment system
- Installs new controls devices/wiring and completes programming changes, PTP/FPT.

Phase 6- Commissioning and Training
- Start-up of new equipment.
- Complete system TAB.
- Cx completes PTP/FPT.
- Owner training.

Project Area: S1 Cooling Towers.
Located at south end of the parking lot.



Mobile Crane Staging Area
Full closure of NE Columbia Rd will be required for crane picks. These will be planned to take place on Saturdays over the course of the project.

Closure of the east end of S1 parking lot for truck turn-around is required on days of crane picks.

Need (15) parking spaces for 18 weeks for the following:
1) Material laydown area (fenced)
2) Parking spots for contractor vehicles
3) HoneyBucket/Handwash Station
4) Connex
5) 40CY roll-off dumpster (8'W x 20' L x 8'H)
6) General waste dumpster

Energy Cost Savings Guarantee

3.1 On-Going Owner Responsibilities

The University of Washington Medical Center shall provide the following services as part of this energy services project. In the event that these services are not provided, energy savings and associated guarantees will be modified to reflect the associated impact.

1. Maintain all equipment per manufacturer's recommendations and proposed maintenance schedule.
2. Maintain all sequence of operations and performance criteria related to installed systems as proposed and designed.
3. Provide other RCM specific on-going responsibilities as provided in Table 3.2 - "Performance Assurance Plan Outline."
4. Provide McKinstry with copies of actual monthly utility billing information on a quarterly basis for the duration of the on-going service period. This includes electric, water, sewer, and steam. For this project, the on-going service period shall be one year, unless noted otherwise.
5. Provide McKinstry access to Energy Management and Control Systems for the purpose of collecting and logging data over time as required for performance verification.
6. The University of Washington Medical Center shall notify McKinstry in writing concerning any changes or alterations to the building that will affect energy usage. This notification should be provided within two weeks of the change. This includes occupancy or use changes, computer load or other load changes, scheduling changes, and sequence of operations changes.

3.2 Change Of Use

In the event that the University of Washington Medical Center chooses to make changes to the facility that require set point adjustments, longer operating hours, or continuous equipment operation, the University of Washington Medical Center agrees that:

1. Savings deemed as met described in Table 3.2 will continue to be deemed as met.
2. Additional cost of extended equipment operation is a cost of the change, not due to a failure of McKinstry or their equipment.
3. McKinstry shall not be responsible for any increase in energy, maintenance, or any other costs incurred because of the extended equipment operation.
4. During the M&V portion of the project McKinstry at its option may make a baseline energy use adjustment to identify and account for a change-of-use at the facility.
5. McKinstry- will calculate the change in energy consumption due to the specific change made to the system's operation.

Table 3.1 - Energy Savings Summary

Project	UWMC University of Washington Medical Center
Scenario	S1 Cooling Towers 2021 Pre-Final
Date	3/25/2022

			Electricity		Total **
Facility Improvement Measures	Facility	Net Effective Guarantee Multiplier *	kWh	kWh ($)	($)
02.01 S1 Cooling Towers Replacement	University of Washington Med Center	90.0%	51,181	$4,284	$4,284
		Totals * **	**51,181**	**$4,284**	**$4,284**

* The savings shown in this table are less than the calculated savings unless a guarantee multiplier of 100% is shown.

** The guarantee is based on Key Performance Indicators shown in Table 3.2. Refer to Section 3 of the ESP for the method of converting Key Performance

*** The guarantee is based on the aggregate savings for all FIMs, not on individual FIM savings.

Table 3.2 - M&V Plan Outline

Project	UWMC University of Washington Medical Center
Scenario	S1 Cooling Towers 2021 Pre-Final
Date	3/25/2022

							Audit Stage (Baselining)	Post Retrofit (Commissioning)	Annual		
FIM Name	Facility	IPMVP Option	KPI	Key Performance Indicators	Baseline Values	Proposed Values	Tasks	Tasks	Tasks	Ongoing Owner Responsibilities	Stipulated Factors
02.01 S1 Cooling Towers Replacement	University of Washington Med Center		1.	Cooling Tower Capacity	Lake Water : 1,050 GPM Cooling Tower Condenser Water : 2,700 GPM	Lake Water : None Cooling Tower Condenser Water : 5,214 GPM	Review available drawings, verify tag data and confirm with Facilities Operators.	Review submittal data and TAB report.	None.	Perform regular maintenance per Manufacturer's requirements.	Existing and proposed are nominal capacities per available drawings and manufacturer data. Condenser loop temperature setpoints of 100 F entering and 85 F leaving the cooling tower. Chiller Plant total capacity is 24,000 MBH nominal. Cooling towers condenser water valves closed 60% per facility operators to prevent spill.Chiller-1 to be switched from lake water to cooling towers. S1 cooling towers operation independent from the Montlake cooling towers.
			2.	Cooling Tower Fan Operation	(2) 50 HP, (1) 60 HP fans with VFD control	(6) 20 HP fans with VFD control	Collect tag data. Review BAS trends for fan speed modulation, cooling load and OAT trends. Review original MEP drawings, Equipment data. Discuss system operation with facilities.	Review submittal data, TAB report and Cx report. Review available fan speed, OAT and cooling load trends. Set-up control point trends necessary for M&V.	Review fan speed trends (2 week duration).	Provide required BAS trends to McKinstry. Operate system as per proposed SOO. Perform regular maintenance. Document operating set points changes and equipment changes or issues. Share documentation with McKinstry as early as possible.	Chiller plant operation including chiller types, operating efficiency, total (PAC and SP) cooling loads. Condenser loop flow, temperature set points and water quality. Cooling tower seasonal operation, typically between Mid-March through Mid-October, when OAT is above 55 F. TMY3 data and weather conditions.
			3.	Condenser Water Pumps	Cooling Towers : (2) 25 HP; 1,350 GPM each Lake Water: (1) 7.5 HP, 1,050 GPM	Cooling Towers : (3) 40 HP; 1,738 GPM each Lake Water: None	Review available drawings and verify site data.	Review submittals.	None	Perform regular maintenance per Manufacturer's requirements.	Cooling tower nominal capacity. Chiller Plant nominal capacity.
			4.	Condenser Water Pump Operation	Constant Speed	Variable Speed	Review BAS trend data. Confirm operation with facilities.	Review TAB report. Set-up control point trends necessary for M&V.	Review pump speed trends (2 week duration).	Provide required BAS trends to McKinstry. Operate system as per proposed SOO. Perform regular maintenance. Document operating set points changes and equipment changes or issues. Share documentation with McKinstry as early as possible.	Condenser water temperature setpoints, design flow rate. Chiller plant cooling load. TMY3 weather data.

Table 3.3 - Base Utility Rates

Project	UWMC University of Washington Medical Center
Scenario	S1 Cooling Towers 2021 Pre-Final
Date	3/25/2022

Building_Name	Utility_Provide	Rate_Name	Utility_Type	ollars_Per_Un	Units	shed_Date_Eff
University of Washington Med Center	Seattle City Light	2022 LGC kWh (Avg)	Electricity	$0.083700	kWh	1/1/2022

Project Financials

4.1 Procurement

The following Figure 4.A outlines proposed procurement and payment reconciliation methods. Changing the proposed method of reconciliation after the acceptance of the Proposal may require an adjustment to the Guaranteed Maximum Project Cost.

DEFINITIONS:

Major Equipment: Major Equipment is any single piece of equipment purchased by McKinstry with a value over $5,000.

Negotiated: Construction contract value is to be established through negotiations with a select or single contractor (i.e. owner preferred controls contractor, mechanical contractor, etc.).

Bid: Construction contract value is to be established through a bid process based upon formal bid documents including plans and specifications which will be bid to a minimum of two (typically three) pre-qualified contractors as approved by the ESCO and owner. Owner shall endorse any selection of a Subcontractor or equipment that is other than low bid through a properly executed change order.

Self-Perform: McKinstry intends to perform work with McKinstry and/or McKinstry personnel.

Schedule of Values (SOV): - Cost shall be substantiated with a properly executed invoice from the subcontractor or supplier that matches the schedule of values in their contract or purchase order.

Time & Materials (T&M): Published sell rates will be established prior to issuance of contract to subcontractor or commencement of work by McKinstry. A monthly labor and material report will be provided which will include labor hours and dollars per individual, and material and equipment invoices.

Firm: Fees that are negotiated prior to proposal and are not reconciled at the end of the project.

Figure 4.A

Construction Cost Category	Proposed Construction Method	End of Project – Reconciled (SOV or T&M)
Controls Systems	Negotiated Subcontract Sole Source	SOV
Major Equipment	Negotiated	SOV
Sheet Metal/Piping	Self Perform	T&M
Electrical	Self Perform	T&M
General Construction	Self-Perform	T&M
TAB/Start up	Self-Perform	T&M
Commissioning	Self-Perform	T&M
Change Order (CO)	As Specified in CO	T&M
ESCO Fees	Self-Perform	T&M

4.2 Payment

This proposal does not include interest charges due to delayed payment per Section 5.6.8 of the Master Agreement. It is the intent of this proposal that monthly progress payments will be made based on schedule of values. If monthly progress payments are not made and McKinstry provides construction period financing, the construction period financing cost would be calculated based on monthly invoices and actual interest rate.

4.3 Design and Construction Personnel

The following are the preliminary list of McKinstry individuals that are anticipated to charge to the job. The Labor multipliers and salaries (Burdened Salaries) as approved by the University of Washington have been made part of the Master Contract and are updated on an annual basis. Reference Attachment 3 and Attachment 4.

4.4 Construction Budget

The Construction Budget was been developed based upon the scope identified in Section 2. The budget does not include any construction period financing costs (section 4.2) or costs associated with Liquidated Damages. If the University requests McKinstry to provide construction period financing or account for liquidated damages, the guaranteed maximum price of the project would be revised to account for these costs. Table 4.1 breaks out the project budget summary and identifies costs associated with the Audit, Guaranteed maximum cost, measurement and verification and other non-guaranteed costs. Table 4.2 identifies the estimated project cost after the potential utility incentive has been paid.

4.5 Allotments

McKinstry may set aside allotments for specific areas of work that have been identified as a potential cost impact but cannot be fully determined at this stage. Should the allotment not be adequate, the Owner will be advised. McKinstry will be compensated for any additional costs via Change Order to the contract should the Owner agree. In extreme situations, McKinstry may request additional funds to cover cost overruns that could not have been foreseen by either party.

2022 Cost Rate

Name	Job Title	2022 Cost Rate ($/hr)
ALLEN, TIFFENY G	896 -Senior Construction Project Engineer	$78.26
AMONKAR, HERAMB M	857 -Building Energy Program Manager	$102.05
BRIGHT, ALEXA K	932 -Business Operations Coordinator	$51.49
COREY-LOIOLA, MARLA	877 -Estimator, Senior	$111.78
CURTIS, DALE M	1475 -General Superintendent	$153.43
DELUCA, ROSEMARIE A	862 -Business Development Manager - Energy	$153.88
DENT, ALEX C	895 -Construction Project Engineer	$65.68
DEVER, TIMOTHY K	903 -Building Energy Engineer	$79.60
ESHLEMAN, MICHAEL E	903 -Building Energy Engineer	$79.60
FIRRANTELLO, JOSEPH	936 -Project Engineer III	$87.22
FUES, RONALD L	1166 -Project Director - Energy	$145.55
GALVIN, GERARD	1541 -Project Development Manager - Energy	$145.55
GLOSS, JACOB R	974 -Associate Account Executive - Energy	$63.70
GOODALL, PETER A	1529 -Senior Architect	$107.77
GOODWIN, JEFFREY W	872 -Senior Engineer	$136.10
HAIL, ROBERT L	262 -Regional Director - Energy	$183.91
HARTHORNE, SCOTT J	1169 -Senior Project Manager - Energy	$121.77
HELGEN, HEATHER J	900 -Director of Regional Operations	$145.55
JOHNSON, BRIAN	872 -Senior Engineer	$136.10
JOHNSON, MARIA E	896 -Senior Construction Project Engineer	$78.26
KEITH, JACOB T	903 -Building Energy Engineer	$79.60
KENNEDY, BRANDON	1178 -Project Manager I - Energy	$91.71
KLEIN, WILLIAM K	436 -Superintendent	$96.30
KNIGHT, MARTIN R	1168 -Project Manager II - Energy	$102.05
LAFONTAINE, LUKE	895 -Construction Project Engineer	$65.68
MALLORY, SCOTT R	872 -Senior Engineer	$136.10
MILLS, ANDREA N	983 -Business Operations Analyst	$72.51
MORGAN, SCOTT A	1178 -Project Manager I - Energy	$91.71
NIEMAN, MARK R	858 -Senior Building Energy Program Manager	$121.77
ONDICH, BRIAN	436 -Superintendent	$96.30
PENDLETON, MELISSA S	890 -Senior Account Executive - Energy	$124.77
PESTL DIMMITT, TY E	896 -Senior Construction Project Engineer	$78.26
POKORNY, WILLIAM G	1169 -Senior Project Manager - Energy	$121.77
POWERS, NOELLE K	430 -Construction Services Manager	$153.43
RASHID, MD M	1183 -Lead Engineer	$107.77
ROBINAUGH, DAVID M	430 -Construction Services Manager	$153.43
ROSSI, BRIAN M	936 -Project Engineer III	$87.22
SAWYERS, SHELBY J	861 -Account Executive I - Energy	$105.44
STOBIE, JOEL D	858 -Senior Building Energy Program Manager	$121.77
TOVAR, GUILLERMO A	895 -Construction Project Engineer	$65.68
TRAHAN, DWAYNE V	436 -Superintendent	$96.30
VARGO, LEANN M	892 -Account Executive II - Energy	$117.59

2023 Cost Rate

Name	Job Title	2023 Cost Rate ($/hr)
ALLEN, TIFFENY G	896 -Senior Construction Project Engineer	$83.65
AMONKAR, HERAMB M	857 -Building Energy Program Manager	$109.10
BRIGHT, ALEXA K	932 -Business Operations Coordinator	$54.60
COREY-LOIOLA, MARLA	877 -Estimator, Senior	$117.36
CURTIS, DALE M	1475 -General Superintendent	$164.01
DELUCA, ROSEMARIE A	862 -Business Development Manager - Energy	$164.49
DENT, ALEX C	895 -Construction Project Engineer	$70.21
DEVER, TIMOTHY K	903 -Building Energy Engineer	$85.09
ESHLEMAN, MICHAEL E	903 -Building Energy Engineer	$85.09
FIRRANTELLO, JOSEPH	936 -Project Engineer III	$92.01
FUES, RONALD L	1166 -Project Director - Energy	$155.60
GALVIN, GERARD	1541 -Project Development Manager - Energy	$155.60
GLOSS, JACOB R	974 -Associate Account Executive - Energy	$68.10
GOODALL, PETER A	1529 -Senior Architect	$115.22
GOODWIN, JEFFREY W	872 -Senior Engineer	$145.49
HAIL, ROBERT L	262 -Regional Director - Energy	$196.60
HARTHORNE, SCOTT J	1169 -Senior Project Manager - Energy	$130.17
HELGEN, HEATHER J	900 -Director of Regional Operations	$155.60
JOHNSON, BRIAN	872 -Senior Engineer	$145.49
JOHNSON, MARIA E	896 -Senior Construction Project Engineer	$83.65
KEITH, JACOB T	903 -Building Energy Engineer	$85.09
KENNEDY, BRANDON	1178 -Project Manager I - Energy	$93.95
KLEIN, WILLIAM K	436 -Superintendent	$102.94
KNIGHT, MARTIN R	1168 -Project Manager II - Energy	$109.10
LAFONTAINE, LUKE	895 -Construction Project Engineer	$70.21
MALLORY, SCOTT R	872 -Senior Engineer	$145.49
MILLS, ANDREA N	983 -Business Operations Analyst	$77.51
MORGAN, SCOTT A	1178 -Project Manager I - Energy	$93.95
NIEMAN, MARK R	858 -Senior Building Energy Program Manager	$130.17
ONDICH, BRIAN	436 -Superintendent	$102.94
PENDLETON, MELISSA S	890 -Senior Account Executive - Energy	$133.38
PESTL DIMMITT, TY E	896 -Senior Construction Project Engineer	$83.65
POKORNY, WILLIAM G	1169 -Senior Project Manager - Energy	$130.17
POWERS, NOELLE K	430 -Construction Services Manager	$164.01
RASHID, MD M	1183 -Lead Engineer	$115.22
ROBINAUGH, DAVID M	430 -Construction Services Manager	$164.01
ROSSI, BRIAN M	936 -Project Engineer III	$92.01
SAWYERS, SHELBY J	861 -Account Executive I - Energy	$112.72
STOBIE, JOEL D	858 -Senior Building Energy Program Manager	$130.17
TOVAR, GUILLERMO A	895 -Construction Project Engineer	$70.21
TRAHAN, DWAYNE V	436 -Superintendent	$102.94
VARGO, LEANN M	892 -Account Executive II - Energy	$125.71
WALLACE, TIFFANY	895 -Construction Project Engineer	$70.21
WILLIAMSON, ANDREW G	862 -Business Development Manager - Energy	$164.49
WOODFIELD, VAUGHN S	896 -Senior Construction Project Engineer	$83.65
ZELVYTE, BEATRICE	1178 -Project Manager I - Energy	$93.95

Table 4.1 Budget Summary

Project
University of Washington Medical Center - S1 Cooling Towers Replacement
UW Project # 207839

Audit (Work Order Part 1)			
Audit Fee		**$**	**94,600**

Guaranteed Maximum Price		**Price**	
Construction		$	2,491,848
Design		$	82,446
General Conditions		$	123,060
Allowances		$	-
Subtotal		$	2,697,354
Fee @	11.5%	$	310,196
Total Guaranteed Maximum Price (GMAX)		**$**	**3,007,550**
Performance Assurance (Separate Work Order)		**$**	**49,440**
Total Combined Project Cost		$	3,151,590

Non-Guaranteed Costs - Shown for Budgeting Only

Owner Contingency	5.00%	of Project GMAX	$	150,377
Tax	10.25%	of Total Combined Project Cost	$	323,038
CPO	10.00%	of Project GMAX	$	300,755
Total Estimated Project Cost			$	3,925,760

Table 4.2 - Facility Improvement Measure (FIM) Summary

Project	UWMC University of Washington Medical Center
Scenario	S1 Cooling Towers 2021 Pre-Final

Facility Improvement Measures	FIM Description	Facility	Budget *
02.01 S1 Cooling Towers Replacement	Replace (3) existing S1 cooling towers serving the S1 chiller plant. The new cooling towers will be sized to operate the existing S1 chillers without the lake water for condenser loop. Replace the old leaking constant speed condenser pumps with new variable speed pumps sized for the new piping and cooling tower. Existing condenser piping has connections to lake water piping at multiple points and a mix of manual and automated valves for operation. Modify necessary condenser water piping to connect to the new cooling towers while maintaining existing lake water piping in the mechanical room.	University of Washington Med Center	$3,925,760
		Totals	**$3,925,760**

* Since design cost, audit cost, etc. are distributed among the FIMs, the total project cost will not go up or down by exactly the amounts shown here if a FIM or FIMs are droppe
** For non recurring operational savings, the values are averaged over the 30 year length of this analysis.
*** Incentives are contingent on final approval and are not guaranteed. Funds are shown for reference only.

University of Washington Medical Center

S1 Cooling Towers Replacement

Project No: 207839

Investment Grade Audit

SEATTLE, WASHINGTON

MARCH 25, 2022

McKinstry
For The Life Of Your Building

Contents

5.1 PURPOSE AND ORGANIZATION

This exhibit documents the analysis performed to establish the utility and operational savings for the project.

The information is organized by FIM (Facility Improvement Measure) as follows:

- FIM Narrative with key assumptions and criteria
- Savings calculation methodology and analysis

Additionally, relevant site survey data, measurement and verification data, utility information and miscellaneous back-up information are provided in the sections following the various FIM sections.

5.2 EXISTING FACILITY DESCRIPTION

UNIVERSITY OF WASHINGTON – MEDICAL CENTER (UWMC)

University of Washington Medical Center (UWMC) buildings includes the Pacific Tower, Muhlenberg Tower (also known as the Cascade Tower), Surgery Pavilion and the Montlake Tower.

The Cascade Tower and Surgery Pavilion share a common chilled water loop. This loop is served by the EA heat recovery chiller, the EA comfort chiller, and S-1 chiller 1 which is cooled by lake water. The heat recovery chiller rejects heat to the Cascade low temperature heating water loop and the domestic hot water (DHW) system – it isn't able to reject heat to the Surgery Pavilion. Currently chiller 1 is the last chiller to stage on. Cascade and Surgery do not have a dedicated process chilled water loop. The Pacific Tower is served by S-1 chillers 2 and 3, and this loop is low on capacity. In the winter, Multistack 3 cools the process chilled water loop and rejects its heat to the comfort chilled water loop (which isn't needed in the winter due to air-side free cooling), so the comfort chilled water loop becomes a heat recovery loop in the winter. Multistack 5 is available for low load dehumidification cooling but hasn't been used for more than last 10 years due to a VFD being added to one of the S-1 chillers to improve its turndown.

The campus used to be on Andover controls which have been converted over to JCI Metasys controls. Many areas of pneumatic controls remain and would be a good opportunity for retrofit as funds become available.

5.3 FACILITY IMPROVEMENT MEASURES – CALCULATIONS

FIM # 02.01 S1 COOLING TOWERS REPLACEMENT

McKinstry Calculation

02.01 S1 Cooling Towers Replacement

Project Information:

Project Name	UWMC University of Washington Medical Center	FIM Name	02.01 S1 Cooling Towers Replacement
TCO Project ID	68	Engineer	Heramb Amonkar
TCO Tool FIM ID	19532	Date	3/1/2022

Description of FIM From TCO Tool:

Replace (3) existing S1 cooling towers serving the S1 chiller plant. The new cooling towers will be sized to operate the existing S1 chillers without the lake water for condenser loop. Replace the old leaking constant speed condenser pumps with new variable speed pumps sized for the new piping and cooling tower. Existing condenser piping has connections to lake water piping at multiple points and a mix of manual and automated valves for operation. Modify necessary condenser water piping to connect to the new cooling towers while maintaining existing lake water piping in the mechanical room.

FIM Calculation Method From TCO Tool:

Electrical energy savings are calculated using ASHRAE Temperature Bin spreadsheet model. Baseline operating conditions are models using combination of field collected data, current and historical BAS trends. Chiller plant load is estimated using BAS trend data from 2019 chiller plant study. Current year (2021) BAS trends are used for establishing Fan Speed operation. Chiller efficiency data is estimated based on measurements from the 2012 Master Plan. Proposed expected cooling load of connected chillers is used to estimate part-load fan speed curve. The model assumes all cooling towers will operate together in parallel. The cooling tower fill and drift eliminators were replaced in year 2019. Water savings from reduced evaporation loss and drift are not calculated. TMY3 weather data of station SEATTLE SEATTLE-TACOMA INTL A (Station ID: 727930) is used for calculation.

Inputs:

	Base	Proposed	Units	Basis of Value
# of Cooling Towers	3	3	Count	Site Data
CT Capacity	2,000	2,295	Tons	Manufacturer's Data
Total # of CT Fans	3	6	Count	Site Data, Proposed Design
Total Fan Power	160	120	HP	Manufacturer's Data, Proposed Design
Fan Speed Control	VFD	VFD	-	Site Data, Proposed Design
# of Condenser Pump	3	3	-	Site Data, Proposed Design
Total Condenser Pump Power	58	120	HP	Site Data, Proposed Design
Pump Speed Control	Constant	VFD	-	Site Data, Proposed Design
Pump Speed (Average)	100%	80%	%	Site Data, ~30 Pump BHP and 40 HP Pump
Total Chiller Plant Capacity	2,000	2,000	Tons	Site Data
S1 CH-1 Condenser Water Entering T	75	85	F	BAS Data, Proposed Design
S1 CH-1 Efficiency	0.413	0.446	kW/ton	Refer Attachment for data
Chiller Plant Lockout OAT	50	54	F	Approx. BAS data and Staff inputs
S1 Plant Chiller Efficiency (Avg)	0.55	0.55	kW/Ton	Assumption
Pump Motor Load Factor	0.95	N/A	-	Assumption
Motor Electric Efficiency	0.92	0.94	-	Typical Values
kBtu/Hr per kW Factor	3.4120	3.4120	kBtu/kWh	Constant
kBtu/Hr per Ton Factor	12.00	12.00	kbtu/TonHr	Constant
kW/HP Constant	0.7460	0.7460	kW/HP	Constant
VFD Exponent	2.50	2.50	-	Assumption
Cooling Tower Evaporation Rate	3	3	GPM/100 Tons	Rule of Thumb, Manufacturer Resources
Cycles of Concentration	10	10	-	Per Chemical Treatment Vendor
Gallons per CCF	748	748	Gal/CCF	Constant

Outputs:

Equipment	Baseline Energy Consumption *kWh/Yr*	Proposed Energy Consumption *kWh/Yr*	Energy Savings *kWh/Yr*
COOLING TOWER FANS	143,479	26,724	116,755
CONDENSER WATER PUMPS	170,088	209,338	-39,250
S1 CH-1 (CHILLER 1)	257,968	278,605	-20,637
TOTAL	571,535	514,667	56,868

Project Information:

Project Name	UWMC University of Washington Medical Center	FIM Name	02.01 S1 Cooling Towers Replacement
TCO Project ID	68	Engineer	Heramb Amonkar
TCO Tool FIM ID	19532	Date	3/1/2022

COOLING TOWER FANS

='Temp Bin'!O9	=IF(B59>$C$29,0.1045*(B59^2)-2.3709*(B59)-107.47,0)	=IF(B59>$C$29,-0.5133*(B59^2)+91.803*(B59)-3358.1,0)	=D59+E59	=VLOOKUP(B59,'CT Fan Speed Trend'!$A$13:$L$65,11,TRUE)	=VLOOKUP(B59,'CT Fan Speed Trend'!$A$13:$L$65,12,TRUE)	=$C$20*$C$35*(G59^$C$36)/$C$32	=(I59)*C59	=F59	=K59+(K59*$D$30*$D$33/$D$34)	=(L59/$D$18)*1.2	=$D$20*$D$35*(N59^$D$36)/$D$32	=(O59)*C59

	Baseline								Proposed				
Temperature Bin	Chiller Plant Operating Hours	S1 CH-1 Cooling Load	S1 CH-2,3 Cooling Load	S1 Chiller Plant Combined Load	Cooling Tower Fan Speed	Cooling Tower Range	Electric Demand	Energy Consumption	Connected Chiller Load	Cooling Tower Load (Heat Rejection)	Cooling Tower Fan Speed	Electric Demand	Energy Consumption
F	*Hrs/Yr*	*Tons*	*Tons*	*Tons*	*%*	*F*	*KW*	*kWh*	*Tons*	*Tons*	*%*	*KW*	*kWh*
90.0	1	526	746	1,272	100%	9.56	130	130	1,272	1,471	77%	49	49
87.5	9	485	745	1,230	100%	8.35	130	1,168	1,230	1,422	74%	45	409
85.0	18	446	737	1,183	100%	9.60	130	2,335	1,183	1,368	72%	41	741
82.5	30	408	722	1,130	100%	10.76	130	3,892	1,130	1,307	68%	37	1,103
80.0	65	372	701	1,073	100%	11.25	130	8,433	1,073	1,240	65%	32	2,097
77.5	46	336	674	1,010	100%	10.49	130	5,968	1,010	1,168	61%	28	1,277
75.0	151	303	640	942	100%	9.67	130	19,591	942	1,090	57%	23	3,524
72.5	129	270	600	870	99%	8.88	125	16,135	870	1,005	53%	19	2,462
70.0	251	239	553	792	96%	8.30	116	29,212	792	915	48%	15	3,788
67.5	217	209	500	709	84%	8.51	85	18,451	709	819	43%	11	2,482
65.0	379	180	440	620	69%	8.08	50	19,102	620	717	38%	8	3,110
62.5	373	153	375	527	53%	4.91	27	10,063	527	609	32%	5	2,037
60.0	624	126	302	429	38%	3.26	11	6,976	429	496	26%	3	2,033
57.5	614	102	223	325	19%	2.04	2	1,285	325	376	20%	2	1,002
55.0	933	78	138	217	13%	1.71	1	738	217	250	13%	1	551
52.5	632	56	47	103	0%	1.80	0	0	103	119	6%	0	58
50.0	941	0	0	0	0%	2.92	0	0	0	0	0%	0	0
47.5	522												
45.0	822												
42.5	561												
40.0	627												
37.5	287												
35.0	270												
32.5	124												
30.0	97												
27.5	21												
25.0	11												
22.5	5												
TOTAL	8,760							143,479					26,724

Project Information:

Project Name	UWMC University of Washington Medical Center	FIM Name	02.01 S1 Cooling Towers Replacement
TCO Project ID	68	Engineer	Heramb Amonkar
TCO Tool FIM ID	19532	Date	3/1/2022

CONDENSER WATER PUMPS

=C59	=IF(G59>0,$C$25,0)	=IF(D98>0,$C$23*$C$35*$C$31/$C$32,0)	=E98*C98	=$D$25	=$D$23*$D$35*(G98^$D$36)/$D$32	=(H98)*C98

	Baseline				Proposed		
Temperature Bin	Chiller Plant Operating Hours	Condenser Pump Speed	Electric Demand	Energy Consumption	Condenser Pump Speed	Electric Demand	Energy Consumption
	Hrs/Yr	*%*	*KW*	*kWh*	*%*	*KW*	*kWh*
90.0	1.0	100%	44	44	80%	54.5	55
87.5	9.0	100%	44	399	80%	54.5	491
85.0	18.0	100%	44	797	80%	54.5	981
82.5	30.0	100%	44	1,329	80%	54.5	1,635
80.0	65.0	100%	44	2,879	80%	54.5	3,543
77.5	46.0	100%	44	2,038	80%	54.5	2,508
75.0	151.0	100%	44	6,688	80%	54.5	8,232
72.5	129.0	100%	44	5,714	80%	54.5	7,032
70.0	251.0	100%	44	11,118	80%	54.5	13,683
67.5	217.0	100%	44	9,612	80%	54.5	11,830
65.0	379.0	100%	44	16,787	80%	54.5	20,661
62.5	373.0	100%	44	16,522	80%	54.5	20,334
60.0	624.0	100%	44	27,639	80%	54.5	34,017
57.5	614.0	100%	44	27,196	80%	54.5	33,472
55.0	933.0	100%	44	41,326	80%	54.5	50,863
52.5	632.0	0%	0	0	0%	0.0	0
50.0	941.0	0%	0	0	0%	0.0	0
47.5	522.0						
45.0	822.0						
42.5	561.0						
40.0	627.0						
37.5	287.0						
35.0	270.0						
32.5	124.0						
30.0	97.0						
27.5	21.0						
25.0	11.0						
22.5	5.0						
TOTAL	8,760			170,088			209,338

Project Information:

Project Name	UWMC University of Washington Medical Center	FIM Name	02.01 S1 Cooling Towers Replacement
TCO Project ID	68	Engineer	Heramb Amonkar
TCO Tool FIM ID	19532	Date	3/1/2022

S1 CH-1 (CHILLER 1)

=C98	=D59	=$C$28*D138	=E138*C138	=$D$28*D138	=(G138)*C138

	Baseline				Proposed	
Temperature Bin	Chiller Plant Operating Hours *Hrs/Yr*	S1 CH-1 Cooling Load	Electric Demand *KW*	Energy Consumption *kWh*	Electric Demand *KW*	Energy Consumption *kWh*
90.0	1.0	526	217	217	234.2	234
87.5	9.0	485	200	1,801	216.1	1,945
85.0	18.0	446	184	3,312	198.7	3,577
82.5	30.0	408	168	5,051	181.8	5,455
80.0	65.0	372	153	9,965	165.6	10,762
77.5	46.0	336	139	6,384	149.9	6,895
75.0	151.0	303	125	18,844	134.8	20,351
72.5	129.0	270	111	14,363	120.2	15,512
70.0	251.0	239	98	24,706	106.3	26,682
67.5	217.0	209	86	18,674	92.9	20,168
65.0	379.0	180	74	28,130	80.2	30,381
62.5	373.0	153	63	23,472	68.0	25,350
60.0	624.0	126	52	32,555	56.3	35,159
57.5	614.0	102	42	25,760	45.3	27,820
55.0	933.0	78	32	30,113	34.9	32,522
52.5	632.0	56	23	14,622	25.0	15,791
50.0	941.0	0	0	0	0.0	0
47.5	522.0					
45.0	822.0					
42.5	561.0					
40.0	627.0					
37.5	287.0					
35.0	270.0					
32.5	124.0					
30.0	97.0					
27.5	21.0					
25.0	11.0					
22.5	5.0					
TOTAL	8,760			257,968		278,605

02.01 S1 Cooling Towers Replacement

TMY3 Temperature Bin Data

Station: WA, SEATTLE SEATTLE-TACOMA INTL A
Station ID: 727930TY

	January	February	March	April	May	June	July	August	September	October	November	December	Total
DBR (°F)	1	2	3	4	5	6	7	8	9	10	11	12	Grand Total
90.0								1					1
87.5							1	8					9
85.0							4	14					18
82.5							11	19					30
80.0				9		3	24	29					65
77.5				3	1	5	9	26	2				46
75.0				5	17	26	38	46	19				151
72.5				6	15	16	35	39	18				129
70.0			1	8	24	51	70	57	31	6	3		251
67.5		2	3	5	19	37	46	77	24	3	1		217
65.0		3	1	21	30	70	96	80	58	17	3		379
62.5		2	8	12	41	60	57	94	71	26	2		373
60.0		3	17	38	66	106	144	83	103	53	11		624
57.5	3	22	12	43	76	95	98	98	100	49	18		614
55.0	4	34	51	88	106	119	92	50	190	120	71	8	933
52.5	9	32	64	71	76	77	19	23	54	127	67	13	632
50.0	34	58	128	139	138	49			37	187	107	64	941
47.5	36	51	95	91	67	6			11	69	50	46	522
45.0	139	85	159	97	52				2	80	98	110	822
42.5	125	55	78	35	12					7	113	136	561
40.0	115	91	82	39	4						115	181	627
37.5	63	75	28	7							33	81	287
35.0	97	80	12	3							23	55	270
32.5	49	31	4								5	35	124
30.0	46	35	1									15	97
27.5	17	4											21
25.0	7	4											11
22.5		5											5
Grand Tota	744	672	744	720	744	720	744	744	720	744	720	744	8,760

S1 Chiller Plant Operation

Per BAS trend data and conversation with UWMC Facilities.

02.01 S1 Cooling Towers Replacement
Existing Cooling Towers BAS Trend Data

Reference :

Report: Chilled Water System Capacity Review & S1 Cooling Towers Upgrade UW Medical Center

Report Date: ######

Data duration: 3-day period trend data of Chilled Water Plants (08/08/18 Wed - 08/10/18 Fri).

Summary of BAS Data.

OA DBT (F)	Average of OA RH (%)	Average of OA WBT (f)	Average of CT 1 SPEED (%)	Average of CT 2 SPEED (%)	Average of CT 3 SPEED (%)	Average of CT1 Range (F)	Average of CT2 Range (F)	Average of CT3 Range (F)
50.0	93.3	49.0		0.0	0.0	9.6	2.7	3.1
51.0	96.0	50.4		1.4	1.9	13.7	4.8	4.8
52.0	90.2	50.4		0.0	0.0	8.8	2.0	1.6
53.0	86.1	50.8		2.9	9.6	5.5	1.4	1.1
54.0	83.8	51.3		5.0	12.2	5.2	1.7	1.5
55.0	77.0	51.2		6.2	19.8	7.0	1.8	1.7
56.0	74.3	51.5		11.0	22.8	6.7	1.9	1.9
57.0	78.9	53.2		14.6	23.8	6.5	2.1	2.0
58.0	#DIV/0!	#VALUE!		16.9	28.6	5.6	2.3	2.3
59.0	77.4	54.9		21.9	34.9	6.1	2.6	2.8
60.0	76.7	55.6		30.8	44.3	6.3	3.2	3.4
61.0	75.8	56.4		36.0	55.4	6.4	4.8	4.5
62.0	80.5	58.3		43.1	63.6	6.8	5.0	4.8
63.0	#DIV/0!	#VALUE!		45.3	78.8	8.8	8.4	6.9
64.0	#DIV/0!	#VALUE!		51.0	77.8	8.7	8.5	6.9
65.0	#DIV/0!	#VALUE!		52.0	85.1	8.3	9.0	7.1
66.0	73.5	60.5		64.4	87.8	5.4	8.0	6.5
67.0	68.4	60.3		73.4	95.5	6.4	9.4	7.6
68.0	73.6	62.3		84.7	96.7	6.5	8.8	6.8
69.0	69.8	62.4		82.4	96.5	7.3	9.5	7.2
70.0	69.0	63.0		91.8	99.7	7.0	9.5	7.1
71.0	68.8	64.0		92.0	99.6	6.5	10.6	7.5
72.0	67.7	64.6		97.1	100.0	6.9	10.2	7.5
73.0	63.6	64.5		99.6	100.0	4.3	10.3	7.8
74.0	61.0	64.6		99.7	100.0	5.0	11.2	8.2
75.0	61.3	65.5		100.0	100.0	4.7	11.3	8.1
76.0	57.8	65.4		99.9	100.0	4.9	10.9	8.1
77.0	60.6	67.2		100.0	100.0	5.7	12.2	8.8
78.0	59.1	67.6		100.0	100.0	9.2	13.7	9.4
79.0	53.8	66.9		100.0	100.0	7.8	13.9	9.8

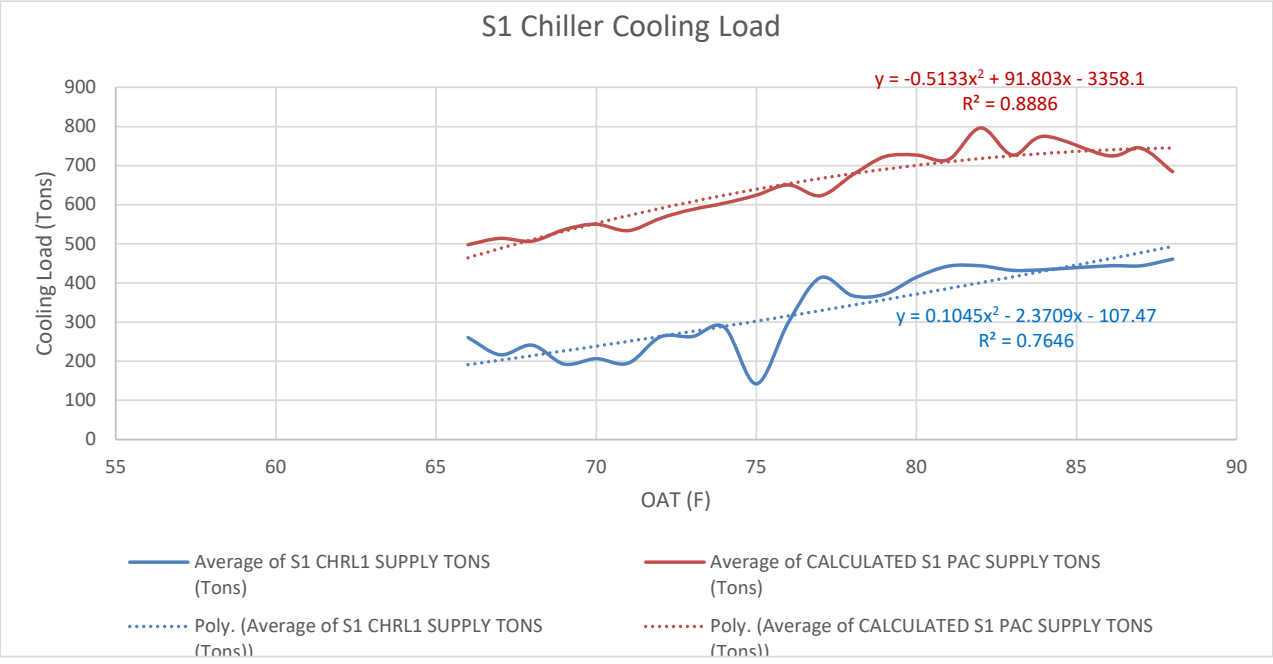
OA DBT (F)	Average of OA RH (%)	Average of OA WBT (f)	Average of CT 1 SPEED (%)	Average of CT 2 SPEED (%)	Average of CT 3 SPEED (%)	Average of CT1 Range (F)	Average of CT2 Range (F)	Average of CT3 Range (F)
80.0	53.1	67.6		100.0	100.0	7.4	12.7	9.8
81.0	48.6	67.1		100.0	100.0	5.6	13.8	9.2
82.0	51.5	68.6		100.0	100.0	5.9	12.6	8.9
83.0	48.3	68.6		100.0	100.0	0.4	10.9	8.8
84.0	51.4	70.2		100.0	100.0	2.6	10.7	8.7
85.0	46.8	69.8		100.0	100.0	4.0	10.6	8.6
86.0	47.7	70.8		100.0	100.0	4.7	10.7	8.7
87.0	50.4	72.7		100.0	100.0	6.2	9.2	7.5
88.0	53.1	74.2		100.0	100.0	7.5	9.0	7.1
89.0	51.6	74.5		100.0	100.0	5.7	11.0	9.1
90.0	47.6	74.2		100.0	100.0	4.5	10.5	8.6
91.0	45.8	74.1		100.0	100.0	-0.7	10.6	8.6
93.0	43.0	74.7		100.0	100.0	-1.9	9.6	7.9
94.0	39.6	74.3		100.0	100.0	-1.8	11.2	9.2
95.0	40.8	75.4		100.0	100.0	-6.2	9.6	8.0
96.0	37.3	74.8		100.0	100.0	-1.1	9.3	7.4
97.0	36.6	75.2		100.0	100.0	-2.9	10.3	8.1
98.0	39.0	76.6		100.0	100.0	6.8	8.0	6.2
99.0	34.9	75.9		100.0	100.0	6.7	8.0	6.2
100.0	33.9	76.3		100.0	100.0	6.6	8.2	6.2
101.0	33.0	76.3		100.0	100.0	6.8	8.1	6.2
102.0	31.4	76.5		100.0	100.0	6.5	7.9	6.0
103.0	32.4	77.7		100.0	100.0	6.2	7.8	5.8

02.01 S1 Cooling Towers Replacement

Existing Chillers cooling Load Trend Data

Reference :
Report: Chilled Water System Capacity Review & S1 Cooling Towers Upgrade UW Medical Center
Report Date: 8/29/2019
Data duration: 3-day period trend data of Chilled Water Plants (08/08/18 Wed - 08/10/18 Fri).

OA DBT (F)	Average of S1CHLR1 CWE TEMP (F)	Average of S1 CHRL1 SUPPLY TONS (Tons)	Average of CALCULATED S1 PAC SUPPLY TONS (Tons)	Average of S1 PAC Chillers Calc + S1 CH1 Supply Tons (Tons)
88	76	461	684	1,145
87	76	444	745	1,189
86	76	444	725	1,169
84	76	434	775	1,209
83	76	433	727	1,160
82	76	444	796	1,241
81	75	443	715	1,158
80	75	415	727	1,142
79	76	371	723	1,094
78	75	368	676	1,044
77	75	414	623	1,037
76	75	299	651	950
75	75	142	624	767
74	75	287	604	891
73	75	263	588	852
72	75	262	565	828
71	74	195	534	729
70	75	206	550	757
69	75	193	536	729
68	75	241	507	749
67	74	216	514	730
66	74	261	498	759



CURVE FIT

	x^2	x	c
S1 CH-1	0.1045	-2.3709	-107.47
S1 PAC	-0.5133	91.803	-3358.1

02.01 S1 Cooling Towers Replacement
S1 CH-1 Efficiency Data

Reference:

Report : University of Washington Medical Center Master Plan Revision 1
Date : 3/12/2013
Page # : 139

S1 Chiller kW/Ton Tests

Commissioning Engineer: Bill Macan

Test Description:

Test the performance of the S-1 chiller to determine how much the cool lake water benefits efficiency.

	TEST-1 CH-S1-1 Lake water (12-4-12)							
	kW	CH Load Percent of 600 Tons	Tons	Evap ewt	Evap lwt	kW/ton	Cond ewt	Cond lwt
Sample-1 (2:06 PM)	50	26	156	53.3	43.4	0.32	50.2	55.5
Sample-2 (2:23PM)	60	28	168	49.6	42.9	0.36	50.2	56.6
Sample-3 (time=?)	45	25	150	49.3	43.4	0.30	50.2	55.7
Sample-4 (2:42 PM)	61	29	174	50	43.2	0.35	56.9	50.2
Average						0.33		

Notes: ABOVE DATA FROM CHILLER PANEL UNLESS OTHER WISE NOTED
Sample-2 DATA RECORDED IMMEDIATELY AFTER MONTLAKE TOWER LOAD WAS TRANSFERED TO S1-1
Sample-3 DATA RECORDED 5 MINUTES AFTER MONTLAKE TOWER LOAD WAS TRANSFERED TO S1-1
Sample-4 DATA RECORDED 10 MINUTES AFTER MONTLAKE TOWER LOAD WAS TRANSFERED TO S1-1

Data screenshot from the report

Yr 2012 Data		*Units*
Condenser Water Entering Temperature	50.0	*F*
Measured Chiller Efficiency	0.33	*kW/Ton*

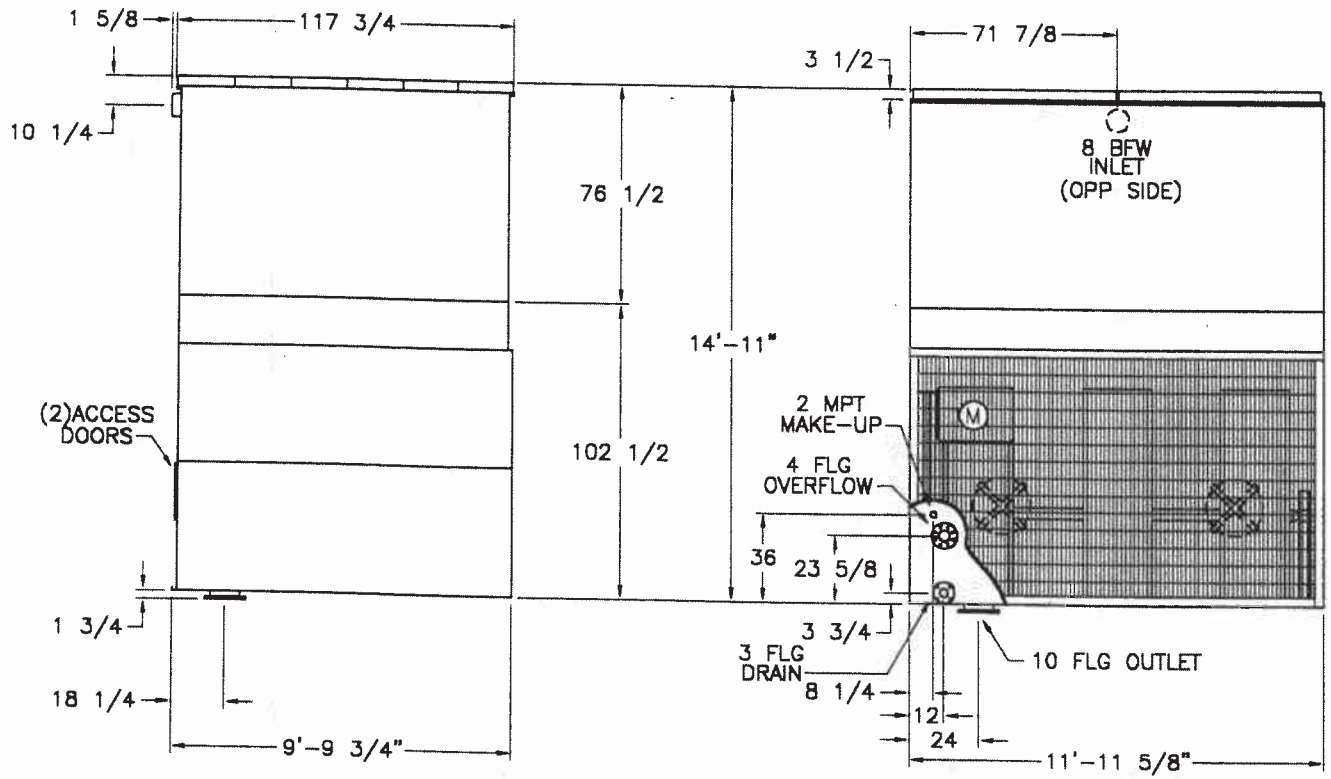
Condenser Water Reset Rule of Thumb		
Efficiency degradation per Deg F rise in condenser water	1.0%	*%*

Interpolation for Baseline Data (Yr 2019)		
Condenser Water Entering Temperature in Summer (Avg)	75.0	*F*
Estimated Chiller Efficiency (Avg)	0.4125	*kW/Ton*

Interpolation for Proposed Data		
Condenser Water Entering Temperature (Estimated)	85.0	*F*
Estimated Chiller Efficiency (Avg)	0.4455	*kW/Ton*

5.4 FACILITY IMPROVEMENT MEASURES - ADDITIONAL SCOPE DOCUMENTS

FIM # 02.01 S1 COOLING TOWERS REPLACEMENT



NOTES:

1. (M) – FAN MOTOR LOCATION
2. MAKE-UP WATER PRESSURE 20 psi MIN. 50 psi MAX.
3. 3/4" DIA. MOUNTING HOLES. REFER TO RECOMMENDED STEEL SUPPORT DRAWING.
4. MPT DENOTES MALE PIPE THREAD
   FPT DENOTES FEMALE PIPE THREAD
   BFW DENOTES BEVELED FOR WELDING.
5. HEAVIEST SECTION IS LOWER SECTION.

WEIGHTS			NO. SHIPPING SECTIONS
SHIPPING	OPER.	HEAVIEST SECTION	
8070	13440	5120	2

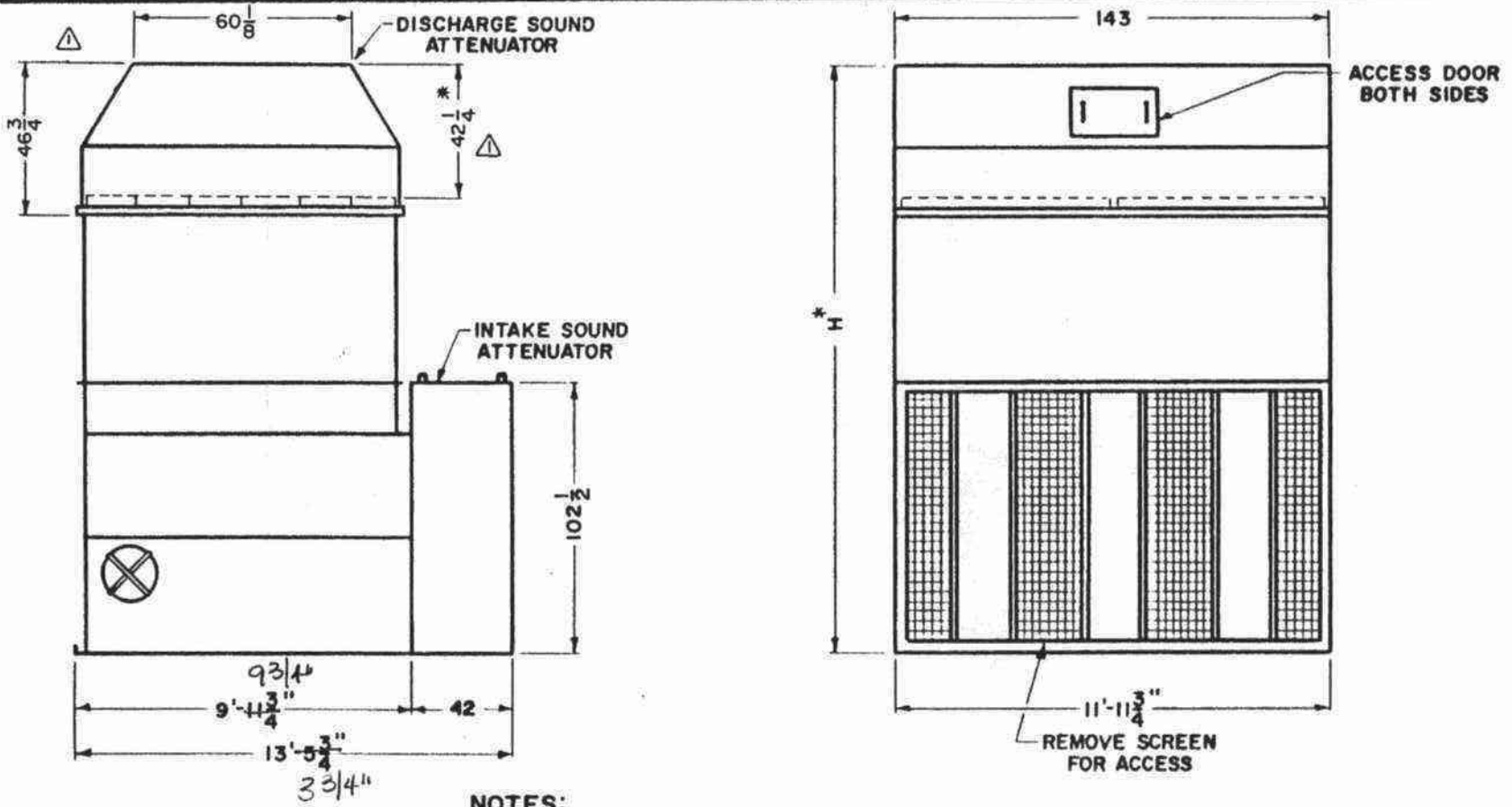
MODEL NUMBER: (2) LSTA 10-122 COOLING TOWERS
CERTIFIED FOR W.A. Botting Company Project: UW Medical Center
CUSTOMER NO. #812-20-04-03-9H EVAPCO NO. #97-7762/63W
CAPACITY 1,350 GPM 100 ° IN 85 ° OUT 68 ° W.B.
FAN MOTOR HP 1) 50 HP Inverter Duty ELEC. SPEC. 460/3/60 TEFC
INLET PRESSURE 4.4 P.S.I.G. Drive Sized For 0" ESP
REMARKS: Accessories: Full Sound Attenuation, Stainless Steel Basin, Low Level Alarm Float Switch (Loose), Epoxy Coated Fan Shaft.

1/22/98 dlr

evapco

COOLING TOWER

TLTM1224ERA-04



NOTES:

- WEIGHT OF DISCHARGE ATTENUATOR ONLY. SHIPPING WEIGHT OF UNIT FOUND ON CERTIFIED PRINT. ELIMINATORS WILL NORMALLY SHIP INSTALLED IN ATTENUATOR.

* THE DISCHARGE ATTENUATOR SURROUNDS THE ELIMINATORS AND IS RECESSED 1" INTO THE ELIMINATOR FRAME. OVERALL HEIGHT OF THE UNIT WITH ATTENUATOR WILL BE THE HEIGHT OF THE UNIT FROM THE CERTIFIED PRINT PLUS 42-1/4". ⚠

WEIGHTS:

- INTAKE ATTENUATOR - 1925 lbs.
- DISCHARGE ATTENUATOR - 1468 lbs

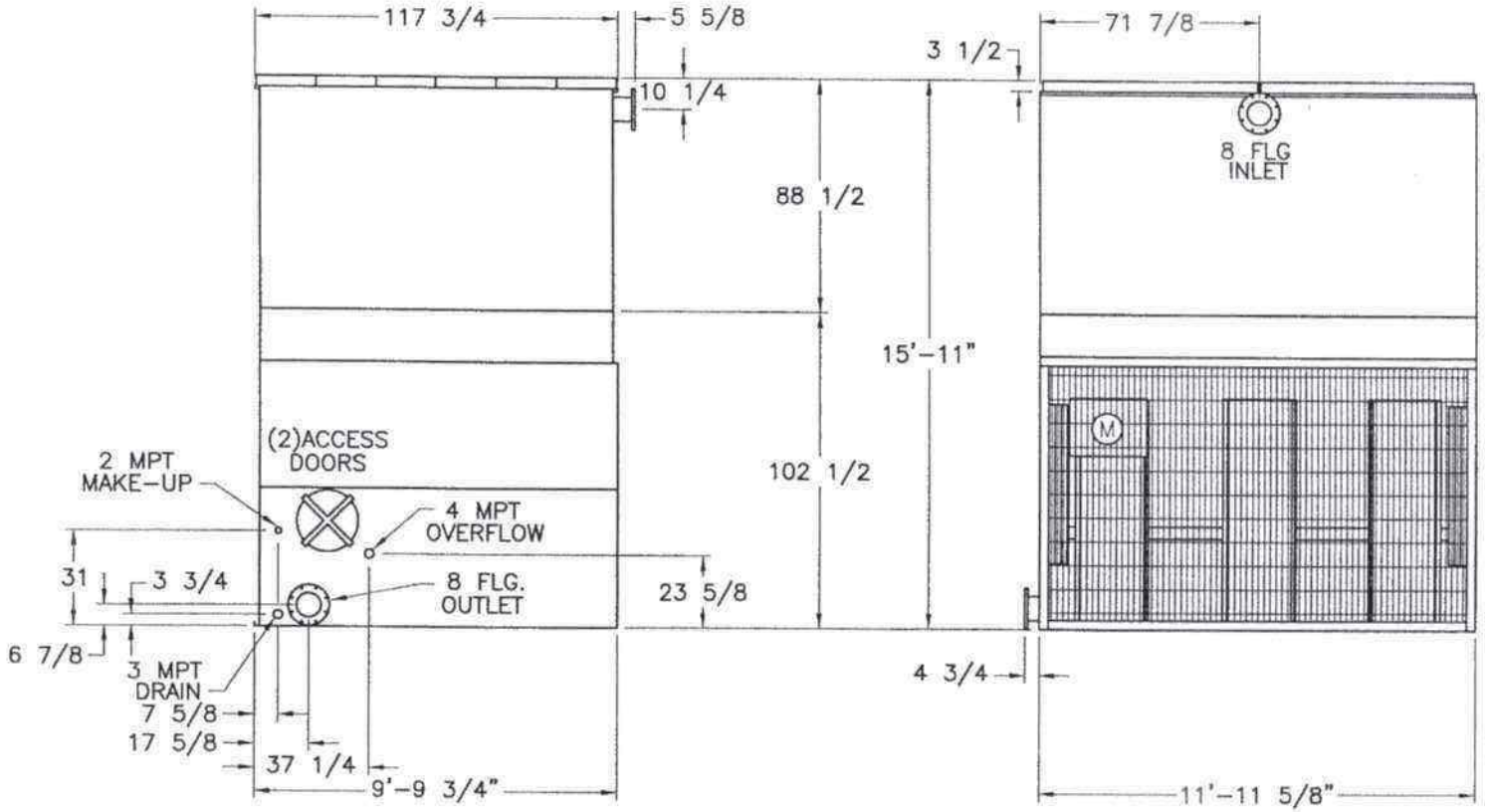
REVISIONS	
⚠ - 60-1/8 WAS 55-1/2 46-3/4 WAS 50 42-1/4 WAS 45-1/2 RALLY 6/20/90	

EVAPCO, INC.

DISCHARGE AND INTAKE ATTENUATION

LSTA 10-121 THRU LSTA 10-126
LSCA 400 THRU LSCA 515, LSWA116A THRU LSWA116D

SCALE: NONE	
DWG. BY: BILL 4/25/88	SP2400



NOTES:

1. (M) – FAN MOTOR LOCATION
2. MAKE-UP WATER PRESSURE 20 psi MIN. 50 psi MAX.
3. 3/4" DIA. MOUNTING HOLES. REFER TO RECOMMENDED STEEL SUPPORT DRAWING.
4. MPT DENOTES MALE PIPE THREAD
   FPT DENOTES FEMALE PIPE THREAD
   BFW DENOTES BEVELED FOR WELDING.
5. HEAVIEST SECTION IS LOWER SECTION.
6. ALL FLG. CONNS. ARE TO BE MOUNTED BY EVAPCO.

WEIGHTS			NO. SHIPPING SECTIONS
SHIPPING	OPER.	HEAVIEST SECTION	
8600	13970	5240	2

EVAPCO MODEL (1) LSTA 10-125 COOLING TOWER

CERTIFIED FOR DIAMOND "B" CONSTRUCTORS, INC. PROJECT UWMC SURGERY PAVILION

CUSTOMER ORDER NO. 2588-13516 EVAPCO No. W027102

CAPACITY 1,800 GPM 95 °F IN 85 °F OUT 68 °F E.W.B.

FAN MOTOR HP (1) 60 INVERTER DUTY ELEC. SPEC. 460/60/3

INLET PRESSURE 4.3 PSIG DRIVES SIZED FOR 0" ESP

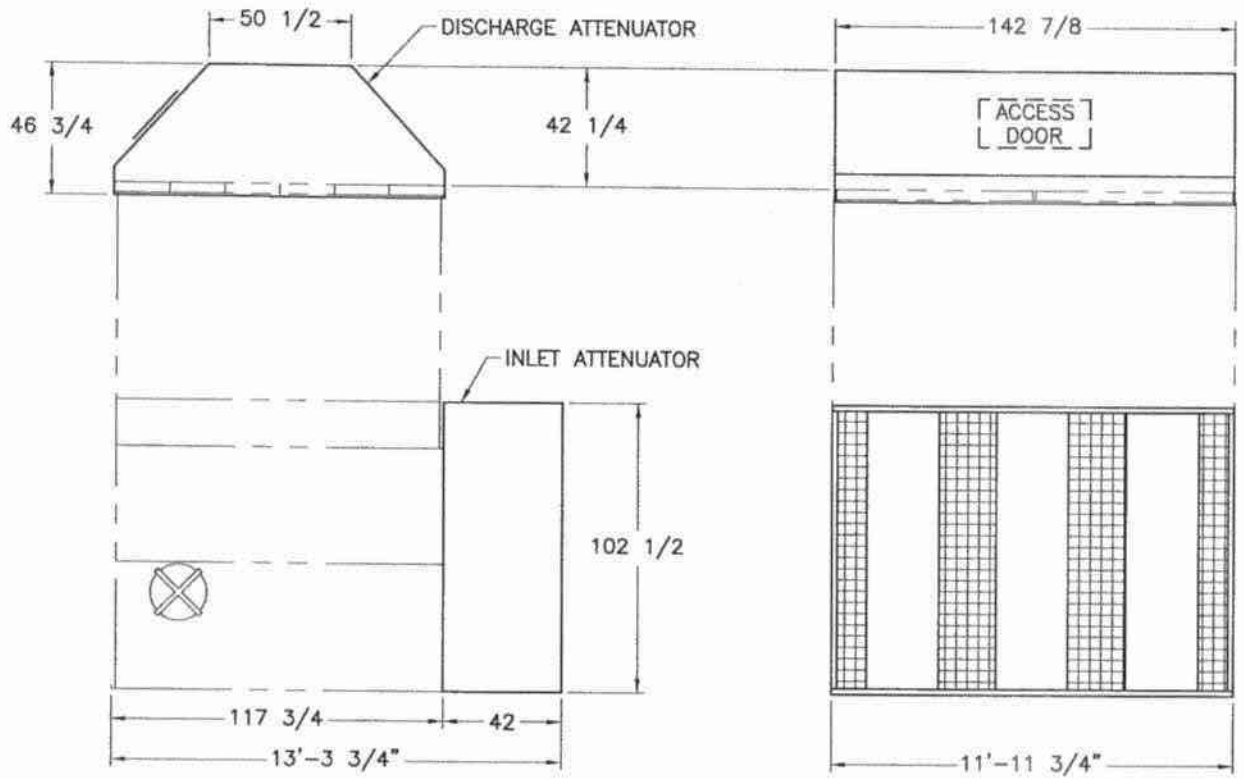
REMARKS UNIT PROVIDED WITH A DISCHARGE SOUND ATTENUATION PACKAGE AND AIR INLET SOUND ATTENUATION (SEE ATTENUATION DRAWING FOR ADDITIONAL WEIGHT). UNIT FURNISHED WITH ELECTRONIC WATER LEVEL CONTROL PACKAGE, (1) 8" FLANGED INLET CONNECTION (TO SHIP LOOSE), (1) 8" FLANGED OUTLET CONNECTION (TO SHIP MOUNTED) AND (1) VIBRATION CUTOUT SWITCH (MOUNTED, WIRING AND SENSITIVITY ADJUSTMENT BY OTHERS.

evapco

COOLING TOWER

JLA/kls 08/19/2002

TLTM1236ERA-65



ALL 3mx12 CENT.

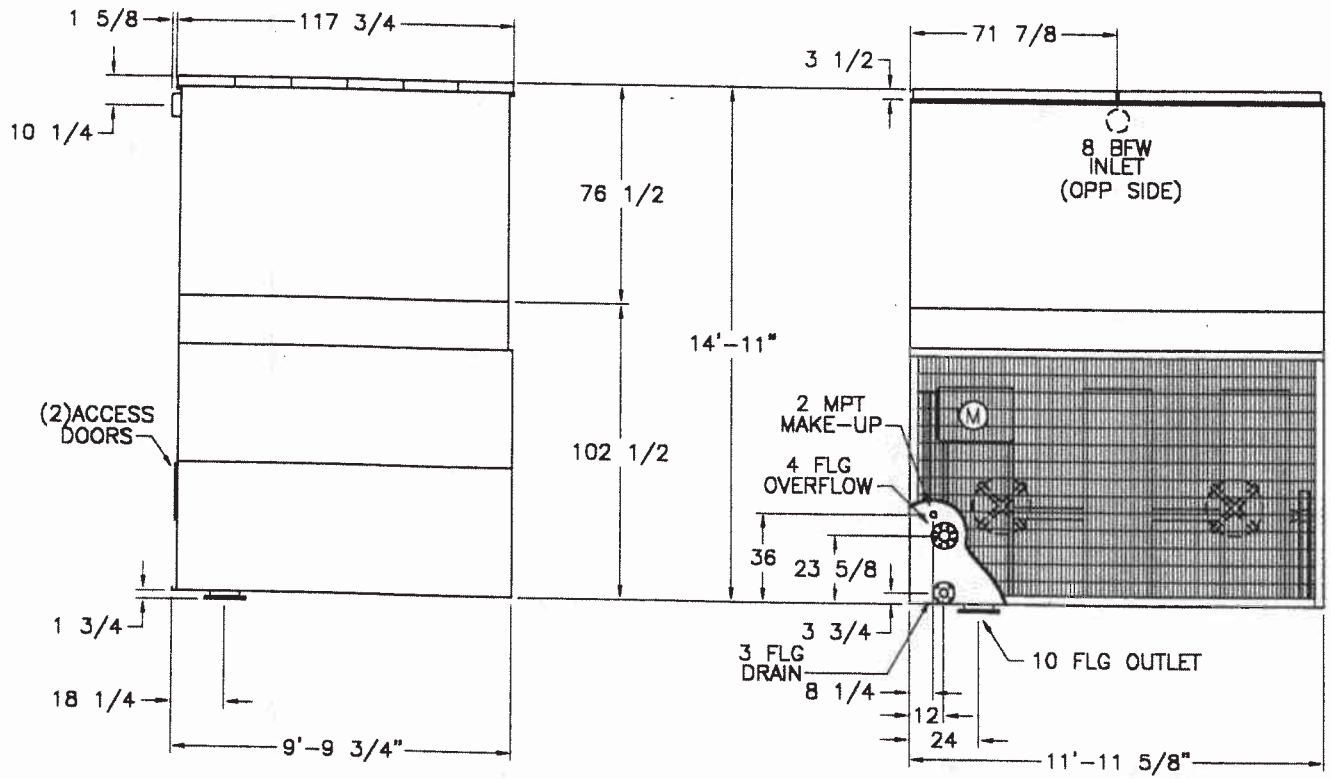
NOTES:

1. APPROXIMATE SHIPPING WEIGHT OF EACH INTAKE ATTENUATOR IS 1925 lbs. APPROXIMATE SHIPPING WEIGHT OF EACH DISCHARGE ATTENUATOR IS 1468 lbs. WEIGHT OF UNIT FOUND ON CERTIFIED PRINT.
2. ELIMINATORS WILL NORMALLY SHIP INSTALLED IN ATTENUATOR.
3. THE DISCHARGE ATTENUATOR SURROUNDS THE ELIMINATORS AND IS RECESSED 1" INTO THE ELIMINATOR FRAME. OVERALL HEIGHT OF THE UNIT WITH THE ATTENUATOR WILL BE THE HEIGHT OF THE UNIT FROM THE CERTIFIED PRINT PLUS 42 1/4".

evapco

FULL SOUND ATTENUATION WITHOUT DAMPERS

TLTM12ERA-FA



NOTES:

1. (M) – FAN MOTOR LOCATION
2. MAKE-UP WATER PRESSURE 20 psi MIN. 50 psi MAX.
3. 3/4" DIA. MOUNTING HOLES. REFER TO RECOMMENDED STEEL SUPPORT DRAWING.
4. MPT DENOTES MALE PIPE THREAD
   FPT DENOTES FEMALE PIPE THREAD
   BFW DENOTES BEVELED FOR WELDING.
5. HEAVIEST SECTION IS LOWER SECTION.

WEIGHTS			NO. SHIPPING SECTIONS
SHIPPING	OPER.	HEAVIEST SECTION	
8070	13440	5120	2

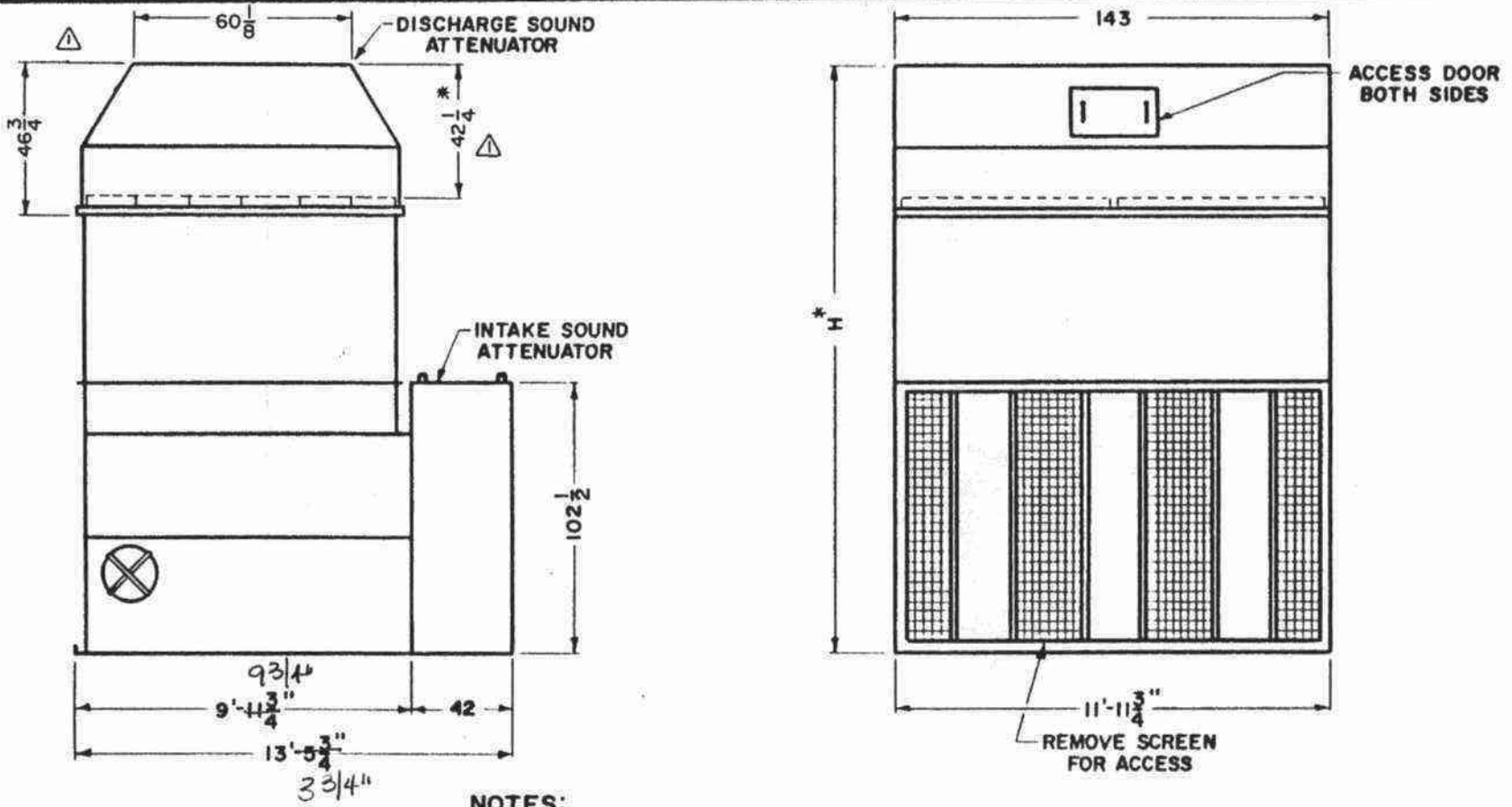
MODEL NUMBER: (2) LSTA 10-122 COOLING TOWERS
CERTIFIED FOR W.A. Botting Company Project: UW Medical Center
CUSTOMER NO. #812-20-04-03-9H EVAPCO NO. #97-7762/63W
CAPACITY 1,350 GPM 100 ° IN 85 ° OUT 68 ° W.B.
FAN MOTOR HP 1) 50 HP Inverter Duty ELEC. SPEC. 460/3/60 TEFC
INLET PRESSURE 4.4 P.S.I.G. Drive Sized For 0" ESP
REMARKS: Accessories: Full Sound Attenuation, Stainless Steel Basin, Low Level Alarm Float Switch (Loose), Epoxy Coated Fan Shaft.

1/22/98 dlr

evapco

COOLING TOWER

TLTM1224ERA-04



NOTES:

- WEIGHT OF DISCHARGE ATTENUATOR ONLY. SHIPPING WEIGHT OF UNIT FOUND ON CERTIFIED PRINT. ELIMINATORS WILL NORMALLY SHIP INSTALLED IN ATTENUATOR.

*THE DISCHARGE ATTENUATOR SURROUNDS THE ELIMINATORS AND IS RECESSED 1" INTO THE ELIMINATOR FRAME. OVERALL HEIGHT OF THE UNIT WITH ATTENUATOR WILL BE THE HEIGHT OF THE UNIT FROM THE CERTIFIED PRINT PLUS 42-1/4". ⚠

WEIGHTS:

- INTAKE ATTENUATOR - 1925 lbs.
- DISCHARGE ATTENUATOR - 1468 lbs

REVISIONS	
⚠ - 60-1/8 WAS 55-1/2 46-3/4 WAS 50 42-1/4 WAS 45-1/2 RALLY 6/20/90	

EVAPCO, INC.

DISCHARGE AND INTAKE ATTENUATION

LSTA 10-121 THRU LSTA 10-126
LSCA 400 THRU LSCA 515, LSWA116A THRU LSWA116D

SCALE: NONE	
DWG. BY: BILL 4/25/88	SP2400

Evapco, Inc.
Sound Data

Sound Pressure Levels (SPL) in dB RE 0.0002 Microbar
Sound Power Levels (PWL) in dB RE 10^{-12} Watt

Sound Reduction Options
Full Attenuation

MODEL: LSTA 10-122
MOTOR: 50 Hp (37 kW)
MOTORS: 1
SPEED: Full Speed

	SOUND PRESSURE LEVEL										
	Conn. End		Fan Side		Opp. End		Opp. Side		Overhead		SOUND
	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	POWER
BAND	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	LEVEL
63 HZ	76	65	83	69	76	65	72	60	83	65	98
125 HZ	71	61	77	64	71	61	72	59	80	63	94
250 HZ	62	50	69	57	62	50	65	51	76	61	88
500 HZ	58	46	63	48	58	46	60	48	72	57	83
1 kHZ	55	42	61	45	55	42	58	45	62	48	77
2 kHZ	53	38	59	44	53	38	57	43	63	48	76
4 kHZ	50	36	60	44	50	36	55	41	60	44	73
8 kHZ	50	36	61	44	50	36	54	36	62	44	73
dBA	62	50	69	55	62	50	65	52	74	58	86

REMARKS: 1. Sound Pressure Levels are according to CTI Standard ATC-128.
2. Sound Power Levels are calculated according to the Small Units Section 8.
3. Sound from free-field conditions over a reflecting plane with +/- 2 db(A) tolerance.
4. Noise levels can increase with variable frequency drives depending on the drive manufacturer and the drive configuration.

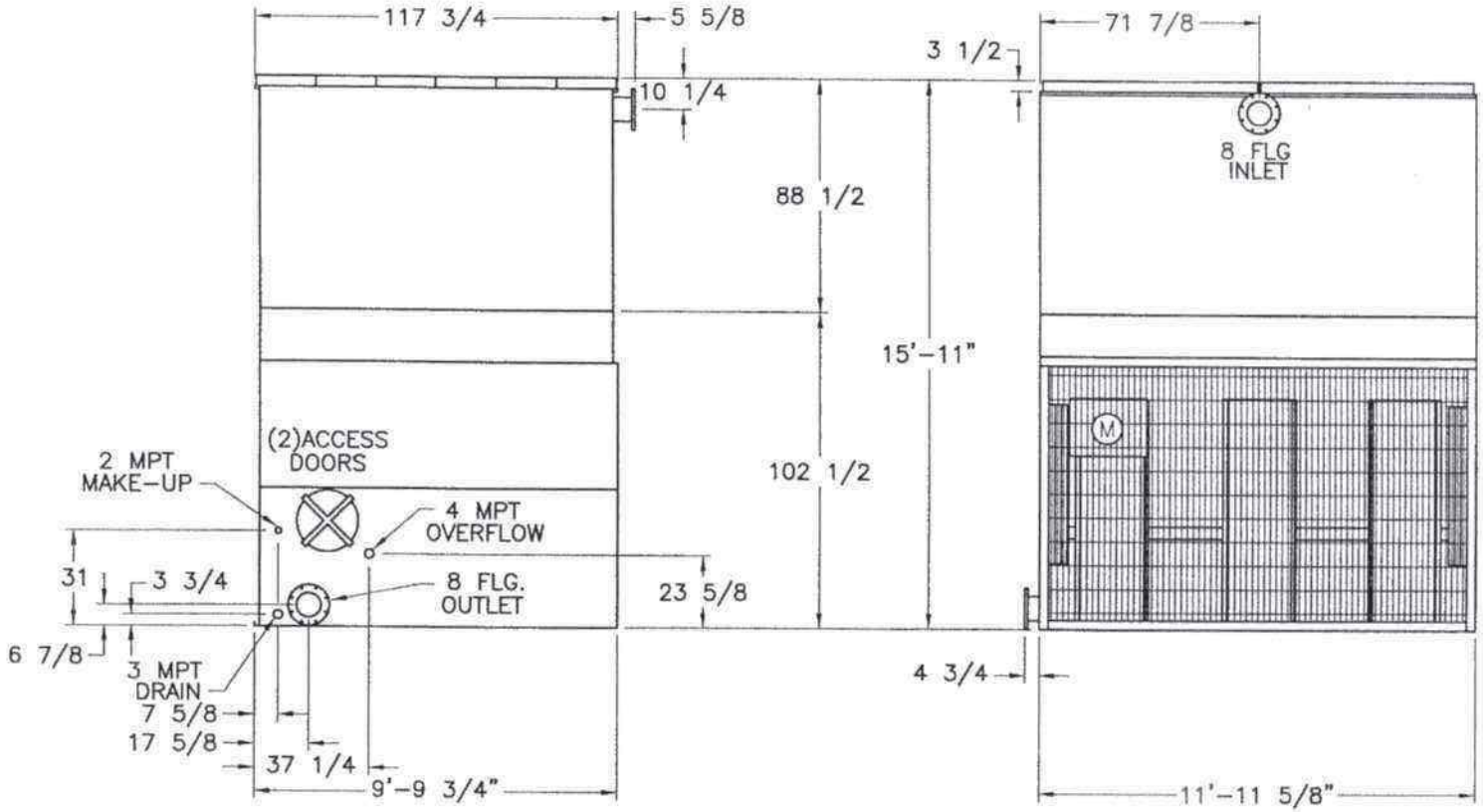
Evapco, Inc.
Sound Data

Sound Pressure Levels (SPL) in dB RE 0.0002 Microbar
Sound Power Levels (PWL) in dB RE 10^{-12} Watt

MODEL: LSTA 10-122
MOTOR: 40 Hp (30 kW)
MOTORS: 1
SPEED: Full Speed

	SOUND PRESSURE LEVEL										
	Conn. End		Fan Side		Opp. End		Opp. Side		Overhead		SOUND
	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	POWER
BAND	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	LEVEL
63 HZ	78	67	84	70	78	67	74	62	84	66	99
125 HZ	74	64	82	69	74	64	74	61	81	64	97
250 HZ	69	57	79	67	69	57	69	55	78	63	94
500 HZ	68	56	80	65	68	56	66	54	79	64	93
1 kHZ	66	53	76	60	66	53	64	51	73	59	89
2 kHZ	64	49	75	60	64	49	63	49	71	56	87
4 kHZ	60	46	73	57	60	46	59	45	69	53	84
8 kHZ	55	41	70	53	55	41	57	39	69	51	81
dBA	71	58	82	67	71	58	70	57	80	65	95

REMARKS: 1. Sound Pressure Levels are according to CTI Standard ATC-128.
2. Sound Power Levels are calculated according to the Small Units Section 8.
3. Sound from free-field conditions over a reflecting plane with +/- 2 db(A) tolerance.
4. Noise levels can increase with variable frequency drives depending on the drive manufacturer and the drive configuration.



NOTES:

1. (M) – FAN MOTOR LOCATION
2. MAKE-UP WATER PRESSURE 20 psi MIN. 50 psi MAX.
3. 3/4" DIA. MOUNTING HOLES. REFER TO RECOMMENDED STEEL SUPPORT DRAWING.
4. MPT DENOTES MALE PIPE THREAD
   FPT DENOTES FEMALE PIPE THREAD
   BFW DENOTES BEVELED FOR WELDING.
5. HEAVIEST SECTION IS LOWER SECTION.
6. ALL FLG. CONNS. ARE TO BE MOUNTED BY EVAPCO.

WEIGHTS			NO. SHIPPING SECTIONS
SHIPPING	OPER.	HEAVIEST SECTION	
8600	13970	5240	2

EVAPCO MODEL (1) LSTA 10-125 COOLING TOWER

CERTIFIED FOR DIAMOND "B" CONSTRUCTORS, INC. PROJECT UWMC SURGERY PAVILION

CUSTOMER ORDER NO. 2588-13516 EVAPCO No. W027102

CAPACITY 1,800 GPM 95 °F IN 85 °F OUT 68 °F E.W.B.

FAN MOTOR HP (1) 60 INVERTER DUTY ELEC. SPEC. 460/60/3

INLET PRESSURE 4.3 PSIG DRIVES SIZED FOR 0" ESP

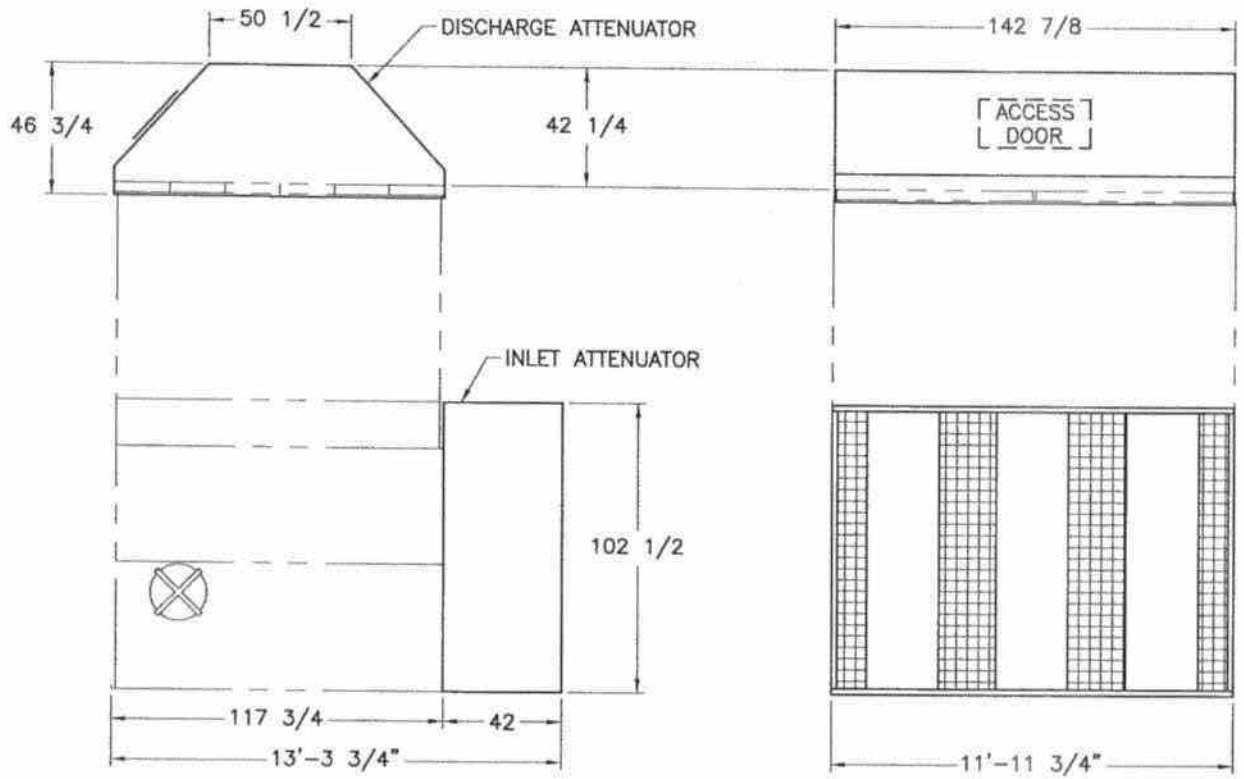
REMARKS UNIT PROVIDED WITH A DISCHARGE SOUND ATTENUATION PACKAGE AND AIR INLET SOUND ATTENUATION (SEE ATTENUATION DRAWING FOR ADDITIONAL WEIGHT). UNIT FURNISHED WITH ELECTRONIC WATER LEVEL CONTROL PACKAGE, (1) 8" FLANGED INLET CONNECTION (TO SHIP LOOSE), (1) 8" FLANGED OUTLET CONNECTION (TO SHIP MOUNTED) AND (1) VIBRATION CUTOUT SWITCH (MOUNTED, WIRING AND SENSITIVITY ADJUSTMENT BY OTHERS.

evapco

COOLING TOWER

JLA/kls 08/19/2002

TLTM1236ERA-65



ALL 3mx12 CENT.

NOTES:

1. APPROXIMATE SHIPPING WEIGHT OF EACH INTAKE ATTENUATOR IS 1925 lbs. APPROXIMATE SHIPPING WEIGHT OF EACH DISCHARGE ATTENUATOR IS 1468 lbs. WEIGHT OF UNIT FOUND ON CERTIFIED PRINT.
2. ELIMINATORS WILL NORMALLY SHIP INSTALLED IN ATTENUATOR.
3. THE DISCHARGE ATTENUATOR SURROUNDS THE ELIMINATORS AND IS RECESSED 1" INTO THE ELIMINATOR FRAME. OVERALL HEIGHT OF THE UNIT WITH THE ATTENUATOR WILL BE THE HEIGHT OF THE UNIT FROM THE CERTIFIED PRINT PLUS 42 1/4".

evapco

FULL SOUND ATTENUATION WITHOUT DAMPERS

TLTM12ERA-FA

Evapco, Inc.
Sound Data

Sound Pressure Levels (SPL) in dB RE 0.0002 Microbar
Sound Power Levels (PWL) in dB RE 10^{-12} Watt

Sound Reduction Options
Full Attenuation

MODEL: LSTA 10-125
MOTOR: 60 Hp (45 kW)
MOTORS: 1
SPEED: Full Speed

	SOUND PRESSURE LEVEL										
	Conn. End		Fan Side		Opp. End		Opp. Side		Overhead		SOUND
	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	POWER
BAND	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	LEVEL
63 HZ	77	66	84	70	77	66	73	61	85	66	99
125 HZ	73	62	78	65	73	62	73	60	82	64	95
250 HZ	63	51	70	58	63	51	66	52	77	62	89
500 HZ	59	47	65	50	59	47	62	50	74	59	85
1 kHZ	57	43	62	46	57	43	60	47	63	49	78
2 kHZ	55	39	60	46	55	39	58	44	64	49	77
4 kHZ	51	37	61	46	51	37	56	42	62	46	75
8 kHZ	50	37	61	45	50	37	55	37	64	46	74
dBA	64	51	70	56	64	51	66	53	75	60	88

REMARKS: 1. Sound Pressure Levels are according to CTI Standard ATC-128.
2. Sound Power Levels are calculated according to the Small Units Section 8.
3. Sound from free-field conditions over a reflecting plane with +/- 2 db(A) tolerance.
4. Noise levels can increase with variable frequency drives depending on the drive manufacturer and the drive configuration.

Evapco, Inc.
Sound Data

Sound Pressure Levels (SPL) in dB RE 0.0002 Microbar
Sound Power Levels (PWL) in dB RE 10^{-12} Watt

MODEL: LSTA 10-125
MOTOR: 50 Hp (37 kW)
MOTORS: 1
SPEED: Full Speed

	SOUND PRESSURE LEVEL										
	Conn. End		Fan Side		Opp. End		Opp. Side		Overhead		SOUND
	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	5 ft	50 ft	POWER
BAND	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	(1.5 m)	(15 m)	LEVEL
63 HZ	79	68	85	71	79	68	75	63	86	67	100
125 HZ	76	65	83	70	76	65	75	62	83	65	98
250 HZ	70	58	80	68	70	58	70	56	79	64	95
500 HZ	69	57	82	67	69	57	68	56	81	66	95
1 kHZ	68	54	77	61	68	54	66	53	74	60	90
2 kHZ	66	50	76	62	66	50	64	50	72	57	89
4 kHZ	61	47	74	59	61	47	60	46	71	55	86
8 kHZ	55	42	70	54	55	42	58	40	71	53	82
dBA	73	59	84	69	73	59	72	58	82	67	97

REMARKS: 1. Sound Pressure Levels are according to CTI Standard ATC-128.
2. Sound Power Levels are calculated according to the Small Units Section 8.
3. Sound from free-field conditions over a reflecting plane with +/- 2 db(A) tolerance.
4. Noise levels can increase with variable frequency drives depending on the drive manufacturer and the drive configuration.

5.5 FIMS CONSIDERED BUT NOT USED

The Chiller System was reviewed in the project to plan for future chiller plant upgrade with chillers that match the new cooling towers.

FIM # 02.02 S1 CHILLERS REPLACEMENT

Detailed Scope of Work

FIM ID # 49027
02.02 S1 Chillers Replacement
University of Washington Med Center

GENERAL

Replace the existing cooling towers serving the S1 cooling plant. Upsize the plant for additional capacity.

SCOPE OF WORK INCLUDES

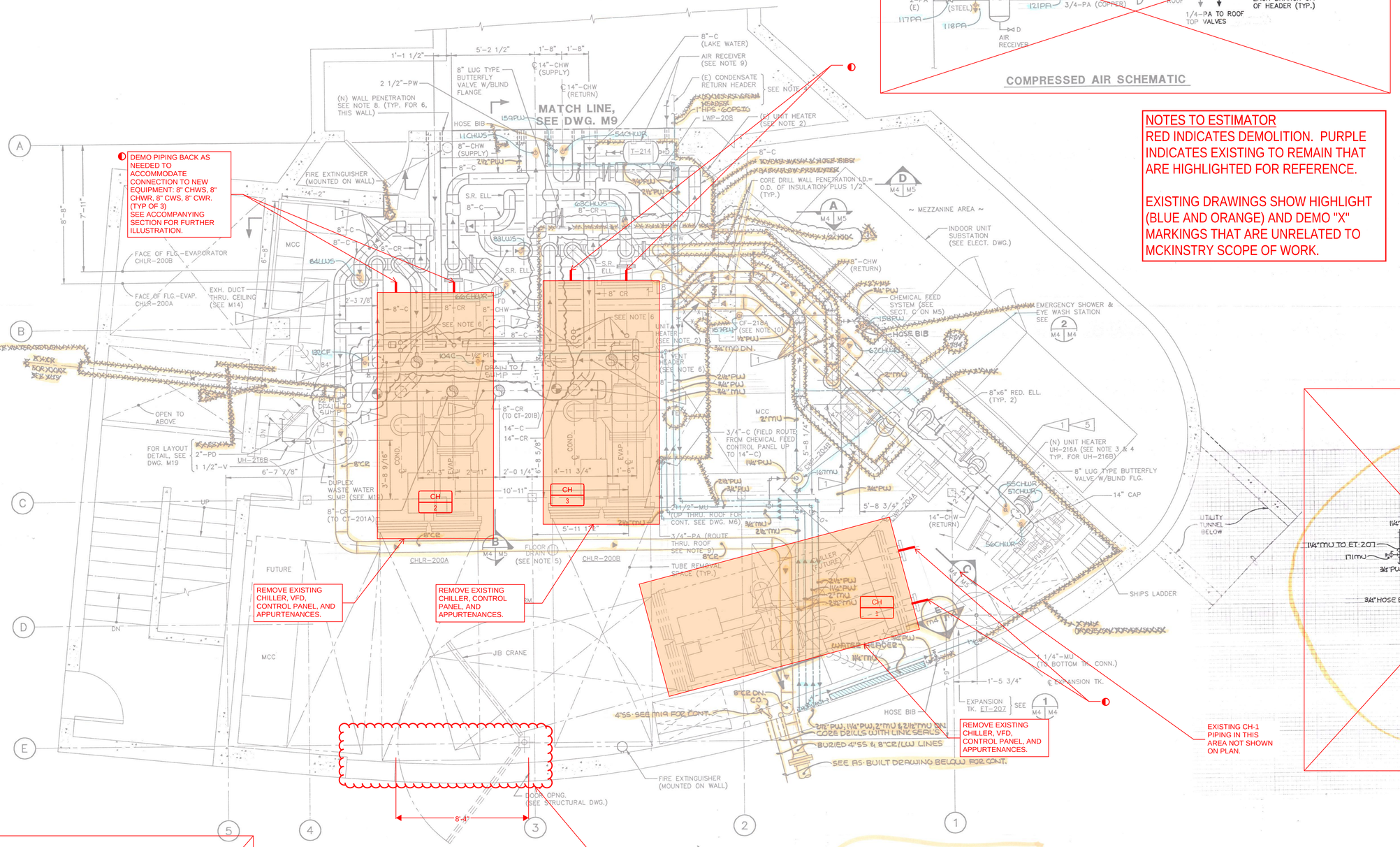
1. General
2. Equipment Furnished by ESCO
   A. CH-1 (w/ VFD and factory controls that can interface with BMS)
   B. CH-2 (w/ VFD and factory controls that can interface with BMS)
   C. CH-3 (w/ VFD and factory controls that can interface with BMS)
3. Mechanical
   A. Demo
      1) Mechanical contractor to safe off all equipment and piping (mechanical piping and plumbing piping) as required to facilitate removal of the three chillers by demolition contractor.
   B. New Work
      1) Piping
         (i) CHWS, CHWR, CWS, and CWR as needed for removal of existing chillers and connection to new chillers. See reference documents for additional information.
         (ii) New CHWR isolation valve, typical of (3) chillers, 8" or 10"
         (iii) Reconnect existing 1-1/4" evaporator and condenser refrigerant relief valve lines to new chillers, typical of 3. Furnish and install piping as required to new connections.
      2) Equipment
         (i) Install (3) new 765 TON chillers. See reference documents and schedule for additional information. VFD packaged with chiller.
      3) Mechanical contractor to test, flush and fill the new system.
      4) Misc.
         (i) Insulation
            (a) CHWS and CHWR piping, interior: 1" MPI insulation with jacketing and labeling to match existing
            (b) Above values per McKinstry piping insulation specification matrix (based on WSEC and Seattle Energy Code, IECC 2018)
4. Demolition
   A. Demolition contractor will be responsible for the removal and of chillers and piping, including refrigerant disposal. Include necessary rigging. McKinstry Essention will be responsible for providing carne and hauling of the demolished equipment. Mechanical subcontractors will be responsible for safe off and cap.
   B. Remove (3) existing chillers with controls, chiller-mounted VFDs, and appurtenances
   C. Demo 8" CHWS and 8" CHWR lines as needed for removal of existing chillers, installation of new chillers, and installation of new isolation valves.
   D. Disconnect existing 1-1/4" evaporator and condenser refrigerant relief valve lines from chiller to be removed, demo back as required to remove chillers and perform new work. Typ of 3.
5. Controls
   A. Refer to attached points list. (Existing vs. new vs. virtual)
   B. Budget for 25% more points than indicated
   C. Sequences to match existing
   D. Chillers to come with factory controls that can interface with BMS
6. Vibration Isolation
   A. Match existing rubber or neoprene pad between housekeeping pad and equipment support
7. Electrical
   A. Demo
      1) Remove existing CH-1, CH-2, and CH-3. Refer to electrical drawings for electrical equipment removal.
   B. New Work
      1) Furnish and install conduit and conductors as shown in drawings for the new chillers.
      2) Retrofit new exhaust fans for transformers E920A and E920B, this increases the capacity from 1500KVA to 2000KVA.
   C. 30 Day metering
      1) There is an overall net load increase, but load calculations will be utilized so metering is not required.

8. Structural (Chiller's replacement is considered like for like and being installed to concrete SOG; concrete SOG works by inspection for replacement chiller incoming load).
    A. (3) Chillers:
        1. Provide seismic attachment connection to conc.
        2. HK pad: New 4" concrete housekeeping pad for chiller extending min 6" beyond connection points
    B. Special inspection:
        1) Post installs concrete anchors special periodic inspection
9. Specialties – Chemical Treatment – Nalco (mechanical contractor and Nalco)
    A. Mechanical contractor to coordinate with Nalco for necessary testing during/after start-up
10. Testing, Adjusting, and Balancing (TAB)
    A. Pre-TAB
        1) CHW primary pumps (production pumps) pressure, speed, flow rate
    B. Chillers: pressure, temperature, flow rates on
        1) CHWS
        2) CHWR
        3) CWS
        4) CWR
    C. CHW primary pumps (production pumps) pressure, speed, flow rate
    D. As required by Seattle Energy Code
11. Commissioning
    A. Perform PTP and FPT of the new cooling towers, condenser pumps and associated controls.
    B. As required by Seattle Energy Code
    C. Verify trending specified in the M&V plan are implemented.
12. Training
    A. McKinstry will provide necessary training to the facilities staff on the new system design, intent, and operation.

CLARIFICATIONS AND EXCLUSIONS

1. Excludes hazardous material testing and abatement. During pre-construction McKinstry will submit a testing request to UWMC based on area of impact. Sampling, testing and abatement if necessary will be performed by UWMC.
2. If existing equipment or components are reused, repairs to existing are not included unless specifically noted in the scope above. At this point, all other related equipment that has been inspected is operating properly.
    A. Electrical switchgear in the chiller room and adjoining space will remain as-is.
3. Existing CHW and CW system components are adequate to serve new chillers, i.e.,
    A. Existing CHW piping is adequate. Minimal piping work required to meet equipment connections.
    B. Existing CHW secondary pumps (distribution pumps) are adequate.
    C. Existing CHW primary pumps (production pumps) are adequate.
    D. Existing CW piping is adequate. Minimal piping work required to meet equipment connections.
    E. Existing CW pumps are adequate.
    F. Existing emergency refrigerant exhaust system meets code requirements for new chillers.
    G. Existing refrigerant relief valve and piping meet code requirements for new chillers.
    H. Existing water treatment is adequate.
4. All work will be performed on weekday during regular hours. Exception to this crane pick for removal and install of the cooling towers will be performed on Saturdays.
5. Additional clarifications if necessary, will be developed in coordination with UWMC Facilities during GMAX development.

MECHANICAL DEMO



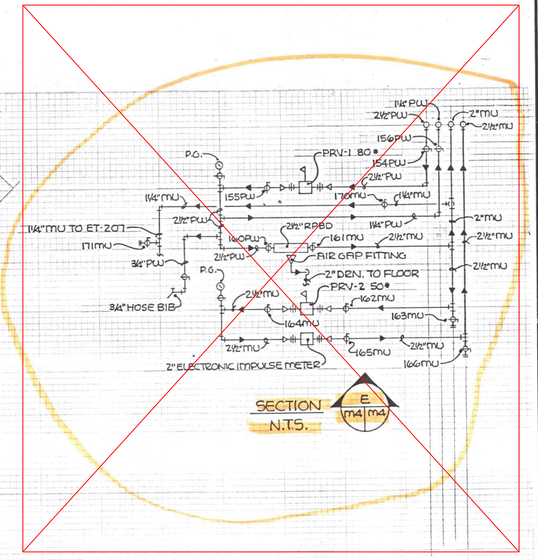
NOTES TO ESTIMATOR

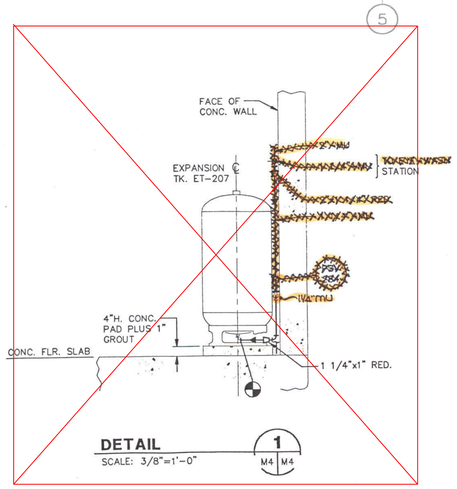
RED INDICATES DEMOLITION. PURPLE INDICATES EXISTING TO REMAIN THAT ARE HIGHLIGHTED FOR REFERENCE.

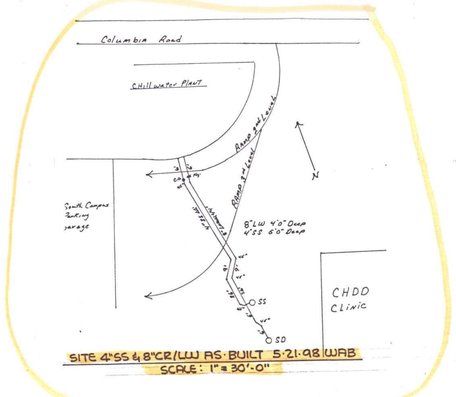
EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

NOTES:

1. SEE GENERAL NOTES ON DWG. M1.
2. CONTRACTOR TO DEMOLISH THE (E) UNIT HEATER AND ITS ASSOCIATED WIRING BACK TO THE TERMINAL POINT. THE (E) UNIT HEATER AND ITS ASSOCIATED PIPING SYSTEMS & SUPPORTS ARE TO BE DEMOLISHED. THE STEAM SUPPLY & RETURN LINES TO & FROM THE UNIT HEATER SHALL BE DEMOLISHED UP TO THE HEADERS SHUT-OFF VALVES. SEE 5/M4 M16
3. CONTRACTOR TO SUPPORT (N) UNIT HEATERS FROM CEILING AS REQ'D. BOTTOM OF UNIT HEATER ELEVATION SHALL BE 9'-0" ABOVE FINISHED FLOOR SURFACE.
4. CONTRACTOR TO ROUTE STEAM SUPPLY LINE AND CONDENSATE RETURN LINE FROM (E) STEAM AND CONDENSATE HEADERS TO (N) UNIT HEATERS. SUPPORT PIPES AS REQ'D. FOR TYPICAL PIPING DIAGRAM OF SUPPLY & RETURN LINES, SEE 5/M4 M16
5. FOR FLOOR DRAIN SYSTEM IN THE NEW CHILLER ROOM, SEE DWG. M19.
6. CONTRACTOR TO ROUTE AND SUPPORT 1 1/4" REFRIGERANT RELIEF VALVE PIPING FROM CHILLER RELIEF VALVE OUTLETS UP TO THE 4" RELIEF VALVE VENT HEADER.
7. FOR EQUIPMENT HOUSE-KEEPING PAD DETAILS, SEE STRUCTURAL DWG.
8. FOR PIPE PENETRATIONS THROUGH CONC. WALL, SEE 9/M4 M16 & 10/M4 M16
9. CONTRACTOR TO MOUNT AIR RECEIVER TK. ON WALL AND FIELD ROUTE 3/4" PA LINE FROM (E) 2" PLANT AIR HEADER IN TUNNEL TO AIR RECEIVER. PROVIDE 3/4" PA HEADER FROM TANK AND FIELD ROUTE 1/4" PA TUBING TO INDIVIDUAL USER AS REQ'D. SEE COMPRESSED AIR SCHEMATIC DIAGRAM THIS DWG. FOR GENERAL DIAGRAM.
10. CONTRACTOR SHALL MOUNT CHEMICAL POT FEEDER ON CONC. WALL, USING STANDARD UNISTRUT & PIPE STRAPS (2). FIELD ROUTE 3/4"-CHW LINES TO 8"-CHW. SEE DWG. M2 FOR ROUTING.







AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
1	12-31-97	ADDED CHILLER PUMPOUT COMP.		Cerr
0	5-12-97	ISSUED FOR BID		

PB PARSONS BRINCKERHOFF 1922 ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR PLAN

ROBERT E. FISHMAN — STATE OF WASHINGTON — 0029237 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

DR.	LW	DRAWING NO.	REV
DES.	FY	M4	1
CHK.	CM	SHEET	OF

APPROVED Colin L. McKee 11/5/97 DATE
PRINCIPAL IN CHARGE 11/5/97 DATE

GRAPHIC SCALE
3/8" = 1'-0"
0 1 2 3 4 5 6 7 8
8'-3/4"

BLDG. NO.: 182/E12
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

212-M- 25 AB

N:\UWC\13428

NONE

MICROFILMED

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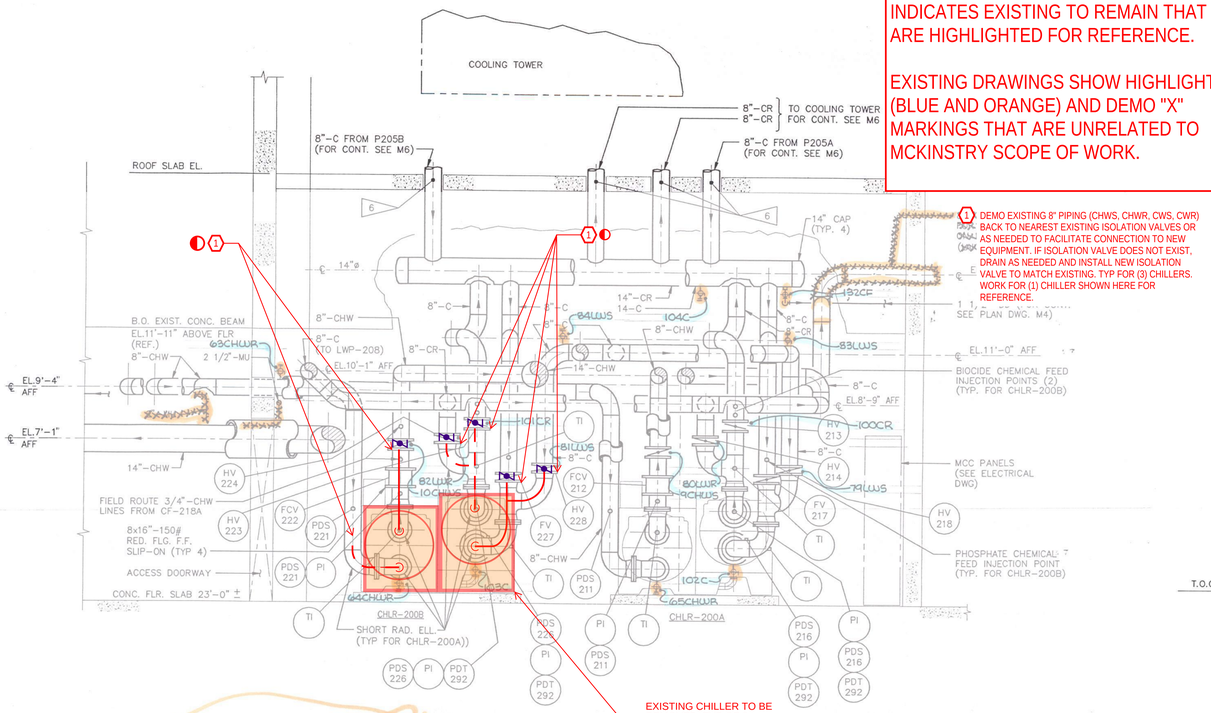
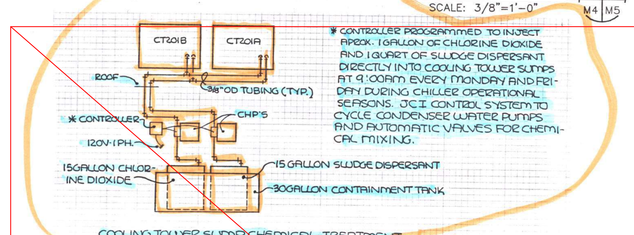
MECHANICAL DEMO

NOTES TO ESTIMATOR
RED INDICATES DEMOLITION. PURPLE INDICATES EXISTING TO REMAIN THAT ARE HIGHLIGHTED FOR REFERENCE.

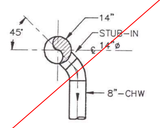
EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.



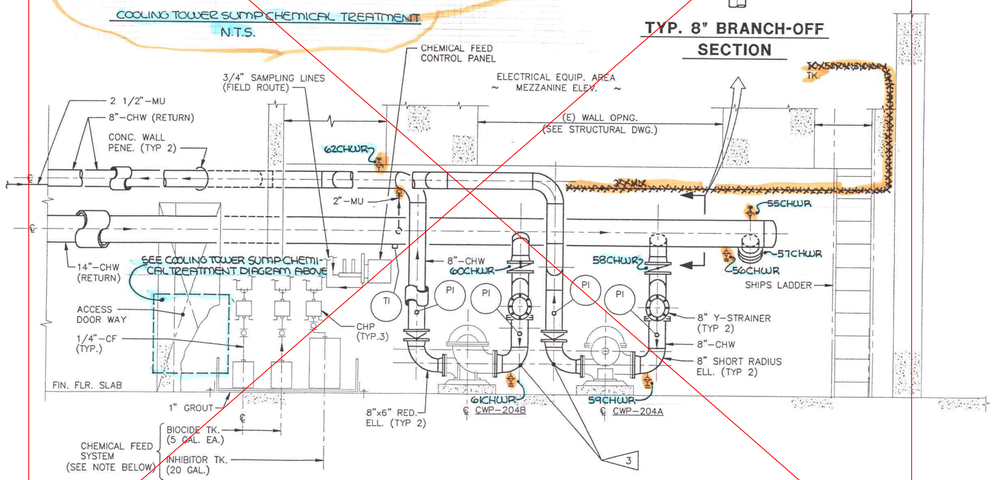
SECTION A
SCALE: 3/8"=1'-0"
M4 | M5



COOLING TOWER SUMP CHEMICAL TREATMENT
N.T.S.

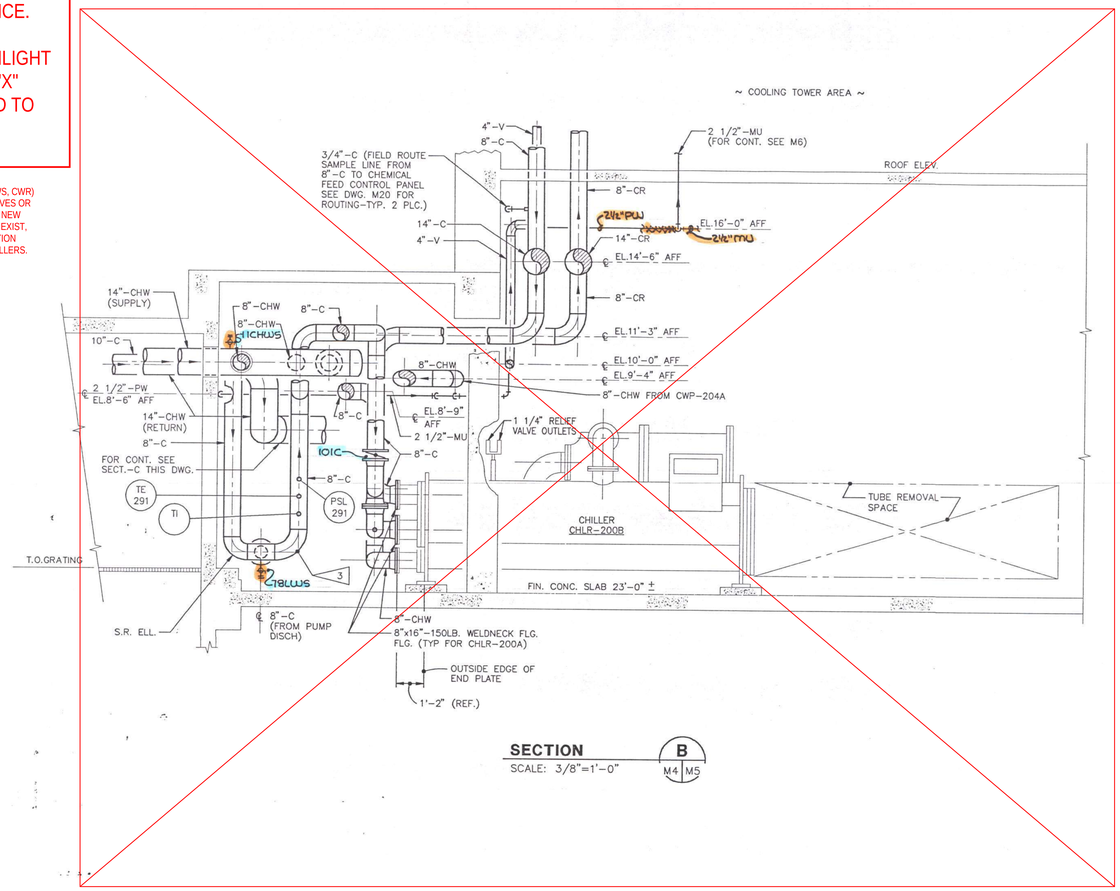


TYP. 8" BRANCH-OFF SECTION

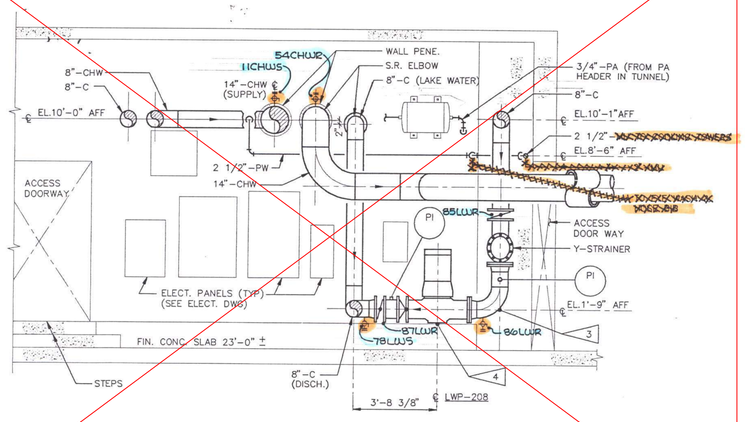


SECTION C
SCALE: 3/8"=1'-0"
M4 | M5

NOTE:
CONTRACTOR SHALL INSTALL CHEMICAL FEED TKS. IN FIBER-GLASS CONTAINMENT AND SHALL BE HELD TIGHTLY W/ANGLE BRACKETS. BOLT ANGLE BRACKETS TO CONC. FLR. SLAB W/CONC. EXPANSION BOLT. ALL 1/4" -CF TUBINGS SHALL BE FIELD ROUTED FROM CHP'S TO INJECTION POINTS. CHEMICAL FEED PUMPS & CONTROL PANELS SHALL BE MOUNTED ON CONC. WALL W/UNISTRUT. SEE CHEMICAL FEED SCHEMATIC ON DWG. M20 FOR ROUTING.



SECTION B
SCALE: 3/8"=1'-0"
M4 | M5



SECTION D
SCALE: 3/8"=1'-0"
M4 | M5

ROBERT E. FISHMAN STATE OF WASHINGTON 00029237 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

GRAPHIC SCALE
3/8" = 1'-0"
0 1 2 3 4 5 6 7 8

AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		CCM

PB PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR SECTIONS AND DETAILS

DR. DC	Colin L. McRae 5/7/97 APPROVED DATE	DRAWING NO.	REV
DES. FY	5/7/97 PRINCIPAL IN CHARGE DATE	M5	0
CHK. CM		SHEET	OF

BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

000000065709 M5
212-M- 26 AB

May 06, 1997 - 08:55:00 - SK
MICROFILMED
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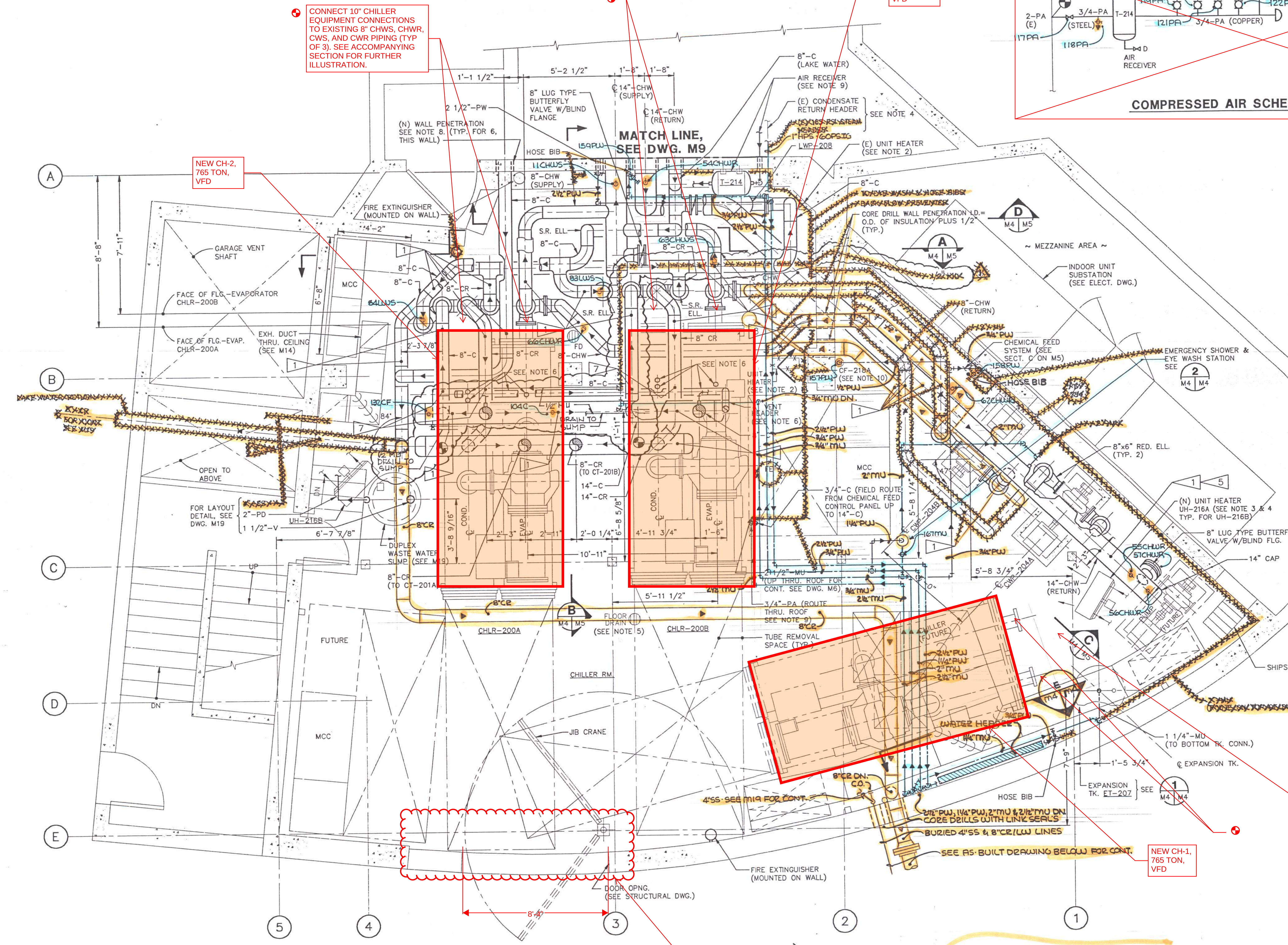
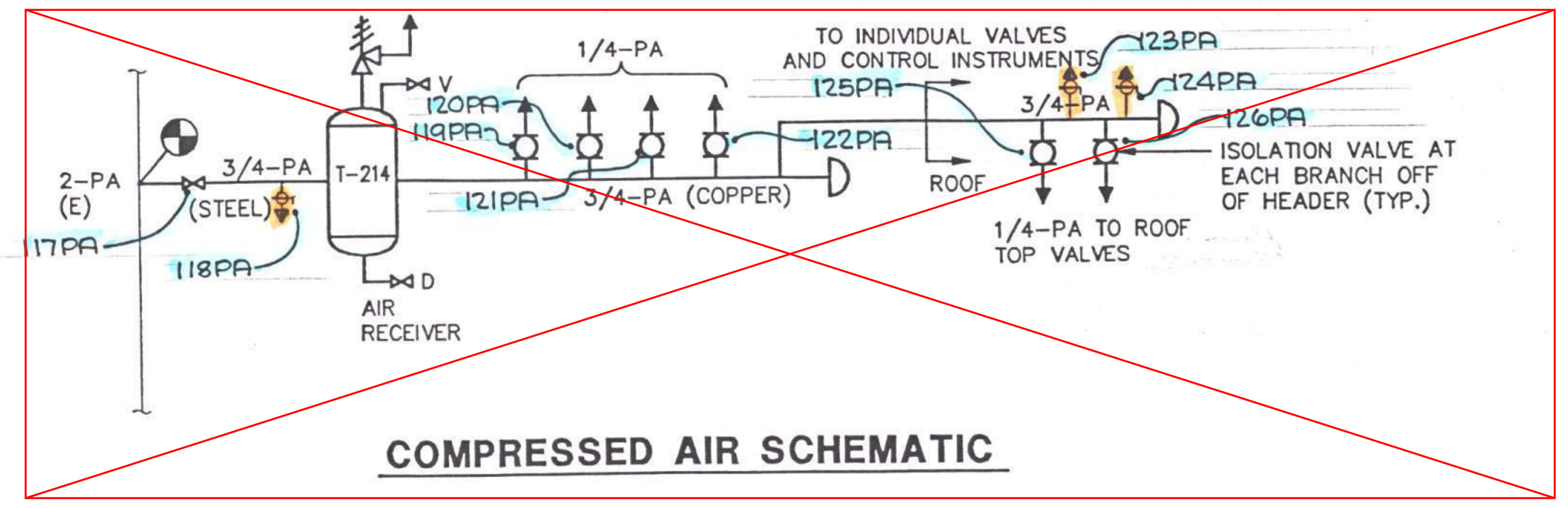
Page 122

MECHANICAL NEW



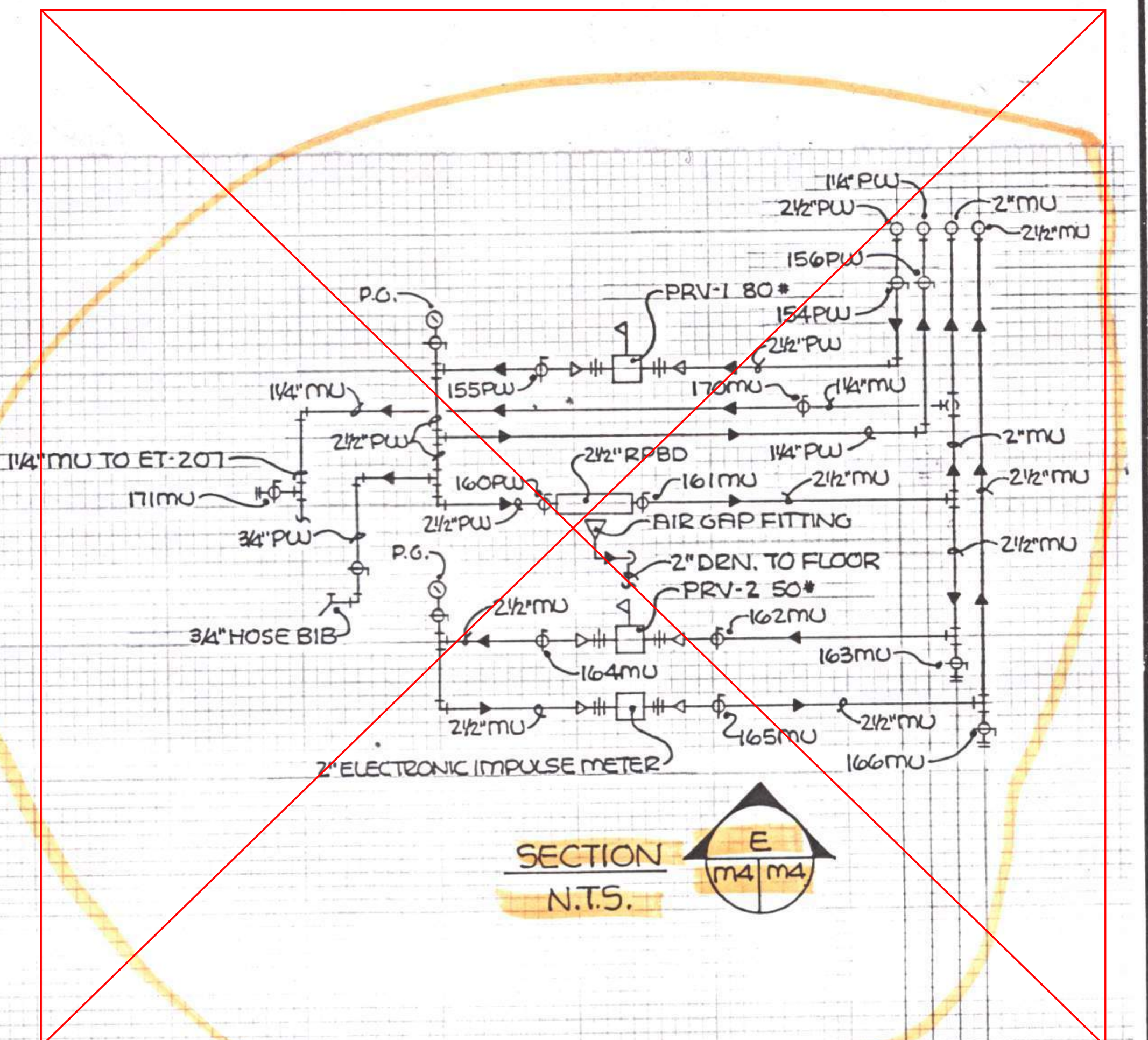


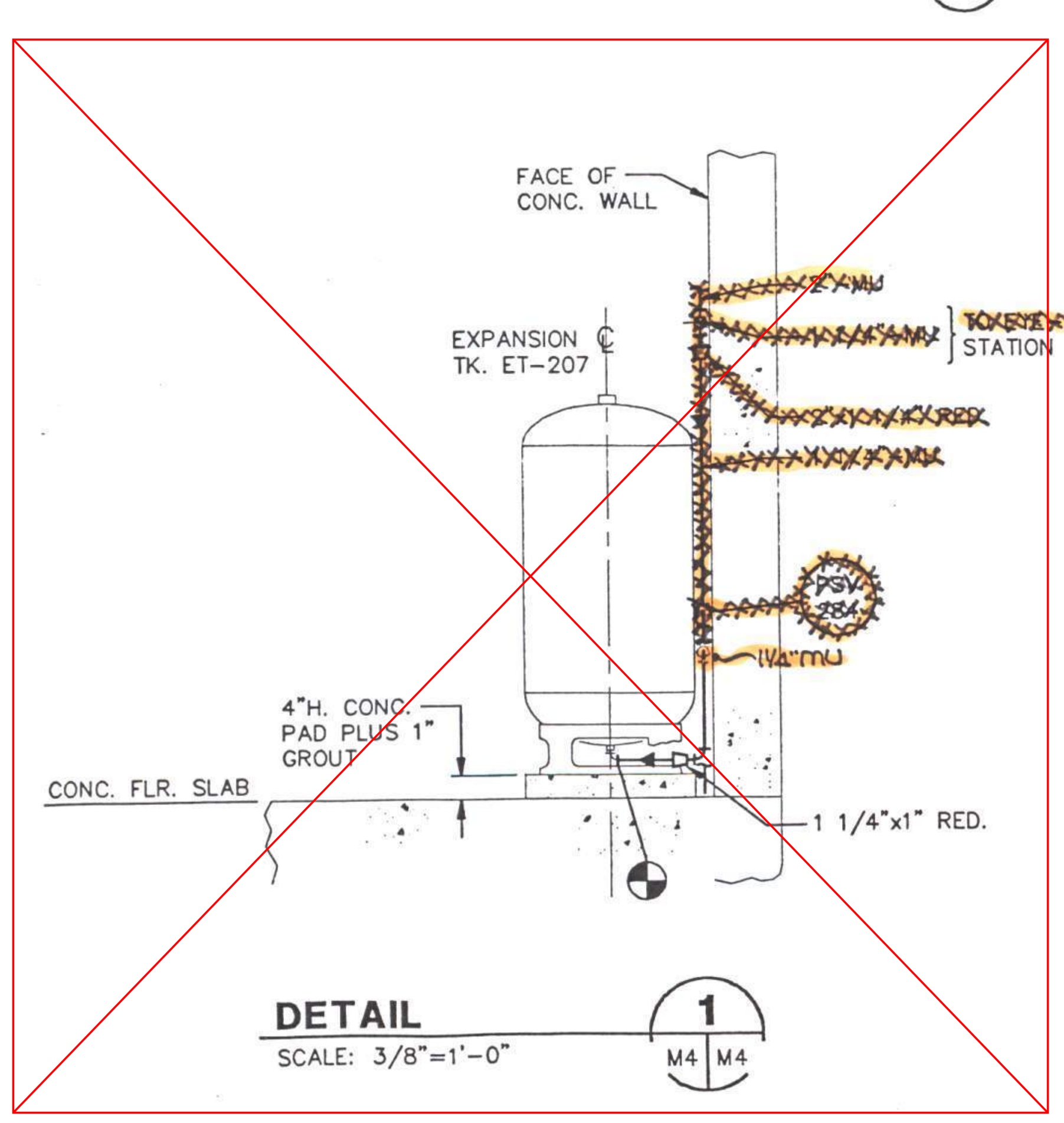
NOTES TO ESTIMATOR
RED INDICATES NEW WORK. PURPLE INDICATES EXISTING TO REMAIN THAT ARE HIGHLIGHTED FOR REFERENCE.

EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.

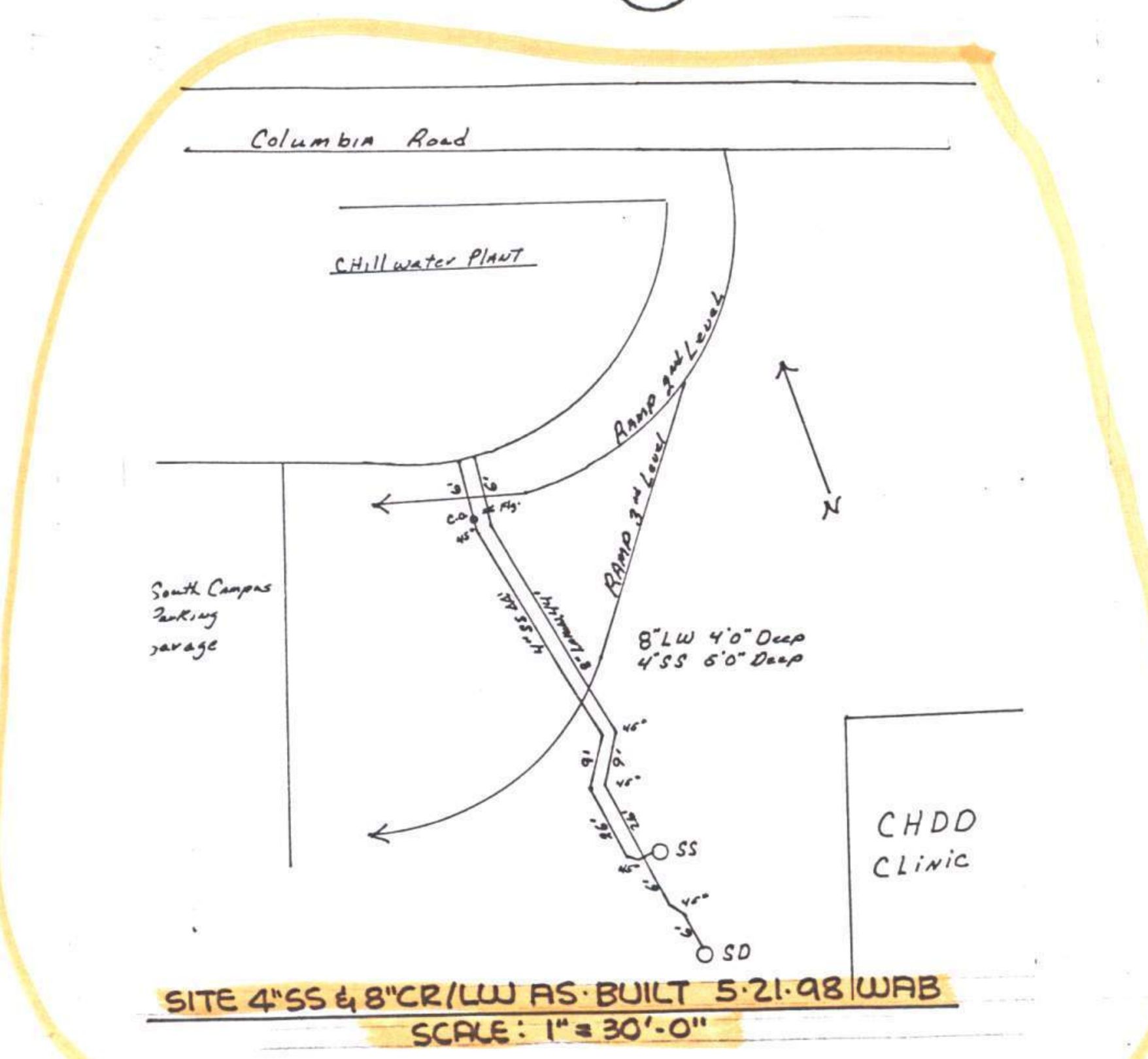
NOTES:

1. SEE GENERAL NOTES ON DWG. M1.
2. CONTRACTOR TO DEMOLISH THE (E) UNIT HEATER AND ITS ASSOCIATED WIRING BACK TO THE TERMINAL POINT. THE (E) UNIT HEATER AND ITS ASSOCIATED PIPING SYSTEMS & SUPPORTS ARE TO BE DEMOLISHED. THE STEAM SUPPLY & RETURN LINES TO & FROM THE UNIT HEATER SHALL BE DEMOLISHED UP TO THE HEADERS SHUT-OFF VALVES. SEE 5 M4/M16
3. CONTRACTOR TO SUPPORT (N) UNIT HEATERS FROM CEILING AS REQ'D. BOTTOM OF UNIT HEATER ELEVATION SHALL BE 9'-0" ABOVE FINISHED FLOOR SURFACE.
4. CONTRACTOR TO ROUTE STEAM SUPPLY LINE AND CONDENSATE RETURN LINE FROM (E) STEAM AND CONDENSATE HEADERS TO (N) UNIT HEATERS. SUPPORT PIPES AS REQ'D. FOR TYPICAL PIPING DIAGRAM OF SUPPLY & RETURN LINES, SEE 5 M4/M16
5. FOR FLOOR DRAIN SYSTEM IN THE NEW CHILLER ROOM, SEE DWG. M19.
6. CONTRACTOR TO ROUTE AND SUPPORT 1 1/4" REFRIGERANT RELIEF VALVE PIPING FROM CHILLER RELIEF VALVE OUTLETS UP TO THE 4" RELIEF VALVE VENT HEADER.
7. FOR EQUIPMENT HOUSE-KEEPING PAD DETAILS, SEE STRUCTURAL DWG.
8. FOR PIPE PENETRATIONS THROUGH CONC. WALL, SEE 9 M4/M16 & 10 M4/M16
9. CONTRACTOR TO MOUNT AIR RECEIVER TK. ON WALL AND FIELD ROUTE 3/4" PA LINE FROM (E) 2" PLANT AIR HEADER IN TUNNEL TO AIR RECEIVER. PROVIDE 3/4" PA HEADER FROM TANK AND FIELD ROUTE 1/4" PA TUBING TO INDIVIDUAL USER AS REQ'D. SEE COMPRESSED AIR SCHEMATIC THIS DWG. FOR GENERAL DIAGRAM.
10. CONTRACTOR SHALL MOUNT CHEMICAL POT FEEDER ON CONC. WALL, USING STANDARD UNISTRUT & PIPE STRAPS (2). FIELD ROUTE 3/4"-CHW LINES TO 8"-CHW. SEE DWG. M2 FOR ROUTING.





ANTICIPATED PATH FOR EQUIPMENT REMOVAL, FIELD CONFIRMATION REQUIRED.



AS-BUILT

GRAPHIC SCALE 3/8" = 1'-0"

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
1	12-31-97	ADDED CHILLER PUMPOUT COMP.		
0	5-12-97	ISSUED FOR BID		

PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR PLAN

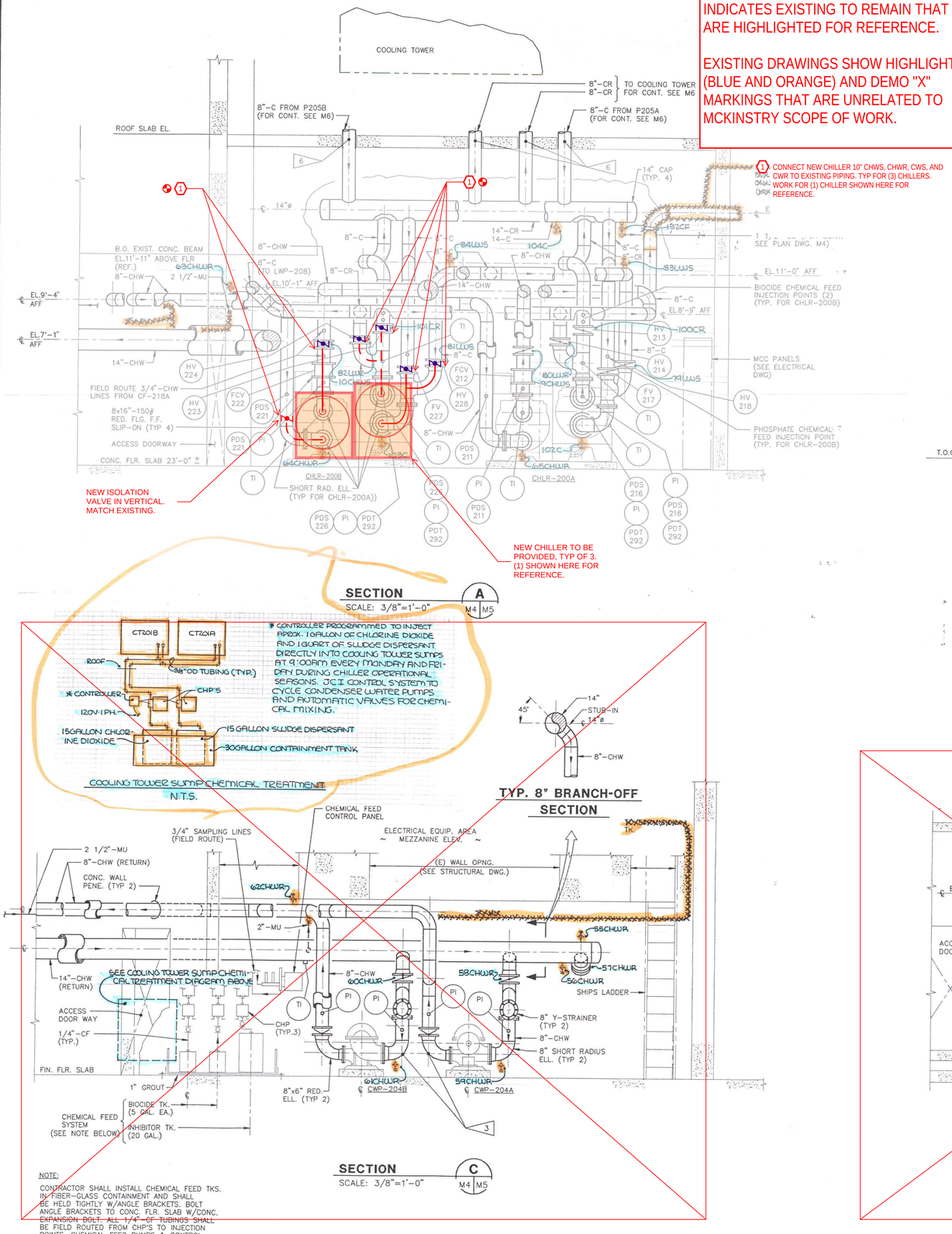
DR. LW — DES. FY — CHK. CM
DRAWING NO. M4 — REV 1
BLDG. NO.: 182 — BLDG. ID: UMC — PROJECT NO.: 1890

212-M-_25 AB

MECHANICAL NEW

NOTES TO ESTIMATOR
RED INDICATES NEW WORK. PURPLE INDICATES EXISTING TO REMAIN THAT ARE HIGHLIGHTED FOR REFERENCE.

EXISTING DRAWINGS SHOW HIGHLIGHT (BLUE AND ORANGE) AND DEMO "X" MARKINGS THAT ARE UNRELATED TO MCKINSTRY SCOPE OF WORK.



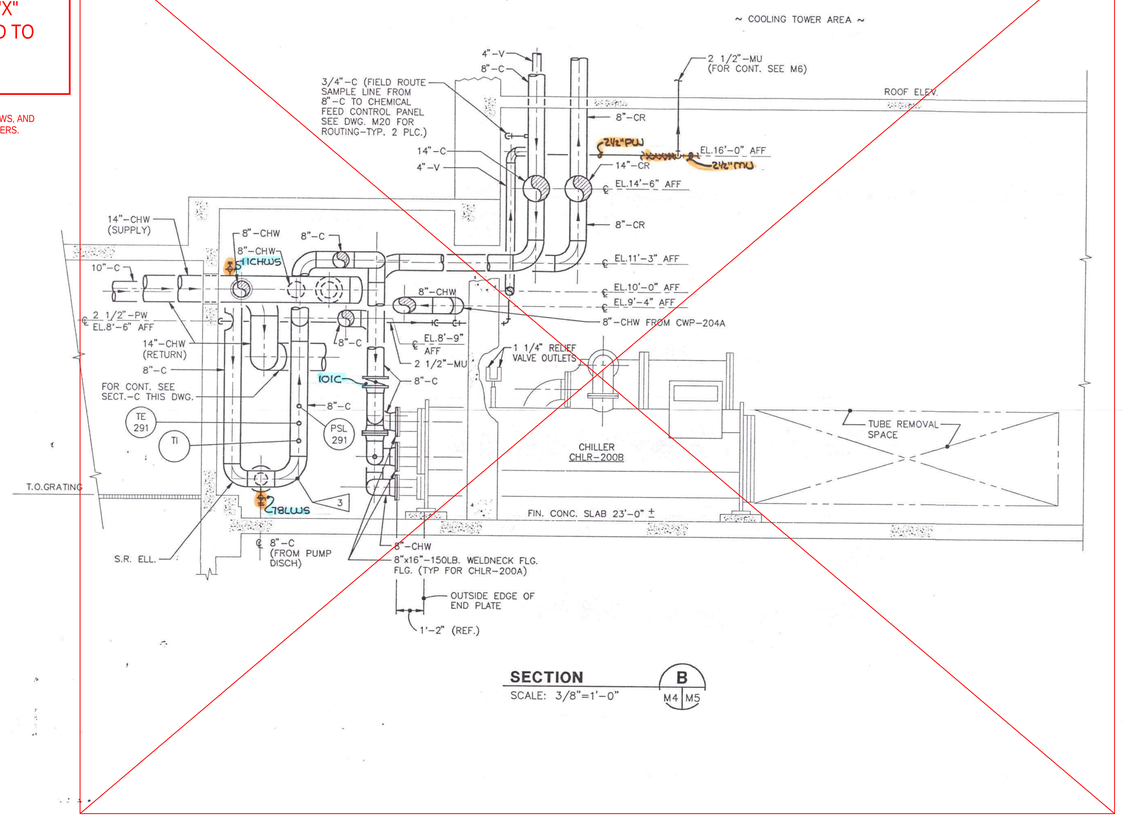
SECTION A
SCALE: 3/8"=1'-0"
M4 | M5

COOLING TOWER SUMP CHEMICAL TREATMENT
N.T.S.

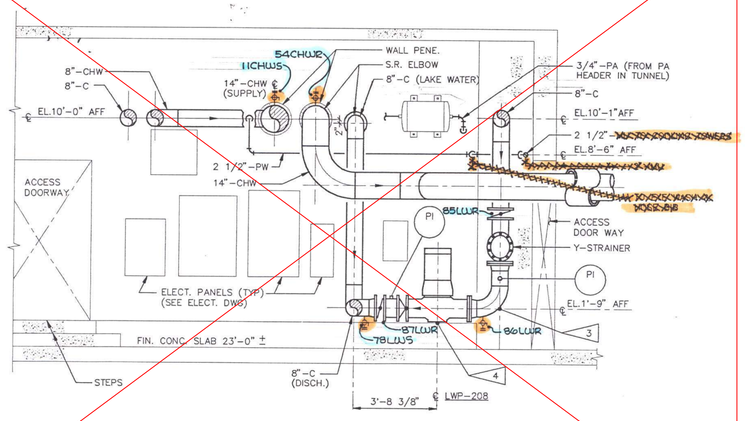
TYP. 8" BRANCH-OFF SECTION

SECTION C
SCALE: 3/8"=1'-0"
M4 | M5

NOTE:
CONTRACTOR SHALL INSTALL CHEMICAL FEED TKS. IN FIBER-GLASS CONTAINMENT AND SHALL BE HELD TIGHTLY W/ANGLE BRACKETS. BOLT ANGLE BRACKETS TO CONC. FLR. SLAB W/CONC. EXPANSION BOLT. ALL 1/4" -CF TUBINGS SHALL BE FIELD ROUTED FROM CHP'S TO INJECTION POINTS. CHEMICAL FEED PUMPS & CONTROL PANELS SHALL BE MOUNTED ON CONC. WALL W/UNISTRUT. SEE CHEMICAL FEED SCHEMATIC ON DWG. M20 FOR ROUTING.



SECTION B
SCALE: 3/8"=1'-0"
M4 | M5



SECTION D
SCALE: 3/8"=1'-0"
M4 | M5

AS-BUILT

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		CCM

PB PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

NEW CHILLED WATER PLANT
FLOOR SECTIONS AND DETAILS

ROBERT E. FISHMAN — STATE OF WASHINGTON — 00029237 — REGISTERED PROFESSIONAL ENGINEER
EXPIRES 12-25-98

DR.	DC	APPROVED	Colin L. McRae 5/7/97 DATE	DRAWING NO.	REV
DES.	FY			M5	0
CHK.	CM	PRINCIPAL IN CHARGE	5/7/97 DATE	SHEET	OF

BLDG. NO.: 182/212
BLDG. ID: UMC/SPG
PROJECT NO.: 1890
FILE NO.:

GRAPHIC SCALE
3/8" = 1'-0"
0 1 2 3 4 5 6 7 8

000000065709 M5 212-M- 26 AB

May 06, 1997 - 08:55:00 - SK

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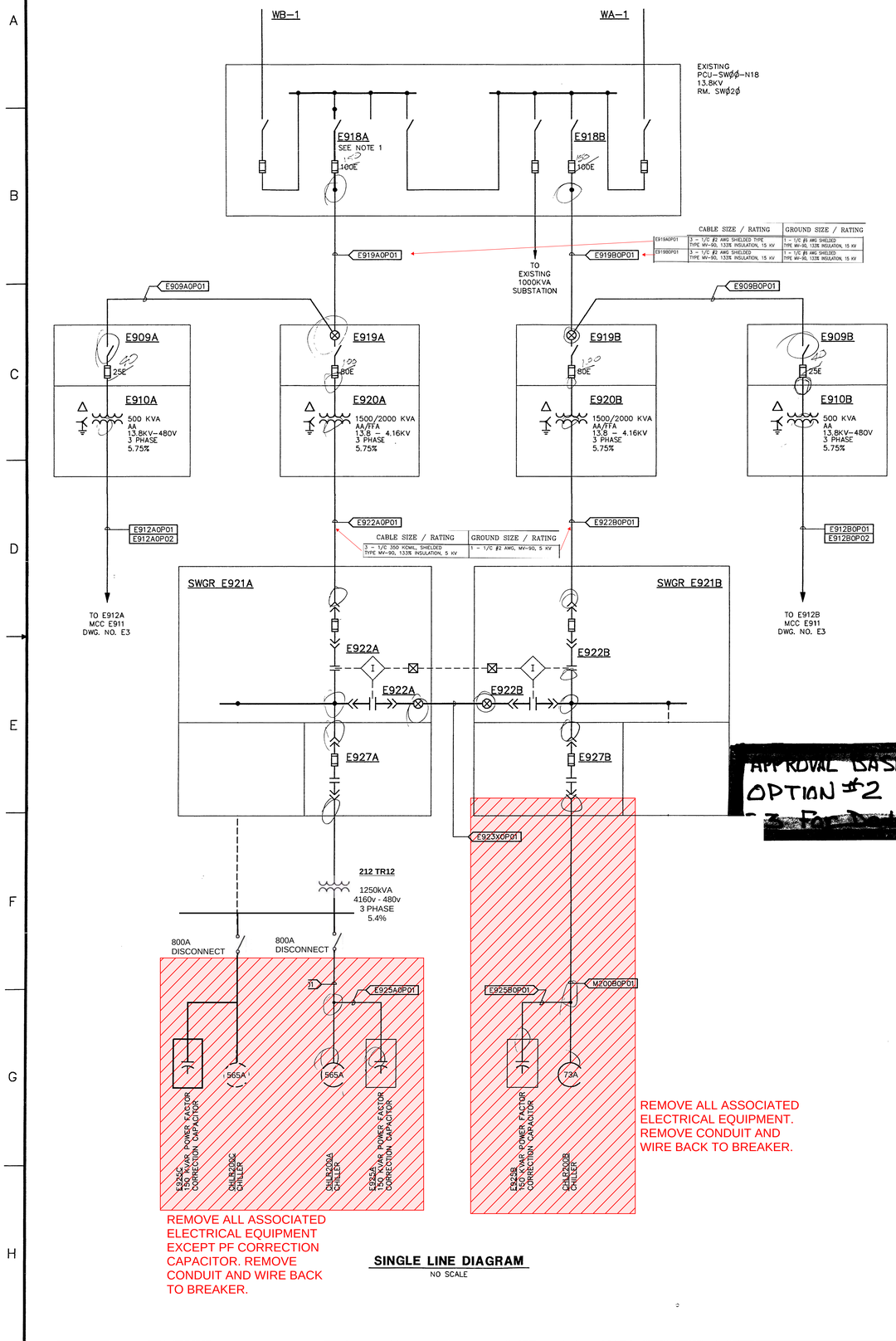
Page 124

MICROFILMED

NONE

ELECTRICAL DEMO

CHILLER FIM (ROM)
DEMO WORK
OVERALL LOAD ADDITION

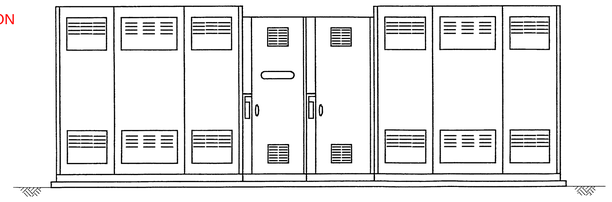


REMOVE ALL ASSOCIATED ELECTRICAL EQUIPMENT EXCEPT PF CORRECTION CAPACITOR. REMOVE CONDUIT AND WIRE BACK TO BREAKER.

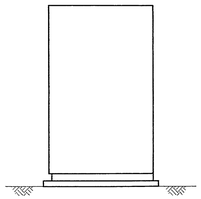
REMOVE ALL ASSOCIATED ELECTRICAL EQUIPMENT. REMOVE CONDUIT AND WIRE BACK TO BREAKER.

APPROVAL BASED ON OPTION #2 See

SINGLE LINE DIAGRAM
NO SCALE



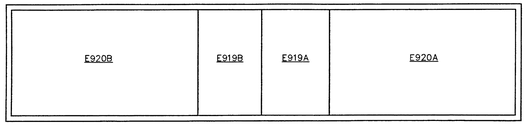
FRONT ELEVATION



SIDE ELEVATION

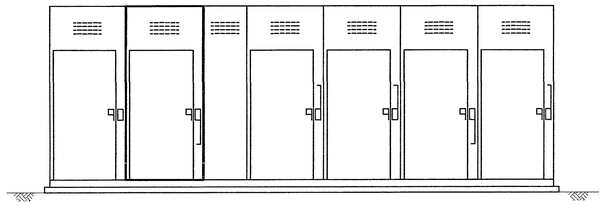
NOTES:

1. PROVIDE 15KV FUSED DISCONNECT SWITCH (SIMILAR TO EXISTING E918B) AND INSTALL INTO EXISTING EMPTY SWITCHGEAR CUBICLE.
2. ASTERISK (*) INDICATES FUTURE EQUIPMENT.

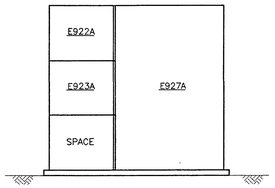


PLAN

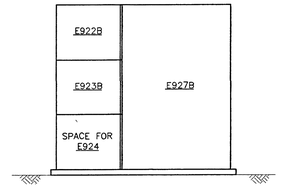
INDOOR UNIT SUBSTATION LAYOUT
SCALE: 3/8"=1'–0"



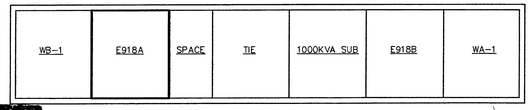
FRONT ELEVATION



FRONT ELEVATION

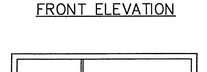


FRONT ELEVATION

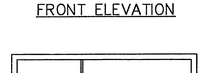


PLAN

EXISTING 15KV SWITCHGEAR
SCALE: 3/8"=1'–0"

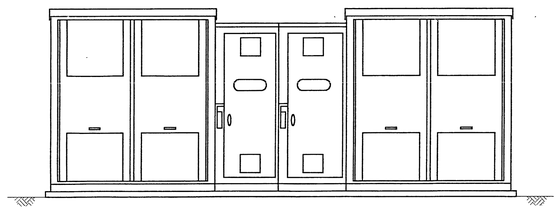


PLAN

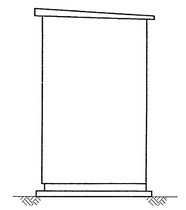


PLAN

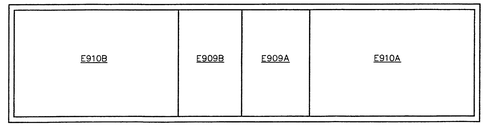
SWGR AND CONTROLLER LAYOUT
SCALE: 3/8"=1'–0"



FRONT ELEVATION



SIDE ELEVATION



PLAN

OUTDOOR UNIT SUBSTATION LAYOUT
SCALE: 3/8"=1'–0"

ALL ELECTRICAL MATERIALS & EQUIPMENT SHALL BE INSPECTED AND APPROVED BY THE ELECTRICAL DIVISION OF THE DEPT. OF CONSTRUCTION AND LAND USE.
SUBJECT TO FINAL APPROVAL OF FIELD INSPECTOR

ALL AVAILABLE FAULT CURRENT MUST COMPLY WITH ART 110-9 AND ART 110-10 OF NEC

CITY OF SEATTLE
DEPT OF CONSTRUCTION AND LAND USE
AUG 14 1997
ELECTRICAL APPROVED Subject to Errors and Omissions
By
751946

LARS ERGINSSON
STATE OF WASHINGTON
13501
REGISTERED PROFESSIONAL ENGINEER
EXPIRES 08-02-97

GRAPHIC SCALE
3/8" = 1'–0"
0 1 2 3 4 5 6 7 8

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5–12–97	ISSUED FOR BID		

PB PARSONS BRINCKERHOFF
ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

SINGLE LINE DIAGRAM
AND PANEL LAYOUT – 4.16KV

DR. SK	Colin L. McKee 5/1/97 APPROVED DATE	DRAWING NO.	REV
DES. RL	5/1/97 PRINCIPAL IN CHARGE DATE	E2	0
CHK. KM		SHEET	OF

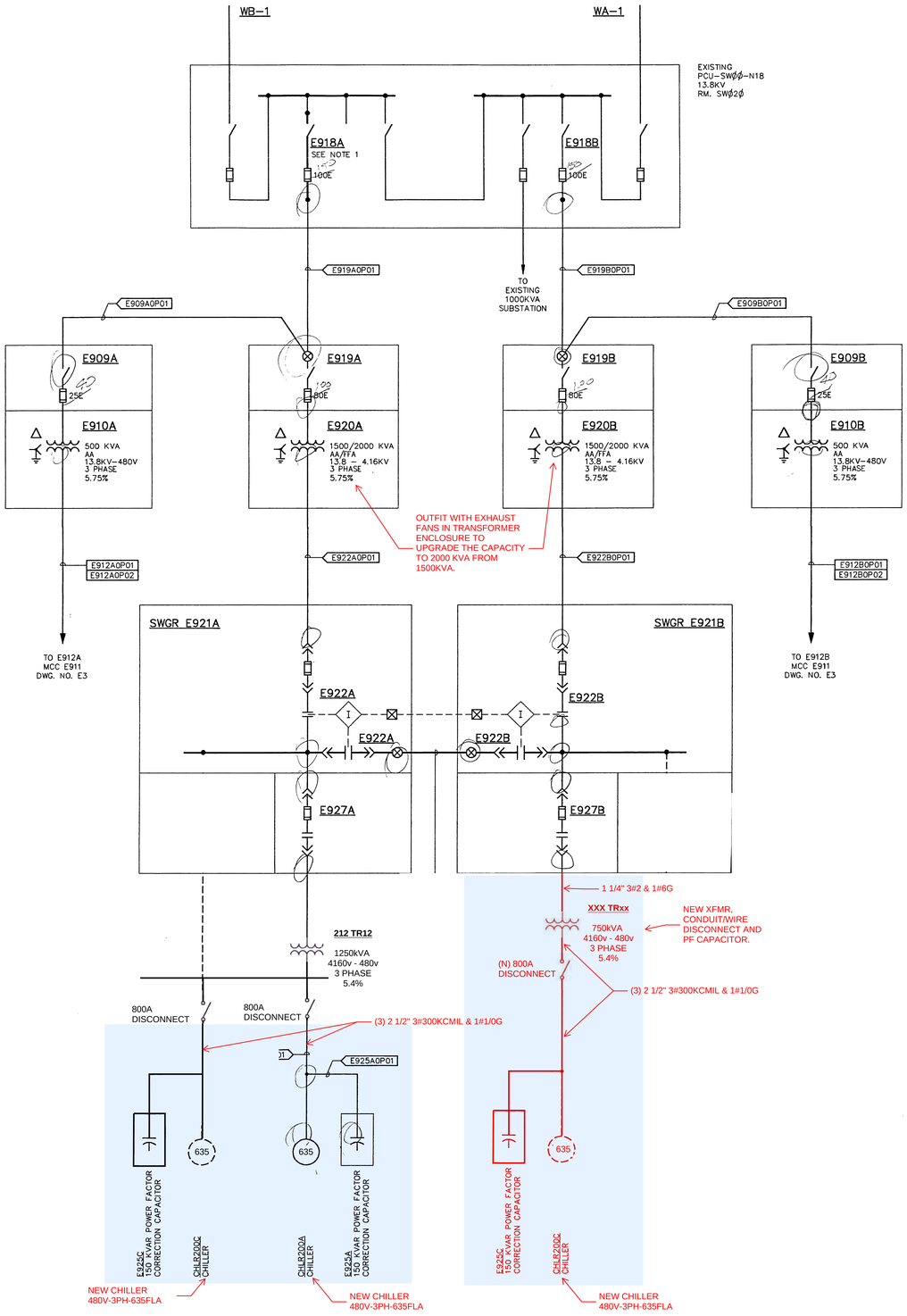
BLDG. NO.: 182
BLDG. ID: UMC
PROJECT NO.: 1890
FILE NO.: 212-E-_25 R 0

N:\UWC\13428

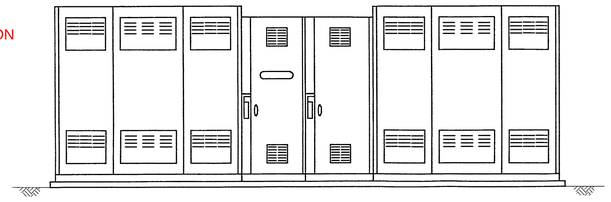
May 07, 1997 – 08:50:36 – SK

ELECTRICAL NEW

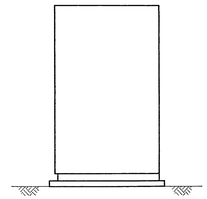
CHILLER FIM (ROM)
NEW WORK
OVERALL LOAD ADDITION



SINGLE LINE DIAGRAM
NO SCALE



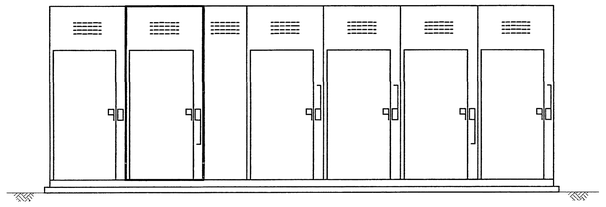
FRONT ELEVATION



SIDE ELEVATION

PLAN

INDOOR UNIT SUBSTATION LAYOUT
SCALE: 3/8"=1'–0"



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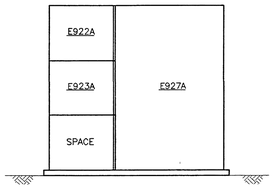
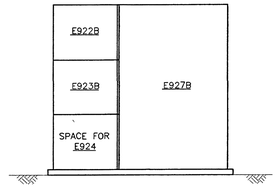
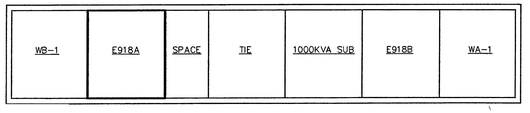


FRONT ELEVATION

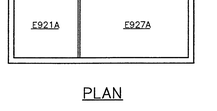


FRONT ELEVATION



PLAN

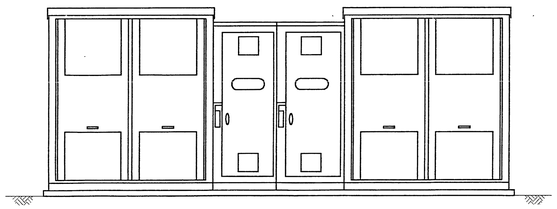
EXISTING 15KV SWITCHGEAR
SCALE: 3/8"=1'–0"



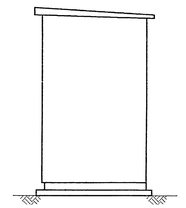
PLAN

PLAN

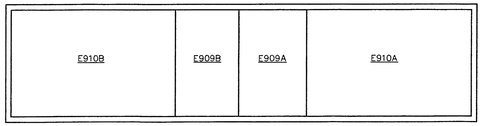
SWGR AND CONTROLLER LAYOUT
SCALE: 3/8"=1'–0"



FRONT ELEVATION



SIDE ELEVATION



PLAN

OUTDOOR UNIT SUBSTATION LAYOUT
SCALE: 3/8"=1'–0"

NOTES:

1. PROVIDE 15KV FUSED DISCONNECT SWITCH (SIMILAR TO EXISTING E918B) AND INSTALL INTO EXISTING EMPTY SWITCHGEAR CUBICLE.
2. ASTERISK (*) INDICATES FUTURE EQUIPMENT.

ALL AVAILABLE FAULT CURRENT MUST COMPLY WITH ART 110-9 AND ART 110-10 OF NEC

CITY OF SEATTLE
DEPT OF CONSTRUCTION
AND LAND USE
AUG 14 1997
ELECTRICAL
APPROVED Subject to Errors and Omissions
By
751946

ALL ELECTRICAL MATERIALS & EQUIPMENT SHALL BE INSPECTED AND APPROVED BY THE ELECTRICAL DIVISION OF THE DEPT. OF CONSTRUCTION AND LAND USE. SUBJECT TO FINAL APPROVAL OF FIELD INSPECTOR

GRAPHIC SCALE
3/8" = 1'–0"
0 1 2 3 4 5 6 7 8

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5–12–97	ISSUED FOR BID		

PB PARSONS BRINCKERHOFF
ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

SINGLE LINE DIAGRAM
AND PANEL LAYOUT – 4.16KV

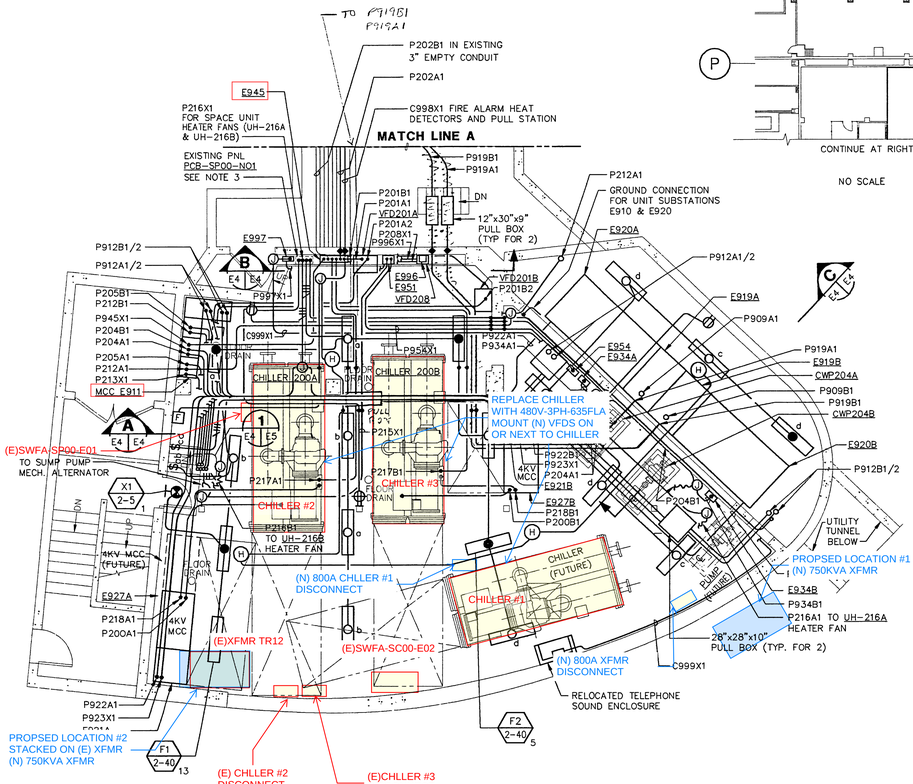
DR. SK	Colin L. McKee 5/1/97 APPROVED DATE	DRAWING NO.	REV
DES. RL	5/1/97 PRINCIPAL IN CHARGE DATE	E2	0
CHK. KM		SHEET	OF

BLDG. NO.: 182
BLDG. ID: UMC
PROJECT NO.: 1890
FILE NO.: 212-E-_25 R 0

N:\UWC\13428

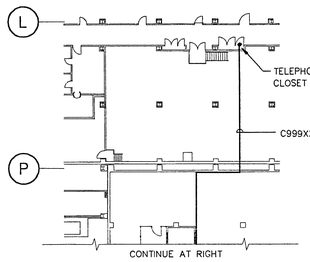
May 07, 1997 – 08:50:36 – SK

ELECTRICAL NEW

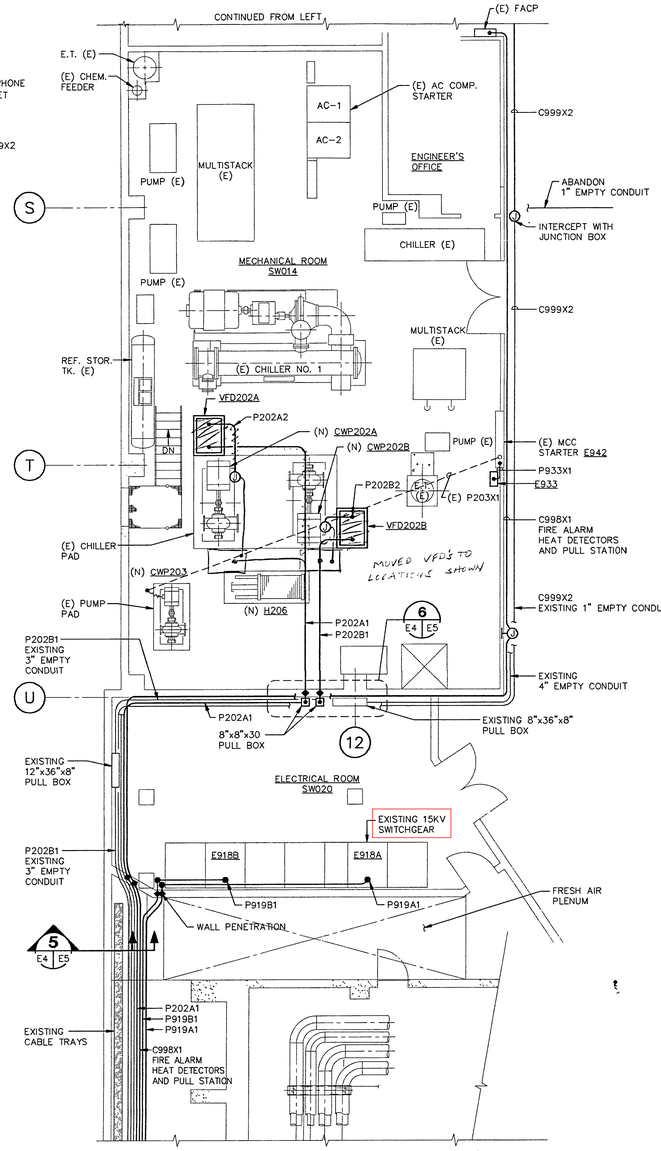


NEW CHILLED WATER PLANT FLOOR PLAN

SCALE: 3/16"=1'-0"



NO SCALE

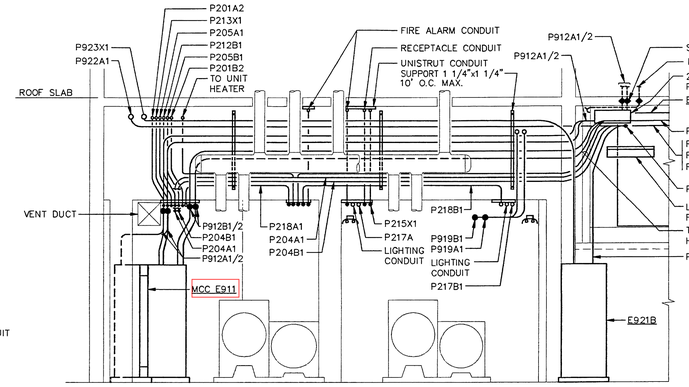


NOTES:

1. REFER TO MECHANICAL PLAN FOR THE EXACT LOCATION OF POWER SERVICE ENTRANCE TO COOLING TOWER FAN MOTOR.
2. REFER TO DWG. NO. A2.2 AND M16 FOR SEALING CONDUIT PENETRATION DETAIL ON WALL AND FLOOR SLAB.
3. REFER TO DWG. NO. E5 FOR (E) PANELBOARD PCB-SP00-NO-1 NEW LOAD SCHEDULE. PANELBOARD WAS PCB-SP02-NO-1.

LIGHTING FIXTURE SCHEDULE

F1 2-40	FLUORESCENT, INDUSTRIAL TYPE, 2-40W LAMP, RAPID START, COOL WHITE, WHITE ENAMEL REFLECTOR, SURFACE MOUNTED, 120V.
F2 2-40	SIMILAR TO F1 BUT WITH 90 MINUTES, MINIMUM BATTERY POWER PACK.
HP 1-70	OUTDOOR TYPE WALL PACK, WALL MOUNTED, 70W HPS, ONE PIECE INJECTION MOLDED FRONT COVER/REFRACTOR, UV STABILIZED POLYCARBONATE, SEALED AND GASKETED, 120V.
X1 2-5	EXIT LIGHT, COMPACT FLUORESCENT LAMPS, 2-5W WITH 90 MINUTES, MINIMUM BATTERY POWER PACK, WALL AND SURFACE MOUNTED, 120V.
X2 2-5	SIMILAR TO X1 BUT WEATHERPROOF.



SECTION A

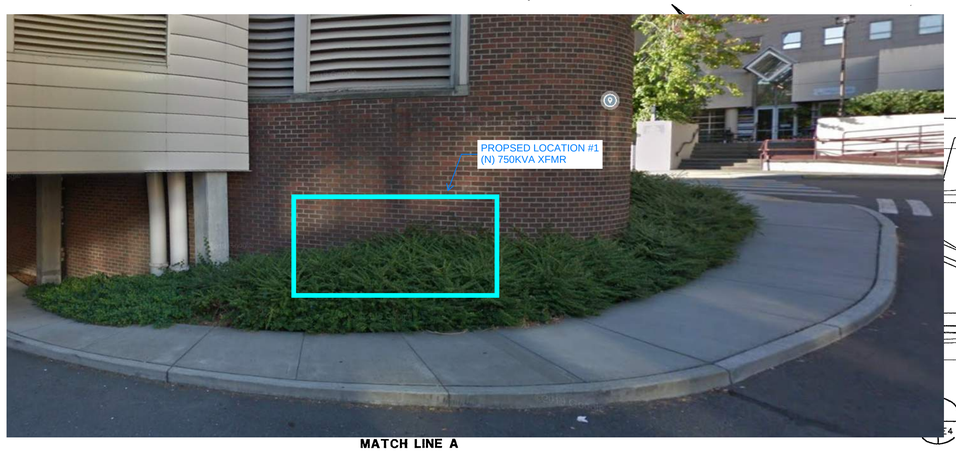
SCALE: 1/4"=1'-0"

SECTION B

SCALE: 1/4"=1'-0"

NEW CHILLED WATER PLANT ROOF PLAN

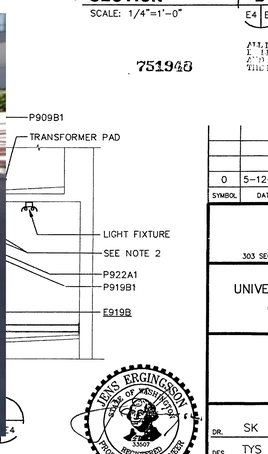
SCALE: 3/16"=1'-0"



MATCH LINE A

UTILIDOR PARTIAL PLAN

SCALE: 3/16"=1'-0"



751948

ALL ELECTRICAL MATERIALS & EQUIPMENT SHALL BE LISTED BY APPROVED TESTING LABORATORIES AND APPROVED BY THE ELECTRICAL DIVISION OF THE DEPT. OF CONSTRUCTION AND LAND USE. SUBJECT TO FINAL APPROVAL OF FIELD INSPECTOR

SYMBOL	DATE	REVISION DESCRIPTION	DRAWN	APP'D
0	5-12-97	ISSUED FOR BID		

PARSONS BRINCKERHOFF ENERGY SERVICES, INC.
303 SECOND STREET, SUITE 850 NORTH, SAN FRANCISCO, CALIFORNIA 94107

UNIVERSITY OF WASHINGTON MEDICAL CENTER
CHILLED WATER UPGRADE PROJECT

ELECTRICAL PLANS AND SECTIONS

DR.	SK		DRAWING NO. E4
DES.	TYS		REV 0
CHK.	BL		SHEET OF

Colin F. McKee 5/1/97 APPROVED DATE
5/1/97 PRINCIPAL IN CHARGE DATE

JINNS ERGINKSON STATE OF WASHINGTON 23600 REGISTERED PROFESSIONAL ENGINEER
EXPIRES 08-02-97

GRAPHIC SCALE
1/4" = 1'-0" 0 1 2 4 6 8 10 12
3/16" = 1'-0" 0 1 2 4 6 8 10 12 14 16

UNIVERSITY OF WASHINGTON 1861

BLDG. NO.: 182
BLDG. ID: UMC
PROJECT NO.: 1890
FILE NO.:

212-E-27R

May 07, 1997 - 09:41:41 - SK

\\UWC\13428

NONE

Project Name: UWMC Phase 5

https://mckinstry871.sharepoint.com/sites/GFN_DEE/Shared Documents/UWMC S1 Cooling Towers/[MES Coordination Matrix - UWMC S1 Towers.xlsx]MES Coordination Table

1/5/2022 13:56

Project Number: 203474
FIM No: 19532
FIM Name: S1 Cooling Towers Replacement (GMAX) and S1 Chillers Replacement (ROM)
Location: UWMC Medical Center Central Plant [47.64895739621886, -122.30849645309132]
Project Phase: GMAX
Purpose: Main MEPS coordination tool for early in a project when Mechanical Equipment Schedules have not yet been created. Also for Energy projects during the IGA phase. Once it is completed for a deliverable, a copy of the tab should be created. Original tab shall serve as record of deliverable. New tab shall be used as the starting point for the next deliverable.

Background of this version: Foundation was 09/28/21 version. 10/3/21 modifications by Dan: Combined features of 09/24/21 and 09/28/21 versions.

EXISTING EQUIPMENT INFORMATION

GENERAL				MECHANICAL														
EXISTING EQUIPMENT TAG	NEW EQUIPMENT TAG	DESCRIPTION	LOCATION	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAPACITY (MBH)	SUPPLY CFM	OA CFM	TSP	GPM	WPD (FT HD)	APD (IN H2O)	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)
S1-CH1		VS CHILLER	S1 CHILLER ROOM	YORK	YK EB EB H5 - CT E		7,200				1,150.000					55.52	43
-CH2 (CHLR-200A)		CHILLER, RETROFIT VS	S1 CHILLER ROOM	YORK			8,400				1,400.000					55	43
-CH3 (CHLR-200B)		CS CHILLER	S1 CHILLER ROOM	CARRIER	EVERGREEN 19XR05004201		8,400				1,400.000					55	43

EXISTING EQUIPMENT TAG	STRUCTURAL				ELECTRICAL					
	DIMENSIONS (LxWxH)	WEIGHT (LBS)	CONNECTION TYPE (SPRING/EXISTING)	STRUCTURAL SUPPORT NOTES	VOLTAGE / POLES	HP	FLA	KVA	MCA	MOCP
S1-CH1					480/3					
-CH2 (CHLR-200A)					480/3					
-CH3 (CHLR-200B)					4160/3					

NEW EQUIPMENT INFORMATION

EXISTING EQUIPMENT TAG	MECHANICAL													
	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CAPACITY (MBH)	SUPPLY CFM	OA CFM	TSP	GPM	WPD (FT HD)	APD (IN H2O)	EAT (°F)	LAT (°F)	EWT (°F)	LWT (°F)
S1-CH1	DAIKIN	WME106CSCSNA		9,180.00				1308.000					56	42
-CH2 (CHLR-200A)	DAIKIN	WME106CSCSNA		9,180.00				1308.000					56	42
-CH3 (CHLR-200B)	DAIKIN	WME106CSCSNA		9,180.00				1308.000					56	42

EXISTING EQUIPMENT TAG	STRUCTURAL				ELECTRICAL – ELECTRICAL INFORMATION								
	DIMENSIONS (LxWxH)	WEIGHT (LBS)	CONNECTION TYPE (RIGID/SPRING)	STRUCTURAL SUPPORT NOTES	EQUIPMENT TYPE	VOLTAGE / POLES	NEUTRAL REQUIRED	HP	FLA	MCA	MOCP	KVA	ALTERNATE POWER
S1-CH1	15' x 8' x 9'	21,184			SM	480/3			635.00	796.00	1200		
-CH2 (CHLR-200A)	15' x 8' x 9'	21,184			SM	480/3			635.00	796.00	1200		
-CH3 (CHLR-200B)	15' x 8' x 9'	21,184			SM	480/3			635.00	796.00	1200		

EXISTING EQUIPMENT TAG	DISCONNECT PROVISIONS			CONTROL PROVISIONS									
	TYPE	LOCATION	FURNISH / INSTALL	TYPE	FURNISH / INSTALL	SIGNAL FROM	SIGNAL VOLTAGE	RACEWAY FURNISH / INSTALL	WIRING FURNISH / INSTALL	SMOKE DETECTOR	MIN. SCCR	NOTES
S1-CH1				VFD								
-CH2 (CHLR-200A)				VFD								
-CH3 (CHLR-200B)				VFD								

Magnitude®Water Cooled Centrifugal Chiller

CH-1, CH-2, & CH-3

DAIKIN

Job Information	*Technical Data Sheet*
Job Name	UWMC S-1
Date	11/29/2021
Submitted By	Billy Kodosky
Software Version	17.40
Unit Tag	WME 765 Ton (Qty 3), Rev 1
Country of Origin	USA

Unit Overview

Model Number	Net Capacity ton	NPLV.IP kW/ton	Voltage	Starter Type	ASHRAE 90.1	LEED EA Credit 4
WME106CSCSNA	765.0	0.3425	460 V / 60 Hz / 3 Ph	VFD	'07, '10, '13 & '16	Qualifies

Unit

Model/Evap/Cond Number:	WME106CSCSNA-M9/E3612-KB2C-2/C3612-LB2C-2/R134-CEAAPACA	**Vintage:**	C
Approval:	AHRI and ETL / cETL		
Vessel Code:	ASME		

Compressor Quantity	Capacity Control	Refrigerant Type	Refrigerant Weight	Altitude
1	VFD / Inlet Guide Vanes	R134a	1466 lb	0 to 3,280 ft

Evaporator

Input Type	Entering Fluid Temperature	Leaving Fluid Temperature	Fluid Type	Actual Fluid Flow	Minimum Fluid Flow
EWT + LWT	56.00 °F	42.00 °F	Water	1308 gpm	352.9 gpm

Length	Diameter	Number of Passes	Tube		Fouling Factor
			Material	Wall Thickness	
12 ft	36 in	2	Copper	0.025 in	0.000100 °F.ft².h/Btu

Condenser

Input Type	Entering Fluid Temperature	Leaving Fluid Temperature	Fluid Type	Fluid Flow
Flow + EWT	84.55 °F	95.20 °F	Water	2030 gpm

Length	Diameter	Number of Passes	Tube		Fouling Factor
			Material	Wall Thickness	
12 ft	36 in	2	Copper	0.025 in	0.000250 °F.ft².h/Btu

Unit Performance (AHRI 550/590)

Design Points Rated with AHRI Condenser Relief

Net Capacity ton	Input kW	Cooling Efficiency kW/ton	NPLV.IP kW/ton	Part Load Cooling Efficiency			Evaporator Fluid		Condenser Fluid	
				75% kW/ton	50% kW/ton	25% kW/ton	Pressure Drop ft H_2O	Entering Temperature °F	Pressure Drop ft H_2O	Leaving Temperature °F
765.0	461.9	0.6038	0.3425	0.4253	0.2927	0.3176	24.7	56.00	20.2	95.20

Performance Points Rated with AHRI Condenser Relief

Point #	% of Design Load	Net Capacity ton	Input kW	Cooling Efficiency kW/ton	Evaporator Fluid				Condenser Fluid			
					Flow gpm	Temperature		Pressure Drop ft H_2O	Flow gpm	Temperature		Pressure Drop ft H_2O
						Entering °F	Leaving °F			Entering °F	Leaving °F	
1	100.0	765.0	461.9	0.6038	1308	56.00	42.00	24.7	2030	84.55	95.20	20.2
2	75.0	573.8	244.0	0.4253	1308	52.50	42.00	24.7	2030	74.78	82.42	20.9
3	50.0	382.5	112.0	0.2927	1308	49.00	42.00	24.7	2030	65.00	69.92	21.8
4	25.0	191.3	60.75	0.3176	1308	45.50	42.00	24.6	2030	65.00	67.49	21.9

Service Data

Service Points Rated with AHRI Condenser Relief

Point #	Superheat Δ °F	Subcooling Δ °F	Evaporator Fluid			Condenser Fluid		
			Temperature °F	Pressure psig	Velocity ft/s	Temperature °F	Pressure psig	Velocity ft/s
1	1.0	11.1	40.4	35.5	7.2	97.5	119.0	6.7
2	1.0	8.4	40.7	35.7	7.2	84.0	93.6	6.7
3	1.0	5.6	41.0	36.0	7.2	70.9	72.5	6.7
4	1.0	2.9	41.3	36.3	7.2	68.0	68.2	6.7

Physical

Evaporator

Inlet Location	Header Type	Header Material	Tube Sheet Material	Design Pressure (Waterside)
Right	Dished, Grooved	Carbon Steel	Carbon Steel	150 psig

Condenser

Inlet Location	Header Type	Header Material	Tube Sheet Material	Design Pressure (Waterside)
Right	Dished, Grooved	Carbon Steel	Carbon Steel	150 psig

Electrical

Voltage:	460 V / 60 Hz / 3 Ph	Power Connection:	Single Point

Rated Load Amps (RLA)	Minimum Circuit Ampacity (MCA)	Recommended Overcurrent Protection Size (ROCP)	Maximum Overcurrent Protection Size (MOCP)	Locked Rotor Amps (LRA)	Power Factor	Lug Connection Size (wires per phase)
635 A	796 A	1000 A	1200 A	698 A	0.93	1200A / (4) 4/0-500 MCM

Above RLA, MCA, MOCP & LRA values are per compressor.

Drive

Type	Model	Location	Harmonic Distortion	Enclosure Type	Motor Protection
VFD	Integral	Unit Mounted	Standard	NEMA 1	Standard

Circuit Breaker	Short Circuit Current Rating	Approval
50 KAIC	50 KAIC	ETL, ETLc

Sound (with insulation)

Sound Pressure

63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	Overall	75% Load	50% Load	25% Load
41.0	58.0	67.0	72.0	74.0	71.0	84.0	71.0	**86.2**	78.8	78.0	79.8

Sound Pressure (dB) measured in accordance with ANSI/AHRI Standard 575-2008 ('A' weighted)

Options

Basic Unit

Packaging:	Bagging only

Insulation

Thermal:	0.75" on Evaporator Shell, Suction Piping, Compressor Inlet, Motor Barrel & High Humidity

Control

Communication Protocol:	BACnet IP/Ethernet

Warranty

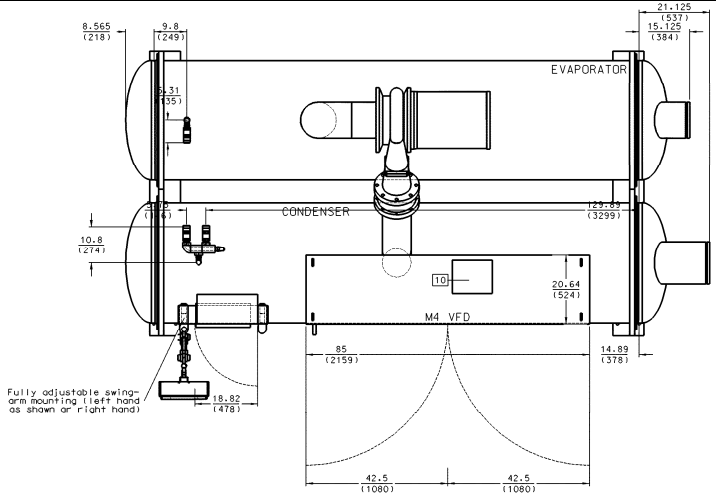
Unit Startup:	Domestic by Daikin Factory Service (Std.)
Standard Warranty:	Domestic, First Year Standard Warranty (Parts & Labor)
Extended Warranty:	5 Years Compressor only Parts & Labor
Delayed Warranty Start:	None (Startup 12-18 months after ship date)

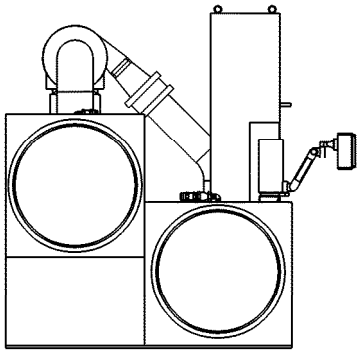
AHRI Certification

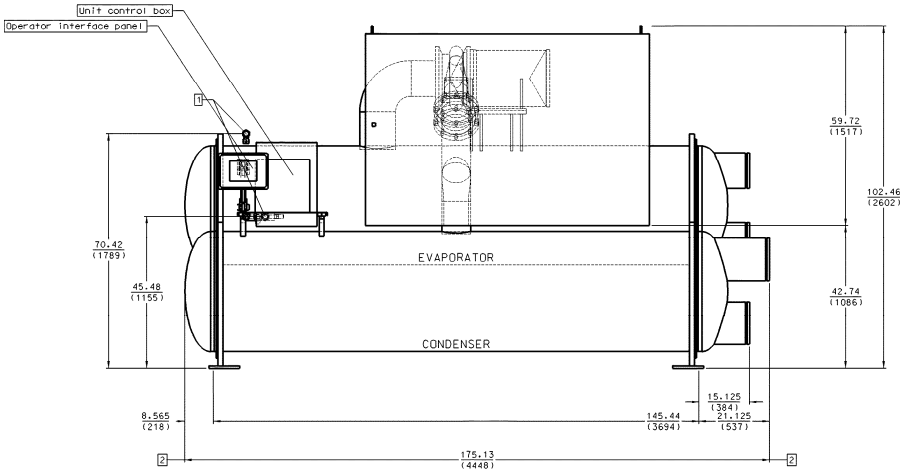
Certified in accordance with the AHRI Water-Cooled Water-Chilling And Heat Pump Water-Heating Packages Certification Program, which is based on AHRI Standard 550/590 (I-P) And AHRI Standard 551/591 (SI). Certified units may be found in the AHRI Directory at www.ahridirectory.org.

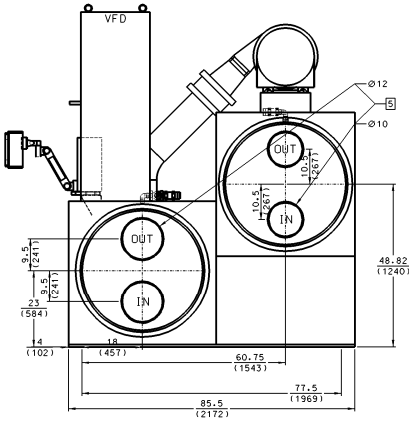
Notes

1. Above RLA, MCA, MOCP & LRA values are per compressor. and are for input amps.
2. Performance kW & kW/ton values are total values unless noted otherwise.
3. Minimum flow is based upon standard condenser water relief and not increased lift due to constant condenser water temperature.
4. Motor overload settings determined by motor amps. Refer to unit nameplate for proper settings.
5. The USGBC bases its LEED EA credit 4 calculations for Enhanced Refrigerant Management on the default values for a water cooled centrifugal chiller with a 25-year life, 10% end of life loss and 2% annual leak rate. The gross AHRI cooling capacity for the unit is at least 10 tons, and the refrigerant charge is 10 lbs.
6. The LEED result above considers the chiller only. When applying this information for credit or prerequisite compliance the entire building must be considered.
7. Use only copper supply wires with ampacity based on 75°C conductor rating. Connections to terminals must be made with copper lugs and copper wire.
8. For orientation purposes, left and right hand vessel connection locations are determined by facing the HMI panel (Human Machine Interface). The unit front is the long dimension side with the HMI panel and rear is the opposite side long dimension.





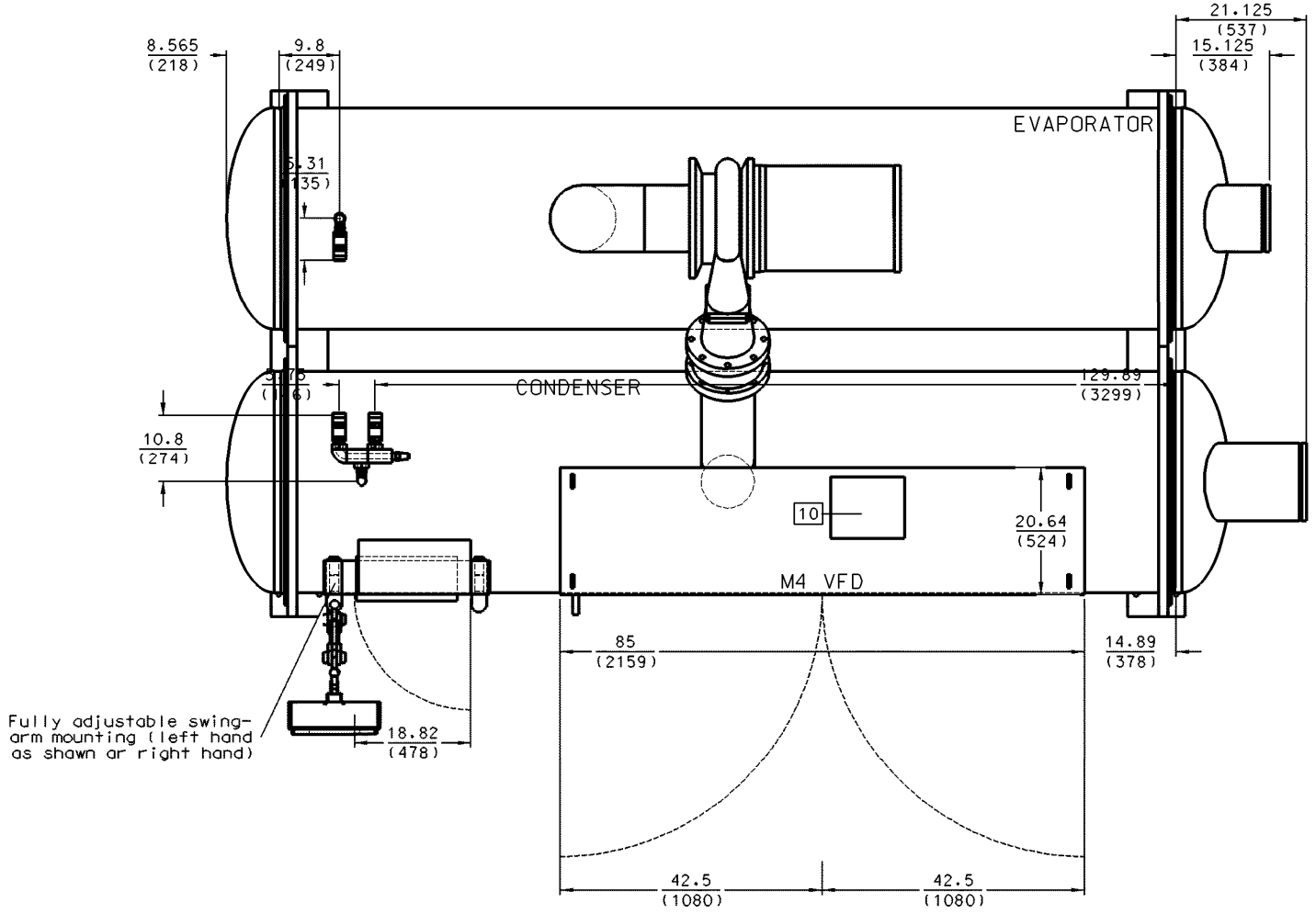




	Refrigerant lbs (kg)	Total Weight (inc. Refrigerant) lbs (kg)	Water Volume gal (l)		Center of Gravity ins (mm)		
			Evap	Cond	X	Y	Z
Operating	1466 (665)	21184 (9609)	160 (604)	206 (780)	76 (1936)	38 (976)	39 (981)
Shipping		18133 (8225)	- (-)	- (-)	76 (1933)	39 (981)	38 (968)

1. 1 in. (25 mm) FPT evaporator and condenser relief valves must be piped per ANSI/ASHRAE 15.
2. At a minimum, length of tube sheet to tube sheet dimensions is required at either end for tube removal, 36 in. (914 mm) is required at other end and each side and top for service
3. Final connections must allow for 0.5 in. (12.7 mm) manufacturing tolerance.
4. 2.5 in. (64 mm) diameter lifting holes are provided. See installation manual for lifting instructions.
5. All water connections are given in standard U.S. pipe sizes. Standard connections are suitable for welding or grooved couplings. All grooved coupling are OGS (Original Grooved System).
6. Vibration isolator pads are provided for field installation (0.25 in (6 mm) thick when loaded).
7. If main power wiring is brought up through the floor, this wiring must be outside the envelope of the unit.
8. The shipping skid adds 4 in. (105 mm) to the overall unit height.
9. Dimensions shown are for units with standard 150 psig (1 MPa) design water side pressure. Check factory for unit dimensions with higher pressures.
10. Incoming power wiring cover plate, see pg 6 for knockout dimensions

Product Drawing	Unit Tag: WME 765 Ton (Qty 3)			Sales Office: Air Reps, LLC		
Product: Magnitude™ Chiller	Project Name: UWMC S-1			Sales Engineer: Ken Horsfall		
Model: WME106CSCSNA/E3612-KB2CR2V/C3612-LB2CR2V	Date: 29/11/2021	Ver/Rev:	Sheet: 1 of 6	Scale: NTS	Tolerance: +/- 1.0”	Dwg Units: in (mm)
WME106CSCSNM900460H6D/E3612KB2CR2VCN4E/C3612LB2CR2VCN4E/SNAC6						



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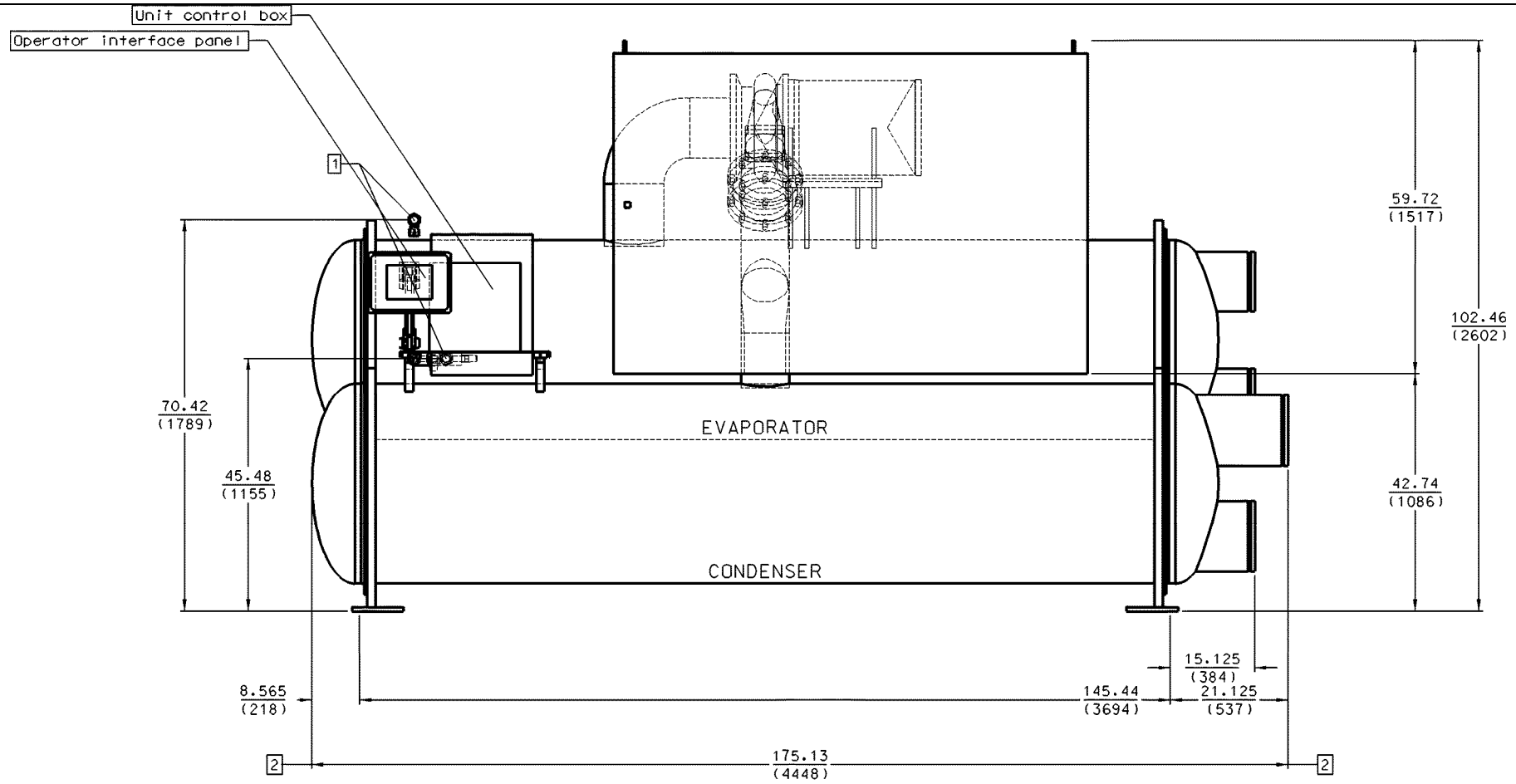
WME106CSCSNM900460H6D/E3612KB2CR2VCN4E/C3612LB2CR2VCN4E/SNAC6							
No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications							



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Product: Magnitude™ Chiller	Project Name: UWMC S-1			Sales Engineer: Ken Horsfall			
Model: WME106CSCSNA/E3612-KB2CR2V/C3612-LB2CR2V	Date: 29/11/2021	Ver/Rev:	Sheet: 3 of 6	Scale: NTS	Tolerance: +/- 1.0”	Dwg Units: in (mm)	
WME106CSCSNM900460H6D/E3612KB2CR2VCN4E/C3612LB2CR2VCN4E/SNAC6							
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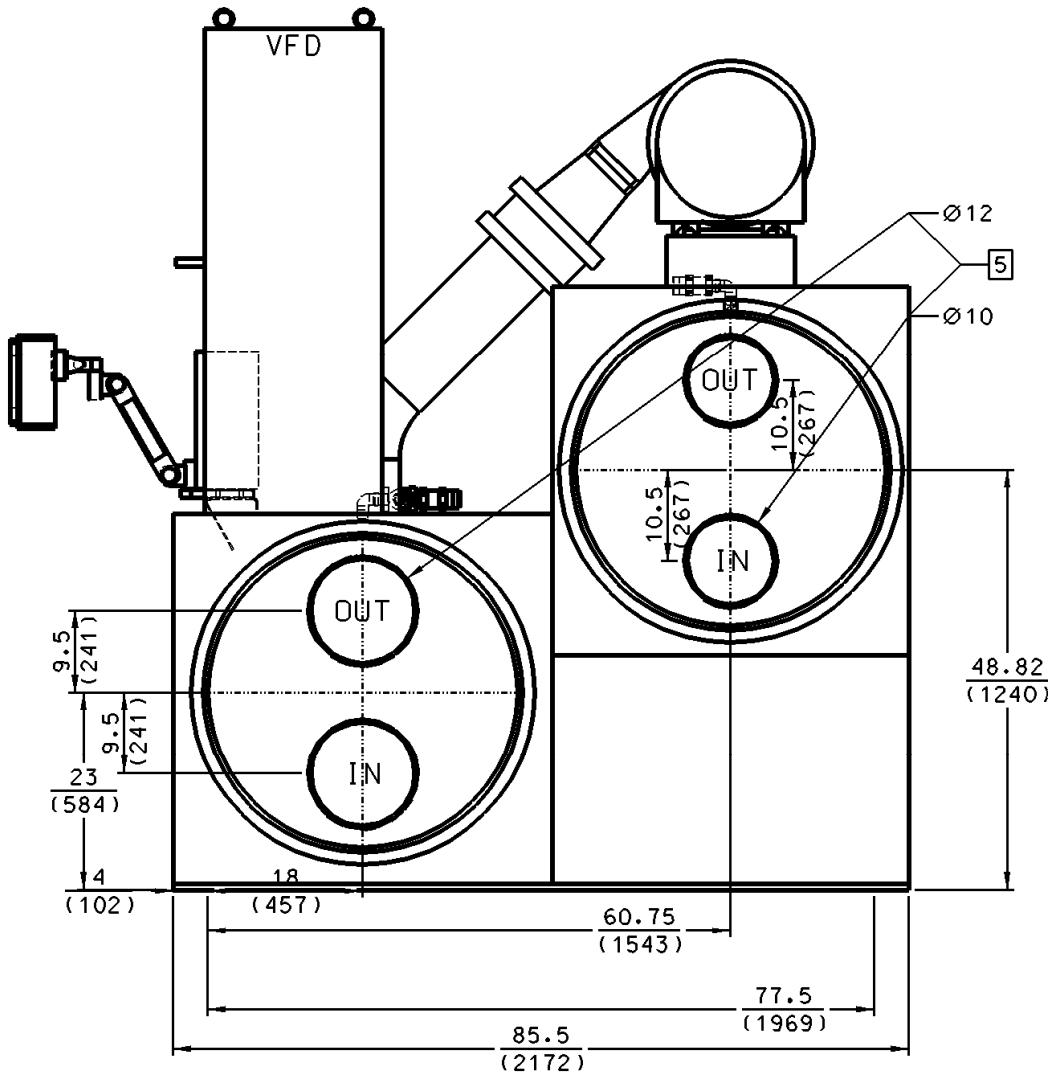

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Product: Magnitude™ Chiller	Project Name: UWMC S-1			Sales Engineer: Ken Horsfall			
Model: WME106CSCSNA/E3612-KB2CR2V/C3612-LB2CR2V	Date: 29/11/2021	Ver/Rev:	Sheet: 4 of 6	Scale: NTS	Tolerance: +/- 1.0"	Dwg Units: in (mm)	
WME106CSCSNM900460H6D/E3612KB2CR2VCN4E/C3612LB2CR2VCN4E/SNAC6							
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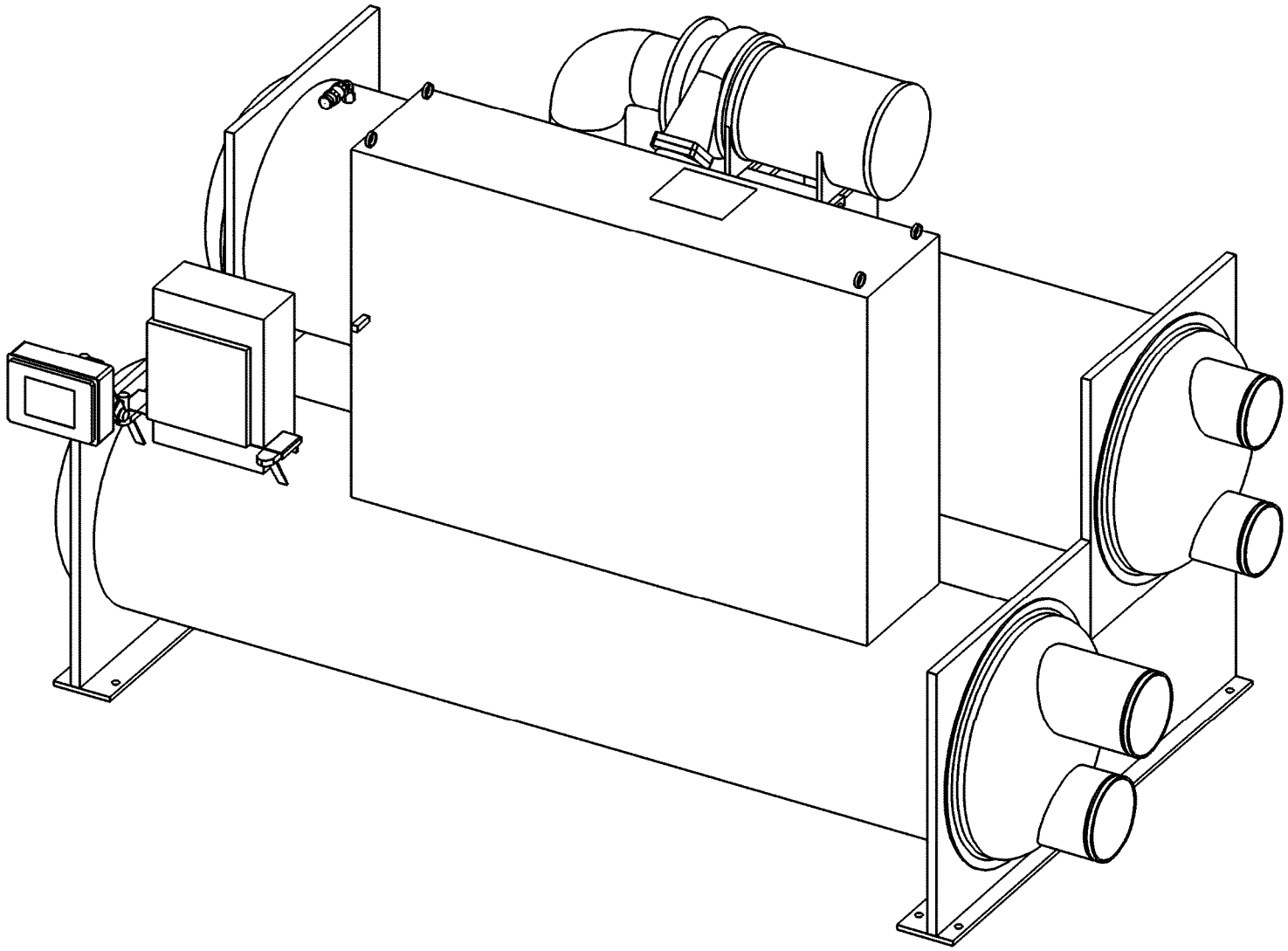
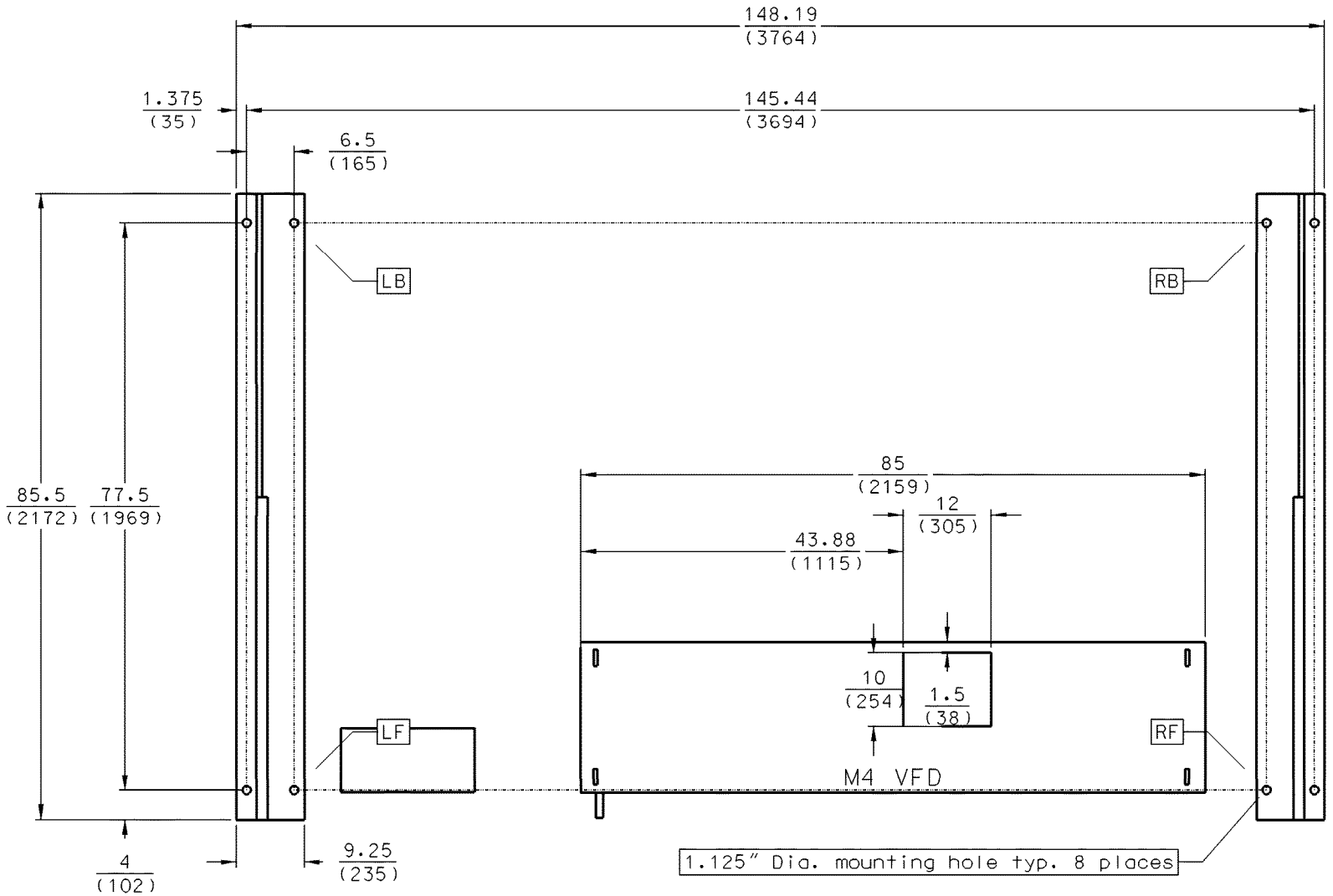


Product Drawing	Unit Tag: WME 765 Ton (Qty 3)			Sales Office: Air Reps, LLC			
Product: Magnitude™ Chiller	Project Name: UWMC S-1			Sales Engineer: Ken Horsfall			
Model: WME106CSCSNA/E3612-KB2CR2V/C3612-LB2CR2V	Date: 29/11/2021	Ver/Rev:	Sheet: 5 of 6	Scale: NTS	Tolerance: +/- 1.0”	Dwg Units: in (mm)	
WME106CSCSNM900460H6D/E3612KB2CR2VCN4E/C3612LB2CR2VCN4E/SNAC6							
No change to this drawing may be made unless approved in writing by Daikin Applied. Purchaser must determine that the equipment is fit and sufficient for the job specifications							

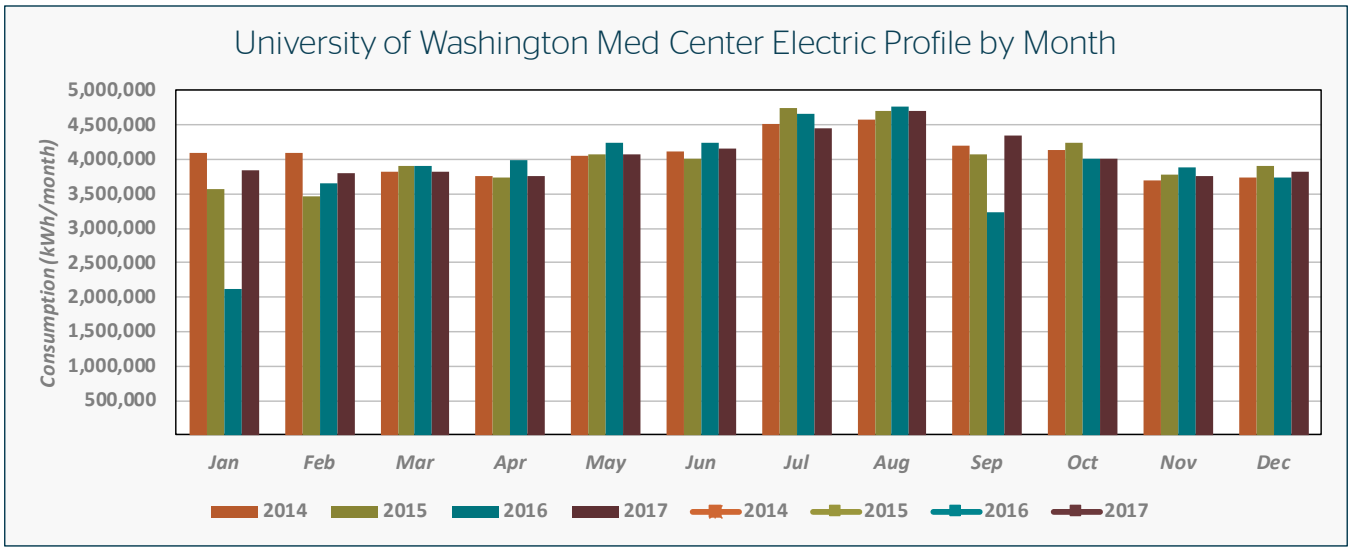


Operating Corner Weight lbs (kg)			
Left Back (LB)	Left Front (LF)	Right Back (RB)	Right Front (RF)
5026 (2280)	5058 (2294)	5533 (2510)	5567 (2525)

Product Drawing	Unit Tag: WME 765 Ton (Qty 3)			Sales Office: Air Reps, LLC			
Product: Magnitude™ Chiller	Project Name: UWMC S-1			Sales Engineer: Ken Horsfall			
Model: WME106CSCSNA/E3612-KB2CR2V/C3612-LB2CR2V	Date: 29/11/2021	Ver/Rev:	Sheet: 6 of 6	Scale: NTS	Tolerance: +/- 1.0"	Dwg Units: in (mm)	
WME106CSCSNM900460H6D/E3612KB2CR2VCN4E/C3612LB2CR2VCN4E/SNAC6							

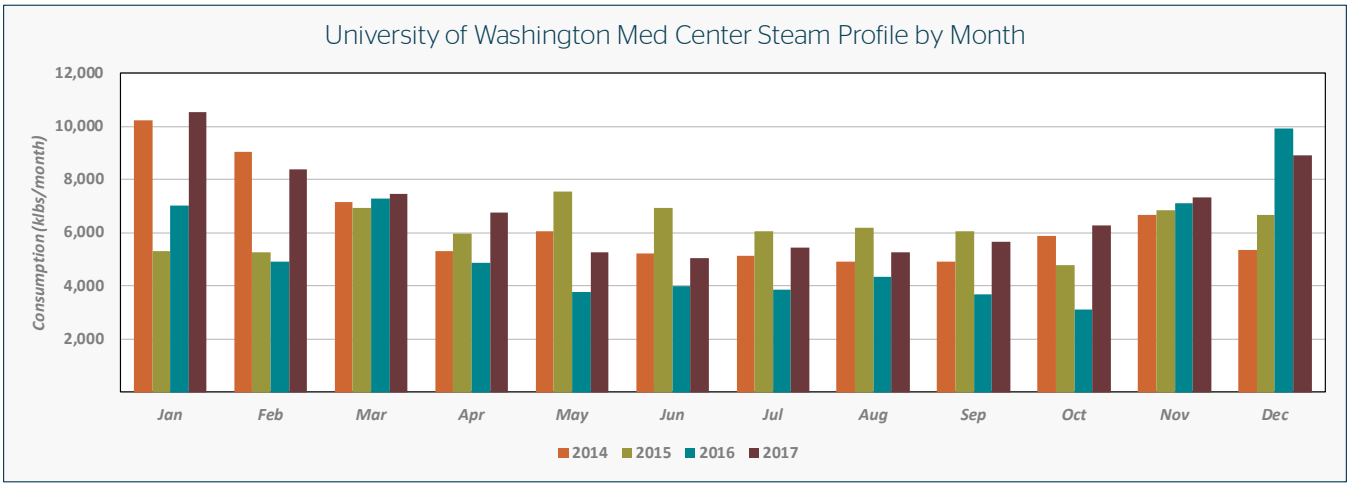
5.6 UTILITY DATA

University of Washington Med Center Monthly Electric Profile				
kWh	2014	2015	2016	2017
Jan	4,091,968	3,577,639	2,125,524	3,843,811
Feb	4,087,848	3,460,924	3,656,965	3,799,275
Mar	3,816,737	3,911,476	3,900,072	3,818,749
Apr	3,749,787	3,743,602	3,990,098	3,761,007
May	4,043,319	4,078,540	4,232,520	4,073,996
Jun	4,106,946	4,003,361	4,241,227	4,151,108
Jul	4,518,260	4,732,871	4,655,351	4,444,749
Aug	4,582,629	4,702,734	4,760,532	4,703,703
Sep	4,197,349	4,064,585	3,241,964	4,345,971
Oct	4,127,627	4,235,020	4,014,316	4,015,286
Nov	3,700,895	3,772,031	3,880,701	3,755,218
Dec	3,735,442	3,905,257	3,727,275	3,813,936
Total	48,758,807	48,188,040	46,426,545	48,526,809



The UW campus supplies electricity to the Medical Center buildings. The monthly consumption trend is same in recent years with summer time increase in use from the chiller plant operation.

University of Washington Med Center Monthly Steam Profile				
klbs	2014	2015	2016	2017
Jan	10,223	5,328	7,035	10,541
Feb	9,040	5,249	4,893	8,373
Mar	7,171	6,924	7,291	7,446
Apr	5,300	5,983	4,849	6,762
May	6,046	7,563	3,754	5,245
Jun	5,226	6,931	3,996	5,054
Jul	5,141	6,040	3,858	5,439
Aug	4,933	6,188	4,329	5,272
Sep	4,919	6,035	3,679	5,650
Oct	5,871	4,789	3,119	6,272
Nov	6,683	6,845	7,106	7,312
Dec	5,333	6,675	9,938	8,920
Total	75,886	74,548	63,848	82,286



High pressure steam supplied from the UW campus stem plant is reduced to 60 PSIG and 15 PSIG in at the steam reducing stations in the building. Steam is used for space heating (HVAC), medical equipment and some for kitchen. In use steam for space heating is evident in the graph. The high use for space heating is driven by the use of 100% OA for space conditioning.