



# REQUEST FOR PROPOSAL

VENDOR SERVICES  
FOR

## CHILLER REPLACEMENT PROJECT

UNIVERSITY OF MARYLAND SHORE REGIONAL MEDICAL CENTER  
AT CHARLESTON, MD

RFP #: 2022-01

DATE: 13 April 2022

RFP Issue Date:	Wed, 13 April 2022
Site Inspection:	Wed, 27 April 2022
Deadline for Questions	Wed, 4 May 2022 [COB 5 pm EDT]
Answers to Questions issued to all Offerors	Wed, 11 May 2022
Proposal Due Date:	Wed, 18 May 2022 [1 pm EDT]
UMMC/SRH Bid Evaluations	13 -27 May 2022
Offeror Interviews	TBD
Estimated Notice to Proceed date:	Mon, 11 July 2022

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For the University of Maryland Shore Medical Center at Chestertown  
Dated 5 April 2022  
  
[PDF included as an attachment to the RFP email]



## **I. INTRODUCTION**

DATE: 13 April 2022

RFP: # 2022-01

SUBJECT: **UM Shore Regional Medical Center Chestertown  
Chiller Replacement Request for Proposal  
UMMS RFP 2022-01**

Dear Prospective Offeror:

University of Maryland Medical System ("UMMS") in its corporate capacity is seeking proposals from qualified respondents to provide a replacement chiller [with associated support equipment/devices/controls] as required per WSP [formerly Leach Wallace Associates] Chiller Study dated 5 April 2022.

This Request for Proposal ("RFP") does not commit the UMMS to pay for any cost of preparation and of a proposal nor to procure or contract for the goods or services as specified herein.

The Contracting Officer is the only person who can legally commit the UMMS to the expenditure of funds in connection with the proposal procurement.

Any contact, correspondence or communication in any way, with anyone other than the Project Manager [H. P. Barry] assigned to this initiative, will result in the disqualification of the vendor making contact from participating in this offer.

Those who receive this RFP other than directly from the UMMS and wish to submit an offer or receive amendments and other information as may be forthcoming, should make themselves known to H. P. Barry – [howard.barry@umm.edu](mailto:howard.barry@umm.edu).

If your firm wishes to submit a proposal, please read and follow the enclosed instructions.

Howard Patrick [Pat] Barry

Senior Project Manager Construction & Facilities Planning  
University of Maryland Medical System  
[Howard.barry@umm.edu](mailto:Howard.barry@umm.edu)

## II. SCOPE OF WORK

### Overview

The intent of this work is for the vendor to furnish and provide services for the installation of:

[Option 1] a new replacement chiller and all related components such as piping, valves, chilled water pumps, variable frequency pumps as well as related components, controls, and utilities.

[Option 2] all work associated with Option 1 plus the addition of an air cooled chiller and pump package to provide N+1 redundancy and add staging flexibility.

This work shall include all labor and materials, and any other items necessary for successful execution and completion of the work.

1. The Scope of Work is in accordance with the attached WSP Chiller Study dated 5 April 2022 [see VI below].
2. The project shall be completed during normal daytime hours, with off-hour work required for utility outages or other disruptive activities that may affect the Users in surrounding areas. UMMS Interim Life Safety Management [ILSM] and Infection Control Risk Assessment [ICRA] protocols shall be implemented to coordinate outages/disruptions with ongoing UM Chestertown Medical Center activities.
3. Offerers shall walk the areas of work to determine the extent of work prior to submitting a bid for this work.
  - a. Walk-thru: All Offerers must attend a pre-bid walk-thru on **Wednesday 27 April 2022 at 1pm**.
  - b. Location is: Loading Dock/Service Entry - University of Maryland Shore Regional Medical Center at Charlestown – 100 Brown St, Chestertown, MD 21620.
4. All work shall be performed in accordance with national and state codes per the WSP Chiller Study and/or as required by local regulation[s].
5. The successful Offerer shall be responsible for coordinating and scheduling inspections with the local authorities and UM SRHMC facility management personnel.
6. Notify owner of any discrepancies in the documents and or field conditions in writing before work begins.
7. Lywood has been pre qualified by UMMS/SRH as an acceptable electrical sub-contractor.

Lywood | Electrical, Automation, Utilities  
Neil Faulkner  
Operations Manager  
103 Division  
Galena, MD 21635  
Cell: 410.200.5089                      Office: 410.648.7841 x 303
8. Controls to be provided per WSP Chiller Study. Include summary of all points and provide price.
9. All valves, per WSP Chiller Study, shall be included in project. See WSP Chiller Study for locations.

10. Refer to WSP Chiller Study for design information regarding existing conditions – Offeror shall be responsible for field verification of all existing conditions that may affect their submission.
11. Full Shop Drawings [Submittals] shall be required for review by WSP to facilitate pre installation coordination and commissioning.

### **III. SOLICITATION INSTRUCTIONS AND PROCEDURES**

#### **A. SUBMISSION REQUIREMENTS**

- (1) Submission Content
  - (a) Proposal – with Cover & Signature Page [see Attachment A]
  - (b) Statement of Qualifications
  - (c) Written description of a project delivery plan including project schedule based on a notice to proceed date on or about 11 July 2022.
- (2) Based on the time required by UMMS to adequately evaluate proposals, Offerors are requested to specify a proposal acceptance period of not less than sixty (60) days.

If UMMS, at any time prior to the due date for receipt of proposals, amends or changes any part of the RFP, then the UMMS Contract Administrator will transmit an appropriate notification to all prospective Offerors, and each Offeror shall acknowledge in writing the receipt of any such amendment unless otherwise provided for in the particular amendment.

- (3) This solicitation provides sufficient information for Offerors to prepare a proposal. In order to provide a forum for questions and to ensure equal opportunity and knowledge for all Offerors, UMMS may at its sole discretion respond to written questions and requests for clarification. Questions or requests must be submitted in writing **via email** to the following address[es] and received not later than, COB 5 pm on 4 May 2022 – answers to all questions will be provided to all Offerors on or before 11 May 2022.

**RFP Terms/Conditions Questions** are to be submitted via email to:

University of Maryland Medical System  
Construction & Facilities Planning  
Attention: H. P. Barry

**E-Mail Address:** [howard.barry@umm.edu](mailto:howard.barry@umm.edu)

**Technical Questions** are to be submitted via email to:

WSP [formerly Leach Wallace]  
Attention: Andrew O'Brien

**E-Mail Address:** [Andrew.OBrien@wsp.com](mailto:Andrew.OBrien@wsp.com)

Note: All questions shall be submitted in writing via email to the above parties.

- (4) UMMS may conduct a pre-award survey to obtain independent verification of the Offeror's technical, managerial, and financial capability to provide the deliverables described. UMMS may also conduct a site survey and inspection of the Offeror's facilities and staff.
- (5) After UMMS has received and evaluated all proposals and determined those Offerors in the "competitive range," those Offerors in the competitive range may be contacted to resolve any clarifications, deficiencies, or questions regarding their proposals and may be asked to provide additional information and a more detailed analysis of the equipment and maintenance needed by UMMS.
  - (a) The "competitive range" is defined as those proposals which are (1) technically acceptable as submitted, or (2) not acceptable as submitted, but could be made acceptable through discussions with

a minor rewrite of the proposals, price and other factors considered

**B. SUBMISSION INSTRUCTIONS**

- (1) The proposal shall stipulate that it is predicated upon all the terms and conditions of this Request for Proposal (“RFP”) and shall acknowledge any amendments thereto.
- (2) Correspondence associated with questions, comments, or containing responses to this RFP, as well as cover letters, must clearly bear the following Subject Line:

**UM Shore Regional Medical Center Chestertown  
Chiller Replacement Proposal  
UMMS RFP 2022-01**

- (3) **Deadline:** The bid package must be submitted via email in PDF format to H. P. Barry at [howard.barry@umm.edu](mailto:howard.barry@umm.edu) no later than 1:00 P.M. EDT on Wednesday 18 May 2022.
  - (a) UMMS specifically disclaims any warranty or guarantee as to the accuracy of the information contained in the bid package. The bid packages will remain the exclusive property of the UMMS; therefore, your firm must return the package to the above-mentioned contact when you submit your bid as outlined below:
- (4) Late proposals, modifications of proposals and withdrawals of proposals:
  - (a) UMMS reserves the right, at its sole discretion, to review a proposal received after the date and time specified for receipt, when it is received before award is made.
  - (b) A modification resulting from the Contract Administrator's request for "Best and Final" offers received after the time and date specified for such offers will not be considered unless received before award and the late receipt is due solely to mishandling by the UMMS after receipt at the UMMS installation.
  - (c) The time of receipt at the UMMS is determined from the time and date stamp of such on the proposal wrapper or other documentary evidence of receipt maintained by the installation.
- (5) Proposals may be withdrawn via emailed written notice, by the Offeror or their authorized representative, received at any time prior to award.

**C. EVALUATION CRITERIA**

- (1) Evaluation of Proposals
  - (a) The evaluation of proposals will be based on UMMS's sole and independent review.
  - (b) The objective of the evaluation process is to identify Offerors whose proposals will result in the lowest overall use of UMMS resources and that will result in most timely completion of the Project.
  - (c) UMMS will evaluate proposals responsive to this Request for Proposal in three phases: a regulatory compliance phase; a technical and schedule phase; and a cost phase.



- (2) Compliance Phase
  - (a) UMMS shall determine whether Offerors have met the requirements of the solicitation. Any proposal submitted by an Offeror who has not complied with the submission requirements outlined in this RFP may, at UMMS's option, be deemed non-responsive and shall be disqualified from further consideration.
  
- (3) Technical and Schedule Phase
  - (a) Technical qualifications of all firms determined to have met the compliance requirements will be evaluated based on demonstration by Offerors of their experience working on major chiller replacement of similar scope in similar situations within an operating/functional healthcare setting.
  
- (4) Cost Phase
  - (a) UMMS will evaluate each Offerer's proposal based on reasonableness of cost. UMMS is not subject to awarding this contract based on low bid but rather will award to the Offeror presenting best value.

#### **IV. ADDITIONAL OWNER INFORMATION**

##### **A. Award of Contract**

- (1) Final contract for this work will be in the form of a Guaranteed Maximum Price Contract, General Conditions, and Supplemental Conditions.
- (2) A contract will be awarded to the responsible Offeror(s) whose offer(s), conforming to this solicitation, will be most advantageous to the UMMS, cost, and other factors considered.
- (3) The UMMS reserves the right to accept other than the lowest offer; reject any or all offers; and to waive informalities and minor irregularities in offers received.
- (4) A written award or acceptance of offer mailed or otherwise furnished to the successful Offeror within the time for acceptance specified in the offer shall be deemed to result in a binding contract without further action by either party.
- (5) The UMMS may accept, within the time specified therein, any offer, whether or not there are negotiations subsequent to its receipt, unless the offer is withdrawn by written notice received by the UMMS prior to award. If subsequent negotiations are conducted, they shall not constitute a rejection or counter offer on the part of the UMMS.
- (6) The UMMS may award a contract, based on initial offers received, without discussion of such offers. Accordingly, initial offers should be submitted on the most favorable terms that the Offeror can submit to the UMMS.
- (7) The UMMS reserves the right to accept all or part of the services proposed

##### **B. Taxes**

The Offeror recognizes that UMMS is a non-profit, tax exempt organization and as such the Offeror shall be responsible for all Federal, State, and Local taxes arising out of its sale of the products to UMMS.

##### **C. Non-Profit Institutions Act Disclaimer**

Offeror warrants that, except as expressly indicated otherwise herein, it has not relied upon the Non-Profit Institutions Act exemption to the Robinson-Patman Act, 15 U.S.C. Section 13 et seq., for pricing on any products and services supplied hereunder.

##### **D. General Requirements/Compliance/Disclosures**

- (1) Offeror shall disclose, in clear, unambiguous language and terms, any interest and/or financial stake in Offeror's business by any UMMS employee, including members of the medical staff, staff, or family members of UMMS employees. This disclosure shall include the nature, type, and equivalent amount of any remuneration, whether in whole or in part, provided to any employee, staff member, or family member. If there are none, Offeror shall state in response to this RFP that there are none.
- (2) Offeror shall disclose, in clear, unambiguous language and terms, any prior, existing or planned arrangement with anyone representing UMMS for a value not specifically tied to this RFP, but which currently or may prospectively benefit UMMS as a result of doing business with Bidder. If there are none, Offeror shall state in response to this RFP that there are none.

##### **E. Non-Discrimination – Affirmative Action**

The provisions of Executive Order 11246, as amended by Executive Order 11375, are incorporated by reference in this RFP and in any resulting order. Offeror certifies compliance with Civil Rights Act of 1964 as amended in 1991, executive orders, and all other relevant statutes prohibiting discrimination based upon race, color, gender, national origin, age, or handicap. Failure to comply can result in termination of this contract.

F. Advertising and Publicity:

Neither the Offeror nor its subcontractors, if any, shall issue or sponsor any advertising or publicity that says or implies that the UMMS recommends or prefers its services. The Offeror may, however, use the UMMS as a confidential reference in seeking other business.

G. Order of Precedence:

Any inconsistency unless otherwise provided herein, shall be resolved by giving precedence in the following order: (1) Purchase Order; (2) Special Provisions; (3) Statement of Work; (4) Terms and Conditions of the Solicitation, if any; and (5) other provisions when attached or incorporated by reference.

V.

**PROPOSAL COVER LETTER & SIGNATURE PAGE**

**UM Shore Regional Medical Center Chestertown  
Chiller Replacement Proposal  
UMMS RFP 2022-01**

Firm Name:

Contact Person:

Address:

Email:

Telephone Number:

Taxpayer I.D. Number:

**UMMS RFP 2022-01**

Date Submitted:

Proposal Due Date:

The undersigned duly authorized representative of Offeror certifies personally and on Offeror's behalf that all of the representations and certifications set forth above in the Certifications and in Offeror's Proposal are complete and accurate. The undersigned representative of Offeror is aware of the penalty under Maryland law for making false statements.

I, the undersigned, hereby authorize University of Maryland Medical System ("UMMS") to request information and records from any source relating to my educational, medical, insurance, financial, credit, employment, and legal history. I specifically authorize UMMS to obtain, among other such information and records, a consumer credit report about me, and to request information and obtain records regarding any legal proceedings or investigations relating to me, whether criminal, civil, or administrative.

I consent to the disclosure of any and all such information to UMMS or its authorized representative for UMMS's use in verifying information I have provided to UMMS and in evaluating my fitness, integrity, competence and experience to provide services to UMMS.

This authorization shall remain valid for a period of one year from the date indicated below or until the completion of my services to UMMS, whichever occurs later.

I know that I have the right to receive a copy of this authorization upon request and agree that a photographic copy of this authorization is as valid as the original.

WITNESS:

OFFEROR:

(Signature)  
(Name typed)

(Title)  
(Date)

**VI. Chiller Study by WSP [formerly Leach Wallace]  
For the University of Maryland Shore Medical Center at Chestertown  
Dated 5 April 2022**

[PDF included as an attachment to the RFP email]

**[END OF RFP]**



UNIVERSITY OF MARYLAND –  
SHORE MEDICAL CENTER  
AT CHESTERTOWN

CHILLER STUDY



***FORMERLY LEACH WALLACE ASSOCIATES, INC.***

7067 COLUMBIA GATEWAY DR COLUMBIA, MD 21046/ 410-579-8100 / [WWW.WSP.COM](http://www.wsp.com)

WSP PROJECT No.: B2201812.000

APRIL 5<sup>TH</sup>, 2022





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## I. INTRODUCTION

### A. Executive Summary

The University of Maryland Shore Medical Center at Chestertown chilled water system contains (2) two water cooled chillers, (2) two cooling towers, and (1) air cooled chiller. These components of the system were installed at different times over the past 35 years.

There are several problems Chestertown facilities has faced with the current chilled water system. The most critical problems addressed in this study are issues with flow and maintenance.

CH-2 is passed its useful life and should be replaced. Parts are no longer available for this chiller and need to be custom made. Facilities noted this chiller needs to be rebuilt every year.

#### Option 1:

It is proposed to:

- Replace CH-2 with a new water cooled chiller and also replace the associated chilled water and condenser water pumps. Pumps shall be equipped with variable frequency drives
- New CH-2 will be a 200 ton dual circuit screw machine arranged in a variable primary flow configuration. Acceptable manufacturers are Daikin, Trane, Carrier, and York.
- Variable frequency drives will be added to existing chiller 1 pump and existing chiller 3 pumps.
- 3-way valves at all Air Handling Units will be replaced with 2-way valves.
- A 4" bypass with control valve is proposed to be installed in the system to bypass water as needed if primary pump flow is greater than air handling unit need.
- It should be noted that a significant retro-commissioning effort will be required to assure the system is working properly at the end of construction. This will be an iterative process with adjustment of pumps and chiller staging to assure all AHU's get proper flow in all chiller staging arrangements.

#### Option 2:

Option 2 includes everything in option 1 with the addition of a 200 ton air cooled chiller and pump package on the roof outside of the penthouse housing CH-1 and CH-2. This 200 ton air cooled chiller will provide N+1 redundancy to the system and add staging flexibility.



# I. Introduction

## B. Overview

The purpose of this study is to review the chilled water system and present options for replacement/upgrades within the owner provided rough order of magnitude budget of \$600,000. The scope of work for each system is based upon reference drawings, site survey and information obtained from the Hospital.



# I. Introduction

## C. Objectives

The primary objectives of the study are summarized as follows:

- Peer Review of the “Central Chilled Water Plant Report” dated 1/11/2021 by James Posey Associates.
- Review “Chiller Replacement and Plant Reconfiguration” proposal from Daikin dated 1/4/2022.
- Site visit to perform schematic level survey of chillers / cooling towers / piping arrangement.
- Provide summary report of the peer review of the central chilled water plant report, Daikin proposal, and options for replacement / enhancement of existing chilled water system. Options will be provided in summary report and described so as to be able to be priced by a contractor.





## II. Existing Conditions

## II. EXISTING CONDITIONS

### A. General

The water cooled chilled water systems are housed in the west penthouse; the system consists of two (2) McQuay centrifugal chillers which are configured in parallel using a common chilled water main. Staff indicated the chillers are not connected to the emergency power distribution system.

Chiller #1 was installed in 2000 and is a 200 ton water cooled chiller. The chiller is in fair condition and is approaching the end of its useful life. The associated chilled water pump and condenser water pump appeared to be in fair condition. The motor on the chilled water pump appeared to have been replaced recently. The chilled water pump is 15 horsepower and rated for 400 GPM at 95 feet of head. The associated condenser water pump is rated for 600 GPM and 55 feet of head. Cooling tower #1 associated with Chiller #1 is a galvanized Baltimore Air Coil tower. This cooling tower is nearing the end of its useful life and should be considered for replacement in the next 5 years.

Chiller #2 was installed in 1990 and is a 200 ton water cooled chiller. The chiller is in poor condition and in need of replacement. Staff indicated the chiller needs to be rebuilt each year with custom parts because the manufacturer does not still make parts for this model. Ratings for Chiller #2 chilled and condenser pumps were not available. Both pumps appear to be in poor condition and are in need of replacement. Cooling tower 2 associated with Chiller #2 is an Evapco tower with galvanized top and stainless-steel base. The cooling tower appeared to be in good condition.

Chiller #3 was installed in 2011 and is a 205 ton air cooled chiller with dual pumps located on the 2<sup>nd</sup> floor roof. The pumps are rated for 410 GPM and 75 feet of head. The chiller and pumps are in good condition. Chiller #3 is beyond half way through its life expectancy, and has approximately 10 years of use remaining.

It was noted and confirmed by staff that the hospital runs a chiller 24/7 365 days a year regardless of outside air. Chiller #3 is typically run in the winter due to ease of operation.

Each air handling unit and fan coil unit connected to the chilled water system is equipped with a 3-way valve to bypass water if the equipment does not need cooling and the valve is off. It is not known how the bypass valves were balanced. Also, according to staff multiple air handling unit controls are not functioning properly and replacement parts cannot be ordered due to age.



### III. ANALYSIS

#### A. Chiller Plant

The connected load of the hospital is reported to be 529 tons within the 2021 central chilled water plant report by James Posey Associate. The current system consists of 605 tons of cooling capacity. The current connected GPM load is 926 GPM.

As described in the existing conditions, CH-2 is passed its useful life and is not able to function reliably for facilities staff. When CH-2 is down, the hospital does not have adequate capacity and redundancy to keep the hospital at designed temperatures. New construction hospitals are required to have N+1 chiller capacity for this reason.

The chilled water plant operates with three (3) stages. Each stage enables a chiller until all three (3) chillers are running. Below the flow rates through the system are identified based on staging.

- Stage 1: CH-3 enabled: 410 GPM
- Stage 2: CH-3 and CH-1 enabled: 810 GPM
- Stage 3: CH-3, CH-2, and CH-1 enabled: 1210 GPM

When chillers are staged on, the flow increases through the system proportionally to the change in number of chillers in service. The bypass valves on each air handling unit can only be balanced properly for one (1) of the three (3) stages due to the fixed position of the balancing valve at each piece of equipment, even though the bypass requirements are different for each stage above.

With all three (3) chillers enabled, the flow through the system is 1,210 GPM and will may require additional bypass water. If the bypass valves are balanced for stage 3 operation, stage 1 will push too much water to the closest air handling unit.



## IV. Recommendations

### IV. RECOMMENDATIONS

#### A. Chiller Plant

Recommendations below are broken down into the (2) two options below. Option 1 attempts to mitigate the flow issues facilities has experienced without completely re-piping the system and the maintenance issues experienced with CH-2. Option 2 addresses the same issues as option 1 with the addition of an air cooled chiller to provide N+1 redundancy. In addition to the options listed below, additional testing is recommended to determine pressures and flow rates at multiple locations within the system. Temperature transmitters, flow meters, and pressure transmitters will be installed throughout the system to be able to monitor flow/pressure/temperature with different chiller staging. Balancing valves will also be tested for positive shutoff capabilities.

##### Option 1:

WSP recommends replacement of Chiller #2 and associated pumps. They are passed their useful life and in need of replacement. Chiller #2 can be replaced as an in-kind replacement with a new 200 ton water cooled screw machine. The new chiller will have dual refrigerant circuits and operate in a variable primary configuration. New chilled water end suction pump rated for 400 GPM and 95 feet of head will be provided. New condenser water end suction pump rated for 600 GPM and 55 feet of head will be provided. Variable frequency controllers will be provided for each pump. Chiller #2 will be able to be operated as a variable primary system.

Existing 3-way control valves will be removed from existing air handling units and replaced with 2-way control valves. A 4" bypass line with a modulating control valve will be added at existing flanges near the penthouse exit. The valve will modulate based on pressure in the chilled water supply main. This will prevent the "dead heading" currently experienced what all (3) chillers/pump are enabled.

Variable frequency controllers will be added to existing CH-1 pumps and CH-3 pumps to allow for tuning of the system.

##### Option 2:

Option 2 includes everything listed in option 1. In addition to option 1, option 2 will include a 200 ton air cooled chiller mounted on the roof outside of the penthouse. Chiller will include a pumping



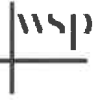
## IV. Recommendations

package sized for 400 GPM and 95 feet of head to match existing pumps in the penthouse. This option allows for N+1 redundancy.



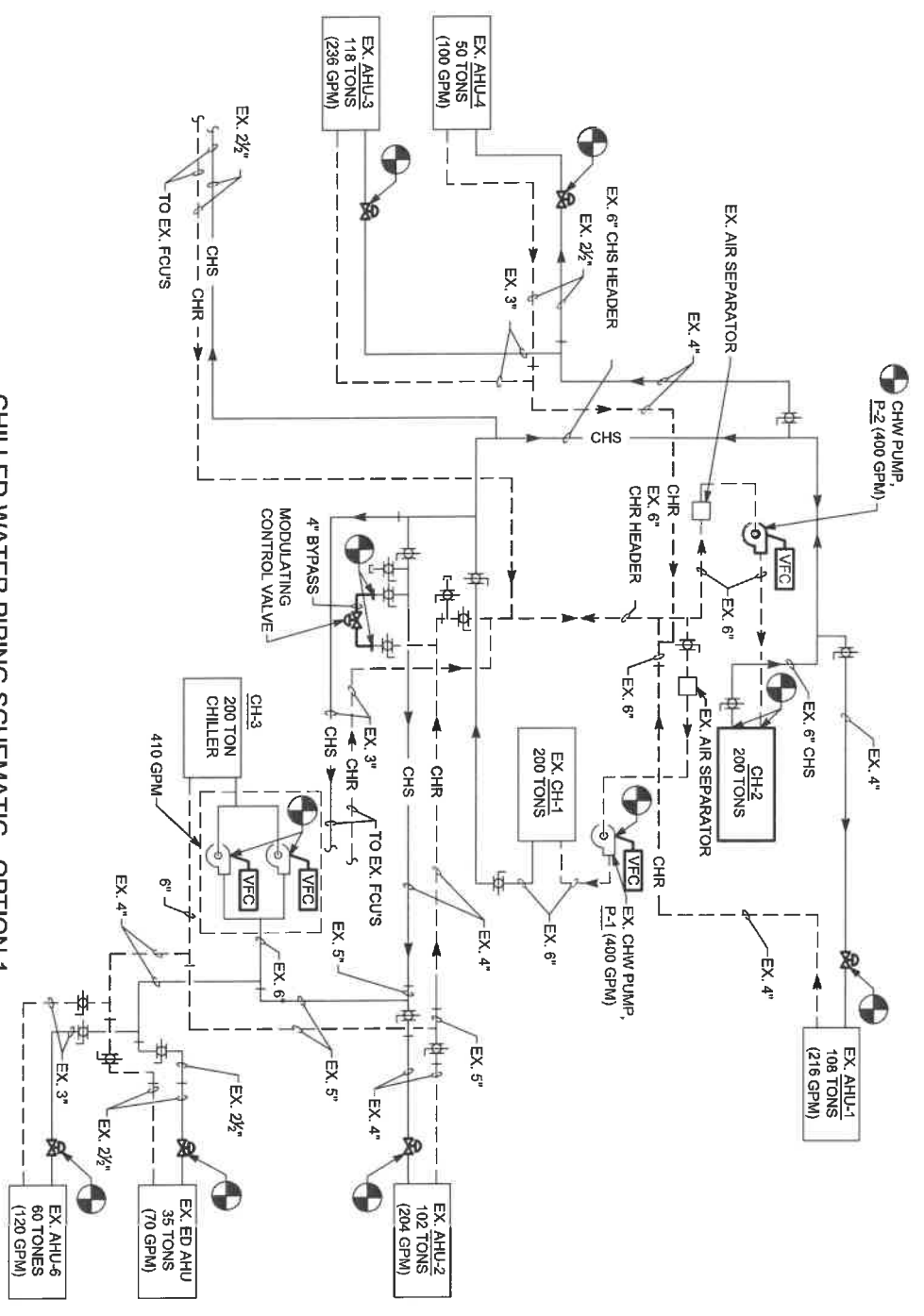


## APPENDICES



- A. SK-1: OPTION 1 SCHEMATIC
- B. SK-2: OPTION 2 SCHEDMATIC
- C. JAMES POSEY STUDY PEER REVIEW





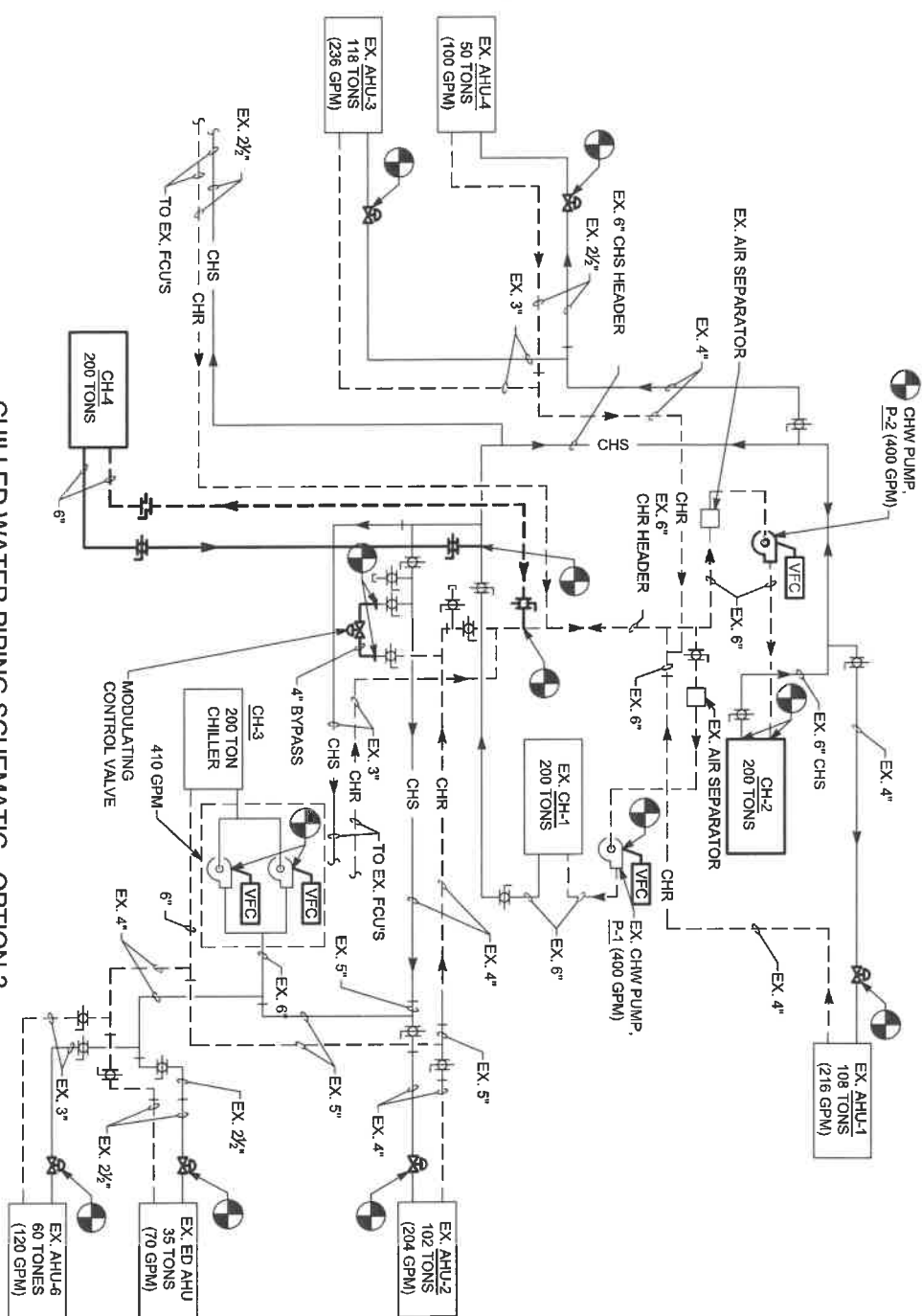
CHILLED WATER PIPING SCHEMATIC - OPTION 1  
 NOT TO SCALE


  
 WSP USA Buildings Inc.  
 Formerly Leach Wallace Associates, Inc.  
 7087 Columbia Gateway Drive, Suite 250  
 Columbia, Maryland 21046  
 P: 410.579.8100

CHESTERTOWN  
 CHILLER STUDY  
 UNIVERSITY OF MARYLAND AND MEDICAL SYSTEM

PROJ. NO.	B2201812.000
DATE:	3/30/2022
SK-1	





CHILLED WATER PIPING SCHEMATIC - OPTION 2

NOT TO SCALE



WSP USA Buildings Inc.  
 Formerly Leach Wallace Associates, Inc.  
 7087 Columbia Gateway Drive, Suite 250  
 Columbia, Maryland 21046  
 P: 410.579.8100

CHESTERTOWN  
 CHILLER STUDY  
 UNIVERSITY OF MARYLAND AND MEDICAL SYSTEM

PROJ. NO.	B2201812.000
DATE:	3/30/2022
SK-2	



## Peer Review of "Chester River Hospital – Central Chilled Water Plant Report

Central Chilled water Plant Report- Review Comments:

Page 2:

- Trend data would be helpful in determining the connected load of the building, which is likely less than the sum of the air handling unit tonnages.
- Analysis of flow appears to be missing. It is critical to understand the GPM to each air handling unit and pipe velocities in the system.
- It would have been helpful if the JPA Emergency Room Feasibility Report referenced was attached as an addendum
- Recommend adding additional information like nameplate data for all equipment.
- Report does not indicate any flow rates / head for chiller pumps. This is critical when analyzing the system.

Page 3:

- It would be helpful for the report to add a basic system of operation on how the plan operates. There is not reference to how chillers stage and which chillers operate and how.

Page 4:

- System schematic is not accurate. Recommend verification in field. See previous LWA schematic.
- Is it known which branch has the longest run and are pump heads sufficient to meet requirement at all operating conditions(stages).
- Has flow path for each stage of chiller operation been tested? What are temperatures, (EWT, LWT) and pressures(entering and leaving) a what are bypass legs balanced for? What TAB data was used in analysis , nothing is noted or indicated.
- Can pumps 1 & 2 deliver chilled water all these units without the local pumps(p3,p4)?

Page 5:

- Indicate the peak load as recorded by the BAS to confirm system performance. Flow issues are noted. Have the associated system airside and waterside temperatures been evaluated for those conditions?
- As the system is constant volume(flow) and adding system pumps increases flow rates has the impact on ahu coils performance been documented?
- When chiller 3 pump is energized have temperatures to ahus been logged? What is the temperature rise observed? Does it stabilize or are pumps shut off? Are chillers operating to capacity? Is condenser water system operating properly and maintain proper flow and temperatures to each chiller?

Page 7:





- The paragraph on system capacity reliability points out that good engineering practice would incorporate a redundant chiller, however the simple addition of a fourth chiller will not result in better system operation unless the system type and configuration is changed. Confirm that taps for temporary chiller are installed and located in a proper location. With all 3 way valves flow will be impacted by pumps operating based on system configuration.

Page 8:

- In paragraph for de-centralized cooling production, available differential pressure across loads is referenced, point is not clear. Based on the length of run and pressure available from the supply side (pumping source) it is likely the pumps are not large enough for the system as configured. Pump p-3 is not located such that it can act as a booster pump.
- In the results paragraph, the low flow to the ahus served by chiller3 are noted and the comment that water is recirculating thru the units if the chiller is not operating, confirms that the location of the connection between the systems needs to be improved.

Page 9:

- The proposed approach replaces the constant flow system with a decoupled primary- secondary variable flow distribution system. This conversion would require the complete replace and reconfiguration of the piping system. Pipe sizes will need to be increased and extensive runs of interconnecting piping would be necessary in order to configure the branch connections in the correct locations. Unless a new location could be found to construct a parallel chilled water plant, major outages and many phases of construction and would be required. This complicated process would require a significant capital investment. Additional study is necessary to evaluate possible alternatives that would stop short of complete system replacement.
  1. Conversion of the constant flow pumping system to a variable flow system is necessary to ensure adequate water flow is available to the AHUs and FCUs. Replacement of the existing 3-way control valves with 2-way valve is required. It can be accomplished in a phased manner, with the largest coil valves being replaced first. Installation of VFDs for the chilled pumps are necessary. It is not likely that the existing chillers can operate with any reduced flow based on their age. So either the chillers would need to be replaced or the decoupled system (new piping and secondary pumps) is required which would allow constant volume flow for the chillers. A system bypass would be necessary , however it may be possible to utilize the fan coil unit 3-way valves to maintain minimum system flow in the short term.
  2. A second option would be to re-pipe the incoming chilled water pipe with an (automatic isolation valve in the branch) into the suction side of pump p-3 and install a VFD to use it as a booster pump when chiller 3 is off and disconnect the line directly feeding the chi-3 loads and adding a valved bypass around the chiller.
  3. A third option is to add a fourth chiller to provide redundancy to the ch-3 system and manually valve off the system from chillers 1 & 2 and also connect the fourth chiller to the existing temporary chilled water taps as backup. This would allow the systems to operate separately without making any other system modifications.



- Additional study is required and testing is required to determine actual flow, pressure and temperature conditions for the ahus and the FCU branches to determine the actual measured requirements. These conditions need to be document in all stages of chiller plant operation, 1 chiller, 2 chillers, and 3 chiller operation. New control sequences based on the existing conditions will most likely be necessary and some level of flow control necessary with locations to be determined as part of the study.

