HENDERSON
BUILDING SOLUTIONS

Lee's Summit Medical Center
2100 SE Blue Parkway
Lee's Summit, MO. 64063

COOLING TOWER

PURCHASE SPECIFICATIONS

6/7/2022

10901 West 84th Terrace, Suite 300 (913) 894-9720
Lenexa, KS 66214

HENDERSONBUILDING.COM

LEE'S SUMMIT MEDICAL CENTER

LEE'S SUMMIT, MO.

COOLING TOWER
PURCHASE SPECIFICATIONS

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HENDERSON
BUILDING SOLUTIONS

June 7, 2022

Re: Lee's Summit Medical Center
Lee's Summit, MO.
Henderson Building Solutions Purchase of
Cooling Tower

Prospective Bidder:

Henderson Building Solutions, LLC is soliciting proposals from selected Manufacturers for supplying one (1) cooling tower, and related services as described in the attached Specifications dated June 7, 2022.

Bidders are required to include with the proposal an equipment fill-in data table for the base bid and any alternate bid equipment. The successful bidder will also be required to agree to the payment terms and the equipment delivery terms described in the Specifications.

All questions or any correspondence shall be directed to Henderson Building Solutions.

Sincerely,

HENDERSON BUILDING SOLUTIONS, LLC

Don Falke
Pre-Construction Manager
don.falke@hendersonbuilding.com

HENDERSON
BUILDING SOLUTIONS

HCA Healthcare℠

Lee's Summit Medical Center
2100 SE Blue Parkway
Lee's Summit, MO. 64063

CHILLER PLANT REVISIONS SPECIFICATIONS

September 27, 2022

10901 West 84th Terrace, Suite 300 (913) 894-9720
Lenexa, KS 66214

HENDERSONBUILDING.COM

LEE'S SUMMIT MEDICAL CENTER
LEE'S SUMMIT, MO

Lee's Summit MC – Chiller Plant Revisions

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DIVISION 26 - ELECTRICAL SPECIFICATIONS

SECTION 001116

INVITATION TO BID

Henderson Building Solutions, LLC
10900 W 84th Terr, Suite 300
Lenexa, KS 66214
Ph: (913) 894-9720
Fax: (913) 894-9051

Chiller Plant Revisions
Lee's Summit Medical Center
2100 SE Blue Parkway
Lee's Summit, MO. 64063

Dear Trade Partner:

Henderson Building Solutions is soliciting bids to provide design assist and construction services for the above referenced project, under the provisions of a Guaranteed Maximum Price Contract. Bids will be received through Henderson Building Solutions' web-based bid management software.

The successful trade partner(s) will enter into a contract agreement with Henderson Building Solutions (HBS) with the basis of compensation being a lump sum guaranteed maximum price (GMP). The successful trade partners will become members of the Project Team and will work closely with the Owner, HBS, and the HBS design team during the remainder of the project design and will be expected to provide design assist input to ensure the design is completed within the GMP.

The Basis of Award will be a best value award involving these factors:

- Evaluation of a one-age narrative on how you intend to build the project
- Evaluation of price
- Evaluation of schedule
- Experience in design assist and track record of holding budgets

For security purposes, bids are not able to be submitted beyond the due date and time listed within the bid package details.

A Pre-Bid Conference and Walkthrough will be conducted at the date, time, and location indicated within the bid solicitation details in the web-based bid solicitation.

Project completion: Construction shall be complete as indicated in the Project Milestone Schedule included in the specifications. Bidders shall review and agree to the penalties for failure to meet the Project Schedule detailed in Section 011100.13.

Henderson Building Solutions reserves the right to reject any and all Bids; is not obligated to the lowest or any other Bid and may waive any formalities in stipulated bidding procedures.

END OF SECTION 001116

SECTION 002113

INSTRUCTIONS TO BIDDERS

PART 1 - GENERAL

1.1 PRE-BID REQUIREMENTS

A. Bidders shall visit and inspect the site where the Work required by this Contract is to be performed. Bidders shall inform themselves of the conditions under which the Work is to be performed, the obstacles which may be encountered, the demolition and temporary removal and reinstallation required to provide access to the Work and all other relevant matters affecting the performance of the Work.

B. Successful Bidder shall not be allowed any extra compensation or extensions to Project Milestone Schedule for any matter which Bidder could have informed themselves by performing the required site inspection prior to the submission of the Bid.

C. Henderson Building Solutions primary bidding contact for this solicitation is indicated below. All questions related to the content within the bidding documents, and scheduling requests of any site inspections, shall be directed to the Henderson Building Solutions bidding contact.

Ashley Baker
TEL (913) 742-5338 **CELL** (314) 960-5497
ashley.baker@hendersonbuilding.com

Don Falke
TEL (913) 742-5699 **CELL** (816) 833-6463
don.falke@hendersonbuilding.com

D. Henderson Building Solutions' web-based bid management platform is managed in partnership with Procore, Henderson Building Solutions' web-based project management software provider. For support in accessing the bidding documents, bidders may contact Procore's customer support at support@procore.com or 833-277-6267.

E. For assistance with submitting a bid, please visit Procore's bidding support page.

1.2 SUBMISSION OF BIDS

A. Bids shall be submitted thru Henderson Building Solutions' web-based bid management software. Bids shall be electronically input into the appropriate sections listed on the web-based bid sheet.

B. Bidder shall include a fully completed Bidder Information Sheet (BIS). The BIS is included in these Specifications. Failure to comply with the above may result in the incomplete Bid being rejected. Required documentation shall be uploaded as an attachment in the web-based bid sheet.

C. All Bids shall be valid for **90 days** from the Bid Date and shall not be withdrawn or altered during that period.

D. A submission of a Bid will be interpreted to mean the Bidder submitting the Bid understands and agrees with all provisions, penalties, warranties and guarantees contained in these Specifications and on the Drawings, unless exceptions to such are clearly identified as "Exclusions" within the appropriate field in the web-based bid sheet.

E. A submission will be interpreted to mean the Bidder submitting the Bid:

1. Is properly licensed to perform the Work according to the laws and regulations governing the site of the Work.

2. Has investigated and has included in the Bid all applicable fees, taxes, permits and regulatory requirements of all authorities having jurisdiction and of local utility companies; and has included the cost of obtaining same in the bid.

F. Each Bidder shall list in the appropriate field in the web-based bid sheet all inclusions within bid. Inclusions shall identify the Titles and Dates of all Drawing Packages, Specifications, and Addenda utilized in the preparation of their bid. Such acknowledgement is a requirement for bids to be considered complete.

G. Each Bidder shall list in the appropriate field in the web-based bid sheet all exceptions to or conflicts between their Bid and these Specifications and the Drawings. If the Bidder takes no exceptions, they shall write "None" in the space provided. Bids which do not comply with this requirement will be rejected.

1. All exceptions shall be specific in nature and referenced to the specific applicable article of these Specifications, the specific Drawing number, or the specific Addenda number. Conflict notations which make reference to the Bidder's descriptive information as a whole are not acceptable. The Bidder shall not alter any part of these Specifications or the Drawings in any way, except by stating their exceptions in the fields provided in the web-based bid sheet.

H. Bids which are not prepared and submitted in accordance with these instructions will imply that Bidder does not intend to comply with all the requirements of the Contract Documents and such Bids will be rejected. If the prospective Bidder declines to Bid, they shall give electronic acknowledgement of such on their respective Bid Sheet for this solicitation.

I. Successful Bidder will be required to furnish on company letterhead a statement verifying that all Prime Contractor’s employees and all Prime Contractor’s Sub-Contractors’ employees that will be on-site have a current Department of Homeland Security, Employment Eligibility Verification (Form I-9) on file.

J. Contractors shall base all Bids upon giving full consideration to and include all costs associated with the allowable working hours and utility interruptions, Project Milestone Schedule, project phasing requirements, and Facility Specific Procedures related to the Work described in the body of these Specifications and shown on the Drawings.

1.3 SELECTION OF SUCCESSFUL BIDDER

A. Henderson Building Solutions will base successful Bidder selection using all pertinent criteria, including cost, as determined by Henderson Building Solutions and the Owner. Henderson Building Solutions reserves the right to reject any and all Bids; and to waive irregularities and informalities in stipulated Bid procedures.

B. All Bids shall become the property of Henderson Building Solutions.

1.4 WITHDRAWAL

A. Bids may be withdrawn, altered, and resubmitted at any time prior to the Bid Date. Bids may not be withdrawn, altered, or revised after the Bid Date.

1.5 INTERPRETATION OF THE BID DOCUMENTS

A. It shall be the Bidder's responsibility to advise Henderson Building Solutions, before the Bid Date, of conflicting requirements, omissions, errors, or ambiguities of information that require clarification and to request such clarification from Henderson Building Solutions prior to the Bid Date.

B. A submission of a Bid will be interpreted to mean the Bidder submitting the Bid has no questions regarding any omissions, errors or ambiguities that may exist in the Contract Documents, and that the Bid will result in a fully completed and functional Project per the Contract Documents.

1.6 SUBCONTRACTORS

A. Bids shall be based on utilizing only those Subcontractors fully qualified to perform the subcontracted work as demonstrated by Subcontractor’s prior experience performing work similar to that required by the Contract Documents; by successfully subcontracting with the Bidder on previous projects; and by demonstrated financial viability.

B. For each Subcontractor utilized by the Bidder where amount of the subcontract is 5% or more of the total Bid, Bidder shall, where requested by Henderson Building Solutions after the receipt of bids, forward the following:

1. Documentation, including references and contact information, demonstrating Subcontractor is qualified to perform the subcontracted work.

2. Information establishing the financial viability and credit worthiness of the Subcontractor.

3. Listing of previous projects where Bidder has utilized the identified Subcontractor, including dollar amounts of subcontract.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 002113

SECTION 003113

MASTER PROJECT MILESTONE SCHEDULE

LEE'S SUMMIT MEDICAL CENTER

CHILLER PLANT REVISIONS

DATE	MILESTONE
9/27/2022	Bid Documents Issued to Bidders
10/13/2022	Mandatory Pre-Bid Conference and Walkthrough for Contractor and Subcontractors
10/27/2022	Bids Due
10/31/2022	Contract Award Issued by Henderson Building Solutions, LLC
10/31/2022	Notice to Proceed Issued by Henderson Building Solutions, LLC
10/31/2022-12/6/2023	Engineering / Design Assist Contractor Collaboration
12/6/2022	Submittals Delivered to Henderson Building Solutions, LLC
12/7/2022	Start Construction on site
12/13/2022	Equipment Delivered (CT-1)
3/22/2023	Project Substantial Completion Achieved
8/11/2023	Project Final Completion Achieved

END OF SECTION 003113

Lee's Summit Medical Center - Chiller Plant Revisions

BIDDER INFORMATION SHEET

Date:		
Company Name:		
Address:		City, State, Zip:
Phone:		Fax:
Contact:		email:

GENERAL INFORMATION	
Provide a list of Officers (President, Vice President, Secretary-Treasurer) and Key Personnel	
Labor Source:	
Number of Permanent Shop Employees:	
Number of Permanent Field Employees:	
Type of Work Performed (with own forces):	
Type of Work Subcontracted to Others:	
Number of Years in Business	
State/City Licenses Number:	
Interested in Bidding Contract Amount:	

Is Business A Certified DBI / HUB Enterprise?:	**MBE** (Minority Business) YES_____NO_____ **WBE** (Women-Owned Business) YES_____ NO_____	
	DBE (Disadvantaged Business) YES_____ NO_____ **SBA (8a) (**Small Business) YES_____ NO_____	
Enter Racial/Ethnic Category:	_____	**A =** African American **B =** American Indian **C =** Alaskan Native **D =** Asian **E =** Hispanic **F =** Pacific Islander **G =** White

For those businesses that are a certified DBI / HUB enterprise, please forward a copy of your recent certification to the person(s) listed in the Instructions to Bidders along with this completed form.

HCA Policies & Procedures states that all contracted employees working on a project at an HCA facility or affiliates must meet federal employment guidelines. By signing below you are agreeing with this requirement and your firm will retain documentations that your employees working on an HCA project will meet the necessary requirements of Section 014100.

Attach a list of your firm's Healthcare Experience in the last 5 years.

Is your firm Union?: Yes_____ No_____ Does your firm provide employee healthcare coverage? Yes_____ No_____

FINANCIAL INFORMATION		
Bonding Limits:	Total:	Per Job:
Bonding Company:		Bonding Rate:
Contact:		
Address:		City & State:
Phone:		Fax:

Dun & Bradstreet D-U-N-s Number:

* Provide a list of Trade References (name, address, and phone number), a minimum of 3.

* Provide Sales and Net Worth information by year for the last three (3) years.

* Provide a brief description of jobs completed within the last three (3) years that demonstrate the Bidder's capability to complete this project (please include Owner or General Contractor reference and phone number).

The Undersigned certifies that the herein above-contained information is truthful to the best of his/her knowledge.

Signed:		
Title:		Date:

COOLING TOWER
Fill-In Data Table

ITEM	FILL-IN DATA
Cooling Tower Designation	
Manufacturer	
Complete Model Number	
Flow Rate (gpm) (Total for **"X" cells**)	
Entering Water Temp (°F)	
Leaving Water Temp (°F)	
Entering Air Temp (°F Wb)	
Max. Drift Losses (% of design gpm)	
Motor (per cell):	
Horsepower	
Voltage	
Amps	
RPM	
Flow rate per motor hp (gpm/hp)	
ASHRAE 90.1 allowable flow rate per motor HP at specified conditions (gpm/hp)	
Fan RPM @ Design	
Pipe Connection (quantity/size):	
Supply	
Return	
Drain	
Overflow	
Bypass	
Equalizer	
Overall Unit Assembled Dimensions:	
Length	
Width	
Height	
Basin Heater (kW/cell)	
Sound Pressure Levels (per ATC-128 at 50 ft. from fan discharge)	
Octave Bands	
63 Hz	dB
125 Hz	dB
250 Hz	dB
500 Hz	dB
1,000 Hz	dB
2,000 Hz	dB
4,000 Hz	dB
8,000 Hz	dB
Overall	dBA

Additional Information

Shipping Weight _____
Operating Weight _____

Organization Providing Specified Labor
Warranty (include address) _____
_____
_____
_____
_____
_____

Manufacturer's Guaranteed Delivery Date
(number of calendar days after issue of
Henderson Building Solutions PO,
see Specification 00020, 1.6, C) _____

General description of required cooling tower field assembly (if none, state none):

_____
_____
_____
_____
_____
_____
_____

Describe any warranties provided by manufacturer above that is required by these specifications:

_____
_____
_____
_____
_____
_____
_____

SECTION 006000

FORM OF AGREEMENT

PART 1 - GENERAL

1.1 FORM OF AGREEMENT

A. The Agreement that will be executed by the successful Contractor and Henderson Building Solutions, LLC is contained on the pages following this Specification Section and is titled **Agreement between Henderson Building Solutions and Design Assist Contractor for Lump Sum Design Assist Services.**

1.2 LIEN WAIVERS

A. Partial and Final Waiver and Release of Lien forms to be utilized by the Contractor and Contractor's subcontractors and suppliers are contained in the pages following this Specification Section.

B. See Specification Section 011100.13 for Contractor's requirements related to transmission of Partial and Final Waiver and Release of Liens to Henderson Building Solutions.

1.3 OTHER FORMS

A. Many of the forms and processes for effective contract and project management will be initiated and executed via Henderson Building Solutions' web-based project management software, as described within these specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 006000

Agreement Between Henderson Building Solutions and Design Assist Contractor for Lump Sum Design Assist Services (Stipulated Sum)

Agreement made as of the ____ day of __, 22

between **HBS:** Henderson Building Solutions, LLC
10901 West 84th Terrace, Suite 300
Lenexa, KS 66214

HBS Representative:

and **DAC:**

DAC Representative:

For the **Project**:

HBS and DAC agree as follows:

DEFINITIONS

1.1. The “Contract Documents” form this Agreement. The Contract Documents consist of this Agreement between HBS and Design Assist Contractor (DAC) (hereinafter, the “Agreement”) and its attached Exhibits; Supplementary and other Conditions agreed to by HBS and DAC; Addenda issued prior to execution of the Agreement; Modifications issued after execution of this Agreement; the Prime Agreement, but only to the extent the Prime Agreement relates to the Work and the terms and conditions under which the Work shall be performed; Instructions to Bidders, sample forms, other information furnished by HBS in anticipation of receiving bids or proposals; the DAC’s bid or proposal; or portions of Addenda relating to bidding requirements, the Project Criteria, including changes to the Project Criteria proposed by HBS and accepted by the Owner, if any; other documents listed in this Agreement; and Construction Documents prepared and approved in accordance with this Agreement. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Architect(if involved) or other Design Professional and Owner, (2) between the Owner and a DAC or Subcontractor, or (3) between any persons or entities other than the Owner and HBS, including but not limited to any consultant retained by the Owner to prepare or review the Project Criteria. The Agreement represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Agreement may be amended or modified only by a Modification. A Modification is (1) a written amendment to the Agreement signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Owner.

1.2. A “Design Assist Contractor or DAC” is a person or entity who has a direct contract with HBS to perform a portion of the construction required in connection with the Work. In addition:

1.2.1. DAC is selected to review and participate in the production of the construction documents and agrees to perform the work identified in the Contract Documents. The term “Contractor” or “DAC" means the DAC or the DAC's representative.

1.3. A “Design Professional” is any person or entity who has a direct contract with HBS to perform design services or other consulting services required in connection with the Work. Design Professional shall also include any subconsultants to any Design Professional.

1.4. The “Prime Agreement” is the Agreement between the Owner and HBS.

1.5. A “Subcontractor” is a person or entity who has a direct contract with a DAC to perform a portion of the construction required in connection with the Work at the site.

1.6. The “Work” means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by HBS to fulfill HBS’s obligations. The Work may constitute the whole or a part of the Project.

ARTICLE 2 - CONTRACT DOCUMENTS

2.1. The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the DAC. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by DAC shall be required only to the extent consistent with the Design Assist Contract Documents and reasonably inferable from them as being necessary to produce the intended results. Where reference is made in this Agreement to a provision of another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

2.2. The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated as follows:

2.2.1. This Agreement.

2.2.2. The Prime Agreement.

2.2.3. The Supplementary and other Conditions of the Agreement, if any, are as follows:

2.2.3.1. Instructions to Bidders, sample forms, and other information furnished by HBS into anticipation of receiving bids or proposals.

2.2.3.2. The Project Criteria, including changes to the Project Criteria proposed by HBS, if any, and accepted by the Owner consist of the following:

2.2.3.3. The Addenda, if any, are as follows:

2.2.3.4. The final Construction Documents consisting of plans and specifications prepared under this Agreement.

ARTICLE 3 - HENDERSON BUILDING SOLUTIONS

3.1. HBS shall pay DAC in current funds for Contractor's performance of the Agreement as set forth in the Agreement.

3.2. If requested by DAC, HBS shall furnish all documents and other information related to the Work. Any information or services relevant to Contractor's performance of the Work under HBS's control shall be furnished by HBS after a request from Contractor for such information or services.

3.3. HBS shall cooperate with the DAC in securing building and other permits, licenses and inspections for proper execution and completion of the Work. HBS shall not be required to pay any fees for such permits, licenses, and inspections unless the cost of such fees is excluded from the responsibility of the DAC under the Contract Documents.

3.4. HBS, including its consultants and representatives, may visit the site. Visits by HBS shall not be construed to create an obligation on the part of HBS to make on-site inspections to check the quality or quantity of the Work. HBS shall not have control over or charge of, nor be responsible for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, because these are solely the DAC rights and responsibilities under the Contract Documents.

3.5. HBS shall not be responsible for the DAC's failure to perform the Work in accordance with the requirements of the Contract Documents. HBS shall not have control over or charge of and will not be responsible for acts or omissions of the DAC, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work for DAC.

3.6. If DAC fails to correct Work which is not in accordance with the requirements of the Contract Documents or persistently fails to carry out the Work in accordance with the Contract Documents, HBS, by a written order, may order DAC to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of HBS to stop the Work shall not give rise to a duty on the part of HBS to exercise this right for the benefit of DAC or any other person or entity.

3.7. If DAC defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a forty-eight (48) hour period after receipt of written notice from HBS to commence and continue correction of such default or neglect with diligence and promptness, HBS may, after such forty-eight (48) hour period, without prejudice to other remedies HBS may have, correct such deficiencies. In such case an appropriate Change Order shall be issued (with or without DAC's consent), deducting from payments then or thereafter due DAC the cost of correcting such deficiencies. If payments then or thereafter due DAC are not sufficient to cover such amounts, DAC shall pay the difference to HBS.

3.8. If HBS observes or otherwise becomes aware of a fault or defect in the Work or non-conformity with the Contract Documents, HBS shall give prompt written notice thereof to DAC.

ARTICLE 4 - DAC

4.1. DAC shall fully execute the Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents or the Agreement to be the responsibility of others.

4.2. The DAC and HBS agree that to the extent applicable to the Work, or the terms under which the Work shall be performed, DAC shall have the same obligations and responsibilities as to HBS as HBS has to the Owner under the Prime Agreement, except as may be modified herein.

4.3. DAC shall be licensed, if required in the jurisdiction where the Project is located. When applicable law requires that services be performed by licensed professionals, DAC shall provide those services through the performance of qualified persons or entities duly licensed to practice their professions.

4.4. Execution of the Agreement by the DAC is a representation that the DAC has visited the site, become familiar with all local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

4.5. Because the Contract Documents are complementary, the DAC shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by HBS, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. The DAC shall promptly report to HBS any errors, inconsistencies or omissions discovered by or made known to the DAC as a request for information in such form as HBS may require.

4.6. The DAC shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of HBS, or by tests, inspections or approvals required or performed by persons or entities other than the DAC.

4.7. DAC shall supervise and direct the Work, using DAC's best skill and attention. The DAC shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Agreement, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the DAC shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures.

4.8. Unless otherwise provided in the Contract Documents, DAC shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for the proper execution and completion

of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

4.9. DAC shall enforce discipline and good order among DAC's employees and other persons carrying out the Agreement. DAC shall not permit employment of unfit persons or persons not skilled in tasks assigned to them.

4.10. DAC warrants that materials and equipment furnished under the Agreement, will be of good quality and new unless otherwise required or permitted by the Contract Documents, that the construction will be free from defects not inherent in the quality required or permitted, and that the Work will conform with the requirements of the Contract Documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. If the Contract Documents require further warranties of the Work, DAC shall warrant the Work in accordance therewith as well.

4.11. DAC shall comply with and give notices required by laws, ordinances, rules, regulations, and lawful orders of public authorities bearing on performance of the Work. DAC shall promptly notify HBS if the Drawings and Specifications are observed to be at variance therewith.

4.12. The DAC may make substitutions only with the written consent of HBS using format and schedule identified in the Contract Documents, after evaluation and acceptance of substitution by HBS and in accordance with a Change Order.

4.13. The DAC shall be responsible to HBS for acts and omissions of the DAC's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work.

4.14. The DAC shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

4.15. DAC shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Agreement. At completion of the Work DAC shall remove from and about the Project waste materials, rubbish, DAC's tools, construction equipment, machinery and surplus materials.

4.16. If the DAC believes that implementation of any instruction received from HBS would cause a violation of any applicable law, statute, ordinance, code, rule, or regulation, the DAC shall notify HBS in writing. The DAC shall not be obligated to perform any act which the DAC believes will violate any applicable law, statute, ordinance, code, rule, or regulation.

4.17. If the DAC encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the DAC shall promptly provide notice to HBS before conditions are disturbed and in no event later than 7 days after first observance of the conditions.

4.18. .

4.19. DAC shall at all times adhere to, and shall cause each of DAC's employees, subcontractors and subcontractors' employees to adhere to, any HBS or Owner policies and procedures in the Contract Documents or as otherwise provided to DAC.

4.20. DAC shall pay all royalties and license fees necessary to perform the Work.

4.21. The DAC and HBS agree to participate in a collaborative design process where DAC shall provide design-assist preconstruction services. DAC and HBS will work together to produce an acceptable level of design documents refinements that maintain the Lump Sum Budget Price or Guaranteed Maximum Price (GMP) and the preparation of detailed construction documents necessary to allow the DAC to execute the work and submit permit level documents to obtain a building permit using a design assist delivery method. The DAC work will include participation in the refinement of the Project design at the development~~lopment~~ level, participation with preparation and coordination of the Construction Documents including but not limited to mechanical, electrical, plumbing, fire sprinklers, fire alarm, fire sprinkler, security electronics; limited CCTV, telephone/data infrastructure and other existing systems within Project scope, if applicable. Complete design assist scope and performance criteria are found in Article 4.

4.22. DAC shall assist Design Professional in the development of the Project design, but shall not provide professional services which constitute the practice of architecture or engineering unless (a) DAC needs to provide such services in order to carry out its responsibilities for construction means, methods, techniques, sequences, and procedures, or (b) such services are specifically called for by the Contract Documents

4.23. Basic Services: DAC agrees to provide or perform, as Basic Services, the Services and tasks set forth in this Agreement and any other services that are necessary, normal, customary, or incidental to the performance of DAC's responsibilities under any Phase of this Agreement. DAC agrees to:

4.23.1. Provide sufficient number(s) of specialists, including Subcontractors, and other workers with requisite skills and experience as appropriate for the successful completion of the Project.

4.23.2. Perform the Services in collaboration with HBS and the selected Architect, Engineer(s), Subcontractors or other third parties as identified by HBS.

4.23.3. Prepare, organize, and distribute monthly progress reports in a timely manner in a format acceptable to HBS.

4.23.4. Conduct Project Status Meetings with HBS, Subcontractors, owners representatives, other third party professionals and consultants working with HBS, and/or State or local agencies as needed and directed by the nature of the work or as directed by HBS during the course of the Work.

4.23.5. The DAC work will include participation in the refinement of the Project design at the Design Development level (approximately the 20-25% development level), participation with preparation and coordination of the construction documents including but not limited to mechanical, electrical, plumbing, fire sprinklers, fire alarm, fire sprinkler, security electronics, limited CCTV, telephone/data infrastructure and other existing systems within Project scope as applicable. This activity will be included in regular scope meetings as set by HBS, typically once a week.

4.23.6. The Design Assist Contractor will lead the Design Assist phase activities. HBS and other third parties (if required) will monitor the progress of the refinements to the Design Development documents, preparation of the construction documents, submission for building permit through the following steps:

4.23.6.1. Attend meetings regularly between the DAC, DAC Subcontractors and HBS to monitor progress in completing the design refinements and construction documents

4.23.6.2. DAC to schedule and attend meetings with HBS to develop submittals for HBS review and approval

4.23.6.3. DAC and HBS to prepare preliminary Design Assist schedule

4.23.6.4. DAC to prepare preliminary Construction Schedule and submit for approval

4.23.6.5. DAC to prepare Cost Estimates at milestones during the development of design and construction documents to validate GMP or Lump Sum Design Assist Budget submitted

4.23.6.6. Provide estimated construction cost breakdowns of the Project at times indicated intervals consistent with the stage of development of the drawings and specifications.

4.23.6.7. DAC shall continually review the design documents for clarity, consistency, constructability, and coordination and collaborate in developing solutions to any identified issues. The purpose of the constructability analysis is to determine that the design is progressing in a manner that will result in sufficiently complete, accurate, and coordinated drawings for construction, and to reduce the risk of disruption, field conflicts, rework, delay, and changes. DAC will focus on accuracy, completeness, sequencing, and coordination. In order to reduce the risk of disruption, delay, rework, or inefficiencies, DAC shall conduct constructability reviews in collaboration with Design Professional throughout the Project design. DAC shall conduct constructability reviews including but not limited to appropriate meeting facilities; documentation of the findings and action items from each; maintain a database of actions taken or resolution of each finding or action item and inform HBS of same in a timely manner. DAC and its Subcontractors shall be responsible for determining whether something is constructible

ARTICLE 5 - Design Development and Contract Documents Phase:

5.1. During this phase HBS, DAC and its Subcontractors that are part of the Project, shall, in coordination with HBS or any other third parties (as necessary and authorized by HBS), provide the following:

(i) Define scope of deliverables from HBS design team:

(a) Architectural design elements (if any)
(b) Structural design elements (if any)

(ii) Define scope of deliverables from DAC team:

(a) Mechanical design elements
(b) Electrical design elements (as required)
(c) Plumbing design elements
(d) Security design elements (as required)
(e) Fire Sprinkler system elements (as required)
(f) Audio Visual design elements (as required)
(g) Information Technology/Telephone design elements (as required)

(iii) Conduct a series of meetings between HBS and DAC to further refine the Project requirements to a 100% Design development level and would include the following:

(a) Design workshops if required by HBS
(b) Progress meetings
(c) Document reviews and comments
(d) Establish baseline cost model (unless provided with proposal)
(e) Prepare milestone cost estimates
(f) Alternative strategies and value analysis
(g) Permitting strategy
(h) Constructability review and comment
(i) Prepare preliminary construction schedule

(iv) Validate GMP or Lump Sum Design Assist Budget for Project scope/budget/schedule at 100% Design Development level

(v) Prepare Construction Documents based on approved 100% DD documents

(a) Work with HBS team to develop documents to obtain Building Permits
(b) Work with HBS to create CD package for submission Building Permit
(d) DAC obtains Building Permits and all other required permits

ARTICLE 6 - Construction Phase:

6.1. The DAC shall provide The Work and shall be responsible for the construction of the Project and provision of the construction phase services in accordance with this Agreement, all approved Construction Documents, and the terms and conditions, according to the schedule specified in the Master Schedule. DAC shall be paid not more than the GMP price or Lump Sum Design Assist

Budget number, unless amended by change order, for the provision of the construction and said Services. Payments will be made in accordance with Article 7 as applicable.

6.2. HBS shall conduct a preconstruction conference with the DAC, and other appropriate persons. This includes collaborative preparation of the following: meeting agenda, preparation of construction procedures for clarifications, change orders, shop drawings, progress payments, field testing and inspection, and safety program, and preparation and distribution of preconstruction conference notes.

6.3. Following each Project status meeting during the construction phase, HBS shall prepare, organize, and distribute in a timely manner, meeting notes and lists of accomplishments and action items for review, comment, and use.

ARTICLE 7 - COMPENSATION

7.1. HBS shall pay DAC the Contract Sum in current funds for HBS's proper performance of the Agreement. The Contract Sum shall be:

Stipulated Sum
The Stipulated Sum shall be XXX dollars ($XX), subject to additions and deductions as provided in the Contract Documents.

The Stipulated Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by HBS:

None

Unit prices, if any, are as follows:

Item	Units and Limitations	Price per Unit ($0.00)

Allowances included in the Stipulated Sum, if any:

Item	Price ($0.00)

Assumptions or qualifications, if any, on which the Stipulated Sum is based, are as follows:

[N/A]

ARTICLE 8 - SUB-CONTRACTS

8.1. Unless otherwise stated in the Contract Documents DAC shall, within seven (7) days after notice to proceed with construction phase, furnish in writing to HBS the names of the Subcontractors supplying labor or other services to perform the Work. DAC's shall not contract with any Subcontractor to whom HBS has made reasonable and timely objection.

8.2. Those portions of the Work that the DAC does not customarily perform with the DAC's own personnel shall be performed by others under subcontracts or by other appropriate agreements with the DAC. HBS may designate specific persons or entities from whom the DAC shall obtain

bids. The DAC shall obtain bids from Subcontractors and from suppliers of materials or equipment fabricated especially for the Work and shall deliver such bids to HBS. HBS shall then determine which bids will be accepted.

8.3. Subcontracts or other agreements shall conform to the applicable payment provisions of this Contract and shall not be awarded on the basis of cost plus a fee without HBS's prior consent.

Each subcontractor and supplier shall have the same payment obligations to its subcontractors and suppliers that HBS has to DAC under this Agreement. To the full extent permitted by law, DAC shall indemnify, hold harmless and, if HBS or Owner elects, defend Owner and HBS from and against any and all claims, damages, losses and expenses, including attorney, expert and consultant fees and legal expenses, related to any liens or claims of nonpayment based on labor, materials and/or equipment furnished for the Work, provided HBS has complied with its payment obligations under this Agreement with respect to such labor, materials and/or equipment.

8.4. By appropriate agreement, written where legally required for validity, the DAC shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the DAC by terms of the Contract Documents, and to assume toward the DAC all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which DAC, by the Contract Documents, assumes toward HBS. Each subcontract agreement shall preserve and protect the rights of HBS under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the DAC that the DAC, by the Contract Documents, has against HBS. The DAC shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The DAC shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

8.5. Each subcontract agreement for a portion of the Work is assigned by the DAC to HBS provided that, (1) assignment is effective only after termination of the Agreement by HBS for cause, pursuant to this Agreement, and only for those subcontract agreements that HBS accepts by written notification to the Subcontractor and DAC; and (2) assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Agreement. When HBS accepts the assignment of a subcontract agreement, HBS assumes the DAC's rights and obligations under the subcontract. Upon such assignment to HBS under this Section, HBS may further assign the subcontract to a successor contractor or other entity.

ARTICLE 9 - CONSTRUCTION BY SEPARATE CONTRACTORS

9.1. HBS reserves the right to perform construction or operations related to the Project with the HBS's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site.

9.2. Costs caused by delays, improperly timed activities or defective construction shall be borne by the party responsible, therefore.

9.3. If the Contract Documents state that DAC is responsible for the installation of certain equipment furnished by the HBS it shall be DAC's responsibility to receive, unload, store, protect, set in place and connect each piece of equipment, unless otherwise stated in the Contract Documents. Any equipment damaged or lost after receipt by DAC shall be replaced or repaired by DAC at no cost to HBS. DAC shall forward a Receiving Notice to HBS the same day such equipment is received. The Receiving Notice shall be in sufficient detail as HBS may require.

ARTICLE 10 - CHANGES IN THE WORK

10.1. Adjustments of the Contract Sum on account of changes in the Work may be determined by any of the methods listed in the Contract Documents. Such changes in the Work shall be authorized by

written Change Order signed by the Owner and HBS, Construction Change Directive signed by the Owner and HBS, or a written order for minor changes in the Work issued by HBS. No additions, deletions or modifications to the Work shall be performed by DAC prior to DAC obtaining a Change Order signed by HBS and the DAC.

10.2. If Changes in the Work is not addressed in the Contract Documents, DAC shall request documentation from HBS for its preferred method of change for the Project.

ARTICLE 11 - TIME

11.1. The date of commencement of the Work shall be the date identified by HBS unless a different date is stated below. The Contract Time shall be measured from the date of commencement, subject to adjustments of this Contract Time as provided in the Contract Documents.

11.2. The DAC shall proceed expeditiously with adequate forces and shall achieve Substantial Completion and Final Completion within the Agreement.

11.3. Liquidated damages for failure to meet schedule, if any, are set forth in the Contract Documents.

11.4. If DAC is delayed at any time in progress of the Work by an act or neglect of HBS or of a separate contractor employed by HBS, or by changes ordered in the Work, by labor disputes, fire, abnormal adverse weather conditions not reasonably anticipated, unavoidable casualties or any causes beyond DAC's control, or by other causes which may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the HBS may determine. This Section does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

11.5. The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

ARTICLE 12 - ACCOUNTING RECORDS

12.1. The DAC and any affiliated person or entity which performs a portion of the Work shall keep full and detailed accounts and exercise such controls as may be necessary for proper financial management under this Agreement, and the accounting and control systems shall be satisfactory to HBS. To comply with the provisions of Section 952 of the Omnibus Reconciliation Act of 1980 (Public law 96.499) and other regulations, DAC hereby agrees to make available to the Secretary of Health and Human Services ("HHS"), the Comptroller General of the General Account Office ("GAO"), or their authorized representatives, all contracts, books, documents and records relating to the nature and extent of the costs thereunder for a period of four (4) years after the furnishing of services thereunder. In addition, DAC hereby agrees, if services are to be provided by subcontract with a related organization, to require by contract that such Subcontractor make available to the HHS and GAO or their authorized representatives, all contracts, accounting records, documents and records relating to the nature and extent of the costs thereunder for a period of four (4) years after the furnishing of services thereunder.

ARTICLE 13 - PAYMENTS AND COMPLETION

13.1. Progress Payments

13.1.1. DAC shall submit applications for payment in a form as identified in the Contract Documents, or otherwise acceptable to HBS. Lien waivers must be submitted with each application for payment in a form acceptable to HBS.

13.1.2. Based upon applications for payment submitted to HBS, HBS shall make progress payments on account of the Contract Sum to the DAC as provided below and elsewhere in the Contract Documents.

13.1.3. HBS will make payments to the DAC after payments are received by HBS from the Owner. To the extent allowed by law, HBS shall make payments to DAC within thirty (30) days of receipt of payment from the Owner and such payments shall be in proportion to amounts received from the Owner. To the extent allowed by law, receipt of payment from the Owner is a condition precedent to HBS's obligation to pay DAC. HBS shall use reasonable and diligent collections efforts, but if the Owner does not pay HBS, HBS has no obligation to pay DAC.

13.1.4. With each application for payment, the DAC shall submit the most recent schedule of values on AIA form G703 or similar in accordance with the Contract Documents, as well as all other documents required to be submitted by the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. Compensation for design services, if any, shall be shown separately. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as HBS may require. This schedule of values, unless objected to by HBS, shall be used as a basis for reviewing the DAC's applications for payment.

13.1.5. In taking action on the DAC's applications for payment, HBS shall be entitled to rely on the accuracy and completeness of the information furnished by the DAC. HBS shall not be deemed to have made a detailed examination, audit or arithmetic verification of the documentation submitted in accordance with this Agreement, or other supporting data; to have made exhaustive or continuous on-site inspections; or to have made examinations to ascertain how or for what purposes the DAC has used amounts previously paid on account of this Agreement. Such examinations, audits and verifications, if required by HBS, will be performed by HBS's auditors acting in the sole interest of HBS. Taking action on the DAC's application for payment does not constitute HBS's acceptance of the Work as being in compliance with the Contract Documents.

13.1.6. Except with HBS's prior approval, the DAC shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

13.2. Progress Payments—Stipulated Sum

13.2.1. Applications for payment where the Contract Sum is based upon a Stipulated Sum shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the application for payment.

13.2.2. Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

13.2.2.1. Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of [ten] percent (10%) on the Work. Pending final determination of cost to HBS of Changes in the Work, amounts not in dispute shall be included as provided herein;

13.2.2.2. Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by HBS, suitably stored

off the site at a location agreed upon in writing), less retainage of ten percent (10%);

13.2.2.3. Subtract the aggregate of previous payments made by HBS; and

13.2.2.4. Subtract amounts, if any, for which HBS has withheld or nullified a payment.

13.2.3. The progress payment amount shall be further modified under the following circumstances:

13.2.3.1. Add, upon Substantial and Final Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as HBS shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and

13.2.3.2. Add, if final completion of the Work is thereafter materially delayed through no fault of the DAC, any additional amounts payable in accordance with this Agreement.

13.3. HBS may withhold approval of a payment in whole or in part to the extent reasonably necessary to protect HBS due to HBS's determination that the Work has not progressed to the point indicated in the application for payment or that the quality of Work is not in accordance with the Contract Documents. If HBS is unable to approve payment in the amount of the application, HBS will notify the DAC in writing. HBS may also withhold a payment or, because of subsequently discovered evidence, may nullify the whole or a part of an application for payment previously issued to such extent as may be necessary to protect HBS from loss for which the DAC is responsible, including loss resulting from acts and omissions, because of the following:

13.3.1. Defective Work not remedied;

13.3.2. Third-party claims filed, or reasonable evidence indicating probable filing of such claims, unless security acceptable to HBS is provided by the DAC;

13.3.3. Failure of the DAC to make payments properly for design services, labor, materials or equipment;

13.3.4. Reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;

13.3.5. Damage to the Owner, HBS, or a separate contractor;

13.3.6. Reasonable evidence that the Work will not be completed within the Contract Time and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

13.3.7. Repeated failure to carry out the Work in accordance with the Contract Documents.

13.4. Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by HBS to the DAC not later than 7 days after HBS's receipt of final payment from the Owner provided the DAC has fully performed this the Work of this Agreement and the requirements of this Agreement have been satisfied, including, but not limited to, punch-lists, Project closeout documentation, and lien waivers, except for the DAC's responsibility to correct non-conforming Work discovered after final payment or to satisfy other requirements, if any, which extend beyond final payment.

13.5. Substantial Completion shall be determined by HBS in accordance with the Contract Documents.

13.6. Final Completion shall be as determined by HBS in accordance with the Contract Documents.

13.7. Acceptance of final payment by the DAC, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final application for payment.

ARTICLE 14 - PROTECTION OF PERSONS AND PROPERTY

14.1. DAC shall be responsible for initiating and maintaining all safety precautions and programs in connection with the performance of the Agreement. Such safety programs shall at a minimum meet the requirements of the Contract Documents and applicable laws and regulations. DAC shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to:

14.1.1. employees on the Work and other persons who may be affected thereby;

14.1.2. the Work and materials and equipment to be incorporated therein; and

14.1.3. other property at the site or adjacent thereto.

14.2. DAC shall give notices and comply with applicable laws, ordinances, rules, regulations and lawful orders of public authorities bearing on safety of persons and property and their protection from damage, injury or loss. DAC shall promptly remedy damage and loss to property at the site caused in whole or in part by DAC, a Subcontractor, or anyone directly or indirectly employed by any one of them, or by anyone for whose acts they may be liable and for which DAC is responsible, except for damage or loss attributable to acts or omissions of the Owner or by anyone for whose acts the Owner may be liable, and not attributable to the fault or negligence of HBS.

14.3. The DAC is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the DAC encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the DAC, the DAC shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to HBS in writing. The DAC shall indemnify HBS for the cost and expense HBS incurs for remediation of a hazardous material or substance DAC brings to the site and negligently handles or otherwise for its failure to comply with this section.

14.4. In an emergency effecting safety of persons or property, DAC shall act to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by DAC on account of an emergency shall be determined as provided in this Agreement.

ARTICLE 15 - INSURANCE

15.1. DAC shall maintain insurance written for not less than limits of liability specified in the Prime Agreement, but in no event less than the limits stated herein. Certificates of such insurance shall be provided to HBS. DAC is not approved to begin work, and will not be allowed on site, until a satisfactory certificate of insurance has been furnished to HBS that meets the requirements of this Agreement. These certificates and the insurance policies shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least thirty (30) days' prior written notice has been given to HBS or ten (10) days’ notice in the case of cancellation due to non-payment.

15.1.1. The insurance requirements shall be written in amounts not less than the following, but in greater amounts if required under the Prime Agreement or applicable Federal, State or local laws and regulations.

15.1.1.1. Workmen's Compensation in amounts required by statute.

15.1.1.2. Employer's Liability in the amount of $1,000,000.

15.1.1.3. Commercial General Liability in the amount of $1,000,000 per occurrence and $2,000,000 general aggregate at least as broad as the latest ISO CG 00 01 policy form and including coverage for liability assumed under an "insured contract," coverage for independent contractors, a separation of insureds provision, and no exclusions for explosion, collapse, underground perils, residential or habitational exposures (if the project includes any aspect within the definition of any such exclusion), and third-party action over or New York Labor Law claims.

15.1.1.4. Business Automobile Liability in the amount of $1,000,000 per accident.

15.1.1.5. Umbrella or Excess Liability in the amount of $5,000,000 per occurrence applicable to the coverages required in Sections 14.1.1.2, 14.1.1.3, and 14.1.1.4.

15.1.1.6. Property or DAC's Equipment insurance covering the cost to replace any equipment or tools used by DAC in connection with the Work.

15.1.1.7. Professional and pollution liability insurance with limits of at least $1,000,000 per claim and aggregate if the Work involves any professional services to be performed by DAC or involves any exposures related to pollutants or contaminants.

15.1.2. On Commercial General Liability and Business Automobile Liability, and Umbrella or Excess Liability insurance coverage required hereunder, HBS, the Owner, each of their parents, subsidiaries, and affiliate entities, and any parties required to be listed as additional insured under the Prime Agreement, shall be named as additional insured on a primary and noncontributory basis, for claims caused in whole or in part by the DAC's negligent acts or omissions, providing full coverage for ongoing and completed operations utilizing coverage forms at least as broad as CG 20 10 and CG 20 37, or their substantial equivalent. DAC also shall require each of its subcontractors with such insurance policies applicable to the Project to obtain similar endorsements on those policies in favor of HBS, the Owner and the Owner Parties. Umbrella or excess policies shall not require horizontal exhaustion but shall apply to the additional insureds on a primary and noncontributory basis.

15.1.3. If DAC has design or professional services in its scope, DAC and its design consultants shall maintain Professional Liability insurance covering professional services on the Project performed by or on behalf of DAC against claims for professional negligence and malpractice in the amount of $1,000,000 per claim and $2,000,000 general aggregate.

15.2. DCA shall obtain a waiver of subrogation endorsement to each insurance policy required herein, including Worker's Compensation and Employer's Liability, that waives the insurer's right to subrogate a claim against the Owner, HBS, each of their parents, subsidiaries, and affiliate entities. DAC also shall require each of its subcontractors with such insurance policies applicable to the Project to obtain similar endorsements on those policies in favor of the Owner, HBS, and each of their parents, subsidiaries, and affiliates.

ARTICLE 16 - CORRECTION OF WORK

16.1. If a portion of the Work is covered contrary to requirements specifically expressed in the Contract Documents, it must be uncovered for HBS's examination and be replaced at the DAC's expense without change in the Contract Time. If a portion of the Work has been covered that HBS has not specifically requested to examine prior to its being covered, HBS may request to see such Work and it shall be uncovered by the DAC. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at HBS's expense. If such Work is not in accordance with the Contract Documents, such costs and the costs of correction shall be at the DAC's expense unless the condition was caused by HBS or a separate contractor, in which event HBS shall be responsible for payment of such costs and the Contract Time will be adjusted as appropriate.

16.2. All equipment and materials shall be new, free of defects, and conform to the Contract Documents, including suitability and fitness for intended purposes. All Work shall be performed in a good and workmanlike manner in compliance with the Contract Documents. The DAC shall promptly correct Work rejected by HBS or failing to conform to the requirements of the Contract Documents, whether discovered before or after HBS's determination that the DAC's Work or designated portion thereof is substantially complete and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for HBS's costs and expenses made necessary thereby shall be at the DAC's expense.

16.3. If, within one year after the date of Substantial Completion or after the date for commencement of warranties or by terms of an applicable warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, DAC shall correct it promptly after receipt of written notice from HBS to do so unless HBS has previously given DAC a written acceptance of such condition.

16.4. The one year period for correction of the Work shall not be extended by corrective Work performed by DAC pursuant to this Article.

16.5. The DAC shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the DAC nor accepted by HBS.

16.6. Nothing contained in this Section shall be construed to establish a period of limitation with respect to other obligations the DAC has under the Contract Documents. Establishment of the one-year period for correction of Work relates only to the specific obligation of the DAC to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the DAC's liability with respect to the DAC's obligations other than specifically to correct the Work.

16.7. If HBS prefers to accept Work that is not in accordance with the requirements of the Contract Documents, HBS may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be affected whether or not final payment has been made.

ARTICLE 17 - TERMINATION AND SUSPENSION OF THE CONTRACT

17.1. HBS may terminate the Agreement if directed to do so by the Owner if the Prime Agreement is terminated, or if the DAC, (1) refuses or fails to supply enough properly skilled workers or proper materials, (2) fails to make payment to Subcontractors for services, materials or labor in accordance with the respective agreements between the DAC and the Subcontractors, (3) disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public

authority, or (4) otherwise is guilty of substantial breach of a provision of the Contract Documents, including, but not limited to, failing to comply with the schedule.

17.2. When any of the above reasons exist, HBS may without prejudice to any other rights or remedies of HBS and after giving the DAC and the DAC's surety, if any, three days' written notice, terminate employment of the DAC and may, subject to any prior rights of the surety, (1) exclude the DAC from the site and take possession of the site and of all materials, equipment, tools, and construction equipment and machinery thereon owned by the DAC, (2) accept assignment of Subcontracts pursuant to this section, and (3) finish the Work by whatever method HBS may deem expedient. DAC shall not be entitled to receive further payment until the Work is finished. If the unpaid balance of the Contract Sum exceeds costs of finishing the Work and other damages incurred by HBS, such excess shall be paid to the DAC. If such costs and damages exceed the unpaid balance, the DAC shall pay the difference to HBS.

17.3. HBS may, at any time, terminate the Agreement for HBS's convenience and without cause. Upon receipt of written notice, the DAC shall, (1) cease operations as directed by HBS in the notice, (2) take actions necessary, or directed, for the protection and preservation of the Work, and (3) except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders. In case of such termination, the DAC shall be entitled to receive payment for Work properly executed and costs incurred up to the date of termination.

17.4. HBS may, without cause, order the DAC in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as HBS may determine. Modifications to the Contract Time or Contract Cost will be discussed at the time of delay and determined based on modifications HBS receives from the Owner.

ARTICLE 18 - INDEMNIFICATION

18.1. The DAC, to the fullest extent permitted by law, agrees to indemnify, defend, and hold harmless the Owner, HBS, and any other indemnified parties in the same manner and to the same extent as HBS is required to indemnify, defend, and hold harmless the Owner, and any other indemnified parties under the Prime Agreement. If there is no indemnity obligations of the Prime Agreement, to the fullest extent permitted by law, the DAC shall indemnify and hold harmless HBS; the Owner; and the contractors, consultants, agents and employees of any of them, from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is caused by the acts or omissions of the DAC, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this section.

18.2. In claims against any person or entity indemnified under this Section by an employee of the DAC, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the DAC or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 19 - CLAIMS

19.1. A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money or other relief with respect to the terms of the Agreement. The term "Claim" also includes other disputes and matters in question between HBS and DAC arising out of or relating to the Agreement. The responsibility to substantiate Claims shall rest with the party making the Claim.

19.2. DAC shall commence all claims for additional time or compensation must be initiated within 7 days after occurrence of the event giving rise to such Claim or within 7 days after the DAC first recognizes the condition giving rise to the Claim, whichever is later. Claims must be initiated by written notice to HBS.

19.3. Pending final resolution of a Claim except as otherwise agreed, the DAC shall proceed diligently with performance of the Agreement and HBS shall continue to make payments in accordance with the Contract Documents.

19.4. If the DAC intends to make a Claim for an increase in the Contract Sum, written notice shall be given before proceeding to execute the portion of the Work that forms the basis of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property.

19.5. If the DAC believes additional cost is involved for reasons including, but not limited to, (1) a written interpretation from HBS, (2) an order by HBS to stop the Work where the DAC was not at fault, (3) a written order for a minor change in the Work issued by HBS, (4) failure of payment by HBS, (5) termination of the Contract by HBS, (6) HBS's suspension, or (7) other reasonable grounds, the DAC shall file a Claim in accordance with this Section.

19.6. If the DAC intends to make a Claim for an increase in the Contract Time, written notice as provided in the Contract Documents shall be given. The DAC's Claim shall include an identification and justification of the delay and documentation of the effect of the delay, in calendar days, to the Project schedule.

19.7. If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the Project Schedule.

19.8. If the DAC suffers injury or damage to person or property because of an act or omission of HBS, or of others for whose acts HBS is legally responsible, written notice of such injury or damage shall be given to the HBS within a reasonable time not exceeding 7 days after discovery. The notice shall provide sufficient detail to enable HBS to investigate the matter.

ARTICLE 20 - CONFIDENTIAL INFORMATION

20.1. DAC shall be bound to any confidentiality provisions in the Prime Agreement as well as any Non-Disclosure Agreements or Confidentiality Agreements entered into before this Agreement. If no such confidentiality agreement or provisions exists, DAC agrees, at a minimum, to protect any Confidential Information, which shall be defined as all proprietary, secret or confidential information or data relating to the business operations, services, methods, policies, procedures, techniques, trade secrets or other business knowledge or processes, clients, or the general business activities and affairs of HBS or Owner or any of their affiliated entities. DAC shall use a reasonable standard of care in maintaining the Confidential Information in strict confidence and agrees to use the Confidential Information only as necessary to fulfill its obligations under this Agreement or applicable law. Thus, DAC shall restrict disclosure only to those employees, subcontractors, vendors, and other persons or entities who (1) need to know such information to fulfill the obligations of this Agreement, and (2) are bound by similar written restrictions on the use of the Confidential Information. DAC shall return or destroy all documents, copies, notes or other materials containing any Confidential Information upon HBS's request.

ARTICLE 21 - DISPUTE RESOLUTION

21.1. Any claim, dispute or other matter in question arising out of or related to this Agreement shall be subject to the same dispute resolution provisions as set forth in the Prime Agreement, except that if the claim, dispute or other matter in question is unrelated to a dispute between the DAC and HBS,

or if the DAC is legally precluded from being a party to the dispute resolution procedures set forth in the Prime Agreement, then claims, disputes or other matters in question shall be resolved in accordance with the procedures set forth in this Article.

21.2. Disputes between the DAC and HBS arising out of the Owner's acts, omissions or responsibilities under the Prime Agreement shall be resolved in accordance with the binding dispute resolution method in the Prime Agreement. In the event of such a dispute, the DAC shall be entitled to relief only to the same extent and according to the same provisions as HBS is entitled to recover from the Owner after deduction for HBS's costs incurred in presenting and litigating or arbitrating the claim, including legal fees, normal overhead costs and apportionment to other affected contractors and consultants.

21.3. If claims, disputes or matters in question are unrelated to a dispute between the DAC and HBS, or if the DAC is legally precluded from being a party to the dispute resolution procedures set forth in the Prime Agreement, then such claims, disputes or matters in question shall be subject to mediation as a condition precedent to binding dispute resolution. Mediation shall be in accordance with the Construction Industry Mediation Rules of the American Arbitration Association currently in effect at the time of the mediation. Request for mediation shall be filed in writing with the other party to the Agreement and with the American Arbitration Association. The request may be made concurrently with the filing of a demand for arbitration or other binding dispute resolution proceedings but, in such event, mediation shall proceed in advance thereof or of legal or equitable proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction.

21.4. If a dispute is not resolved after a good faith attempt at mediation, either party may submit the dispute to litigation in a court of competent jurisdiction.

ARTICLE 22 - OWNERSHIP AND USE OF DOCUMENTS

22.1. Drawings, specifications, and other documents including those in electronic form, prepared by a Design Professional and furnished by HBS are Instruments of Service. HBS, HBS's Design Professionals individually shall retain all common law, statutory and other reserved rights, including copyright in those Instruments of Services furnished by them. Drawings, specifications, and other documents and materials and electronic data are furnished for use solely with respect to this Project.

22.2. The DAC, Subcontractor, and material or equipment suppliers shall not own or claim a copyright in HBS's or the Architect's, Consultants' and separate contractors' Instruments of Service. Submission or distribution of Instruments of Service to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of HBS's or the Architect's, Consultants' and separate contractors' reserved rights.

22.3. The DAC, Subcontractors, Sub-subcontractors, and material or equipment suppliers are authorized to use and reproduce HBS's and the Architect's, Consultants' and separate contractors' Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The DAC may retain one record set. The DAC, Sub-contractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of HBS and the Architect, Consultants and separate contractors that produced the Instruments of Service.

22.4. The DAC and the DAC's Subcontractors and consultants grant to HBS the same rights and interest in its Instruments of Service that HBS has granted Owner under the Prime Agreement.

22.5. Unless otherwise granted in a separate license, the receiving party's use, modification, or further transmission of the Digital Data, as provided in this Agreement, is specifically limited to the design and construction of the Project and nothing contained in the Agreement conveys any other right to use the Digital Data for another purpose. To the fullest extent permitted by law, the receiving party shall indemnify the transmitting party from and against all claims arising from or related to the receiving party's modification to, or unlicensed use of, the Digital Data. When transferring Digital Data, no representations are made by either party as to long term compatibility, usability, or readability of the Digital Data resulting from the use of software application packages, operating systems, or computer hardware. Digital Data are not to be construed as or used as "original Documents" as defined by various state regulations or statutes. If there is a discrepancy between the Digital Data and the hard copies, the hard copies govern.

ARTICLE 23 - SPECIAL TERMS & CONDITIONS

23.1. DAC represents that, to the best of its knowledge it has not made, directly or indirectly, during the last three years, and will not knowingly make during the term of this Agreement, any bribes, kickbacks or other impermissible payments to any employees of Owner with respect to receiving work from HBS related to projects of the Owner or its affiliates. Also, during the last three years, DAC has not knowingly received, and in the future will not solicit or knowingly receive during the term of the Agreement, any such payments from vendors, suppliers or other persons contracting with DAC with respect to DAC's work for HBS related to projects for the Owner or its affiliates. The term "impermissible payments" shall include, without limitation, the investment by DAC, or any employees of the DAC, in business ventures in which any such investment is disclosed to, and approved in advance by, the Owner's general counsel, provided that (x) investments in corporations that are traded on a national securities exchange or on the over-the-counter market and (v) investments in securities (including real estate securities) offered by persons in the business of syndicating securities shall not be deemed to be "impermissible payments."

23.2. DAC represents that, to the best of its knowledge, it has not paid during the last three years any consulting fees to any employee of the Owner or any other person, that are related directly or indirectly, to DAC's work for HBS related to projects for the Owner or its affiliates. Also, DAC covenants that it will not knowingly pay during the term of this Agreement any such consulting fees to any employee of the Owner or any other person, that are related, directly or indirectly, to DAC's work for HBS related projects for the Owner or its affiliates. The term "consulting fees" shall not including (1) salaries or bonuses paid by the DAC to its regulatory or full time officers and employees related, directly or indirectly, to the DAC's performance of work for HBS related to the projects for the Owner or its affiliates, (2) fees paid to investment bankers related to the performance of investment banking services for the Agreement, (3) professional fees paid to lawyers, engineers, financial counselors, scheduling services companies and accounting firms as long as (a) any such payee is in the business of offering its services publicly to contractors other than the DAC, (b) the fees paid are appropriate to the services performed for the DAC, and (c) the amount of fees paid is not dependent on the volume of work performed by the DAC for HBS related to projects for the Owner or its affiliates, and (4) fees paid to other business entities, as long as payment of such fees is not approved in advance by the Owner's designee.

23.3. DAC agrees to perform the services as an independent contractor. Neither DAC nor any employee of DAC or other person retained by DAC shall be (a) considered under the provisions of this Agreement or otherwise, an employee, agent, or partner of HBS; or (b) eligible to participate in any welfare, retirement, or other plan, or receive any other benefits, provided or made available to, HBS's employees. DAC agrees that, as between the parties, all entities and individuals supplied or otherwise retained by DAC will be the employees or contractors of DAC, and there shall be no employment, contractual or direct relationship between such entities or individuals and HBS. As

such, HBS shall be responsible for all compensation and benefits that may be due to such entities and individuals, including, without limitation, regular pay, overtime, worker's compensation, vacation, sick time, disability, pension and any other compensation or benefits that such individuals may be owed under any applicable law as a result of their performance of the Work for and on behalf of DAC pursuant to this Agreement. DAC agrees to indemnify, defend, and hold HBS harmless from and against any claims, losses, expenses, judgments or liability (including reasonable attorney's fees) arising from the performance by the entities and individuals supplied or otherwise retained by DAC hereunder of any duties assigned to such individuals or entities hereunder (including, without limitation, Claims for overtime, worker's compensation or any other benefits that may be associated with employment, as well as claims against HBS that may be made by any governmental agency with respect to the employment status of the individuals supplied hereunder.

ARTICLE 24 - MISCELLANEOUS PROVISIONS

24.1. The Agreement shall be governed by the law stated in the Prime Agreement, or if no such law is stated, then the law of the place where the Project is located.

24.2. HBS and DAC respectively bind themselves, their partners, successors, assigns and legal representatives to the other party hereto and to partners, successors, assigns and legal representatives of such other party in respect to covenants, agreements and obligations contained in the Contract Documents. Neither party to the Agreement shall assign the Agreement to any third party without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract Documents.

24.3. Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.

24.4. No action or failure to act by the Owner or HBS shall constitute a waiver of a right or duty afforded them under the Contract Documents, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed in writing.

24.5. If any provision of this Agreement is found to be invalid or unenforceable in whole or in part, such finding shall not affect the validity or enforceability of any other provisions of this Agreement or the remainder of the provision in question. In lieu of each provision of this Agreement, or party thereof, that is found to be invalid or unenforceable, there shall be added as part of this Agreement a provision as similar in terms to such invalid or unenforceable provision as is possible, valid, and enforceable.

24.6. Nothing contained in this Agreement shall create a contractual relationship with, or cause of action in favor of, a third party against either HBS or DAC, except to the extent the Owner is required to be a beneficiary to HBS's subcontracts under the Prime Agreement.

24.7. Where reference is made in this Agreement to a provision of another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

This Agreement entered into as of the day and year first written above.

HENDERSON BUILDING SOLUTIONS, LLC: DAC:

By: _____ By: _____

Name: _____	Name: _____
Title: _____	Title: _____
Date: _____	Date: _____

CONTRACTOR'S PARTIAL WAIVER AND RELEASE OF LIEN

A. OWNER: _____

B. CONTRACTOR: _____

C. PAYER: **Henderson Building Solutions, LLC**

D. PROJECT: _____

E. ADDRESS: _____

_____

_____

F. FACILITY IDENTIFICATION NUMBER: _____

G. APPLICATION FOR PAYMENT NUMBER: _____

H. AMOUNT OF PAYMENT: _____

For and in consideration of the payment to be made by Henderson Building Solutions to the Contractor in the amount set forth in Item H. above, which payment is for Work, labor and services and/or materials furnished for the construction of the above referenced Project, the Contractor hereby certifies as follows:

1. The Contractor hereby waives, releases and quit claims in favor of the Owner of the Project, each and every party acquiring title to and/or making a loan on the Project, and the title company or companies examining and/or insuring title to the Project and any and all of their successors and assignees, all rights of the Contractor to assert a lien upon the land and improvements comprising the Project, but only to the extent of sums actually received for Work, labor, services and materials furnished through _____ _____, plus the sum paid as set forth in item H above.

2. The Contractor has not assigned any lien or right to perfect a lien against the Project, and the Contractor has the right, power and authority to execute this document.

3. The Contractor warrants that all laborers and all subcontractors employed by the Contractor, and all other laborers, trade contractors and sub-subcontractors of every tier and all suppliers or materialmen who have furnished work, labor, materials or services incorporated into the Project and any lien or bond claimant relating to the Work, labor, materials or services of any such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers or materialmen furnished in connection with the Project, have been paid their respective portion of all prior payments and that none of such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers, materialmen, or other claimants have any claim of lien against the Project through the _____ day of_____ _____,20___.

4. No security interest has been given or executed by the Contractor for or in connection with any materials, appliances, machinery, fixtures, or furnishings placed upon or installed in the Project.

IN WITNESS WHEREOF, this Partial Release of Lien has been executed this _____ day of _____ _____, 20___.

WITNESSE

_____

_____ By:_____

_____ Its:_____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
(Notary Public)

My Commission Expires: _____

(Notarial Seal)

EQUIPMENT SUPPLIER'S PARTIAL WAIVER AND RELEASE OF LIEN

A. OWNER: _____

B. CONTRACTOR: _____

C. PAYER: **Henderson Building Solutions, LLC**

D. PROJECT: _____

E. ADDRESS: _____

_____

_____

F. FACILITY IDENTIFICATION NUMBER: _____

G. APPLICATION FOR PAYMENT NUMBER: _____

H. AMOUNT OF PAYMENT: _____

For and in consideration of the payment to be made by Henderson Building Solutions to the Equipment Supplier in the amount set forth in Item H. above, which payment is for Equipment, labor and services and/or materials furnished for the construction of the above referenced Project, the Contractor hereby certifies as follows:

1. The Equipment Supplier hereby waives, releases and quit claims in favor of the Owner of the Project, each and every party acquiring title to and/or making a loan on the Project, and the title company or companies examining and/or insuring title to the Project and any and all of their successors and assignees, all rights of the Equipment Supplier to assert a lien upon the land and improvements comprising the Project, but only to the extent of sums actually received for Equipment, labor, services and materials furnished through ___ _____, plus the sum paid as set forth in item H above.

2. The Equipment Supplier has not assigned any lien or right to perfect a lien against the Project, and the Equipment Supplier has the right, power and authority to execute this document.

3. The Equipment Supplier warrants that all laborers and all subcontractors employed by the Equipment Supplier, and all other laborers, trade contractors and sub-subcontractors of every tier and all suppliers or materialmen who have furnished work, labor, materials or services incorporated into the Project and any lien or bond claimant relating to the Equipment, labor, materials or services of any such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers or materialmen furnished in connection with the Project, have been paid their respective portion of all prior payments and that none of such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers, materialmen, or other claimants have any claim of lien against the Project through the ___ _____ day of_____,20___.

4. No security interest has been given or executed by the Equipment Supplier for or in connection with any Equipment materials, machinery, fixtures, or furnishings placed upon or installed in the Project.

IN WITNESS WHEREOF, this Partial Release of Lien has been executed this _____ day of _____ _____, 20___.

WITNESSE

_____

_____ By:_____

_____ Its:_____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
(Notary Public)

My Commission Expires: _____

(Notarial Seal)

CONTRACTOR'S AFFIDAVIT AND FINAL WAIVER AND RELEASE OF LIEN

A. OWNER: _____

B. CONTRACTOR: _____

C. PAYER: **Henderson Building Solutions, LLC**

D. PROJECT: _____

E. ADDRESS: _____

_____

_____

F. FACILITY IDENTIFICATION NUMBER: _____

G. APPLICATION FOR PAYMENT NUMBER: _____

H. AMOUNT OF FINAL PAYMENT: _____

For and in consideration of the payments made by Henderson Building Solutions to the Contractor or to any subcontractor, materialman or supplier of the Contractor, for labor and employed in and/or materials furnished for the construction of the above referenced Project, the Contractor hereby certifies as follows:

1. Upon receipt of the sum specified in Item H. above, the Contractor certifies that it has received payment in full for all sums due and payable under the contract described herein, as amended by all change orders and other amendments, if any (collectively, the "Contract"), and all sums due for all materials furnished to and/or for all Work performed and labor and services furnished in the construction of the Project, and the Contractor hereby affirms that there will be no outstanding claims against the Contractor and/or its sureties in connection with this Project.

2. Contingent upon receipt of the sum specified in item H., the Contractor does hereby waive, release and quit claim in favor of the Owner of the Project, each and every party acquiring title to and/or making a loan on the Project, and the title company or companies examining and/or insuring title to the Project and any and all of their successors and assignees, all rights of the Contractor to assert any lien upon the land and improvements comprising the Project, by virtue of any law in the jurisdiction in which the land and improvements are situate or any amendment of said law, regarding the rights of a contractor, subcontractor, laborer, supplier, or materialman to assert a lien or claim against the Project.

3. Contingent upon receipt of the sum specified in Item H., the Contractor does hereby forever release, waive, and discharge the Project and the Owner of the Project, from any and all causes of action, suits, debts, accounts, damages, liens, encumbrances, judgments, claims, and demands whatsoever, in law or equity which the Contractor and/or its successors and/or assignees ever had, now have, or ever will have against the Owner of the Project, by reason of the Contract and/or the performance of Work and/or the furnishing of labor, services and materials relating to the construction of the Project; and the Contractor hereby agrees to indemnify and hold the above parties harmless from any and all damages, costs, expenses, demands, suits, and legal fees, directly or indirectly relating to or arising out of any claim or lien by any party relating to that which was paid or performed or should have been performed by or for the Contractor in connection with the Project or under the terms of the Contract.

4. The Contractor has not and will not assign any claim against the Owner of the Project, nor any lien or right to perfect a lien against the Project, and the Contractor has the right, power, and authority to execute this Affidavit, Final Waiver and Release.

5. Contingent upon receipt of the sum specified in Item H., the Contractor agrees that all laborers and all subcontractors employed by it, and all other laborers, trade contractors and subcontractors and sub-subcontractors of every tier and all suppliers or materialmen who have furnished Work, labor, materials or services in connection with the Project will be paid in full and that none of such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers, materialmen, or other claimant will have any claim, demand or lien against the Project, and the Contractor hereby agrees to hold the Project and the Owner of the Project harmless from any such claim, demand or lien.

6. No security interest has been given or executed by the Contractor for or in connection with any materials, appliances, machinery, fixtures, or furnishings placed upon or installed in the Project.

This Affidavit, Waiver and Release shall be an independent agreement and covenant and shall operate and be effective with respect to Work and labor done and materials furnished under any supplemental contract or contracts, whether oral or written, for extra or additional work on the Project and for any further work done or materials furnished at any time with respect to the Project subsequent to the execution hereof.

IN WITNESS WHEREOF, this Final Release of Lien has been executed this _____ day of_ _____, 20___.

WITNESS

_____

_____ By:_____

_____ Its:_____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
(Notary Public)

My Commission Expires: _____

(Notarial Seal)

EQUIPMENT SUPPLIER'S AFFIDAVIT AND FINAL WAIVER AND RELEASE OF LIEN

A. OWNER: _____

B. CONTRACTOR: _____

C. PAYER: **Henderson Building Solutions, LLC**

D. PROJECT: _____

E. ADDRESS: _____

_____

_____

F. FACILITY IDENTIFICATION NUMBER: _____

G. APPLICATION FOR PAYMENT NUMBER: _____

H. AMOUNT OF PAYMENT: _____

For and in consideration of the payments made by Henderson Building Solutions to the Equipment Supplier or to any subcontractor, materialman or supplier of the Equipment Supplier, for labor and employed in and/or materials furnished for the construction of the above referenced Project, the Equipment Supplier hereby certifies as follows:

1. Upon receipt of the sum specified in Item H. above, the Equipment Supplier certifies that it has received payment in full for all sums due and payable under the contract described herein, as amended by all change orders and other amendments, if any (collectively, the "Contract"), and all sums due for all materials furnished to and/or for all Work performed and labor and services furnished in the construction of the Project, and the Equipment Supplier hereby affirms that there will be no outstanding claims against the Equipment Supplier and/or its sureties in connection with this Project.

2. Contingent upon receipt of the sum specified in item H., the Equipment Supplier does hereby waive, release and quit claim in favor of the Owner of the Project, each and every party acquiring title to and/or making a loan on the Project, and the title company or companies examining and/or insuring title to the Project and any and all of their successors and assignees, all rights of the Equipment Supplier to assert any lien upon the land and improvements comprising the Project, by virtue of any law in the jurisdiction in which the land and improvements are situate or any amendment of said law, regarding the rights of a Equipment Supplier, subcontractor, laborer, supplier, or materialman to assert a lien or claim against the Project.

3. Contingent upon receipt of the sum specified in Item H., the Equipment Supplier does hereby forever release, waive, and discharge the Project and the Owner of the Project, from any and all causes of action, suits, debts, accounts, damages, liens, encumbrances, judgments, claims, and demands whatsoever, in law or equity which the Equipment Supplier and/or its successors and/or assignees ever had, now have, or ever will have against the Owner of the Project, by reason of the Contract and/or the performance of Work and/or the furnishing of labor, services and materials relating to the construction of the Project; and the Equipment Supplier hereby agrees to indemnify and hold the above parties harmless from any and all damages, costs, expenses, demands, suits, and legal fees, directly or indirectly relating to or arising out of any claim or lien by any party

relating to that which was paid or performed or should have been performed by or for the Equipment Supplier in connection with the Project or under the terms of the Contract.

4. The Equipment Supplier has not and will not assign any claim against the Owner of the Project, nor any lien or right to perfect a lien against the Project, and the Equipment Supplier has the right, power, and authority to execute this Affidavit, Final Waiver and Release.

5. Contingent upon receipt of the sum specified in Item H., the Equipment Supplier agrees that all laborers and all subcontractors employed by it, and all other laborers, trade contractors and subcontractors and sub-subcontractors of every tier and all suppliers or materialmen who have furnished Work, labor, materials or services in connection with the Project will be paid in full and that none of such laborers, subcontractors, trade contractors, sub-subcontractors, suppliers, materialmen, or other claimant will have any claim, demand or lien against the Project, and the Equipment Supplier hereby agrees to hold the Project and the Owner of the Project harmless from any such claim, demand or lien.

6. No security interest has been given or executed by the Equipment Supplier for or in connection with any equipment, materials, machinery, fixtures, or furnishings placed upon or installed in the Project.

This Affidavit, Waiver and Release shall be an independent agreement and covenant and shall operate and be effective with respect to Work and labor done and materials furnished under any supplemental contract or contracts, whether oral or written, for extra or additional work on the Project and for any further work done or materials furnished at any time with respect to the Project subsequent to the execution hereof.

IN WITNESS WHEREOF, this Final Release of Lien has been executed this _____ day of _____ _____, 20___.

WITNESSE

_____

_____ By:_____

_____ Its:_____

Subscribed and sworn to before me this _____ day of _____, 20___.

_____
(Notary Public)

My Commission Expires: _____

(Notarial Seal)

SECTION 007200

GENERAL REQUIREMENTS, TERMS AND CONDITIONS

PART 1 - GENERAL

1.1 GENERAL

A. This Specification Section includes the following:

1. Instruction to Bidders
2. Submission of Bids
3. Project Schedule
4. Selection of Manufacturer
5. Guaranteed Delivery Date
6. Method of Payment
7. Data to be Submitted with Bid Package
8. Withdrawal
9. Interpretation of Specifications
10. Taxes and Compliance with Laws
11. Form of Agreement
12. Suspension and Termination
13. Inspection Upon Delivery
14. Assignment
15. Shipping and Insurance
16. Indemnity
17. Patents
18. Waiver
19. Governing Laws
20. Mediation
21. Installation
22. Safety
23. Incidental Labor and Materials

24. Submittals

25. Warranty

26. Operation and Maintenance Manuals

27. Start-up and Training

1.2 INSTRUCTIONS TO BIDDERS

A. Proposals will be received by Henderson Building Solutions, LLC, via ProCore web-based platform:

June 17, 2022
2:00 PM EST

B. For security and bid integrity purposes, bids are not able to be submitted beyond the due date and time listed.

C. To furnish all equipment, materials, services and related work set forth in these specifications. All proposals shall be prepared and submitted in accordance with these Specifications.

D. Manufacturers may visit the project site prior to the submission of the proposal to inform themselves of the conditions under which the equipment to be supplied shall be installed. Site visits shall be scheduled by contacting:

Ashley Baker
TEL (913) 742-5338 **CELL** (314) 960-5497
ashley.baker@hendersonbuilding.com

Don Falke
TEL (913) 742-5699 **CELL** (816) 833-6463
don.falke@hendersonbuilding.com

E. Henderson Building Solutions' web-based bid management platform is managed in partnership with Procore, Henderson Building Solutions' web-based project management software provider. For support in accessing the bidding documents, bidders may contact Procore's customer support at support@procore.com or 833-277-6267.

F. For assistance with submitting a bid, please visit Procore's bidding support page.

1.3 SUBMISSION OF BIDS

A. Bids shall be submitted through Henderson Building Solutions' web-based bid management software. Bid shall be electronically input into the appropriate sections listed on the web-based bid sheet.

B. A submission of a bid package will be interpreted to mean the Manufacturer submitting the proposal understands and agrees with all provisions, penalties, warranties and guarantees in these Specifications, unless exceptions to same are listed clearly as "Exclusions" within the appropriate field in the web-based bid sheet.

1. Exceptions to the payment terms and warranty requirements may subject the bid to being rejected.

C. Bids that are not prepared and submitted in accordance with these Specifications will imply that the bidder does not intend to comply with all the Specifications and such bids will be considered irregular and subject to rejection. If the Manufacturer declines to bid, they shall give electronic notice to the listed Henderson Building Solutions contact of their intentions not to submit a proposal no later than 4 days prior to the date the bids are due.

D. Each proposal shall be carefully prepared using the fill-in data tables found within these Specifications. Entries on the fill-in data tables shall be typed or legibly written. A completed fill-in data table shall be uploaded as an attachment in order for a bid to be considered complete.

E. Each Bidder shall list in the appropriate field in the web-based bid sheet all inclusions within bid. Inclusions shall identify the Titles and Dates of all Specifications and Addenda utilized in the preparation of their bid. Such acknowledgement is a requirement for bids to be considered complete.

F. The bidder shall list in the appropriate field in the web-based bid sheet all exceptions or conflicts between the bidder's proposal and these Specifications. If more space is required for this listing, additional pages may be added. If the bidder takes no exceptions to these specifications, bidder shall write "None" in the space provided. Proposals which do not comply with this requirement will be considered irregular and may be rejected.

G. All exceptions to these Specifications shall be specific in nature and referenced in the specific applicable article of these Specifications. Conflict notations which make reference to the Manufacturer general descriptive information as a whole will not be accepted.

H. Bidders shall not alter any part of these Specifications in any way, except by stating their exceptions in the field provided in the web-based bid sheet.

I. The bidder shall assemble all drawings, catalog data and other supplementary information necessary to thoroughly describe services, materials and equipment included in their proposal, and shall include such supplemental information as attachments when necessary to fully describe bidders offering.

1.4 PROJECT SCHEDULE

A. The following project milestone schedule represents milestones in the project for which the successful bidder will supply information, services or equipment during the course of this project.

PROJECT MILESTONE SCHEDULE

	Project Milestones	Date
1.	Submit bid	6/17/2022
2.	Henderson Building Solutions' P.O. Issued	6/22/2022
3.	Provide equipment submittals, including Installation instructions for Henderson Building Solutions' approval	6/29/2022
4.	Release equipment for production	7/8/2022

5.	Installation Contractor selected by Henderson Building Solutions	7/20/2022
6.	Equipment delivered	11/18/2022
7.	Cooling Tower start-up (approx.)	12/5/2022
8.	Warranty start date (approx.)	12/30/2022

1.5 SELECTION OF MANUFACTURER

A. Henderson Building Solutions shall identify the successful bidder based on the proposal that best meets the following criteria. Henderson Building Solutions reserves the right to reject any and all proposals; and to waive irregularities in any proposal that is submitted.

1. The quality, completeness and adequacy of the technical portion of the proposal.

2. Price of base bid and any alternate bids.

3. Guaranteed delivery date.

4. Ability to meet planned construction schedule.

5. Dimensional and performance compatibility with existing conditions.

6. Total project installation costs.

7. Equipment efficiency.

8. Special terms and conditions offered related to warranties, payment terms, discounts, service agreements, etc. offered by the bidder.

B. All proposals shall become the property of Henderson Building Solutions.

1.6 GUARANTEED DELIVERY DATE

A. Manufacturer shall acknowledge the importance to the overall project schedule, of the Manufacturer's ability to deliver the equipment to the site in a timely manner. Manufacturer shall identify, in the Equipment Fill-In Data Table, Manufacturer's guaranteed delivery date for the equipment. Manufacturer's guaranteed delivery date shall be the number of consecutive calendar days between the date Manufacturer receives Henderson Building Solutions' purchase order and the date the Equipment is delivered to the site. Manufacturer's guaranteed delivery date shall include all time required by Manufacturer to obtain site or other information, to prepare and process submittals, to perform any required factory testing and all other functions that effect equipment delivery date. Manufacturer shall allow 30 calendar days for Henderson Building Solutions review of Manufacturer's submittals.

B. The equipment delivery date identified in the Project Milestone Schedule represents Henderson Building Solutions' best interests in meeting overall project schedule. Manufacturer shall not be obligated to meet the delivery date identified in the Project Milestone Schedule. The basis of this agreement and any penalties contained here in shall be Manufacturer's Guaranteed Delivery Date identified by Manufacturer in the Equipment Data Fill-In Table.

C. Henderson Building Solutions reserves the right, should overall project schedule require, to instruct the Manufacturer to delay delivery of the equipment beyond Manufacturer's Guaranteed Delivery Date for a period up to 90 consecutive calendar days.

1.7 METHOD OF PAYMENT

A. Henderson Building Solutions, LLC will issue to the successful bidder a Purchase Order on or about the date listed in the Project Milestone Schedule.

B. All correspondence, RFIs, etc., shall be transmitted through the "Correspondence" tab within the bid sheet.

C. No payments will be made to the Manufacturer until after all required submittals are received and approved, and until all equipment is delivered to the installing contractor and has been accepted by the site on behalf of Henderson Building Solutions. Manufacturer shall submit an invoice to Henderson Building Solutions in the amount of 90% of the total contract amount after equipment has been delivered to and accepted by the installing contractor. Henderson Building Solutions will submit manufacturer's invoice to the Owner within seven days of receipt from Manufacturer. Henderson Building Solutions will make payment to Manufacturer within seven day of Henderson Building Solutions receiving payment from the Owner. The final 10% of the contract amount shall be invoiced by the Manufacturer after the equipment has been started, placed into service and has been tested and verified that the equipment meets the performance set forth in these specifications as determined by Henderson Building Solutions, all owner training is complete, and all O&M manuals have been delivered to Henderson Building Solutions. Henderson Building Solutions will submit manufacturer's invoice to the Owner within seven days of receipt from Manufacturer. Henderson Building Solutions will make payment to Manufacturer within seven day of Henderson Building Solutions receiving payment from the Owner. Manufacturer's invoices received prior to dates described will not be processed until described events have taken place.

D. Manufacturer shall include with each application for payment a properly executed and notarized Partial or Final Waiver and Release of Lien using the forms included in these Specifications.

E. No exceptions shall be allowed to the method of payment described. Manufacturer may, at Manufacturer's option, include with the bid a proposed method of payment that differs from the payment method described in these Specifications. Should Manufacturer choose to include alternative payment method with the bid, Manufacturer shall also include amount to be deducted from the base bid price should Henderson Building Solutions accept Manufacturer's alternate payment method. In no case shall any proposed alternate payment method relieve Manufacturer from any other requirements of these Specifications.

F. Time is of the essence and Henderson Building Solutions will suffer financial loss if the Manufacturer does not meet the guaranteed delivery date. Proving the actual loss suffered if the equipment is not delivered on time would be difficult, therefore, liquidated damages are assessed for delay (but not as a penalty). Manufacturer shall recognize the importance of meeting the guaranteed equipment delivery date identified in these Specifications and listed by the Manufacturer in the Equipment Fill-in Data Table, and as such, Manufacturer shall allow Henderson Building Solutions to charge Manufacturer a liquidated damage in the amount of Five Hundred Dollars ($500.00) per calendar day for each day after contractual delivery date for which the equipment has not yet been delivered. Contractual delivery date shall be established at the time successful Manufacturer is issued Henderson Building Solutions' purchase order and shall be equal

to the date of issue of Henderson Building Solutions' purchase order plus the Manufacturer's Guaranteed Delivery Date entered by the Manufacturer in the Equipment Fill-In Data Table. Equipment shall be deemed to be delivered when all equipment and specified accessories provided by the Manufacturer have arrived at the job site and have been accepted by the installing contractor.

1.8 DATA TO BE SUBMITTED WITH BID PACKAGE

A. The following information shall be included in the proposal by the bidder. Failure to include this information will subject the bid to rejection. A complete set of required information shall be provided for the base equipment and all alternate bid equipment whether or not an alternate bid is specified or voluntarily submitted by the bidder.

1. Cooling Towers
   a. Fully completed Proposal Form.
   b. Guaranteed delivery date (number of calendar days) to site from the factory manufacturing the equipment from the date of issue of purchase order.
   c. Guaranteed assembly date (number of calendar days) from delivery date when assembly is provided by Manufacturer.
   d. One complete set of bid material and information requested.
   e. CTI-Certified Performance Data.
   f. Fully completed Cooling Tower Fill-in Data Table for base bid towers and any alternate bid towers.
   g. Dimensioned drawings detailing overall assembled tower length, width, height, maintenance space requirements, clearances, location of all field connections, size and type of all field connections, recommended method of support and shipping and operating weights. Include all accessories required by these Specifications.
   h. Detailed description of all field assembly to be provided by others.
   i. Other information deemed by the bidder to fully clarify the bid.

1.9 WITHDRAWAL

A. Proposals may be withdrawn, altered and resubmitted at any time before the bid submission date.

B. Proposals may not be withdrawn, altered or resubmitted for 90 days after the bid submission date.

1.10 INTERPRETATION OF SPECIFICATIONS

A. It shall be the bidder's responsibility to advise Henderson Building Solutions, before the bid date, of conflicting requirements, omissions or of information which requires clarification and to request such clarification from Henderson Building Solutions prior to the bid date.

1.11 TAXES AND COMPLIANCE WITH LAWS

A. Manufacturer shall include in the bid payment of all applicable taxes and fees levied by governing bodies at the location of the point of delivery for all services, materials and equipment provided by the Manufacturer.

B. Manufacturer shall at its own costs comply with all federal, state, and local laws, regulations, codes, and ordinances applicable to the Manufacturer and all equipment, materials and services provided by the Manufacturer.

1.12 FORM OF AGREEMENT

A. Henderson Building Solutions will issue successful bidder a Purchase Order in the amount of the bidder's lump sum price. Purchase Order will require Manufacturer to comply with all Sections of these Specifications, including, but not limited to Section 007200; Fill-In Data Tables; Partial Lien Waiver and Release of Lien; Affidavit, Final Waiver and Release of Lien, all specification sections included in Divisions 22, 23, 24, 25, and 26; all Addenda to the specification issued by Henderson Building Solutions, all of which shall jointly form the agreement between Henderson Building Solutions and the Manufacturer. Exceptions identified by the Manufacturer with the bid and accepted by Henderson Building Solutions will be specifically identified in the Purchase Order.

B. Acceptance of the Henderson Building Solutions Purchase Order by the Manufacturer shall be limited to the requirements of these specifications. Any additional terms, conditions, or instructions proposed by or included by the Manufacturer in the bid are rejected by Henderson Building Solutions unless specifically identified in the Purchase Order.

1.13 SUSPENSION AND TERMINATION

A. Henderson Building Solutions may, with written order, direct the Manufacturer to suspend, delay or, interrupt Manufacturer's performance of Manufacturer's obligation per these Specifications for such period of time to be appropriate for the convenience of the Owner or Henderson Building Solutions. Manufacturer shall immediately suspend, delay, or interrupt as directed by Henderson Building Solutions. Manufacturer's guaranteed delivery date and price shall be adjusted by Change Order as mutually agreed to by Henderson Building Solutions and Manufacturer.

B. Henderson Building Solutions may, with written order, terminate this Agreement for the convenience of Henderson Building Solutions or the Owner. Henderson Building Solutions shall pay the Manufacturer an amount representing Manufacturer's actual documented cost as of the date of the termination plus a reasonable mark-up as mutually agreed to by Henderson Building Solutions and the Manufacturer.

1.14 INSPECTION UPON DELIVERY

A. Henderson Building Solutions or its agent reserves the right to refuse to accept equipment and accessories which are not in compliance with these specifications and/or Manufacturer's submittals or are damaged and in Henderson Building Solutions' opinion repair of damage compromises equipment and accessories ability to meet the intended function.

B. Henderson Building Solutions' acceptance of items at time of delivery does not relieve Manufacturer from full compliance with these Specifications.

1.15 ASSIGNMENT

A. Manufacturer's rights, duties and obligations detailed in these Specifications and Henderson Building Solutions' Purchase Order may not be assigned to other parties without the written consent of Henderson Building Solutions.

B. Henderson Building Solutions may assign Henderson Building Solutions' Purchase Order and all rights, duties and obligations detailed in these Specifications and Henderson Building Solutions' Purchase Order to one of Henderson Building Solutions' subcontractors. Assignment by Henderson Building Solutions does not require Manufacturer's consent.

C. Should Henderson Building Solutions assign the Henderson Building Solutions' Purchase Order to a Henderson Building Solutions subcontractor, Manufacturer shall:

1. Invoice Henderson Building Solutions' subcontractor and receive payment from Henderson Building Solutions' subcontractor per the terms described in these Specifications.

2. Allow Henderson Building Solutions' subcontractor to represent Henderson Building Solutions and serve as Henderson Building Solutions' agent regarding all claims, warranties and other duties and responsibilities of Manufacturer required by these Specifications and Henderson Building Solutions' Purchase Order.

1.16 SHIPPING AND INSURANCE

A. The Manufacturer shall furnish and deliver, freight allowed to the jobsite, all equipment as described in these Specifications. Manufacturer shall provide all necessary insurance and assume full responsibility for all damages and losses occurring to all equipment supplied until equipment has been delivered to the jobsite and accepted by the Henderson Building Solutions or its agent. The jobsite is:

Lee's Summit Medical Center
2100 SE Blue Parkway
Lee's Summit, MO. 64063

B. Manufacturer shall, prior to any of its employees, agents, or representatives' entrance on to the site where the project is located, purchase and maintain insurance that protects the Manufacturer from any and all claims arising out of the Manufacturer's performance of Manufacturer's obligations under this Agreement. Insurances to be maintained by Manufacturer include but are not limited to: Workman's Compensation Insurance, Commercial General Liability, and Automobile Liability Insurance.

1.17 INDEMNITY

A. To the fullest extent permitted by Law, the Manufacturer shall indemnify and hold harmless Henderson Building Solutions and its agents, consultants, employees, and others as required by this Agreement from all claims and liabilities for bodily injury or property damage, including reasonable attorney's fees, costs, and expenses incurred that may arise from this Agreement, and which is not reimbursed by insurance coverage that was required by this Agreement, but only to the extent caused by the negligent acts or omissions of the Manufacturer, or anyone contracted or employed directly or indirectly by the Manufacturer. The Manufacturer shall be entitled to reimbursement of any defense costs paid by the Manufacturer above the Manufacturer's percentage of liability for the underlying claim under this article.

1.18 PATENTS

A. The Manufacturer shall indemnify, defend, and hold Henderson Building Solutions harmless from all suits or claims for infringement of any patent rights or copyrights arising out of the use or sale of the materials or equipment purchased and shall pay and discharge any and all judgements or decrees that may be rendered in any such suit, action, or proceedings, provided the Manufacturer's ability to do so has not been materially prejudiced by Henderson Building Solutions' failure to give the Manufacturer written notice of such suit or claim. Unless identified in this Agreement as requiring patent rights or copyrights, the Manufacturer's obligations under this article shall not apply to materials or equipment specified by Henderson Building Solutions nor purchased materials or equipment modified by the Owner or Henderson Building Solutions, unless the Manufacturer has consented to such modification in writing, which shall not be unreasonably withheld.

1.19 WAIVER

A. Manufacturer's or Henderson Building Solutions' failure to insist on performance of any term or condition of this Agreement, or to exercise any right or privilege provided in this Agreement, shall not thereafter waive any such term, condition, instruction, or any right or privilege.

1.20 GOVERNING LAWS

A. This Agreement shall be governed by the laws in effect at the site of the project.

1.21 MEDIATION

A. Disputes between the parties to this Agreement not resolved by direct discussion shall be submitted to mediation pursuant to the Construction Industry Rules of the American Arbitration Association, with a mutually agreed to mediator identified within 15 calendar days. Mediation shall be a condition precedent to any other forms of binding dispute resolution.

1.22 INSTALLATION

A. A contract for equipment installation will be awarded by Henderson Building Solutions after the award of this contract. The equipment shall be delivered to the job site, or at installing contractor's option, to the installation contractor's designated storage location.

1. Off-loading of equipment and moving of equipment to final installed location shall be provided by the installing contractor.

B. Manufacturer shall fully coordinate installation of new equipment with installing contractor. Coordination includes but is not limited to:

1. Coordination of exact equipment delivery date and location.

2. Furnishing detailed rigging, assembly and installation instructions.

3. Providing all other information required by the installing contractor to properly set, connect, inspect, install, test and start equipment.

4. Manufacturer shall make allowance in the proposal for any costs associated with:
   a. Providing factory authorized start-up services simultaneously with new equipment installation and matching start-up services to installation sequence and final project schedule.

5. Manufacturer shall recognize the logistical issues associated with the installation of equipment of this type in a facility of the type in which the equipment will be installed, and shall make factory authorized service personnel available for start-up and troubleshooting based on the construction schedule established by Henderson Building Solutions and the installing contractor and the inevitable adjustments to same made by the installing contractor, and the allowable working dates and hours established by the Owner due to causes beyond the Henderson Building Solutions' and the installing contractor's control. Extra payment will not be allowed to the Manufacturer as a result of project schedule adjustments.

C. Manufacturer shall provide a minimum 10-day advance notice of equipment delivery date to Henderson Building Solutions and the installing contractor.

1.23 SAFETY

A. In the event the Manufacturer, its employees or agents are required to come onto the project site in conjunction with complying with the requirements of these Specifications, including meeting Manufactures warranty obligations. Manufacturer shall comply with all current safety requirements required by all governing authorities and required by the Owner.

1.24 INCIDENTAL LABOR AND MATERIALS

A. Any labor or material incidental to and required to provide the products and services described in these Specifications, whether or not specifically identified, shall be provided by the Manufacturer.

B. Manufacturer shall provide the Owner, with a copy to the Henderson Building Solutions, all applicable MSDS data sheets.

1.25 SUBMITTALS

A. Product data, performance, dimensions, shop drawings, certifications and other information required to be submitted is identified in other Sections of this Specification.

B. All submittals shall be uploaded into the web-based project management software workflow electronically using read only PDF files. The first page of the file shall be Contractor’s standard form used for the transmission of submittals. PDF files that are not named per the below directions will be returned without review or action by HBS.

C. The first page of the PDF file shall be Manufacturer’s standard form used for the transmission of submittals and shall include the following at a minimum:

1. SUBMITTAL or RESUBMITTAL

2. Henderson Building Solutions project number

3. Specification Section Number

4. Products/materials included in submittal

5. Submittal Sequence Number:
   a. Example: “SUBMITTAL-236500-Cooling Towers-No.1”
   b. Example: “RESUBMITTAL-236500-Cooling Towers -No.2”

D. Actions on Submittals:

1. Henderson Building Solutions will review each submittal, will revise submittal as required to comply with the Contract documents and will mark with Action Stamp.

2. Henderson Building Solutions will return reviewed submittal electronically using the same file format as used by Contractor.

E. Action Stamp: Each submittal will be stamped with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, as follows, to indicate the action taken:

1. "1" – Approved: When submittal is marked "Approved" that part of the Work covered by the submittal process may proceed.

2. "2" – Approved as Corrected: When submittal is marked "Approved as Corrected", that part of the Work covered by the submittal may proceed provided all submittal review notes are fully complied with, without exception.

3. "3" – Revise and Resubmit: When submittal is marked "Revise and Resubmit", do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery or any other activity. Prepare a NEW submittal in accordance with all submittal review notes and specified requirements; resubmit without delay.

4. "4" – Rejected: Where submittal is marked "Rejected", submittal has been rejected without review for compliance with specifications. Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery or any other activity. Prepare a NEW submittal showing full compliance with the specified requirements; resubmit without delay. Contractor shall perform no portion of the Work that requires the Contractor to obtain approved submittals until such approval has been obtained from the Construction Manager.

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5. "5" – No Action Taken: Where submittal is primarily for information or record purposes, special processing or other activity, the submittal will be returned, marked "No Action Taken". Resubmittal is not required.

F. Henderson Building Solutions approval of a submittal or any portion of a submittal shall not be interpreted as approval of any of the following information included in the submittal.

1. Quantities (i.e., number, lengths, volumes, square feet, weights, etc.).

2. Methods of factory and/or field assembly.

3. Transport, storage, rigging, installation, start-up and testing methods.

4. Warranties in conflict with specified warranties.

5. Payment terms in conflict with specified terms.

G. Installation Instructions: Manufacturer shall submit an electronic copy of the final installation instructions to Henderson Building Solutions. Installation instructions shall clearly state:

1. Method to be used by installing contractor to set unit in place, including rigging instructions.

2. Proper procedures for storing and protecting unit at job site.

3. Location of all field connection points to be met by related contractors, including mechanical, electrical, and controls.

4. Detailed checkout and start-up procedures.

5. Complete list of Manufacturer supplied materials and labor required to place equipment into service.

6. Complete list of materials and labor to be supplied by installing contactor required to place equipment into service, including identification of Manufacturer supplied components to be field installed or assembled by others.

7. Recommended equipment mounting and support methods, including any vibration isolation requirements.

8. Minimum require service clearances.

1.26 WARRANTY

A. Manufacturer shall warrant for a period of one (1) year that all equipment, materials, and services supplied by Manufacturer conform to these Specifications, are fit and sufficient for the intended purpose, and are free from defects in material and workmanship. The Manufacturer shall repair or replace any defects in materials or workmanship or any non-compliance with these specifications at Manufacturer's expense including the full cost of material, labor, shipping, and all other expenses, discovered during the warranty period.

B. Manufacturer to provide an additional parts warranty in addition to the base bid warranty covering all equipment, materials and parts included in the base bid warranty. Duration of additional parts only warranty shall be as identified within respective equipment specifications.

C. The warranty provided by the Manufacturer shall commence the day after the equipment installation is complete and all equipment is successfully started and tested and accepted by Henderson Building Solutions, on or about the date listed in the Project Milestone Schedule.

1. Henderson Building Solutions shall establish the start date for the specified warranty via written notification to the Owner and Manufacturer. Start date of warranty shall be established by Henderson Building Solutions upon receipt of specified start-up logs and reports for all equipment supplied by Manufacturer.

2. All equipment supplied by the Manufacturer shall be covered by a single warranty period established based on the date the last piece of equipment was successfully started and placed into service.

3. All inspection and preventative maintenance at intervals required to keep Manufacturer's warranty in full force.

4. Operating inspections to be performed twice during the first-year warranty period at times directed by Owner. Operating inspection shall include:

a. Inspection of control circuit, including power supply and transformers for proper operation.
b. Inspection of the lubrication system for proper operation.
c. Verification of correct set points and operation of all equipment safeties and operating controls.
d. Repair, adjustment and testing of operating and safety controls as required to provide correct operation and optimize equipment performance.
e. Logging and reporting: Date of inspection, operating hot water and steam temperatures and vessel pressures, water flow rates, motor temperatures, pump volts, amps, and percent load; and initial set point and final set point of all operating controls and safeties.
f. The results of the operating inspection shall be reviewed in detail with the Owner at the time of the inspection. Review will include any adjustment made to the equipment and controls and changes to any operational practices recommended by the manufacturer.

D. Manufacturer shall maintain an authorized service agency within 60 miles of the jobsite or shall retain a mechanical contractor or mechanical service agency, qualified to service the type of equipment supplied, within 60 miles of jobsite.

1. Manufacturer shall identify organization, and its location, that will provide equipment service and the labor portion of the warranty.

2. Any organizations retained by the Manufacturer to provide labor portion of the Warranty shall be subject to the Owner's approval.

3. Response time for warranty issues shall be 4 hours or less.

1.27 OPERATION AND MAINTENANCE MANUALS

A. Provide one (1) electronic copy of equipment operation and maintenance manuals. Provide Manufacturer’s standard operation and maintenance manuals for all equipment models supplied.

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replacement parts.

2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions, including all routine maintenance required to keep specified warranties in effect.

4. Servicing instructions and lubrication charts and schedules.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 START-UP AND TRAINING

A. Provide the services of a factory-authorized service representative to provide start-up and testing services specified in other Sections of the Specification, and to demonstrate and train the Owner's maintenance personnel as specified below.

B. Owner Training:

1. Train the Owner's maintenance personnel on proper operation, start-up and shutdown procedures, troubleshooting procedures, and servicing and preventative maintenance schedules and procedures. Review with the Owner's personnel the data contained in the Operating and Maintenance Manuals.

2. Schedule training with Owner at least 14 days in advance. Notify Henderson Building Solutions when Owner training duties have been established.

3. Allow minimum of 4 hours for on-site training of Owner's maintenance personnel by a factory-authorized representative. Training shall be conducted in 1 session of 4 hours as directed by the Owner.

4. Owner shall be allowed to video record and reuse, for Owner’s use only, all Owner Training required by these Specifications.

END OF SECTION 007200

SECTION 007213

SPECIAL PROJECT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Manufacturer shall, in addition to meeting the requirements of other Sections of these Specifications, shall provide the services and materials detailed in this Specification Section.

B. Any labor or material incidental to providing the services described in this Specification Section, whether or not specifically included in this or other Specification Sections shall be provided by the Manufacturer.

1.2 SUBMITTALS

A. Submit shop drawings and material lists for any and all products and materials supplied by manufacturer to meet requirements of this Specification Section. Include weights and dimensions.

B. Submit rigging and installation instructions for any and all products supplied by manufacturer to meet the requirements of this Specification Section. Clearly indicate all items requiring field assembly by others.

PART 2 - PRODUCTS (NOT USED)

PART 3 - SERVICES PROVIDED BY MANUFACTURER

3.1 UNIT CONFIGURATION

A. Manufacturer shall field verify the location of existing mechanical and electrical services to be connected to new cooling tower. Services to be verified include location of condenser water, make-up water, equalizer, drain piping, electrical services and any existing equipment in close proximity to new units that may affect the performance or servicing of the equipment.

1. To the extent possible, new cooling tower shall be constructed so that pipe connections and power connection are located on the same side of the unit as the existing location of power, condenser water, make-up water, equalizer and drain piping.

3.2 COORDINATION

A. Manufacturer shall fully coordinate installation of cooling tower with installing mechanical and electrical contractors retained by Henderson Building Solutions under separate contract.

B. Manufacturer shall supply installing contractor detailed rigging and installation instructions.

C. Control of new cooling tower will be via DDC controls provided by existing BMS, shall coordinate unit(s) delivery with installing contractor and controls contractor to allow controls to be installed in new boilers and deaerator units prior to new units being rigged and set in place.

D. Manufacturer shall recognize the logistical issues associated with the installation of new cooling tower in an acute care medical facility and shall make factory authorized service personnel available for start-up and troubleshooting based on both the construction schedule established by the installing contractor and the inevitable adjustments to same made by the installing contractor due to causes beyond Henderson Building Solutions' and the installing contractor's control. Extra payment will not be allowed to the manufacturer as a result of required or project schedule adjustments.

3.3 SHIPPING

A. Manufacturer shall be responsible for all shipping and insurance costs from the factory to the jobsite or to the installing contractor's selected storage locations.

B. Offloading of all new air handling units shall be provided by the installing contractor.

END OF SECTION 007213

SECTION 011100

SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY OF WORK

A. The Work shall consist of providing all labor, equipment, materials, and services, as well as performing all related work necessary to provide a complete and functional installation of the **Henderson Building Solutions, LLC (HBS) furnished Cooling Tower (1), Contractor furnished Condenser Water Pumps (3)** and related work required by the Contract Documents. The Work includes, but is not limited to, the following:

1. Demolition of existing equipment, piping and electrical services as required to install the new equipment and as indicated on drawings.
2. Receive, store and deliver to site all HBS provided equipment as required and indicated in the project documents. (See Section 01540)
3. Provide flow and temperature pre & post testing of all associated chillers, cooling towers and equipment within the scope of this project.
4. Installation of new Cooling Tower:
    a. Installation of one (1) new HBS furnished cooling tower and associated specialties.
    b. Installation of one (3) condenser water pumps (Contractor Furnished).
    c. Equipment and work primarily located in chiller plant.
    d. Modifications to existing condenser water, chilled water, and make-up water piping, including valves and specials, as necessary to facilitate the work.
    e. Isolate existing condenser water, chilled water, and make-up water piping, as necessary to facilitate the work while minimizing impacts to related systems or equipment.
    f. Isolate existing electrical power to properly facilitate the work while minimizing impacts to adjacent systems or equipment. Maintain all proper lockout/tagout procedures as required.
    g. Insulation of all new and modified systems as specified.
    h. Modifications to, or addition of, system controls and instrumentation as indicated.
    i. Modifications to, or addition of, system safeties and alarms as indicated.
    j. Installation of all structural components indicated or required for the installation.
    k. Start-Up services as required to start equipment. Start-up services to be assisted by the equipment manufacturer’s authorized service agency.
    l. Fluid flow testing and reporting.
    m. Provide all closeout documentation as required by these specifications.
5. Modifications to existing electrical systems:
    a. Work to be performed in a phased approach, as indicated within these specifications.
    b. Modifications to existing circuitry as necessary to transfer loads onto newly installed equipment.
    c. Modifications to existing mechanical systems serving electrical room/enclosure as indicated.

d. Provide all closeout documentation as required by these specifications. Edit the below to suit the actual piece of equipment provided under this project. Refer to plans, specifications, and HEI Design team the applicability of items highlighted, and edit to suit the project.

6. Participation in commissioning process per specification section 01620. Commissioning will be performed by a third party under contract to Henderson Building Solutions or the Owner.

1.2 WORK SEQUENCE

A. Work shall be sequenced and performed using methods and at the times that will minimize any disruption to the Owner's normal use of the facility and that will in no way endanger the facility's occupants, visitors and the public.

B. Contractor shall closely schedule all work with Henderson Building Solutions and the Owner's designated representative.

C. Where specific allowable working hours, work sequencing or construction phasing is included on the Contract Documents; said sequencing or phasing shall be adhered to by the Contractor, without exception.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011100

SECTION 011100.13

CONTRACT SUPPLEMENTAL CONDITIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Project Management Software

B. Working Sequence, Schedule for Completion and Liquidated Damages

C. Contractor's Construction Schedule

D. Substantial Completion

E. Final Completion

F. Application for Progress Payments

G. Application for Final Payment

H. Clarifications and Changes to the Work

I. Contractors Administrative Responsibilities

J. Project Safety Requirements

K. Warranties

L. Demolition and Repairs

M. Temporary Utilities

N. Assignment of the Work

O. Manufacturer's Directions

P. Storage of Materials

Q. Use of the Site

R. Measurements

S. Occupancy

T. Construction by Others

U. Runways and Drop Cloths

V. Special Working Conditions

W. Documents Maintenance

X. Record Documents

Y. Operation and Maintenance Manuals/Project Manual

Z. Correction of the Work

AA. Hazardous Materials

1.2 WEB-BASED PROJECT MANAGEMENT SOFTWARE

A. Henderson Building Solutions utilizes a web-based project management software solution for hosting and managing Project communications and documentation. Web-Based project software includes, at a minimum, the following features:

1. Directory of Project Personnel

2. Access control for creation, modification, viewing, and printing documentation. Access will be based on the company's and/or individuals' roles in the project. Access rights will be determined by Henderson Building Solutions.

3. Creation, logging, tracking and notification for project communications and workflows identified in other portions of this Specification. Project communications and workflows include, but are not limited to, RFIs, submittals, change events, Change Orders, daily logs, inspections, observations, incidents, and scheduling.

4. Processing and tracking of applications for payment and contract modifications.

5. Creation and distribution of meeting minutes.

6. Document Management of Plans, Specifications, and field / coordination drawings.

7. Management of construction progress photographs.

8. Mobile Device compatibility.

B. Contractor's personnel shall utilize all functionality available through Henderson Building Solutions' web-based project management software for project communication and documentation. Contractor's personnel shall obtain the appropriate certifications for each staff members respective role in the project. Training and certification are made available by the software provider and are accessible via website.

1.3 WORKING SEQUENCE, SCHEDULE FOR COMPLETION AND LIQUIDATED DAMAGES

A. Contractor and all Subcontractors, and Suppliers shall furnish sufficient forces, construction tools and equipment, and shall work such hours as may be required to insure the execution of the Work in accordance with the Project Milestone Schedule, the Project phasing, the allowable working hours and the allowable disruptions to Owner's normal use of the facility stated in the Contract Documents. If in the opinion of Henderson Building Solutions, LLC, the Contractor is not making sufficient progress towards meeting these requirements, the Contractor shall take such steps as may be necessary to improve the progress. Should Henderson Building Solutions deem it necessary to meet these requirements, Henderson Building Solutions will require the Contractor to increase the level of staffing, the number of shifts, overtime work and additional days of work including holidays, Saturdays and Sundays, in addition to other measures as necessary all without additional payments to the Contractor.

B. Henderson Building Solutions or the Owner each has the authority to call a progress meeting at the job site at any time. The Contractor's Project Manager is required to attend

all such meetings. It is the intent of Henderson Building Solutions to hold regular meetings through the course of the Project. Scheduling of these meetings shall be established by Henderson Building Solutions prior to the start of the Work.

C. Substantial Completion shall be achieved per the schedule below. Refer to the Project Milestone Schedule included in these Specifications for additional Project schedule information. See this Specification section for work required to be completed to achieve Substantial Completion. Delivery of Operation and Maintenance Manuals is a requirement to achieve Substantial Completion.

Start Date	Substantial Completion Date	Liquidated Damages for Delays Beyond Substantial Completion Date
Per Henderson Notice to Proceed	**149 Calendar days from Notice to Proceed**	**$1,000.00** per Calendar Day

D. Time is of the essence and Henderson Building Solutions will suffer financial loss if the Contractor does not complete the Work by the Substantial Completion Date. Proving the actual loss suffered if the Work is not completed on time would be difficult, therefore, liquidated damages are assessed for delay (but not as a penalty) for failure to meet the Substantial Completion date. Liquidated damages will be incurred starting with the calendar day following the Substantial Completion date listed above and accrue each calendar day until Substantial Completion is achieved. Substantial Completion is defined in these Specifications. Henderson Building Solutions will assess the Contractor the liquidated damages listed by deducting the total liquidated damages amount from any amounts due to the Contractor by Henderson Building Solutions.

E. If the Contractor incurs a delay due to factors beyond their, their Subcontractors, and their Suppliers control, the Contractor shall submit a claim to Henderson Building Solutions, within three (3) weekdays after such occurrence, requesting additional time to achieve Substantial Completion. Failure to submit a claim within the required time will result in a rejection of the claim by Henderson Building Solutions.

F. If a Proposal Request for additional work will require the Contractor additional time to achieve Substantial Completion, the Contractor shall submit with the reply to the Request for Quotation a claim for additional time to Henderson Building Solutions. The Contractor shall include in the request for additional time sufficient information to demonstrate the cause and to what extent the change will delay obtaining Substantial Completion of the Contract.

G. The determination that delays have occurred beyond the Contractor's control does not automatically mean an extension of time will be granted. The Contractor must substantiate the delay by indicating suspended Work activities on the critical path of the Contractor's Construction Schedule.

H. Determination of the date of achievement of Substantial Completion by the Contractor shall be solely the responsibility of Henderson Building Solutions.

1.4 CONTRACTOR’S CONSTRUCTION SCHEDULE

A. Contractor shall, within 7 calendar days after receipt of notice to proceed, submit to Henderson Building Solutions the Contractor’s construction schedule for the Work. The Contractor’s construction schedule shall:

1. Demonstrate compliance with Project Milestone Schedule; Project phasing requirements; and Project allowable disruption to Owner’s normal use of the facility.

2. Include scheduled deliveries of Henderson Building Solutions or Owner provided equipment and material.

3. Include scheduled deliveries of Contractor provided equipment critical to the Project schedule.

4. Include activities and schedule of Contractor's subcontractors.

5. Be prepared, in sufficient detail, to allow review and approval by the Henderson Building Solutions.

B. Contractor's construction schedule shall be periodically updated to reflect current conditions when directed by Henderson Building Solutions and when Project schedule is altered as allowed by Henderson Building Solutions.

1.5 SUBSTANTIAL COMPLETION

A. Substantial Completion as used in the Contract Documents and body of these Specifications shall be defined as follows:

1. Complete removal and proper disposal of all items indicated to be demolished.

2. Complete installation of major and ancillary equipment provided under this contract, regardless of party which furnished equipment. Complete installation shall include, but not be limited to, the following:
   a. All structural modifications necessary to support new equipment completed.
   b. New equipment installed in locations designated and permanently secured in place.
   c. All service line and ductwork connections completed, including all valves, dampers, specials, ancillaries within the respective service line and/or ductwork.
   d. Complete fill and/or refill of all heat transfer media as indicated.
   e. All insulation of service lines and/or ductwork indicated to receive insulation completed.
   f. All service line field quality control tests performed, and results submitted and accepted by Henderson Building Solutions.
   g. All electrical, control, life safety, and security connections complete – including all variable frequency drives, starters, disconnects, etc. necessary for proper operation of equipment.
   h. Equipment operating in a fully automated state in response to appropriate signals from the Building Automation System, for all operational states as identified within the equipment sequence of operation.
   i. System and equipment alarms and safeties properly wired, programmed, and operating to disable equipment and/or notify facility operators.

3. All areas on the building and/or site disrupted by the performance of the work properly restored as indicated within these documents.

4. All architectural and envelope improvements completed, properly sealed from environmental conditions, and accepted by Henderson Building Solution.

5. All rental equipment and ancillaries properly decommissioned and removed from site.

6. All temporary construction barriers completely removed. All interim life safety measures, security measures, and infection control risk mitigation measures put in place for performance of work are to be completely relinquished, allowing normal facility operations in the areas of work to continue.

7. All air and fluid testing completed, and reports submitted to and approved by Henderson Building Solutions.

8. All start-up services complete, and proper start-up documentation completed, submitted to, and accepted by Henderson Building Solutions.

1.6 FINAL COMPLETION

A. Final Completion as used in the Contract Documents and body of these Specifications shall be defined as follows:

1. Substantial completion achieved.

2. All required tagging, labeling complete and signs installed.

3. All electrical directories complete.

4. All construction materials and tools removed from the site and site turned over to Owner “broom clean.”

5. All punch list inspection items completed and approved by Henderson Building Solutions and the Owner.

6. All deficiencies identified in the commissioning process remedied.

7. All inspections and tests required by authorities having jurisdiction completed and approved and submitted to Henderson Building Solutions.

8. All items required to be included with application for final payment delivered to Henderson Building Solutions.

9. Record drawings delivered to Henderson Building Solutions.

10. O&M Manuals submitted to and approved by Henderson Building Solutions.

11. Owner training schedule established and agreed to by Owner and Henderson Building Solutions.

1.7 APPLICATION FOR PROGRESS PAYMENTS

A. At a time, consistent with the requirements of this Section and the Form of Agreement between Henderson Building Solutions and Contractor, or as mutually agreed to by the Contractor and Henderson Building Solutions, Contractor shall submit a properly executed and notarized Application for Payment.

B. The amount shown on the Application for Payment shall be established by the value of work completed as stipulated in the Form of Agreement between Henderson Building Solutions and Contractor.

C. The form of application for payment shall be the 1992 edition of AIA Document G702 "Application and Certificate for Payment" and either the 1992 edition of AIA Document G703 "Continuation Sheet", or similar format acceptable by Henderson Building Solutions.

1. Include with Application for Payment a completed Schedule of Values indicating percent of work completed for each item in the Schedule of Values.

2. Schedule of Values shall provide a detailed breakdown of the Work. Breakdown shall include itemization of all major trades by major segments of the Work and large equipment and material quantities.
   a. Submit Schedule of Values to Henderson Building Solutions for approval a minimum of 14 days prior to submitting first Application for Payment. Revise schedule of values as directed by Henderson Building Solutions and resubmit.
   b. Schedule of Values shall include any and all Allowances identified in other Sections of this Specification.
   c. Update schedule of values to reflect all approved changes in the Work.

3. Materials and equipment shall not be included with Application for Payment until materials and equipment have been delivered to the site. Application for payment shall not include materials and equipment stored off-site.

D. Henderson Building Solutions will not process Contractor's 1st application for payment until Contractor has provided Henderson Building Solutions all required submittals and all required submittals have been approved by Henderson Building Solutions.

E. Contractors executed and notarized partial or final lien waivers using the forms included in Division 00 shall be submitted with all applications for payment.

F. Partial or final lien waivers properly executed and notarized by each of the Contractors subcontractors and suppliers shall be submitted with each application for payment.

1. Submit lien waivers for each of Contractors subcontractors and suppliers where total subcontracted amount is $5,000 or greater.

G. Contractor warrants that title to all work covered by an application for payment will pass to the Owner at the time of payment.

H. Contractor warrants all work for which payment has been received from Henderson Building Solutions shall, to the best of the Contractor's knowledge, be free and clear of any liens, claims, security interests or encumbrances.

I. Payments by Henderson Building Solutions to the Contractor do not constitute acceptance by Henderson Building Solutions of any portion of the Work.

1.8 APPLICATION FOR FINAL PAYMENT

A. Submit Final Application for Payment following the procedures specified for progress payments and per the following:

B. Complete the following prior to submitting Application for Final Payment.

1. All work defined as being required to be completed per these Specifications.

2. Forward to Henderson Building Solutions and the Owner all written Warranties provided by the equipment and material manufacturers and suppliers.

3. Forward to Henderson Building Solutions copies of Record Drawings, and Operation and Maintenance Manuals.

4. Deliver to location designated by Owner all extra stock and spare parts required by this Contract. Forward acknowledgement of receipt of same to Henderson Building Solutions that includes Owner's signature.

5. Prepare and deliver other documents identified in Section 017700 “Contract Closeout.”

6. Complete all other requirements to be completed prior to submitting Application for Final Payment identified elsewhere in the Contract Documents.

C. Include the following with Application for Final Payment.

1. Written confirmation, signed by Owner, of completion of Owner training or a written agreement detailing times and dates that the Owner training will be performed.

1.9 CLARIFICATIONS AND CHANGES TO THE WORK

A. Request for Information (RFI)

1. If during the performance of the Work clarification of the Contract Documents is required, Contractor shall request such clarification from Henderson Building Solutions by initiating a Request for Information within the Project Management Software utilized by Henderson Building Solutions. Henderson Building Solutions shall provide response to all RFIs and return to the Contractor through same Project Management Software, for distribution to all Contractor’s subcontractors.

2. Henderson Building Solutions responses to Contractor's RFI's are not authorization to proceed with any work which in the Contractor's opinion requires additional compensation or change to the Project Schedule. If additional compensation or time is required, the Contractor shall immediately submit a Change Order Request to Henderson Building Solutions.

B. Change Events

1. Should a situation arise in which a change has the potential to impact the project in any way, a change event will be initiated within Henderson’s web-based project management software. Change events may originate from RFIs, observations, correspondence, or Owner direction. Henderson Building Solution or the contractor may initiate a Change Event. Initiation, response dialog, or closure of a Change Event is not an authorization to proceed with changing the work.

C. Request for Quotation (RFQ)

1. Should the resolution to a Change Event result in a change to the contract value or time, Henderson Building Solutions will respond to the Change Event with a Request for Quotation (RFQ). Contractor shall prepare a Change Order Request for submission to Henderson Building Solutions. The Contractor's proposal shall include a detailed itemization of costs listing individual material and equipment unit costs and quantities, labor hours and hourly rates for each trade and Contractor and subcontractor mark-ups. Itemization shall include both adds and deducts. The same level of detailed itemization of cost required of the Contractor shall be required of Contractor’s subcontractors when subcontractors represent 20% or

more of the total cost of the Change Order Request. Henderson Building Solutions will review the cost documentation to determine if a Commitment Change Order will be authorized. Contractor shall not proceed with additional work until authorization has been received in writing from Henderson Building Solutions. No additional amount will be paid for preparation or submittal of proposals in this form or for re-submittal should the breakdown or other documentation be considered inadequate by Henderson Building Solutions.

2. The following maximum increases in cost (mark-up) shall be allowed in establishing the total cost of additions and deletions to the scope of the Project:

		Fee not to Exceed
a.	To Contractor for work by Contractor's own forces.	5%
b.	To Contractor for work performed by other than Contractor's own forces.	5%
c.	To Subcontractor for work performed by Subcontractor's own forces.	5%
d.	To Subcontractor for work performed by other than Subcontractor's own forces.	5%

3. The above percentages will not be allowed on insurance premiums, taxes, or fees. The above percentages include and shall represent all the cost of complying with the general requirements, all supervision and all overhead and profit associated with changes in the scope of the Project.

4. Contractor's response to a Request for Quotation shall clearly quantify any change in Contract time that will result if Contractor's response is accepted by Henderson Building Solutions. Contractor shall furnish sufficient documentation for changes to the Contract Time to allow review by Henderson Building Solutions.

5. Contractor shall provide individual itemized costs and effects on Contract time where a Request for Quotation includes multiple changes to the work.

D. Commitment Change Order (CO)

1. If Henderson Building Solutions determines that the response to a Request for Quotation (RFQ) will be accepted, Henderson Building Solutions will prepare a Commitment Change Order (CO) which will describe the change or changes, will refer to the Change Event, Request for Quotation and Change Order Request, and will be signed by Henderson Building Solutions and Contractor. No work associated with any Commitment Change Order is authorized nor will payments be made without a fully executed written Change Order.

2. When authorized in writing and in advance by Henderson Building Solutions, time and material accounting of a change in work may be used. The Contractor shall maintain an accurate account of labor and material involved in the change. Such time and material records shall be forwarded to Henderson Building Solutions, on a daily or weekly basis, per the direction of Henderson Building Solutions for verification and approval prior to Contractor including the change in the Application for Payment. Contractor shall notify Henderson Building Solutions when work on the change is to start and when it has been completed. To receive full recognition, labor assigned to the changes must, insofar as possible, work continuously on the change, rather than interchanging between contract work and the work associated with the change performed using time and material accounting.

E. All change management procedures will be managed via Henderson Building Solutions' Project Management Software.

1.10 CONTRACTORS ADMINISTRATIVE RESPONSIBILITIES

A. Contractor shall utilize a full time, on-site Project Superintendent, under direct employment of the Contractor, to oversee and coordinate all aspects of the Work required by this Contract.

1. The Project Superintendent shall have full authority to make decisions for and to act on the behalf of the Contractor without requiring notice to or approval of any of the other employees or agents of the Contractor.

2. Contractor's Project Superintendent shall have a minimum five (5) years' experience in the type of work required by this Contract.

3. Project Superintendent shall be on-site at all times during which work is being performed by the Contractor or their Subcontractors.

4. Project Superintendent shall be responsible for coordinating all work, schedules, and utility interruptions with the Owner's representative.

5. Project Superintendent shall serve as the primary point of contact between Henderson Building Solutions and Contractor's Subcontractors, and equipment Suppliers.

6. Project Superintendent shall conduct all construction meetings required by these Specifications. Meeting agendas and minutes shall be managed through web-based project management software.

7. Project Superintendent shall complete and submit to Henderson Building Solutions a Daily Work Report through the workflow provided within the web-based project management software platform.

B. Contractor shall be responsible for all scheduling of and coordination with all Subcontractors and material Suppliers, including those directly contracted with the Owner or with Henderson Building Solutions, to ensure timely sequencing of the Work, to minimize any disruption to utilities and to the Owner's normal use of the facility; and to ensure work is completed according to the Project Milestone Schedule.

C. Contractor shall coordinate all work involving Facility utility services and associated local utility companies, to ensure timely sequencing of the work and to minimize interruptions of normal utility service. All fees and costs assessed by the utilities shall be paid by the Contractor and shall be considered work required by the Contract.

D. Contractor shall be responsible for obtaining approval of all authorities having jurisdiction as described in these Specifications.

E. Contractor shall coordinate the start-up of all system, sub-systems, and equipment. Contractor shall require and schedule the attendance of all Subcontractors performing work related to systems and equipment start-up. Contractor shall notify the Owner and Henderson Building Solutions a minimum 72 hours in advance of all system and equipment start-up.

1.11 PROJECT SAFETY REQUIREMENTS

A. All parties involved with this Project are and shall be committed to maintaining a safe worksite and integrating safety into all construction and construction related activities.

B. It shall be the Contractor's responsibility to identify and comply with all applicable provisions of federal, state, and municipal safety laws, regulations, and building codes as they apply to the Work required by this Contract. Contractor shall be responsible for the safety of the Contractor's employees, agents, suppliers, and Subcontractors.

C. Prior to beginning any on-site activities, the Contractor shall develop a Project specific written Safety Program. The Safety Program shall:

1. Identify the Contractor's standard safety policies, procedures, and employee training.

2. Identify hazards specific to the Work required by this Project, such as crane use, open shafts, excavation, fall protection and confined spaces; and the procedures and policies that will be used to protect workers and the public.

3. Identify hazards specific to the Work required by this Project that may pose risks to the Owner's employees, agents, and the public; and the procedures and policies that will be used to notify and protect the Owner's employees, agents, and the public.

4. Establish schedule of weekly "toolbox" safety meetings and identify personnel that will conduct the meetings. Owner's personnel may also attend the weekly meetings.

5. Identify the Contractor's employee that will be responsible for maintaining a safe worksite and enforcing Contractor's general and Project specific safety policies and procedures.

6. Address other topics that may be requested by the Owner or Henderson Building Solutions.

D. Project Safety Program shall be submitted to the Owner and Henderson Building Solutions prior to the Contractor beginning any on-site activities.

1. A sample job hazard analysis is included at the end of this Specification Section.

E. Contractor shall create a record of each weekly safety meeting within Henderson Building Solutions' Project Management Software, under the Meetings section of the project dashboard. Include a copy of the topics addressed during each meeting and a list of the meeting attendees.

F. Contractor shall create a report of each incident that occurs within Henderson Building Solutions' Project Management Software, under the Incident Reporting section of the project dashboard. Include all applicable incident and investigation information, incident records, witness statements, and corrective/preventative actions. Incident records may include any of the following:

1. Injury/Illness

2. "Near-Miss" incidents

3. Non-Injury accidents involving damage to property, materials, or equipment

4. Environmental incidents

G. Contractor shall periodically perform inspections of all areas of the Project site to verify safety policies and procedures are fully in place and to identify and remedy any unsafe conditions, construction methods or other hazards. Frequency of inspections shall be as needed to maintain a safe worksite.

1.12 WARRANTIES

A. Project Warranty:

1. The Contractor shall provide a one-year full parts and labor warranty for all materials, equipment, and labor furnished by the Contractor under this Contract. Contractor's warranty shall include all materials, parts, labor, and all other costs necessary to honor the warranty. Contractor warrants that the Work is free from defects in material and workmanship, complies with the Contract Documents and is 100 percent complete including all remedies to the Work identified by Henderson Building Solutions.

B. Other Warranties:

1. Disclaimers and Limitations: Any of the Contractor's Equipment Manufacturers, Materials Supplier's or Subcontractor's disclaimers and limitations on product or installation warranties not in compliance with specified Project Warranty do not relieve the Contractor from providing the specified Project Warranty.

C. Warranty Requirements:

1. Related Damages and Losses: When required to be corrected under the Project Warranty, Contractor shall remove and replace construction that has been damaged as a result of such failure or must be removed and replaced to provide access for correction of warranted construction.

D. Commencement of Warranty Period:

1. Warranty period shall commence at time Final Completion is achieved as defined in these Specifications and as determined by Henderson Building Solutions.

2. Henderson Building Solutions shall issue in writing to both Contractor and Owner Warranty start and end dates.

1.13 DEMOLITION AND REPAIRS

A. All equipment and material removed during the performance of the Work shall be presented to the Owner. Equipment and material accepted by the Owner shall be delivered to a location on the site designated by the Owner. All equipment and material not accepted by the Owner shall be deemed property of the Contractor, shall be promptly removed from the site, and shall be legally disposed of by the Contractor.

B. Contractor shall be responsible for removal and reinstallation of all existing building structure, fixtures, finishes, and other building components (i.e., ceiling, walls, light fixtures, roofing, windows, and doors, etc.) required to perform the Work.

C. Contractor shall repair all building structure, improvements, permanent and moveable fixtures, and finishes including paving and landscaping damaged as a result of Work

performed under this Contract using skilled tradesmen and materials matching existing structure, improvements, fixtures, and finishes. All repairs shall be completed to the satisfaction of the Owner and Henderson Building Solutions.

1.14 TEMPORARY UTILITIES

A. Temporary Electric Power: Electric power for equipment and power tools may run from Owner's existing service. Contractor to provide all materials and labor necessary to connect to existing service. Location of connection to existing service is to be at Owner's convenience and direction.

B. Temporary Water: Water will be provided by Owner from Owner's existing service. Location of connection is to be at Owner's convenience and direction.

C. Sanitary Agreements: Owner will allow workmen to use only those toilets, sinks and drinking fountains in the existing Facility designated by the Owner.

1.15 ASSIGNMENT OF THE WORK

A. The division of the body of the Specifications into various sections or headings and the assignment of the Work to individual drawings and the use of drawing numbers and titles has been arranged for clarity in the delineation of the various parts of the whole work. It is not the intent of each Specification Section, each Drawing nor each drawing number or title to develop any secondary responsibilities for the satisfactory completion of the Work; nor is the assignment by Henderson Building Solutions of any parts of the Work to any specific trade or craft to be inferred from the Specifications or the Drawings. Contractor is fully responsible for providing all work required by this Contract.

1.16 MANUFACTURER'S DIRECTIONS

A. All Manufacturer's materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned as recommended by the Manufacturer unless otherwise specifically directed by Henderson Building Solutions or specified herein.

1.17 STORAGE OF MATERIALS

A. All materials delivered to the job shall be stored so as to keep them in first class condition and free from deterioration. Equipment and material shall be stored as recommended by the manufacturer. Steel shall be stored on racks at least 6 inches from the ground and shall be protected from the weather. In general, material deliveries shall be coordinated with the progression of work to avoid prolonged storage of materials or equipment at job site. On-site storage of equipment, materials and tools shall be only in locations and for durations identified by the Owner or Henderson Building Solutions.

B. Storage of materials, fabricated assemblies, and equipment off-site shall be allowable only upon written authorization by Henderson Building Solutions. Approval must be obtained prior to storing materials and fabricated assemblies off-site. All materials, assemblies, and equipment stored off-site must be stored within a bonded and secured storage facility. Quantities of materials, assemblies, and equipment must be provided to Henderson Building Solutions when requesting authorization to store materials, assemblies, and equipment off-site.

1.18 USE OF THE SITE

A. Rubble, trash, demolished or removed materials and equipment shall not be stored on the site or left unattended and shall be disposed of daily in a manner approved by the Owner.

B. Contractor’s and subcontractor’s employees shall park personal and company vehicles only in the locations designated by the Owner.

1.19 MEASUREMENTS

A. Before ordering any materials or equipment or doing any work, the Contractor shall verify all measurements at the site and shall be responsible for the correctness of same. No extra charge shall be allowed on account of the differences between actual measurements and those indicated on or inferred from the Drawings.

1.20 OCCUPANCY

A. All areas of building shall remain occupied by the Owner during the performance of the Work except those specific areas where work is actually being performed as identified by the Contract Documents. Contractor shall notify Owner 7 days in advance of need to interrupt Owner's normal occupancy or use of areas involved in this Contract, or any other areas within the Facility, and shall perform the work in such a manner to minimize all such interruptions.

B. Occupancy or use of a portion or portions of the Work by the Owner shall not constitute achievement of Substantial or Final Completion nor constitute acceptance of Work by Henderson Building Solutions not complying with the Contract Documents.

1.21 CONSTRUCTION BY OTHERS

A. Henderson Building Solutions and the Owner reserve the right to perform construction and construction related work at the site with their own forces and with other contractors.

B. Contractor shall fully cooperate with Henderson Building Solutions and the Owner so that neither the Contractor’s work nor work performed by the Owner or Henderson Building Solutions are adversely affected. Cooperation shall include coordination, exchange of information, attending meetings and efforts as necessary by both the Contractor and the Owner and Henderson Building Solutions employees and contractors.

C. Contractor shall not restrict the Owner, Henderson Building Solutions, and their Subcontractor’s access to, or use of the site, nor inhibit in any way their ability to meet other contractual obligations.

1.22 RUNWAYS AND DROP CLOTHS

A. Whenever Contractor's performance of the Work requires them to work in proximity to or in direct contact with any finishes, furnishing or furniture, Contractor shall protect such finished work using the best possible practices.

B. See other Specification Sections and the Drawings for additional protection requirements.

1.23 SPECIAL WORKING CONDITIONS

A. The Contractor will recognize the presence of employees, visitors and other members of the public at the site and shall employ adequate precautions to protect the employees, visitors and the public from all hazards associated with the Work and to protect the Work from damage. "Spotters" shall be utilized when equipment is being installed or removed.

B. Contractor’s materials, tools, equipment, and construction apparatus shall not be left unlocked or unprotected. Contractor's workmen shall be instructed to keep small tools in

their personal possession or observation at all times. Neither the Owner nor the Henderson Building Solutions assume responsibility for the Contractor's materials, tools, equipment, or construction apparatus used or stored at the site.

C. The Owner's building engineering staff and administrators shall be consulted as to any hazards particular to this site, this facility, and the Work. Contractor shall comply with all directions given by the Owner and the Owner's designated representatives.

D. No firearms or other weapons, explosives, intoxicating beverages, or narcotics shall be carried on, or used on the Owner's property. Contractors and all Subcontractors shall adhere to Owner's tobacco use policy.

E. There shall be no fraternization with the Owner's employees, agents or the general public by the Contractor or Contractor's employees.

F. Contractor shall recognize the fact that most employees of the Owner are non-union personnel and that such fact shall not be considered as excuse for delay in the Work. Contractor, Contractor's agents, Subcontractors, employees, and Suppliers shall not interfere in any manner with the labor relations between Owner and its employees. In no case will any responsibility of the Contractor to employ union labor be extended to Owner, nor will the work performed by Owner's employees, whether union or non-union, be interfered with by Contractor, its employees, Subcontractors, agents or suppliers.

G. The Contractor shall be responsible for informing all of their personnel and employees, Subcontractors, Suppliers, and related employees of the "Special Working Conditions."

1.24 DOCUMENT MAINTENANCE

A. Upon contract award, Henderson Building Solutions shall issue to contractor an electronic set of documents titled "Issued for Construction", and will include the original set of bidding documents, updated to reflect modifications made during the bidding process.

B. An electronic version of the Issued for Construction set will also be uploaded to Henderson Building Solutions' Project Management Software page. Contractor shall be responsible for continuously maintaining the uploaded version of the Issued for Construction set to reflect all RFIs, approved submittals, Observations, Inspections, actual installed condition, locations, and approved changes issued by Henderson Building Solutions. Each item related to maintenance of documents shall be linked to the respective action within the Project Management Software. Contractor shall utilize the interactive tools within the Project Management Software to perform maintenance on documents.

C. These documents maintained within the Project Management Software shall become the basis of the Contractor's preparation of the Project Record Drawings and Project Manual.

1.25 RECORD DOCUMENTS

A. Prepare "as-built" record documents for all systems installed and/or affected by the performance of the work, including connections to existing. Existing systems shall be represented in a manner which sufficiently identifies connection points and locations relative to major equipment upstream and downstream of connection point. Record drawings shall be produced using the same file format as that which is provided to contractor. Provide electronic copies, in both PDF and DWG / RVT format, on a Universal Serial Bus (USB) device as part of record Drawings. Provide full size hard copy version of the same. All PDF and/or hard copy versions of as-builts shall be stamped "As-Built" or "Record Drawing" and shall bear the logo of the installing contractor(s). Record Drawings

shall be updated shop drawings or Henderson Building Solutions Drawings Issued for Construction and shall include:

1. Record Drawings shall represent actual installed condition of all work.

2. Ductwork mains and branches, type, size, location, and elevation for both exterior and interior; locations of fire, smoke, combination fire/smoke, balancing, backdraft and other types of dampers or louvers, and other control devices; filters; grilles and diffusers with airflow rates and devices requiring periodic maintenance or repair, turning vanes, access doors, air terminal units and all other devices located in or connected to ductwork systems.

3. Mains and branches of all piping systems, type, size, locations and elevation with valves and control devices located and numbered to match valve schedule, with items requiring maintenance located (i.e., traps, strainers, expansion compensators, mixing valves, etc.). Refer to Division 23 Section "Mechanical Identification." Indicate actual inverts and locations of all underground piping.

4. Equipment locations (exposed and concealed) dimensioned from prominent building lines.

5. Approved substitutions, Contract Modifications, and actual equipment and materials installed.

B. Henderson Building Solutions will provide Contractor with AutoCAD Drawing files for use by the Contractor in preparing and submitting final Record Drawings. Use of HBS drawings will require the Contractor to agree to a single use of the drawings and other stipulations required by HBS's consultants. A form will be provided by HBS for this purpose.

1.26 OPERATION AND MAINTENANCE MANUALS/PROJECT MANUAL

A. Submission to and approval by Henderson Building Solutions of the project Operation and Maintenance/Project Manual is required for the Contractor to achieve project Final Completion.

B. Submit electronic copies of closeout documents for approval through Henderson Building Solutions Project Management Software.

C. Once closeout documents have been approved through Henderson Building Solutions Project Management Software; the Contractor will submit one (1) hard copy and one (1) electronic copy of Operation and Maintenance Manuals to Henderson Building Solutions. Organize operating and maintenance data hard copy into suitable sets of manageable size. Bind and properly index data in individual heavy-duty, 3-ring, vinyl covered binder, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Organize operating and maintenance data electronic copy into suitable documents of manageable file size. Create cover page and properly index data. Include the following types of information:

1. Copies of all warranties. (Equipment and Contractor Installation Warranty with Contact Information)

2. Copies of all system, equipment, etc. start-up reports.

3. Emergency instructions.

4. Spare parts list.

5. Control and wiring diagrams.

6. Recommended "turn around" cycles.

7. Inspection and Maintenance procedures.

8. Shop Drawings and Product Data. **(Include a copy of each Approved Submittal)**

9. One copy of all marked up "As Built" Drawings.

10. Copies of all reports by inspectors representing authorities having jurisdiction

11. One copy of final Test and Balance report.

12. Other information that may be useful or required by Henderson Building Solutions necessary to document the work performed under this contract.

13. All RFI's with Henderson Building Solutions responses.

1.27 CORRECTION OF THE WORK

A. Throughout the course of the project, Henderson Building Solutions and its agents and/or consultants may make periodic observations of the work being performed. Observations which do not comply with the Contract Documents will be initiated by the observer within the Project Management Software and linked to the appropriate area(s) on the uploaded Issued for Construction set. Contractor shall respond to observations appropriately until deficiency is resolved.

B. Contractor shall correct any Work rejected by Henderson Building Solutions for failure to comply with the Contract Documents, whether discovered before or after the Work has been covered by subsequent Work, whether or not inspected by Henderson Building Solutions and whether or not the Work has been determined to be substantially or finally complete.

C. Contractor shall bear the full cost of correcting the Work to bring the Work into compliance with the Contract Documents. Cost of correction shall include all costs associated with:

1. Uncovering and recovering the Work.

2. Recovering and replacing the non-conforming Work.

3. Any re-inspections, acceptances, certifications, and approvals required by authorities having jurisdiction and by the Contract Documents.

4. Revisions to Record Documents.

1.28 HAZARDOUS MATERIALS

A. Contractor shall comply with the Contract Documents and all laws, standards and handling criteria regarding hazardous materials, substances, and wastes, including asbestos, lead-based paints, petroleum products, mold, radon, and polychlorinated biphenyl (PCB) in performing the Work. No hazardous materials shall be brought onto the Project site or otherwise incorporated into the Work by any of the Contractor parties. In the event hazardous materials are encountered that are not addressed in the Contract Documents, Contractor shall immediately (1) stop Work in the affected area, (2) report the condition to

the Owner and Henderson Building Solutions both verbally and in writing and (3) take all reasonable precautions to prevent or contain the movement, spread or disturbance of the suspected hazardous materials and to protect all persons and property. Once the Owner has investigated and, if necessary, properly remediated, abated or contained the suspected hazardous material, Work in the affected area shall resume. Provided the Contractor fulfills its obligations herein, The Contract Time shall be extended appropriately by Change Order.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011113

HENDERSON
BUILDING SOLUTIONS

SITE SAFETY & HEALTH PLAN

Chiller Plant Revisions

HCA Healthcare

Lee's Summit Medical Center

2100 SE Blue Parkway
Lee's Summit, MO. 64063

Revised 12/2/21

8345 Lenexa Drive, Suite 110
Lenexa, KS 66214
(913) 894-9720

HENDERSONBUILDING.COM

Site Specific Job Hazard Analysis

Project: **Chiller Plant Revisions**
Location: **Lee's Summit MC – Lee's Summit, MO.**

Job Tasks	Potential Hazards	Recommend Action(s)
1. Stocking of materials and equipment	Strains and sprains	1. Utilize crane or extra workers to move equipment and materials. 2. Stack/Store materials to avoid tipping. 3. Store materials behind guard railing or six feet from the leading edge when on the roof. 4. Store materials away from traffic patterns or means of egress from the building. 5. Demarcate the ground storage areas to prevent pedestrian or vehicular traffic from entering the work zone. 6. Chemicals, e.g., epoxy paint, shall be properly stored away from sources of ignition.
2. Housekeeping	Slip/Trip hazards	1. Housekeeping shall be maintained throughout the project. 2. Nails shall be bent over or removed from pallets. Scrap material and wire shall be picked-up. 3. Aisles and walkways shall be maintained free of materials. 4. Debris shall be cleaned up at the end of each day. 5. Debris shall be removed from the roof by use of crane or chute system. Debris shall not be thrown from the roof level.
3. Roofing Operations	Fall hazards	1. Guard railing shall be utilized along the leading edge of the roof and at materials delivery locations. 2. Stand on solid surfaces. 3. Utilize fencing, if necessary, to prevent debris from falling over edge to ground below. 4. Use personal fall arrest equipment when guard railing is not utilized. 5. Warning lines may be used if they are set at least 15 feet from the edge of the roof. If workers go outside the warning lines, they must be tied off. 6. This is a standing seam roof, and the Roofers will leave anchor points for use, if anchor points are not provided then EMC will install their own on the standing seam metal.
4. Utilizing Hand/Power Tools	Electrical contact and lacerations	1. Only use equipment that is operating properly. 2. Only use the appropriate tool for the operation. 3. Guards shall be intact and operational. 4. Utilize operational GFCI's for all power equipment. 5. Inspect extension cords for damaged or missing ground pins. 6. Gloves- if it is determined that gloves are more dangerous by the employee then they can be removed.
5. Using Cranes	Fall hazards, crushing	1. Workers will wear hardhats all the time. 2. Inspect equipment/rigging for damage. Competent person onsite. 3. Proper hand signals or radio contact used to flag crane loads. 4. Only trained operators shall be utilized. 5. Cranes shall be properly setup and separated from public by barriers. 6. Crane's outriggers shall be flagged. 7. No one standing under load 8. Only qualified riggers and signalers will be used 9. Document crane inspection prior to performing lift.
6. Personal Protective Equipment	Fall hazards, Eye injuries, Hearing & Respiratory Hazards, Knee Injuries	1. Hard hats will be worn at all times. 2. Eye protection shall be worn when cutting, grinding, or mixing. 3. Personal fall arrest equipment shall be utilized when exposed to fall hazards over 6 feet above an elevated surface and not protected with a guardrail system. 4. Personnel, when exposed to noise levels above the PEL shall wear earplugs. 5. Proper clothing shall be worn to prevent chemical exposure. 6. Knee pads shall be worn while working on the knees.

Job Tasks	Potential Hazards	Recommend Action(s)
7. Oxygen/Acetylene Brazing/Welding Grinding/Cutting	Fires and burns, spark producing activities	1. Fire extinguishers shall be positioned throughout the project. 2. Gas cylinders shall be stored properly in an upright position and secured from tipping. 3. Housekeeping shall be maintained. 4. Torch/welding operations shall be monitored at all times by authorized employees. 5. Fire watch shall be provided during torching/welding operations and for 30-minutes following the torching operations. 6. A 30-minute fire watch shall be provided during and after the use of any grinders or cutters that may be spark producing. 7. Wear proper clothing. 8. Use proper tinted shade lens when cutting or welding.
8. Equipment and Vehicles	Struck by accidents	1. Only trained and qualified operators shall operate equipment. 2. Operators shall utilize restraint devices, e.g., seat belts when operating equipment. 3. Equipment shall be inspected daily to ensure proper working condition.
9. Ladders	Falls	1. Inspect ladders daily before use. Remove or repair damaged ladders. 2. Use three point of contact to climb ladders. 3. Secure extension ladders used for access. 4. Ladders must extend three feet past landing, when used to access upper levels or roofs. 5. Stepladders must be used in the open position. Never climb a leaned stepladder 6. Workers will abide by all safety warnings, e.g., not stepping above the second to top step.
10. Electrical	Electrocution and falls	1. Temporary outlets shall be protected with GFCI's. 2. Extension cords shall be inspected before each use. 3. Energized power panels shall be completely covered. Electrical rooms shall be isolated from other trades. 4. Temporary lighting shall be provided with cage guards and attached above workers.

Sequence of Basic Job Steps	Potential Hazards	Recommend Action(s)
1. Fall Protection	Tripping and falling hazards	1. Workers shall not be exposed to greater than a 6-foot fall. 2. Workers shall utilize fall protection, personal fall arrest systems, when a standard guard railing is not provided. 3. A standard guard railing shall consist of a top rail, midrail and toe board. 4. All floor holes greater than 2 inches in diameter shall be covered. Floor covers shall be secured and marked. Additionally, floor holes shall be capable of withstanding twice the intended load. 5. Housekeeping shall be maintained to eliminate slip/trip hazards. 6. On mezzanine level – a guard rail is provided when material is loader or when the guardrail is taken down for any reason employees with have to tie of with a personal fall restrain system.
2. Hazard Communication/Global Harmonization	Occupational exposure to chemicals asbestos and lead	1. Only properly trained and approved individuals shall be allowed to remove asbestos materials or lead contaminated materials. 2. Controls shall be instituted to ensure that workers are not exposed to hazardous materials. 3. Workers shall follow all project-required procedures for personal protective equipment, exposure control/containment, monitoring, and disposal. 4. A written hazard communication program shall be required by each contractor onsite identifying the following: • Hazard Determination Procedures • Material Safety Data Sheets • Labeling Requirements • Training • Non-routine Tasks 5. Material Safety Data Sheets shall be provided for all chemical utilized onsite and a copy maintained on the project. 6. Proper ventilation shall be provided, when necessary, to ensure air quality.
3. Trolley Crane	Crushing, pinching	1. Workers will wear hardhats all the time. 2. Inspect equipment/rigging for damage. Competent person onsite. 3. Proper hand signals or radio contact used to flag crane loads. 4. Only trained operators shall be utilized. 5. Cranes shall be barricade when lifting around other trades. 6. No one standing under load 7. Only qualified riggers and signalers will be used
4. Aerial Lifts	Falls, electrocutions and struck-by incidents	1. Only trained operators shall utilize lifts. 2. Fall protection shall be worn at all times in all lifts including scissor lifts. 3. Power lines shall be avoided. Remain a minimum of ten feet away from the power lines. 4. Workers shall perform daily visual inspections of the lift. 5. Workers will review the project to determine specific hazards when operating lifts, e.g., terrain.

Equipment to be Used	Inspection Requirements	Training/Certification Requirements
Oxygen/Acetylene Cylinders	New cylinders upon each refill	All foremen are required to have completed OSHA 10-hour training classes for the described tasks. All workers have either completed a five-year apprenticeship program for respective trades (apprentices must work under direct supervision of qualified foreman) EPA certified refrigerant handling/ transportation EPA certified refrigerant distribution: "Universal" certification (to include type I, II, and III appliances).
Refrigerant Cylinders/Hoses	No refill on cylinders / visuals on hoses	
Ladders	Visual Inspection Daily	
Electric Saws/ Grinders	Visual Inspection daily to cords	
Sheet Metal Hand Tools	Ensure proper cutting edge. Check with usage.	
Electric Welders	Daily visual inspection to all cords.	
Roustabout- material handler	Make sure all components are correct and that the cable is in good working order	

SECTION 011100.19

WORKING HOURS, UTILITY INTERRUPTIONS AND PROJECT PHASING

PART 1 - GENERAL

1.1 BASIS OF BID

A. Contractor shall prepare the bid and execute the Work based on conducting all work to be performed at the site only during the allowable working hours specified in this Specification Section and detailed elsewhere in the Contract Documents.

B. Contractor shall prepare the bid and execute the Work requiring utility interruptions per the requirement of this Specification Section and detailed elsewhere in the Contract Documents.

C. Contractor shall prepare the bid and execute the Work utilizing the Project Phasing requirements of this Specification Section and detailed elsewhere in the Contract Documents.

1.2 ALLOWABLE WORKING HOURS

A. Allowable Working Hours: Allowable working hours shall be defined as those hours during which Contractors, material Suppliers, technicians, and startup personnel may have access to various interior and exterior areas at the site for the purpose of performing all work required by this Contract.

B. Normal Business Hours: 7:30am to 4:30pm; Monday through Friday. Not all work required to complete the Project can be performed during normal business hours. Work required to be performed outside normal business hours is identified later in this Specification Section.

C. Overtime will be required whenever there are any critical shutdowns, change overs, or any other overnight work needed.

D. Refer To **"Project Construction Phases and Special Working Hours"** later in this section, if applicable, for additional requirements related to allowable working hours.

E. Application: All work performed at the site, both within the Facility and exterior to the Facility, by the Contractor, by all Contractor's Subcontractors and by all other Contractor's Partners shall be performed only during the specified allowable working hours.

F. Verification of allowable working hours shall be the responsibility of the Contractor prior to the start of any work required by this Contract. Verification shall include the following:

1. Contractor shall meet with Owner's representative to detail the type of work to be performed in each area where work will be performed within and exterior to the facility.

2. Contractor shall obtain, from Owner's representative, Owner's normal occupancy and utilization schedules for all areas within the Facility that will be affected by work required by this contract.

3. Contractor shall then establish allowable working hours, for each type of work in each individual area in which work is to be performed. All allowable working hours shall be approved by Owner.

4. Contractor shall prepare a written description of allowable working hours for each type of work in each individual area in which work is to be performed. Written description shall be distributed to all Subcontractors, all other Contractor's Parties and to Henderson Building Solutions and to the Owner.

G. In general, Owner will allow the Contractor to perform work in the following areas during normal business hours, if work performed by the Contractor does not adversely affect in any manner Owner's normal use of the Facility, nor create objectionable noise, dust, or other disturbances.

1. Work performed exterior to the facility, including on the roof that does not disrupt normal traffic patterns not normal entry to or exit from the facility.

2. Work performed in mechanical and electrical rooms and spaces.

3. Work performed in non-critical, non-sterile corridors and public waiting areas and lobbies. Spaces in this category will only be those spaces identified in advance by the Owner.

4. Work performed in rooms or areas not accessible to the public. Rooms or areas in this category will only be those identified in advance by the Owner.

H. Work occurring in or disrupting the normal operation of the following areas (including associated support spaces) shall only be performed during the allowable hours listed for each area. Contractor shall give the Owner a minimum **7-days** advance notice prior to performing work in or disrupting the normal operation:

I. Owner reserves the right to require Contractor to immediately cease any work in any location should said work produce noise, dust, fumes or in any other manner interfere with Owner's normal or required use of the Facility; or creates any unacceptable interruption in the normal operation of any mechanical, electrical, plumbing or fire protection and alarm systems or other required systems.

J. Owner reserves the right to require Contractor to cease work in any area Owner requires access to on an emergency basis.

K. Contractor shall maintain contingency work plans should Owner be required to alter allowable working hours on short notice or require Contractor to cease work as previously described. Contractor contingency plan shall allow efficient use of their personnel in other areas or perform other portions of the Work when Owner exercises the right to deny Contractor access to specific areas. Additional payment to the Contractor will not be allowed as a result of Owner's denial of access to areas within the Facility.

L. Contractor's and Subcontractor's personnel may, at the Owners discretion, be allowed access to areas within the Facility during times other than during specified allowable working hours to perform the following:

1. Taking of measurement, inventory, etc., as required to order product and materials and to shop fabricate items for field installation.

2. Making general observations related to scheduling of work and product and material deliveries.

3. Receiving products and materials that cannot be delivered during allowable working hours.

4. Owner will require Contractors to immediately cease work associated with items 1, 2 and 3 above should said work produce noise, dust, fumes or interfere in any way with Owner's normal and required use of the Facility.

5. All work listed for paragraphs 1, 2, and 3 above shall be scheduled in advance with the Owner.

M. Delivery of material and products shall be scheduled to occur during allowable working hours. Where deliveries cannot occur during allowable working hours, Contractor shall coordinate delivery times and location with Owner, a minimum of 72 hours in advance of delivery. Owner shall identify allowable areas of on-site temporary storage and allowable maximum storage period. Materials and products shall be set in final installed location only during allowable working hours.

1.3 PROJECT CONSTRUCTION PHASES AND SPECIAL WORKING HOURS

A. Work shall be performed using the project phasing as established during the design assist process.

B. In order to maintain adequate steam load for the hospital, boiler number 1 or number 3 will need to remain in service until new boilers are capable of meeting hospital steam load requirements.

1.4 UTILITY INTERRUPTIONS

A. Definition: Utility interruptions shall be defined as any disruption to the normal operation of the following MEP systems caused by the Contractor in order to perform the work required by this contract.

B. All disruptions of utility services shall be performed only during hours identified by the Owner and approved by Henderson Building Solutions. Contractor shall establish allowable time periods for utility interruptions using methods similar to that described for establishing allowable working hours (Section 1.2).

C. All interruptions shall be as short in duration as possible. Any service interrupted shall be restored to full operation as soon as practical and at a minimum shall be restored to full operation a minimum of 2 hours prior to Owner occupancy or normal use of space or system effected by interruption.

D. All interruptions shall be scheduled with Henderson Building Solutions and the Owner a minimum of 7 days in advance of interruption.

E. Contractor shall schedule the work in such a manner as to minimize the number of utility interruptions required to perform the Work.

1.5 DRAWINGS AND SPECIFICATIONS

A. Additional requirements for project phasing, allowable working hours and utility interruptions may be identified on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 011100.19

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. A Product Substitution Request Form is included at the end of this Section.

1.2 PRODUCTS, OPTIONS AND SUBSTITUTIONS

A. By executing the Contract, the Contractor agrees that only products of the types and makes identified on the Drawings or in these Specifications will be provided by the Contractor.

1. When products of several Named Manufacturers are specified, use of products by one of the Named Manufacturers that comply with the specified requirements is required.

2. Where the phrase "or equal" or "or approved equal" is used, use of a product by an Un-Named Manufacturer is allowed if product to be supplied by an Un-Named Manufacturer fully complies with specified requirements. Compliance with specified requirements will be reviewed by Henderson Building Solutions, LLC. Henderson Building Solutions shall be solely responsible for determining acceptability of an Un-Named Manufacturer.

3. When only one Named manufacturer is identified, substitute products by an Un-Named Manufacturer will not be allowed.

4. The naming of Manufacturers and specific products as acceptable does not imply the Named Manufacturer or product complies with the specified requirements. It shall be the responsibility of the Named Manufacturer and the Contractor to furnish products fully complying with specified requirements.

B. Products of the same kind or type shall be provided by a single manufacturer.

C. Within ten (10) days after award of the Contract, Contractor may propose to use products by Un-Named Manufacturers or use materials other than the type specified. Contractor’s proposed substitutions will be considered within this period of time, provided the substitution is equal to or superior to that specified. Henderson Building Solutions will be the sole judge of equality or superiority, and Henderson Building Solutions decision shall be final and not subject to appeal.

1. Product substitution requests received after the specified time period will be rejected.

D. Owner shall receive the benefit of the difference in the cost involved in accepted substitutions resulting in lower Project costs and the Contract will be so altered by Change Order. Credits to the contract sum shall be established prior to Henderson Building Solutions approval of a substitution. Substitutions that increase the Contract costs will be rejected.

E. Requests for substitutions shall be in writing and shall include the following:

1. A completed Product Substitution Request Form.

2. Adequate product data to demonstrate compliance with the Specifications or that product exceeds specified requirements.

3. Statement describing any effect on Project Schedule resulting from Henderson Building Solutions acceptance of product substitution.

4. Detailed cost breakdown identifying reductions in Project costs resulting from use of product substitutions. Breakdown to include any redesign costs that may be incurred by Henderson Building Solutions. Any redesign cost amounts will be provided to the Contractor by Henderson Building Solutions.

F. Requests for substitutions shall be interpreted to mean that the Contractor:

1. Has investigated the proposed substitute product; determined that it is equal or superior to that specified, is suitable for the purpose intended; and is acceptable by the authorities having jurisdiction.

2. Will provide the same warranty for the substitution that is required for the product specified.

3. Certifies that the cost data presented is complete and includes all related costs, and the Henderson Building Solutions redesign costs if any; and that the Contractor waives any claims for additional costs related to the substitution, which subsequently become apparent.

4. Will coordinate installation of the substitution with other Contractors and Subcontractors, and make changes as required for the work to be complete in compliance with the Contract Documents.

G. Substitutions will not be considered a justifiable cause for any delay of the completion of Work.

H. Contractor’s failure to place orders for specified products in a timely manner shall not be grounds for approval of substitutions, nor will substitutions be considered solely to expedite project completion.

I. Product substitutions will not be considered should they require, in the Henderson Building Solutions opinion, an unacceptable level of revision of the Contract Documents or the Project Milestone Schedule.

1.3 UNNAMED PRODUCTS

A. When a product is specified only by reference standard, performance criteria or descriptive requirements and does not include one or more Named Manufacturers, submit a product by any manufacturer meeting the specified requirements or standards. Include the Manufacturer's name, catalog numbers, brochures, cut-sheets, test reports, certifications and other similar descriptive product data clearly indicating that the products comply with requirements of the Contract Documents. Products that do not conform to specified requirements will be rejected.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

PRODUCT SUBSTITUTION REQUEST FORM

PROJECT: _____ DATE: _____

TO: Henderson Building Solutions, LLC
10901 W. 84th Terr., Suite 300
Lenexa, KS 66214

The undersigned hereby submits for review, the following substitution for the specified product listed:

Spec. Section	Page	Paragraph	Specified Manufacturer and Product
_____	_____	_____	_____

PROPOSED SUBSTITUTION:

Manufacturer: _____

Product Name: _____

Model Number: _____

The undersigned has attached product data, specifications, drawings, performance and test data including independent laboratory tests. Applicable portions of attachments are clearly marked. Included is a description of all changes to Contract Documents including Project costs and schedule that acceptance of the proposed substitution will require.

The undersigned certifies:

1. Proposed substitution has been fully investigated and determined to be equal or superior to specified product and will be accepted by authorities having jurisdiction.
2. The same warranty will be furnished for proposed substitution as for specified product.
3. Maintenance service and source of replacement parts, as applicable, is available at the same level as the specified product.
4. Proposed substitution will have no adverse effect on other trades and will not affect or extend Project schedule.
5. Proposed substitution does not affect dimensions and functional clearances.
6. The undersigned will pay for any changes to the project design, including Architectural, Structural and MEP Engineering design, detailing, and construction administration cost caused by the use of the proposed substitution.

Submitted By: _____

Signature: _____

Company: _____

HENDERSON BUILDING SOLUTIONS REVIEW:

☐ Approved

☐ Not Approved

Reviewed by: _____ Date: _____

END OF SECTION 012500

SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for submittals required for performance of Work.

1. Henderson Building Solutions, LLC will pre-populate a list of all submittals required to be furnished by the Contractor within the project management software.

2. See individual specification sections for submittal requirements specific to each product, material, equipment, or service required by the Work.

3. Contractor shall, prior to submitting, review each submittal to ensure the information required to be included in the submittal (as identified in each specific section) is in fact included.

4. Submittals that do not include all required information (as identified in each specification section) will be returned to the Contractor without review.

1.2 SUBMITTAL PROCEDURES

A. All submittals shall be uploaded into the web-based project management software workflow electronically using read only PDF files. The first page of the file shall be Contractor's standard form used for the transmission of submittals. PDF files that are not named per the below directions will be returned without review or action by HBS.

B. The first page of the PDF file shall be Contractor's standard form used for the transmission of submittals and shall include the following at a minimum:

1. SUBMITTAL or RESUBMITTAL

2. Henderson Building Solutions project number

3. Specification Section Number

4. Products/materials included in submittal

5. Submittal Sequence Number:
   a. Example: "SUBMITTAL-1630004321-232113-Hydronic Specials-No.1"
   b. Example: "RESUBMITTAL-1630004321-232113-Hydronic Specials-No.2"

C. Processing: Allow sufficient review time so that the Project will not be delayed as a result of the time required to process submittals, including time for required re-submittals.

1. Allow 7 calendar days for Henderson Building Solutions MEP submittal review. Allow 10 calendar days for Henderson Building Solutions review of Structural, Architectural, and other non-MEP submittals. Allow additional time if processing must be delayed to permit coordination with subsequent and related submittals.

2. No extension of Contract Time will be authorized due to Contractor's failure to transmit submittals to Henderson Building Solutions sufficiently in advance of the

Contractor’s need for approved submittals based on the Contractor’s Project Schedule.

D. Clearly mark each submittal to show applicable choices, options and accessories provided. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the information applicable to the product or material supplied. Submittals not marked to show applicable choices will be returned for revision. Include the following information with each submittal where applicable. See each Section of these Specifications for additional information to be included with each submittal.

1. Manufacturer's printed installation and application recommendations.

2. Compliance with specified trade association’s standards.

3. Compliance with specified testing agencies, Codes and Standards requirements.

E. Contractors Review: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents prior to forwarding to Henderson Building Solutions. Note any corrections and required field dimensions on body of submittal.

F. Approval Stamp: Stamp each submittal with a Contractor’s approval stamp. Include Project name and location, submittal number, Specification Section number and title, name of reviewer, date of Contractor’s approval and statement certifying that submittal has been reviewed, checked, and approved by the Contractor for compliance with the Contract Documents.

1.3 HENDERSON BUILDING SOLUTIONS ACTION

A. Henderson Building Solutions will review each submittal, will revise submittal as required to comply with the Contract Documents, and will return to Contractor within the web-based project management software.

B. Contractor will be notified via project management software that submittal has been reviewed.

C. Each submittal will be marked as follows to indicate the action status:

1. Approved Submittal: When submittal is marked "Approved Submittal” that part of the Work covered by the submittal process may proceed.

2. Approved as Noted: When submittal is marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided all submittal review notes are fully complied with, without exception.

3. Revise and Resubmit: When submittal is marked "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or any other activity. Prepare a NEW submittal in accordance with all submittal review notes and specified requirements; resubmit without delay.

4. Rejected: Where submittal is marked "Rejected," submittal has been rejected without review for compliance with specifications. Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or any other activity. Prepare a NEW submittal showing full compliance with the specified requirements; resubmit without delay. Contractor shall perform no portion

of the Work that requires the Contractor to obtain approved submittals until such approval has been obtained from Henderson Building Solutions.

5. Incomplete Submission: Where submittal is marked “Incomplete Submission” submittal is considered incomplete. Prepare a NEW submittal in accordance with all specified requirements; submit without delay. Contractor shall perform no portion of the Work that requires the Contractor to obtain approved submittals until such approval has been obtained from Henderson Building Solutions.

D. Review of submittals shall be for compliance with drawings, schedules, specifications, and design intent. Approval of a submittal or any portion of a submittal shall not be interpreted as approval of the following information included in the submittal:

1. Quantities (i.e. number, lengths, volumes, square feet, weights, etc.)

2. Dimensional compatibility with installed locations.

3. Methods of factory and/or field assembly.

4. Transport, storage, rigging, installation, start-up, and testing methods.

5. Warranties in conflict with specified warranties.

6. Payment terms in conflict with specified terms.

E. Contractor’s first Pay Application will not be processed until all required submittals have been received and approved by Henderson Building Solutions.

F. Permanent copies of all Henderson Building Solutions approved submittals will be maintained in the project management software where they can be viewed or downloaded at any time during the project.

1.4 SUBMITTALS TO AUTHORITIES HAVING JURISDICTION

A. Contractor shall be responsible for preparing and submitting calculations, shop drawings, product data and all other required documents to all authorities whose approval must be obtained to perform and accept the Work.

B. Format and number of copies shall be as required by reviewing authorities. Henderson Building Solutions shall be provided with one copy of all such submissions concurrent with submission to reviewing authority.

C. Contractor shall provide Henderson Building Solutions one copy of all approved submissions (with proof of reviewing authority’s approval). Contractor shall provide Henderson Building Solutions with one copy of all field inspection and field test reports issued by the reviewing authorities.

D. Documents required by paragraphs A, B and C above shall be included in the Project Manual detailed in Section 011100.13.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013300

SECTION 013500

FACILITY SPECIFIC PROCEDURES

PART 1 - GENERAL

1.1 FACILITY SPECIFIC PROCEDURES

A. The Contractor shall perform all work using methods, procedures and materials fully complying with the following Owner's policies specific to Work being performed at this facility.

1. "ILSM Policy"
2. "Asbestos Policy"
3. "Bloodborne Pathogens Exposure Control Plan"
4. "Construction and Renovation Guidelines"
5. "Construction Vendor Policy and Sign-Off Form"
6. "Fire Alarm Response Plan"
7. "Fire Prevention Management Plan"
8. "Personal Protective Equipment Policy"

B. Per updated guidance provided, 11/11/21, HCA will be requiring Covid Vaccinations for all employees and contractors. Additional details regarding date of compliance and exemptions should be released this month. Contractor should expect that by construction start date this policy will be in effect. This verification should be stated on contractor badging for project.

C. Contractor shall require full compliance with and participation in all Facility Specific Procedures by all Contractor's subcontractors and suppliers without exception.

D. Each of the Facility Specific Procedures are included in the pages following this Specification Section.

E. Contractor shall not be allowed any extra compensation nor any extensions to the Project Milestone Schedule resulting from compliance with the Facility Specific Procedures.

1.2 BARRIERS AND CONSTRUCTION TRAFFIC SAFETY

A. Protect non-Contractor owned vehicles, stored materials, site, site improvements and structures from damage.

B. Provide barriers to prevent unauthorized entry of Owner's employees and the public into areas where construction is occurring, to direct traffic to avoid areas where construction is occurring, to allow for Owner's use of site to the maximum extent possible during construction, and to protect existing facilities and adjacent properties from damage from construction operations.

C. When operating any motorized construction equipment in areas where the public or Owners employees are present, provide a spotter (or signal person) whose sole job responsibility shall be to ensure safe operation, including directing traffic and keeping the area of traffic clear of people.

1.3 EXTERIOR ENCLOSURES

A. Provide temporary weather-tight closure of exterior openings to provide acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks where required.

1.4 SHEETING TYPE COVERS

A. In all Owner occupied production, retail and public spaces protect all interior finishes, fixtures, equipment and merchandise from damage and from dust, dirt and other debris in areas where construction work is being performed.

B. Cover all finishes, fixtures, equipment and merchandise with clear poly sheeting with overlapped and continuously taped joints or other material acceptable to the Henderson Building Solutions and the Owner.

C. Promptly remove covers at completion of construction activities. Broom clean all floor surfaces, clean all ceilings and leave space in condition equal to that prior to construction activities being performed.

D. Erect specified dust barriers in areas where construction activities will create dust, dirt or debris that cannot be contained using poly sheeting coverings.

E. Covering of finishes, fixtures, equipment and merchandise in areas identified below will only be allowed during the allowable working hours identified in specification section 011100.16. Covers shall be removed during all other hours. Coverings in Owner occupied areas shall be removed per schedule identified by the Owner or Henderson Building Solutions.

1.5 DUST BARRIERS

A. In all areas identified below, protect finishes, fixtures, equipment, merchandise and stored materials using specified sheeting type covers.

B. In addition to poly sheeting coverings, the area where construction activities are occurring shall be completely enclosed with a dust barrier consisting of vertical poly sheeting extending from ceiling or underside of roof to floor. Sheeting shall overlap with vertically joints continuously taped. Attachment to ceiling or underside of roof and to floor shall be air tight and shall utilize methods that will not damage ceiling, underside of roof or floor finishes.

C. Promptly remove all covers and vertical barriers at completion of construction activities.

D. All areas within the area enclosed by vertical dust barriers shall be cleaned so that area is restored to the sanitary condition that existed prior to start of construction activities. Contractor shall broom clean and wet mop all floors using cleaning solution approved in advance by the Owner. Contractor shall clean all equipment, fixtures, walls, ceilings and other horizontal and vertical surfaces using liquid cleaning solutions approved in advance by the Owner.

E. Erection and disassembly of dust barriers in the areas identified below shall only be performed during the allowable working hours identified in specification section 011100.16.

1.6 SECURITY

A. Comply with Owners policies related to the entry, access and use of the Facility by Contractors, including procedures associated with sign-in and sign-out, badging, access to restricted areas, roof access, reporting procedures, and other security procedures in place at the Facility.

B. Maintain the integrity of the existing building security and security systems at all times. Protect work and Owner's operations from unauthorized entry, vandalism, and theft.

1.7 DOCUMENTATION

A. Contractor shall maintain adequate written and photographic documentation verifying full compliance with specified Facility Specific Procedures and shall make documentation available to the Owner and Henderson Building Solutions upon request.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 013500

HCA MIDWEST HEALTH LEE'S SUMMIT MEDICAL CENTER

Title: 303-EC-0419 Interim Life Safety Measures (ILSM)	**Version: 5**	**Reference#: 12436**
	Effective Date: 12/05	
	Replaced/Revised: 2/15	
Department: EOC/ Facilities	**Last Reviewed: 01/09/2018**	
Owner: Dir Plant Ops/Sec/Eng	**Next Review: 01/09/2021**	

POLICY:

It is Lee's Summit Medical Center (LSMC) policy to ensure a high level of safety during all times when the life safety features have been compromised by either renovation, construction, or inadequate life safety components. To meet the provisions of the Interim Life Safety Measures as set forth by the Joint Commission.

PURPOSE:

During periods of construction or anytime significant deficiencies compromise the level of Life Safety Protection provided by the building LSMC will assess the impact and/or implement Interim Life Safety Measures to protect all patients, staff and/or visitors.

SCOPE:

This Plan will be implemented throughout the facility during times of construction, or any time the Life Safety protection components are impaired

PROCEDURE:

1. Whenever a construction or renovation project at LSMC receives approval, an assessment will be completed to determine what levels of Interim Life Safety Measures (ILSM), if any, will occur.
2. The Safety Officer in coordination with the Director of Facility Management (DFM)/Project Manager will determine the need for ILSM by completing the Life Safety Assessment (LSA) located on the first tab (titled "LSA") of the ILSM Process Template.
3. Where Requirements for Improvement (RFI) have been identified during a Life Safety survey, ILSM must be evaluated and implemented as determined by the Safety Officer and DFM until the resolution is completed.
4. Once the Life Safety Assessment (LSA) has been completed, the Safety Officer, in coordination with the DFM or designee, will determine the necessary action(s) to temporarily compensate for any life safety hazards posed to buildings and occupants. The evaluation will include:
    a. Code Deficiencies

b. Construction related deficiencies.

c. Maintenance or repairs.

5. A written LSA will be issued for each project with an analysis of potential hazards, as well as mitigation procedures and other requirement(s) deemed necessary. A copy of the LSA will be maintained in the Engineering and Facility Management office
6. Any changes to the plan will be communicated immediately to the Safety Officer, and DFM and a new LSA and ILSM plan issued.
7. When ILSM is required, the Safety Officer will develop the work plan and communicate the ILSM requirements needed to Security and the appropriate department directors and contractors, and will verify that the ILSM measures are properly implemented.
8. Records pertaining to ILSM documentation will be kept as follows:
    a. Current for open Requirements for Improvement (RFI); and
    b. Current for active ILSM.
9. Daily inspections will be performed on the means of egress in any area undergoing construction, repair, or improvement. The activity will be documented. (If Applicable)
10. An ILSM Posting will be filled out, issued to the affected departments, and posted in the area(s) affected. Alternate routes of egress will be attached to the ILSM posting and posted in the area(s) affected as needed, as determined by the LSA. (If Applicable)
11. The Safety Officer or designee will maintain a current listing of all active ILSM and communicate this listing to the Environment of Care (EOC)/Safety and Security Committee.

RESPONSIBILITY:

Engineering and Facility Management, Security, Safety Officer, Department Directors and Managers

FIRE DRILL LOG

Quarter

Shift	Date	Location	Comments

1st						
2nd						
3rd						
1st						
2nd						
3rd						

Quarter

Shift	Date	Location	Comments
1st			
2dn			
3rd			
1st			
2nd			
3rd			

Quarter

Shift	Date	Location	Comments
1st			
2nd			
3rd			
1st			
2nd			
3rd			

Quarter

Shift	Date	Location	Comments
1st			
2nd			
3rd			
1st			
2nd			
3rd			

ILSM Posting

ILSM POSTING

Effective on:

Interim Life Safety Measures are in effect for the following areas:

Reason:

Requirements:

Alternate route of egress is (attach map)

For questions please contact the Safety officer or designee at: _____

HCA MIDWEST HEALTH
LEE'S SUMMIT MEDICAL CENTER

Title: 830-EC-001 Asbestos Abatement	**Version: 4**	**Reference#: 1694**
	Effective Date: 08/02	
	Replaced/Revised: 11/16	
Department: Plant Operations	**Last Reviewed: 11/03/2016**	
Owner: Dir Plant Ops/Sec/Eng.	**Next Review: 11/03/2019**	

PURPOSE AND SCOPE:
The intent of this policy is to instruct the Engineering Department of the correct procedures involving asbestos. The Lee's Summit Medical Center was constructed in 2007 without the use of Asbestos containing materials.

PROCEDURE:

1. Course of Action

    1.1 LSMC personnel will not remove, handle or dispose of asbestos. Only qualified and certified contractors will handle, remove, and dispose of asbestos containing materials.

HCA Healthcare℠ | Capital Deployment

TO:	Principals at Partner Architecture firms, General Contractors and Vendors
FROM:	Clint Russell, VP Capital Deployment Construction and Equipment
COPY:	Enterprise Emergency Operations Center, Capital Deployment and Engineering
DATE:	February 2, 2022
SUBJECT:	Construction Guidance for the Federal Vaccine Mandate (CMS Mandate)

The Biden administration recently issued a mandate requiring COVID-19 vaccinations for the majority of healthcare workers. Given this CMS mandate, HCA Healthcare will now require all of our colleagues in healthcare facilities, who do not qualify for an exemption, to be fully vaccinated by February 28, 2022.
Many of the construction, repair and maintenance vendors in our facilities are transitory by nature and have extremely infrequent or restricted contact with patients, visitors and staff. Personnel who fall in these categories must follow the below guidance for compliance with the CMS mandate:

Until further notice, the following directive will apply to our vendors and contractors at each hospital and project.

1. All workers who enter any area of the hospital are assumed to be unvaccinated and are required to wear a non-fit tested N95 mask at all times.
2. Those workers who choose to provide proof of vaccination will not be required to wear this N95 mask and instead may follow the masking guidelines currently in place for vaccinated colleagues at the facility.
3. Personnel with oversight responsibility and thus a commitment to consistent presence in the facility (such as superintendents or leadership) are expected to follow the CMS mandate and those with a religious or medical exemption must mask according to item 1, above.
4. Workers who do not enter the hospital will not be required to wear a mask or provide proof of vaccination. This exemption will also apply to workers in a “greenfield” site or separate area of the hospital that is barricaded off from healthcare space, such as a shelled floor or behind infection control barriers. Should workers enter or travel through hospital space, they must mask accordingly.
5. Contracting entities and vendor employers will be required to provide conspicuous visual cues to identify those workers who provided vaccination documentation (helmet stickers or badge identification).

Each company, general contractor, subcontractor, repair service, etc., is required to store documentation of their employees’ vaccination status and must allow full audit of these documents when requested. An attestation from each company on employee status may be allowed. For HCA Capital Deployment projects, general contractors are expected to store documentation on those that choose to provide proof of vaccine or the attestation of a vendor/subcontractor as to their teams’ vaccine status.

We understand the implications this mandate may have for many of our partners, but we hope you understand our need to comply with federal healthcare regulations.

SECTION 014100

PERMITS, REGULATIONS AND TAXES

PART 1 - GENERAL

1.1 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall be responsible for obtaining and paying for any and all permits, licenses, plan reviews, inspections, etc., including building permits, required by all authorities having jurisdiction over the Work required by this Contract.

B. Contractor shall arrange and pay for any and all reviews, approval and inspections required by non-governing authorities having jurisdiction over the Work, including any utility companies, as required by the Work.

C. Contractor shall make payment of all applicable taxes, including but not limited to sales, consumer, use and similar taxes levied by all governing bodies for all work, material and equipment provided by the Contractor.

D. All work shall be in full compliance with the building codes, ordinances and regulations adopted by all governing bodies having jurisdiction over the Work required by this Contract.

1. The Contractor shall promptly notify Henderson Building Solutions, LLC if the Contractor observes that any portions of the Contract Documents are at variance with the codes, ordinances and regulations governing the Work. Henderson Building Solutions shall take such actions necessary to bring the Work into compliance.

E. Contractor shall, after obtaining approval of Submittals and/or Shop Drawings from Henderson Building Solutions, forward any and all required information to any authority having jurisdiction, including but not limited to local and State Fire Marshals, as required to obtain approval of same.

F. The Contractor and all Subcontractors performing work under this Contract shall fully comply with the provisions of the Federal Occupational Safety and Health Act and the rules and regulations promulgated pursuant to this Act.

G. Contractor shall comply with or warrant:

1. Comply with the provisions of Section 952 of the Omnibus Reconciliation Act of 1980 (Public law 96.499) and other regulations, and further agrees to make available to the Secretary of Health and Human Services ("HHS"), the Comptroller General of the General Account Office ("GAO"), or their authorized representatives, all contracts, books, documents and records relating to the nature and extent of the costs thereunder for a period of four (4) years after the furnishing of services thereunder. In addition, Contractor hereby agrees, if services are to be provided by subcontract with a related organization, to require by contract that such subcontractor make available to the HSS and GAO or their authorized representatives, all contracts, accounting records, documents and records relating to the nature and extent of the costs thereunder for a period of four (4) years after the furnishing of services thereunder.

2. Warrant that Contractor (i) is not currently excluded, debarred, or otherwise ineligible to participate in the federal health care programs as defined in 42 U.S.C. § 1320a-7b(f) (the "federal health care programs"); (ii) has not been convicted of a

criminal offense related to the provision of health care items or services and has not been excluded, debarred or otherwise declared ineligible to participate in the federal health care programs; and, (iii) is not under investigation or otherwise aware of any circumstances that may result in it being excluded from participation in the federal health care programs.

3. Comply with the Health Insurance Portability and Accountability Act of 1996, as codified at 42 U.S.C. § 1320d ("HIPAA") and any current and future regulations promulgated thereunder including without limitation the federal privacy regulations contained in 45 C.F.R. Parts 160 and 164 (the "Federal Privacy Regulations"), the federal security standards contained in 45 C.F.R. Part 142, and the federal standards for electronic transactions contained in 45 C.F.R. Parts 160 and 162, all collectively referred to herein as "HIPAA Requirements." Contractor agrees not to use or further disclose any Protected Health Information (as defined in 45 C.F.R. Section 164.501) or Individually Identifiable Health Information (as defined in 42 U.S.C. Section 1320d), other than as permitted by HIPAA Requirements and the terms of this Agreement. Contractor will make its internal practices, books, and records relating to the use and disclosure of a patient's Protected Health Information available to the Secretary of Health and Human Services to the extent required for determining compliance with the Federal Privacy Regulations.

4. Contractor represents and warrants that neither it nor any of the other Contractor Parties will employ or use any individual to perform Work who is not legally authorized to work in the United States in the capacity required to perform such Work. Contractor further certifies that all employees and other individuals performing Work are legally authorized to work in the United States in the capacity required to perform the Work and will provide upon request written documentation to support such certification. Contractor shall indemnify, hold harmless and, if the Owner elects, defend Owner from and against all claims, damages, losses and expenses arising out of any alleged failure of Contractor to comply with its warranties, representations, and certifications under this paragraph.

5. Contractor shall maintain, preserve and make available to Henderson Building Solutions for at least six years after final payment, records of all costs incurred by Contractor arising out of or relating to the Work, including invoices, vouchers, checks, receipts, time sheets, accounts, cost reports, contracts, inspections, tests, lien waivers and releases. Upon reasonable notice, Henderson Building Solutions shall have the right to audit all of the Contractor's books and records with respect to the Project.

H. SUBCONTRACT AGREEMENTS

1. Contractor agrees to include all the provisions contained in Specification Section 014100 in each of its agreements with all subcontractors for work or services to be performed for the Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 014100

SECTION 014500

TESTS AND INSPECTIONS

PART 1 - GENERAL

1.1 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall arrange for and pay for all tests, inspections and approvals, associated with the Work, required by the Contract Documents, by laws, or by any authorities having jurisdiction over the Work.

B. All required tests and inspections shall be scheduled and obtained by the Contractor matching the sequence of the Work to ensure Work is completed per the Project Milestone Schedule.

C. Contractor shall forward to Henderson Building Solutions, LLC all certificates or notices of all tests and inspections, including the results of tests and inspections, issued by the entities performing the tests and inspections. Where such entities do not issue certificates and/or results of tests and inspections, Contractor shall provide a written report to Henderson Building Solutions detailing:

1. Date and time of test or inspection.

2. System or equipment tested or inspected.

3. Entity performing test or inspection, including contact name and contact information.

4. Results of test or inspection.

5. Any remedial actions identified by the entity performing the test or inspection.

D. Contractor shall perform all remedial actions identified by the entity performing the test and/or inspection; and shall perform any other work required to obtain the approval of the entity performing the test and/or inspection. No additional payments shall be made to the Contractor, nor shall any extensions to the Project Milestone Schedule be granted where required remedial actions are Work required by the Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 014500

SECTION 016213

OWNER PURCHASING AGREEMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes:

1. Acceptable Suppliers for selected portions of the work.

1.2 DEFINITIONS

A. Within the confines of the vendors list included at the end of this section, the following definitions apply to the abilities of named products and manufacturers during the bidding and award phases of the project. All other products and manufacturers not included within the vendors list included at the end of this section shall adhere to the requirements specified in other sections.

B. All named products and manufacturers shall adhere to other section of this specification related to product requirements and substitutions, regardless of their sourcing designation.

C. Sole Source (no substitutions): This is the only product / manufacturer that can be used. This precludes involvement by other companies to bid and receive awards.

D. Multi-Source (no substitutions): There are multiple products / manufacturers that can be used, which are all identified on the list. The precludes involvement by other companies to bid and receive awards.

E. Preferred Vendor: The manufacturer shall be allowed to provide a bid price for the project. This does not preclude involvement by other companies to bid and receive awards.

1.3 PIPE, PIPE FITTINGS, AND VALVES SUPPLIER

A. The Owner has entered into a purchasing agreement with Ferguson Enterprises for supply of mechanical and plumbing pipe, pipe fittings and valves; backflow preventers and plumbing fixtures.

B. Contractor shall solicit for bid purposes and shall purchase solely from Ferguson Enterprises all types of mechanical and plumbing pipe, fittings and valves; back flow preventers and plumbing fixtures specified in Division 22 and 23. The requirement to purchase solely from Ferguson Enterprises does not apply to medical gas piping, fitting and valves.

C. Ferguson Enterprises Contact:

1. Alton Lassiter
(615) 316-1848
alton.lassiter@ferguson.com

1.4 ELECTRICAL PRODUCTS AND MATERIALS SUPPLIERS

A. The Owner has entered into a purchasing agreement with Consolidated Electrical Distributors (CED) – Nashville and Graybar Electric – Nashville, for supply of the following electrical products and materials.

1. Buss Duct
2. Conductors, Splices, and Terminations
3. Grounding and Bonding Products and Materials
4. Supporting and Hanging Products and Materials
5. Raceways, Conduit, Pull and Outlet Boxes
6. Metering Products and Devices
7. Transformers
8. Switchgear
9. Motor Controllers
10. Switchboards
11. Panelboards
12. Motor Control Centers
13. Ground Fault Products and Materials
14. Cabinets
15. Wiring Devices
16. Disconnect Switches
17. Variable Frequency Drives
18. UPS's
19. Surge Protection Devices
20. Circuit Breakers

B. Contractor shall solicit for bid purposes and shall purchase solely from CED or Graybar all listed types of electrical products and materials Specified in Division 26.

C. CED Contact

1. Lance Smith
   CED – Nashville
   (615) 329-2601
   (615) 207-7223
   hca@ced-nashville.com

D. Graybar Contact

1. Linda Lard
Graybar – Nashville
(615) 743-3208
HCA@graybar.com

1.5 LIGHT FIXTURES

A. The Owner has entered into a purchasing agreement with Graybar Electric – Nashville for supply of the following:

1. Interior Light Fixtures

2. Exterior Light Fixtures

3. Lamps

4. Lighting Controls

B. Contractor shall solicit for bid purposes and shall purchase solely from Graybar all listed types of light fixtures and products Specified in Division 26.

C. Graybar Contact

1. Linda Lard
Graybar – Nashville
(615) 743-3208
HCA@graybar.com

1.6 BUILDING MATERIALS, SYSTEMS, OR EQUIPMENT

A. The Owner has entered into a purchasing agreement with named product manufacturers as identified in the vendors list attached to the end of this section. Bidders shall adhere to this list in the solicitation of product pricing, with consideration being taken with regard to each individual product or manufacturers sourcing designation.

B. Sourcing designation is as identified within the vendors list table. Each sourcing designation is as defined within this specification section.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 016213

HCA Healthcare Capital Deployment Peferred Vendors				Last Update: May 2022
Designation	Description			
Sole Source (**no substitutions**)	This is the only product / manufacturer that can be used. This precludes involvement by other companies to bid and receive awards.			
Multi Source (**no substitutions**)	There are multiple products / manufacturers that can be used, which are all identified on the			
Preferred vendor	While not a negotiated contract, the manufacturer has preferred status and shall be allowed to			
NA	Not applicable to work / scope preformed internally			

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Division 03 - Concrete				
Gypsum Concrete Underlayment	Ardex			Multi source
	Mapei			Multi source
Division 06 - Wood, Plastics and Composites				
Sheathing	USG			Preferred
	Georgia Pacific			Preferred
Division 07 - Thermal and Moisture Protection				
Exterior Insulation and Finish System (EIFS)	Dryvit			Multi source
	Sto		Mike Gracey (Primary) mgracey@stocorp.com Phone: 404-973-9249 Tim Salerno (StoPanel Division) tsalerno@stocorp.com Phone: 407-466-5371	Multi source
Slab-On-Grade Vapor Retarder	Ardex			Multi source
	Concure			Multi source
	Koester			Multi source
	Stauf			Multi source
	WR Grace			Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
EPDM	Carlisle - Syntec			Multi source
	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	Firestone	55355	Matt Traverse traversematt@bfusa.com (615) 937-5152	Multi source
	Genflex			Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
Thermoplastic Polyolefin (TPO) Roofing	Carlisle - Syntec			Multi source
	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	FiberTite			Multi source
	Firestone	55355	Matt Traverse traversematt@bfusa.com (615) 937-5152	Multi source
	Genflex			Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Sarnafil	18262	Bill Love love.bill@us.sika.com Phone: 586-201-0431	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Modified Bitumen	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	Firestone	55355	Matt Traverse traversematt@bfusa.com (615) 937-5152	Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Johns Manville	15419	Eric Smith eric.smith@jm.com 916-230-1536	Multi source
	Siplast			Multi source
	Soprema	12456	Eric Younkin eyounkin@soprema.us 330-334-0066 ext. 2228	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
	WP Hickman			Multi source
Sheet Metal Roofing	Centimark	5781	Wayne Barr wayne.barr@centimark.com Phone: 615-991-9223	Multi source
	J. Reynolds & Company	5641	Matt Skipper mskipper@jreynolds.com Phone 817-306-9596	Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source
Thermal Insulation	Owens Corning			Preferred
Applied Fireproofing	WR Grace			Multi source
	CAFO			Multi source
	Isolatek			Multi source
Penetrating Firestopping	WR Grace			Multi source
	3M			Multi source
	STI			Multi source
	Hilti			Multi source
	Multiple Manufacturers	148	Mike Harrod WW Grainger, Inc. mike.harrod@grainger.com phone: 502-655-0258	Multi source
Joint Sealants	Sherwin Williams	5893	Patrick Noble patrick.t.noble@sherwin.com Phone 216-515-7925	Multi source
	Koroseal			Multi source
	Tremco	5768	Casey Chandler cchandler@tremcoinc.com Phone 704-575-7613	Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Division 08 - Doors and Windows				
Wood Doors	VT		Jacob Freese VT Doors jfreese@vtindustries.com 712-369-8902	Preferred
Metal Doors and frames	Steelcraft	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Republic			
Mechanical lock	Schlage	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Falcon			
Door closers	LCN	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Falcon			
Exit Devices	Von Duprin	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Falcon			
Accessories	IVES	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com phone: 615-631-8650	Sole Source
	Glenn-Johnson			
	Falcon			
Sliding Glass ICU/CCU Doors Automatic Door Operators	Besam			Multi source
	Stanley			Multi source
Division 09 - Finishes				
Gypsum Board Assemblies	USG			Preferred
	Georgia Pacific			Preferred
Resilient Flooring	Mannington	5468	Terri Bailey HCA@mannington.com Phone: 615-427-8980	Sole Source
Resinous Flooring				
Carpeting	Shaw	500169	Deborah Smith deborah.smith@shawinc.com 704-249-6758	Multi source
	Tandus	500148	James Bourgeois james.bourgeois@tarkett.com 225-205-4519	Multi source
	Masland	6573	Jeff Taylor jeff.taylor@maslandcontract.com Phone: 404-543-7167	Multi source
	Mannington	5468	Terri Bailey HCA@mannington.com Phone: 615-427-8980	Multi source
Tile	Crossville Ceramics			Multi source
	Daltile Corporation			Multi source
	Louisville Tile (Crossville Ceramics)			Multi source
	Royal Mosa			Multi source
	Stonepeak Ceramics, Inc.			Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Base	Mannington	5468	Terri Bailey HCA@mannington.com Phone: 615-427-8980	Sole Source
Paint and coatings	Sherwin Williams	5893	Patrick Noble patrick.t.noble@sherwin.com Phone 216-515-7925	Multi source
Wallcovering	Eykon			Multi source
	DesignTex Inc. (includes J.M. Lynne and Essex)		Available through contract furniture dealers	Multi source
	Koroseal Interior Products			Multi source
	MDC Wallcoverings		Available through contract furniture dealers	Multi source
	National Wallcovering		Available through contract furniture dealers	Multi source
	Maharam		Available through contract furniture dealers	Multi source
	Sherwin Williams	5893	Patrick Noble patrick.t.noble@sherwin.com Phone 216-515-7925	Multi source
Wall Protection	InPro Corporation	44661	Julie Mooney 262-679-9010 ext. 5254 jmooney@inpro.com	Sole Source
Solid Surface	Avonite			Multi source
	Corian			Multi source
	Formica			Multi source
	Wilsonart International, Inc.			Multi source
Acoustic Ceilings	Armstrong World Industries	6924	Anna Justice HCA@armstrong.com Phone: 717-396-4325	Sole source
Plastic Laminate	Formica			Multi source
	Panola Industries - Nevamar			Multi source
	Panola Industries – Pionite			Multi source
	Wilsonart International, Inc.			Multi source
Division 10 - Specialties				
Marker Boards	Claridge		Matt Green Matt@chameleonwhiteboard.com 615.656.3280 ext 1	Multi source
	Eagan Visual		Available through contract furniture dealers	Multi source
	Staples Advantage	2532	Deb Mailmstrom deb.malmstrom@staples.com Phone: 770-532-8033	Multi source
	Peter Pepper		Available through contract furniture dealers	Multi source
Solid Surface Shower System	InPro Corporation	44661	Mike O'Connell Inpro Corporation moconnell@inprocorp.com Phone: 608-640-8196	Sole Source
Lockers	Quantum Medical	5522	Elizabeth Faller elizabethf@quantumstorage.com 15800 NW 15th Ave Miami, FL 33169	Multi source
	Storage Systems	500166	Bill Kreager bkreager@storagesystems.com Phone: 888-614-0004	Multi source
Division 11 - Equipment				
Food Service Equipment	Inman Foodservices Group	7227	Billy Inman billy.inman@inman-inc.com 3807 Charlotte Ave, Nashville TN 37209 Phone: 615-812-6500	Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Division 12 - Furnishings				
Ice Machines	Follett Corporation	5000041	Gary Gutman ggutman@follettice.com 800-523-9361	Multi source
Audio-Visual Equipment (TVs, Accessories)	Grainger	4077	Todd Dietrich todd.dierich@grainger.com 314-368-8659	Multi source
	Remar	3248	Kevin Kolff kkolff@remarinc.com 615-449-0231	Multi source
	Telehealth	500045	Darrell Leftwich darrell.leftwich@telehealth.com 615-383-7836	Multi source
Division 13 - Special Construction				
Division 14 - Conveying Systems				
Elevators	Schindler	7257	Daniel Winder daniel.winder@schindler.com 972-358-5063	Multi source
	Otis	4229	Ernie Dominguez Ernie.Dominguez@otis.com 512-567-7840	Multi source
	Kone	6008	Dean Enrico dean.enrico@kone.com 770-527-1163	Multi source
Pneumatic Tube System	Pevco	31267	James Valerino 410-961-3050 jvalerino@pevco.com	Preferred
	Swisslog			Preferred
Division 21 - Fire Suppression & Detection				
Division 22 - Plumbing				
Domestic Water Piping and Valves	Mueller	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Borzan			
	Dura-Line			
	Uponor			
	Nibco			
	Milwaukee			
	B-Line			
	FNW			
	Conbraco			
	Anvil			
	Ipsco			
	Victaulic			
Domestic Water Backflow Preventers, Trap Primers, and Shock Absorbers	Zurn/Wilkins	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Proflo			
	PPP			
	Sioux Chief			
	Watts			
Domestic Water Pumps	Taco	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Multi source
	Grundfos			Multi source
	Bell & Gossett			Multi source
	SyncroFlo			Multi source
	Canariis			Multi source
	Systecon			Multi source
Domestic Waste Piping and Drains	Charlotte	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Tyler Pipe			
	ABI			
	Ideal			
	Proflo			
	Zurn			

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Mechanical Piping	Ipsco	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Borzan			
	Nupi-Niron			
	Weldbend			
	Milwaukee			
	Nordstrom			
	B-Line			
	FNW			
	Nibco			
	Anvil			
General Service Compressed Air Piping and Valves	Beacon Medeas			Multi source
	Allied Health Products			Multi source
	Amico			Multi source
	Powrex			Multi source
Commercial Domestic Water Softeners	Culligan			Multi source
	Anderson Chemical			Multi source
	Bruner			Multi source
	Hydromax			Multi source
	Stay-rite			Multi source
	Marlo			Multi source
	Garratt-Callahan Company	3968	John Reseland ireseland@g-c.com 412-721-5292	Multi source
	Wigan			Multi source
	Nalco	3923	Lawrence Gess lgess@nalco.com 630-305-1658	Multi source
Commercial Storage Electric Domestic Water Heaters	Hesco			Multi source
	Ruud			Multi source
	Bradford White			Multi source
	State	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Multi source
	AO Smith			Multi source
	PVI			Multi source
Commercial, Atmospheric, Gas Domestic Water Heaters	Teledyne Laars			Multi source
	Aerco			Multi source
	Hesco			Multi source
	Bradford White			Multi source
	Patterson Kelly			Multi source
	Lochinvar	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Multi source
	PVI			Multi source
	AO Smith			Multi source
Commercial, Power-Vent, Gas Domestic Water Heaters	Aerco			Multi source
	Hesco			Multi source
	Patterson Kelly			Multi source
	Armstrong			Multi source
Plumbing Fixtures and Drinking Fountains	Symmons	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Zurn			
	Elkay			
Medical Gas Piping System	Elkhart	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Mueller			
	Nibco			
Deionized Water Piping	Enfield	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Orion			

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Division 23 - Heating, Ventilation and Air Conditioning (HVAC)				
Electric Motors	MagneTek			Multi source
	Lincoln			Multi source
	Marathon			Multi source
	Gould			Multi source
	Toshiba			Multi source
	Baldor			Multi source
	Reliance			Multi source
	US Motors			Multi source
	General Electric			Multi source
Vibration Isolation	Mason Industries			Multi source
	kinetics Noise Control			Multi source
	Vibration Eliminator			Multi source
	Korfund			Multi source
	Amber Booth			Multi source
Building Automation System	Johnson Controls	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	Siemens	3574	Ed Tambornino ed.tambornino@siemens.com Phone: 615-329-2601	Multi source
	Schneider Electric/ via Graybar	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi source
Fuel Oil Storage and Handling System	Xerexes			Multi source
	Owens Corning			Multi source
Fuel Oil Leak Detection and Alarm System	Enterprise Brass			Multi source
	Veeder-Root			Multi source
	Pollulert			Multi source
	PetroVend			Multi source
HVAC Pumps	Peerless			Multi source
	Armstrong			Multi source
	Bell & Gossett	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Multi source
	Aurora			Multi source
	Paco			Multi source
	Taco			Multi source
	Grundfos			Multi source
	Weinman			Multi source
Steam and Condensate Heating Piping	Ipsco	5999	Bettina Dawson Ferguson Enterprises bettina.dawson@ferguson.com Phone: 615-316-1920	Sole Source
	Borzan			
	Nupri - Niron			
	B-Line			
	FNW			
	Milwaukee			
	Weiss			
	Sarco			
	Weldbend			
	Nibco			
	Anvil			
Sound Alternators	McGill			Multi source
	IAC			Multi source
	Vibro-Acoustics			Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Variable Air Volume (VAV) units	Johnson Controls	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	Siemens	3574	Ed Tambornino ed.tambornino@siemens.com Phone: 615-329-2601	Multi source
Air Filters	American Air Filter			Multi source
	CamFil	6688	David Blackwell 806-773-8408 Dave.Blackwell@camfil.com	Multi source
	TriDim	6686	Tabatha Henshaw 540-967-5789 t.henshaw@tridim.com	Multi source
	Clarcor	6718	Chuck Lehman clehman@clcair.com 502-810-5764	Multi source
Prefabricated Gas Vent System	American Metal Products			Multi source
	Metal-fab			Multi source
	Selkirk			Multi source
	Metalbestos			Multi source
Fire Tube Boilers	Burnham			Multi source
	Cleaver Brooks			Multi source
	Superior Boiler			Multi source
	Industrial Combustion			Multi source
	Lochinvar			Multi source
	Bryan			Multi source
	Aerco			Multi source
	Hurst			Multi source
	Weil-McLane			Multi source
Deaerator	Cleaver Brooks			Multi source
	Chicago Heater			Multi source
	Crane Cochrane			Multi source
	Industrial Steam			Multi source
Air-Cooled Condensing Units	Carrier	6741	Justin Leslie 352-318-5139 Justin.leslie@carrier.com	Multi source
	Trane	3572	Brian Bolin brian.bolin@Trane.com Phone: 615-584-9391	Multi source
	Daiken/McQuay	3574	Mark Kearschner mark.kearschner@daikinmcquay.com Phone: 704-340-1520	Multi source
	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
Centrifugal Water Chiller	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Packaged Air Cooled Chiller	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Packaged Air Cooled Chiller for MRI	Filtrine			Multi source
	KKT			Multi source
	Kraus			Multi source
	Neslab			Multi source
Cooling Tower	Baltimore Air Coil			Multi source
	Evapco			Multi source
	Marley			Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Air-Handling Unit - Medium Or Low Pressure	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Rooftop Air Handling Unit	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Packaged Rooftop Unit	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Sole source
Computer Room Air-Conditioning Unit	Liebert			Multi source
	Airedale			Multi source
	HiRoss			Multi source
	DataAire			Multi source
	Compu-Aire			Multi source
	Schneider			Multi source
	Stultz			Multi source
Split System A/C Units	Carrier	6741	Justin Leslie 352-318-5139 Justin.leslie@carrier.com	Multi source
	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	McQuay	3574	Mark Kearschner mark.kearschner@daikinmcquay.com Phone: 704-340-1520	Multi source
	Trane	3572	Brian Bolin brian.bolin@Trane.com Phone: 615-584-9391	Multi source
Duct Heaters	Carrier	6741	Justin Leslie 352-318-5139 Justin.leslie@carrier.com	Multi source
	McQuay	3574	Mark Kearschner mark.kearschner@daikinmcquay.com Phone: 704-340-1520	Multi source
	Trane	3572	Brian Bolin brian.bolin@Trane.com Phone: 615-584-9391	Multi source
	York/JCI	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
Humidifiers	Armstrong			Multi source
	Hermidifier			Multi source
	Dristream			Multi source
	Pure Stream			Multi source
	Nortec			Multi source

Contract Category	Supplier	HPG Contract Nu	Contact Information	HCA Designation
Division 26 - Electrical				
Pad-Mounted Transformers	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Sole Source
Generator Synchronizing Switchgear	ASCO	7228	Ron Caprio 770-757-8747 ron.caprio@ascopower.com	Sole Source
Circuit Breaker Distribution Switchboards	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Sole Source
Safety Switches	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Sole Source
Emergency Standby Engine Generator System	Cummins Crosspoint	6344	Chris Banet HCA@cummins.com Phone: 615-478-2057	Multi source
	Caterpillar	46261	Steve Turner HealthTrust@cat.com Phone: 309-494-5105	Multi source
	Kohler	66551	Keith Kraemer hcasales@nixonpower.com Phone: 615-664-1487	Multi source
	Generac	3489	Mike Evans HCA@essellc.com Phone: 865-806-9435	Multi source
Surge Protective Devices	Square D	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Sole Source
Modular Headwall Units	BLOX	64799	Amanda Moore amoore@bloxbuilt.com 205-424-3242	Multi source
	Neopod	75807	Michael Miller mmiller@neopodsystems.com 512-987-0097	Multi source
Lighting	Acuity	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Sole Source
Fire & Life Safety Systems	Johnson Control	3273	Kevin Tolbert BE-HCA@jci.com 478-952-8740	Multi source
	Siemens	3574	Ed Tambornino ed.tambornino@siemens.com Phone: 615-329-2601	Multi source
	Edwards			Multi source
Structured Voice and Data Cabling Infrastructure	Accu-Tech	6715	Tim Flannagan 615-430-0813 Tim.Flannagan@accu-tech.com	Multi source
	Graybar	5892	Graybar – Nashville Jess Hoover, Charlie Shannon HCA@graybar.com 239-494-2088, 615-743-3226	Multi Source
Division 28 - Electronic Safety and Security				
Security System	ADT			Multi source
	Stanley			Multi source
Access Controls	Lenel Systems International, Inc.		Rick Keebler richard.keebler@lenel.com 513-260-1140	Multi source
	Software House / Tyco International		Keg Giles kgiles@tycoint.com 770-595-4719	Multi source
	aptiQ	7702	Gene Jones SSC South / Allegion gene.jones@allegion.com 615-631-8650	Multi source

SECTION 016400

RECEIPT OF OWNER AND HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT

PART 1 - GENERAL

1.1 OWNER AND HENDERSON BUILDING SOLUTIONS, LLC (HBS) FURNISHED EQUIPMENT

A. The Owner and HBS will, where indicated in the Contract Documents, furnish equipment to be incorporated into the Work by the Contractor.

B. Contractor shall, on the Owner's or HBS' behalf, accept delivery of the equipment and shall complete and promptly forward to HBS the equipment receipt notice included on the following page and complete any additional documentation required by the Owner for Owner furnished equipment.

C. Contractor shall immediately inform the Owner or HBS of any defects that prevent the Contractor accepting the equipment on behalf of the Owner or HBS. Contractor shall assume full responsibility for the equipment once accepted by the Contractor.

D. Additional Contractor responsibilities associated with Owner and HBS furnished equipment are included in other divisions of these specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

LEE'S SUMMIT MEDICAL CENTER

CHILLER PLANT REVISIONS

EQUIPMENT RECEIPT NOTICE

Date and Time Received: _____

Location Received: _____

Equipment Received: _____

_____

Equipment Accepted By: _____

Equipment Manufacturer: _____

Bill of Lading #: _____

Freight Company: _____

Condition of Equipment: _____

_____

_____

_____

_____

Note any damaged, missing or non-shipped components.

Contractor to complete this form upon receipt of equipment. Email completed form to com-inbound-lees-summit-mc-chiller-plant-revisions@us02.procoretech.com

END OF SECTION 016400

SECTION 016400.13

INSTALLATION REQUIREMENTS FOR OWNER AND HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT

PART 1 - GENERAL

1.1 TRANSFER OF HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT

A. Henderson Building Solutions, LLC (HBS) has issued purchase orders to respective manufacturer(s) for one (1) cooling tower.

1. The purchase order for the chillers includes freight (FOB job-site), start-up and testing services and Owner training and equipment warranty.

B. Payments to each manufacturer shall be made by Henderson Building Solutions directly to the manufacturer or manufacturer's representative except when Henderson Building Solutions Purchase Order is assigned to the Contractor per Section 016400.16.

C. All equipment has been purchased FOB job site. The Contractor shall coordinate the exact delivery time and location with each manufacturer. Equipment shall not be stored at the job site. Contractor shall provide offsite storage, protection, and required insurance until such time as the work allows for the delivery to job site for installation.

1. Preliminary scheduled equipment delivery dates are listed below. Contractor shall schedule final delivery dates directly with each manufacturer to ensure timely work flow and compliance with overall project schedule.

a. Cooling Tower – December 13, 2022

D. Contractor shall, on Henderson Building Solutions behalf, inspect and accept the equipment at point of delivery. Contractor shall immediately inform Henderson Building Solutions of any defects that prevent acceptance of equipment. Contractor shall assume full responsibility for the equipment once accepted, shall be responsible for any damage to the equipment occurring after Contractor's acceptance of the equipment, shall provide offloading of equipment at point of delivery, shall provide transport and rigging to place equipment in final installed location; and shall communicate directly with the equipment manufacturers to schedule all inspection, testing, start-up services and Owner training. Contractor shall provide and pay for any storage of equipment required prior to installation. Storage shall be off-site. Coordination of exact equipment delivery dates and location shall be responsibility of the Contractor.

1. Contractor shall complete the "Equipment Receipt Notice" form (Section 01540) and return to Henderson Building Solutions immediately upon receipt and Contractor's acceptance of the equipment.

1.2 EQUIPMENT WARRANTIES

A. Cooling Tower is being supplied with a 1-year parts only warranty. Contractor shall provide the labor portion of the warranty, for the duration of the manufacturer's parts warranty, for the cooling tower and all other components supplied by the manufacturer.

B. Contractor shall consult manufacturer to obtain information needed to quantify Contractor's labor obligations during the period covered by manufacturer's warranty.

1. Contractor shall provide a one year labor warranty covering Contractors work provided to install equipment and components shipped loose by the Manufacturer for field installation by the Contractor.

C. Contractor shall conduct the work in such a manner as to maintain in full force all warranties provided by each equipment manufacturer.

1.3 INSTALLATION OF OWNER AND HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT

A. Contractor shall fully familiarize themselves with the equipment submittal and installation information included in these Specifications and shall provide all labor and material required to install equipment in the location indicated on the Drawings and required for a properly functioning installation as indicated in the equipment installation information whether or not same is shown on the Construction Drawings.

B. It shall be the responsibility of the Contractor to obtain any additional information required to prepare the bid and to install Owner and Henderson Building Solutions furnished equipment directly from the manufacturers.

C. Equipment shall be rigged and lifted into place by the Contractor as directed by manufacturer. Contractor shall fully inform themselves of all conditions, work, materials, equipment, etc., required to provide installation of equipment in final location shown on the Drawings. Contractor's bid shall provide for complete installation of the equipment in the final location.

D. Field verify existing access and clearances available to place equipment in its final location prior to preparing the bid.

1. Provide temporary removal and reinstallation of any building components including mechanical, electrical, building fixtures, walls, doors, windows and roofs necessary to place equipment in the final installed location.

E. Equipment is being shipped fully assembled except as shown in the equipment submittals or described on the Drawings or in the Specifications. Contractor shall include in the bid all costs associated with equipment disassembly and reassembly necessary to place equipment in the final installed location.

1. All disassembly and reassembly shall be performed using methods required to maintain manufacturer’s warranty.

2. Provide new gaskets, seals, joining hardware, etc. where same is damaged by disassembly.

F. Contractor shall provide labor to install all accessories provided by the manufacturers for field installation.

G. Contractor shall provide complete draining and refill of any and all piping systems required to perform the work. Draining of piping systems shall be accomplished by isolating systems to greatest extent possible. Draining of entire piping systems shall not be allowed.

H. All Owner or Henderson Building Solutions furnished equipment shall be installed per equipment manufacturers written instructions.

I. Contractor shall provide all required insurances not provided by the equipment manufacturer.

J. Cooling Tower Installation

1. Contractor shall provide installation of all components provided by the cooling tower manufacturer for field installation.

2. Provide all labor necessary to assist manufacturer in initial cooling towers start-up and testing. Contractor shall schedule start-up, testing and Owner training with cooling tower manufacturer.

3. Contractor shall verify dimensions of required cooling tower supports and shall coordinate same with other trades.

4. Do not scale dimensions from the Drawings. Contractor will not be allowed extra payment for differences between the manufacturer's shop Drawings and the Construction Drawings. Where discrepancies occur, the manufacturer's shop Drawings shall be considered the basis of the Contractor's bid.

5. Maintain manufacturer's recommended clearances for service and maintenance.

6. Assist VFD installer with lock-out programming of critical fan speeds.

K. Manufacturer supplied accessories for each of the Owner or Henderson Building Solutions supplied equipment includes the accessories described below.

1. Cooling Tower
   a. Fan guards.
   b. Electric basin heaters, disconnect switch and controls.
   c. Air inlet screens.
   d. Service access platforms with guard rails.
   e. Walkway.
   f. Perimeter guard rails.
   g. Ladders with cages.
   h. Mechanical vibration cutoff switch.

PART 2 - PRODUCTS (NOT USED)

PART 3 - SCHEDULE OF EQUIPMENT FURNISHED BY OWNER OR HENDERSON BUILDING SOLUTIONS

3.1 OWNER OR HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT SCHEDULES

A. The following pages list the equipment furnished by the Owner and Henderson Building Solutions, manufacturer's contact information, accessories and services provided by the manufacturer, warranties to be provided by the Contractor and estimated delivery date to the site.

B. See drawings for addition information regarding Owner and Henderson Building Solutions furnished equipment.

C. See manufacturer's submittals and installation information included at the end of these specifications for additional information regarding Owner and Henderson Building Solutions furnished equipment.

HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT INFORMATION SHEET

Equipment Drawing Tag: CT-3

Equipment Description: Cooling Tower

Manufacturer: Baltimore Aircoil Company

Manufacturers Contact Info:
Company: McQueeny Group
Contact Name: Tyler Seals
Contact Phone: 913-396-4700
Contact Email: TSeals@mcqueenygroup.com
Other Contact Information:

Warranty provided by Manufacturer: 5 Year parts

Warranty provided by Contractor: 1 Year Labor on parts installed

Estimated Delivery Date: 12/13/2022

Services provided by manufacturer:
Disassembly/reassembly: No
Start-up: Yes
Owner Training: Yes
Other: PM Maintenance Inspections (2 Trips – First Year)

Accessories provided by manufacturer

Accessories	Factory or Field Installed
Fan Guard	Field Installed
Basin Water Level Controls	Field Wiring
Basin Heater Control	Field Installed
External Ladder	Field Assembled and Installed
Safety Railings	Field Assembled and Installed
Fan Deck Extension	Field Assembled and Installed
Access door platform	Field Installed
Control Panel	Field Installed

Other Information:

END OF SECTION 016400.13

SECTION 016400

RECEIPT OF OWNER AND HENDERSON BUILDING SOLUTIONS FURNISHED EQUIPMENT

PART 1 - GENERAL

1.1 OWNER AND HENDERSON BUILDING SOLUTIONS, LLC (HBS) FURNISHED EQUIPMENT

A. The Owner and HBS will, where indicated in the Contract Documents, furnish equipment to be incorporated into the Work by the Contractor.

B. Contractor shall, on the Owner's or HBS' behalf, accept delivery of the equipment and shall complete and promptly forward to HBS the equipment receipt notice included on the following page and complete any additional documentation required by the Owner for Owner furnished equipment.

C. Contractor shall immediately inform the Owner or HBS of any defects that prevent the Contractor accepting the equipment on behalf of the Owner or HBS. Contractor shall assume full responsibility for the equipment once accepted by the Contractor.

D. Additional Contractor responsibilities associated with Owner and HBS furnished equipment are included in other divisions of these specifications.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

LEE'S SUMMIT MEDICAL CENTER

CHILLER PLANT REVISIONS

EQUIPMENT RECEIPT NOTICE

Date and Time Received: _____

Location Received: _____

Equipment Received: _____

_____

Equipment Accepted By: _____

Equipment Manufacturer: _____

Bill of Lading #: _____

Freight Company: _____

Condition of Equipment: _____

_____

_____

_____

_____

Note any damaged, missing or non-shipped components.

Contractor to complete this form upon receipt of equipment. Email completed form to com-inbound-lees-summit-mc-chiller-plant-revisions@us02.procoretech.com

END OF SECTION 016400

SECTION 017316

RIGGING AND HOISTING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Rigging and Hoisting Work includes:

1. Rigging and hoisting for installation of new or temporary equipment and removal of existing or temporary equipment and materials.

B. Contractor shall be solely responsible for selection of equipment and methods used to perform any work required by this Specification Section.

1.2 JOB CONDITIONS

A. It is expressly understood that Henderson Building Solutions, LLC and the Owner will not be responsible for interpretations or conclusions drawn by Contractor regarding existing site conditions.

B. Existing Utilities and Improvements

1. Contractor shall make a detailed field inspection and note all obstructions and improvements at the subsurface, surface and overhead which may affect the method of operation in performing the Work. All overhead, surface and subsurface improvements shall be protected by the Contractor during performance of the Work. Any expense caused by the existence of overhead, surface or subsurface improvements or their protection or repair shall be considered included with the Work.

1.3 LOCATION OF CONTRACTOR'S EQUIPMENT

A. All equipment used by Contractor to perform rigging and hoisting shall be located in such a manner as to prevent damage to all existing improvements including overhead, surface and subsurface improvements.

1. Contractor shall, where indicated on the drawings, utilize only the staging areas and equipment entry and removal pathways shown on the drawings. Use of other staging and pathways shall only be allowed of approved in advance by Henderson Building Solutions.

B. Contractor shall inspect existing site conditions and available drawings in determining the best location of all rigging equipment. Additional information and drawings will be made available to the Contractor, upon request, as they may exist. Contractor shall be responsible for verifying the accuracy of any information provided by the Owner, Henderson Building Solutions, utility companies or from any other source. Contractor shall be responsible for repair of damage, to the satisfaction of the Owner, caused due to location and type of equipment and methods used to perform the Work.

C. Contractor shall coordinate the location, dates, and duration of all rigging and hoisting work and any equipment deliveries a minimum of 7 days in advance with the Owner and Henderson Building Solutions.

1.4 PUBLIC SAFETY

A. Fencing, planking, lights, barricades, warning signs, guard rails and Contractor employees shall be provided, erected and maintained for the safety of the public and the protection of the streets, sidewalks and adjacent property. All protection devices employed shall comply with local code and regulatory requirements.

B. Protective devices shall be removed when work is completed and the requirement for protective devices is no longer necessary.

C. The construction site, the building and all occupants shall be protected as required by the ANSI safety code and all other Federal, State and Local applicable codes.

1.5 APPROVALS

A. Contractor shall obtain and pay for any approvals or permits required by any governing authorities or utility companies having jurisdiction over the work.

B. Contractor shall be responsible for all costs associated with temporary closures, rerouting, traffic direction, or other requirements associated with disruption of public or private roadways, entrances or parking areas.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 MOISTURE AND FREEZE PROTECTION

A. Contractor shall protect all openings into the existing Facility, utilized by the Contractor during the performance of the Work, to prevent water from entering building, including ground water, rain, snow, service water and other sources of water. Contractor shall repair all damage to structure, finishes, equipment and materials caused by entrance of water to building through such openings at no cost to Henderson Building Solutions or the Owner. Contractors shall also be responsible to provide the necessary covering and insulation to prevent freezing of any equipment, piping or miscellaneous components in the Facility, or damage to any equipment, fixtures or finishes resulting from the exposure to low or high temperatures.

3.2 EQUIPMENT RIGGING

A. Contractor shall obtain specific equipment rigging and installation instructions from equipment manufacturer(s) prior to performing the Work.

B. All rigging, disassembly, assembly and protection of equipment required for installation shall be performed per manufacturer's instructions.

C. Contractor shall be responsible for any damage to new or existing equipment occurring during rigging and hoisting work. Contractor shall repair any damage to equipment per the direction of the equipment manufacturer and Henderson Building Solutions at no cost to the Owner or Henderson Building Solutions.

3.3 COORDINATION

A. Contractor shall schedule all work associated with rigging and hoisting a minimum of 7 days in advance with Henderson Building Solutions and the Owner.

END OF SECTION 017316

SECTION 017329

CUTTING, PATCHING AND SUB-SURFACE INVESTIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes procedural requirements for cutting, patching and sub-surface investigation.

B. Areas where sub-surface investigation is to be performed are shown on the drawings.

1.2 DEFINITIONS

A. Cutting: Removal of existing construction necessary to permit installation or performance of the Work.

B. Patching: Restoration and repair work required to restore surfaces to original conditions after installation of the Work.

C. Sub-Surface Investigation: The determination of the existence and location of pipe, conduit, wiring, reinforcement and other components in or below floor systems, roof systems and exterior finished grade.

1.3 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational and Miscellaneous Elements: Do not cut and patch elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Visual Requirements: Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

D. Rated Construction: Cut and patch existing elements that are fire and/or smoke rated using methods and materials that maintain the existing rating and that are approved by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Existing Materials: Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible.

B. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials and that are approved in advance by Henderson Building Solutions, LLC and the Owner.

PART 3 - EXECUTION

3.1 CUTTING AND PATCHING

A. Examination:

1. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.
    a. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes.
    b. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

B. Preparation

1. Temporary Support: Provide temporary support of Work to be cut.

2. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

3. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

4. Existing Services: Where existing services are required to be removed, relocated or abandoned, bypass such services before cutting to minimize interruption of services to occupied areas using methods approved by the Owner.

C. Performance

1. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
    a. Cut existing construction to provide for installation of other components or performance of other construction and subsequently patch as required to restore surfaces to their original condition.

2. Noise and Dust Generating Operations: Coordinate noise and dust generating operations with the Owner and Owners Facility Specific Procedures (Specification Section 013500) to minimize disturbance to normal operations. Noise and dust generating operations may be required to be conducted at other than normal working hours.

3. Cutting: Cut existing construction by sawing, drilling, breaking, chipping, grinding and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer, and comply with original Installer's written recommendations.
    a. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
    b. Existing Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
    c. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
    d. Proceed with patching after construction operations requiring cutting are complete.

4. Patching: Patch construction by filling, repairing, refinishing, closing up and similar operations following performance of other Work. Patch with durable seams that

are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications.

a. Inspection: Where feasible or required, test and inspect patched areas after completion to demonstrate integrity of installation.

b. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

c. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in new space. Provide an even surface of uniform finish, color, texture and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

1) Where patching occurs in a painted surface, apply primer and intermediate paint coats over patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

2) Perform work to maintain existing fire and smoke ratings.

d. Ceilings: Patch, repair or re-hang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

e. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

f. Rated Construction: Where cutting and patching rated construction fully restore fire and/or smoke rating of existing construction using only materials and methods acceptable to authorities having jurisdiction. Obtain and pay for any required inspections after completion of restoration.

3.2 SUB-SURFACE INVESTIGATION

A. Locations

1. Perform sub-surface investigations for all work occurring below grade exterior to the facility and in interior areas where shown on the drawings.

B. Investigation Methods

1. Equipment methods and techniques used to perform sub-surface investigation shall be selected by the Contractor; shall be appropriate for location and material(s) where investigation is to occur; and shall not damage in any way the construction or finish where investigation is to occur.

2. Where necessary for a full sub-surface investigation, Contractor shall employ multiple methods of sub-surface investigation.

C. Performance

1. Verify area(s) where sub-surface investigations are to occur with drawings and on-site observation. Where discrepancies occur, contact Henderson Building Solutions for direction.

2. Move all portable furniture, equipment and other obstructions to allow access to areas to be investigated. Replace at completion of investigation.

3. Prepare a to-scale drawing of the entire area to be investigated. Include on drawing:
   a. All non-portable items located at the surface of the area to be investigated.
   b. All items located in floors, roofs and walls of area to be investigated. Include type (pipe, reinforcing bar, conduit, etc.), installed depth, and size of item where possible.
   c. All items located below floors and below grade in areas to be investigated. Include type (pipe, tank, conduit, etc.) and size of item where possible.

4. Forward drawings and any other documents detailing results of sub-surface investigations to Henderson Building Solutions.

5. Where drawing indicates work involving existing pipe, conduit, reinforcement, etc. located below or in floors, walls, roofs or below grade, such work shall be considered work required by this project. Additional compensation shall not be allowed to the Contractor.

6. Contractor may be allowed additional compensation where sub-surface investigations identify pipe, conduit, reinforcement, etc. requiring removal or modification in order to accommodate the work required by this project. The Proposal Request and Change Order process identified in other sections of these specifications shall be used where the Contractor may be entitled to additional compensation.

END OF SECTION 017329

SECTION 017700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes requirements for Contract closeout and related matters.

B. All documents described in this Section of the Specifications shall be submitted to Henderson Building Solutions, LLC and/or the Owner prior to Henderson Building Solutions making final payment to Contractor.

1.2 CLEAN UP

A. At the completion of work, remove all temporary facilities, unused materials, tools, equipment, trash, and debris from the site. Leave the site clean, neat, and ready for full and normal use by the Owner.

1.3 HENDERSON BUILDING SOLUTIONS FINAL INSPECTION REPORT

A. Submit to Henderson Building Solutions a report detailing actions taken by Contractor as a result of Henderson Building Solutions final project (punch list) inspection. Contractor's report shall detail action taken for each individual item included in Henderson Building Solutions final inspection report. Include a copy of Henderson Building Solutions inspection report with Owner's signature verifying completion of remedial actions.

1.4 COMMISSIONING REPORT

A. Submit to Henderson Building Solutions, using forms contained in the Commissioning Report, written verification that all deficiencies identified in the Commissioning Report have been remedied by the Contractor. Include detailed description of actions taken by Contractor for each deficiency identified in the Commissioning Report.

1.5 OTHER DOCUMENTS

A. See Section "Final Completion" and "Application for Final Payment" for other documents to be submitted with Application for Final Payment. Documents identified in Section 011100.13 include:

1. Record Drawings.
2. Operation and Maintenance Manuals/Project Manual.
3. Lien Waivers.
4. Owner Training Verification.
5. Extra Stock and Spare Parts.
6. Project and Other Warranties.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION 017700

SECTION 230010

GENERAL MECHANICAL REQUIREMENTS

PART 1 - GENERAL REQUIREMENTS

1.1 DESCRIPTION OF WORK

A. This Division requires the furnishing and installing of complete functioning systems, and each element thereof, as specified or indicated on the Drawings and Specifications or reasonably inferred from same; including every article, device or accessory (whether or not specifically called for by item) reasonably necessary to facilitate each system's functioning as indicated by the design and the equipment specified. Elements of the work include materials, labor, supervision, supplies, equipment, transportation, and utilities.

B. Division 23 of the Specifications and Drawings numbered with prefixes M generally describe these systems, but the scope of the Mechanical work includes all such work indicated in the Contract Documents: Instructions to Bidders; Proposal Form; General Conditions; Supplementary General Conditions; Architectural, Structural, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.

C. The Drawings have been prepared to convey the scope of work, indicating the arrangement of the equipment, fixtures, ductwork, piping, etc. without showing all the exact details as to elevations, offsets, control lines, and other installation requirements. The Contractor shall use the Drawings when laying out the work and shall verify that materials and equipment will fit into the designated spaces, and which, when installed per manufacturers requirements, will ensure a complete, coordinated, satisfactory and properly operating system.

1.2 QUALITY ASSURANCE

A. All work under this Division shall be executed in a thorough professional manner by competent and experienced workmen licensed to perform the Work specified.

B. All work shall be installed in strict conformance with manufacturers' requirements and recommendations. Equipment and materials shall be installed in a neat and professional manner and shall be aligned, leveled, and adjusted for satisfactory operation.

C. Material and equipment shall be new, shall be of the best quality and design, shall be current model of the manufacturer, shall be free from defects and imperfections and shall have markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Material and equipment of the same type shall be made by the same manufacturer whenever practicable.

D. Unless specified otherwise, manufactured items shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this project.

1.3 CODES, REFERENCES AND STANDARDS

A. Execute Work in accordance with the National Fire Protection Association and all Local, State, and National codes, ordinances and regulations in force governing the particular class of Work involved. Obtain timely inspections by the constituted authorities, and upon final completion of the Work obtain and deliver to the Owner executed final certificates of acceptance from the Authority Having Jurisdiction.

B. Any conflict between these Specifications and accompanying Drawings and the applicable Local, State and Federal codes, ordinances and regulations shall be reported to Henderson Building Solutions, LLC in sufficient time to allow Henderson Building Solutions to prepare the Supplementary Drawings and Specification Addenda required to resolve the conflict.

C. The governing codes are minimum requirements. Where these Drawings and Specifications exceed the code requirements, these Drawings and Specification shall prevail.

D. All material, manufacturing methods, handling, dimensions, method or installation and test procedure shall conform to but not be limited to the following industry standards and codes:

IMC	2018 International Mechanical Code
IPC	2018 International Plumbing Code
IECC	2018 International Energy Conservation Code
IFC	2018 International Fire Code
ADC	Air Diffusion Council
AIA	Guidelines for Design and Construction of Hospital and Healthcare Facilities
ANSI	American National Standards Institute
AHRI	Air Conditioning, Heating and Refrigeration Institute
ASHRAE	American Society of Heating Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society of Testing Materials
AWS	American Welding Society
AWWA	American Water Works Association
ETL	Electrical Testing Laboratories
HI	Hydraulic Institute
MSS	Manufacturer’s Standardization Society of the Valve and Fitting Industry
NEC	2017 National Electrical Code
NFPA	National Fire Protection Association
NEMA	National Electrical Manufactures' Association
OSHA	Occupational Safety and Health Act
UL	Underwriter's Laboratories

E. Contractor shall comply with rules and regulations of public utilities and municipal departments affected by connections of services.

F. All mechanical work shall be performed in compliance with applicable safety regulations, including OSHA regulations. Safety lights, guards, shoring and warning signs required for the performance of the mechanical work shall be provided by the Contractor.

1.4 DEFINITIONS

A. General:

1. Furnish: The term “furnish” is used to mean “supply and deliver to the project site, ready for unloading, unpacking, assembly, installation and similar operations.”

2. Install: The term “install” is used to describe operations at the project site including the actual “unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.”

3. Provide: The term “provide” means “to furnish and install, complete and ready for the intended use.”

4. Furnished by Owner, Henderson Building Solutions or Furnished by Others: The item will be furnished by the Owner or Others. It is to be installed and connected under the requirements of this Division, complete and ready for operation, including items incidental to the Work, including services necessary for proper installation and operation. The installation shall be included under the guarantee required by the Contract Documents.

5. Engineer: Where referenced in this Division, “Engineer” is the Engineer of Record and the Design Professional for the Work under this Division and is a consultant to, and an authorized representative of Henderson Building Solutions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to Henderson Building Solutions.

6. AHJ: The local code and/or inspection agency (Authority) Having Jurisdiction over the Work.

7. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other listed Manufacturers and models that meet the specified criteria.

B. The terms "approved equal", “equivalent”, or "equal" are used synonymously and shall mean “accepted by or acceptable to Henderson Building Solutions as equivalent to the item or manufacturer specified”. The term "approved" shall mean labeled, listed, or both, by an NRTL, and acceptable to the AHJ over this project.

1.5 COORDINATION

A. The Contractor shall visit the site and ascertain the conditions to be encountered while installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make do provision for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, incorrect or faulty installation of Work under this Division or for additional compensation for Work covered by this Division.

B. The Contractor shall refer to Drawings of the other disciplines and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. The Contractor shall make offsets required to clear equipment, beams and other structural members; and to facilitate concealing piping and ductwork in the manner anticipated in the design.

C. The Contractor shall confirm and coordinate the final location and routing of all mechanical, electrical and control systems with structural components and other trades. . The Contractor shall not proceed with any installation in such areas until Henderson Building Solutions has given written approval to proceed or has provided modified contract drawings or written instructions to resolve the apparent conflict.

D. The Contractor shall maintain a foreman on the jobsite at all times to coordinate his work with other contractors and subcontractors so that various components of the mechanical systems will be installed at the proper time, will fit the available space, and will allow proper

service access to the equipment. Carry on the Work in such a manner that the Work of the other contractors and trades will not be handicapped, hindered, or delayed at any time.

E. Work of this Division shall progress according to the "Construction Schedule" as established by the Prime Contractor and as approved by Henderson Building Solutions. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule so as to ensure successful achievement of schedule dates.

1.6 MEASUREMENTS AND LAYOUTS

A. The drawings show the various components of the systems approximately to scale and indicate how they are to be integrated with other parts of the building. Figured dimensions shall be taken in preference to scale dimensions. Determine exact locations by jobsite measurements, by checking the requirements of other trades and equipment manufacturers, and by reviewing the Contract Documents. The Contractor will be held responsible for errors which could have been avoided by proper checking and inspection.

1.7 SUBMITTALS

A. Refer to Division 1 for submittal requirements.

B. Submittals and shop drawings shall not contain Henderson Building Solutions or HEI's firm name or logo, nor shall it contain the HEI's engineers' seal and signature. They shall not be copies of Henderson Building Solutions or HEI's work product. If the Contractor desires to use elements of such product, the license agreement for transfer of information at the end of this section must be used.

1.8 ELECTRONIC DRAWING FILES

A. In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format from Henderson Building Solutions. Contractor shall complete and send the form attached at the end of this section. Contractor shall indicate the desired shipping method and drawing format on the attached form. Engineer's release agreement form must be received before electronic drawing files will be sent.

1.9 OPERATION AND MAINTENANCE MANUALS

A. Refer to Division 1 for Operational and Maintenance Manual requirements.

1.10 PROJECT MANUAL

A. Assemble and submit at completion of the project a Project Manual per the requirements of Division 1.

1.11 SPARE PARTS

A. Provide to the Owner the spare parts specified in the individual sections in Division 23 of this specification.

1.12 RECORD DOCUMENTS

A. Prepare record documents for all Mechanical systems in accordance with the requirements of Division 1 Section "Contract Closeout". In addition to the requirements specified in Division 1, indicate the following installed conditions:

1. Mains and branches of piping systems, type, size, location and elevation, with valves and control devices located and numbered with valve schedule, concealed unions located, and with items requiring maintenance located. Valve location diagrams, complete with valve tag chart. Refer to Division 23 Section “Mechanical Identification.”

2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.

3. Approved substitutions, Contract modifications, and actual equipment and materials installed.

1.13 PAINTING

A. Where factory finishes are provided and no additional field painting is specified, marred or damaged surfaces shall be touched up or refinished so as to leave a smooth, uniform finish.

1.14 DELIVERY, STORAGE AND HANDLING

A. Deliver, receive, handle and store equipment and materials at the job site in the designated area and in such a manner as to prevent equipment and materials from damage and loss. Store equipment and materials delivered to the site on pallets and cover with waterproof, tear resistant tarp or plastic or as required to keep equipment and materials dry. Follow manufacturer's recommendations, and at all times, take every precaution to properly protect equipment and material from damage, to include the erection of temporary shelters to adequately protect equipment and material stored at the Site. Equipment and/or material which become rusted or damaged shall be replaced or restored by the Contractor to a condition acceptable to Henderson Building Solutions.

B. The Contractor shall be responsible for the safe storage of his own tools, material and equipment.

1.15 PROJECT CONDITIONS

A. Conditions Affecting Work in Existing Buildings: The following project conditions apply:

1. The Drawings describe the scope of remodeling to the existing building. However, the Contractor shall visit the Site prior to submitting his bid to determine the nature and extent of work involved.

2. Work in the existing building shall be scheduled with Henderson Building Solutions and the Owner.

3. Certain demolition work must be performed prior to starting the new work. The Mechanical Contractor shall perform the demolition which involves Mechanical systems, equipment, piping and equipment.

4. Mechanical Contractor shall remove articles which are not required for the new Work. Unless otherwise indicated, each item removed by the Mechanical Contractor during this demolition shall become his property and shall be removed by the Mechanical Contractor from the premises and dispose of them in accordance with applicable federal, state and local regulations.

5. Mechanical Contractor shall relocate and reconnect Mechanical facilities that must be relocated in order to accomplish the remodeling shown in the Drawings or

indicated in the Specifications. Where Mechanical equipment or materials are removed, the Mechanical Contractor shall cap unused piping beyond the floor line or wall line to facilitate restoration of finish.

6. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.

7. Locate, identify, and protect mechanical services passing through demolition area and serving other areas outside the demolition limits. Maintain services to areas outside demolition limits. When services must be interrupted, install temporary services for affected areas.

1.16 HAZARDOUS MATERIALS

A. The Contractor is hereby advised that building components to be encountered as part of the Work may have been painted or stained with lead based products. It is the Contractor's responsibility to take all proper precautions concerning potential lead based products and to comply with the Occupational Safety and Health Administration's Lead in Construction Rule, 29 CFR Part 1926 et al, and Hazard Communication Standard 29 CFR 1926.59. These precautions include material sampling and analysis, OSHA required worker protection, area isolation, engineering and work practice controls, and cleaning. The Contractor shall handle all suspect or identified lead based products with care as not to scratch, scrape, grind, or in any other way release the lead based products, except as specifically required by the Work. The Contractor is responsible for properly cleaning all areas where suspect or identified lead based paint products are disturbed prior to returning the building to the Owner.

B. The Contractor shall not install new lead or lead bearing products as defined by the U.S. Consumer Product Safety Commission's Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint 16 CFR 1303 et al., which is 0.6% lead and greater by weight of the total nonvolatile content of the paint or of the dried paint film, including but not limited to paints, coatings, stains, etc.

C. In the event that asbestos or any other hazardous material is or will be encountered while performing the Work, the Contractor shall immediately cease work and notify Henderson Building Solutions and the Owner.

1.17 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 1 Section "Cutting and Patching." In addition to the requirements in Division 1, the following requirements apply.

B. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

C. Perform cutting, fitting and patching of mechanical and plumbing equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.

2. Remove and replace defective Work.

3. Remove and replace Work not conforming to requirements of the Contract Documents.

4. Remove samples of installed Work and specified for testing.

5. Install equipment and materials in existing structures.

6. Upon written instructions from Henderson Building Solutions, uncover and restore Work to provide for Henderson Building Solutions observation of concealed Work.

D. Cut, remove and legally dispose of selected mechanical equipment, components, and materials as indicated, including but not limited to removal of mechanical piping, mechanical equipment and other mechanical items made obsolete by the new Work.

E. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

F. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent spaces.

G. Patch finish surfaces and building components using new materials matching the original installation and experienced installers.

1.18 START-UP, TESTING AND BALANCING

A. Contractor shall provide all labor and materials necessary to perform the specified Mechanical start-up, testing and balancing.

B. Where start-up, testing and balancing is specified to be provided by or witnessed by others (including government authorities), Contractor shall provide all labor required to witness, support and generally facilitate the specified Work being performed by others.

PART 2 - PRODUCTS AND MATERIALS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION 230010

AGREEMENT FOR TRANSFER OF INFORMATION
MACHINE-READABLE FORMAT

PROJECT NAME: _____

PROJECT NO/PHASE: _____ Made this day, _____

By and Between Henderson Engineers, Inc., Lenexa, Kansas (hereinafter referred to as ENGINEER) and _____ (hereinafter referred to as RECIPIENT).

The enclosed electronic media are provided pursuant to your request for the purpose of production of shop drawings or record drawings. In using it, modifying it, or accessing information from it, you are responsible for confirmation, accuracy, and checking of the data from the media. ENGINEER hereby disclaims any and all responsibility from any results obtained in use of this electronic media and does not guarantee any accuracy of the information.

RECIPIENT agrees that it shall not use the information provided by ENGINEER for any purpose other than that described above without the express written consent of ENGINEER. RECIPIENT also hereby acknowledges that the data delivered by ENGINEER is for use by RECIPIENT only and is not to be released to any other party without the written consent of the ENGINEER and does not transfer ownership of the instruments of professional service.

RECIPIENT understands that the automated conversion of information and data from the system and format used by ENGINEER to an alternate system or format cannot be accomplished without the possibility of introduction of inexactitudes, anomalies, and errors. In the event project documentation provided to RECIPIENT in machine readable form is so converted, RECIPIENT agrees to assume all risk associated therewith, and to the fullest extent permitted by law, to hold harmless and indemnify ENGINEER from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising therefrom or in connection therewith.

RECIPIENT recognizes that changes or modifications to ENGINEER'S instruments of professional service introduced by anyone other than ENGINEER may result in adverse consequences that ENGINEER can neither predict nor control. Therefore, and in consideration of ENGINEER'S agreement to deliver its instruments of professional service in machine readable format, RECIPIENT agrees, to the fullest extent permitted by law to hold harmless and indemnify ENGINEER from and against all claim, liabilities, losses, damages, and costs, including misuse or reuse by others of the machine readable information and data provided by ENGINEER under this Agreement. The foregoing indemnification applies, without limitation, to any use of the project documentation on another project, for additions to this project, or for completion of this project by others; ENGINEER may authorize excepting only such use in writing.

Signature
HENDERSON ENGINEERS, INC.

_____
Date _____

Signature
RECIPIENT

_____
Date _____

Shipping Method	Format	Media
☐ E-Mail	☐ AutoCAD 2000/2002	☐ CD-ROM
☐ First Class Mail	☐ AutoCAD 2004/2005	☐ DVD
☐ FedEx Overnight (No P.O. Boxes)	☐ DXF	

Shipping or E-Mail Address: Phone:

SECTION 230519

METERS AND GAUGES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of meters and gauges:

1. Temperature gauges and fittings.

2. Pressure gauges and fittings.

1.2 SUBMITTALS

A. Product data for each type of meter and gauge. Include size, materials, scale range, ratings, accuracy and dimensions.

B. Application Schedule: Submit detailed application schedule listing each system meters and gauges are installed in, location within system for each meter and gauge with scale range for each location.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Self-Powered Digital Thermometers:
   a. Weiss Instruments, Inc.

2. Direct Mounted, Liquid Filled Pressure Gauges:
   a. Weiss Instruments, Inc.

2.2 THERMOMETERS, GENERAL

A. Accuracy: Plus, or minus one scale division to maximum of 1.0 percent of scale range.

B. Scale Range: Temperature ranges for services listed as follows:

1. Condenser Water: 0°F to 120° F

C. Thermometers installed outdoors shall be equipped with a waterproof housing

2.3 SELF-POWERED DIGITAL THERMOMETERS

A. Case: High impact ABS with glass passivated thermistor, 3-1/2 inches long.

B. Adjustable Joint: Finished to match case, 180-degree adjustment in vertical plane, 360-degree adjustment in horizontal plane, with locking device.

C. Display: 3/8" LCD digits, wide ambient formula, 10 lux, and -40ºF to 300ºF range. Provide with an accuracy of 1%.

D. Recalibration: Internal potentiometer.

E. Stem: Stainless steel, aluminum or brass, for separable socket, length to suit installation.

1. Minimum 6" stem where installed in air sensing applications.

F. Provide Weiss, DVU-35 with separable well.

2.4 THERMOMETER WELLS

A. Thermometer Wells: Brass or stainless steel, pressure rated to match piping system design pressure; with extensions for insulated piping. Fill each thermometer well with heat conductive compound.

1. Provide wells for all hydronic applications.

2. Provide extensions for insulated piping.

2.5 DIRECT MOUNTED, LIQUID FILLED, DIAL PRESSURE GAUGES

A. Type: General use, ASME B40.1, Grade A, phosphor bronze bourdon-tube type, bottom connection and glycerin filled.

B. Case: Drawn steel or aluminum, acrylic lens, 2-1/2 inches diameter, solid front, blowout back.

C. Connector: Brass, 1/4-inch NPS, threaded, with quarter turn shut-off valve. Provide snubber for gauges at pumps

D. Scale: White coated aluminum, with permanently etched markings.

E. Accuracy: Plus, or minus 1 percent of middle half of scale range.

1. Scale ranges including requirement for compound.

F. Range: 2 times operating pressure.

G. Lens: Acrylic.

H. Fittings:

1. Snubbers: 1/4-inch brass brushing with corrosion resistant metal disc suitable for system installed.

PART 3 - EXECUTION

3.1 THERMOMETERS INSTALLATION

A. Install thermometers at chiller condenser shells, and where indicated on the drawings, in vertical and tilted positions to allow reading by observer standing on floor.

B. Thermometer Wells: Install in all hydronic application piping where thermometers are indicated. Fill well with thermal conducting compound. Locate to ensure accurate measurement of fluid temperature.

3.2 INSTALLATION OF PRESSURE GAUGES

A. Install at chiller condenser shells, pumps and where indicated on the drawings, located in most readable position.

B. Provide shut-off valve for all gauges. Provide snubbers for all gauges located at pumps.

END OF SECTION 230519

SECTION 230523

VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes general duty valves common to mechanical piping systems.

B. Special purpose valves are specified in other Divisions piping system Sections.

1.2 SUBMITTALS

A. Product Data for each valve type. Include body material, valve design, pressure and temperature classification, end connection details, seating materials, trim material and arrangement, dimensions and required clearances, and installation instructions.

1. Valve Application Schedule: Submit application schedule for each pipe system valves are installed in. Schedule to include pipe system, pipe size, valve type, pressure rating, end connections and valve accessories furnished.

B. Maintenance data for valves to include in the operation and maintenance manual specified in Division 1. Include detailed Manufacturer's instructions on adjusting, servicing, disassembling, and repairing.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain each type of valve from a single Manufacturer.

B. ASME Compliance: Comply with ASME B 31.9 for building services piping and ASME B 31.1 for power piping.

C. MSS Compliance: Comply with the various MSS Standard Practice documents referenced.

1.4 DELIVERY, STORAGE AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.

2. Protect threads, flange faces, and weld ends.

3. Set ball valves open to minimize exposure of functional surfaces.

4. Set butterfly valves closed or slightly open.

5. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store indoors and maintain valve temperature higher than ambient dew-point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use a sling to handle large valves. Rig to avoid damage to exposed parts. Do not use handwheels and stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Check Valves:
   a. Kitz
   b. NIBCO
   c. Crane
   d. Grinnell
   e. Milwaukee
   f. Kennedy

2. Ball Valves:
   a. Kitz
   b. NIBCO
   c. Apollo
   d. Watts
   e. Milwaukee
   f. Hammond

3. Butterfly Valves:
   a. Kitz
   b. NIBCO
   c. Crane
   d. Centerline
   e. Grinnell
   f. Keystone
   g. Hammond

2.2 GENERAL REQUIREMENTS FOR VALVES

A. Pressure and Temperature Ratings: As indicated in the “Application Schedule” of Part 3 of this Section and as required to suit system pressures and temperatures.

B. Sizes: Same size as upstream pipe, unless otherwise indicated.

C. Valve Operators: Use specified valve operators and handwheels. Provide the following special operator features:

1. Chainwheel operator for valves 4” and larger located 6’-6” or higher above the finished floor that will be operate on a regular basis. Provide chain to 60 inches above finished floor.

D. Extended Stems: Where insulation is indicated or specified, provide extended stems arranged to receive insulation. Provide plastic protective sleeve for ball valve installed in insulated piping.

E. Threads: ASME B 1.20.1.

F. Flanges: ASME B 16.1 for cast iron, ASME B 16.5 for steel, and ASME 16.24 for bronze valves.

G. Solder Joint: ASME B 16.18.

1. Caution: Where soldered end connections are used, use solder having a melting point below 840°F for gate, globe, and check valves; and below 421ºF for ball valves.

2.3 BALL VALVES

A. Ball Valves, 2 Inches and Smaller for Hydronic Piping: MSS SP-110, 600-psi CWP, ASTM B-584 bronze body, 2-piece construction; chrome plated ball and stem, full port, blowout proof; Teflon seats and seals; threaded or soldered end connections, with:

1. Operator: Vinyl-covered steel lever handle.

2. Stem Extension and Protective Shield: For valves installed in insulated piping.

3. Memory Stop: For operator handles.

B. Ball Valves, 2-1/2 Inches and Larger for Hydronic Piping: MSS SP-72, Class 150, 600 psig CWP, carbon steel split body, stainless steel ball and stem, Teflon seats and seals, flanged ends.

1. Operator: Lever handle with locking device.

2.4 BUTTERFLY VALVES

A. Butterfly Valves, 2-1/2 Inches and Larger: MSS SP-67 Type 1, Class 125/150, 200-psi (150-psi for 14” and larger) CWP, ASTM A 126 CL B cast-iron body or ASTM A 536 shock resistant ductile iron body, 2” extended neck, stainless-steel stem, EPDM cartridge seat liner and seals. Valves to be lug style suitable for bi-directional dead end service at rated pressure without the need for a down stream blind flange:

1. Disc Type: Aluminum bronze.

2. Operator: Lever handle with latch lock for valves 6 inches and smaller and gear operator with position indicator for valves 8 inches and larger.

2.5 CHECK VALVES

A. Swing Check Valves, 2 Inches and Smaller: MSS SP-80 Type 1 or 2, Class 125, 200-psi CWP; horizontal or vertical flow, Y-pattern, ASTM B 62 cast-bronze body and cap, bronze disc, threaded or soldered end connection.

B. Swing Check Valves, 2 1/2 Inches and Larger: MSS SP-71 Type 1, Class 125, 200-psi (150 psi for 14 inches and larger) CWP, ASTM A 126 cast-iron body and bolted cap, horizontal or vertical flow, bronze disc, flanged end connections.

C. Wafer Type Check Valves, 2 1/2 Inches and larger: MSS SP-125 Class 125, 200-psi CWP, ASTM B 62 bronze body, ASTM B16 brass disc, stainless steel pins and springs, EDPM seats, two-piece shell, center-guided, threaded ends.

D. Globe Type Check Valves, 2 1/2 Inches and Larger: MSS SP-125 Class 125, 200-psi (150 psi for 14 inches and larger) CWP, ASTM A 126 cast-iron body, bronze disc, stainless-steel pins and springs, EPDM seats, flanged ends.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine piping system for compliance with requirements for installation tolerances and other conditions affecting performance of valves. Do not proceed with installation until unsatisfactory conditions have been corrected.

B. Do not attempt to repair defective valves; replace with new valves.

3.2 INSTALLATION

A. Install valves as indicated, according to manufacturer's written instructions.

B. Install valves with unions or flanges at each piece of equipment arranged to allow servicing, maintenance, and equipment removal without system shutdown.

C. Locate valves for easy access and provide separate support where necessary.

D. Install valves in horizontal piping with stem at or above the center of the pipe.

E. Install valves in a position to allow full stem movement.

F. Installation of Check Valves: Install for proper direction of flow as follows:

1. Swing Check Valves: Horizontal position with hinge pin level.

2. Wafer Check Valves: Horizontal or vertical position, between flanges.

G. For Installation of check valves at pumps, see the Application Schedule at the end of this section.

3.3 SOLDERED CONNECTIONS

A. Cut tube square and to exact lengths.

B. Clean end of tube to depth of valve socket with steel wool, sand cloth, or a steel wire brush to a bright finish. Clean valve socket.

C. Apply proper soldering flux in an even coat to inside of valve socket and outside of tube.

D. Remove the cap and disc holder of swing check valves having composition discs.

E. Insert tube into valve socket, making sure the end rests against the shoulder inside valve. Rotate tube or valve slightly to ensure even distribution of the flux.

F. Apply heat evenly to outside of valve around joint until solder melts on contact. Feed solder until it completely fills the joint around tube. Avoid hot spots or overheating valve. Once the solder starts cooling, remove excess amounts around the joint with a cloth or brush.

3.4 THREADED CONNECTIONS

A. Note the internal length of threads in valve ends and proximity of valve internal seat or wall to determine how far pipe should be threaded into valve.

B. Align threads at point of assembly.

C. Apply appropriate tape or thread compound to the external pipe threads, except where dry seal threading is specified.

D. Assemble joint, wrench tight. Wrench on valve shall be on the valve end into which the pipe is being threaded.

3.5 FLANGED CONNECTIONS

A. Align flange surfaces parallel.

B. Assemble joints by sequencing bolt tightening to make initial contact of flanges and gaskets as flat and parallel as possible. Use suitable lubricants on bolt threads. Tighten bolts gradually and uniformly with a torque wrench.

C. For dead-end service, butterfly valves require flanges both upstream and downstream for proper shutoff and retention.

3.6 VALVE END SELECTION

A. Select valves with the following end connections:

1. Copper Tube sizes 2 Inches and Smaller: Threaded.

2. Copper Tube sizes 2 -1/2 Inches and Larger: Flanged.

3. Steel Pipe sizes 2 Inches and Smaller: Threaded.

4. Steel Pipe sizes 2-1/2 Inches and Larger: Flanged.

3.7 APPLICATION SCHEDULE

A. Use valves of the types indicated on the Drawings for each system. Where valve types are not indicated use valves of the type shown in the following paragraphs.

B. Chilled and Condenser Water:

1. Valves 2-1/2 Inches and Smaller:
   a. Ball Valves.
   b. Swing Check Valves.

2. Valves 2-1/2 Inches and Larger:
   a. Ball Valves.
   b. Butterfly Valves.
   c. Swing Check Valves.

C. Check Valves at Mechanical Pumps:

1. Use the following Check Valve Types:
   a. Wafer-Type Check Valve.
   b. Globe-Type Check Valve.

3.8 ADJUSTING

A. Adjust or replace packing after piping systems have been tested and put into service, but before final adjusting and balancing. Replace valves if leak persists.

END OF SECTION 230523

SECTION 230529

MECHANICAL SUPPORTS AND ANCHORS

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the following:

1. Horizontal-piping hangers and supports.
2. Vertical-piping clamps.
3. Hanger-rod attachments.
4. Building attachments.
5. Welded steel brackets.
6. Saddles and shields.
7. Miscellaneous materials.

B. Supports specific to individual mechanical systems and included in other Divisions and Sections.

1.2 DEFINITIONS

A. Terminology used in this section is defined in MSS SP-90.

1.3 SUBMITTALS

A. Product data, including dimensions, materials and installation instructions for each type of support and anchor. Submit pipe hanger and support schedule showing Manufacturer's figure number, application and features for each required pipe hanger and support.

1. Application schedule to include pipe system, size, hanger and/or support type with accessories, support spacing and building attachments. Include manufacturer and model number in schedule.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with applicable building codes pertaining to product materials and installation of supports and anchors.

PART 2 - PRODUCTS

2.1 MANUFACTURED UNITS

A. Hangers and support components shall be factory fabricated of materials, design, and manufacturer complying with MSS SP-58.

1. Components shall have galvanized coatings where installed for piping and equipment that will not have field-applied finish.

2. Pipe supports shall be copper or shall have a nonmetallic coating for electrolytic protection where attachments are in direct contact with un-insulated copper.

B. Horizontal Piping Hangers and Supports:

1. Adjustable Steel Clevis Hanger: MSS Type 1.

2. Adjustable Steel Band Hanger: MSS Type 7.

3. Adjustable Copper Band Hanger: MSS Type 9.

4. Wall Brackets: MSS Type 31, 32 or 33 welded steel securely anchored to wall substrate.

5. U-Bolts: MSS Type 24.

C. Vertical Piping Clamps:

1. Riser Clamp: MSS Type 8.

D. Hanger Rod Attachments:

1. Steel Turnbuckle: MSS Type 13.

E. Building Attachments:

1. Top Beam C-Clamp: MSS Type 19 with nut on threaded rod above and below clamp.

2. C-Clamp: MSS Type 23.

3. Top Beam Clamp: MSS Type 25.

4. Steel or Malleable Concrete Inserts: MSS Type 18. For upper attachment to suspend pipe hangers from concrete deck.

F. Welded Steel Brackets:

1. MSS Type 31, 32 or 33, as required by loading.

G. Saddles and Shields:

1. Protective Shield: MSS Type 40, galvanized, length and gauge as recommended by manufacturer to prevent crushing of insulation or at minimum per Part 3 of this Section.

2.2 MISCELLANEOUS MATERIALS

A. Steel Plates, Shapes, and Bars: ASTM A 36.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions under which supports, and anchors are to be installed. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF HANGERS AND SUPPORTS

A. General: Install hangers, supports, clamps and attachments to support piping properly from building structure (beams and joists); comply with MSS SP-69 and SP- 89. Arrange for grouping of parallel runs of horizontal piping supported together on field- fabricated, heavy-duty trapeze where possible. Where piping of various sizes is supported together by trapeze, space hangers for smallest pipe size or install intermediate supports for smaller diameter pipe as specified above for individual pipe hangers.

B. Install additional supports at concentrated loads, as shown on drawings, and including equipment, valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

C. Support from Structural Steel: Liquid filled piping may be supported directly off of the structural framing members as outlined below. Where pipes are supported or hung from steel joists or beams, the supports or hangers shall not be hung from or fastened to the bottom chord of the joists or flange of beam but shall be supported and fastened to the top chord of the joists or flange of beam. Only clamps or fasteners manufactured for this purpose may be used. Where runs of piping are parallel to the joists or beams and are located between joists or beams, pre-fabricated support channels shall be installed to span between the joist top chords or beam flanges for support of hangers. Channel supports shall be attached to joist top chords or beam flanges as described above.

D. Use of Hanger Tabs: Hanger tabs provided as an integral part of the composite steel floor deck shall be used for support of ceiling loads only. Piping, wiring, ductwork and other mechanical loads shall not be suspended from these hanger tabs.

E. Field-Fabricated, Heavy-Duty Steel Trapezes: Fabricate from steel shapes selected for loads required; weld steel in accordance with AWS D-1.1.

F. Load Distribution: Install hangers and supports so that piping live and dead loading and stresses from movement will not be transmitted to connected equipment.

G. Pipe Slopes: Install hangers and supports to provide pipe slopes where specified or required.

H. Insulated Piping: Install protective shields MSS Type 40. Shields shall span an arc of 180 degrees and shall have dimensions in inches not less than the following:

NPS	LENGTH	THICKNESS (GAUGE)
1/2 through 3	12	0.048 (18)
4	12	0.060 (16)
5 and 6	18	0.060 (16)
8 through 14	24	0.075 (14)

1. Insert material shall be at least as long as the protective shield. Provide insert on all piping 1 inch and larger. All piping shall have insert material per Specification Section 230700.

I. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers and other accessories.

3.3 SPACING OF HORIZONTAL PIPE HANGERS:

A. Except as otherwise specified in individual pipe sections or shown on the drawings, provide pipe hangers spaced no greater than that shown in following table:

Steel Pipe Supports

Pipe Size	Max. Span	Min. Rod Size
3/4”	7 ft.	3/8”
1”	7 ft.	3/8”
1-1/4”	7 ft.	3/8”
1-1/2”	9 ft.	3/8”
2”	10 ft.	3/8”
2-1/2”	10 ft.	1/2”
3”	12 ft.	1/2”
4”	14 ft.	5/8”
5”	16 ft.	5/8”
6”	17 ft.	3/4”
8”	19 ft.	7/8”
10”	20 ft.	7/8”
12”	23 ft.	7/8”
14”	25 ft.	1”

Copper Pipe Supports

Pipe Size	Max. Span	Min. Rod Size
1/2”	4 ft.	3/8”
3/4”	5 ft.	3/8”
1”	6 ft.	3/8”
1-1/4”	6 ft.	3/8”
1-1/2”	8 ft.	3/8”
2”	8 ft.	3/8”
2-1/2”	9 ft.	1/2”
3”	10 ft.	1/2”
4”	10 ft.	1/2”

B. Vertical Support:

1. Support vertical piping at roof.

3.4 INSTALLATION OF ANCHORS

A. Install anchors at proper locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

B. Fabricate and install anchors by welding steel shapes, plates, and bars to piping and to structure. Comply with ASME B31.9 and with AWS Standards D1.1.

C. Install powder actuated drive-pin fasteners in concrete. Install fasteners according to powder-actuated tool manufacturer's operating manual.

D. Install mechanical-anchor fasteners in concrete. Install fasteners according to manufacturer's written instructions.

3.5 ADJUSTING

A. Hanger and Support Adjustment: Adjust hangers and supports to distribute loads equally on attachments and to achieve indicated slope of pipe.

END OF SECTION 230529

SECTION 230548

SEISMIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Supports, anchors, restraints, bracing and building attachments for mechanical systems and equipment required to meet the specified project Seismic Design Category requirements.

2. Design and submission responsibilities for compliance with this Specification Section.

1.2 DEFINITIONS

A. IBC: International Building Code.

B. ASCE: American Society of Civil Engineers.

1.3 QUALITY ASSURANCE

A. IBC: Provide seismic restraint systems meeting the requirements of the 2018 IBC except where more stringent requirements are specified.

B. ASCE 7: Provide seismic restraint systems meeting the requirements of ASCE 7-10 “Minimum Design Loads for Buildings and Other Structures”; Chapter 13, “Seismic Design Requirements for Nonstructural Components.”

C. Seismic-Design Criteria:

1. Site Class as Defined in the IBC: B.

2. Assigned Seismic Use Group or Building Category as Defined in the IBC: IV.

3. Seismic Design Category: A.

D. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, “Structural Welding Code-Steel”.

E. Design Responsibility: Provide all design services necessary to meet the requirements of this Specification Section performed by a qualified professional engineer registered in the same jurisdiction as the project location. Design of seismic restraint components and application shall be performed and meet the requirements of ASCE 7-10. Services to be provided include but are not limited to:

1. Design Analysis: To determine design forces and to support selection and arrangement of seismic restraint components required by this Specification Section.

2. Drawings: Preparation of plans, details and specifications for all mechanical systems and equipment supports, anchors, bracing, restraints and building

attachments required by this Specification Section. Include all information necessary for fabrication and installation of seismic restraint components. Include additional information where required by Authorities Having Jurisdiction and by Project Mechanical or Structural Engineer.

3. Affix seal to and sign all plans, details and specifications prepared to meet the requirements of this Specification Section.

F. Additional Information: Obtain any information necessary to meet the requirements of this Specification Section from the Project Structural Engineer and/or Henderson Building Solutions, LLC.

G. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval by ICC-ES or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

H. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated and that is acceptable to authorities having jurisdiction.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Product data indicating manufacturers make and model, style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used, including cables, structural shapes, fasteners, rods, clamps, building attachments and component attachments.

a. Provide detailed application schedule for each mechanical system listing system, system component, component size and seismic restraint products and installation details utilized.

B. Delegated-Design Submittal: Seismic-restraint plans, details, specifications, design criteria, including analysis data signed and sealed by the professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment and component weight and seismic forces required to select seismic restraints.

2. Seismic-Restraint Details:

a. Plans: To scale, using same scale as construction drawings, showing equipment and components requiring seismic restraint; and location, spacing, arrangement of seismic restraints clearly referenced to details for each seismic restraint detail.
b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events.

C. Coordination Drawings: Show coordination of seismic bracing for mechanical piping and equipment with other systems and equipment in the vicinity, including other supports and seismic restraints. Participate in preparation of Mechanical coordination drawings specified elsewhere.

D. Welding certificates.

E. Qualification Data: For registered Professional Engineer and Independent Testing Agency responsible for design of seismic restraints.

F. Field quality-control test reports.

PART 2 - PRODUCTS

2.1 SEISMIC-RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide seismic restraint products by one of the following:

1. Amber/Booth Company, Inc.

2. California Dynamics Corporation.

3. Cooper B-Line, Inc.; a Division of Cooper Industries.

4. Hilti, Inc.

5. Kinetics Noise Control.

6. Loos & Co.; Cableware Division.

7. Mason Industries.

8. Unistrut; Tyco International, Ltd.

9. Vibro-Acoustics

B. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES or an agency acceptable to authorities having jurisdiction.

C. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.

2. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.

3. Maximum 1/4-inch air gap, and minimum 1/4-inch- thick resilient cushion.

D. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

E. Restraint Cables: ASTM A 603 galvanized or ASTM A 492 stainless-steel cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.

F. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections or reinforcing steel angle clamped to hanger rod.

G. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings and matched to type and size of anchor bolts and studs.

H. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings and matched to type and size of attachment devices used.

I. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

J. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.

K. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive seismic control components for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATION OF SEISMIC RESTRAINTS

A. ASCE 7-10: The following mechanical components are exempt from the requirements of this Specification Section per exceptions identified in ASCE 7-10:

1. Any component or system with an Ip equal to 1.0.

2. Piping 2 inches diameter and smaller in Design Category C with an Ip greater than 1.0.

3. Piping 1 inch diameter and smaller in Design Categories D, E and F with an Ip greater than 1.0.

4. Piping 3 inch diameter and smaller in Design Categories D, E and F with an Ip equal to 1.0.

5. Piping supported by hangars 12 inches or less measured from the top of pipe to attachment to structure. Where rod hangars are used, they shall be equipped with swivels or eye nuts.

6. Pressure piping and piping supports designed and constructed in accordance with ASME B31.

7. Trapeze assemblies supporting ducts with a total duct weight of less than 10 lbs./ft.

B. The following mechanical systems are assigned a component Ip of 1.5. All components associated with these systems shall meet the requirements of this Specification Section.

1. Chilled water and condenser water systems.

2. Cooling towers.

C. All mechanical system components not assigned an Ip of 1.5 shall be assigned an Ip of 1.0.

3.3 SEISMIC-RESTRAINT DEVICE INSTALLATION

A. Equipment Restraints:

1. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.

2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds 0.125 inch (3.2 mm).

B. Piping Restraints:

1. Comply with requirements in MSS SP-127.

C. Install cables so they do not bend across edges of adjacent equipment or building structure.

D. Drilled-in Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.

2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.

3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.

4. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.

5. Set anchors to manufacturer's recommended torque, using a torque wrench.

6. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

A. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 23 Section "Hydronic Piping" for piping flexible connections.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Where required by authority having jurisdiction engage a qualified testing agency to perform tests and inspections. Submit results report to Engineer

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections prior to acceptance of the work. Submit test results to Engineer

C. Perform the tests and inspections required by authority having jurisdiction as identified in the 2018 IBC.

D. Remove and replace malfunctioning units and retest.

E. Prepare test and inspection reports.

3.6 ADJUSTING

A. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 230548

SECTION 230553

MECHANICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Labeling and identifying mechanical systems and equipment. Additional requirements for special systems are included in individual system specification sections.

1.2 SUBMITTALS

A. Product data for all identification products and materials supplied:

B. Submit application schedule listing each system, equipment and other devices requiring identification with products and materials to be used for identified system or equipment.

C. Identification materials and devices for pipes, equipment and valves.

D. Valve tag schedules.

1.3 QUALITY ASSURANCE

A. ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

B. Coordinate installation of identifying devices after completion of covering where devices are applied to surfaces.

PART 2 - PRODUCTS

2.1 IDENTIFYING DEVICES AND LABELS

A. Self-Adhesive Plastic Pipe Markers: Manufacturer's standard pre-printed, pressure-sensitive, permanent-type, self-adhesive back, color-coded pipe markers, with flow arrows, lettering and colors conforming to ASME A13.1. Width for markers to be a minimum 1-1/2 inches. Colors and letters to match existing installation, or as directed by Henderson Building Solutions, LLC.

B. Snap-On Plastic Pipe Markers: Manufacturer’s standard pre-printed, semi-rigid snap-on, color-coded pipe markers, with flow arrows, lettering and colors conforming to ASME A13.1. Seton "Stemark" or approved equal. Colors and letters to match existing installation or as selected by Henderson Building Solutions.

C. Plastic Equipment Markers: Laminated-plastic, black with 1/2" or larger white lettering equipment markers, minimum 5" by 2", with mechanical fasteners.

D. Valve Tags: Brass, round, minimum 2 inches diameter with black filled letters and brass "S" hooks, and brass chains.

E. Equipment Warning Signs Provide pressure sensitive, acrylic plastic, preprinted, 10" x 7" warning signs as follows: "DANGER - This Equipment Starts Automatically" or as specified elsewhere.

PART 3 - EXECUTION

3.1 LABELING AND IDENTIFYING

A. Piping Systems: Install pipe markers on each new or modified system listed. Include arrows showing normal direction of flow.

1. Condenser Water (CWS and CWR).

B. Install on pipe insulation segment where required for hot non-insulated pipes.

C. Locate pipe markers as follows:

1. Near each valve and control device.

2. Near each branch, excluding short take-offs for fixtures and terminal units.

3. Near locations where pipes pass through walls or roofs.

4. Near major equipment and other points of origination and termination.

5. Spaced at maximum 25 feet intervals along each run. Reduce intervals to 15 feet in congested areas of piping and in Mechanical/Boiler/Chiller Rooms.

D. Equipment: Install engraved plastic equipment markers on each of the following [new and existing] mechanical equipment.

1. Cooling Towers.

2. Pumps.

3. Variable Frequency Drives.

E. Text of Signs and Labels

1. Equipment: Use identification matching that is shown on the drawings (i.e.: CT-3, etc.).

F. Valves: Install valve tags secured to each valve for all valves installed in all piping 1-1/2 inches and larger including fire protection piping.

G. Valve Tag Text: Identify system valve is installed in, using appropriate abbreviation (match existing if applicable) and include valve identification number.

H. Valve Tag Schedule: Provide Owner with complete schedule of all tagged valves. Provide individual schedule for each separate piping system indicating valve number, general location, and intended purpose of valve.

I. Post framed and typewritten schedule of all valve tags in mechanical rooms.

J. Warning Signs: Install warning signs, in location to alert service personnel, for the following mechanical equipment that is automatically scheduled by remote control systems.

1. Cooling towers.

2. Pumps.

3.2 PAINTING AND FINISHING

A. Damage and Touch-Up: Repair marred, and damaged factory painted finishes with materials and procedures to match original factory finish.

END OF SECTION 230553

SECTION 230593

TESTING, ADJUSTING AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies the requirements and procedures for mechanical and plumbing systems testing, adjusting, and balancing. Requirements include measurement and establishment of the fluid pressures and flow rates for each of the mechanical systems as required meeting design specifications and recording and reporting the results.

1. The terms “measure” and “measurement” used in this specification section require the Contractor to obtain values for the variable identified and to record and report values to Henderson Building Solutions, LLC without performing adjustments to balancing devices controlling variable.

B. Refer to other sections of these specifications for requirements to participate in project commissioning process (if applicable).

C. A meeting shall be held a minimum of 7 days in advance of performing test and balance work. Meeting shall include Test and Balance Contractor, Engineer, Henderson Building Solutions, Owner, Mechanical and Controls Contractor and appropriate subcontractors.

1. It shall be the responsibility of the Test and Balance contractor to schedule the reference meeting.

D. Test, adjust, and balance the following new mechanical systems:

1. Hydronic systems including and condenser water systems.

2. Pumps.

3. Water chillers.

4. Cooling towers.

E. All test and balance work shall be performed to match the sequence of the work required by the project schedule and during the allowable working hours required by these specifications.

1. Provide pre-construction test and balance measurements of the existing systems and equipment where specifically indicated. Pre-construction measurements shall be taken prior to making any modifications, upgrades or adjustments to the existing system or equipment.

2. Provide intermediate test and balance work to match project phasing requirements including multi-phased installation of project mechanical and plumbing systems and equipment; and where required to meet project schedule.

F. Test and balance work shall include determination of correct set points and verification of the operation of the controls and system components.

1. Pump differential pressure control.

1.2 SUBMITTALS

A. Agency Data:

1. Submit proof that the proposed testing, adjusting, and balancing agency meets the qualifications specified below.

B. Engineer and Technicians Data:

1. Submit proof that the Test and Balance Engineer assigned to supervise the procedures, and the technicians proposed to perform the procedures meet the qualifications specified in Quality Assurance Section of this Specification.

C. Certified Reports: Submit testing, adjusting, and balancing reports bearing the seal and signature of the Test and Balance Engineer. The reports shall be certified proof that the systems have been tested, adjusted, and balanced in accordance with the referenced standards; are an accurate representation of how the systems have been installed; are a true representation of how the systems are operating at the completion of the testing, adjusting, and balancing procedures; and are an accurate record of all final quantities measured, to establish normal operating values of the systems. Follow the procedures and format specified below:

1. Draft reports: Upon completion of testing, adjusting, and balancing procedures, prepare draft reports on the approved forms. Draft reports may be handwritten, but must be complete, factual, accurate, and legible. Organize and format draft reports in the same manner specified for the final reports. Submit 2 complete sets of draft reports. Only 1 complete set of draft reports will be returned.

2. Final Report: Upon verification and approval of draft reports, prepare final reports, type written, and organized and formatted as specified below. Submit 2 complete sets of final reports.

3. Report Format: Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders. Provide binding edge labels with the project identification and a title descriptive of the contents. Divide the contents of the binder into the below listed divisions, separated by divider tabs:
   a. General Information and Summary
   b. Hydronic Systems
   c. Control Systems

4. Report Contents: Provide the following minimum information, forms and data:
   a. General Information and Summary: Inside cover sheet to identify testing, adjusting, and balancing agency, Contractor, Owner, Architect, Engineer, and Project. Include addresses, and contact names and telephone numbers. Also include a certification sheet containing the seal and name address, telephone number, and signature of the Certified Test and Balance Engineer. Include in this division a listing of the instrumentations used for the procedures along with the proof of calibration.
   b. The remainder of the report shall contain the appropriate forms containing as a minimum, the information indicated on the standard report forms prepared by the NEBB OR AABC, for each respective item and system. Prepare a schematic diagram for each item of equipment and system to accompany each respective report form

c. Report shall include an Appendix that shall contain all manufacturers fan curves for all and, all manufacturers pump curves, all vessel pressure drops versus flow curves, all balancing valves (all sizes) flow versus pressure drop curves.
d. Report shall include a summary of problems encountered during test and balance, such as final flow rates less than design, motors over amping at design conditions, etc.

1.3 QUALITY ASSURANCE

A. Test and Balance Engineer's Qualifications: A certified Test and Balance Engineer on staff and having at least 5-years of successful testing, adjusting, and balancing experience on projects with testing and balancing requirements similar to those required for this project.

B. Agency Qualifications:

1. Employ the services of an independent testing, adjusting, and balancing agency meeting the qualifications specified below, to be the single source of responsibility to test, adjust, and balance the building mechanical and plumbing systems identified above, to produce the design objectives. Services shall include checking installations for conformity to design, measurement and establishment of the fluid quantities of the mechanical systems as required to meet design specifications and recording and reporting the results.

2. The independent testing, adjusting, and balancing agency shall be certified by National Environmental Balancing Bureau (NEBB) or Associated Air Balance Council (AABC) in those testing and balancing disciplines required for this project. Agency shall have at least one Professional Engineer certified by NEBB or AABC as a Test and Balance Engineer. The project shall be staffed at all times by qualified personnel.

C. Codes and Standards:

1. NEBB: "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems."

2. AABC: "National Standards for Total System Balance."

3. NEBB: "Procedural Standards for the Measurement and Assessment of Sound and Vibration."

D. Balancing Tolerances:

1. Hydronic Systems: Balance water systems to ± 5 percent of specified flow.

1.4 PROJECT CONDITIONS

A. Systems Operation: Systems shall be fully operational prior to beginning test and balance procedures.

PART 2 - PRODUCTS AND MATERIALS (NOT USED)

PART 3 - EXECUTION

3.1 PRELIMINARY PROCEDURES FOR HYDRONIC SYSTEM BALANCING

A. Before operating the system perform these steps:

1. Obtain manufacturer's flow versus pressure drop curves for chiller vessels, pumps, balancing valves, etc.

2. Open valves to fully open position.

3. Check strainers for cleanliness. If dirty strainers are encountered, notify Mechanical Contractor. Do not proceed with test and balance until after strainers have been flushed clean.

4. Verify operating temperatures of chillers and cooling towers are at design requirements.

3.2 MEASUREMENTS

A. Provide all required instrumentation to obtain proper measurements, calibrated to the tolerances specified in the referenced standards. Instruments shall be properly maintained and protected against damage.

B. Provide instruments meeting the specifications of the referenced standards.

C. Use instruments with minimum scale and maximum subdivisions and with scale ranges proper for the value being measured.

D. When averaging values, take a sufficient quantity of readings which will result in a repeatability error of less than 5 percent. When measuring a single point, repeat readings until 2 consecutive identical values are obtained.

E. Use pulsation dampeners where necessary to eliminate error involved in estimating average of rapidly fluctuation readings.

F. Take measurements in the system where best suited to the task.

3.3 PERFORMING TESTING, ADJUSTING, AND BALANCING

A. Perform testing and balancing procedures on each system identified, in accordance with the detailed procedures outlined in the referenced standards and these specifications.

B. Retest, adjust, and balance systems subsequent to significant system modifications and where test and balance results are not acceptable to the Construction Manager. Resubmit test and balance results.

3.4 RECORD AND REPORT DATA

A. Record data regarding design conditions from contract documents and installed conditions from shop drawings including equipment identification number, model number, location, area served, manufacturer, model number, serial number, motor nameplate horsepower and rpm, fan rpm, capacity and electrical voltage, amps and phases.

B. Prepare and submit report of recommendations for correcting unsatisfactory mechanical performances when system cannot be successfully balanced.

C. Test and balance contractor shall submit preliminary and/or final report or field notes upon request from HBS or Commissioning agent. The TAB contractor shall assume the financial

burden of any and all return trips (travel and labor) associated with the commissioning agents work if the reports are not submitted upon request, within one week of request or within one week of the schedule defined in the front end documents.

3.5 TEST AND BALANCE DATA AND MEASUREMENT

A. Obtain the following data via field measurement, in addition to that specified elsewhere for each of the following systems and equipment. Include data in Test and Balance Report.

1. Hydronic Pumps:
   a. Motor volts and amps at all phases and VFD hertz.
      1) At 100% speed.
      2) At speed required to achieve design flow rate (where equipped with a VFD).
   b. Pump rpm.
      1) At 100% speed.
      2) At speed required to achieve design flow rate (where equipped with a VFD).
   c. Pump inlet and discharge pressure.
      1) At speed required to achieve design flow rate (where equipped with a VFD).
   d. Pump flow and fluid temperature.
      1) At design flow rate.
   e. Actual pump impeller diameter (determined from pump shut-off head measurement).
   f. Branch line flows.
   g. Pump balancing valve position and pressure drop.
   h. Pump shut-off head (dead head).

2. Water Chillers (at design flow rates):
   a. Evaporator and condenser inlet and outlet pressures.
   b. Evaporator and condenser fluid flow rates.
   c. Evaporator and condenser inlet and outlet temperatures.
   d. Evaporator inlet and outlet pressures at minimum flow rate.

3. Cooling Towers (at design flow rates):
   a. Entering and leaving water temperatures.
   b. Individual cell balancing valve position and pressure drop.
   c. Fan motor volts and amps at all phases at 100% speed.
   d. Outdoor air dry bulb and wet bulb temperatures.

3.6 PUMPS WITH VARIABLE SPEED DRIVES

A. Balancing of hydronic pumps equipped with variable speed drives shall be accomplished by determining the maximum pump speed required to deliver the design flow rate. Pump balancing valves shall be used for flow measurement purposes only and shall be kept full open and shall not be used to adjust pump flow rates.

1. Report pump speed required to achieve design flow rates to Controls Contractor.

3.7 SYSTEM OPERATING MODES DURING TESTING AND BALANCING

A. Test and balance each system with multiple operating modes as follows. Report specified measurements for each mode of system operation listed.

B. Cooling Towers and Condenser Water Pumps

1. Test, adjust and balance to design flow rates with:
   a. One pump and one cooling tower on.
   b. Repeat for each of three individual condenser water pumps and each of the three individual cooling towers.
   c. Repeat with two pumps and two cooling towers on and with three pumps and three cooling towers on.
   d. Pumps VFD hertz readings shall be used as control set points based on number of condenser water pumps and cooling towers on.

2. Measure and report.
   a. Pump volts, amps, VFD hertz, inlet and outlet pressures and total flow with one condenser water pump and one cooling tower on.
   b. Repeat for each of three individual condenser water pumps and each of the three individual cooling towers.
   c. Repeat with two pumps and two cooling towers on and with three pumps and three cooling towers on.

END OF SECTION 230593

SECTION 230700

MECHANICAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes piping insulation.

B. Insulation work includes insulating all new construction, existing piping that is damaged during the performance of work.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data for covers, wraps and insulating materials, adhesives and cements showing compliance with referenced standards for each type of insulation.

B. Submit application schedule listing manufacturer's product number, insulation type, joining methods, jackets, K-value, thickness and furnished accessories for each mechanical application and pipe and duct size.

1.3 QUALITY ASSURANCE

A. Fire Performance Characteristics: Conform to the following characteristics for insulation including covers, facings, cements, and adhesives, when tested according to ASTM E 84 and NFPA 255. Label insulation with appropriate markings of testing laboratory.

1. Interior Insulation: Flame spread rating of 25 or less and a smoke developed rating of 50 or less.

1.4 SEQUENCING AND SCHEDULING

A. Schedule covers and insulation application after inspection and pressure testing of piping systems.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. CertainTeed Corporation.

2. Knauf Fiber Glass GMBH.

3. Johns Manville.

4. Owens-Corning Fiberglass Corporation.

2.2 GLASS FIBER

A. Material: Inorganic mineral or glass fibers, bonded with a thermosetting resin.

B. Jacket: As specified for types of insulation.

C. Preformed Pipe Insulation: ASTM C 547, Type 1, rigid pipe insulation, jacketed.

1. Thermal Conductivity: 0.23 average maximum at 75ºF mean temperature.

2. Density: 3.5 to 5.5 pcf average maximum.

3. Jacket: Factory applied, kraft paper bonded to aluminum foil and reinforced with glass fibers.

2.3 INSULATING CEMENTS

A. Provide insulating cements as recommended by insulation manufacturer complying with applicable ASTM section.

2.4 ADHESIVES AND COATINGS

A. Provide adhesives and coatings as recommended by insulation manufacturer for type and location of insulating materials.

2.5 JACKETS

A. PVC Fitting Covers and Pipe Jackets: Factory-fabricated fitting covers manufactured from 20-mil-thick, high- impact, ultra-violet-resistant PVC.

1. Adhesive: As recommended by manufacturer.

B. Aluminum Jacket: ASTM B209, 3003 Alloy, H-14 tempered, roll stock ready for shop or field cutting.

1. Embossed Finish, 0.016 inch thick.

2. Elbows: Preformed, 45 and 90 degree elbows; same material, finish and thickness as jacket.

2.6 INSERTS

A. Piping Inserts: Polyisocyanurate insulation, ASTM C 591, minimum 90 psi compression strength with vapor barrier.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Refer to schedules at the end of this Section for materials, forms, and thicknesses required for each mechanical system.

B. Install vapor barriers on insulated pipes having surface operating temperatures below 60°F including chilled water

C. Apply insulation material, accessories, and finishes according to the manufacturer's printed instructions.

D. Install insulation with smooth, straight, and even surfaces.

E. Seal joints and seams to maintain vapor barrier on insulation requiring a vapor barrier.

F. Seal penetrations for hangers, supports, anchors, and other projections in insulation requiring a vapor barrier, using the proper coatings.

G. Apply adhesives and coatings at manufacturer's recommended coverage-per-gallon rate.

H. Items Not Insulated: Unless otherwise indicated do not apply insulation to the following systems, material, and equipment.

1. Interior flexible connectors for pipes.

2. Testing laboratory labels and stamps.

3. Nameplates and data plates.

4. Following piping specials:
   a. Unions on system above 70 ˚F.
   b. Removable strainer end caps on system above 70 ˚F.
   c. Balancing valves in piping systems operating above 70˚F.
   d. Flanges at connections to equipment operating at above 70˚F such as pump. All other flanges shall be insulated.

3.2 PIPE INSULATION INSTALLATION, GENERAL

A. Tightly butt longitudinal seams and end joints. Bond with adhesive.

B. Stagger joints on double layers of insulation.

C. Apply insulation continuously over fittings, valves, and specialties, except as otherwise indicated.

D. Apply insulation with a minimum number of joints.

E. Interior Wall and Roof Penetrations: Apply insulation continuously through walls and roof, except fire-rated walls.

F. Fire-Rated Walls Penetrations: Coordinate termination of insulation at fire rated walls and floors with UL rated assembly utilized at rated wall or rated floor pipe or duct penetration.

G. 90 and 45 Degree Elbows: Coat pipe insulation ends with vapor barrier coating. Apply pre-molded, precut, or field-fabricated segments of insulation around fittings. Make joints tight. Bond with adhesive.

1. Use same material and thickness as adjacent pipe insulation.

2. Cover insulation with PVC fitting covers and seal circumferential joints with PVC tape.

H. Hangers and Anchors: Apply insulation continuously through pipe hangers using galvanized metal insulation shield. Provide high density insulation inserts or steel saddles extending beyond metal insulation shields at all hangers.

I. Exterior Pre-Form Pipe Insulation Jacket: Install continuous[aluminum jacket, seal all joints with silicon caulk and secure all joints with stainless steel bands.

3.3 EXISTING PIPING

A. Repair all existing insulation damaged during performance of the work using products matching existing installation.

3.4 APPLICATIONS

A. General: Materials and thicknesses for piping are specified in schedules at the end of this Section.

B. Piping Systems: Unless otherwise indicated, insulate the following piping systems:

1. Condenser water piping.

3.5 PIPING INSULATION SCHEDULES

EXTERIOR CONDENSER WATER PIPING				
PIPE SIZES	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	SPECIAL JACKET
1/2 TO 1-1/2	PREFORMED GLASS FIBER	1	YES	ALUMINUM
2 TO 6	PREFORMED GLASS FIBER	1-1/2	YES	ALUMINUM
8 TO 12	PREFORMED GLASS FIBER	2	YES	ALUMINUM

INTERIOR CONDENSER WATER PIPING				
PIPE SIZES	MATERIALS	THICKNESS IN INCHES	VAPOR BARRIER REQ'D	SPECIAL JACKET
1/2 TO 1-1/2	PREFORMED GLASS FIBER	1	YES	NO
2 TO 6	PREFORMED GLASS FIBER	1	YES	NO
8 TO 12	PREFORMED GLASS FIBER	1	YES	NO

END OF SECTION 230700

SECTION 230923

DIRECT DIGITAL CONTROL SYSTEM

PART 1 - GENERAL REQUIREMENTS

1.1 SUMMARY

A. This section specifies direct digital control components and related work necessary to implement the control and monitoring of the HVAC and other equipment shown on the drawings.

B. This section includes:

1. Contractor's administrative responsibilities.

2. Submittal requirements.

3. Record drawings requirements.

4. Operation and Maintenance Manuals.

5. Owner Training.

6. Warranty and systems adjustment.

7. Control Components.

8. Control component labeling and identification.

9. Installation methods and requirements.

10. Software and programming requirements.

11. System hardware.

12. System communications.

C. Drawings and Division 0 and 1 Specifications apply to all work required by this Specification Section.

1.2 SYSTEM DESCRIPTION

A. Control work required consists of the expansion of an existing DDC system. Expansion to include replacement of existing DDC system, additions to existing DDC system and installation of new sequences of operation and other control functions indicated.

B. The DDC system will perform all control logic for identified mechanical and electrical equipment as indicated on the drawings and will monitor operation of other mechanical and electrical equipment as shown on the drawings.

C. Physical operation and monitoring of facility systems and equipment will utilize the control interconnection methods as indicated on the drawings. Control system will also include local electric control systems provided by equipment manufacturers.

1. Provide installation of control components supplied by others where indicated on the drawings.

2. Provide all hardware, software, control components and coordination to achieve interconnection from DDC system to equipment and controls supplied by others, where such interconnection is shown on the drawings.

D. The DDC system shall utilize an existing personal computer based operators' workstation and new and existing intelligent DDC controllers of the size and capacity required to provide all communication, energy management, temperature control, monitoring and alarm functions simultaneously.

1.3 CONTRACTORS GENERAL RESPONSIBILITIES

A. The Contractor shall furnish and install a total turnkey system to be fully operational with all software features specified fully implemented including but not limited to system operation, networking and communication, energy management, temperature control, system security access, reports and graphics and other software as required to meet the requirements of the specifications, drawings and the sequences of operation.

B. The Contractor shall furnish and install all hardware, software and controls components necessary to meet these specifications, to achieve the sequences of operation, to integrate with the new or existing controls provided by equipment manufacturers and to provide operational communications networks whether or not all required components are specified or shown on the drawings.

C. It shall be the responsibility of the Contractor to obtain all information required from Henderson Building Solutions, LLC, other contractors, suppliers or manufacturers and the Owner, necessary to determine the interconnection requirements for all equipment shown on the drawings. Contractors shall fully coordinate the interconnection with others and supply all necessary materials and labor to achieve a fully functional interconnection.

D. The Contractor shall coordinate the installation of control devices such as, but not limited to, pipe wells and taps, switches, relays, control valves, interlocks, etc., with other construction trades to ensure timely sequencing of the Work. It shall be the Contractor's responsibility to ensure such devices are installed in correct locations, utilizing methods and materials acceptable to the Contractor and meeting these specifications.

E. Contractor shall fully coordinate system installation with installing electrical contractors to ensure both complete power system and control and communication system.

1. Controls contractor shall be responsible for providing all power required by the DDC system, including conduit, wire, transformers, circuit breakers, etc., unless such work is specifically shown on the drawings to be provided by others.

F. Contractor shall supply all control devices and components shown on the drawings and required by the specifications that are not supplied by individual equipment manufacturers. It shall be the responsibility of the Contractor to determine the quantity and type of control components supplied by other manufacturers and to coordinate control installation with same.

G. Contractor shall participate in all system and equipment startup, testing, adjusting, balancing and commissioning as scheduled by Henderson Building Solutions or by the controls contractor's prime contractor. See other specification sections for project commissioning requirements.

1.4 EXISTING CONTROL SYSTEM

A. Existing DDC system is a Metasys as manufactured by Jonson Controls

B. All DDC components shown on the drawings as existing are based on best information available to Henderson Building Solutions.

1. Contractor shall field verify existence and condition of all DDC components shown as existing to be reused on the drawings. Where components to be reused do not exist, contractor shall install new component at no added cost to the contract. Where existing components require replacement or repair, contractor shall solicit direction from Henderson Building Solutions.

2. Where existing DDC components are installed but not shown on the drawings, contractor shall perform the work in such a manner as to keep all existing DDC components fully functional. Contractor shall seek direction from Henderson Building Solutions where existing DDC components require integration into or modification of the sequences of operation shown on the drawings.

C. Software: Expansion of the existing DDC system shall utilize existing system software to the maximum extent possible. Reuse the existing communications, alarm, system security, graphics and other software currently resident in the system. See other parts of this specification section for additional requirements.

D. Provide identification of new and existing DDC control components as specified later in this section.

1.5 QUALITY ASSURANCE

A. National Fire Protection Agency:

1. NFPA-70, National Electrical Code (most current edition)

2. NFPA-90A, standard for the Installation of Air Conditioning and Ventilating Systems (most current edition)

1.6 SYSTEM LISTING COMPLIANCE

A. The entire DDC system shall be approved and listed by Underwriters Laboratories, Inc. UL Listing compliance shall include, but not be limited to, the following:

1. UL916, Energy Management Systems

B. All electrical equipment and components employed in the system shall be UL Listed and labeled per the most current edition of the NEC.

C. All equipment furnished under this Contract shall be manufactured and installed in accordance with the latest Federal Communications Commission Emissions Guidelines (FCC rules part 15, Section 15). All equipment subject to these regulations shall comply with these regulations. All equipment subject to these regulations shall be installed and wired in accordance with these regulations.

D. Additional listing requirements are included in the device specification.

1.7 SUBMITTALS

A. General:

1. Before proceeding with the installation of controls and devices, the Contractor shall submit all required drawings and descriptive and product data specified.

2. At the time of submission, the Contractor shall inform the Engineer in writing of any deviation in the exhibits submitted from the requirements of the drawings, specifications and sequences of operations.

3. Henderson Building Solutions will review exhibits submitted only for conformance with the design concept of the Project and with the information given in the Contract. Henderson Building Solutions review of a separate item shall not indicate review of an assembly in which the items function. Henderson Building Solutions review is not intended to indicate approval of dimensions or quantities.

4. Henderson Building Solutions review of submittals shall not relieve the Contractor of responsibility for any deviation from the requirements of the Contract, unless the Contractor has Henderson Building Solutions approval in writing of such deviation at the time of submission. Henderson Building Solutions review shall not relieve the Contractor from responsibility for errors or omissions in the submitted exhibits.

B. Direct Digital Control System Components:

1. Submit manufacturer's technical data, wiring diagrams and shop drawings indicating dimensions, weights and enclosure construction for all DDC distributed controllers.

2. Submit technical data on any new software supplied including description of functions performed by software and location within the system where software shall reside.

3. Submit individual detailed DDC distributed controller drawings indicating controller identifications, components included in controller, numbering of terminals and communications ports, type of cable connected to each terminal port, and specific field devices wired to each terminal including identification of each field device and application. Clearly differentiate between existing and new. Indicate source (electrical panel ID) of 120V power to each panel to which 120V power is connected. Indicate method of connecting controller to equipment supplied by others and to existing communications network.

4. Submit methods and materials used to connect existing communications network.

5. Submit sample mechanical and electrical equipment graphics for existing and new equipment controlled.

C. Control System Components:

1. Submit detailed schematic control drawings for each device or equipment controlled indicating all control components referenced to manufacturer's model number. Drawings shall include all control and power wiring with termination point (controller and terminal number) clearly indicated and written sequences of operation referenced to specific control components (i.e., "shall modulate valve V-3"). Include default (N.O. or N.C., etc.) position for all components where applicable. Clearly indicate those components that are existing versus new components.

2. Submit manufacturer's technical data for each control component and material specified and control components not specified but required for complete installation. Data shall include construction materials, dimensions, ranges, accuracy, intended application, agency listing and other data necessary to show compliance with specifications.

3. Submit control valve schedule with complete make and model numbers, size, data for each valve design flow, total pressure drop at design flow, working pressure, control range, construction materials and other pertinent data.

4. Submit valve actuator schedule, listing make and model numbers, size, quantity, control range and mounting arrangement.

5. Submit products and methods to be used to comply with system identification requirements.

6. All control drawings shall be prepared using AutoCAD, most current release.

D. All Points List: Submit prior to substantial completion, a hard copy print out of all new and existing points included in the DDC system for each piece of equipment included in the project. The all points list shall include point name, associated equipment, status and measured value and set point.

E. Equipment Graphics: Submit prior to substantial completion, a hard copy print of all new equipment and system graphics (if utilized) with all required data display indicating real time values.

1.8 RECORD DRAWINGS

A. Record drawings shall be supplied per Division 1, using most current release of AutoCAD, after the system has been accepted by Henderson Building Solutions. Record drawing shall consist of updated submittal drawings reflecting final installed condition of the DDC system.

1.9 OPERATION AND MAINTENANCE MANUALS

A. Submit Operation and Maintenance Manuals complying with Division 1 requirements. Operation Manuals shall include all submittals specified updated to reflect "As Built" conditions and shall include:

1. Maintenance required and troubleshooting procedures for all components supplied.

2. Software manuals for software supplied with system expansion

3. System Warranty

1.10 OPERATOR INSTRUCTION AND TRAINING

A. Contractor shall furnish factory authorized training for system operation, trouble shooting and programming as listed below.

1. Contractor shall provide 4 hours of on-site (location to be determined by Owner) training. Training shall be conducted in one block of 4 hours held on separate days. Training shall cover use, programming, control algorithms, alarms,

operation, maintenance and troubleshooting and other topics selected by Owner, tailored to the system installed under this Contract.

1.11 WARRANTY AND SYSTEM ADJUSTMENT

A. All components, equipment, material, labor, software and assemblies supplied under this Contract, shall be guaranteed against defects in material and workmanship for the period specified in Division 1, but at a minimum of 24 months from completion including commissioning and acceptance. Warranties are conditionally based on the requirement that the items covered within the guarantee are used and maintained in accordance with the manufacturer's recommendations.

B. Contractor shall recognize that the installation of DDC systems of the type and complexity described in these documents required a debugging and fine tuning period that will extend past the date of Henderson Building Solutions acceptance. Acceptance of system installation by Henderson Building Solutions will not relieve Contractor of the responsibility for performing system debugging, adjustment and fine-tuning. The system debugging, adjustment and fine-tuning shall be considered work of the Contract for a period equal to the specified warranty period. Determination of work required by this paragraph shall be solely the responsibility of Henderson Building Solutions. Contractor responsibilities required by this paragraph include but are not limited to:

1. Adjustment of all temperature, pressure, reset, time function, alarm, safety and all other control system set points and algorithms.

2. Revisions to software-based monitoring, logging, etc., routines as needed to meet facility's indoor environment requirements.

3. Relocating sensors that do not accurately sense measured fluid, air or space installed in.

4. Diagnosis, troubleshooting and remediation of control-based problems experienced with equipment and system operation including integration with control systems, communication networks and equipment provided by others.

5. Updating of record drawings and graphic screens to reflect all changes made during warranty period.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturers: Subject to compliance with the drawings and specifications, provide DDC components of the most current vintage of one of the following manufacturers:

1. Johnson Controls

B. DDC system components, including software, shall be of the most current vintage of the manufacturer's product line compatible with existing DDC system.

2.2 UNITRUPTED POWER SUPPLY

A. All new DDC controllers, including ATU controllers, shall include an uninterruptable power supply capable of suppling all connected controllers at full function for a minimum of 15 minutes. A single UPS may supply multiple controllers

B. All existing DDC controllers reused or modified under this project shall be equipped with an uninterruptable power supply as specified for new controllers above.

2.3 SYSTEM IDENTIFICATION

A. All new DDC distributed controllers shall include a plastic laminate tag (1" by 3") mechanically fastened to panel face identifying controller. Controller identification shall match tagging system used in control drawing submittal.

B. All new and existing non-DDC control cabinets reused in the work shall include a plastic laminate tag as required for DDC distributed controllers.

C. All control components located within a new control cabinet or new DDC distributed controller shall be identified using adhesive backed embossed plastic name tags with identification matching that used in the control drawing submittals.

D. All new control components mounted on mechanical or electrical equipment (i.e., temperature sensors, pressure switches, etc.) shall be identified as described for components located in control cabinets.

2.4 SYSTEM COMPONENT NAMING PROTOCOL

A. The Owner (the FacilitiGroup Energy Center) has established a standard for the naming of DDC system objects and controllers. The standard establishes a specific method for naming all DDC system objects and controllers resulting in the use of a common naming system for all the Owners facilities. The naming standard is to be utilized on this project without exception.

B. Objects names will be written in sequence as follows:

1.	Site Qualifier	7 letter abbreviation identifying the Facility
2.	Area Qualifier	Used when 2 or more areas are on the same controller, Not to exceed 5 characters
3.	System Name	System identification using Owner's abbreviations
4.	Value	Units, status, command associated with object
5.	Multiplier Qualifier	As needed to apply to Value
6.	Setpoint Qualifier	Identifies type of object setpoint (setpoint, high setpoint, Low setpoint)
7.	Object Type Qualifier	Identifies object as a variable, calculated value, Integrated or logic

C. Object Name Examples

1. DRSRSTA.NTWRChlr01GPM-100LoSpt.Var
   a. Site Qualifier = DRSTA = Doctors Hospital of Sarasota
   b. Area Qualifier = NTWR = North Tower
   c. System Name = Chlr01 = Chiller # 1
   d. Value = GPM = Flow (in GPM)
   e. Multiplier Qualifier = 100 = Actual value is displayed value x 100
   f. Setpoint Qualifier = LoSpt = Low (minimum setpoint)
   g. Object Type Qualifier =. Var = Variable

D. The Owner has established a standard list of abbreviations to be used for all Site, System, Value Setpoint and Object type qualifiers. The abbreviations are generally grouped by and are specific to system or equipment types (i.e., AHU's chilled water, air terminals units). These abbreviations are to be used in the naming of all DDC system objects. Henderson

Building Solutions will provide the Owner's standard lists of abbreviations to the Contractor after the bid.

E. The Owner (FacilitiGroup Energy Service Center) shall be contacted for direction in cases where standard abbreviations have not been established, where deviations from the standard are requested or where clarifications are needed.

F. Logic or programming points that do not display on the DDC system may keep their standard but are to have the object qualifier ". Logic" applied to the end of the standard name.

G. Site codes and the protocol for naming objects and controllers, servers and similar DDC system components will be supplied by the Owner (FacilitiGroup Energy Service Center).

2.5 APPLICATION OF SYSTEM COMPONENT NAMING PROTOCOL

A. All new objects and controllers included in this project shall utilize the System Component Naming Protocol. All existing objects and controllers that are associated with the individual system or equipment being installed (or modified) as part of this project will have all existing objects and controllers renamed using the System Component Naming Protocol as part of the work required by this Specification Section.

B. All existing DDC system objects and controllers located at the Facility shall be renamed using the System Component Naming Protocol as part of the work required by this Specification Section.

1. Renaming of controllers and non-DDC control cabinets shall include installation of plastic laminate tags for each renamed controller as specified under System Identification in this Specification Section.

2. Renaming of control components located in in a DDC controller, a non DDC control cabinet or mounted outside of a controller or cabinet shall be tagged with an adhesive backed name tags as specified under System Identification in this Specification Section

2.6 CONTROL CABINETS

A. General Control Cabinet Requirements:

1. Furnish UL-listed cabinets.

2. Construct cabinets of manufacturer's standard gauge steel adequately braced and reinforced.

3. Paint cabinets with prime coat and finish coat of enamel.

4. Install control cabinets only in mechanical and electrical rooms or where shown on the drawings. Wall mount or mount on floor mounted Unistrut frame.

5. Do not mount or install control cabinets on any HVAC or electrical equipment.

B. Control Cabinet Design:

1. Completely enclosed.

2. Brackets for wall mounting or mounting to a Unistrut frame.

3. Size to accommodate all control components.

4. Equipped with:
   a. Hinged doors.
   b. Key locks (all keyed to match existing facility key system).
   c. Removable backplate.

C. Control Cabinet Components:

1. Terminal Blocks:
   a. Identify terminals for all electrical connections.
   b. Affix to inside of panel with stainless steel screws and mounting channel.
   c. Provide Square D Class 9080 or approved equal.
   d. Furnish jumpers, special tools and other accessories as required.

2. Wiring:
   a. All wiring shall be done in accordance with the NEC.
   b. Prewire at factory to terminal strips for field connections.
   c. Factory test all wiring.
   d. Connect terminal with flexible panelboard wiring to electrical control switches and devices mounted on hinged doors.
   e. Provide flexible panelboard wiring approved by NEC.
   f. Color code all wiring.

D. Control Cabinet Application:

1. All control system components not required to be directly mounted on or in equipment, ducts, pipes, starters or not located in control enclosures provided by other equipment manufacturers shall be installed specified control cabinets.

2.7 BUTTERFLY CONTROL VALVES:

A. MSS SP-67, Type 1, Class 125, 200 psi CWP, ASTM A126 cast iron body or ASTM A536 ductile iron body, extended neck, stainless steel stem, aluminum bronze disc, EPDM seat, lug style. Provide with top valve stem bushing to absorb actuator thrust and upper and lower stem bearings.

2.8 BALL CONTROL VALVES:

A. Provide V-notch ball type control valves where specifically indicated on the drawings. Valve shall be equal percentage type with parabolic shaped port, minimum 150 psig design pressure, brass body, stainless steel ball, EPDM O-rings stem seals and ball seals. Valves shall be Delta Control Products soft-touch ball valve or approved equal.

2.9 CONTROL VALVE ELECTRIC ACTUATORS:

A. Provide UL listed electric proportional actuators as an integral component with associated control valve. Actuators to automatically stop at end of travel, include permanently lubricated gear train, have torque exceeding 150% of installation requirement but not less than 50 inch pounds, include spring return where a failed position is indicated on the drawings, have an accuracy and repeatability of 1-1/2% and produce a feedback signal proportional to actual actuator position readable through the DDC control system. Provide actuators with metal bodies and with NEMA 4 weather shield enclosure where located outdoors. Provide with visual indication of actuator position, gear release for manual position and motor thermal overload protection.

2.10 WATER DIFFERENTIAL PRESSURE SWITCH

A. Rated for pipe pressures installed in, with NEMA 1 enclosure, adjustable setpoint, brass bellows, with 2 sets of contacts (1 for direct equipment control, 1 for DDC notification). Provide with copper connecting tubing and brass shutoff cocks at switch inlet and outlet.

2.11 PIPE INSERTION TEMPERATURE SENSORS

A. Shall contain an RTD sensing element to monitor water temperature. The Contractor shall provide brass wells of sufficient size for the pipe to be installed. Transmitter shall be factory calibrated to an accuracy of +/-1.0%. Install to prevent condensation of moisture and pack wells with thermal conductive compound.

2.12 CURRENT RELAYS

A. Shall be Hawkeye Model 908 or approved equal, adjustable current operated solid state relays with internal circuits powered by induction from wires being monitored. Provide size and ratings to match application. Provide LED indication of output status.

2.13 WATER FLOW SWITCHES

A. Pressure-flow switches of bellow-actuated mercury or snap-acting type with appropriate scale-range and differential pressure adjustment, with stainless steel paddle.

2.14 PIPING DIFFERENTIAL PRESSURE SENSOR

A. Shall provide continuous monitoring of differential pressure between supply and return piping and be selected for a range representative of sensed pressure. Provide factory calibration to an accuracy of +/-1% over scale range. Provide with drain/vent plugs, copper connecting tubing with shutoff cocks and required mounting hardware. Provide with signal filtering to dampen effects of turbulence

2.15 CONDUIT

A. Conduit: Conduit shall be thin wall, electric metallic tubing, in trace sizes 1/2" to 4" with set screw type steel connectors and couplings. Flexible metal conduit may be used for final 12" connection to devices. Install conduit parallel or perpendicular to main building lines with right angle bends consisting of cast metal fittings or symmetrical bends.

B. **Use of Conduit**: All power wiring (120V) shall be installed in conduit. All control and communication wire shall be installed in conduit when located in spaces without ceilings, mechanical or electrical equipment rooms, chases, walls or where exposed to weather, and other locations indicated on the drawings.

C. Nails, perforated strap or plumber's tape shall not be used for the support of conduits.

D. Junction or pull boxes shall be installed as required for pulling or taping of conductors. Boxes and covers shall be of code gauge galvanized steel with sufficient number of screws to hold cover firmly in place. Fronts for recessed boxes shall be larger than boxes. All junction and pull boxes to be readily accessible.

E. See Division 26 for allowable types of conduit where control wire is installed outdoors or below grade.

F. All conduit install associated with the DDC control system and other systems listed below are to be color coded from the factory in accordance with the current facility. Where the

facility does not have a standard color for system conduit use the color scheme detailed below. The requirement for use of colored conduit only applies to tubing and does not apply to fittings, connectors, junction boxes, etc.

1. Control wiring = Blue
2. Fire Alarm = Red
3. Life Safety Branch Emergency Power = Yellow
4. Critical Branch Emergency Power = Orange
5. Equipment Branch Emergency = Green
6. Normal Power = No color required

2.16 WIRES AND CABLES

A. All wiring and cable shall bear the Underwriters' label or stamping indicating wire size, type, voltage and grade. All wire shall be soft annealed copper, thermoplastic covered, not less than 98% conductivity and of the 600-volt class.

B. Wire #10 and smaller shall be type THHN solid conductor; #8 AWG and larger shall be THW stranded conductor. Wire size shall be not less than #12 AWG unless specifically indicated otherwise.

C. Control Cable:

1. Control cable shall be multi-conductor cable jacketed with Teflon FED jacket, minimum thickness .015". Conductors shall be stranded tinned annealed copper per ASTM B 286 and insulated with extruded fluorinated ethylene propylene per ASTM D 2116.

2. Cable shall meet UL requirements of plenum rated cable and be so labeled where not installed in conduit.

3. Furnish in no. 14-, 16-, or 18-gauge as required. All cable used in communications applications shall be shielded.

2.17 DDC DISTRIBUTED CONTROLLERS

A. Provide DDC distributed controllers of the number and type necessary to achieve the functions required by the drawings and this specification section.

1. DDC distributed controllers shall be manufacturers most current vintage compatible with the existing DDC system communications network and software.

2. Controllers shall include CPU’s, clock function, RAM, ROM and communications ports (1 for network, 1 for service tool), and resident software.

3. Controllers shall provide all equipment control and monitoring functions in the event of a loss of connection to the DDC system communications network.

4. Controllers shall be housed in a locking NEMA 1 enclosure with LED indication of CPU status and network communications status. Keying shall match system in place at the facility.

5. Provide each controller with integral surge protection for both power and network connections.

6. Provide each controller with UPS capabilities specified in Section 2.2.

2.18 GRAPHICS SOFTWARE

A. Provide Dynamic multi-color graphics loaded into all existing on-site and remote operator workstations (if applicable) meeting the following requirements.

B. Equipment and Systems Graphics:

1. Provide individual equipment or system graphic screens for each new or modified system or equipment connected to the DDC system.

2. System or equipment graphic screen shall consist of a schematic representation of the system or equipment including all components (pumps, fans, coils, dampers, etc.) and all control devices (valves, damper motors, etc.).

3. Each system graphic shall include continuously updated, dynamic display of the following information:
   a. Equipment status (normal, override, alarm).
   b. Analog or binary value with English units of all sensor inputs with indication of points outside of selected ranges.
   c. Set points of all control functions (i.e., S/A, M/A, CWS, etc.) with indication of setpoints in override condition.
   d. Indication (% open) of all modulating devices controlled by the DDC system (valves, etc.).
   e. Normal (failed) position of all control components.
   f. Identification of DDC system panel(s) providing control of equipment or system.

4. All control points shall be able to be changed or overridden by accessing the point from graphics screen. Access to point shall be via mouse driven cursor or similar means and entering through the keyboard the new or override value. Overrides shall include ability to set the time duration of the override.

5. Any point which goes into alarm and has a graphic screen associated with that point shall allow operator access to that point's alarm message through the graphic screen by use of a single keystroke.

C. Requirements for All Graphics Screens:

1. All graphic screens shall continuously display outside air temperature and humidity.

2. Graphics software shall be fully interactive with all other DDC system software so that point setpoints can be changed while the point is displayed, and change will be automatically transferred to all other DDC system software.

2.19 DDC SYSTEM SOFTWARE

A. Expansion of the existing DDC system shall utilize the existing system software to the maximum extent possible.

1. Expansion of the DDC system shall include programming existing system operating, communications, alarm management, security and other software to incorporate all new DDC system devices and to reflect the removal of existing DDC system devices.

2. Update or upgrade existing software where necessary to achieve the work required by the drawings and this specification section. Any new or revisions to existing software shall be fully compatible with existing software that will remain in use.

3. Utilize existing DDC system graphic software to meet the specified requirements for graphics software. Provide new graphics software if existing software cannot meet specified requirements for system and equipment graphics.

PART 3 - EXECUTION

3.1 HORIZONTAL ACCESS

A. All cable, conduit and wire, whether low or line voltage, shall be routed and installed above accessible corridor ceilings or in mechanical rooms or mechanical tunnels except where cable, conduit or wire must by necessity, connect to a room field point. All cable, conduit and wire shall be routed as high as possible to allow maximum access above the ceiling.

B. Cable, conduit and wire shall not be exposed in any occupied spaces except where specifically allowed on the drawings. Cable, conduit and wire shall be routed above ceilings or in walls. Conduit may be exposed only in dedicated mechanical or electric spaces or where specifically shown on the drawings.

3.2 VERTICAL ACCESS

A. All cable, conduit and wire, whether low or line voltage, requiring to be routed between floors shall be installed only in vertical mechanical or electrical chases. All cable and wire installed in vertical mechanical or electrical chases shall be fully installed in conduit.

3.3 ACCESS TO ROOF MOUNTED EQUIPMENT

A. All cable, conduit, wire, etc. requiring routing to roof mounted equipment shall be routed through the interior of the equipment roof curb. Any required penetration of the roof curb, equipment exterior casing, equipment interior panels, etc., shall be sealed to provide air and watertight seal to Henderson Building Solutions satisfaction. Penetration of roof other than at interior of roof curbs shall not be allowed. All DDC system points associated with roof mounted equipment shall be located internally to roof mounted equipment and shall not interfere with equipment control, equipment operation or equipment access.

3.4 START UP AND TESTING

A. Fully test all control devices including but not limited to, actuators, valves, dampers, thermostats, aquastats, low temperature thermostats, high static switches, etc. Replace all defective components.

B. Fully test and field verify factory calibration of all DDC system components including but not limited to, sensors, switches, transducers and DDC controllers. Replace all defective components and sensors that do not meet specified accuracy. Use of fixed software offsets will not be accepted as method of sensor calibration.

C. Implement all alarm and security access functions described in the sequences of operation and all alarm and security functions desired by the Owner. Obtain alarm parameters, alarm priorities, alarm descriptive messages, alarm acknowledgement, access levels, passwords and other requirements from Owner.

D. Fully test all installed software and programming to verify correct implementation of specified sequences of operation. Tests to include:

1. Visual field verification of stroking all actuators from full open to full closed.

2. Visual field verification of modulation of all variable speed drives.

3. Visual field verification of direction of valve or damper movement or drive speed increase/decrease versus commanded direction.

4. All verifications shall be proved visually. Verification via computer or service tool feedback is not acceptable.

E. Provide Henderson Building Solutions and the Owner with written certification signed by controls contractor that the entire system including communications network has been calibrated and tested as specified with all software, hardware and control loops operational.

3.5 CONTROL COMPONENTS

A. Locate all control components not required to be directly mounted on mechanical or electrical equipment in control cabinets. Install control cabinets only in locations allowed by this specification section or the drawings.

B. Provide all mounting hardware necessary to locate control components at required location.

C. Seal all openings created for installation of control components air, water or weathertight as installation dictates.

D. Locate sensors in accessible locations and in a method to minimize stratification errors. Relocate as required or directed by Henderson Building Solutions.

E. Verify location of all control components located in occupied spaced with Owner prior to installation. Coordinate location with casework, furniture, wall coverings, etc., prior to installation.

F. Electrical and Control Wiring:

1. Provide all wiring and raceway required for a complete and working system meeting the requirements of this section and of Division 26.

2. It shall be the responsibility of the controls contractor to provide all power (120V) required by the system to all locations required by the system provided.

3. All control cable not installed in conduit shall be installed in a neat and workmanlike manner, shall be supported at minimum 8 foot intervals from structure, and shall not rest on ceilings, ducts, pipes or other non-structural components. Parallel runs of cable shall be mechanically bundled at a minimum of 5 foot intervals.

4. All control conduit and cable shall be installed as high as possible and installed parallel or perpendicular to building walls.

5. All wire-to-wire connections shall be made at a terminal block or terminal strip. All wiring within enclosures shall be neatly bundled and anchored to permit access and prevent restriction to devices and terminals.

6. Install plenum wiring in sleeves where it passes through walls and floors. Maintain firing rating at all penetrations.

7. Size of conduit and size and type of wire shall be the design responsibility of the Control System Contractor, in keeping with the manufacturer's recommendation and NEC.

8. Flexible metal conduits and liquid-tight, flexible conduits shall not exceed 18" in length and shall be supported at each end.

3.6 COMPONENT TESTING

A. Fully test all control devices including, but not limited to, motors, valves, dampers, thermostats, aquastats, low temperature thermostats, high static switches, etc. Replace all defective components.

1. Visual field verification of stroking all actuators from full open to full closed.

2. Visual field verification of valve or damper movement versus commanded direction.

3. All verifications shall be proved visually. Verification via computer or service tool feedback is not acceptable.

3.7 SOFTWARE

A. All specified and other software necessary for system operation and control functions shall be fully installed, programmed and tested for each specific application.

B. Fully test all installed software and programming to verify correct implementation of specified sequences of operation. Tests to include:

1. Visual field verification of stroking all actuators from full open to full closed.

2. Visual field verification of modulation of all variable speed drives.

3. Visual field verification of direction of valve or damper movement or variable speed drive speed increase/decrease versus commanded direction.

4. All verifications shall be proved visually. Verification via computer or service tool feedback is not acceptable.

C. Implement all alarm and security access functions described in the sequences of operation and alarm functions desired by the Owner. Obtain alarm parameters, alarm priorities and routing, alarm descriptive messages, alarm acknowledgment, access level passwords and other requirements from Owner.

D. Provide setup of a minimum of 5 trend logs. Obtain points to be logged, frequency of logging and archiving requirements from the Owner.

E. Provide setup of a minimum of 10 runtime, event or pulse totalization routines. Obtain points, method of totalization and archiving requirements from the Owner.

F. Fully implement all equipment sequences of operation.

G. Create, install and make all specified graphic screens fully functional.

3.8 ADDITIONAL REQUIREMENTS

A. Contractor shall remove all existing controls and control components made obsolete by work performed under this Contract. Removal includes but is not limited to controllers, control panels and cabinets, sensors, actuators, relays, clocks, timers, tubing, wire, conduit, supports, etc. Repair ducts, pipe, walls and insulation to match existing conditions.

B. Contractor shall not damage or in any way inhibit the operation of any existing controls required to remain operational, whether or not such controls are shown on the drawings.

C. Contractor shall, without additional payment from Owner, relocate any installed control components, tubing, wire or conduit as required by other contractors during the performance of other contractors' work.

D. This facility requires that all HVAC, electrical, plumbing, fire and security systems remain operational at all times. Therefore, existing control systems indicated to be removed shall remain during the installation of the new DDC system until existing control system is no longer required. Once each new system has been commissioned and validated, the Contractor shall remove all existing controllers, wiring and pneumatic tubing, etc. per these specifications.

E. Performance of work shall not interfere with the Owner's normal use of the facility. Work on certain equipment and/or system and in or for certain parts of the building and interruptions of systems, equipment or in control of systems serving certain parts of the building must be scheduled in advance with Henderson Building Solutions and the Owner. See other specification sections and the drawings for allowable working house and project phasing.

END OF SECTION 230923

SECTION 232113

HYDRONIC PIPING AND SPECIALS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes piping systems for chilled water, condenser water and equipment drain lines. Piping materials and equipment specified in this Section include:

1. Pipes, fittings, and specialties.

2. Special duty valves.

3. Hydronic specialties.

1.2 SUBMITTALS

A. Product data, including rated capacities and pressures of selected models, weights (shipping, installed, and operating), dimensions, furnished specialties and accessories, and installation instructions for each hydronic specialty and special duty valve specified. Include flow versus pressure drop curves.

B. Maintenance data for hydronic specialties and special duty valves, for inclusion in operating and maintenance manual specified in Division 1.

C. Certification of compliance with ASTM and ANSI manufacturing requirements for pipe, fittings, and specialties.

D. Reports specified in Part 3 of this Section.

E. Schedule of piping systems, including service condenser water, drains, etc.) pipe type, fitting type(s), pipe size, and joining method for various systems and applications.

F. Maintenance records of in-warranty maintenance services performed.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the provisions of the following:

1. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.

2. ASME B31.9 “Building Service Piping.”

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturer: Subject to compliance with requirements, provide hydronic piping system products from one of the following:

1. Calibrated Balancing Valves:
   a. Bell & Gossett ITT; Fluid Handling Div.
   b. Taco, Inc.

c. Tour & Anderson.

2. Air Vents:
   a. Bell & Gossett ITT; Fluid Handling Div.
   b. Hoffman Specialty ITT, Fluid Handling Div.
   c. Spirax Sarco.
   d. Amtrol, Inc. (Thrush).

3. Dielectric Unions:
   a. Perfection Corp.
   b. Watts Regulator Co.
   c. Zurn Industries.

4. Pump Suction Diffuser:
   a. Amtrol, Inc.
   b. Bell & Gossett ITT, Fluid Handling Div.
   c. Mueller.
   d. Taco, Inc.

5. Flexible Connectors:
   a. The Metraflex Co.
   b. Flex-Hose Co., Inc.
   c. Mason-Mercer.
   d. Hyspan.

2.2 PIPE AND TUBING MATERIALS

A. Steel Pipe 2 Inches and Smaller: ASTM A 53 or ASTM A 106, Schedule 40, Type S (seamless), Grade B, black steel pipe, plain ends.

B. Steel Pipe 2-1/2 Inches to 12 Inches: ASTM A 53, Schedule 40, Type E (electric resistance welded), Grade B, black steel pipe, bevel ends.

C. Steel Pipe 14 Inches to 24 Inches: ASTM A 53, Schedule Standard, Type E (electric resistance welded), Grade B, black steel pipe, bevel ends.

D. Hard Copper Tube: ASTM B 88, Type L, water tube, drawn temper.

2.3 FITTINGS

A. Cast-Iron Threaded Fittings: ASME B16.4, Class 125 and 250.

B. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 and 300.

C. Steel Fittings: ASTM A 234/A 234M, seamless or welded, for welded joints.

D. Cast-Iron Threaded Flanges: ASME B16.1, Class 125 and 250; raised ground face, bolt holes spot faced.

E. Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connection and facing:

1. Material Group: 1.1.

2. End Connections: Butt welding.

3. Facings: Raised face.

F. Wrought Copper Fittings: ASME B16.22, streamlined pattern.

G. Cast Bronze Flanges: ASME B16.24, Class 150; raised ground face, bolt holes spot faced.

H. Unions: ASME B16.39, malleable-iron, Class 150 and 300.

I. Dielectric Unions: Threaded or soldered end connections for the pipe materials in which installed; constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

J. Sleeves: The following materials are for wall and roof penetrations:

1. Steel Sheet-Metal: 24 gauge or heavier, galvanized sheet metal, round tube closed with welded longitudinal joint.

2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, plain ends.

K. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53, Schedule 40, black steel; seamless for 2 and smaller and electric resistance welded for 2-1/2 and larger.

2.4 JOINING MATERIALS

A. Welding Materials: Comply, with Section II, Part C. ASME Boiler and Pressure Vessel Code for welding materials appropriate for the wall thickness and chemical analysis of the pipe being welded.

B. Gasket Material: Thickness, material, and type suitable for fluid to be handled, and design temperatures and pressures.

C. Solder Filler Metals: ASTM B 32, 95-5 Tin-Antimony.

2.5 SPECIAL DUTY VALVES

A. Calibrated Balancing Valves: 175 psig water working pressure, 250oF maximum operating temperature, bronze body, plug or ball valve with calibrated variable orifice. Provide with connections for portable differential pressure meter with integral check valves and seals. Valves shall have integral pointer and calibrated scale to register degree of valve opening. Valves 2 inches and smaller shall have threaded connections and 2 1/2-inch valves shall have flanged connections.

2.6 HYDRONIC SPECIALTIES

A. Manual Air Vent: Bronze body and nonferrous internal parts; 150 psig working pressure, 225ºF operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8-inch discharge connection and 1/2-inch inlet connection.

B. Suction Diffusers:

1. Pump Suction Diffusers: Cast-iron body, with threaded connections for 2-inches and smaller, flanged connections for 2-1/2 inches and larger; outlet connection to match size of pump; 175 psig working pressure, 250ºF maximum operating temperature; and complete with the following features:
   a. Stainless-steel inlet vanes with length 2-1/2 times pump suction diameter or greater.

b. Stainless-steel cylinder strainer with 3/16-inch diameter openings with total free area equal to or greater than 5 times cross-sectional area of pump suction, designed to withstand pressure differential equal to pump shutoff head.
c. Disposable fine mesh start-up strainer to fit over cylinder strainer.
d. Adjustable foot support tap designed to carry weight of suction piping.
e. Blowdown tapping in bottom; gauge tapings in suction and discharge.

C. Flexible Connectors: Stainless steel corrugated hose or bellows with woven, stainless steel wire reinforcing protective jacket; 150 psig working pressure, 250ºF operating temperature, threaded ends for 2 inch and smaller and flanged ends for 2 1/2 inches and larger.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

A. Condenser Water Piping:

1. 1-1/2 Inches and Smaller: Copper tube with solder joints.

2. 2 Inches: Screwed steel pipe, or copper tube with solder joints at Contractor's option.

3. 2-1/2 Inches to 10 Inches: Schedule 40, welded steel pipe.

4. 12 Inches to 24 Inches: Schedule Standard, welded steel pipe.

B. Equipment and Condensate Drain Piping:

1. Screwed steel pipe, or copper tube with solder joints at Contractor's option.

3.2 PIPING INSTALLATIONS

A. Install exposed piping at right angles or parallel to building walls. Diagonal runs are permitted, only where indicated on the drawings.

B. Locate groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

C. Install drains at low points in mains, risers, and branch lines and where indicated on the drawings, consisting of a tee fitting, 3/4-inch ball valve, and short 3/4-inch threaded hose connection and cap.

D. Install unions in pipes 2-inches and smaller, adjacent to each valve, at final connections to each piece of equipment, and elsewhere as indicated on the drawings.

E. Install dielectric unions to join dissimilar metals.

F. Install flanges on valves, apparatus, and equipment having 2-1/2 inches and larger connections.

3.3 HANGERS AND SUPPORTS

A. Install all pipe supports per Section 230529.

3.4 HYDRONIC SPECIALTIES INSTALLATION

A. Install manual air vents at high points in the system and elsewhere as required for system air venting and where indicated on the drawings.

3.5 FIELD QUALITY CONTROL

A. Preparation for Testing: Prepare hydronic piping in accordance with ASME B 31.9 and as follows:

1. Leave joints including welds uninsulated and exposed for examination during the test.

2. Provide temporary restraints for flexible connectors which cannot sustain the reactions due to test pressure. If temporary restraints are not practical, isolate expansion joints from testing.

3. Flush system with clean water. Clean strainers.

4. Isolate equipment that is not to be subjected to the test pressure from the piping. If a valve is used to isolate the equipment, its closure shall be capable of sealing against the test pressure without damage to the valve. Flanged joints at which blinds are inserted to isolate equipment need not be tested.

B. Testing: Test hydronic piping as follows:

1. Use ambient temperature water as the testing medium, except where there is a risk of damage due to freezing. Another liquid may be used if it is safe for workmen and compatible with the piping system components.

2. Use vents installed at high points in the systems to release trapped air while filling the system. Use drains installed at low points for complete removal of the liquid.

3. Examine systems to see that equipment and parts that cannot withstand test pressures are properly isolated. Examine test equipment to ensure that it is tight and that low-pressure filling lines are disconnected.

4. Subject piping systems to a hydrostatic test pressure which at every point in the system is not less than 1.5 times the design pressure. The test pressure shall not exceed the maximum pressure for any vessel, pump, valve, or other component in the system under test. Make a check to verify that the stress due to pressure at the bottom of vertical runs does not exceed either 90 percent of specified minimum yield strength, or 1.7 times the "SE" value in Appendix A of ASME B31.9, Code for Pressure Piping, Building Services Piping.

5. After the hydrostatic test pressure has been applied for at least 8 hours, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components as appropriate, and repeat hydrostatic test until there are no leaks. Submit results of test to Engineer.

3.6 ADJUSTING AND CLEANING

A. Clean and flush hydronic piping systems. Remove, clean, and replace strainer screens. Refill system and provide initial chemical treatment. Provide initial fill on newly installed systems.

B. Mark position indicating nameplates of pump discharge and all other balancing valves after hydronic system balancing has been completed, to permanently indicate final balanced position.

C. Check expansion tanks to determine that they are not air bound and that the system is completely full of water, and all air has been removed from system.

END OF SECTION 232113

SECTION 232123

HYDRONIC PUMPS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following types of hydronic pumps:

1. Base-mounted, flexible-coupled, end-suction pumps.

1.2 SUBMITTALS

A. Product data including certified performance curves of selected models indicating selected pump's operating point, weights (shipping, installed, and operating), materials of construction, furnished specialties, and accessories.

B. Provide in the submittal, the pump performance curve based on the actual pump motor RPM to be supplied. Standard pump RPM curves are not acceptable.

C. Shop drawings showing layout and connections for hydronic pumps. Include directions for installation of foundation bolts and other anchorages.

D. Maintenance data for hydronic pumps for inclusion in Operating and Maintenance Manual specified in Division 1 and Division 23 Section "Basic Mechanical Requirements."

1.3 QUALITY ASSURANCE

A. UL Compliance: Provide hydronic pumps which are listed and labeled by UL and comply with UL Standard 778 "Motor Operated Water Pumps".

B. NEMA Compliance: Provide electric motors and components shall comply with NEMA standards.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements provide pumps by one of the following manufacturers.

1. Bell & Gossett, ITT; Div. of ITT Fluid Technology Corp.

2. Armstrong Pumps, Inc.

3. Aurora.

4. Paco.

5. Peerless Pump Co.

6. Taco; Fabricated Products Div.

7. Grundfos

B. Drawings are based on pumps manufactured by Bell & Gossett. Contractor shall, if providing pumps by other acceptable manufacturer, make all allowances necessary to adapt unit bid to the site conditions including but not limited to piping connection sizes, pump base, locations of piping, piping specialties, relocation of piping, electrical connections, size of electrical feeds, dimensions, etc.

2.2 PUMPS, GENERAL

A. Pumps: Factory-assembled and factory-tested. Fabricate casings to allow removal and replacement of impellers without necessity of disconnecting piping. Type, sizes, and capacities shall be as scheduled.

B. Motors: Conform to NEMA Standard MG-1, general purpose, continuous duty, Design B, except Design C where required for high starting torque; single speed with type of enclosure and electrical characteristics as indicated; with built-in thermal-overload protection, and grease-lubricated ball bearings. Select motors that are non-overloading within the full range of the pump performance curve.

C. Efficiency: Provide "Energy Efficient" motors having a minimum efficiency as indicated in accordance with IEEE Standard 112, Test Method B.

D. Apply factory finish paint to all non-stainless steel surfaces, to assembled, and tested units prior to shipping.

E. Motors controlled by variable frequency drives shall be rated for such use.

2.3 BASE-MOUNTED, FLEXIBLE-COUPLED, END-SUCTION PUMPS

A. General Description: Pumps shall be base-mounted, centrifugal, flexible-coupled, for true back pullout, end-suction, single-stage, bronze-fitted, radially split case design, and rated for 175 psig working pressure and 225°F continuous water temperature.

B. Casings Construction: Cast iron, with flanged piping connections, and threaded gauge tapings at inlet and outlet flange connections. Provide vent and drain ports at top and bottom of casing.

C. Impeller Construction: Statically and dynamically balanced, closed, overhung, single-suction, fabricated from cast bronze conforming to ASTM B 584, keyed to shaft and secured by a locking cap screw. Impeller selection shall not exceed 90% of the impeller diameter range.

D. Pump Shaft and Shaft Sleeve Bearings: Steel shaft, with aluminum bronze sleeve and grounding rings.

E. Seals: Internally flushed mechanical seals consisting of carbon steel rotating ring, stainless steel spring, ceramic seat, and flexible bellows and gasket.

F. Bearings: Heavy-duty, greaseable ball bearings, replaceable without disturbing piping with foot support at coupling end.

G. Pump Couplings: Flexible, capable of absorbing torsional vibration and shaft misalignment; complete with metal coupling guard and drop-out spacer for removal of bearing frame without disturbing pump end piping or motor.

H. Mounting Frame: Factory-welded frame and cross members, fabricated of steel channels and angles conforming to ASTM B 36, with fully open grouting area. Fabricate for mounting

pump casing, coupler guard, and motor. Grind welds smooth prior to application of factory finish.

I. Motor: Secured to mounting frame with adjustable alignment on mounting frame.

PART 3 - EXECUTION

3.1 PUMP BASES

A. Extend concrete pump pads as required:

1. Install reinforcing bars and place anchor bolts and sleeves using manufacturer's installation template.

2. Place concrete and allow to cure before installation of pumps. Use Portland Cement conforming to ASTM C150, 3,500 psi compressive strength, and normal weight aggregate, unless dictated otherwise by Structural Engineer.

3.2 INSTALLATION

A. General: Comply with the manufacturer's written installation and alignment instructions.

B. Install pumps in locations and arranged to provide access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.

C. Support pumps and piping separately so that the weight of the piping system does not rest on the pump.

D. Set base-mounted pumps on concrete foundation. Disconnect coupling halves before setting. Do not reconnect couplings until the alignment operations have been completed.

E. Support pump base plate on rectangular metal blocks and shims, or on metal wedges having a small taper, at points near the foundation bolts to provide a gap of 1 inches between the pump base and the foundation for grouting.

F. Adjust the metal supports or wedges until the shafts of the pump and driver are level. Check the coupling faces and suction and discharge flanges of the pump to verify that they are level and plumb.

G. Fill pump baseplates to top of base rails with grout.

3.3 ALIGNMENT

A. Align pump and motor shafts and piping connections after setting on foundations, after grout has been set and foundation's bolts have been tightened, and after piping connections have been made.

B. Adjust alignment of pump and motor shafts for angular and parallel alignment by one of the two methods specified in the Hydraulic Institute "Centrifugal Pumps - Instructions for Installation, Operation and Maintenance."

C. After alignment is correct, tighten the foundation bolts evenly.

1. Alignment tolerances shall meet manufacturer's recommendations.

3.4 FIELD QUALITY CONTROL

A. Check suction piping connections for tightness to avoid air entering pump suction piping.

B. Clean all suction diffusers and remove any start-up strainer screens.

END OF SECTION 232123

SECTION 236500

FACTORY-FABRICATED COOLING TOWERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes factory-fabricated cooling tower. Cooling tower shall be an induced draft, propeller fan, top discharge, crossflow cooling tower.

1.2 QUALITY ASSURANCE

A. Design Loads: Cooling tower shall be designed and constructed to withstand the greater of the specified wind loads and earthquake force or that required by the local Building Code.

B. Codes and Standards:

1. UL and NEMA Compliance: Provide electric motors and electrical components required as part of factory-fabricated cooling towers, which have been listed and labeled by UL and comply with specified NEMA Standards.

2. NEC Compliance: All cooling towers electrical wiring, conduit, components and their installation shall be in accordance with NFPA 70 "National Electrical Code".

3. Cooling tower performance shall be CTI-certified per STD-201.

4. ASHRAE: Cooling towers shall have an efficiency equal to or greater than that required by the most current edition of ASHRAE 90.1 including all addenda.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data, included materials of construction, methods of assembly, furnished accessories, rated capacities, fan performance data, weights (shipping and operating), installation and start-up instructions, and all other information required to show full compliance with Specifications.

B. Shop Drawings: Submit assembly-type shop drawings indicating dimensions, weight loadings, required clearances, basin depths, access locations and methods of assembly of all components including accessories. Clearly indicate all components to be field installed by others. Locate all support locations with weight loads at each location and manufacturer’s recommended method of support.

C. Wiring Diagrams: Submit manufacturer's electrical requirements for power supply wiring to cooling towers. Submit manufacturer's ladder-type wiring diagrams for interlock, safeties and control wiring. Clearly differentiate between portions of wiring that are factory-installed and portions to be field-installed. Include in wiring diagram submittal all accessories provided by manufacturer.

D. Operation and Maintenance Data: Submit operation and maintenance data and parts list for each cooling tower, control and accessory; include "trouble shooting" maintenance guide. Include this data, product data, shop drawings and wiring diagrams in the operation and maintenance manual.

E. Submit sound pressure levels (dB) per ATC-128 for air inlet face, casing face and fan discharge. Submit total sound power levels (dB). Sound levels shall be submitted for each of eight primary octave bands and overall.

F. Test Reports: Submit written reports signed by factory authorized personnel indicting results of equipment start-up and performance test.

G. Submit CTI-certified cooling tower performance data indicating compliance with scheduled performance. Provide performance curve plotting Leaving-Water Temperature (LWT) against Wet-Bulb Temperature (WBT) at constant entering water temperature and constant air flow rate.

H. Installation Instructions: Submit cooling tower installation instructions. Installation instructions shall clearly state:

1. Method to be used by installing contractor to set unit in place, including rigging instructions.

2. Location of all field mechanical and electrical connections.

3. Detailed checkout and start-up procedures.

4. Complete list of manufacturer supplied materials and labor required to place towers into service.

5. Complete list of materials and labor to be supplied by installing contractor required to place towers into service, including identification of manufacturer-supplied components to be field-installed by others.

6. Equipment mounting and support requirements, including structural and vibration isolation requirements.

I. Manufacturer's warranty certificate.

1.4 WARRANTY

A. See Division 00 for warranty requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Subject to compliance with requirements, provide factory-fabricated cooling towers of one of the following:

1. Marley Cooling Tower Co.

2. Evapco, Inc.

3. Baltimore Aircoil Co.

2.2 FACTORY-FABRICATED COOLING TOWERS

A. General: Fabricate cooling towers, using manufacturer's standard design, materials and construction in accordance with published product information, except as otherwise specified.

B. Design structural system for the following live-loading in addition to tower dead-loads and operating-loads:

1. Wind Loading: 30 PSF on exposed vertical surfaces.

2. Earthquake Resistance: Acceleration of 1.0 G horizontally through center of gravity.

C. Tower shall be self-supporting and shall be capable of being installed on a steel or concrete or steel frame providing continuous support under two sides of the tower or on posts providing support at the corner of each cell of the tower. Fabricate structural system, lifting lugs, mechanical equipment supports, casings, fan decks and fan cylinders using corrosion resistant coated, heavy gauge G-235 hot-dip galvanized steel. Uncoated galvanized steel is not acceptable. Casings shall be minimum 16 gauge.

1. Assembly of basins and casing shall be by one of the following methods:
   a. Stainless steel bolt connections and fasteners; seal joints to make watertight.
   b. Weld connections. Weld seams continuously to make watertight. Repair galvanization damaged from welding.

2. Components constructed of galvanized steel shall be provided with a corrosion resistant coating that, when tested, results in the compliance with the following performance characteristics:
   a. Withstand 6000 hours of 5% salt spray per ASTM B117 without blistering, chipping, or loss of adhesion.
   b. Withstand 6000 hours of exposure to acidic (pH=4.0) and alkaline (pH=11.0) water solutions at 95°F without signs of chemical attack.
   c. Withstand impact of 160 in-lbs per ASTM D2794 without damage to the corrosion resistant layer.
   d. Withstand 6000 hours of UV radiation equivalent to 120,000 hours of sun exposure without loss of functional properties.
   e. Withstand 200 thermal shock cycles between -25°F and 180°F without deterioration.
   f. Withstand 6000 hours of exposure to 60 psig water jet without signs of wear or erosion.

D. Hot Water Distribution Basin: Type 304 stainless steel, factory sealed, provided with removable stainless steel basin covers, flanged steel or cast iron horizontal inlet flow control valves capable of shut-off, and replaceable distribution nozzles of non-ferrous material providing full coverage of fill.

E. Cold Water Collection Basin: Type 304 stainless steel, factory sealed, sloped to bottom or side outlet as specified, with anti-vortex plate, and stainless steel suction screen. Provide with drain and overflow connections. Provide large hinged man door in tower casing to allow access to basin.

F. Make-Up Valve: Slow acting, stainless steel electric solenoid valve. Makeup valve control

shall be housed within a NEMA 250, Type 4 enclosure. Provide solid state water level controls with multiple stainless steel electrode probes, contained within a freeze-proof chamber, and relays wired to terminal strip to provide control the following points:

1. High Water Level

2. Low Water Level

3. High Water Alarm Level

4. Low Water Alarm Level

5. Heater Safety Cutout

G. Wetted-Surface Fill, Drift Eliminators and Louvers: 15 mil PVC film fill with integral drift eliminators and louvers formed as part of the sheet. Fill shall be elevated above floor of cold water basin. Tower shall have zero splash out and drift losses not exceeding 0.005% of design flow rate. Material used to have flame spread rating of 5 or less per ASTM E 84.

H. Fans: Shaft driven, propeller type, cast or extruded aluminum blades and hub. Fans shall be designed for low rpm operation with a variable speed drive, and designed to minimize noise generation. Sound pressure level shall not exceed 75 dBA overall at 50' from fan discharge. Fans shall be factory-installed in the fan section. Fan blades shall be adjustable pitch. Fans shall be statically and dynamically balanced and adjusted at the factory. Provide removable, one foot tall fan cylinder constructed of same material and structural design as casing. Provide removable fan guard, welded heavy gauge rod, galvanized steel, wire mesh screens at fan discharge on top of fan cylinder, complying with OSHA regulations.

I. Motor Type: Provide premium efficiency/inverter duty, totally enclosed air-over motor, 1.15 service factor, complying with ASHRAE 90.1. Motor to be installed inside the cooling tower's moist air stream and shall be insulated to withstand cooling tower duty. Motor shall be have a corrosion resistant finish. Motor to be provided with normally closed thermostats.

1. Motors driven by carriable frequency drive shall include a maintenance free, circumferential, conductive micro fiber shaft grounding ring (AEGIS SGR) to discharge shaft currents to ground.

J. Variable Frequency Drive: Cooling Tower manufacturer to provide a pulse-width-modulated variable frequency drive for direct driven motors, listed and labeled as a complete unit and arranged to provide variable speed of a NEMA MG-1, Design B, 3-phase, premium efficiency induction motor by adjusting output voltage and frequency. VFD shall be shipped loose for field installation in a NEMA 1 enclosure. VFDs shall be provided with the following characteristics:

1. Allowable manufacturers of variable frequency drives:
   a. ABB
   b. Danfoss Graham
   c. Square D/Schneider
   d. York/Toshiba
   e. Yaskawa
   f. JCI

2. Output Rating: 3 phase, 1 to 120 Hz

3. Unit Operating Requirements:

a. Input AC voltage to tolerance of plus or minus 10% of line voltage
b. Input frequency tolerance of 60 Hz, plus or minus 3 percent minimum.

c. Capable of driving full load under the following conditions, without derating: Ambient Temperature: 5°F to 104°F; Humidity: Less than 95%, non-condensing; Altitude: 3300 feet.
d. Minimum Efficiency: 96 percent at 60 Hz, full load.
e. Minimum Displacement Primary Side Power Factor: 96 percent.
f. Overload Capability: 1.1 times the base load current for 60 seconds.
g. Starting Torque: 100 percent of rated torque.
h. Speed Regulation: Plus or minus 1 percent.
i. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.

4. Self-Protection and Reliability Features:
   a. Input transient protection by means of surge suppressors.
   b. Over and under voltage trips, inverter over-temperature, overload and overcurrent trips.
   c. Motor overloads: Matched to motor nameplate full load amps.
   d. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
   e. Loss of phase protection.
   f. Ground fault protection.
   g. Short circuit protection.
   h. Motor overload fault.

5. VFD shall send loss of load and signal loss of load condition. VFD shall be internally protected from damage by a loss of load.

6. Automatic Reset or Restart: VFD shall attempt three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bi-directional auto-speed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor, or load.

7. Torque Boost: Automatically vary starting and continuous torque to at least 1.5 times the minimum torque to insure high-starting torque and increased torque at low speeds.

8. Motor Temperature Compensation at Slow Speeds: Adjustable current fall back based on output frequency for temperature protection of self-cooled fan ventilated motors at slow speeds.

9. Input Line Conditioning: The VFD shall have integral 5% line reactors to reduce the harmonics to the power line. The 5% impedance can be from dual reactors (positive and negative DC buss) or from AC line reactors.

10. Panel-Mounted Operator Station: Start/Stop and Auto/Manual selector switches with manual speed control potentiometer or touch keypad.

11. Display: High-resolution backlit LCD and selector switch or touch keypad, mounted flush in controller door and connected to indicate the following controller parameters in plain language.
    a. Output frequency (Hz).
    b. Motor speeds (rpm).

c. Motor status (running, stop, fault).
d. Motor current (amperes).
e. Motor torque (percent).
f. Fault or alarming status (code).

Set-point frequency (Hz).

g. Analog input values.
h. Analog output values.
i. Elapsed time (resettable).
j. KWH (resettable).
k. Digital input status.
l. Digital output status.
m. Output voltage.

12. Control Signal Interface: Provide VFD with the following:
    a. Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10V or 4-20 mA) and 4 programmable digital inputs. All inputs shall be optically isolated. Inputs shall be able to start/stop and provide speed control of the VFD.
    b. Remote Signal Inputs: Capability to accept any one of the following speed-setting input signals from the BMS or other control systems.
        1) 0 to 10 VDC
        2) 0-20 or 4-20 mA.
        3) Fixed frequencies using digital inputs.
        4) RS 485.
        5) Keypad display for local hand operation.
    c. Output Signal Interface: A minimum of 1 analog output signal (4-20 mA) or (0-10V), which can be programmed to any of the following:
        1) Output frequency (HZ).
        2) Output current (load).
        3) DC link voltage (VDC).
        4) Motor-torque (percent).
        5) Motor speed (rpm).
        6) Set-point frequency (Hz).
    d. Remote Indication Interface: A minimum of 2 dry circuit form C relay outputs (120-VAC, 1 A) for remote indication of the following:
        1) Motor running.
        2) Fault and warning indication (over-temperature or over-current).

13. Communications: Provide a serial interface allowing VFD to be used with an external system within a multi-drop network configuration. Interface shall allow all parameter settings of VFD to be programmed via BMS control. Provide capability for VFD to retain these settings within the non-volatile memory.

14. Integral Input Disconnection Means: Fusible switch with lockable handle. Disconnecting means shall be at the input to the VFD before all drive and bypass circuits.

15. Short Circuit Current Rating: VFD shall have a short circuit current rating in both drive and bypass (if provided) mode higher than available fault current as shown on the electrical one-line diagram or on VFD schedule (100 KAIC minimum).

K. Electrical: Provide unit with factory wired terminal box, within NEMA 3R stainless steel enclosure. All fan motors and vibration cutout switches shall be factory wired to an externally mounted terminal box with knockouts for field connections.

L. Accessories: Provide cooling tower with the following accessories:

1. Provide removable, Type 304 stainless steel or UV and corrosion resistant PVC mesh air inlet screens.

2. Provide aluminum ladder attached to side of tower for access to fan deck with extension to/from bottom tower to grade. Ladder to also provide access to a casing access door platform. Provide galvanized handrails, including knee rails and toe boards, at top of cooling tower around entire perimeter. Provide ladder safety cage meeting OSHA regulations.

3. Provide platforms on the louvered face with handrails for access and maintenance of hot water basins. Hot water basins shall be capable of being accessed without disrupting cooling tower operation.

4. Provide casing access doors that swing inward at both end walls to access collection basin and plenum area, and constructed of same material and structural design as casings.

5. Provide equipment removal davit to lower mechanical equipment (fans, gear drives) from elevated supports to internal metal working surfaces.

6. Provide internal walkway with ladder up to mechanical equipment/platform with handrail meeting OSHA regulations, constructed of galvanized steel or aluminum bar grating spanning from end to end of cooling tower from casing access door to casing access door.

7. Provide basin sweeper piping within the cold water basin, constructed of PVC with plastic eductor nozzles.

8. Provide vibration limit switch to interrupt power to the motor in the event of excessive vibration. Switch shall be factory wired and field adjustable with manual reset.

9. Provide removable fan discharge stack, height as scheduled of same material and meeting same structural design requirements as casing. Fan discharge screens to be located at termination of discharge stack.

10. Furnish 480V, 3ph. electric immersion type basin heater for each cell to provide minimum 40˚F basin water temperature at an outdoor temperature of +10˚F. Furnish heater assembly complete with one or more stainless steel immersion heaters, NEMA 3R enclosure, configured for single point electrical connection. Provide with fused disconnect switch, contactor, control probe to monitor water level and temperature, 24V transformer, and solid-state circuit board for temperature control and low water cut off.

11. Flanged bottom equalizer connection with blind flange cover.

12. Flanged bottom inlet with all hot water piping and balancing methods from bottom connection to underside of the top of tower factory installed, and all hot water tower piping from top of tower to hot water basins external to casing top shipped loose for field installation. All factory provided piping internal to cooling tower to be Schedule 40 PVC. All factory provided piping external to cooling tower to be Schedule 40 steel with flanged connections.

13. Flanged bottom bypass connection. Bypass connection to allow hot water to be diverted directly to the cold water basin without passing across tower fill.

14. Flanged bottom outlet connection or flange side outlet connection.

2.3 COOLING TOWER PERFORMANCE

A. Cooling tower shall be selected for the following peak operating conditions.

Cooling Tower 1

1.	Quantity of cells	1
2.	Flow Rate per Cell (gpm)	1,290
3.	Entering Water Temperature (°F)	95
4.	Leaving Water Temperature (°F)	85
5.	Entering Air WB Temperature (°F)	78
6.	Maximum Drift Losses (0.005% of Design Flow Rate)	9.35
7.	Motors per Cell	1
8.	Maximum Motor hp per Cell	30
9.	Inlet Connection Location	bottom
10.	Outlet Connection Location	bottom
11.	Bypass Connection Location	bottom
12.	Electrical Characteristics	480/3
13.	Sound Characteristics (dbA) (Measured 50’ from Fan Discharge)	71

PART 3 - EXECUTION

3.1 START-UP AND TRAINING

A. Provide the services of a factory authorized service representative to provide specified assembly, start-up and testing service and to demonstrate and train the Owner's maintenance personnel as specified below:

B. Start-Up Service:

1. Supervise assembly and start-up in accordance with manufacturer's instruction of all equipment and VFD(s). Supervise testing and adjusting of all equipment. Recommend replacing damaged or malfunctioning controls and equipment. Any equipment or components found to be defective shall be replaced.

2. Supervise lubrication service, where applicable, including filling of reservoirs and confirming that lubricant is of proper quality and type.

3. Provide written start-up reports, signed by the manufacturer's representative, detailing results of tower start-up.

C. Training:

1. Training of Owner's maintenance personnel shall be as specified in Section 00020.

END OF SECTION 236500

SECTION 260010

GENERAL ELECTRICAL REQUIREMENTS

PART 1 - GENERAL REQUIREMENTS

1.1 DESCRIPTION OF THE WORK

A. This Division requires providing complete functioning systems, and each element thereof, as specified, indicated, or reasonably inferred, on the Drawings and in these Specifications, including every article, device, or accessory (whether or not specifically called for by item) reasonably necessary for each system's functioning as indicated by the design and the equipment specified.

B. Division 26 of these Specifications and Drawings numbered with prefixes E generally describe these systems, but the scope of the electrical Work includes all such Work indicated in all Contract Documents: Division 0 and 1 specifications, Mechanical, Plumbing and Electrical Drawings and Specifications; and Addenda.

1.2 QUALITY ASSURANCE

A. Execute all Work under this Division in a thorough and professional manner by competent and experienced workers duly trained to perform the Work.

B. Install all Work in strict conformance with all manufacturers' requirements and recommendations unless these Documents exceed those requirements. Install all equipment and materials in a neat and professional manner, aligned, leveled, and adjusted for satisfactory operation, in accordance with NECA guidelines.

C. All material and equipment shall be new, of the best quality and design, free from defects and imperfections and with markings or a nameplate identifying the manufacturer and providing sufficient reference to establish quality, size and capacity. Provide all material and equipment of the same type from the same manufacturer whenever practicable.

D. Unless specified otherwise, manufactured items of the same types specified within this Division shall have been installed and used, without modification, renovation, or repair for not less than one year prior to date of bidding for this Project.

1.3 CODES, REFERENCES AND STANDARDS

A. Execute all Work in accordance with, and comply at a minimum with, National Fire Protection Association (NFPA), and all national, state and local building codes, ordinances and regulations in force governing the Work.

B. The governing codes are minimum requirements. Where the Drawings and Specifications exceed the code requirements the Drawings and Specifications shall prevail.

C. Contractor shall comply with, make all notices required by and pay all fees required by the rules and regulations of all public utilities and municipal utility departments where required by the work.

D. Obtain timely inspections by all authorities having jurisdiction; and, upon final completion of the Work, obtain and deliver to the Owner executed final certificates of acceptance from the authorities having jurisdiction.

E. All material, manufacturing methods, handling, dimensions, installations and test procedures shall conform to but not be limited to the following industry standards, acts and codes:

1. IBC International Building Code
2. ADA Americans with Disabilities Act
3. AIA Guidelines for Design and Construction of Hospital and Healthcare
4. Facilities or State Adopted Regulations
5. AEIC Association of Edison Illuminating Companies
6. ANSI American National Standards Institute
7. ASTM American Society of Testing Materials
8. AWS American Welding Society
9. AWWA American Water Works Association
10. ETL Electrical Testing Laboratories
11. ICEA Insulated Conductors Engineers Association
12. IEEE Institute of Electrical and Electronics Engineers
13. IES Illuminating Engineering Society
14. NBFU National Board of Fire Underwriters
15. NEC National Electrical Code, NFPA 70
16. NECA National Electrical Contractors Association
17. NEMA National Electrical Manufactures' Association
18. NETA InterNational Electrical Testing Association
19. NFPA National Fire Protection Association
20. OSHA Occupational Safety and Health Act
21. UL Underwriter's Laboratories

1.4 DEFINITIONS

A. Whenever used in these Specifications or Drawings, the following terms shall have the indicated meanings:

1. Furnish: “Supply and deliver to the project site, ready for unloading, unpacking, assembling, installing, and similar operations.”

2. Install: “Perform all operations at the project site, including, but not limited to, and as required: unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, testing, commissioning, starting up and similar operations, complete, and ready for the intended use.”

3. Provide: “Furnish and install complete and ready for the intended use.”

4. Furnished by Owner (or Owner-Furnished), Furnished by Henderson Building Solutions, LLC, or Furnished by Others: “An item furnished by the Owner, by Henderson Building Solutions or under other Divisions or Contracts, and installed under the requirements of this Division, complete, and ready for the intended use, including all items and services incidental to the Work necessary for proper installation and operation.”

5. Engineer: Where referenced in this Division, “Engineer” is the Engineer of Record and the Design Professional for the Work under this Division, and is a Consultant to, and an authorized representative of, the Construction Manager, as defined in the General and/or Supplementary Conditions. When used in this Division, it means increased involvement by, and obligations to, the Engineer, in addition to involvement by, and obligations to, the “Construction Manager.”

6. AHJ: Any regulatory and/or inspection agency (Authority) Having Jurisdiction over the Work.

7. NRTL: Nationally Recognized Testing Laboratory, as defined and listed by OSHA in 29 CFR 1910.7 (e.g., UL, ETL, CSA, etc.), and acceptable to the Authority having Jurisdiction (AHJ) over this project. Nationally Recognized Testing Laboratories and standards listed are used only to represent the characteristics required and are not intended to restrict the use of other NRTLs that are acceptable to the AHJ, and standards that meet the specified criteria.

1.5 COORDINATION

A. The Contractor shall review and shall coordinate with other Divisions for electrical work included in other Divisions but not listed in Division 26 or indicated on electrical Drawings.

B. The Contractor shall visit the site and ascertain the conditions to be encountered in installing the Work under this Division, verify all dimensions and locations before purchasing equipment or commencing work, and make do provisions for same in the bid. Failure to comply with this requirement shall not be considered justification for omission, alteration, and incorrect or faulty installation of any of the Work under this Division or for additional compensation for any Work covered by this Division.

C. The Contractor shall refer to Drawings and Divisions of the other trades and to relevant equipment drawings and shop drawings to determine the extent of clear spaces. Make all offsets required to clear equipment, beams and other structural members, and to facilitate concealing conduit in the manner anticipated in the design.

D. The Contractor shall provide materials with trim that will fit properly for the types of ceiling, wall, or floor finishes installed.

E. The Contractor shall maintain an electrical foreman on the jobsite at all times to coordinate this Work with other trades so that various components of the electrical systems is installed at the proper time, fits the available space, and allows proper service access to all

equipment. Carry on the Work in such a manner that the Work of the other trades will not be handicapped, hindered, or delayed at any time.

F. Work of this Division shall progress according to the "Construction Schedule" as established by the Prime Contractor and as approved by Henderson Building Solutions. Cooperate in establishing these schedules and perform the Work under this Division, in a timely manner in conformance with the construction schedule to ensure successful achievement of all schedule dates.

1.6 MEASUREMENTS AND LAYOUTS

A. Verify all existing and all final locations of equipment, rough-ins and other components with field measurement. Calculated dimensions or dimensions indicated in the Contract Documents take precedence to scaled dimensions. Determine exact locations by job measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. The Contractor shall be held responsible for errors that could have been avoided by proper checking and inspection.

1.7 SUBMITTALS

A. Refer to Division 1 and the Contract for submittal requirements.

1.8 ELECTRONIC DRAWING FILES

A. In preparation of shop drawings or record drawings, Contractor may, at his option, obtain electronic drawing files in AutoCAD or DXF format from the Engineer. Contractor shall complete and forward to Henderson Building Solutions the form attached at the end of this section. Contractor shall indicate the desired shipping method and drawing format on the attached form. Engineer’s release agreement form must be received before electronic drawing files will be sent.

1.9 SPARE PARTS

A. Provide to the Owner the spare parts specified in the individual specification sections.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver equipment and material to the job site in their original containers with labels intact, fully identified with manufacturer's name, make, model, model number, type, size, capacity and Underwriter's Laboratories, Inc. labels and other pertinent information necessary to identify the item.

B. Deliver, receive, handle and store equipment and materials at the job site in the designated area and in such a manner as to prevent equipment and materials from damage and loss. Store equipment and materials delivered to the site on pallets and cover with waterproof, tear resistant tarp or plastic or as required to keep equipment and materials dry. Follow manufacturer's recommendations, and always take every precaution to properly protect equipment and material from damage, including the erection of temporary shelters to adequately protect equipment and material stored at the Site. Equipment and/or material which becomes rusted or damaged shall be replaced or restored by the Contractor to a condition acceptable to Henderson Building Solutions.

C. Contractor shall be responsible for the safe storage of Contractor’s own tools, material and equipment.

1.11 CUTTING AND PATCHING

A. General: Perform cutting and patching in accordance with Division 1. In addition to the requirements in Division 1, the following requirements apply:

B. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.

C. Perform cutting, fitting, and patching of mechanical and plumbing equipment and materials required to:

1. Uncover Work to provide for installation of ill-timed Work.

2. Remove and replace defective Work.

3. Remove and replace Work not conforming to the requirements of the Contract Documents.

4. Remove samples of installed Work as specified for testing.

5. Install equipment and materials in existing structures.

6. Upon written instructions from Henderson Building Solutions, uncover and restore Work to provide for Henderson Building Solutions/Engineer observation of concealed Work.

D. Cut, remove and legally dispose of selected equipment, components, and materials as indicated, including but not limited to removal of conduit, wiring, panel boards, light fixtures and trim, and other electrical items made obsolete by the new Work.

E. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

F. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.

G. Patch finish surfaces and building components using new materials matching the original installation and experienced installers.

1.12 RECORD DOCUMENTS

A. Prepare record documents in accordance with requirements in Division 1. In addition to the requirements specified in Division 1, indicate the following installed conditions created in AutoCAD on solid state flash drive:

1. Major raceway systems, size and location for both exterior and interior.

2. Approved substitutions, contract modifications and actual equipment materials installed.

3. Indicate all deviations from original Contract Documents.

1.13 OPERATION AND MAINTENANCE MANUALS

A. Operation and Maintenance manuals shall include product data and required shop drawings worked to reflect “as-built” conditions. In addition to the requirements specified in Division 1, including the following information for all equipment:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests and complete nomenclature and commercial numbers of replacement parts.

2. Manufacturer’s printed operating instructions to include start up, break-in and routine and normal operating instruction, regulation, control, stopping, shutdown, emergency instruction and summer and winter operating instructions.

3. Maintenance procedures for routine preventative maintenance and troubleshooting, disassembly, repair, reassembly, aligning and adjusting instructions.

4. Servicing instructions, lubrication charts and schedules and parts listed.

1.14 PROJECT MANUAL

A. Assemble and submit at completion of the project per the requirements of Division 1, a project manual that includes at a minimum the following:

1. All RFI’s with Engineer’s responses.

2. Copies of all approved submittals, including all shop drawings.

3. Copies of all test reports.

4. Copies of all reports by inspectors representing authorities having jurisdiction. Include initial and final reports and any Contractor responses to same.

5. Other information required by Henderson Building Solutions necessary to document the Work performed under this Contract.

1.15 HAZARDOUS MATERIALS

A. The Contractor is hereby advised that building components to be encountered as part of the Work may have been painted or stained with lead based products. It is the Contractor’s responsibility to take all proper precautions concerning potential lead based products and to comply with the Occupational Safety and Health Administration’s Lead in Construction Rule, 29 CFR Part 1926 et al, and Hazard Communication Standard 29 CFR 1926.59. These precautions include material sampling and analysis, OSHA required worker protection, area isolation, engineering and work practice controls, and cleaning. The Contractor shall handle all suspect or identified lead based products with care as not to scratch, scrape, grind, or in any other way release the lead based products, except as specifically required by the Work. The Contractor is responsible for properly cleaning all areas where suspect or identified lead based paint products are disturbed prior to returning the building to the Owner.

B. The Contractor shall not install new lead or lead bearing products as defined by the U.S. Consumer Product Safety Commission’s Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint 16 CFR 1303 et al., which is 0.6% lead

and greater by weight of the total nonvolatile content of the paint or of the dried paint film, including but not limited to paints, coatings, stains, etc.

C. If asbestos or any other hazardous material is or will be encountered while performing the Work, the Contractor shall immediately cease work and notify the Owner and Henderson Building Solutions.

1.16 EXISTING CONDITIONS

A. Existing conditions indicated on the Drawings are taken from the best information available to Henderson Building Solutions and the Engineer, existing drawings, and from limited, in-situ, visual site observations; and, they are not to be construed as "AS BUILT" conditions. The information is shown to help establish the extent of the Work.

B. Verify all actual existing conditions at the project site and perform the Work as required to meet the existing conditions and the intent of the Work.

1.17 ACCESS TO EQUIPMENT

A. Locate all pull boxes, junction boxes and controls to provide easy access for operation, service inspection and maintenance. Provide an access door where equipment or devices are located above or behind inaccessible walls and ceilings.

B. Maintain all code required clearances and clearances required by manufacturers.

1.18 ELECTRICAL INSTALLATIONS

A. Sequence, coordinate and integrate the various elements of electrical systems, materials and equipment. Comply with the following requirements:

1. Coordinate electrical systems, equipment and materials installation with installation of other building components (structural, mechanical, etc.).

2. Coordinate the installation of required boxes, supporting devices and steel pipe sleeves to be set in poured-in-place concrete and other construction components, as they are constructed.

3. All openings in or through floor construction, fire walls or smoke partitions shall be sealed. Fire stopping, sealing materials and installation methods shall be UL classified systems.

4. Sequence, coordinate and integrate installation of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.

5. Where mounting heights are not detailed or dimensioned, install systems, materials and equipment to provide the maximum headroom possible.

6. Install systems, materials and equipment to conform with approved submittal data to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the Construction Manager.

7. Install systems, materials and equipment level and plumb, parallel and perpendicular to other building systems and components.

8. Install electrical equipment to facilitate servicing, maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.

9. Install systems, materials and equipment giving right-of-way priority to systems required to be installed at a specific slope.

10. Tighten electrical connections and terminals, including screws and bolts, in accordance with manufacturer's published torque tightening values. Where manufacturer's torqueing requirement are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL 486A and UL 486B.

11. Install electrical equipment in accordance with manufacturer's written instructions, applicable requirements of NECA's "Standard of Installation" and in accordance with recognized industry practices to fulfill project requirements.

12. Immediately prior to final inspection, the Electrical Contractor shall clean all material and equipment installed under the Electrical Contract. Dirt, dust, plaster, stains and foreign matter shall be removed from all interior and exterior surfaces.

13. Adjust operating mechanisms for free mechanical movement.

14. Where types, sizes or ratings of any electrical equipment, materials or accessories are not indicated, comply with established industry standards for those applications indicated.

15. Where applicable and otherwise noted, provide NEMA Type 1 general-purpose enclosures for equipment in interior applications and NEMA Type 3R weather tight enclosures for equipment in exterior applications and any interior applications susceptible to moisture.

1.19 ADJUSTING, ALIGNING AND TESTING

A. Adjust, align and test all electrical equipment furnished and/or installed under this Division.

B. Check motors for alignment with drive and proper rotation and adjust as required.

C. Check and test protective devices for specified and required application and adjust as required.

D. Check, test and adjust adjustable parts of all light fixtures and electrical equipment as required to produce the intended performance.

E. Verify that completed wiring system is free from short circuits, unintentional grounds, low insulation impedances, and unintentional open circuits.

F. After completion, perform tests for continuity, unwanted grounds, and insulation resistance in accordance with the requirements of NFPA 70 and NETA.

G. Be responsible for the operation, service and maintenance of all new electrical equipment during construction and prior to acceptance by Henderson Building Solutions of the

complete project under this Contract. Maintain all electrical equipment in the best operating condition including proper lubrication.

H. Notify Henderson Building Solutions immediately of all operational failures caused by defective material, labor or both.

I. Refer to individual Sections for additional and specific requirements.

1.20 START-UP OF SYSTEMS

A. Contractor shall provide all labor, material and equipment necessary to perform the specified electrical systems start-up, testing and adjusting.

B. Where start-up, testing and adjusting of both electrical and mechanical systems is specified to be provided by or witnessed by others (including governing authorities), Contractor shall provide all labor, materials and equipment required to witness, support and generally facilitate the work being performed by others.

C. Prior to start-up of electrical systems, check all components and devices, lubricate items appropriately, and tighten all screwed and bolted connections to manufacturers' recommended torque values using appropriate torque tools.

D. Each power and control circuit shall be energized, tested and proved free of breaks, short-circuits and unwanted grounds.

E. After all systems have been inspected and adjusted, confirm all operating features required by the Drawings and Specifications and make final adjustments as necessary.

F. Demonstrate that all equipment and systems perform properly as designed per Drawings and Specifications.

G. At the time of final review and tests of the power systems, all equipment and system components shall be in place and all connections at panelboards, switches, circuit breakers, and the like, shall be complete. All fuses shall be in place, and all circuits shall be continuous from point of service connections to all electrical devices.

1.21 TESTS

A. Perform tests where required by these Specifications. The tests shall establish the adequacy, quality, safety, and reliability for each electrical system installed.

B. For specific testing requirements of each electrical systems, refer to the Specification section that describes that system.

C. Promptly correct all failures or deficiencies revealed by these tests as determined by the Engineer.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 260010

AGREEMENT FOR TRANSFER OF INFORMATION

MACHINE-READABLE FORMAT

PROJECT NAME: _____ PROJECT NO/PHASE: _____

Made this day _____

By and Between Henderson Engineers, Inc., Lenexa, Kansas (hereinafter referred to as ENGINEER) and _____ (hereinafter referred to as RECIPIENT).

The enclosed electronic media are provided pursuant to your request for the purpose of production of shop drawings or record drawings. In using it, modifying it, or accessing information from it, you are responsible for confirmation, accuracy, and checking of the data from the media. ENGINEER hereby disclaims any and all responsibility from any results obtained in use of this electronic media and does not guarantee any accuracy of the information.

RECIPIENT agrees that it shall not use the information provided by ENGINEER for any purpose other than that described above without the express written consent of ENGINEER. RECIPIENT also hereby acknowledges that the data delivered by ENGINEER is for use by RECIPIENT only, and is not to be released to any other party without the written consent of the ENGINEER and does not transfer ownership of the instruments of professional service.

RECIPIENT understands that the automated conversion of information and data from the system and format used by ENGINEER to an alternate system or format cannot be accomplished without the possibility of introduction of inexactitudes, anomalies, and errors. In the event project documentation provided to RECIPIENT in machine readable form is so converted, RECIPIENT agrees to assume all risk associated therewith, and to the fullest extent permitted by law, to hold harmless and indemnify ENGINEER from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees, arising therefrom or in connection therewith.

RECIPIENT recognizes that changes or modifications to ENGINEER'S instruments of professional service introduced by anyone other than ENGINEER may result in adverse consequences that ENGINEER can neither predict nor control. Therefore, and in consideration of ENGINEER'S agreement to deliver its instruments of professional service in machine readable format, RECIPIENT agrees, to the fullest extent permitted by law to hold harmless and indemnify ENGINEER from and against all claim, liabilities, losses, damages, and costs, including misuse or reuse by others of the machine readable information and data provided by ENGINEER under this Agreement. The foregoing indemnification applies, without limitation, to any use of the project documentation on another project, for additions to this project, or for completion of this project by others; ENGINEER may authorize excepting only such use in writing.

Signature

HENDERSON ENGINEERS, INC.

Signature

RECIPIENT

Date

Date

Shipping Method	Format	Media
☐ E-Mail	☐ AutoCAD 2000/2002	☐ CD-ROM
☐ First Class Mail	☐ AutoCAD 2004/2005	☐ DVD
☐ FedEx Overnight (No P.O. Box)	☐ DXF	

Shipping or E-Mail Address:

Phone:

SECTION 260500

COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes limited scope general construction materials and methods, electrical equipment coordination, and common electrical installation requirements as follows:

1. Joint sealers for sealing around electrical materials and equipment, and for sealing penetrations in fire and smoke barriers, floors, and foundation walls.

1.2 SUBMITTALS

A. Product data for the following products:

1. Through-penetration firestop systems.

1.3 QUALITY ASSURANCE

A. Provide through-penetration firestop systems that comply with the following requirements.

1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is UL, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

2. Through-penetration firestop system products bear classification marking of qualified testing and inspection agency.

B. Engage an experienced installer who is certified, licensed or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer’s willingness to sell its through-penetration firestop system products to Contractor or to an installer engaged by Contractor does not in itself confer qualifications on buyer.

1.4 PROJECT CONDITIONS

A. Do not install through-penetration firestop systems when ambient or substrate temperatures are outside limitations recommended by manufacturer.

B. Do not install through-penetration firestop systems when substrates are wet.

PART 2 - PRODUCTS AND MATERIALS

2.1 FIRESTOPPING

A. Firestopping sealants, systems and accessories shall have fire-resistance ratings indicated, as established by testing identical assemblies in accordance with UL 2079 or ASTM E 814, by Underwriters' Laboratories, Inc., or other NRTL acceptable to AHJ.

B. Manufacturers

1. Hilti, Inc.

2. Specified Technologies Inc.

C. Performance Requirements

1. Provide products that upon curing, do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.

2. Openings within walls and floors designed to accommodate cabling systems subjected to frequent cable changes shall be provided with re-enterable products specifically designed for retrofit.

D. Latex Sealants: Single component latex formulations that upon cure do not re-emulsify during exposure to moisture.

E. Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item.

F. Firestop Putty: Intumescent, non-hardening, water resistant putties containing no solvents, inorganic fibers or silicone compounds.

G. Silicone Sealants: Moisture curing, single component, silicone elastomeric sealant for horizontal surfaces (pourable or nonsag) or vertical surface (nonsag).

H. Silicone Foam: Multicomponent, silicone-based liquid elastomers, that when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

PART 3 - EXECUTION

3.1 COMMON REQUIREMENTS FOR ELECTRICAL INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Coordinate seals with wall, ceiling, roof or floor materials and rating of the surface (sound, fire, waterproofing, etc.)

C. Comply with NECA 1.

3.2 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire/smoke-rated floor and wall assemblies to restore original fire-resistance rating of assembly.

B. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust, release agents, water repellents, and any other substances that may inhibit optimum adhesion.

C. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.

D. Do not proceed until unsatisfactory conditions have been corrected.

3.3 JOINT SEALERS

A. Preparation for Joint Sealers

1. Clean surfaces of penetrations, sleeves, or both, immediately before applying joint sealers, to comply with recommendations of joint sealer manufacturer.

2. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

B. Application of Joint Sealers

1. General: Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

2. Tooling: Immediately after sealant application and prior to time shining or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

END OF SECTION 260500

SECTION 260519

LOW VOLTAGE CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product data showing full compliance with requirements.

1.2 SEQUENCING AND SCHEDULING

A. Coordination: Coordinate layout and installation of cable with other installations.

1. Revise locations and elevations from those indicated as required to suit field conditions and as approved by Henderson Building Solutions, LLC.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver wire and cable according to NEMA WC-26.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:

1. Conductors and Cables:

a. AFC Cable Systems.

b. American Insulated Wire Corp; Leviton Co.

c. Brand-Rex Cable Systems, Brintec Corp.

d. Carol Cable Company, Inc.

e. General Cable.

f. Southwire.

g. Stabiloy.

2. Connectors and Splices for Conductors and Cables

a. Amp Inc./Tyco Int.

b. Electrical Products Division, 3M Co.

c. Hubbell/Anderson.

d. Thomas & Betts Corp.

2.2 BUILDING WIRES AND CABLES

A. UL Listed building wires and cables with conductor material, insulation type, cable construction and rating as specified in Part 3 "Applications" Article.

B. Thermoplastic Insulation: Conform to NEMA WC 5.

C. Color Coding: See "Section 260553 – Electrical Identification."

2.3 CONNECTORS AND SPLICES

A. UL Listed factory fabricated wiring connectors of size, ampacity rating, material, type and class for application and for service indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine raceways and building finishes to receive wires and cables for compliance with installation tolerances and other conditions. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 CONDUCTOR APPLICATIONS

A. Branch Circuits: Type THHN/THWN-2, single copper conductors in raceway, minimum size #12 AWG. Use solid conductor for #12 AWG branch circuit wiring.

B. Class 1, Class 2 and other Control Circuits: Type per manufacturer's directions or as shown on drawings. Use type THHN/THWN-2, copper conductors in raceway where types are not indicated, minimum size #14 AWG.

3.3 INSTALLATION

A. Install wires and cables as indicated, according to manufacturer's written instructions and the NECA "Standard of Installation."

B. Remove existing wire from raceway before pulling in new wire and cable.

C. Pull conductors into raceway simultaneously where more than one is being installed in the same raceway.

1. Use pulling compound or lubricant where necessary except on isolated power branch circuits. Compound used must not deteriorate conductor or insulation.

2. Use pulling means, including fish tape, cable, rope, and basket weave wire/cable grips that will not damage cables or raceway.

3. Do not use pulling compounds of any kind on isolated power branch circuits, i.e. operating rooms, etc.

D. Install exposed cable parallel and perpendicular to surfaces or exposed structural members and follow surface contours where possible.

E. Conductor Splices: Keep to minimum.

1. Install splices and taps that possess equivalent or better mechanical strength and insulation ratings than conductors being spliced.

2. Use splice and tap connectors that are UL listed and labeled and compatible with conductor material. Splice connectors used for connecting copper to aluminum conductors shall be listed for such purposes.

F. Connect components to wiring and to ground as indicated and instructed by manufacturer. Tighten connectors and terminals, including screws and bolts, according to equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals according to tightening torques specified in UL Standard 486A.

G. Conceal cables in finished walls and ceilings unless otherwise indicated or installed in mechanical or electrical rooms.

H. Identify and color code conductors and cable according to Section "260553 – Electrical Identification."

3.4 FIELD QUALITY CONTROL

A. Prior to energizing electrical circuits, test wires and cables for electrical continuity, short circuits and for proper phase sequence.

B. Subsequent to wire and cable hook-up, energize circuits and demonstrate proper functioning. Correct malfunctions and retest to demonstrate compliance.

END OF SECTION 260519

SECTION 260526

GROUNDING AND BONDING

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes grounding of electrical systems and equipment. This section includes:

1. Grounding conductors.

2. Connector products.

1.2 SUBMITTALS

A. Product Data for ground conductors, connectors, connection materials and grounding fittings.

1.3 QUALITY ASSURANCE

A. Comply with UL 467 for all grounding, connector and bonding materials and equipment.

B. Ground Components, Devices, and Accessories: All grounding, connector and bonding materials and equipment shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Governing Requirements: Where types, sizes, ratings and quantities indicated on the drawings or these specifications are in excess of National Electrical Code (NEC) requirements, the more stringent requirements and the greater size, rating and quantity indications shall govern.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements. Provide products by the following:

1. Burndy; Part of Hubbell Electrical Systems.

2. ERICO International Corporation.

3. Harger Lightning and Grounding.

4. ILSCO.

5. O-Z/Gedney; a Brand of the EGS Electrical Group.

6. Panduit Corp.

7. Thomas & Betts Corp.

2.2 GROUNDING CONDUCTORS

A. Comply with applicable provisions of Section "260519 – Conductors and Cables." Conform to NEC Table 8, except as otherwise indicated, for conductor properties including stranding.

1. Material: Copper.

2. Equipment Ground Conductors: Insulated with green color insulation.

2.3 CONNECTORS

A. Listed and labeled and complying with UL 467.

B. Bolted Clamps: Copper or copper alloy meeting ASTM 8-1-87 heavy-duty type.

PART 3 - EXECUTION

3.1 APPLICATION

A. Equipment Grounding Conductors: Comply with NEC Article 250 for types, sizes and quantities of system and equipment grounding conductors, except where specific types, larger sizes or more conductors than required by NEC are indicated on the drawings or in these specifications.

1. Install insulated grounding conductor with circuit conductors for the items below in addition to those required by Code:
   a. Branch circuits.
   b. Three-phase motor branch circuits.
   c. Flexible raceway runs.

3.2 INSTALLATION

A. General: Ground electrical systems and equipment according to NEC requirements, except where Drawings or Specifications exceed NEC requirements.

B. Grounding Conductors: Route along the shortest and straightest paths possible, except as otherwise indicated. Avoid obstructing access or placing conductors where they may be subjected to strain, impact or damage.

3.3 CONNECTIONS

A. General: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors and connection methods so metals in direct contact will be galvanically compatible.

1. Use electroplated or hot-tin-coated materials to assure high conductivity and to make contact points closer in order of galvanic series.

2. Make connections with clean, bare metal at points of contact.

3. Make aluminum to steel connections with stainless steel separators and mechanical clamps.

4. Make aluminum to galvanized steel connections with tin-plated copper jumpers and mechanical clamps.

5. Coat and seal connections having dissimilar metals with inert material to prevent future penetrations of moisture to contact surfaces.

B. Equipment Grounding Wire Terminations: For No. 8 AWG and larger, use pressure type grounding lugs. No. 10 AWG and smaller grounding conductors may be terminated with winged pressure type connectors.

C. Tighten screws and bolts for grounding and bonding connectors and terminals according to manufacturer's published torque-tightening values. Where these requirements are not available, use those specified in UL 486A.

END OF SECTION 260526

SECTION 260529

HANGERS AND SUPPORTS

PART 1 - GENERAL

1.1 COORDINATION

A. Coordinate installation of equipment supports, and roof penetrations.

1.2 SUBMITTALS

A. Product Data: For Fabricated Metal Equipment Support Assemblies.

PART 2 - PRODUCTS

A. Steel Slotted Support Systems: Comply with Metal Framing Manufacturers Association MFMA-4, factory-fabricated components for field assembly.

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
   a. Allied Tube & Conduit.
   b. Eaton B-Line, Inc.
   c. ERICO International Corporation; of the Pentair family.
   d. Thomas & Betts Corporation.
   e. Unistrut; Tyco International, Ltd.
   f. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.

3. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

E. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
   a. Manufacturers: Subject to compliance with requirements, provide products by the following:
      1) Hilti Inc.
      2) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      3) MKT Fastening, LLC.
      4) Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, stainless steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
   a. Manufacturers: Subject to compliance with requirements, provide products by the following:
      1) Eaton B-Line, Inc.
      2) Empire Tool and Manufacturing Co., Inc.
      3) Hilti Inc.
      4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
      5) MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.

4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.

5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.

6. Toggle Bolts: All-steel springhead type.

7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

B. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

C. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41mm).

D. Material: Steel conforms to ASTM A1011 SS GR 33 or A1011 HSLAS GR 45 Class 2, E-Coat or Power Coat finish, 12-gauge, 0.108-inch (2.8 mm), and nominal thickness.

E. Provide fittings and accessories that mate and match with framing and are of same manufacturer.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for conduit a minimum of every 10 feet. Minimum rod size shall be 1/4 inch (6 mm) in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with single-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch (38-mm) and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, conduit may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb. (90 kg).

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.

2. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.

3. To Concrete: Expansion anchor fasteners.

4. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches (100 mm) thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches (100 mm) thick.

5. To Steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.

6. To Light Steel: Sheet metal screws.

7. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION 260529

SECTION 260533

RACEWAYS AND BOXES

PART 1 - GENERAL

1.1 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. FMC: Flexible metal conduit.

C. LFMC: Liquid-tight flexible metal conduit.

D. RMC: Rigid metal conduit.

1.2 SUBMITTALS

A. Product data showing full compliance with requirements.

1.3 COORDINATION

A. Coordinate layout and installation of raceways and boxes with other construction elements to ensure adequate headroom, working clearance and access.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Metal Conduit and Tubing:
   a. Alflex Corp., Division of Southwire.
   b. Anamet, Inc.; Anaconda Metal Hose.
   c. Republic Conduit.
   d. Wheatland Tube.

2. Conduit Bodies and Fittings:
   a. Crouse-Hinds; Div. of Eaton.
   b. Emerson Electric Co.; Appleton Electric Co.
   c. Thomas & Betts Corp.

3. Boxes, Enclosures and Cabinets:
   a. Hoffman Engineering Co.; of the Pentair Family.
   b. Hubbell Inc.; Killark Electric Manufacturing Co.
   c. Thomas & Betts Corp.

2.2 METAL CONDUIT AND TUBING

A. Rigid Steel Conduit: ANSI C80.1.

B. EMT and Fittings: ANSI C80.3.

1. Fittings: Steel set screw or compression type. Die-cast not permitted.

C. FMC: Zinc-coated steel.

D. LFMC: Flexible steel conduit with PVC jacket.

E. Fittings: NEMA FB 1; compatible with conduit/tubing materials.

2.3 OUTLET AND DEVICE BOXES

A. Sheet Metal Boxes: NEMA OS 1.

2.4 PULL AND JUNCTION BOXES

A. Small Sheet Metal Boxes: NEMA OS 1.

2.5 CONDUIT IDENTIFICATION

A. Conduit utilized in the systems identified below shall be factory painted using the color scheme currently in place at the Facility. Where the Facility does not have a color scheme in place the color scheme shown below is to be utilized. The requirement for factory painted conduit applies only to tubing and does not apply to fittings, connectors, junction boxes, etc. Contractor may submit deduct to identify conduits and fittings with paint or tape.

1. Fire Alarm = Red

2. MEP Control Systems = Blue

3. Life Safety Branch Emergency Power = Yellow

4. Critical Branch Emergency Power = Orange

5. Equipment Branch Emergency Power = Green

6. Normal Power = Color not required

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive raceways, boxes, enclosures and cabinets for compliance with installation tolerances and other conditions affecting performance of raceway installation. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 WIRING METHODS

A. Outdoors: Use the following wiring methods unless otherwise indicated:

1. Exposed: Rigid steel.
   a. Roof Areas: EMT.

2. Connection to vibrating equipment (including transformers, hydraulic, pneumatic, electric solenoid or motor-drive equipment): LFMC.

3. Boxes and Enclosures: NEMA 250, Type 3R.

B. Indoors: Use the following wiring methods unless otherwise indicated.

1. Exposed: EMT.

2. Concealed: EMT.

3. Connection to vibrating equipment (including transformers, hydraulic, pneumatic, electric solenoid or motor-drive equipment): FMC or LFMC; except in wet or damp locations, use LFMC only (maximum of 4' in plenum spaces such as air handlers, ceiling spaces, etc.).

4. Damp, Wet, or Hazardous Locations: Rigid steel conduit.

5. Boxes and Enclosures: NEMA 250, Type 1, except as follows:
   a. Damp, Wet or Hazardous Locations: NEMA 250, Type 3R.

6. Factory bent elbows are not acceptable. Contractor shall field bend all conduit installations.

3.3 ROOF PENETRATIONS

A. For roof penetrations, route raceways through a pipe curb such as ThyCurb by Thybar Industries. Seal per manufacturer's directions.

3.4 INSTALLATION

A. Install raceways, boxes, enclosures and cabinets as indicated, according to manufacturer's written instructions.

B. Conceal conduit and EMT, unless otherwise indicated, within finished walls and ceilings.

C. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

D. Install raceways level and square and at proper elevations. Provide adequate headroom.

E. Complete raceway installation before starting conductor installation.

F. Support raceways as specified in Section "260529 – Hangers and Supports."

G. Use temporary closures to prevent foreign matter from entering raceways.

H. Make bends and offsets so ID is not reduced. Keep legs of bends in the same plane and straight legs of offsets parallel, unless otherwise indicated.

I. Use raceway fittings compatible with raceways and suitable for use and location.

J. Run concealed raceways, with a minimum of bends in the shortest practical distance considering the type of building construction and obstructions, unless otherwise indicated.

K. Install threaded joints of rigid metal conduit with at least 5 threads fully engaged.

L. Install exposed raceways parallel to or at right angles to nearby surfaces or structural members and follow the surface contours as much as practical.

1. Run parallel or banked raceways together on common supports where practical.

2. Make bends in parallel or banked runs from same centerline to make bends parallel.

M. Join raceways with fittings designed and approved for the purpose and make joints tight.

1. Make raceway terminations tight. Use bonding bushings or wedges at connections subject to vibration. Use bonding jumpers where joints cannot be made tight.

2. Use insulating bushings to protect conductors.

N. Tighten set screws of thread-less fittings with suitable tools.

O. Terminations: Where raceways are terminated with locknuts and bushings, align raceways to enter squarely and install locknuts with dished part against the box. Where terminations are not secure with 1 locknut, use 2 locknuts: 1 inside and 1 outside the box.

P. Where raceways are terminated with threaded hubs, screw raceways or fittings tightly into the hub so the end bears against the wire protection shoulder. Where chase nipples are used, align raceways so the coupling is square to the box and tighten the chase nipple so no threads are exposed.

Q. Install pull wires in empty raceways. Monofilament plastic line with not less than 200 lb. tensile strength. Leave at least 12 inches of slack at each end of the pull wire.

R. Flexible Connections: Use maximum of 6 feet of flexible conduit for all motors. Use liquid-tight flexible conduit in wet or damp locations (maximum of 4' in plenum spaces such as air handlers, ceiling spaces, etc.). Install separate ground conductor across flexible connections.

3.5 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure coatings, finishes and cabinets are without damage or deterioration at the time of Substantial Completion.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC or paint finishes with matching touch-up coating recommended by manufacturer.

3.6 CLEANING

A. On completion of installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt and construction debris and repair damaged finish including chips, scratches and abrasions.

END OF SECTION 260533

SECTION 260553

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product data for all identification products and material supplied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. EZ Code.

2. LEM Products, Inc.

3. Markal Corp.

4. Panduit Corp.

5. Rust Oleum.

6. Ty-Rap.

2.2 ELECTRICAL IDENTIFICATION PRODUCTS

A. Colored Adhesive Marking Tape for Raceways, Wires and Cables: Self-adhesive vinyl tape not less than 3 mils thick by 1 inch to 2 inches in width.

B. Wire/Cable Designation Tape Markers: Vinyl or vinyl-cloth, self-adhesive, wraparound, cable/conductor markers with preprinted numbers and letters.

C. Engraved, Plastic-Laminated Labels: Engraving stock melamine plastic laminate, 1/16 inch minimum thick labels up to 20 square inches, or 8 inches in length; 1/8 inch thick for larger sizes. Engraved legend in white letters on black face (or red face for emergency power equipment) and punched for mechanical fasteners.

D. Fasteners for Plastic Laminated Labels: Self-tapping stainless steel screws or number 10/32 stainless steel machine screws with nuts and flat and lock washers.

E. Cable Ties: Fungus-inert, self-extinguishing, one-piece, self-locking nylon cable ties, 0.18 inch minimum width, 50 lb. minimum tensile strength, and suitable for a temperature range from minus 50 deg. F to 350 deg. F. Provide ties in specified colors when used for color-coding.

F. EMT raceways, factory anodized for entire length, color as specified in specification Section 260533 – Raceways and Boxes.

G. Formed Steel, GRC, PVC Raceways and Boxes: Minimum one coat enamel paint for entire length of outside of raceway and boxes.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Lettering and Graphics: Coordinate names, abbreviations, colors and other designations used in electrical identification work with corresponding designations specified or indicated on the drawings. Install numbers, lettering and colors as approved in submittals and as required by Code.

B. Install identification devices in accordance with manufacturer's written instructions and requirements of NEC.

C. Sequence of Work: Where identification is to be applied to surfaces that require finish, install identification after completion of finish work.

D. Install equipment/system, circuit/device identification as follows:

1. Apply equipment identification labels of engraved plastic laminate on each piece new electrical equipment installed and any existing piece of electrical equipment whose label information has changed. This includes communication/signal/alarm systems, unless unit is specified with its own self-explanatory identification. Except as otherwise indicated, provide two lines of text, with 1/2 inch high lettering on 2 inch high label, white lettering in black field or red field for emergency power equipment. Text shall match terminology and numbering of the Contract Documents and shop drawings. The first line of text shall be name of equipment. The second line of text shall be "Fed From Panel" information. Apply labels for each unit of the following categories of electrical equipment.
   a. All branch circuit breakers and switches
   b. Disconnect switches
   c. Variable Frequency Drives

E. Provide new directories for all existing panelboard directories to reflect work performed under this contract.

F. Install required labels at locations indicated and at locations for best convenience of viewing without interference with operation and maintenance of equipment.

G. Provide branch/feeder circuit identification as follows:

1. All junction boxes shall be identified. Using a black permanent marker, mark the blank cover with the correct circuit number(s) and designated panel related to the branch circuit(s). This procedure can be terminated upon the continuation of the same last circuit existing in that run.

H. Color Coding for Phase and Voltage Level Identification, 600 V and Less: Use the colors listed below for conductors.

1. Color shall be factory applied or, for sizes larger than NO. 10 AWG, or if authorities having jurisdiction allow, field applied.

2. Colors for 208/120 V Circuits:
   a. Phase A: Black.
   b. Phase B: Red.
   c. Phase C: Blue.
   d. Neutral: White.

e. Ground: Green.

3. Colors for 480/277 V Circuits:
   a. Phase A: Brown.
   b. Phase B: Orange.
   c. Phase C: Yellow.
   d. Neutral: Gray.
   e. Ground: Green.

4. Field-Applied, Color Coding Conductor Tape: Apply in half lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

END OF SECTION 260553

SECTION 262816

DISCONNECT SWITCHES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data for disconnect switches and accessories specified in this section.

B. Maintenance data for tripping devices to include in the operation and maintenance manual specified in Division 1.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements. Provide disconnect switches and enclosed circuit breakers by one of the following:

1. Switches:

a. Eaton Corp.; Cutler-Hammer Products.

b. Square D Co.

2.2 DISCONNECT SWITCHES

A. Enclosed, Non-Fusible Switch: Type HD, enclosure consistent with environment where located, handle lockable with 2 padlocks and interlocked with cover in CLOSED position.

B. Enclosure: NEMA KS 1, Type 1, unless otherwise specified or required to meet environmental conditions of installed locations.

1. Outdoor Locations: Type 3R.

C. Switches for VFD Applications: Switches installed on the load side of variable frequency drives (VFD) shall be provided with an auxiliary contact kit factory or field installed. The auxiliary contact shall be of the early-break-late-make type with respect to the main contact blades. Connect the auxiliary contact to a digital input on the VFD and program VFD to automatically shut down when the switch auxiliary contact is opened.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install disconnect switches in locations as indicated according to manufacturer's written instructions.

B. Install disconnect switches level and plumb.

C. Install wiring between disconnect switches and components to wiring system and to ground as indicated and instructed by manufacturer.

D. Connect disconnect switches and components to wiring system and to ground as indicated and instructed by manufacturer.

1. Tighten electrical connectors and terminals according to manufacturer's published torque tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

E. Identify each disconnect switch according to requirements specified in Section 260553 "Electrical Identification."

3.2 FIELD QUALITY CONTROL

A. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt and construction debris and repair damaged finish including chips, scratches and abrasions.

END OF SECTION 262816

SECTION 262923

VARIABLE FREQUENCY DRIVES

PART 1 - GENERAL

1.1 SUBMITTALS

A. Product Data: For each type of Variable Frequency Drive (VFD), provide fault current ratings, dimensions, mounting arrangements, location for conduit entries, shipping and operating weights and manufacturer's technical data on features, performance, electrical ratings, characteristics and finishes.

B. Shop Drawings: For each VFD.

1. Include dimensioned plans, elevations, sections and details. Show tabulations of installed devices, equipment features and ratings. Include the following:
   a. Each installed unit's type and details.
   b. Short circuit current ratings of integrated unit.
   c. UL Listing for series rating of overcurrent protective devices in combination controllers.
   d. Features, characteristics, ratings and factory settings of each motor control center unit.

2. Wiring Diagrams: Power, signal and control wiring for VFD. Provide schematic wiring diagram for each type of VFD.

C. Operation and Maintenance Data: For VFDs, all installed devices and components to include in emergency, operation and maintenance manuals. Include the following:

1. Routine maintenance requirements for VFDs and all installed components.

1.2 QUALITY ASSURANCE

A. Source Limitations: Obtain VFDs through one source from a single manufacturer.

B. Electrical Components, Devices and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction and marked for intended use.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFDs, minimum clearances between VFDs and adjacent surfaces and other items. Comply with indicated dimensions and clearances.

D. Comply with NFPA 70.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver VFDs in shipping splits of lengths that can be moved past obstructions in delivery path as indicated.

B. Store VFDs indoors in clean, dry space with uniform temperature to prevent condensation. Protect VFDs from exposure to dirt, fumes, water, corrosive substances and physical damage.

C. If stored in areas subject to weather, cover VFDs to protect them from weather, dirt, dust, corrosive substances and physical damage. Remove loose packing and flammable materials from inside controllers. Install electrical heating of sufficient wattage to prevent condensation.

1.4 COORDINATION

A. Coordinate layout and installation of VFDs with other construction including conduit, piping, equipment and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate features of VFDs, installed units and accessory devices with pilot devices and control circuits to which they connect.

C. Coordinate features, accessories and functions of each VFD and each installed unit with ratings and characteristics of supply circuit, motor, required control sequence and duty cycle of motor and load.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Drawings are based on manufacturer indicated in Variable Frequency Drive Schedule. If the contractor provides a VFD from one of the other acceptable manufacturers it will be the contractors responsibility to make all allowances necessary to adapt provided unit to the site conditions. Allowances shall include, but not be limited to, locations of electrical connections, dimensions, weights, clearances, enclosures, ratings, operating conditions, manufacturer's recommendations and extra coordination with other trades. Extra compensation will not be allowed for any additional work required due to differences in manufacturers.

B. Manufacturers, VFDs: Subject to compliance with requirements. Provide products by one of the following:

1. ABB (ACH550).

2. Danfoss Graham (VLT HVAC FC102 Series).

3. Toshiba (Q9 Plus HVAC).

4. Square D/Schneider.

5. Yaskawa.

6. JCI.

2.2 VARIABLE FREQUENCY DRIVES

A. Description: NEMA IC 2, IGBT, PWM VFD, listed and labeled as a complete unit and arranged to provide variable speed of a NEMA MG 1, Design B, 3 phase, premium efficiency induction motor by adjusting output voltage and frequency.

B. Design and Rating: Match load type such as fans, blowers and pumps and type of connection used between motor and load such as direct or through a power transmission connection.

C. Output Rating: 3 phase, 1 to 120 Hz.

D. Unit Operating Requirements:

1. Input AC voltage to tolerance of plus or minus 10% of line voltage.

2. Input frequency tolerance of 60 Hz, plus or minus 3 percent minimum.

3. Capable of driving full load under the following conditions, without de-rating:
   a. Ambient Temperature: 0 to 40 degrees C
   b. Humidity: Less than 95 percent (non-condensing)
   c. Altitude: 3300 feet (1000 m)

4. Minimum Efficiency: 96 percent at 60 Hz, full load.

5. Minimum Displacement Primary Side Power Factor: 96 percent.

6. Overload Capability: 1.1 times the base load current for 60 seconds.

7. Starting Torque: 100 percent of rated torque.

8. Speed Regulation: Plus or minus 1 percent.

9. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.

E. Internal Adjustability Capabilities:

1. Acceleration: 1 to a minimum of 1800 seconds.

2. Deceleration: 1 to a minimum of 1800 seconds.

3. Current Limit: 50 to a minimum of 110 percent of maximum rating.

F. Self-Protection and Reliability Features:

1. Input transient protection by means of surge suppressors.

2. Under and over voltage trips, inverter over-temperature, overload and overcurrent trips.

3. Motor Overloads: Matched to motor nameplate full load amps.

4. Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.

5. Loss of phase protection.

6. Ground fault protection.

7. Short circuit protection.

8. Motor overload fault.

G. VFD shall sense loss of load (broken belt, motor disconnect opened, no water in pump) and signal loss of load condition. VFD shall be internally protected from damage by a loss of load.

H. Automatic Reset and Restart: VFD shall attempt three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bi-directional auto-speed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor or load.

I. Torque Boost: Automatically vary starting and continuous torque to at least 1.5 times the minimum torque to insure high-starting torque and increased torque at low speeds.

J. Motor Temperature Compensation at Slow Speeds: Adjustable current fall back based on output frequency for temperature protection of self-cooled fan ventilated motors at slow speeds.

K. Input Line Conditioning: The VFD shall have integral 5% line reactors to reduce the harmonics to the power line and comply with IEC 61000-3-12. The 5% impedance can be from dual DC reactors (positive and negative DC buss) or from AC line reactors (each phase).

L. Panel-Mounted Operator Station: Start/Stop and Auto/Manual selector switches with manual speed control.

M. Display: High-resolution backlit LCD and selector switch or touch keypad, mounted flush in controller door and connected to indicate the following controller parameters in plain language.

1. Output frequency (Hz).
2. Motor speeds (rpm).
3. Motor status (running, stop, fault).
4. Motor current (amperes).
5. Motor torque (percent).
6. Fault or alarming status (code).
7. Set-point frequency (Hz).
8. Analog input values.
9. Analog output values.
10. Elapsed Time (resettable).
11. KWH (resettable).
12. Digital input status.
13. Digital output status.

14. Output voltage.

N. Control Signal Interface: Provide VFD with the following:

1. Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10 V or 4-20 mA) and 4 programmable digital inputs. All inputs shall be optically isolated. Inputs shall be able to start/stop and provide speed control of the VFD.

2. Remote Signal Inputs: Capability to accept any one of the following speed-setting input signals from the BMS or other control systems.
   a. 0 to 10 VDC.
   b. 4-20 mA.
   c. Fixed frequencies using digital inputs.
   d. RS485.
   e. Keypad display for local hand operation.

3. Output Signal Interface:
   a. A minimum of 1 analog output signal (4-20mA) or (0-10V), which can be programmed to any of the following:
      1) Output frequency (Hz).
      2) Output current (load).
      3) DC link voltage (VDC).
      4) Motor-torque (percent).
      5) Motor speed (rpm).
      6) Set-point frequency (Hz).

4. Remote Indication Interface: A minimum of 2 dry circuit form C relay outputs (120VAC, 1A) for remote indication of the following:
   a. Motor running.
   b. Fault and warning indication (over-temperature or over-current).

O. Critical Speeds: VFDs shall have a minimum of two sets of critical speed lockout parameters.

P. Communications: Provide a serial interface allowing VFD to communicate with the Building Automation System (BAS).

Q. Integral Input Disconnecting Means: Fusible switch with lockable handle or circuit breaker input disconnecting means per VFD schedule. Disconnecting means shall be at the input to the VFD before all drive and bypass circuits.

R. Short Circuit Current Rating: VFD shall have a short circuit current rating in both drive and bypass (if provided) mode higher than available fault current as shown on the electrical one-line diagram or on VFD schedule (100 KAIC minimum).

2.3 ENCLOSURES

A. VFD shall be installed in a NEMA 1 enclosure for indoor units.

2.4 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory assembled and tested VFDs before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, surfaces and substrates to receive VFDs for compliance with requirements, installation tolerances, installation location dimensions and other conditions affecting performance.

B. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFD installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Select features of each VFD to coordinate with ratings and characteristics of supply circuit and motor, required control sequence and duty cycle of motor, drive and load. For 900 rpm and 1200 rpm motors, upsize VFD to next size as required to accommodate increased full load amperage of low rpm motors.

3.3 WARRANTY

A. All VFDs shall be provided with a warranty of not less than 24 months from time of startup.

3.4 INSTALLATION

A. Anchor each wall mounted VFD to steel channel sills arranged and sized according to manufacturer's written instructions. Attach by bolting.

B. Input, output and control wiring shall be installed in separate conduits.

C. Install VFD per manufacturer's directions.

3.5 PROGRAMMING

A. Program VFD upper frequency limit to match value shown in VFD schedule.

3.6 IDENTIFICATION

A. Identify VFDs, components and control wiring according to Section "260553 – Electrical Identification."

3.7 CONTROL WIRING INSTALLATION

A. Install wiring between VFDs and remote devices.

B. Bundle, train and support wiring in enclosures.

C. Connect Hand/Off/Automatic switch and other automatic control devices where available.

1. Connect selector switches to bypass only manual and automatic control devices that have no safety functions when switch is in Hand position.

2. Connect selector switches with control circuit in both Hand and Automatic positions for safety type control devices such as low and high-pressure cutouts, high temperature cutouts and motor overload protectors.

3.8 CONNECTIONS

A. Conduit installation requirements are specified in Section “260533 – Raceways and Boxes.”

B. Ground VFD.

C. Tighten electrical connectors and terminals according to manufacturer’s published torque-tightening values. If manufacturer’s torque values are not indicated, use those specified in UL 486A and UL 486B.

3.9 FIELD QUALITY CONTROL

A. Visual and mechanical inspection: Include the following inspections and related work.

1. Motor Control Device Ratings and Settings: Verify that ratings and settings as installed are appropriate for final loads and final system arrangement and parameters. Recommend final protective device ratings and settings where differences are found. Use accepted revised ratings for settings to make the final system adjustments.

2. Inspect for defects and physical damage, NRTL labeling and nameplate compliance with current project drawings.

3. Exercise and perform operational tests of mechanical components and other operable devices in accordance with manufacturer’s instructions.

4. Check tightness of electrical connections of devices with calibrated torque wrench. Use manufacturer’s recommended torque values.

5. Clean devices using manufacturer’s approved methods and materials.

6. Verify proper fuse types and ratings in fusible devices.

3.10 CLEANING

A. Clean VFDs internally upon completion of installation and according to manufacturer’s written instructions. Vacuum dirt and debris. Do not use compressed air to assist in cleaning.

3.11 DEMONSTRATION

A. Engage a factory authorized service representative to provide 4 hours training to Owner’s maintenance personnel to adjust, operate and maintenance VFDs.

END OF SECTION 262923