

# Dexter Community Schools 2017 Bond Project

## Bid Package 26 District-Wide Mechanical Equipment Replacement Project Manual

### Bid Categories Include:

- 26-22-01 Domestic Water Heaters Purchase
- 26-23-01 Heating Boilers Purchase
- 26-23-02 Make-up Air Units Purchase
- 26-23-03 Rooftop Units Purchase
- 26-23-04 Chiller Purchase
- 26-23-05 Evaporative Cooler Purchase
- 26-23-06 Separators, Pumps, and Tanks Purchase



#### Prepared by:

ARCHITECTS/ENGINEERS  
Peter Basso Associates, Inc.  
5145 Livernois, Suite 100  
Troy, MI 48098  
Architect's Project No.  
2022.0011.04

CONSTRUCTION MANAGER  
Granger Construction Co.  
6267 Aurelius Road  
Lansing, MI 48911  
Tel. 517-393-1670  
Fax no fax available  
CM Project No. 1710-00

ISSUED  
March 3, 2022

## **Section 00 0101 Project Title Page**

PROJECT: DEXTER COMMUNITY SCHOOLS 2017 BOND PROJECT

BID PACKAGE: 26 DISTRICT-WIDE  
MECHANICAL EQUIPMENT REPLACEMENT

OWNER: DEXTER COMMUNITY SCHOOLS  
2704 Baker Rd  
Dexter, MI 48130

ARCHITECT: PETER BASSO ASSOCIATES, INC.  
5145 Livernois, Suite 100  
Troy, MI 48098

CONSTRUCTION MANAGER: GRANGER CONSTRUCTION COMPANY	
MAIN OFFICE	PROJECT OFFICE
6267 Aurelius Rd.	N/A
P.O. Box 22187	N/A
Lansing, MI 48909	Tel. 734-904-1169
Tel. (517) 393-1670	<a href="mailto:gbrand@grangerconstruction.com">gbrand@grangerconstruction.com</a>

END OF SECTION

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### TECHNICAL SPECIFICATIONS

*All Division 02 through 48 specifications are issued by Peter Basso Associates, Inc. and dated 3/1/2022 unless otherwise noted.*

<b>DIVISION 02 – EXISTING CONDITIONS</b>		
Not Used		
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Not Used		
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Not Used		

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Not Used		

END OF SECTION

## Section 00 0115 List of Drawing Sheets

*Drawings have been issued by Peter Basso Associates, Inc. and are dated 3/1/2022 unless otherwise noted.*

<b>No.</b>	<b>Title</b>	<b>Issuer</b>	<b>Date</b>
<b>Creekside Intermediate School</b>			
M0.1	Mechanical Standards and Drawing Index		
MD2.1B	First Level Plumbing Demolition Plan – Zone ‘B’		
MD2.1F	First Level Plumbing Demolition Plan – Zone ‘F’		
MD3.1A	First Level Mechanical Demolition Plan – Zone ‘A’		
MD3.1C	First Level Mechanical Demolition Plan – Zone ‘C’		
MD3.1E	First Level Mechanical Demolition Plan – Zone ‘E’		
MD3.1F	First Level Mechanical Demolition Plan – Zone ‘F’		
M2.1B	First Level Plumbing Plan – Zone ‘B’		
M2.1F	First Level Plumbing Plan – Zone ‘F’		
M3.1A	First Level Mechanical Plan – Zone ‘A’		
M3.1C	First Level Mechanical Plan – Zone ‘C’		
M3.1E	First Level Mechanical Plan – Zone ‘E’		
M3.1F	First Level Mechanical Plan – Zone ‘F’		
M6.1	Mechanical Details		
M6.2	Mechanical Details		
M7.1	Mechanical Schedules		
M7.2	Mechanical Schedules		
M7.3	Mechanical Schedules		
<b>Dexter High School</b>			
M0.1	Mechanical Standards and Drawing Index		
MD3.1C	First Level Mechanical Demolition Plan – Zone ‘C’		
M3.1C	First Level Mechanical Plan – Zone ‘C’		
M6.1	Mechanical Details		
M7.1	Mechanical Schedules		
M7.2	Mechanical Schedules		
<b>Mill Creek Middle School</b>			
M0.1	Mechanical Standards and Drawing Index		
MD3.1C	First Level Mechanical Demolition Plan – Zone ‘C’		
M2.1C	First Level Plumbing Plan – Zone ‘C’		
M3.1C	First Level Mechanical Plan – Zone ‘C’		
M4.1C	First Level HVAC Piping Plan – Zone ‘C’		
M6.1	Mechanical Details		
M6.2	Mechanical Details		
M7.1	Mechanical Schedules		
M7.2	Mechanical Schedules		
M7.3	Mechanical Schedules		
<b>Wylie Elementary School</b>			
M0.1	Mechanical Standards and Drawing Index		
MD3.1E	First Level Mechanical Demolition Plan – Zone ‘E’		
M3.1E	First Level Mechanical Plan – Zone ‘E’		
M6.1	Mechanical Details		
M6.2	Mechanical Details		
M7.1	Mechanical Schedules		
M7.2	Mechanical Schedules		

END OF SECTION

## Section 00 1116 Invitation to Bid

PROJECT:DEXTER COMMUNITY SCHOOLS 2017 BOND PROJECT

BID PACKAGE:26 DISTRICT-WIDE  
MECHANICAL EQUIPMENT REPLACEMENT

OWNER:DEXTER COMMUNITY SCHOOLS  
2704 Baker Rd  
Dexter, MI 48130

ARCHITECT:PETER BASSO ASSOCIATES, INC.  
5145 Livernois, Suite 100  
Troy, MI 48098

CONSTRUCTION MANAGER:GRANGER CONSTRUCTION COMPANY  
MAIN OFFICE PROJECT SITE CONTACT  
6267 Aurelius Rd. Gregory Brand  
P.O. Box 22187 Use main office address  
Lansing, MI 48909 Tel. 734-904-1169  
Tel. (517) 393-1670 Fax no fax available  
Fax (517) 393-1382 [gbrand@grangerconstruction.com](mailto:gbrand@grangerconstruction.com)

PROJECT LOCATION:DISTRICT-WIDE  
District-Wide, Dexter, MI 48130  
2704 Baker Road, Dexter, MI 48130

THE WORK INCLUDES:Replace mechanical equipment district-wide.

Invitation is hereby made to have qualified bidders submit bid proposals for the following work categories:

26-22-01 Domestic Water Heaters Purchase  
26-23-01 Heating Boilers Purchase  
26-23-02 Make-up Air Units Purchase  
26-23-03 Rooftop Units Purchase  
26-23-04 Chiller Purchase  
26-23-05 Evaporative Cooler Purchase

An optional pre-bid meeting will be held on March 10, 2022 at 2:00:00 PM via a Microsoft Teams Meeting (Online only).

**Due to school district security concerns, bidders should not go to the site without prior arrangement with Granger Construction.**

Bid proposals are requested and will be received as a "single lump sum proposal" prior to **2:00 p.m.**, local time, on **March 18, 2022**.

The Construction Manager is providing bid documents to Bidders electronically without charge. **BID**

**DOCUMENTS ARE AVAILABLE AT THE FOLLOWING LINK:**

<https://app.buildingconnected.com/public/5565f9b93ad9f70800b26d32>.

Interested firms should submit a digital/electronic copy of the bid proposal to Dexter Community Schools via the BuildingConnected website. Bids are to be submitted according to the detailed instructions in 00 2113 Instructions to Bidders.

Bidders who required to submit a written bid, separate sealed bid proposals for the above work categories must be received on or before the bid opening date and time. Bids are to be submitted to:

Dexter Community Schools  
Attn: Jennifer Miceli, Bond Projects Purchasing  
2704 Baker Rd., Dexter, MI 48130

Bid security in the form of bonds are required to be submitted with all proposals. An electronic copy of the bond may be submitted with electronically submitted bids. Bid security in the form of a certified check is acceptable bid security only for proposal less than \$50,000. If a check is the bid security, bid must be tendered in writing and in person, accompanied by the cashier check.

The Owner reserves the right to reject any or all proposals, to accept other than a low bid, and to waive informalities, irregularities and/or errors in proposals, which they feel is in their best interest.

Dexter Community Schools and Granger Construction Company make a continuous effort to broaden their business relationships with Diversity Firms (aka Historically Underutilized Businesses (HUB)) and local businesses. EEO M/F/H/V

All bids must contain a sworn and notarized statement disclosing any familial relationship existing between the bidder or any employee of the bidder and any member of the Dexter Community Schools Board of Education and acknowledge compliance with the Michigan Iran Economic Sanctions.

All addenda will be posted to the site linked below. Each bidder shall ascertain, prior to submitting a bid, that they have reviewed all addenda issued and shall acknowledge such on the Bid Proposal Form. No addendum will be issued later than three (3) days prior to the date for receipt of bids except an addendum, if necessary, postponing the date for receipt of bids or withdrawing the request for bids.

Bidders are responsible for all costs and coordination of their work wherever it is shown within the entire project manual and all project bid documents.

Dexter Community Schools reserves the right to reject any or all proposals, to accept other than a low bid, and to waive informalities, irregularities and/or errors in proposals, which they feel is in their best interest.

Plans and specifications will be on file at the following locations:

Plan Room	Phone
Builders Exchange of Grand Rapids & West Michigan	(616) 949-8650
Builders Exchange of Kalamazoo	(269) 349-2507
Builders Exchange of Lansing & Central Michigan	(517) 372-8930
Builders Exchange of NW Michigan	(231) 946-5531
CAM – Construction Association of Michigan	(248) 972-1000
Washtenaw Contractors Association	(734) 662-2570

END OF SECTION

## **Section 00 2113 Instructions to Bidders**

1. **DELIVERY OF BIDS:** Bids must be RECEIVED not later than 2:00 p.m., LOCAL TIME, ON 3/18/2022, for all bid categories. Late bids will be returned unopened. See item BID PROPOSAL REQUIREMENTS below for details of bid preparation and delivery.
2. **FORM OF BID:** Use the Bid Proposal Form within Building Connected. Do not modify, alter, qualify, or attach stipulations to the Bid Proposal Form unless requested. The Owner and the Construction Manager reserve the right to reject such bids as non-responsive.
3. **BID DOCUMENTS:** Bid documents for this project are available at the following link: <https://app.buildingconnected.com/public/5565f9b93ad9f70800b26d32>
4. **ADDENDA:** Prior to the receipt of bids, addenda will be posted to the link above. No addendum will be issued later than three (3) days prior to the date for receipt of bids except an addendum, if necessary, postponing the date for receipt of bids or withdrawing the request for bids. Each bidder shall ascertain, prior to submitting a bid, that he/she has reviewed all addenda issued and shall acknowledge such on the Bid Proposal Form.
5. **PRE-BID MEETING:** Project documents, scope, procedure, and schedule will be reviewed and questions will be answered. The minutes and attendance list from this meeting will be included in an addendum.
  - A. This meeting is optional for this bid package.
  - B. Date & Time: March 10, 2022 at 2:00:00 PM
  - C. Location: Microsoft Teams Meeting
6. **SCHEDULE:** Work on this bid package must be performed according to the Milestone Schedule in Section 01 3210 Project Scheduling.
7. **UNIT PRICES:** If Unit Prices are required for with your bid it will be noted in your Scope of Work. Submit Unit Prices on the Bid Proposal Form. Unit prices quoted shall be acceptable to the Subcontractor as full compensation for extra work required by the Owner and as just credit to the Owner for work deleted from the Contract after reduction by the contractually allowed mark-up for overhead and profit. The submission of required Unit Prices is mandatory. Bid Proposals submitted without required Unit Prices may be rejected. It is agreed that the decision to utilize or not to utilize Unit Prices for changes in the Work will be made at the discretion of the Construction Manager or the Owner.
8. **MATERIAL ALLOWANCES:**
  - A. Any applicable Material Allowances are indicated in the Scope of Work descriptions.
  - B. The amount of allowance includes: net cost of product, delivery to the site, and applicable taxes. In addition to the amount of the allowance, include in Base Bid, for inclusion in Contract Sum, Contractor's costs for handling at site including unloading, uncrating and storage; protection from elements, from damage; labor, installation and finishing; other expenses (e.g., testing, adjusting and balancing) required to complete installation; overhead and profit.
  - C. Purchase product/material under allowance only as specified, or as directed by the Construction Manager.
  - D. Selection of product/material: The Architect/Engineer will consult with Contractor in consideration of product/material and suppliers, make selection, designate product or material to be used and notify the Contractor in writing to designate product size, color and texture, supplier, and cost. The Contractor shall assist and make appropriate recommendations to the Architect/Engineer in determining qualified suppliers. The Contractor will also obtain proposals from suppliers when requested by the Architect/Engineer. The Contractor will notify the Architect/Engineer, in writing, of the anticipated effect the selection will have on contract sum and duration. The Contractor is responsible for arranging delivery, unloading, prompt inspection of product for damage and defects, and submitting claims for transportation damage.
  - E. Each Allowance must be shown as a line item in the schedule of values.
  - F. After selection of material by Architect/Engineer and Owner written allowance approval will be issued by the CM to reflect allowable billing, plus or minus, from the allowance line item.



- G. Unused funds included under allowances shall be credited to the Owner by deduct Change Order prior to approval of Final Application for Payment.
9. REQUESTED ALTERNATES: All required alternates and unit prices shall be quoted by all Bidders. Subcontractor agrees that prices quoted for requested alternates (to be quoted on Bid Form) shall be acceptable as full compensation for work thus described in the drawings, specifications, and Instructions to Bidders. Subcontractor understands the Owner reserves the right to elect to utilize these prices at the discretion of the Construction Manager and the Owner. It is understood that this Subcontractor's performance and timeliness in the work described as lump sum base bid will be considered in the decision to authorize this Subcontractor to proceed with any alternates. It is also agreed that the Owner may elect to add or delete any or all alternates to or from a Subcontractor's work at any time during the project, as is practical, for the stipulated sums quoted. The Owner and the Construction Manager reserve the right to award this contract on the basis of any combination of requested and voluntary alternates, if in their best interest to do so. See section 012300 for a description of alternates.
10. VOLUNTARY ALTERNATES: Submit Voluntary Alternates at location indicated on Proposal Form or on Bidder's company letterhead clearly labeled as: *"Bid Package 26 District-Wide Mechanical Equipment Replacement Voluntary Alternate(s)"*
- A. Voluntary Alternates must be adequately detailed to allow acceptance or rejection as presented. The Owner may not consider Voluntary Alternates if the requested Lump Sum Base Bid, Unit Prices, and Requested Alternates are not offered. The Owner and the Construction Manager reserve the right to award this Contract on the basis of any combination of Requested and Voluntary Alternates, if in their best interest to do so.
11. EXTRA WORK FEES: Refer to the Section 01 2600 Contract Modification Procedures.
12. CREDIT FOR WORK DELETED: Refer to the Section 01 2900 Price and Payment Procedures.
13. PERFORMANCE AND LABOR AND MATERIAL BONDS: Bonds may be required for this project. Refer to Section 00 6000 Payment and Performance Bonds.
14. HAZARD COMMUNICATION STATEMENT: Refer to Section 01 3520 Safety Requirements.
15. LEAN: Lean initiatives will be implemented throughout the project to improve reliability, planning, quality, safety, and team performance. Project planning and scheduling utilize the Last Planner production system. This will require attendance by the project manager and foreman at periodic pull planning and phasing meetings, weekly planning meetings, and daily onsite huddles. Subcontractors shall input, maintain, and update their work plans, including work activities, manpower, and issues, and make them accessible to the Granger superintendent.
16. LEED: This project will incorporate sustainability and energy conservation within the design, but it will not be formally submitted for LEED certification.
17. BIDDERS EXAMINATION OF PREMISES AND THE CONTRACT DOCUMENTS:
- A. Inspection of the work areas is required but must not interfere with the Owner's ongoing activities.
- B. Each Bidder shall visit the site(s) to become familiar with local conditions affecting the job. Each Bidder shall take their own measurements and be responsible for the correctness of those measurements. Each Bidder shall be held to have made such examinations and no allowances will be made in their behalf by reason of error or omission on their part. If any portion of the Bidder's work depends, for proper results, upon existing conditions, the Bidder shall notify the Construction Manager of any conditions or defects that will affect the results. Failure to so notify will constitute the Bidder's acceptance of the conditions.
- C. Each Bidder shall examine the bidding documents carefully. In the event that the documents require interpretation or correction of any inconsistency, ambiguity, or error, the Bidder will notify the Construction Manager in writing at least seven (7) days prior to the bid due date for clarification by written addenda. If such interpretation is not requested, the bid will be presumed to be based on the interpretation and instructions given by the Architect, and / or Construction Manager after the Subcontractor Agreement is executed, and in accordance with the terms of that Agreement. Only a written interpretation or correction prior to the bid due date will be binding. Neither the Owner, Architect nor Construction Manager will be responsible for any verbal explanations or interpretations of the Contract Documents.

- D. Plans, diagrams and other descriptive information that depict existing conditions are provided for scope identification and scheduling purposes only dimensions should not be scaled. Quantities, elevations, measurements and locations shown may have been approximated and/or gathered from dated, incomplete original construction documents. **Therefore, this data should not be used for bidding purposes without field verification by the bidder.**
- E. The Contract Documents are intended to provide sufficient information and intent for the Bidder to assume responsibility for all Work and Materials necessary for proper completion of the Work. The Bidder's own site inspection or contract document review of the work areas shall be relied upon to provide the bidder all other information he may require to properly execute and complete the Work. If inspection presents any unanswered questions, they must be submitted in writing to the Construction Manager as described above.
- F. Failure to request any required written clarification by addenda and submission of a Bid Proposal shall constitute acceptance of all contract document terms and conditions.
- G. Each bidder, by submitting a bid, represents that the bidder has read and understands the bidding documents, has satisfied himself as to the extent of the proposed work by personal examination of the site and surroundings, is familiar with the local conditions and weather extremes under which the work is to be performed and has made his own estimate there from of the equipment, labor, facilities and difficulties attending the performance and completion of the work.

18. SUBSTITUTIONS: Refer to Section 01 2500 Substitution Procedures.

#### 19. MINORITY, WOMAN, AND HANDICAPPER SUBCONTRACTORS AND SUPPLIERS

Bidders are urged to utilize minority, woman, and handicapper owned business on this project.

#### 20. BID SECURITY

- A. Bid security will be required for all proposals.
- B. Form of Bid Security
  - 1) All proposals over \$50,000 shall be accompanied by a satisfactory bid bond executed by the bidder and an approved security company in an amount of not less than five percent (5%) of the final base bid sum.
  - 2) For bids less than \$50,000 a certified check in the amount of 5% of the bid will be allowed as bid security.
- C. The amount of the bid bond shall be forfeited to the Owner upon failure of the successful bidder to enter into a contract within fifteen (15) days after acceptance of the proposal.
- D. The providing of security hereunder shall entitle the Owner to recover the full amount of the difference between the bid submitted and the amount for which the Owner ultimately contracts for the work, but not more than the 5% bid bond.
- E. Bid security signed by attorney-in-fact must be accompanied by a certified and effectively dated copy of their power of attorney.
- F. The bid security shall be made out to Dexter Community Schools.
- G. Include a scan of the original bid security in the bid proposal document. The original must be presented at the post-bid interview. For bids providing a certified check as bid security (less than \$50,000) the original of the check must be presented at the time of bid submission.
- H. Minimum surety requirements are included in Section 00 6000 Payment and Performance Bonds.

#### 21. BID PROPOSAL REQUIREMENTS:

- A. The bidder shall assume full responsibility for timely delivery of bid to the location designated.
- B. DELIVERY OF BIDS: Bids must be **RECEIVED** prior to **2:00 p.m.**, local time, on March 18, 2022. Late bids will be considered non-responsive. See item Bid Proposal Requirements below for details of bid preparation and delivery.
- C. Use the bid form available on the Building Connected website to submit electronic bids.
- D. For bidders unable to submit their bid electronically

- 1) Bids shall be submitted in an opaque, sealed envelope. Identify the envelope with:
- 2) Project name
- 3) Name and address of bidder
- 4) Notation "BID ENCLOSED"
- 5) Bid Package, Work Category name and number
- 6) Submit in duplicate.
- 7) Bids shall be delivered by the same due date and time to

Dexter Community Schools  
Business Office  
2704 Baker Rd  
Dexter, MI 48130

- E. A bid is invalid if it has not been received prior to the time and date for receipt of bids indicated or prior to any extension thereof issued by addendum to the bidders. Bids received after the time and date for receipt of bids will be considered non-responsive.
- F. No responsibility shall attach to the Construction Manager, the Owner, or the authorized representatives of either one, for the premature opening of any proposal that is not properly addressed, delivered and identified.
- G. Each bidder shall ascertain, prior to submitting a bid, that they have reviewed all addenda issued and shall acknowledge such on the Bid Proposal Form.
- H. All bids must be signed as follows:
  - 1) Corporations: Signature of official shall be accompanied by a certified copy of the resolution of the board of directors authorizing the individual signing to bind the corporation.
  - 2) Partnerships: A certified copy of the power of attorney authorizing the individual signing to bind all partners shall accompany the signature of one partner. If a certified copy of the partnership's certificate submitted with the bid indicates that all partners have signed, no authorization is required.
  - 3) Bids submitted by joint ventures shall be signed by one of the joint ventures and shall be accompanied by a certified copy of the power of attorney authorizing the individual signing to bind all the joint ventures. If a certified copy of the joint venture's' certificate submitted with the bid indicates that all joint ventures have signed, no authorization is required.
  - 4) Individual signing in own behalf: No authorization is required.
  - 5) Individual signing on behalf of another: Power of attorney or comparable evidence of authority shall accompany bid.
- I. Negligence in preparation, improper preparation, errors in and/or omissions from the bid shall not relieve the bidder from fulfillment of any and all applicable obligations and requirements of the Contract documents.
- J. Include a scan of the original bid security in the bid proposal document. The original must be presented at the post-bid interview. For bids providing a certified check as bid security (less than \$50,000) the original of the check must be presented at the time of bid submission.

## 22. BID READING

- A. Bids will be read publicly at 2:15 p.m. in Bates School conference room, 2704 Baker Rd. Dexter, MI 48130 and will be broadcast via Microsoft Teams [https://teams.microsoft.com/l/meetup-join/19%3ameeting\\_YmZmN2lwNDctOTY0Ni00OTM3LWI3MjYtOWE4MjM5YmVmOTli%40threa.d.v2/0?context=%7b%22Tid%22%3a%22e2f598a4-90d2-4cef-a81c-93f4d63da9fe%22%2c%22Oid%22%3a%2206ee70bc-f34f-4d7a-a9d5-729546bee6b1%22%7d](https://teams.microsoft.com/l/meetup-join/19%3ameeting_YmZmN2lwNDctOTY0Ni00OTM3LWI3MjYtOWE4MjM5YmVmOTli%40threa.d.v2/0?context=%7b%22Tid%22%3a%22e2f598a4-90d2-4cef-a81c-93f4d63da9fe%22%2c%22Oid%22%3a%2206ee70bc-f34f-4d7a-a9d5-729546bee6b1%22%7d)

## 23. CONSIDERATION OF BIDS

- A. The bidder acknowledges the right of the Owner to reject any or all bids and to waive any informality or irregularity in any bid received. In addition, the bidder recognizes the right of the Owner to reject a bid:
  - 1) If the bidder fails to furnish any required bid security, or fails to submit the data required by the bidding documents; or
  - 2) If the bid is in any way incomplete or irregular; or

- 3) If the bidder's performance as a contractor was unsatisfactory under a prior contract for the construction, repair, modification, or demolition of a facility with the Owner or the Construction Manager; or
  - 4) For known poor performance by the bidder; or
  - 5) Inadequate financial condition.
- B. It is the intent of the Owner to award a Contract to the lowest, qualified, responsive bidder demonstrating a complete scope of work, provided the bid has been submitted in accordance with the requirements of the bidding documents and does not exceed the funds available.
- C. Bidders may be requested to submit to the Construction Manager a properly executed Bidder's Qualification Statement (see Section 00 4513 Bidder's Qualifications) or other informational format specified by the Construction Manager after bid opening. Bidders shall be prepared to submit their most recent audited financial statement prior to the Construction Manager making an award of contract. Simple balance sheets will not be acceptable.

#### 24. POST-BID INTERVIEW:

- A. After the Bids are received, tabulated, and evaluated by the Project Team, the apparent low bidders shall meet with the Construction Manager and any other members of the Project Team, as they choose, at a post-bid meeting. A post-bid (aka pre-award) meeting will be conducted with the apparent successful bidders to review specification compliance, scope of work, schedule and Contractor capabilities.
- 1) This meeting may be waived at the discretion of the Owner and/or Construction Manager.
  - 2) The pre-award meeting notes will become a part of the contract documents executed resulting from this meeting.
- B. The Bidder will provide the following information at the post-bid meeting:
- 1) The original Bid Security and accompanying power-of-attorney if required.
  - 2) Bidder Qualification Form, Section 00 4513 Bidder's Qualifications, if requested.
  - 3) Designation of the work to be performed by the Bidder with his own forces including manpower for the Contractor and that of their subcontractors. The Owner and Construction Manager reserve the right to disqualify bids wherein the bidder plans to provide less than 30% of the work of the project with their own forces.
  - 4) Detailed cost breakdown of the bid including labor, equipment, material unit prices and subcontract amounts.
  - 5) A list of subcontractors, suppliers and the proprietary names of principal items or systems of materials, and equipment proposed for the work.
  - 6) The names and backgrounds of the Contractor's key staff members including superintendent and assistants and establish the reliability and responsibility of the persons or entities proposed to furnish and perform the work described in the Bidding Documents.
  - 7) Commitment to construction schedules, identification of items requiring long lead deliveries and manpower information in accordance with Section 01 3210 Project Scheduling.
- C. Prior to award of a contract, the Construction Manager will notify the Bidder if either The Owner, the Architect, or the Construction Manager, after due investigation, has reasonable objection to any proposed person or entity. If the Owner, Architect or Construction Manager has reasonable objection to any proposed person or entity, the Bidder may submit an acceptable substitute person or entity with an adjustment in his bid price to cover the difference in cost occasioned by such substitution. The Owner may, at his discretion, accept the adjusted bid price or he may disqualify the Bidder. In the event of either withdrawal or disqualification under the terms of this subparagraph, bid security will not be forfeited, notwithstanding the provision of the Bid Security item above in this Section.
- D. The Bidder will be required to establish to the satisfaction of the Construction Manager, The Owner and Architect, the reliability and responsibility of the persons, subcontractors or entities proposed to furnish and perform the work.

END OF SECTION

## **Section 00 2410 Work Required for All Bid Categories**

1. Bidders of all Work Categories shall include all Work, compliance and costs for compliance with the appendices, the bidding requirements, General Conditions, general requirements, drawings and technical specifications, including all addenda. All bid categories are bound by the instructions in this Section 00 2410 Work Required for All Bid Categories. They shall include within their bids this work as well as all bid/contracting requirements, and the specification sections as listed within the specific Bid Category Scopes, and the clarifications to scope which follow in each bid category. Particular emphasis is placed on the following requirements, which are stated below for emphasis and clarity.
2. Definitions: See other instructions in 007300 Supplementary Conditions shall govern in contract interpretation, but in preparation of all proposals and their interpretation by the CM and the Owner, the following definitions shall be understood and shall be the source of factual intent in all scope of work descriptions:
  - A. **ADDENDUM:** An addendum is a written and/or graphic instrument issued by the Owner's Representative prior to award of Contract which modifies or interprets the Bidding Documents by additions, deletions, clarifications, or corrections. The Bidding Documents for the original Work shall govern the work therein described, unless modified by the Addendum. All costs or credits due to the Addendum shall be incorporated into the Bidder's Bid Proposal Form for Addenda issued prior to Owner's receipt of Bids and by letter on Bidder's letterhead modifying Bid Form amounts for Addenda issued after Owner's receipt of Bids; letter shall be signed by and as for the original Bid Form submission.
  - B. **ALTERNATE PRICE:** The term used in the Contract Documents means a variation to the Base Bid to cover a variation in the Contract requirements. If the Owner accepts the Alternate Price, the variation is then a part of the Contract and the quoted amount will be added or deducted from the Lump Sum Base Bid Price and will be used in determining or modifying the Contract Sum.
  - C. **ARCHITECT'S SUPPLEMENTAL INSTRUCTION (ASI or CLARIFICATION)** Is a written and/or graphic instrument issued by the Owner's Representative after award of Contract to describe certain clarifications of or deviations from the Contract Documents not affecting cost or time. An ASI is an order to do the work.
  - D. **BID PROPOSAL** Is a complete and properly signed proposal to do the Work of an individual Bid Category(ies) for the sums stipulated therein, submitted in accordance with the Bidding Documents.
  - E. **BASE BID** is the sum stated in the Bid Proposal for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which work may be added to or deducted from for sums stated in Alternate Bids.
  - F. **BIDDER** is a person or legal entity who submits a Bid Proposal. After award of a contract, the Bidder will be known as Trade Contractor or Vendor. All Trade Contractors on this project are considered prime Trade Contractors. Vendors provide equipment shipped FOB site and technical support on site, but no installing labor. Subcontractors are firms which have agreements to provide services on behalf of Trade Contractors. The term Subcontractor(s) include firms who are subcontracted at any tier (sub-subcontractor, etc.). All subcontractors are to be bound within their respective agreements to higher tier firms, to all the requirements the prime level Trade Contractor has to the Construction Manager.
  - G. **BID CATEGORIES** are units of work performed by a Trade Contractor (and their subcontractors of any tier) which form part of the total project. The term Bid Category should not be confused with the term Specification Technical Section. Technical Sections of the Specification establish quality and performance criteria, and the Bid Categories designate work scope and assignment. Technical Sections are listed within each Bid Category to identify, along with the scope narratives, the assignment of work.
  - H. **BID CATEGORY DESCRIPTION** is a written description of the scope of work to be performed by a Bidder for a Bid Category. A description of the work is provided in the Scope of Work for each Bid Category.
  - I. **BULLETIN:** A written and/or graphic instrument issued by the Owner's Representative, after award of Contract, used to solicit a proposal for a change in the Work which may affect cost and/or time. The Contract Documents for the original Work shall govern the work described unless otherwise modified by the Bulletin. A Bulletin is not an order to do the work, but a request to submit a quotation.
  - J. **COMPLETE:** Where complete is used, it shall mean "complete with connections, supports, attachments, and incidental items necessary for a finished and properly operating assembly or installation."

- K. **CONNECT:** The term connect shall mean “to bring service(s) to point of installation and make final connections of the service(s) to the installed equipment and provide miscellaneous auxiliary appurtenances necessary to make operable for its intended use.”
  - L. **CONTRACT DOCUMENTS** consist of the Agreement, the Conditions of the Contract (General Conditions), all Division 00 Contracting Requirements, all Division 01 General Requirements, Drawings, Specifications, other documents listed in the Agreement, all Addenda issued prior to and all modifications issued after execution of the agreement.
  - M. **CONSTRUCTION CHANGE DIRECTIVE:** A directive to make changes in the work or duration of the work that is issued by the Construction Manager. Contractual obligations upon the Trade Contractor are the same as those BEFORE a Construction Change Directive (CCD) is issued unless stated differently within the CCD. A CCD is an order to do the work.
  - N. **FURNISH:** To supply (only) to another party for their use of installation, including cost of delivery to jobsite and full coordination with the receiving party.
  - O. **INSTALL:** To unload, distribute, uncrate, assemble, and fix into the intended final positions. The installer to provide all miscellaneous hardware and supplies required to anchor and support securely, connect, clean-up, and legally dispose of rubbish.
  - P. **PROVIDE** shall be understood to mean furnish, install, protect, trim, cut and patch as required to put in place a complete operable and/or finished installation which is complete in every way intended in the contract documents, including all required expert labor, material, and equipment for said installation.
  - Q. **REVIEW:** Where used in conjunction with the Architect's action on the Trade Contractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Architect as stated in General (and Supplementary) Conditions. Such review shall not release the Trade Contractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
  - R. **TRADES:** Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
  - S. **TRADE SPECIALISTS:** Certain Sections of the Specifications require that specific construction activities be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and their assignments are requirements over which the Trade Contractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Trade Contractor. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
3. All Bidders of Any Category must include:
- A. **BIDDER QUALIFICATION:** Bidders must fully comply with the Granger qualification criteria for projects of this size, scale, and scope. Demonstrate three (3) years of successful installation minimum on projects of similar or larger scale and scope.
  - B. **WORKER & CREWING QUALIFICATIONS:** Meet defined requirements for professional (“experienced”) installer (Section 01 4001 Quality Requirements). Provide journeyman workforce with apprenticeship or other demonstrable training program. Apprentices/helpers shall not exceed 25% of crewing. Provide at least 30% of the labor required with personnel in the employ of the Contractor. No subcontract may exceed 50% of the Contract without written approval of the Construction Manager.
  - C. **Supervision QUALIFICATIONS:** Each bidder shall provide proposed competent supervision resume(s) and Owner/architect references from previous project experience if invited to a post-bid interview. If approved by the Construction Manager, the supervisor shall remain assigned to the project for the entire project duration, unless the Owner or Construction Manager requests his or her replacement in writing. The supervisor shall be on-site full-time whenever the Contractor has direct employees or subcontractors (of any tier) on-site. Supervisor must have minimum OSHA 30-hour training. Supervisor shall attend all job progress meetings and other required meetings and inspections as directed by the Construction Manager.

- D. REVIEW OF DOCUMENTS AND COORDINATION AMONG TRADES: Develop a complete understanding of other work categories and provide continuous coordination with interfacing trade contract work of other categories. Bidders are responsible for reviewing all construction documents issued with this bid package including project manual specifications, civil, structural, architectural, food service, mechanical, electrical drawings, low voltage/data design information and all other work as shown.
- 1) Note that some sections of the technical specifications may include a paragraph titled "Related Sections". This paragraph is an aid to the Project Manual and is not intended to include all sections which may be related. It is each Contractor's obligation to investigate how related sections may affect their bid and proposed work, and to include costs for the applicable work in related sections and/or coordination with same in their bid proposal to coordinate all sections whether indicated under "Related Sections" or not.
  - 2) Estimating information and quantities indicated on the drawings are for convenience and reference only. Contractors will be held responsible for having provided their own quantity take-offs to determine actual quantities contained in the construction documents.
  - 3) Each Contractor shall include all required labor claimed by its respective trade, for installation of equipment furnished by another Contractor.
- E. ELECTRONIC COMMUNICATION:
- 1) All Contractors will be required to use electronic communication techniques defined by the Construction Manager to facilitate information flow between the Contractor and the Construction Manager.
  - 2) After bids are received, all project documents, including but not limited to drawings, specifications, bulletins, addenda, field mark-ups, RFIs, sketches, punch lists, and warranty issues, will be managed and distributed exclusively through PlanGrid application.
  - 3) All successful bidders are **required** to have a subscription to this application for the duration of the entire project, including the warranty period indicated within the bid documents. ALL field foremen are required to have an electronic tablet (iPad preferred) with a cellular data plan included, at all times while on site. Document management and quality control will be administered via your electronic device(s) in the field, using PlanGrid.
  - 4) For pricing information on PlanGrid subscriptions contact Brigid Holdridge at 248.921.4980 or [Brigid.Holdridge@autodesk.com](mailto:Brigid.Holdridge@autodesk.com).
  - 5) This project will also use electronic documents (such as spreadsheets, text, PDF, 2D CAD, and other commonly used file formats) for most project documents and correspondence including RFI's, submittals, change requests, architect's supplemental instructions, project schedules, meeting notes, change orders, project specifications, drawings, etc.
  - 6) Instructions for access to the Construction Manager's project collaboration site will be provided to all Trade Contractors awarded contracts. Use of these electronic documentation systems **will require that every Contractor provide to their supervision and other staff on site an iPad, Windows or Android tablet device with cellular internet access in the field.** The work may also require a computer with internet access and an email address that is used on a daily basis.
  - 7) Each Contractor will be responsible for its own internet access, computing, printing and duplication costs.
- F. Building Information Modeling (BIM):
- 1) All Contractors, Suppliers, subcontractors of any tier, and/or their designee are to take part in the collaborative BIM process as directed by Construction Manager to plan for clash-free installation of all work before beginning work in the field. This will include but not be limited to coordination and collaboration model review processes, scheduling, prefabrication reviews and a modular construction analysis process.
  - 2) All trades and suppliers are required to own and understand the Navisworks software and how to navigate, take measurements and utilize the project BIM model throughout the entire course of project delivery.
  - 3) Failure to provide all required planning and participation in the BIM model shall subject the installer to absorbing all costs, which may, in the sole opinion of the Construction Manager, have been foreseen, reduced or avoided had the installer fully and properly coordinated their work within the BIM model, with work of others, existing conditions, or changes in the work.

- G. **TAXES, PERMITS, BONDS AND FEES:** The Construction Manager will obtain the general building permit from the State of Michigan. All applicable taxes (including Michigan sales tax), permits and fees required by any legal authority are to be included in the Base Bid(s). Payment and Performance Bond costs shall be quoted as an add to the base bid but excluded from the base bid.
- H. **LAYOUT AND ENGINEERING:** All layout, control points, and engineering required to execute the work of the category being bid and as defined in the specifications. Coordinate all layout with other trades.
- I. **MEANS OF INSTALLATION:** Provide all labor, tools, equipment, incidental hardware and materials required to receive, unload, store, protect and install both materials furnished by the bid category and materials furnished by other categories but required to be installed as a requirement of the category being bid.
- J. **SUBMITTALS:** Submittal of information defined by Section 01 3301 Submittal Procedures within twenty (20) calendar days of issuance of a letter of intent or contract award.
- K. **LEED REQUIREMENTS:** This project will NOT be built under formal LEED submission but all Contractors will be expected to provide materials and systems as specified that are sustainable, provide energy efficiency and provide materials that minimize off-gassing inside any structure as they apply to the Contractor's work.
- L. **MATERIAL STATUS LOG:** Provide a materials status log including purchase order numbers, vendors, and expected delivery information within twenty (20) calendar days of issuance of a letter of intent authorizing material procurement or contract award. Update log as items change or upon request. Include all contact information for vendors and subcontractors for each element on expediting log.
- M. **EXISTING CONDITIONS:** Contractors are responsible to perform field investigation and review existing conditions and Owner as-built drawings prior to executing the work to ensure that existing conditions are well understood. Contractors shall provide within their bid proposals all costs for modification cut/patch, structural restoration and neat repair of finishes of existing conditions as required to implement the complete contract documents intent.
- N. **GEOTECHNICAL INVESTIGATION:** Available Project Information references available geotechnical investigations related to the project as prepared by N/A. It is the responsibility of the Bidder and any sub-bidders to make additional geo-technical investigations if, after reviewing the geo-technical investigation report and from deductions or conclusions made thereof, further data is required to determine site conditions and to properly provide for required construction. Such additional investigations shall be at no additional cost to Owner and shall be undertaken only upon Construction Manager's written authorization. Any test pits excavated shall be backfilled and compacted the same they are dug. Bidder and sub-bidders shall provide insurance protecting and holding Owner, Construction Manager and Architect harmless from claims arising from this additional investigation work due to bodily injury, including death, and due to property damage to the Owner's or other's property.
- O. **HAZARD COMMUNICATION:** Under no circumstances are Contractors to disturb Asbestos-Containing Materials (ACM) or any other hazardous materials without appropriate engineering controls. If the Contractor suspects that a material within the scope of this project is a hazardous material (including asbestos, lead, polychlorinated biphenyl, or other regulated building material) that has not already been identified and/or is in the scope of work to be abated, notify the Construction Manager immediately.
- P. Due to the age of the previously existing buildings, and in the absence of empirical data from the hazardous material survey, coated surfaces on adjacent existing buildings shall be assumed to contain lead-based paint. This includes but is not limited to any type of paint, primer, coating, lacquer, or varnish on any building component. Proper precautions must be taken to ensure that workers and building occupants are not exposed to airborne lead concentrations at or above the OSHA Action Level (AL) of 30 ug/m3.
- Q. If work will be conducted on any previously coated surface of an existing building, the Contractor must submit to the Construction Manager current proof of appropriate detailed written lead work plan in accordance with 29 CFR § 1926.62 (Michigan Part 603). This submittal will include proof of training, written respirator program, and negative exposure assessments from projects with similar conditions at a minimum. Contractors performing work in these buildings must follow the provisions of the University of Michigan AEC & OSEH Construction Safety Requirements (January 2010 – revised 5/1/10) and the



division 13 specifications in this project manual. The MIOSHA Lead Standard (Part 603) can be viewed at: [http://www.michigan.gov/documents/CIS\\_WSH\\_part603\\_35656\\_7.pdf](http://www.michigan.gov/documents/CIS_WSH_part603_35656_7.pdf)

4. **SAFETY COMPLIANCE:** Bidders shall be aware that compliance with the current revision of the Granger Site Safety Program for this project shall be required of each Contractor, subcontractors and/or lower tier subcontractors, in addition to compliance with all Federal and State OSHA standards. Refer to Section 01 3520 Safety Requirements for further information.
  - A. Bidders shall take specific note of the following points of emphasis in the Granger Site Safety Program:
  - B. Granger Construction Safety Program
    - 1) Granger Site Safety Program Acknowledgement – All Contractors will be required to submit an acknowledgement signed by both project manager and onsite foreman personnel
    - 2) Personal Protective Equipment – Hard hat, safety glasses, and reflective vest or shirt worn at all times by all personnel on the project site.
    - 3) 100% Fall Protection above 6 feet – Implemented by all personnel on the project site.
    - 4) Compliance with OSHA Silica Safety standards. Options may include employing selection of alternative materials, wet methods, HEPA vacuum dust reduction systems, personnel exposure monitoring, etc. Plan to provide documentation of your firm's silica safety plan.
    - 5) Use of GFCI Protected Extension Cords – Must be utilized when working off of existing building receptacles. No connection to existing circuits without GFCI protection is allowed.
    - 6) Mandatory Site Specific Safety Planning – All Contractors shall prepare & submit a site-specific safety plan for approval. Their plans shall adopt as a minimum all requirements of the Granger project safety plan.
    - 7) Mandatory Job Hazard Analysis (JHA) – All Contractors shall prepare and submit task analyses and train employees for all identified hazards prior to starting work on a given task. Said JHAs shall be reviewed and revised as the hazards of the work evolves, but not less than weekly.
    - 8) Mandatory Jobsite Safety Orientation – All Contractors and their subcontractors shall complete a brief project-specific jobsite safety orientation prior to starting work on the site.
    - 9) Onsite Safety Representative Requirement – Any Contractor with 20 or more workers on site (total of direct payroll and subcontracted employees) in any given week shall provide a full time non-working competent project safety person, in addition to their superintendent and foreman, on site in their employment for that entire week. When crew levels are under 20, the Contractor's appropriately trained superintendent may act as the project safety person for the Contractor. The project safety person shall meet the minimum of 30-hour OSHA certification and current CPR/first-aid training. The project safety person shall be responsible to assure necessary training is documented and provided as required. The safety supervisor shall ensure compliance with all project safety policies, procedures, pre-task analysis, daily task analysis, Owner requirements and OSHA regulations. This person shall have authority to stop work and/or direct changes in work process to reduce hazards. This person shall join superintendent and foreman in all MIOSHA partnership events.
    - 10) Celebration of Exemplary Safety Behavior – Regular awards for individuals who promote a strong safety culture and lead by example will be a part of the Construction Manager's and every Contractor's safety plan.
    - 11) Disciplinary Plan – Disregard of safety policies results in written reprimand (1st offense), written reprimand and suspension (2nd offense), or termination (3rd offense). Negligent or willful unsafe behavior in the sole opinion of the Construction Manager shall be adequate reason to increase to 2nd or 3rd level response.
  - C. **SITE SPECIFIC SAFETY PLAN:** Provide, as part of the award process, an outline of how the Bidder will comply with current MIOSHA regulations. At a minimum, the following items must be addressed in the plan:
    - 1) Employee training for equipment operation and use; particularly work undertaken on ladders, scaffolds and or aerial lift platforms work.
    - 2) Equipment maintenance procedures and records.
    - 3) Fall protection, detailed for the work of each bid category. Particular attention shall be provided to fall protection and safe use of ladder, scaffold and aerial lift equipment safety.
    - 4) Enforcement of compliance of personal protection device use requirements. Note that hard hats, reflective shirts or vests, and safety glasses are mandatory for all project personnel at all times

without exception. Workers may be permanently barred from work on site for failure to comply with this and other safety requirements.

- 5) Hoisting, lifting, and crane use patterns: hoist usage and inspections shall be performed daily at a minimum by qualified persons with appropriate training. No lift shall be conducted prior to approval of a hoisting safety plan submitted by the Contractor. The plan must be in full compliance with MIOSHA requirements and reviewed by the Construction Manager. The hoisting safety plan shall include analysis of existing conditions at the time of the lift, coordination of truck equipment access to the lift area as well as coordination with other Contractors on site, adequate bearing capacity analysis including required mats or temporary sub-base or base provision and preparation to distribute loads safely, hoist or lift device capacity analysis at all points of load travel, hoisted load travel plan, planning and work as required to assure that no person will be exposed to a falling load during the load travel, and analysis of how the load will be moved to its final location within the Work until safely secured within the Work.
  - 6) Hoisting must comply with safety requirements and be planned carefully with a written site-specific job safety task analysis, which has been submitted to the CM for review and comment before the work is undertaken.
  - 7) No crane shall be used on site until its entire swing area is identified in the Contractor's crane use plan and the work area is blocked by barricades.
  - 8) First aid and safety training recording procedures
  - 9) Scaffolding inspections by qualified persons
5. OWNER COORDINATION: All Contractors shall be aware of the Owner's on-going use of the facility and shall coordinate and schedule work accordingly with notice to Construction Manager.
- A. Note any work undertaken before the last day of classes or after Labor Day must be performed on evening shift or weekends. Include any shift differential cost within lump sum base bid. Even though classes are not in session, the Owner reserves the right to use its facilities for normal summer programming as its needs dictate. Coordinate your work around any such scheduled needs.
  - B. All work shall comply with local noise and work ordinances where applicable.
  - C. Loud work must be coordinated with the Construction Manager's superintendent.
  - D. Any work that could endanger staff, students, or visitors will need to be scheduled to avoid such danger. This may include weekend, evening or night work. No crane hoisting or structural demolition will be allowed outside of approved times.
  - E. Contractors will be expected to behave in an appropriate manner. Foul language and inappropriate clothing will not be tolerated.
  - F. No jobsite radios will be allowed if any portion of the facility is occupied during the construction period.
  - G. Construction Manager will authorize locations for tool, material, and equipment storage. Contractors will relocate stored materials, tools, and equipment as directed by Construction Manager to allow for the Owner's on-going use of the facility and to allow for access to other construction work. Be prepared to move stored elements as directed by CM.
6. SCHEDULE: Work on this bid package must be performed according to the Milestone Schedule which is described in Section 01 3210 Project Scheduling. Bidders shall be aware of delivery requirements to accommodate the completion schedule of this project and shall include all expediting, accelerated delivery, and overtime costs to allow for completion and turnover as shown in the milestone schedule. Bidders shall provide workers on site for at least five (5) days of eight (8) working hours each, per week. It is the Bidder's responsibility to prepare and submit shop drawings and other submittals in a timely manner to accommodate the milestone and progress schedule and prevent delays to the project. Provide multiple mobilizations as necessary to maintain job progress. This project is primarily planned to be executed during school vacation periods over summer and during winter break, depending on the system being replaced.
7. SCHEDULE INPUT: Provide schedule input to CM to allow completion of the work as per the contract milestone schedule. No activity may exceed five (5) work days. Show predecessor and successor logic. Provide crewing size information with the logic input. During the work provide input to adjust the schedule logic and crewing to maintain contract milestone schedule. Note the additional requirements of Section 01 3210 Project Scheduling.

8. **DAMAGES:** If Substantial Completion for the project occurs later than the Substantial Completion date established in the Milestone Construction Schedule, which is not due to a Force Majeure Event, as defined in the General Conditions, the Construction Team (including the Construction Manager, Contractors, and their subcontractors and suppliers) will be responsible to pay actual damages incurred by the Owner for the delay.
9. **WORKER IDENTIFICATION:** All workers on site shall wear a hard hat, safety glasses, and reflective shirt or vest at all times. All workers shall carry a State-issued picture identification card on their person at all times and present it to any Owner or Construction Management representative upon request.
10. **NO SMOKING/NO TOBACCO RULE:** Per State Law, NO smoking or other tobacco use will be allowed on the project site at any time. There are no exceptions to this rule. Any worker found using any form of tobacco may be permanently removed from the project at the sole discretion of the Construction Manager.
11. **DELIVERIES AND ON-SITE STORAGE:** Since storage space on the project site is limited, Contractors must utilize "just-in-time" deliveries. Materials must be received in advance of the time that they will be needed on-site, stored off-site until such time as they are required, and delivered in a timely manner to facilitate work progress. Material, equipment, and tools may not be stored on-site in excess of ten (10) working days prior to installation or use.
12. **TEMPORARY SIGNAGE AND BARRICADES:** Provide and maintain barricading and signage required outside the project area to completely define the construction work area. Post all work areas as directed by the Construction Manager. Provide barricades and flagmen to make safe entry and exit of large or slow moving loads on and off public streets and where safe access requires them. During the school year, no deliveries will be allowed during school drop off and pick up times (7:30 to 8:30 AM and 2:30 to 3:30 pm) and other restrictions for school activities as defined by CM. No crane shall be used on site until its entire swing area is identified in the Contractor's crane use plan and the work area is blocked by barricades.
13. **ON-SITE ROADS AND TEMPORARY ROAD CLOSURES:**
  - A. Each Contractor will enforce a five (5) MPH speed limit on site.
  - B. Each Contractor must provide barricades, signage, and flag persons that comply with the MMUTCD, state, and local requirements to safely reroute pedestrians and vehicles. Each Contractor must also provide barricades, signage and flag persons to facilitate moving trucks and equipment onto and off site as required for the work of their bid category.
  - C. Each Trade requiring road closure in the public ROW shall obtain and pay for any city/state permit costs or fees.
14. **PROTECTION OF EXISTING BUILDING & FINISH CONDITIONS:** All Contractors are to protect new or existing flooring and other finishes while working, operating lifts, and moving items on rolling scaffold or carts by using plywood or masonite panels or other appropriate protection for the loads imposed. Contractors are responsible to clean tires from lifts and carts and remove any lodged objects that could cause damage and to restore any consequential damage that does occur. Protect structure from overloading by analyzing live and static lift loads and provide any protection or shoring required to protect existing structure. Each Contractor working in a finished space is responsible for protecting the area surrounding their work. If any finish (floors, walls, carpet, furniture or seating) needs to be cleaned, replaced, or repaired, the responsible Contractor will pay for any costs incurred. If any furniture fixtures or equipment needs to be moved, each Contractor requiring same shall take a picture or prepare a sketch of in place conditions and locations and shall re-install FF&E in its original location after its work is complete during the summer. During school days this shall be required daily. Further, each Contractor working off shift or on weekends in a finished or occupied space shall clean it completely at the end of each shift so that the space is ready for use the following day for Owner usage.
15. **HOISTING & RIGGING:** Provide any personnel lifts or hoisting and rigging necessary to complete work of your bid category. No hoisting or rigging will be provided by the Construction Manager. Do NOT ask to use the Owner's equipment, ladders or tools. Any hoisting equipment must be approved by the Construction Manager and may not overload existing structure. Protect all finishes. Hoisting must comply with safety requirements and be planned carefully with a written site-specific job safety task analysis, which has been submitted to the CM for review and comment before the work is undertaken.

16. WASTE RECYCLING: Dumpsters will be furnished by the Construction Manager for all trades except as described in the specific Scopes of Work for bid categories. Each Contractor will coordinate with and participate in a waste recycling program. See Section 01 7001 Execution Requirements for more details. Dumpsters for construction debris and unidentifiable waste for the new work will be furnished by the Owner. Every subcontractor shall pick up and remove all trash and debris caused by their operations EVERY DAY and place it into dumpsters or haul it off-site.
17. UTILITY SHUTDOWNS: Three (3) day minimum notice to Owner's personnel for any utility shutdowns. Schedule any required utility shut downs so as to minimize the impact to the other Contractors and Owner's use of its building. All shutdowns should be planned and performed during off-hours and scheduled utilizing overtime as required to minimize impact on other trades.
18. CONTINUOUS AND FINAL CLEAN-UP: Provide continuous trash removal and clean-up per Section 01 7001 Execution Requirements. All Contractors to provide final cleaning of material and equipment provided under their bid category at a time directed by the Construction Manager immediately prior to Owner occupancy. All adjacent surfaces shall also be wiped clean and restored to the same condition or better than existed before the work was undertaken.
19. PROJECT COMMISSIONING: All Contractors must provide and comply fully with commissioning requirements and in the individual specifications assigned to their particular bid categories, to the extent that the items pertain to their individual scopes of work. Coordinate all activities with the Construction Manager.
20. LOGISTICS: Note that these plans may be changed if in the sole opinion of the Construction Manager it serves the best interest of the project to do so. Notice will be provided.
21. LOGISTICS: Before work begins at each site, diagrammatic logistics plans shall be developed by CM allowing all trades understanding where work areas exist, access, deliveries, load-in, load-out, clean up, and parking are permitted. These plans will be followed by all trades and workers. As the work evolves, these plans may be changed if, in the sole opinion of the Construction Manager, it serves the best interest of the project to do so. Notice will be provided of any change to the plans.

End of Section

## **Section 00 2413 Scopes of Work for Bid Categories**

### **Bid Category 26-22-01 Domestic Water Heaters Purchase**

#### **A. WORK INCLUDES**

1. Except for those items (if any) specifically noted to be excluded as defined below, the work of this bid category shall include all of the work and contract requirements according to Divisions 00 and 01 complete, including all bid requirements, Contract Documents; General and Supplemental Conditions, and General Requirements. Should any conflict exist between this written scope of work and the scope of work inferred by the Division 1 General Requirements or the technical specifications listed below, the work required by this bid category description shall govern. Work of this bid category specifically includes the work of the technical specification sections listed below, in their entirety, unless otherwise noted within this work category description:
2. Technical Specifications Included:  
22 3410            Condensing Fuel-Fired Domestic Water Heaters

#### **B. CLARIFICATIONS**

1. Provide all work described in 00 2410 Work Required for All Bid Categories.
2. Furnish Fuel-Fired Domestic Water Heaters at Creekside and Dexter High School as indicated on the mechanical schedules and the above specifications and with all required accessories including expansion tanks.
3. Include applicable taxes, including sales tax.
4. Include all shipping costs and insurance during shipping to the schools' loading docks.
5. Provide complete, job-specific submittals as an attachment to the bid proposal. The details provided will be used to evaluate the bid proposal during the award process. The owner reserves the right to reject a bid because of an incomplete submittal package. Award will be based on the best value for the school district. Analysis may include both initial installed cost, future operating and maintenance costs, and other factors.
6. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.
7. Provide rigging and installation instructions in advance to allow for planning.
8. Provide manufacturer authorized onsite supervision. The manufacturer's representative shall provide technical direction and assistance to the installation contractor in assembly of the equipment, connections and adjustments, and testing of the assembly and components.
9. Manufacturer's trained representative shall train Owner's personnel on start-up and shutdown procedures, troubleshooting, vibration test locations, service schedules, and preventative maintenance procedures

#### **C. EXCLUDED**

1. Installation and final testing shall be done under a separate contract, by the installation contractor. All necessary hardware to secure the assembly in place shall be provided by the installation contractor.

#### **D. UNIT PRICES**

1. None.

#### **E. ALLOWANCES**

1. None

#### **F. ALTERNATES**

1. Voluntary Alternate M1: Provide all pumps and accessories per the mechanical schedules and specification 232123. Shipping would be coordinated with installing contractor within 50 miles of Dexter, MI.

End of Bid Category 26-22-01

## **Bid Category 26-23-01 Heating Boilers Purchase**

### **A. WORK INCLUDES**

2. Except for those items (if any) specifically noted to be excluded as defined below, the work of this bid category shall include all of the work and contract requirements according to Divisions 00 and 01 complete, including all bid requirements, Contract Documents; General and Supplemental Conditions, and General Requirements. Should any conflict exist between this written scope of work and the scope of work inferred by the Division 1 General Requirements or the technical specifications listed below, the work required by this bid category description shall govern. Work of this bid category specifically includes the work of the technical specification sections listed below, in their entirety, unless otherwise noted within this work category description:
3. Technical Specifications Included:  
23 5216            Condensing Boilers

### **B. CLARIFICATIONS**

4. Provide all work described in 00 2410 Work Required for All Bid Categories.
5. Furnish Condensing Boilers at Wylie and Creekside as indicated on the mechanical schedules and the above specifications and with all required accessories, including expansion tanks.
6. Include applicable taxes, including sales tax.
7. Include all shipping costs and insurance during shipping to the schools' loading docks.
8. Provide complete, job-specific submittals as an attachment to the bid proposal. The details provided will be used to evaluate the bid proposal during the award process. The owner reserves the right to reject a bid because of an incomplete submittal package. Award will be based on the best value for the school district. Analysis may include both initial installed cost, future operating and maintenance costs, and other factors.
9. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.
10. Provide rigging and installation instructions in advance to allow for planning.
11. Provide manufacturer authorized onsite supervision. The manufacturer's representative shall provide technical direction and assistance to the installation contractor in assembly of the equipment, connections and adjustments, and testing of the assembly and components.
12. Manufacturer's trained representative shall train Owner's personnel on start-up and shutdown procedures, troubleshooting, vibration test locations, service schedules, and preventative maintenance procedures

### **C. EXCLUDED**

1. Installation and final testing shall be done under a separate contract, by the installation contractor. All necessary hardware to secure the assembly in place shall be provided by the installation contractor.

### **D. UNIT PRICES**

1. None.

### **E. ALLOWANCES**

1. None

### **F. ALTERNATES**

1. Voluntary Alternate M1: Provide all pumps and accessories per the mechanical schedules and specification 232123. Shipping would be coordinated with installing contractor within 50 miles of Dexter, MI.

End of Bid Category 26-23-01

## **Bid Category 26-23-02 Make-up Air Units Purchase**

### **A. WORK INCLUDES**

1. Except for those items (if any) specifically noted to be excluded as defined below, the work of this bid category shall include all of the work and contract requirements according to Divisions 00 and 01 complete, including all bid requirements, Contract Documents; General and Supplemental Conditions, and General Requirements. Should any conflict exist between this written scope of work and the scope of work inferred by the Division 1 General Requirements or the technical specifications listed below, the work required by this bid category description shall govern. Work of this bid category specifically includes the work of the technical specification sections listed below, in their entirety, unless otherwise noted within this work category description:
2. Technical Specifications Included:  
20 0513           Motors  
20 2923           Variable Frequency Controllers  
23 7333           Indirect-fired Heating & Ventilation units

### **B. CLARIFICATIONS**

1. Provide all work described in 00 2410 Work Required for All Bid Categories.
2. Furnish Rooftop Makeup Air Units at Mill Creek as indicated on the mechanical schedules and the above specifications and with all required accessories.
3. Include applicable taxes, including sales tax.
4. Include all shipping costs and insurance during shipping to the school's loading dock.
5. Provide complete, job-specific submittals as an attachment to the bid proposal. The details provided will be used to evaluate the bid proposal during the award process. The owner reserves the right to reject a bid because of an incomplete submittal package. Award will be based on the best value for the school district. Analysis may include both initial installed cost, future operating and maintenance costs, and other factors.
6. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.
7. Provide rigging and installation instructions in advance to allow for planning.
8. Provide manufacturer authorized onsite supervision. The manufacturer's representative shall provide technical direction and assistance to the installation contractor in assembly of the equipment, connections and adjustments, and testing of the assembly and components.
9. Manufacturer's trained representative shall train Owner's personnel on start-up and shutdown procedures, troubleshooting, vibration test locations, service schedules, and preventative maintenance procedures

### **C. EXCLUDED**

1. Installation and final testing shall be done under a separate contract, by the installation contractor. All necessary hardware to secure the assembly in place shall be provided by the installation contractor.

### **D. UNIT PRICES**

1. None.

### **E. ALLOWANCES**

1. None

### **F. ALTERNATES**

1. Voluntary Alternate M1: Provide all pumps and accessories per the mechanical schedules and specification 232123. Shipping would be coordinated with installing contractor within 50 miles of Dexter, MI.

End of Bid Category 26-23-02

## **Bid Category 26-23-03 Rooftop Units Purchase**

### **A. WORK INCLUDES**

1. Except for those items (if any) specifically noted to be excluded as defined below, the work of this bid category shall include all of the work and contract requirements according to Divisions 00 and 01 complete, including all bid requirements, Contract Documents; General and Supplemental Conditions, and General Requirements. Should any conflict exist between this written scope of work and the scope of work inferred by the Division 1 General Requirements or the technical specifications listed below, the work required by this bid category description shall govern. Work of this bid category specifically includes the work of the technical specification sections listed below, in their entirety, unless otherwise noted within this work category description:
2. Technical Specifications Included:  
20 0513           Motors  
20 2923           Variable Frequency Controllers  
23 8121           Commercial Rooftop Air Conditions

### **B. CLARIFICATIONS**

1. Provide all work described in 00 2410 Work Required for All Bid Categories.
2. Furnish Commercial Rooftop Air Conditioning Units at Creekside as indicated on the mechanical schedules and the above specifications and with all required accessories.
3. Include applicable taxes, including sales tax.
4. Include all shipping costs and insurance during shipping to the school's loading dock.
5. Provide complete, job-specific submittals as an attachment to the bid proposal. The details provided will be used to evaluate the bid proposal during the award process. The owner reserves the right to reject a bid because of an incomplete submittal package. Award will be based on the best value for the school district. Analysis may include both initial installed cost, future operating and maintenance costs, and other factors.
6. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.
7. Provide rigging and installation instructions in advance to allow for planning.
8. Provide manufacturer authorized onsite supervision. The manufacturer's representative shall provide technical direction and assistance to the installation contractor in assembly of the equipment, connections and adjustments, and testing of the assembly and components.
9. Manufacturer's trained representative shall train Owner's personnel on start-up and shutdown procedures, troubleshooting, vibration test locations, service schedules, and preventative maintenance procedures

### **C. EXCLUDED**

1. Installation and final testing shall be done under a separate contract, by the installation contractor. All necessary hardware to secure the assembly in place shall be provided by the installation contractor.

### **D. UNIT PRICES**

1. None.

### **E. ALLOWANCES**

1. None

### **F. ALTERNATES**

2. Voluntary Alternate M1: Provide all pumps and accessories per the mechanical schedules and specification 232123. Shipping would be coordinated with installing contractor within 50 miles of Dexter, MI.

End of Bid Category 26-23-03



## **Bid Category 26-23-04 Chiller Purchase**

### **A. WORK INCLUDES**

1. Except for those items (if any) specifically noted to be excluded as defined below, the work of this bid category shall include all of the work and contract requirements according to Divisions 00 and 01 complete, including all bid requirements, Contract Documents; General and Supplemental Conditions, and General Requirements. Should any conflict exist between this written scope of work and the scope of work inferred by the Division 1 General Requirements or the technical specifications listed below, the work required by this bid category description shall govern. Work of this bid category specifically includes the work of the technical specification sections listed below, in their entirety, unless otherwise noted within this work category description:
2. Technical Specifications Included:  
20 0513           Motors  
20 2923           Variable Frequency Controllers  
23 6416           Centrifugal Water Chillers

### **B. CLARIFICATIONS**

1. Provide all work described in 00 2410 Work Required for All Bid Categories.
2. Furnish Electric Centrifugal Refrigeration Machine at Mill Creek as indicated on the mechanical schedules and with all required accessories.
3. Include applicable taxes, including sales tax.
4. Include all shipping costs and insurance during shipping to the school loading dock.
5. Provide complete, job-specific submittals as an attachment to the bid proposal. The details provided will be used to evaluate the bid proposal during the award process. The owner reserves the right to reject a bid because of an incomplete submittal package. Award will be based on the best value for the school district. Analysis may include both initial installed cost, future operating and maintenance costs, and other factors.
6. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.
7. Provide rigging and installation instructions in advance to allow for planning.
8. Provide manufacturer authorized onsite supervision. The manufacturer's representative shall provide technical direction and assistance to the installation contractor in assembly of the equipment, connections and adjustments, and testing of the assembly and components.
9. Manufacturer's trained representative shall train Owner's personnel on start-up and shutdown procedures, troubleshooting, vibration test locations, service schedules, and preventative maintenance procedures

### **C. EXCLUDED**

1. Installation and final testing shall be done under a separate contract, by the installation contractor. All necessary hardware to secure the assembly in place shall be provided by the installation contractor.

### **D. UNIT PRICES**

1. None.

### **E. ALLOWANCES**

1. None

### **F. ALTERNATES**

1. Voluntary Alternate M1: Provide all pumps and accessories per the mechanical schedules and specification 232123. Shipping would be coordinated with installing contractor within 50 miles of Dexter, MI.

End of Bid Category 26-23-04

## **Bid Category 26-23-05 Evaporative Cooler Purchase**

### **A. WORK INCLUDES**

1. Except for those items (if any) specifically noted to be excluded as defined below, the work of this bid category shall include all of the work and contract requirements according to Divisions 00 and 01 complete, including all bid requirements, Contract Documents; General and Supplemental Conditions, and General Requirements. Should any conflict exist between this written scope of work and the scope of work inferred by the Division 1 General Requirements or the technical specifications listed below, the work required by this bid category description shall govern. Work of this bid category specifically includes the work of the technical specification sections listed below, in their entirety, unless otherwise noted within this work category description:
2. Technical Specifications Included:  
20 0513           Motors  
20 2923           Variable Frequency Controllers  
23 7600           Closed Circuitry Evaporative Fluid Coolers

### **B. CLARIFICATIONS**

1. Provide all work described in 00 2410 Work Required for All Bid Categories.
2. Furnish Closed Circuit Evaporate Cooler at Mill Creek as indicated on the mechanical schedules and with all required accessories.
3. Include applicable taxes, including sales tax.
4. Include all shipping costs and insurance during shipping to the school loading dock.
5. Provide complete, job-specific submittals as an attachment to the bid proposal. The details provided will be used to evaluate the bid proposal during the award process. The owner reserves the right to reject a bid because of an incomplete submittal package. Award will be based on the best value for the school district. Analysis may include both initial installed cost, future operating and maintenance costs, and other factors.
6. Protect control panels, pipe openings, and other sensitive components with heavy plastic or other durable means to ensure unit cleanliness is maintained during shipping and storage.
7. Provide rigging and installation instructions in advance to allow for planning.
8. Provide manufacturer authorized onsite supervision. The manufacturer's representative shall provide technical direction and assistance to the installation contractor in assembly of the equipment, connections and adjustments, and testing of the assembly and components.
9. Manufacturer's trained representative shall train Owner's personnel on start-up and shutdown procedures, troubleshooting, vibration test locations, service schedules, and preventative maintenance procedures

### **C. EXCLUDED**

1. Installation and final testing shall be done under a separate contract, by the installation contractor. All necessary hardware to secure the assembly in place shall be provided by the installation contractor.

### **D. UNIT PRICES**

1. None.

### **E. ALLOWANCES**

1. None

### **F. ALTERNATES**

1. Voluntary Alternate M1: Provide all pumps and accessories per the mechanical schedules and specification 232123. Shipping would be coordinated with installing contractor within 50 miles of Dexter, MI.

End of Bid Category 26-23-05

## **Section 00 3100 Available Project Information**

**These appendices are incorporated by reference only. These documents are available at <https://app.buildingconnected.com/public/5565f9b93ad9f70800b26d32>.**

Bidders acknowledge that they understand these appendices may have financial impact on their proposal and they assume responsibility for that potential cost impact.

### **1. APPENDICES TO THESE SPECIFICATIONS BY REFERENCE HEREUNDER**

- A. Granger Construction Company Safety & Health Manual (SF010WI v.7)
- B. Federal OSHA Regulation CFR 1926-58-Construction Standards

### **2. REQUEST FOR INFORMATION FORM is available at the link above.**

### **3. GEOTECHNICAL INVESTIGATION**

- A. Geo-technical investigations have been conducted at the site. The Owner is furnishing a report regarding conditions in the area where work is to be performed under the Contract. Such investigations were made for the purpose of study and design.
- B. Bidder, and those Sub-bidders affected by site conditions shall be fully responsible for reviewing the geo-technical investigation report and for any conclusions made on the basis of the information contained therein.
- C. If the water table is shown to be located at a level that could interfere with construction, provide means to remove or divert the water without harming other construction or property as part of the base bid amount. Refer to the work category descriptions for specific de-watering requirements, if any.
- D. The Geo-technical investigation report is furnished only for information and as a convenience to the Bidders. It is expressly understood, and agreed, that the Construction Manager, Architect, and Owner assume no responsibility whatsoever in respect to the sufficiency or accuracy of the investigations. There is no warranty or guaranty, either expressed or implied, that the conditions indicated by such investigations, or records thereof, are representative of all conditions throughout the site. Nor are such investigations an indication that unforeseen conditions will not be encountered, or that materials other than, or in proportions different from those indicated, will not be encountered.
- E. It is the responsibility of the Bidder and any sub-bidders to make additional geo-technical investigations if, after reviewing the geo-technical investigation report and from deductions or conclusions made thereof, further data is required to determine site conditions and to properly provide for required construction. Such additional investigations shall be at no additional cost to the Owner and shall be undertaken only upon Owner's or Construction Manager's written authorization. Notify the Construction Manager in writing if access to the site is required prior to the bid date.
- F. Bidder and sub-bidders shall provide insurance protecting and holding Owner and Architect harmless from claims arising from this additional investigation work due to bodily injury, including death, and due to property damage to Owner's or other's property.

**END OF SECTION**

## Section 00 4100 Bid Proposal Form

Bids shall be submitted via Building Connected. The below form is only for bids unable to be submitted electronically.

Submit in Duplicate – each must have original signatures and Notary endorsement  
Do not modify, alter, qualify, or attach stipulations

DATE: \_\_\_\_\_

BID CATEGORY: NO. & DESCRIPTION: \_\_\_\_\_

COMPANY NAME: \_\_\_\_\_

LEGAL ADDRESS: \_\_\_\_\_

ZIP CODE \_\_\_\_\_

DELIVERY ADDRESS (IF DIFFERENT FROM ABOVE) \_\_\_\_\_

ZIP CODE \_\_\_\_\_

TELEPHONE: \_\_\_\_\_

CONTACT NAME: \_\_\_\_\_

E-MAIL ADDRESS: \_\_\_\_\_

PROJECT: **Dexter Community Schools 2017 Bond Project**  
**Bid Package 26 District-Wide Mechanical Equipment Replacement**

RECEIPT OF BIDS: prior to **2:00 p.m.**, local time, **March 18, 2022**

ADDRESSED TO: [bond@dexterschools.org](mailto:bond@dexterschools.org) AND COPIED to [dexterbids@grangerconstruction.com](mailto:dexterbids@grangerconstruction.com)

Attn: **Craig McCalla**  
**Dexter Community Schools**  
**2704 Baker Rd**  
**Dexter, MI 48130**

ADDENDA: Following addenda have been received, are hereby acknowledged, and their execution is included in bid sums listed herein.

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_ Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_ Addendum No. \_\_\_\_\_ Dated \_\_\_\_\_

The bidder agrees to perform all work for bid category(ies) as described in the contract documents, for the base bid(s) stated below. Bidders are required to bid the entire scope of work for each bid category they bid.

The base bid(s) shall not include the cost of Performance and Payment Bonds. For each category to be bid: include the bid category and description; the base bid, both written and in figures, and the cost of the Performance and Payment Bonds (should they be required) in figures. In case of discrepancy, amount shown in words will govern.

The undersigned Bidder, having carefully examined and thoroughly perused specifications for the above named project; and become fully familiar with all conditions affecting the work required by those specifications, prepared by Peter Basso Associates, Inc. dated 3/2/2022 hereby proposes to provide all materials, labor, services, etc., required thereby for the base bid sum of

**BASE BID:** This bid covers all expenses incurred in performing all the work required.

Bid Category & Description: \_\_\_\_\_

Base Bid (In Words): \_\_\_\_\_

Base Bid (In Figures): \$ \_\_\_\_\_

Bidding Company:

**PERFORMANCE & PAYMENT BONDS:** The additional cost to provide Performance & Payment Bonds, if required, will be \$ \_\_\_\_\_ for the Base Bid, plus \_\_\_\_\_ % of any accepted Mandatory or Voluntary Alternate(s).

**COMBINED BID:** Combined bids covering several bid categories will not be accepted unless separate bid amounts are listed above for each bid category making up the combined bid amount. The amount for a combined bid need not be equal in amount to the total of the individual category bids.

Bid Categories included: \_\_\_\_\_

Base Bid (In Words): \_\_\_\_\_

Base Bid (In Figures): \$ \_\_\_\_\_

**REQUESTED ALTERNATES:** Contractor agrees that prices quoted for Requested Alternates (to be quoted below) shall be acceptable as full compensation or credit for work thus described in the drawings, specifications, and Instructions to Bidders. Refer to Section 00 2413 Scopes of Work for Bid Categories and Section 012300 Alternates.

Alt.	Description	(+) or (-)	Amount
M1	Provide all pumps and accessories.	(Add)	\$ _____
_____	_____	(Add)	\$ _____
_____	_____	(Add)	\$ _____
_____	_____	(Add)	\$ _____
_____	_____	(Add)	\$ _____

**VOLUNTARY ALTERNATES:** Contractor agrees that voluntary alternates for materials, methods, and/or equipment specified, if accepted by Owner, will be added to or deducted from base bid. If needed attach additional typed sheets on your letterhead and clearly labeled as

Dexter Community Schools 2017 Bond Project Bid Package 26  
District-Wide Mechanical Equipment Replacement  
Voluntary Alternate(s)

Item	Amount Add (+) or Deduct (-)
_____	_____
_____	_____
_____	_____

**LABOR RATES:** The following labor rates are required to be offered by all Bidders. The Bidder agrees that the following amounts will be used in determining contract changes from the base bid for authorized changes in the scope of work. Labor rates SHALL NOT include Bidder's mark-up for overhead and profit. Appropriate back-up of labor rates will be required at the post-bid meeting to confirm accuracy of labor rates. Submitted labor rates will be compared with industry-accepted rates.

List all job classifications for all trades planned for work.

JOB TITLE	FOREMAN		JOURNEYMAN	
	TIME	TIME & ½	TIME	TIME & ½
_____	\$ _____	\$ _____	\$ _____	\$ _____
_____	\$ _____	\$ _____	\$ _____	\$ _____
_____	\$ _____	\$ _____	\$ _____	\$ _____

**UNIT PRICES:** The following unit prices to base bid categories are required to be offered by all Bidders. The Bidder agrees that the following amounts will be used in determining contract changes from the base bid for authorized changes in the scope of work. Do not include unit cost in the base bid amount(s). Unit prices shall include Bidder's mark-up for overhead and profit. Details are in Section 00 2413 Scopes of Work for Bid Categories.

Description	Amount	Unit

**ALLOWANCE(S):** If your scope of work indicates any allowance(s) it must be included in your base bid amount. Refer to Section 00 2413 Scopes of Work for Bid Categories

**TAXES, PERMITS, BONDS AND FEES:** The bid amount must include all applicable taxes, permits, bonds and fees, required by all legal authorities at the location of the Work.

**EMR DISCLOSURE:** Provide the current EMR for your company. \_\_\_\_\_

**ASBESTOS-FREE PRODUCT INSTALLATION:** It is hereby understood and agreed that no products/materials containing asbestos, including chrysotile, amosite, crocidolite, tremolite, anthophyllite, actinolite or any combination of these materials that have been chemically treated and/or altered shall be installed or introduced into the building by the contractor or his employees, agents, subcontractors, or other individuals or entities over whom the contractor has control. The contractor, its subcontractors of any tier, and vendors of any tier shall be required to sign a certification statement ensuring that all products or materials installed or introduced into a building will be asbestos-free.

**NON-COLLUSIVE CERTIFICATION:** By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief.

1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or any competitor;
2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor;
3. No attempt has been made or will be made by the bidder to insure any other person, partnership, or corporation to submit or not to submit a bid for the purpose of restricting competition;
4. The person signing this bid or proposal certifies that he has fully informed himself regarding the accuracy of the statements contained in this certification, and under the penalties of perjury, affirms the truth thereof, such penalties being applicable to the bidder as well as to the person signing in its behalf.
5. That attached hereto (if corporate bidder) is a certified copy of resolution authorizing the execution of this certificate by the signature of this bid or proposal in behalf of the corporation bidder.

**AGREEMENT:** Undersigned agree(s) to execute an agreement for work covered by this proposal on the form included in of these bid documents, and in accordance with the Section 00 7200 General Conditions of the Contract, Section 00 7300 Supplementary Conditions, and other Contract Documents, provided the Bidder be notified of proposal's acceptance within ninety (90) days after due date of opening. Undersigned further agrees that this proposal shall remain open during such ninety (90) day period. Signature below serves as acknowledgment that Bidder understands Bid Documents and Appendices, and Bidder assumes full responsibility for the cost impact of same. Undersigned also acknowledges that Owner reserves right to accept or reject any and all bids with or without cause, and/or to waive informalities in bidding.

**BID ATTESTATION:** The Bidder, having examined the Bidding Documents and all other related documents and being familiar with the site of the proposed work including the availability of materials and labor and weather conditions hereby proposes to furnish all labor, materials, tools, equipment, machinery, equipment rental, transportation, superintendence, all services, and to perform all work in the category(ies) bid for construction of the Dexter Community Schools 2017 Bond Project Bid Package 26 District-Wide Mechanical Equipment Replacement, for the amount stated above.

All applicable taxes, permits, fees, and bond costs are included in the Base Bid/s, all listed Alternates, and all Unit Prices.

FIRM NAME \_\_\_\_\_

BY (Signature)

NAME (Type or Print)

TITLE

DATE

## DISCLOSURE AFFIDAVIT FOR COMPETITIVE BIDS

The Construction Manager will neither consider nor recommend a bid that does not include this disclosure statement.

### DISCLOSURE OF IRAN LINKED BUSINESS

As a duly authorized representative of the entity submitting this bid, I certify with my signature below, that this bid is submitted in compliance with the Iran Economic Sanctions Act (MCL 129.313) of the State of Michigan. Our business is not an Iran Linked Business as defined in the aforementioned Act, will not become an Iran Linked Business while engaged in this project, and will not subcontract with Iran Linked Businesses for any of the products or services required for this project.

### DISCLOSURE OF FAMILIAL RELATIONSHIPS FOR COMPETITIVE BIDS

Disclose any familial relationship that exists between the owner or any employee of the bidder and any member of the Dexter Community Schools Board of Education or Superintendent. (MCL 380.1267)

\_\_\_ THERE IS NO FAMILIAL RELATIONSHIP.

\_\_\_ THE FOLLOWING FAMILIAL RELATIONSHIP exists:

\_\_\_\_\_  
\_\_\_\_\_

Attach additional pages, if necessary, to disclose familial relationship(s).

FIRM NAME \_\_\_\_\_

NAME (Printed) \_\_\_\_\_

TITLE \_\_\_\_\_ DATE \_\_\_\_\_

I, \_\_\_\_\_, having been duly sworn on oath, say that  
*[printed name of affiant]*

I am the above-named, that I have personally prepared the foregoing affidavit, and that the same is true to the best of my knowledge and belief.

\_\_\_\_\_  
*[signature of affiant]*

Subscribed and sworn to before me, this \_\_\_\_\_ day of \_\_\_\_\_, 2019.

\_\_\_\_\_  
*[signature of Notary]*

\_\_\_\_\_, Notary Public  
*[printed/typed name of Notary]*

My commission expires: \_\_\_\_\_.

END OF BID FORM



## Section 00 4343 Wage Rates Form

### DEXTER COMMUNITY SCHOOLS 2017 BOND PROJECT

#### HOURLY TRADE RATES FOR EXTRA WORK

1. The following is a request for an itemized cost breakdown of labor rates for all labor classifications that your company will be paying on this project. Your submittal will help speed up our evaluation and processing of extra work.
2. This form is to be completed for each trade/classification and submitted to the CM within two (2) days after bid if requested, or within 14 days of award of subcontract if not requested prior. This form is to be completed and submitted for all classifications of lower tier subcontractors. Attach additional sheets as necessary.
3. Labor rates quoted are to be actual cost as described in Section 01 2600 Contract Modification Procedures Extra Work Fees. Only direct labor costs are allowed. Travel, small tools, consumed or partially consumed materials, allowances, etc. are considered part of OH&P.
4. Any individuals who receive a base wage higher than the established "scale" for a particular trade must be submitted separately if they will be employed on this project.

COMPANY NAME \_\_\_\_\_

TRADE \_\_\_\_\_ CLASSIFICATION \_\_\_\_\_

UNION LOCAL NO \_\_\_\_\_ TELEPHONE \_\_\_\_\_

TAXABLE BASE LABOR RATE \$ \_\_\_\_\_

FRINGE BENEFITS \$ \_\_\_\_\_  
(Pension, Vacation, Health,  
Training, Apprentice, Etc.)

TOTAL WAGE \$ \_\_\_\_\_

INSURANCE & TAXES \$ \_\_\_\_\_  
(FICA, MESC, FUTA, W/C)

SUBTOTAL \$ \_\_\_\_\_  
(Total Wage + Insurance & Taxes)

SUBTOTAL (ALL COSTS) \$ \_\_\_\_\_

OVERHEAD & PROFIT \$ \_\_\_\_\_  
(15% x ALL COSTS)

TOTAL SELLING RATE \$ \_\_\_\_\_  
(ALL COSTS + 15%)

ADD FOR FOREMAN \$ \_\_\_\_\_

Rates Effective Through Date \_\_\_\_\_

END OF SECTION

## **Section 00 4513 Bidder's Qualifications**

### **DO NOT SUBMIT WITH BID**

The two (2) apparent low bidders will be required to fill out a Bidder Qualification form prior to attending a post-bid meeting with the Construction Manager and Architect.

When requested, complete the Granger Construction Company Bidder Qualifications Form found within this specification section. This completed form, along with the requested attachments, will be used by the Owner and the Construction Manager as part of their determination if a bidder is qualified for award of contract. By submitting their bid proposal, bidders accept and understand the CM has the right to not qualify a bidder and thus reject a proposal as non-responsive on behalf of the Owner or the Architect.

If requested and submitted at least fourteen (14) days prior to bid, the CM will provide this evaluation before a bidder tenders a proposal. Bidders who elect to be qualified after a proposal is submitted understand the CM has the right to not qualify a bidder and thus reject a proposal as non-responsive and shall not have any right nor claim for any cost against the Owner, the CM or the Architect.

Satisfactory evidence of the following items must be submitted in duplicate. Bidders who: 1) do not submit all requested data, 2) do not meet criteria shown or 3) who present inaccurate data, may not be offered a subcontract. Submission of a bid proposal shall be evidence the Bidder understands and agrees that the Construction Manager has the right to reject as non-responsive any bid proposal which is not fully supported or not in full compliance with any required criteria.

#### **A. Financial Criteria:**

1. Net Worth: Provide audited or reviewed financial statements for the last two fiscal years.
2. Work-in-Progress Schedule: Provide a complete work-in-progress schedule for all work under contract, showing % complete, notice of any claims in process, resolved, or anticipated. (See sample form which follows).
3. Describe current banking arrangements and contact information.

#### **B. Insurance:**

1. A letter from your agent or actual certificate of insurance which provides the coverages and limits as shown in Section 00 7317 Insurance Requirements.
2. Insurance shall be proffered by U.S. domiciled firm, licensed to conduct business within the State of Michigan and rated by A.M. Best as A-, financial category FSC IV or better.
3. Policy shall not be canceled or withdrawn unless it is replaced by a policy with no lapse in coverage which meets the same criteria for the duration of the contract through completion of the one year warranty obligation.

#### **C. Bonds:**

1. Provide a bid bond from a surety acceptable to the Construction Manager and Owner.
2. Bonds shall be proffered by U.S. domiciled firm licensed to conduct business within the State of Michigan, U.S. Treasury listed, and rated by A.M. Best as A-, financial category FSC IV or better.

#### **D. Safety:**

1. Provide evidence of worker's compensation experience modification rating (EMR). An EMR of less than one (EMR<1.0) is desired. Provide explanation for any EMR > 1.0.
2. Evidence that the worker's compensation agent and carrier will provide statutory coverage for this project and Employer's Liability Coverage with policy limits not less than \$500,000 per occurrence per person.
3. Provide a copy of the firm's written safety policy accompanied with an attestation by a corporate officer to fully comply with Granger Construction Company's Safety Policy, all MIOSHA regulations, and other published work rules on this project.

#### **E. Work Experience and Technical Ability:**

1. Provide a list of at least three (3) contracts of similar size and complexity all of which was under this firm's contractual responsibility. Other factors which would indicate risk management of adjacent operations, protection of active utilities and maintenance of site security will also be considered as evidence of technical ability. Identify client, property owner, designer and/or engineer, scheduled completion date and actual completion date, and contact person(s) for these contracts.
2. Provide the resume of all supervisory or key personnel who will commit at least 50% of their time to this project. Minimum related experience should be one (1) year for each \$100,000 of project contract. For contracts exceeding \$1 million, minimum required experience is ten (10) years.
3. Certify your firm's intent to perform at least thirty (30) percent of this Work with your own forces. Describe any work you may subcontract. (Note: No single subcontract may exceed fifty 50% of your contract without Construction Manager and Owner written authorization).
4. How long has your firm been in business? At this location? Under this name (Describe other names)?
5. Have you ever failed to complete a contract? (If YES- describe).
6. Have you ever placed a claim, litigation, or arbitration action against a client or had such an action placed against your firm?

Any firm who has placed a claim against an education client or had an education client place a claim against the firm bidding, wherein the education client gave or received any claimed amount is defined as NOT QUALIFIED.

7. Provide a listing of all education projects in the last three (3) years include client contact information.

**COMPLETE THE FORM WHICH FOLLOWS ONLY UPON REQUEST**

## BIDDER QUALIFICATIONS FORM

Complete this form only upon request. Do not submit with your bid.

### I. GENERAL INFORMATION AND CORPORATE HISTORY

A. Firm Name: \_\_\_\_\_  
Firm Address: \_\_\_\_\_  
Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_

B. Years in business under present name (Attach details of other/names): \_\_\_\_\_

C. Primary areas of work you will be bidding: \_\_\_\_\_

D. Project Contact names and phone numbers in your firm:

	Name	Office Phone	Cell Phone	Fax
Project Executive:	_____	_____	_____	_____
Project Manager:	_____	_____	_____	_____
Superintendent:	_____	_____	_____	_____
Accountant:	_____	_____	_____	_____

E. Total number of staff employed by firm: 1) Office: \_\_\_\_\_ 2) Field: \_\_\_\_\_

F. Is your firm in compliance with EEO requirements? Yes ☐ No ☐

G. Do you have a State of Michigan Dept. of Civil Rights Certificate of Awardability? Yes ☐ No ☐

H. Is your firm a minority business enterprise or owned by any other recognized, disenfranchised group (e.g. women, handicapped, etc.)? Yes ☐ No ☐ If so, please give the outside agency has certified the business ownership of your firm and describe the ownership.

Agency	Ownership Type
--------	----------------

I. Has your firm ever worked for Granger before? Yes ☐ No ☐  
If so, what job(s) and what year(s) was it completed?

J. List three supplier references for work completed in the last two years:

Firm	Products Supplied	Contact Person	Telephone
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### II. FINANCIAL CRITERIA

A. Attach complete independently audited or reviewed financial statements for the last two fiscal years.

B. Attach a Work in Progress list for all work underway and committed.

C. Annual sales for last three years:

Year	Amount	Year	Amount	Year	Amount
_____	_____	_____	_____	_____	_____

D. Are payroll taxes and fringe benefits paid to date? Yes ☐ No ☐ If not, please explain:

E. Bank Reference:

Primary Bank Name & Address

Contact Name

Telephone

Fax

How long has this bank been your primary bank? \_\_\_\_\_ Years

F. What is your current line of credit? \$ \_\_\_\_\_

How much is currently outstanding? \$ \_\_\_\_\_

**III. INSURANCE**

A. General Liability and Workers Compensation/Employer Liability Insurance Carrier:

Name

Address

Telephone

B. General Liability and Workers Compensation/Employer Liability Insurance Agent:

Name

Address

Telephone

**IV. BONDING**

A. Bonding Company:

Name

Address

Telephone

B. How long have you had a relationship with this Bonding Company? \_\_\_\_\_

C. Bonding Agent:

Name

Address

Telephone

D. Total bonding capacity: \_\_\_\_\_

E. Single project bonding limit: \_\_\_\_\_

F. Value of work currently bonded: \_\_\_\_\_

**V. SAFETY**

A. Workers Compensation experience modifier in the last three years:

Year

EMR

Year

EMR

Year

EMR

**VI. WORK EXPERIENCE AND TECHNICAL ABILITY**

A/B. List the three most significant projects completed in the last three years similar in type, size or complexity to the project you are pursuing.

#1 Project Name & Location: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Owner Contact & Phone: \_\_\_\_\_

CM/GC Firm: \_\_\_\_\_

CM/GC Contact & Phone: \_\_\_\_\_

Architect Firm: \_\_\_\_\_

Architect Contact & Phone: \_\_\_\_\_

Contract Amount: \_\_\_\_\_

Completion Date: \_\_\_\_\_

---

#2 Project Name & Location: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Owner Contact & Phone: \_\_\_\_\_

CM/GC Firm: \_\_\_\_\_

CM/GC Contact & Phone: \_\_\_\_\_

Architect Firm: \_\_\_\_\_

Architect Contact & Phone: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Completion Date: \_\_\_\_\_

---

#3 Project Name & Location: \_\_\_\_\_

Owner Name: \_\_\_\_\_

Owner Contact & Phone: \_\_\_\_\_

CM/GC Firm: \_\_\_\_\_

CM/GC Contact & Phone: \_\_\_\_\_

Architect Firm: \_\_\_\_\_

Architect Contact & Phone: \_\_\_\_\_

Contract Amount: \_\_\_\_\_ Completion Date: \_\_\_\_\_

C. Who will be your on-site Supervision on the project (**ATTACH RESUME**):

---

D. List all signatory union affiliations and/or typical trades to be used if not union:

---

E. What percent of work will be performed by your own forces (i.e. not subcontracted): \_\_\_\_\_

What firms do you plan to use as major subcontractors?

---

F. Contracts:

Has firm ever been terminated by a client? Yes ☐ No ☐

Has firm failed to complete a contract? Yes ☐ No ☐

Has firm been involved in bankruptcy or reorganization? Yes ☐ No ☐

Has your firm ever been involved in claims, litigation or arbitration? Yes ☐ No ☐

\* If you answered yes to any of the above questions, please submit details on a separate sheet.

ATTEST:

The bidder understands that Granger will use both subjective and objective criteria to evaluate your firm's qualifications for this project. I understand that Granger may not accept our bid proposal if we do not meet granger's written bidder prequalification criteria and that by signature below, I certify that all of the above information is correct. I understand that inaccurate data may be grounds to reject our bid proposal.

***\* To be signed by an officer of the company or an individual authorized by its Board of Directors or President in writing. Attach the document.***

COMPANY: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

PRINTED NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

END OF SECTION

## **Section 00 5000 Contract Agreement Form**

1. Granger Construction's Subcontract Agreement between Construction Manager and Subcontractor is hereby made part of these Specifications.
2. Granger Construction's Purchase Order between Construction Manager and Supplier is hereby made part of these specifications.
3. These documents will be used with no exceptions or revisions. A copy of each of these agreements is available for reference at the following link:  
<https://app.buildingconnected.com/public/5565f9b93ad9f70800b26d32>.

END OF SECTION



## **Section 00 6000 Payment and Performance Bonds**

1. The Bidder, if awarded the Contract, may be required by the Owner or the Construction Manager to provide, a Performance Bond and a Labor and Material Payment bond, covering up to the full amount of the Contract sum as security for the faithful performance of all work under the Contract and payment of all charges in connection therewith. Such bonds may be requested at any time during the term of the Owner or CM/Subcontractor Agreement and must be furnished within fifteen (15) days of the request for the bonds.
2. Performance and labor and material payment bonds will not be required for contracts less than \$50,000.
3. The cost to provide performance and labor and material payment bonds will be priced as a separate add option.
4. Bond Requirements
  - A. The form that will be used for all performance bonds on the project shall be AIA Document A312, 1984 Edition. This document is not bound within this Project Manual but is hereby a part of the Contract Documents.
  - B. It is required that the surety company complies with the following:
    - 1) Insurance and Surety companies shall be deemed qualified and acceptable in connection with Contractor bonding and insurance requirements under said contracts only if such companies have a policy holders rating of A- or higher and a financial category not less than Class IV or better, as shown on Best's Key Rating Guide, latest edition.
    - 2) The proposed bonding company of the bidder must be acceptable to the Owner and Granger Construction Company. If, at any time, after acceptance of the contractor's bond, the surety fails to meet the criteria stated in above, the contractor must, as a precondition to continuing work and receiving further payments, replace the bond with a bond from a surety that meets the stated criteria.
  - C. Granger Construction Company shall be the named obligee and Dexter Community Schools shall be named dual obligee on the bonds
  - D. Bonds shall be duly executed by the Contractor, as principal, and by a Surety that is licensed in the State of Michigan. Only first party bonds will be accepted.
  - E. Bonds signed by attorney-in-fact must be accompanied by a certified and effectively dated copy of their power of attorney.
  - F. The Performance and Payment Bond penal sums (i.e., the contract amount) must be invoiced separately from the work of the contract.

END OF SECTION

## **Section 00 7200 General Conditions of the Contract**

1. The General Conditions of the Contract for Construction, AIA Document A201, 2007 Edition, is hereby made a part of these Specifications and is available at <https://app.buildingconnected.com/public/5565f9b93ad9f70800b26d32>.
2. AIA Document A201, 2007 Edition, may be examined at the office of Construction Manager, or may be purchased at AGC Lansing Office, 2323 N. Larch, Lansing, Michigan 48909
3. AIA Document A201, 2007 Edition, is further modified by the project Supplementary Conditions, Section 00 7300.
4. Pursuant to the Subcontract Agreement and/or Purchase Order, the contract between Contractor and Owner together with all the General, Supplemental, special, and other conditions, and any general requirements thereof are incorporated and made part of these specifications.

END OF SECTION

## Section 00 7300 Supplementary Conditions

### SUPPLEMENTARY CONDITIONS

The following supplements modify, change, delete from, or add to the "General Conditions of the Contract for Construction", AIA Document A201 2007 Edition. Where an Article of the General Conditions is modified or a Paragraph, Subparagraph, or Clause thereof is modified or deleted by these supplements, the unaltered provisions of that Article, Paragraph, Subparagraph, or Clause shall remain in effect.

#### GENERAL CONDITIONS

1. The term "Contractor" shall be interchangeable with "Construction Manager" and all references herein to the "Owner-Contractor Agreement" shall mean the "Owner-Construction Manager Agreement", and shall be treated as such when used throughout the contract documents.

#### Article 1: GENERAL PROVISIONS

##### 1.1 BASIC DEFINITIONS

- 1.1.1 (Delete the last sentence of the subparagraph and add the following to the end of the Subparagraph) "The Subcontractor acknowledges and agrees that the Contract Documents are sufficient to provide for the completion of the Work and to include work, whether or not shown or described, which reasonably may be inferred to be required or useful for the completion of the Work in accordance with applicable laws, codes, and professional standards".

##### 1.1.9 MISCELLANEOUS DEFINITIONS

- .1 **ADDENDUM**; An addendum is a written and/or graphic instrument issued by the Owner's Representative prior to award of Contract which modifies or interprets the Bidding Documents by additions, deletions, clarifications, or corrections. The Bidding Documents for the original Work shall govern the work therein described, unless modified by the Addendum. All costs or credits due to the Addendum shall be incorporated into the Bidder's Bid Proposal Form for Addenda issued prior to Owner's receipt of Bids and by letter on Bidder's letterhead modifying Bid Form amounts for Addenda issued after Owner's receipt of Bids: letter shall be signed by and as for the original Bid Form submission.
- .2 **ALTERNATE PRICE**; The term used in the Contract Documents means a variation to the Base Bid to cover a variation in the Contract requirements. If the Owner accepts the Alternate Price, the variation is then a part of the Contract and the quoted amount will be added or deducted from the Lump Sum Base Bid Price and will be used in determining or modifying the Contract Sum.
- .3 **BULLETIN**; A written and/or graphic instrument issued by the Owner's Representative, after award of Contract, used to solicit a proposal for a change in the Work which may affect cost and/or time. The Contract Documents for the original Work shall govern the work described unless otherwise modified by the Bulletin. A Bulletin is not an order to do the work, but a request to submit a quotation. A Change Order shall adjust changes to the Contract amount or time.
- .4 **CLARIFICATION**; Is a written and/or graphic instrument issued by the Owner's Representative after award of Contract to describe certain clarifications of or deviations from the Contract Documents not affecting cost or time. A Clarification is an order to do the work.
- .5 **COMPLETE**; Where complete is used, it shall mean "complete with connections, supports, attachments, and incidental items necessary for a finished and properly operating assembly or installation".
- .6 **CONNECT**; The term connect shall mean "to bring service(s) to point of installation and make final connections of the service(s) to the installed equipment and provide miscellaneous auxiliary appurtenances necessary to make operable for its intended use."
- .7 **FIELD ORDER**; A directive to make changes in the work that is issued by the Construction Manager. Contractual obligations upon the Subcontractor are the same as those for a Construction Change Directive.
- .8 **FURNISH**; To supply (only) to another party for their use of installation, including cost of delivery to jobsite.
- .9 **INSTALL**; To unload, distribute, uncrate, assemble, and fix into the intended final positions. The installer to provide all miscellaneous hardware and supplies required to anchor and support securely, connect, clean-up, and legally dispose of rubbish.
- .10 **PROVIDE**; To furnish, install, and connect complete.

- .11 **REVIEW**; Where used in conjunction with the Architect's action on the Subcontractor's submittals, applications, and requests, is limited to the duties and responsibilities of the Architect as stated in General and Supplementary Conditions. Such review shall not release the Subcontractor from responsibility to fulfill Contract requirements unless otherwise provided in the Contract Documents.
- .12 **TRADES**; Use of titles such as "carpentry" is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter". It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
- .13 **TRADE SPECIALISTS**; Certain Sections of the Specifications require that specific construction activities be performed by specialists who are recognized experts in the operations to be performed. The specialists must be engaged for those activities, and their assignments are requirements over which the Subcontractor has no choice or option. Nevertheless, the ultimate responsibility for fulfilling Contract requirements remains with the Subcontractor. This requirement shall not be interpreted to conflict with enforcement of building codes and similar regulations governing the Work. It is also not intended to interfere with local trade union jurisdictional settlements and similar conventions.
- .14 **WORKING DAYS**; Standard working days for the Project shall be all calendar days except Saturdays, Sundays, and legal holidays where the Project is located and shall invoke no cost or time penalties. Working days other than the "standard working days" will be considered "premium working days" and shall include, if any, cost penalty. Work to be performed on "premium working days" requires written permission from the Owner's Representative, and shall be requested a minimum of 48 hours prior to such requirement.

## 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

- 1.2.4 (Add) "In the event of a conflict among the Contract Documents, the Architect reserves the right to determine which governs. When a duplication of material or equipment occurs in Drawings and Specifications in separate subcontracts, each Subcontractor shall be deemed to have bid on the basis of each furnishing such material or equipment. The Contractor will decide which Subcontractor(s) shall furnish the same and which contract amount shall be adjusted, for not incorporating such material or equipment into the Project.
- 1.2.5 (Add) "If there should be a conflict between two or more of the Contract Documents, the following order of interpretation shall apply:
  - .1 The terms and conditions as set forth in the Bidding Requirements, including legal advertisement thereof, shall have full force and effect until such time as the Subcontract Agreement is executed between the Contractor and Subcontractor.
  - .3 Where requirements specifically set forth in the Contract and/or Subcontract Agreement are in conflict with other Contract Documents, the Contract and/or Subcontract Agreement shall govern.
  - .4 Where there is a conflict between the requirements of the General Conditions of the Contract and the Supplementary Conditions, the requirements of the Supplementary Conditions shall govern, except where the requirements set forth in the Supplementary Conditions are contrary to law, in which case the legal requirements shall govern. The General Conditions of the Contract shall take precedence over other Contract Documents except for the Contract and/or Subcontract Agreement.

## Article 3: CONTRACTOR

### 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

- 3.2.5 (Add) "Should the Drawings and Specifications appear to be in disagreement with each other relative to the quality or quantity of Work required, the better quality and the greater quantity shall be provided, unless instructions are otherwise furnished to the Contractor by the Architect in writing".

### 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

Delete this Section in its entirety. Refer to Section 01 3210 Project Scheduling for provisions on this subject. References to Paragraph 3.10 elsewhere in the Contract Documents shall read as referring to that Section in the Specifications.

### 3.12 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

Refer to Section 01 3301 Submittal Procedures, for further provisions on this subject.

### 3.18 INDEMNIFICATION

3.18.1 Delete paragraph in its entirety and refer to Article 16 of Subcontract.

3.18.2 Delete paragraph in its entirety and refer to Article 16 of Subcontract.

### **Article 4: ARCHITECT**

#### 4.1 GENERAL

4.1.1 (Add)....."The term "Architect", "Architect/Engineer", or "Engineer" as used herein means the Architect or his authorized representative".

4.2.8 Replace the word "Architect" with "Construction Manager".

### **Article 6: CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

6.2.4 Delete the word...."wrongfully"...in this subparagraph.

#### 6.3 OWNER'S RIGHT TO CLEAN UP

6.3.1 Modify this sub-paragraph by deleting the word "Contractor", replacing the word "Contractors" with "Subcontractors", and replacing the word "Architect" with "Construction Manager."

### **Article 7: CHANGES IN THE WORK**

7.3.3.3 (In Subparagraphs 7.3.3 and 7.3.7 the allowance for overhead and profit combined, included in the total cost to the Owner, shall be based on the schedule described in Section 00 2113 – Instructions to Bidders.)

7.3.6 Delete the last sentence in this sub-paragraph.

7.3.7 (Change the phrase at the end of the first sentence)...."a reasonable allowance for overhead and profit"...to read..."a fixed percentage fee as provided in Clause 7.3.3.3 for profit and overhead".

7.3.9 Delete this sub-paragraph in its entirety.

7.3.10 Architect prepares change orders.

### **Article 8: TIME**

#### 8.2 PROGRESS AND COMPLETION

8.2.3 (Delete and replace with the following) Each Prime Contractor, Subcontractor, and/or material company shall furnish sufficient labor forces, construction plant, and equipment, temporary heat, enclosures, etc., required for their Work and protection unless specified elsewhere, and shall work such hours, including night shifts and overtime operations as may be necessary to insure the prosecution of the Work in accordance with the approved current progress schedule. If, in the opinion of the Construction Manager, the Subcontractor falls behind the progress schedule, the Subcontractor shall take such steps as may be necessary to improve his progress and the Construction Manager may require him to increase the number of shifts, and/or overtime operations, days of work, and/or the amount of construction plant, all without additional costs to the Owner. Failure of the Subcontractor to comply with the requirements of the Construction Manager under this provision shall be grounds for determination by the Construction Manager that the Subcontractor is not prosecuting the Work with such diligence as will insure completion within the time specified.

#### 8.3 DELAYS AND EXTENSIONS OF TIME

8.3.1 (Delete and replace with the following). Refer to Section 00 5000; CM / Subcontractor Agreement, Article 9.

8.3.3 (Delete and replace with the following). Refer to Section 00 5000; CM / Subcontractor Agreement, Article 9.

8.3.4 (Add the following) "If in the sole opinion of the Construction Manager the Work is not progressing as required by the Project Schedule or has begun to significantly delay the progress of another Subcontractor's work, or it is likely that the Work will not be substantially complete by the applicable date for Substantial Completion, the Subcontractor upon written notice from the Construction Manager and without additional cost or compensation will increase its work force and, if requested by the Construction Manager, work overtime to make up for the delay. Should the Subcontractor fail to increase its work force, work overtime, or proceed to make up for the delay to the satisfaction of the Construction Manager or the

Owner, the Construction Manager or the Owner, in addition to other remedies under this Agreement and the other Construct Documents, will have the right to cause other Subcontractors and agents, to work overtime and to take whatever other action is deemed necessary to avoid delay in the Substantial Completion of the Work and of the Project, and the cost and expense of such overtime and other action will be borne by the Subcontractor and may be set off against sums due to the Subcontractor”.

- 8.3.5 (Add the following Subparagraph) “In the event the Subcontractor is deemed by the Construction Manager as unable to meet the Project Construction Schedule because of the failure of any of the Subcontractor’s suppliers and/or subcontractors to timely deliver materials, equipment, and labor for the project, the Subcontractor agrees that the Construction Manager shall be authorized, on behalf of the Subcontractor, to deal directly with such delinquent suppliers and/or Subcontractors. The Subcontractor shall take such actions as the Construction Manager shall request to assist the Construction Manager in dealing with such delinquent suppliers and/or Subcontractors in such manner as the Construction Manager shall deem necessary for the completion of the Project, which may include, but shall not be limited to, the termination of such delinquent suppliers and/or Subcontractors and the issuance of replacement orders to other suppliers chosen by the Construction Manager on behalf of the Subcontractor. If, in the sole opinion of the Construction Manager, the Subcontractor is at fault, no additional cost will be passed on to the Owner”.

## **Article 9: PAYMENTS AND COMPLETION**

### **9.2 SCHEDULE OF VALUES**

Delete this Paragraph in its entirety. Refer to Section 01 2900 Payment Procedures, for provisions on this subject. References to Paragraph 9.2 elsewhere in the Contract Documents shall read as referring to that section in the specifications.

### **9.3 APPLICATIONS FOR PAYMENT**

- 9.3.1.1 Delete this sub-paragraph in its entirety.

- 9.3.4 (Add) "Until final payment, the Owner will pay 90 percent (90%) of the amount(s) submitted by the Subcontractor on his monthly application for payment and/or as approved by the Architect, for labor performed and work properly in place, and for materials delivered on the site of the Work or in an approved storage site (10 percent (10%) remainder is retainage).

### **9.5 DECISIONS TO WITHHOLD CERTIFICATION**

- 9.5.1 (Delete Clauses .1 through .7 and replace with the following)

- .1 The Subcontractor is in default of the performance of any of its obligations under the Contract Documents, including but not limited to: failure to provide sufficient skilled workers; work, including equipment or materials, which is defective or otherwise does not conform to the Contract Documents; failure to conform to the Project Time Schedule; or failure to follow the directions of or instructions from the Architect, Construction Manager, or owner.
- .2 The Subcontractor is in default of the performance of any of its obligations under another contract that it has with the Owner.
- .3 The filing of third party claims or reasonable evidence that third party claims have been or will be filed.
- .4 The Work has not proceeded to the extent set forth in the Application for Payment.
- .5 Any representations made by the Subcontractor are untrue.
- .6 The failure of the Subcontractor to make payments to its Subcontractors, material men, or laborers, including benefits payable to labor organizations that are required by virtue of the Subcontractor being signatory to such organizations.
- .7 Damage to the Owner’s property or the property of another Subcontractor or person.
- .8 The determination by the Architect that there is a substantial possibility that the Work cannot be complete for the unpaid balance of the Contract Sum.
- .9 Liens filed or reasonable evidence indicating the probable filing of such liens.

9.5.4 (Add) "If the Subcontractor disputes any determination by the Architect with regards to Certificate of Payment, the Subcontractor nevertheless shall continue to prosecute the Work".

#### **Article 10: PROTECTION OF PERSONS AND PROPERTY**

##### **10.4 EMERGENCIES**

10.4.1 (To the end of this Subparagraph add the following) "Nothing in this paragraph shall be construed as relieving the Subcontractor from the cost and responsibility for emergencies covered hereby, which with normal diligence, planning, and the close supervision of the Work as required under the Contract, could have been foreseen or prevented".

#### **Article 11: INSURANCE AND BONDS**

11.1.2 (Delete this sub-paragraph in its entirety.)

11.1.3 In the first sentence of this sub-paragraph, replace the word "Owner" with Construction Manager in both of the locations where the word "Owner" appears.

11.1.5 (Add) The insurance required by Subparagraph 11.1.1 shall be on an occurrence basis and effective in full until acceptance by the Owner of the Subcontractor's work, except for Products/Completed Operations Liability Coverage and Pollution Liability Coverage, if required, which shall be in effect for a period of two years after acceptance of the Subcontractor's work.

#### **Article 12: UNCOVERING AND CORRECTION OF WORK**

##### **12.3 ACCEPTANCE OF NONCONFORMING WORK**

12.3.1 (To the end of this Subparagraph add the following) "The acceptance of nonconforming Work by the Owner shall be by written Change Order signed by the Owner's authorized representative. No person has authority to accept nonconforming work except pursuant to such written Change Order".

#### **Article 13: MISCELLANEOUS PROVISIONS**

##### **13.5 TESTS & INSPECTIONS**

13.5.1 (Add)... "Refer to Section 01 4001 Quality Requirements, for additional provisions on this subject".

13.6 INTEREST (Delete paragraph in its entirety.)

13.7 TIME LIMITS ON CLAIMS. The time limit for claims is six (6) years after the date of substantial completion. (Delete 10 years)

(Add)... Section 13.8: SEXUAL HARASSMENT

13.8.1 The Subcontractor shall assure that it, its employees and agents, all subcontractors, and all subcontractor employees and agents, are aware of and comply with this policy prohibiting sexual harassment on the project site and Owner's premises. The Subcontractor shall act promptly to stop any violation of the policy by any such persons, by removing the violator from the site or otherwise. Failure by the Subcontractor promptly to investigate complaints and take appropriate action to address violations of the policy shall be deemed a material breach of this Contract. Sexually harassing behavior is made unlawful by Title VII of the Civil Rights Act of 1964 and the Elliott-Larsen Civil Rights Act.

13.8.2 Sexual harassment is defined as unwelcome advances, requests for sexual favors, or other behavior of a sexual nature when such conduct has the purpose or effect of unreasonably interfering with an individual's work or performance, or of creating an intimidating, hostile, or offensive environment. Examples of behavior encompassed by the above definition include, but are not limited to:

- .1 Physical assault.
- .2 Threats or insinuations that cause the victim to believe that sexual submission or rejection will affect his/her reputation or standing.
- .3 Direct propositions of a sexual nature.
- .4 Subtle pressure for sexual activity, an element of which may be conduct such as unwelcome sexual leering.
- .5 Conduct intending to or having the effect of discomforting and/or humiliating a reasonable person at whom the conduct is directed. This may include, but is not limited to, comments of a sexual nature or sexually explicit statements, whistling, questions, jokes, or anecdotes, and unnecessary touching, patting, hugging or brushing against a person's body.

Depending upon the circumstances, any of the above types of conduct may be sexual harassment even if that conduct only occurs once.

**Article 15: CLAIMS AND DISPUTES**

- 15.1.2 Delete this sub-paragraph in its entirety. Refer to the CM / Subcontractor Agreement, Article 24.
- 15.1.3 Delete this sub-paragraph in its entirety. Refer to the CM / Subcontractor Agreement, Article 24.
- 15.1.6 Claims for Consequential Damages is to be modified so that the terms of the Owner / CM agreement are followed as they relate to this Article.
- 15.2.5 (Delete everything after "to" in the last sentence). Add Article 24 in CM / Subcontractor Agreement.
- 15.2.6 Delete this paragraph in its entirety. Refer to CM / Subcontractor Agreement, Article 24.
- 15.2.6.1 Delete this paragraph in its entirety. Refer to CM / Subcontractor Agreement, Article 24.
- 15.3 MEDIATION Delete this paragraph in its entirety. Refer to the CM / Subcontractor Agreement, Article 24.
- 15.4 ARBITRATION Delete this paragraph in its entirety. Refer to the CM / Subcontractor Agreement, Article 24.

**END OF SUPPLEMENTARY CONDITIONS – 2007 EDITION**

END OF SECTION



## Section 00 7316 Insurance Requirements

1. Certificates of Insurance are to include the following coverages:

### GENERAL LIABILITY INSURANCE

Each Occurrence	\$ 1,000,000
Occurrence box must be checked	
General Aggregate	\$ 2,000,000
Personal and Adv. Injuries	\$ 1,000,000
Products – Comp/Op Aggregate	\$ 2,000,000

### AUTOMOBILE LIABILITY INSURANCE

Combined Single Limit	\$ 1,000,000
OR	
Bodily Injury (per person) Bodily Injury (per accident) Property Damage	\$ 1,000,000

### EXCESS LIABILITY INSURANCE

Umbrella Form Each Occurrence = Aggregate	\$ 1,000,000
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### WORKERS COMPENSATION AND EMPLOYERS LIABILITY

Statutory Limits box must be checked	X
Each Accident (Employers Liability)	\$ 500,000
Disease – Policy Limit (Employers Liability)	\$ 500,000
Disease – Each Employee (Employers Liability)	\$ 500,000

### PROFESSIONAL LIABILITY INSURANCE (required for all Professional Service Vendors)

Each Claim	\$ 1,000,000
Aggregate	\$ 1,000,000

*\*SME required to hold \$2,000,000*

2. All liability insurance policies shall name Granger Construction Company, Dexter Community Schools, and Peter Basso Associates, Inc. as additional insured parties and shall be non-contributory and primary coverage for the additional insureds.
3. G17957B is not acceptable.
4. The form used for additional insured coverage shall be on form CG 2010, 1985 edition, or equivalent, and shall not exclude products/completed operations hazard coverage.
5. The completed operations coverage shall be kept in effect for three (3) years following completion of the Subcontractor's work.
6. Notice of Change is required a minimum of thirty (30) days prior and must be listed on the Certificate of Insurance.

END OF SECTION

## **Section 00 7317 Insurance, Indemnity, and Waiver of Subrogation**

The following is a section of the contract agreement between Dexter Schools and Construction Manager which is applicable to all subcontracts.

### **11.3 Owner's Liability Insurance**

11.3.1 The Owner shall be responsible for purchasing and maintaining his own liability insurance and, at his option, may purchase and maintain such insurance as will protect him against claims which may arise from operations under this Agreement.

### **11.4 Insurance to Protect Project**

11.4.1 The Owner shall maintain current builder's risk insurance. This insurance shall include as named insured the Owner, the Construction Manager and its Trade Contractors, and shall insure against loss from the perils of fire, extended coverage, and shall include "all risk" insurance for physical loss or damage including, without duplication of coverage, at least theft, vandalism, malicious mischief, transit, collapse, flood, earthquake, testing, and damage resulting from defective design, workmanship or material. The Owner will be responsible for any coinsurance penalties or deductibles. If the Project covers an addition to or is adjacent to an existing building, the Construction Manager and Trade Contractors shall be named as additional insured under the Owner's property insurance covering such building and its contents.

11.4.1.1 If the Owner finds it necessary to occupy or use a portion or portions of the Project prior to Date of Substantial Completion thereof, such occupancy shall not commence prior to a time mutually agreed to by the Owner and Construction Manager and to which the insurance company or companies providing the property insurance have consented by endorsement to the policy of policies. This insurance shall not be canceled or lapsed on account of such partial occupancy. Consent of the Construction Manager to such occupancy or use shall not be unreasonably withheld.

11.4.2 The Owner shall purchase and maintain such boiler and machinery insurance as may be required or necessary. This insurance shall include the interests of the Owner, the Construction Manager and the Trade Contractors.

11.4.3 The Owner shall purchase and maintain such insurance as the Owner deem necessary to protect the Owner and Construction Manager against loss of use of Owner's property due to those perils insured pursuant to Subparagraph 11.4.1.

11.4.4 The Owner shall, if requested by the Construction Manager, provide valid certificates of insurance for all policies with the Construction Manager before an exposure to loss may occur. Copies of any subsequent endorsements will be furnished to the Construction Manager. The Construction Manager will be given thirty (30) days notice of cancellation, non-renewal, or material modification.

### **11.5 Property Insurance Loss Adjustment**

11.5.1 Subject to the terms of the applicable insurance coverage, any insured loss shall be adjusted with the Owner and the Construction Manager and made payable to the Owner and Construction Manager as their interests may appear.

11.5.2 Subject to the terms of the applicable insurance coverage, upon the occurrence of an insured loss, monies received will be distributed in accordance with the agreement of the parties in interest, or in the absence of such agreement, in accordance with the dispute resolution provisions pursuant to Article 15.

### **11.6 Waiver of Subrogation**

11.6.1 The Owner and Construction Manager waive all rights against each other, the Architect/Engineer, Trade Contractors and their Trade Subcontractors for damages caused by perils covered by insurance provided under Paragraph 11.4, except such rights as they may have to the proceeds of such insurance held by the Owner and the Construction Manager as trustees. The Construction Manager shall require similar waivers from all Trade Contractors and their Trade Subcontractors.

11.6.2 The Owner and Construction Manager waive all rights against each other and the Architect/Engineer, Trade Contractors and their Trade Subcontractors for loss or damage to any equipment used in connection with the Project and covered by any property insurance. The Construction Manager shall require similar waivers from all Trade Contractors and their Trade Subcontractors.

11.6.3 The Owner waives subrogation against the Construction Manager, Architect/Engineer, Trade Contractors, and their Trade Subcontractors on all property and consequential loss policies carried by the Owner on adjacent properties and under property and consequential loss policies purchased for the Project after its completion.

11.6.4 If the policies of insurance referred to in this Paragraph require an endorsement to provide for continued coverage where there is a waiver of subrogation, the Owners of such policies will cause them to be so endorsed.

END OF SECTION

## **Section 01 1100 Summary of Work and Use of Premises**

1. SECTION INCLUDES
  - A. Related Documents
  - B. Project Description
  - C. Future Work
  - D. Work by Owner
  - E. Owner Furnished Products
  - F. Use of Premises, Barricades, and Protection
  - G. Administrative Responsibilities
  - H. Permits, Fees & Notices
  - I. Contractor Construction Sequence
2. RELATED DOCUMENTS
  - A. Drawings, Division 00, General and Supplementary Conditions, and other Division 01 Specification Sections which apply to Work of this section.
  - B. In Divisions 01 through 33, a reference to the project General Conditions includes by inference all amendments or supplements in the project Supplementary Conditions.
3. DESCRIPTION
  - A. The intent of this Section is to indicate the Work required by the Subcontractor and to provide information regarding the duties, responsibilities, and cooperation required by the Subcontractor, with similar requirements for their subcontractors and suppliers.
  - B. The Project is defined to include the Bid Categories described in Section 00 2413 Scopes of Work and each is recognized to be a major part of the project, with Work to be performed concurrently and in close coordination with Work of other Bid Categories.
  - C. Related sections:  
Some sections of the technical specifications (Divisions 1 through 33) may include a paragraph titled "Related Sections". This paragraph is an aid to the Project Manual and is not intended to include all sections which may be related. It is Subcontractor's obligation to coordinate all sections whether indicated under "Related Sections" or not.
4. FUTURE WORK
  - A. Future Contracts for completion of the Project will be awarded and coordination of work will be required between successful bidders of this bid package & successful bidders of future bid packages.
5. WORK BY OWNER
  - A. Work by Owner is work that the Owner will contract for separately; design, drawings, specifications, and work will be by others per separate contract. Work by Owner is indicated on drawings or specifically described elsewhere in this Project Manual.
6. OWNER FURNISHED PRODUCTS
  - A. Owner furnished products are indicated on the drawings.
  - B. Owner's Responsibilities:
    - 1) Arrange and pay for product delivery to site.
    - 2) On delivery, inspect products jointly with Construction Manager and Subcontractor.
    - 3) Submit claims for transportation damage and replace damaged, defective, or deficient items.
  - C. Subcontractor's Responsibilities:
    - 1) Receive, schedule for delivery and unload products at site; inspect for quantity, completeness and damage, jointly with Owner and Construction Manager.
    - 2) Handle, store, install and protect finish products.

3) Repair or replace items damaged until substantial completion.

## 7. USE OF PREMISES, BARRICADES, AND PROTECTION

- A. Subcontractors and their Subcontractors shall be subject to such rules and regulations for the conduct of the work as the Owner or Construction Manager may establish. Employees shall be properly and completely clothed while working. Bare torsos, legs, and feet will not be allowed. Subcontractors and their subcontractors shall recognize that use of vulgar or profane language is cause for immediate dismissal. Drugs, alcohol, tobacco products of any kind, or other offensive materials or firearms are absolutely prohibited, and violations are cause for summary dismissal and/or criminal prosecution.
- B. Subcontractors shall maintain free access to buildings and areas of the site for designated vehicles, service vehicles, and firefighting equipment and at no time shall block off or close roadways or fire lanes without providing auxiliary roadways and means of entrance acceptable to the Owner. Fire hydrants must remain accessible. Subcontractors shall give the Construction Manager, Owner and the local fire department at least 48 hours notice of any such changes of routes.
- C. Subcontractors shall not load or permit any part of a structure to be loaded with a weight that will endanger its safety or cause damage to the components of the structure.
- D. The Owner or Construction Manager shall have the option to curtail or delay activities that affect his operations. Should a Subcontractor be asked to stop his work the Subcontractor shall do so immediately and proceed with other activities with no additional cost to the Owner or Construction Manager. Subcontractors are to cooperate with the Owner's representative and Construction Manager in construction operations to minimize conflict, and to facilitate Owner usage of adjacent spaces not under construction.

## 8. ADMINISTRATIVE RESPONSIBILITIES OF SUBCONTRACTORS AND CONSTRUCTION MANAGER

- A. The Construction Manager shall be responsible for the maintenance of the Construction Schedule and the general supervision of every phase of the Work.
- B. Subcontractors shall cooperate with and assist the Construction Manager in the preparation of construction progress and procedures, schedule of product deliveries, and their effect on the overall project progress and completion

## 9. PERMITS, FEES, AND NOTICES

- A. The Construction Manager will secure the general building permit for the Owner. Each Subcontractor shall secure and pay for other permits, governmental fees, and licenses necessary for the proper execution and completion of his Work, which are applicable at the time the bids are received. Fees to relocate utilities on Owner's property shall be included in the bid of the Subcontractor doing the relocation.
- B. Utility Tie-Ins: Shall be arranged with local utility company and other involved parties for minimum interruption of service.
- C. Shutdowns of existing systems shall be limited to minimum time required and scheduled with other involved parties. Provide three (3) days written notice of shutdown to Construction Manager and Owner.
- D. Inspections of installed work shall be performed by the governing authority as arranged for by the Subcontractor. Work shall not be covered until approved.

## 10. CONTRACTOR CONSTRUCTION SEQUENCE

- A. Refer to Project Schedule located in Section 01 3216 Project Scheduling.

REMINDER: REFER TO SECTIONS 00 2410 and 00 2413 FOR

SCOPE OF WORK DESCRIPTIONS

END OF SECTION

## **Section 01 2500 Substitution Procedures**

1. To obtain approval to use unspecified products in the base bid, bidders shall submit written requests at least ten (10) days before the bid date and time. Each such request shall include a complete description of the proposed substitute and the name and specification section of the material or equipment for which it is to be substituted. Requests shall clearly describe the product for which approval is asked, including all data necessary to demonstrate acceptability. If the product is acceptable, the Architect will approve it in an Addendum issued to all plan holders of record.
2. Use the form following this section.

END OF SECTION

## Substitution Request Form

E-mail the completed form to Beth Kromis at [bkromis@grangerconstruction.com](mailto:bkromis@grangerconstruction.com)

Project: Dexter Community Schools 2017 Bond Project A/E #:  
Bid Package 26 District-Wide Mechanical Equipment Replacement GCC #: 1710-00  
Subcontractor: \_\_\_\_\_  
Work Category: \_\_\_\_\_ Date: \_\_\_\_\_  
Specification No & Title \_\_\_\_\_  
Section Page & Paragraph: \_\_\_\_\_  
Product Description: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_  
Trade Name: \_\_\_\_\_  
Model/Details: \_\_\_\_\_

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old  
Manufacturer: \_\_\_\_\_  
Manufacturer Address: \_\_\_\_\_  
Differences between proposed substitution and specified product: ☐ Point-by-point comparison attached.

Does the proposed substitution affect other work: ☐ No ☐ Yes; explain:

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ Other

Similar Installation Project: \_\_\_\_\_ Date Installed \_\_\_\_\_  
Project Address: \_\_\_\_\_  
Project Owner: \_\_\_\_\_  
Project Architect: \_\_\_\_\_  
Architect Contact (Name & phone/e-mail): \_\_\_\_\_

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.

SUBMITTED BY

Subcontractor Company: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_

Signed by: \_\_\_\_\_

Phone \_\_\_\_\_ E-mail: \_\_\_\_\_

---

A/E's REVIEW AND ACTION

- ☐ Substitution approved – Make submittals in accordance with Submittal Procedures Section.
- ☐ Substitution approved as noted – Make submittals in accordance with Submittal Procedures Section.
- ☐ Substitution rejected – Use specified materials.
- ☐ Substitution Request received too late – Use specified materials.

Additional Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reviewed by \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_



## **Section 01 2600 Contract Modification Procedures**

1. This Section Includes:
  - A. Related Sections
  - B. CM/Owner Requested Changes
  - C. Contractor Requested Changes
  - D. Change Order Basis
  - E. Extra Work Fees
  - F. Credit for Deleted Work
  - G. Execution of Change Orders
  - H. Contested Work
2. Related Sections
  - A. Section 01 2900 Payment Procedures
  - B. Section 01 3000 Administrative Requirements
3. CM/Owner Requested Changes
  - A. The Construction Manager may issue a Request for Quotation Bulletin which includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the requested price will be considered valid.
  - B. Subcontractor will prepare and submit an estimate within fourteen (14) days.
  - C. Failure to submit such a written claim within fourteen (14) days may be interpreted as the Subcontractors full acceptance of the Proposed change at a cost or credit to the Owner as determined by the Architect and Construction Manager.
4. Contractor Requested Changes
  - A. The Subcontractor may propose changes by submitting a request for change to the Construction Manager, describing the proposed change and its full effect on the Work. Including a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time with full documentation and a statement describing the effect on Work by separate or other Subcontractors. Any requested substitutions must be documented in accordance with Section 01 6001 Product Requirements. The Construction Manager may stipulate which Change Order method shown below shall be used to adjust the Contract.
5. Change Order Basis
  - A. Stipulated Sum Change Order: Based on Bulletin, fixed price quotation and Subcontractor's fixed price quotation or Subcontractor's request for a Change Order as approved by the Construction Manager.
  - B. Unit Price Change Order: For pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Field Order. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
  - C. Cost Change Directive (CCD)/Field Order (FO): Construction Manager may issue a directive, signed by the Owner, instructing the Subcontractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. The document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute the change. Payment will be made after CCD/FO is incorporated into the work by execution of a change order.
  - D. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Construction Manager will determine the change allowable in Contract Sum and Contract Time as provided in the Contract Documents. Maintain detailed records of work done on Time and Material basis. T&M sheets must be reviewed and

signed by the Construction Manager. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work. A cost breakdown of all wages, material and vendor invoices must be submitted with all extra work. Only that labor expended on the site shall be reimbursable. Management, estimating, expediting, trucking, warehousing and small tools shall be viewed as overhead.

6. Extra Work Fees

- A. For any additional work performed upon authorization of Owner, Bidder agrees to accept the following fees:
  - B. There will be a fee of (A, ~~B~~, or C per schedule below) applied to total cost of labor if completely quoted within fourteen (14) days of authorization. Extra work fee shall be reduced as shown on the schedule below if not completely quoted within fourteen (14) days. Reimbursable labor must be expended at the project site and must include hourly wage rate plus all insurance, taxes, health and welfare contributions and other employee benefits. No other miscellaneous fees, allowances, off site labor, or Overhead costs are allowed; overhead includes all costs not directly expended at the project site.
  - C. There will be a fee of (A, ~~B~~, or C per schedule below) applied to total cost of material. Total cost of material includes applicable sales tax.
  - D. There will be a fee of (D, ~~E~~, or F per schedule below) applied to the quote of a subcontractor's work performed for a Bidder. **These fees shall be acceptable as full compensation for extra work including all Bidder overhead and profit.**
  - E. Additional bond premiums will be allowed at net invoice charge. A cost breakdown of all wages, material and vendor invoices must be submitted with all extra work to contracts.
  - F. Markups are based on amounts determined after all applicable discounts are applied. Costs exclude warehousing, small tools or estimating charges that are part of overhead.
  - G. Extra Work Fee Schedule
    - A = 15% for extra work completely and correctly quoted within 14 days of authorization.
    - ~~B~~ = NOT USED
    - C = 5% for extra work completely and correctly quoted within 14-28 days of authorization.
    - D = 7½% for extra work by lower tier subcontractor completely and correctly quoted within 14 days of authorization.
    - ~~E~~ = NOT USED
    - F = 2½% for extra work by subcontractors completely and correctly quoted within 14 28 days of authorization.
  - H. For work not quoted within 28 days, the subcontractor shall be paid the cost estimate as determined solely by the Construction Manager plus mark ups C & F. This Extra Work Fee Schedule is a Mandatory contract obligation upon all bidders.
7. Credit for Deleted Work: Should any work be deleted from Contract by order of Owner, full cost savings realized thereby will be credited to Owner.
8. Execution of Change Orders: Construction Manager shall issue Change Orders for signatures of parties as provided in Section 00 7200 General Conditions of the Contract, Article 7, and provide executed documents to all signatory parties.
9. Contested Work: Refer to Article 24 of the CM/Contractor Agreement

END OF SECTION

## **Section 01 2900 Payment Procedures**

1. SECTION INCLUDES
  - A. Related Sections
  - B. Schedule of Values
  - C. Material Allowances
  - D. Billing for Stored Materials
  - E. Applications for Payment
2. RELATED SECTIONS
  - A. General Conditions and Supplementary Conditions
  - B. Section 01 3301 Submittal Procedures
  - C. Section 01 6000 Product Requirements (TMP)
  - D. Section 01 6001 Product Requirements (GCC)
3. SCHEDULE OF VALUES
  - A. Submit typed schedule on AIA Form G703 -Application and Certificate for Payment Continuation Sheet.
  - B. Submit Schedule of Values within 7 days after Construction Manager-Subcontractor Agreement or Letter of Intent is received (whichever occurs first).
  - C. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the major specification Section or follow other specific direction from the CM. The Schedule of Values must be approved by the Construction Manager prior to issuance and acceptance of the Subcontractor's first Application for Payment. Provide detail and/or additional breakdown as required by Construction Manager. Submit evidence to substantiate proposed Schedule of Values upon request.
  - D. The following items must be included on the schedule of values unless not included in the contract.
    - 1) Payment and Performance Bonds
    - 2) Allowance(s)
  - E. Revise schedule to list approved Change Orders, with each Application for Payment.
  - F. Retainage in the amount ten percent (10%) will be withheld from all progress payments.
4. MATERIAL ALLOWANCES:
  - A. Purchase product/material under allowance only as specified, or as directed by the Construction Manager.
  - B. Each Allowance must be shown as a line item in the schedule of values.
  - C. Notification will be given in writing of approval to bill on the allowance line item.
  - D. Selection of product/material: Refer to Section 01 3301 Submittal Procedures.
  - E. After selection of material by Architect/Engineer and Owner, the contract prices will be adjusted by Change Order to reflect charges, plus or minus, from the allowance.
  - F. Unused funds included under allowances shall be credited to the Owner by deduct Change Order prior to approval of Final Application for Payment.
5. BILLING FOR STORED MATERIALS
  - A. Obtain approval from the Construction Manager prior to purchasing material for early payment of stored material.
  - B. Stored Material Payment is intended to be used for major items only and only with advance approval by the Construction Manager. Significant savings to the owner may be required to obtain this approval.
    - 1) Material must be required for the final work.
    - 2) Multiple unit items must be inventoried each month.

- 3) The invoice from the supplier must be submitted.
  - 4) Proof of title and insurance must be submitted.
  - 5) Photographic confirmation of the material, clearly labeled for this project.
  - C. Stored Material Payment will not be considered for commonly available items.
  - D. Material stored off site will not receive consideration for payment until the Construction Manager receives and approves complete documentation of legal title, insurance, material supply bond, and property security.
6. APPLICATIONS FOR PAYMENT
- A. No application will be processed until the Schedule of Values is submitted and approved.
  - B. Content and Format: Use the AIA G703 format or an equivalent electronic version.
  - C. Submit a draft (pencil) copy of the application for payment before the 20<sup>th</sup> of each month.
  - D. Site personnel shall review the pencil application. and notify contractors of the approval or revisions required to finalize the application.
  - E. No application will be processed until the pencil copy is approved.
  - F. Percentage completion of a line item will be the percent complete projected through the end of the month.
  - G. Submit one (1) copy of the finalized application. The finalized, original Application must be submitted on or before the 25<sup>th</sup> day of each month. Computer generated facsimiles of standard forms are acceptable if they are of like content and size, subject to the Construction Manager's approval.
  - H. Waiver of Lien: With each application, submit sworn statements and waivers of lien from every entity who may file a lien arising out of the contract, and related to work covered by the payment.
    - 1) Submit final Application for Payment with final waivers from every entity involved with performance of Work covered by the application who could be entitled to a lien.
    - 2) Waiver Forms: Submit waivers of lien on forms, and executed in a manner, acceptable to Owner.

END OF SECTION

## Section 01 3000 Administrative Requirements

### 1. SECTION INCLUDES

- A. Related Sections
- B. Project Document Management
- C. BIM Coordination
- D. LEAN
- E. Coordination
- F. Field Engineering
- G. No Smoking/Tobacco Rule
- H. Pre-Bid and Site Inspection Meeting
- I. Post-Bid Meeting
- J. Pre-Construction/Kick-off Meeting
- K. Progress Meetings

### 2. RELATED SECTIONS

- A. Section 01 3210 Project Scheduling
- B. Section 01 7000 Execution Requirements

### 3. PROJECT DOCUMENT MANAGEMENT

- A. All project documents, including but not limited to Drawings, Specifications, Bulletins, Addenda, Field Mark-Ups, RFI, sketches, Punch Lists, and Warranty Issues, will be managed and distributed exclusively through PlanGrid application. All successful bidders are **required** to have a subscription to this application for the duration of the entire Project, including the warranty period. For pricing information on PlanGrid subscriptions, please reference [www.plangrid.com](http://www.plangrid.com). All field foremen are **required** to have an electronic tablet (iPad preferred) with a cellular data plan included at all times. Document management and quality control will be administered via electronic device in the field, using PlanGrid.

### 4. BIM COORDINATION

- A. The following Bid Categories will participate in BIM coordination, with Granger Construction as the lead BIM coordinator. Provide fully coordinated, and detailed, electronic shop drawings in 3D software compatible with Revit®, for weekly BIM coordination meetings that will be managed in Navisworks®.
  - 1) Structural Masonry
  - 2) Structural Steel
  - 3) Fire Protection
  - 4) Mechanical
  - 5) Electrical
  - 6) Low Voltage
  - 7) Earthwork & Utilities

### 5. LEAN

- A. Lean initiatives will be implemented throughout the project to improve reliability, planning, quality, safety, and team performance. Project planning and scheduling utilize the Last Planner production system. This will require attendance by the project manager and foreman at periodic pull planning and phasing meetings, weekly planning meetings, and daily onsite huddles. Subcontractors shall input, maintain, and update their work plans, including work activities, manpower, and issues, and make them accessible to the Granger superintendent.

### 6. COORDINATION

- A. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

- B. Each Subcontractor shall see that sleeves and inserts are kept in their proper positions and not displaced by the placing of concrete or other construction work. Locations of chases are indicated in the Drawings. The separate Subcontractor and sub-Subcontractor of the Work involved shall be responsible for inclusion of these items in the Work and shall advise each other and CM of required changes.
- C. Each Subcontractor shall recognize the complex nature of the Project, such as the bid package, bid category(ies), the sequential nature of contracts, and the concurrent operations of other Subcontractors with the Work under this Project. Subcontractors are required to review, discuss, and coordinate their work with the work of other Subcontractors as well as through the CM with regard to sequence, compatibility of materials and sizes and required clearances prior to beginning the work to avoid construction delays which impact the Owner's occupancy of the facility.
- D. Each Subcontractor shall become thoroughly familiar with the requirements of Division 1, the Schedule, project milestones, and scope of work of other Subcontractors and make adjustments necessary to maintain the project master Construction Schedule, as well as the schedules of their Subcontractors.
- E. The completion of the building(s) additions or renovations within the prescribed time is dependent upon the close and active cooperation and open discussions of those involved; therefore, it is expressly understood and agreed that each Subcontractor shall layout and install his work at such time and in such manner as not to delay or interfere with the carrying forward of the Work of other Subcontractors. Observation of the work by others shall not be interpreted as relieving a Subcontractor from his responsibility for coordination, superintendence, or scheduling and direction of the Work.
- F. The Subcontractors are to report interferences, discrepancies, or incompatibilities discovered to the Construction Manager whose decision as to the party or parties at fault and as to the manner in which the matter may be resolved, shall be binding and conclusive on all parties. The Construction Manager may direct layout/location changes as required to make the entire work fit together. Minor changes of this nature will not be considered for increase in contract amount. Failure of a Subcontractor to notify other Subcontractors and the CM of a potential interference, incompatibility, or discrepancy and failure to coordinate his work with that of other Subcontractors prior to installation or fabrication may be considered as sufficient cause to deny consideration for additional payment for what otherwise may be considered a change.
- G. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair. Make adequate provisions to accommodate items scheduled for later installation.
- H. Coordination and Layout Drawings:
  - 1) Prepare and maintain Coordination and Layout Drawings.
  - 2) Prepare the Coordination and Layout Drawings in electronic format PDF (2D) and CAD (3D). Drawing size shall be uniform for each set prepared. Size of drawing shall match the size of the Contract Drawings.
  - 3) Coordination and Layout Drawings are special types of drawings prepared by the Subcontractor, prior to fabrication and installation, for its use, that show the relationship and integration of different construction elements that require careful coordination during fabrication and/or installation to have a maximum utilization of space for efficient installation of the different components or for the proper function as intended. Primary emphasis for this coordination is for work Divisions 21 through 33.
  - 4) Show the interrelationship of components that were shown on separate Shop Drawing submittals.
  - 5) Coordination and Layout Drawings shall be drawn to scale showing the intended method of installation and construction. Use Contract Drawings and Specifications, which are schematic representations of the Architect's design intent, as a guide in preparing the Drawings. The Drawings shall not be a repetition or direct copy of the Contract Drawings. The Drawings shall reflect the full intent of the Architect's Contract Drawings. Type, quantity, and location of equipment shall not be compromised. During preparation of the Drawings for any item of work or trade, coordinate with Drawings of all other work or trades involved in the Project.
  - 6) Indicate required installation sequences.
  - 7) Provide the Construction Manager access to the Drawings for reference during normal working hours.
  - 8) Maintain and file in a chronological and numerical order.
  - 9) Post changes and modifications as they occur.

- 10) Use final Coordination and Layout Drawings in preparing "Record Drawings" as called for in Section "Project Close-Out".
  - I. Coordinate completion and cleanup of Work of separate Sections in preparation for Substantial Completion and for portions of Work designated for Owners partial occupancy.
  - J. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
7. FIELD ENGINEERING
- A. Section Includes
    - 1) Owner furnished survey
    - 2) Project Record Documents
    - 3) Examination
    - 4) Survey Reference Points
    - 5) Survey Requirements
  - B. Related Sections
    - 1) Section 01 7000 Execution Requirements: Project Record Documents
  - C. Owner Furnished Survey
    - 1) The Owner has conducted topographic survey and boundary survey used for site design and engineering. This survey information is shown on the construction documents for establishment of building control lines and benchmarks as shown on construction documents.
    - 2) Subcontractors will, at their own expense, be responsible for all field engineering lines and elevations required for the complete execution of their work.
  - D. Examination
    - 1) Verify locations of survey control points prior to starting work.
    - 2) Promptly notify Construction Manager of any discrepancies discovered.
  - E. Survey Reference Points
    - 1) Subcontractor to locate and protect survey control and reference points.
    - 2) Control datum for survey is that indicated on drawings.
    - 3) Protect survey control points prior to starting site work; preserve permanent reference points during construction.
    - 4) Promptly report to Construction Manager the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
    - 5) Replace at your own expense dislocated survey control points based on original survey control. Make no changes without prior written notice to Construction Manager.
  - F. Survey Requirements
    - 1) Each Subcontractor shall provide his own field engineering services at his expense. Utilize recognized engineering survey practices.
    - 1) Establish elevations, lines and levels. Locate and lay out all work by instrumentation and similar appropriate means:
    - 2) Periodically verify layouts by same means.
8. NON-SMOKING/TOBACCO RULE
- A. No smoking, or tobacco products, will be allowed on project site after building enclosure or as governed by governing authorities and/or Owner requirements. There are no exceptions to this rule. Any worker found smoking can be permanently removed from the project at the sole discretion of the Construction Manager.
9. PRE-BID AND SITE INSPECTION MEETING
- A. Pre-Bid Meeting: Prior to bidding, a project inspection and pre-bid meeting will be held for the purpose of review and clarification of the contract documents, to allow the Subcontractor to confirm his estimates and quantity surveys, and to allow the Subcontractors the opportunity to familiarize themselves with the project site. This meeting will be called by the Construction Manager and shall be attended by

representatives of the Architect, Owner and trade contract bidders as detailed in the Instructions to Bidders.

#### 10. POST-BID MEETING

- A. Post-Bid Meeting will be conducted with the apparent successful bidders to review specification compliance, scope of work, schedule and Subcontractor capabilities. This meeting may be waived at the discretion of the Owner and/or Construction Manager. The Post-Bid Meeting notes will become a part of the contract documents executed resulting from this meeting.

#### 11. PRE-CONSTRUCTION/KICK-OFF MEETING

- A. Construction Manager will schedule a conference at the project site prior to Subcontractor occupancy.
- B. Attendance Required: Construction Manager, Subcontractor, and major Sub-Subcontractors and all of their superintendents/foremen proposed for use on this project.
- C. Agenda:
  - 1) Use of premises by Owner and Subcontractor.
  - 2) Construction facilities and controls provided by Owner.
  - 3) Temporary utilities provided by Owner.
  - 4) Review of contract limits and building layout.
  - 5) Security, safety and housekeeping procedures.
  - 6) Schedule review and planning of overall Project.

#### 12. PROGRESS MEETINGS

- A. Construction Manager will schedule and administer meetings throughout progress of the Work at weekly intervals (or as frequently as the Construction Manager deems necessary).
- B. Construction Manager will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes, and distribute copies to Architect/Engineer, Owner, participants, and those affected by decisions made.
- C. Attendance Required: Job superintendent, major Subcontractors and suppliers as required for coordination of work, Owner, Architect/Engineer, and others as appropriate to agenda topics for each meeting. The subcontractor's project manager may be required to attend progress meetings at the discretion of the Construction Manager.
- D. Agenda will be as defined by the Construction Manager.

END OF SECTION



## **Section 01 3210 Project Scheduling**

### **1. SECTION INCLUDES**

- A. Definitions
- B. General Requirements for Schedule Submittals
- C. Milestone Schedule

### **2. DEFINITIONS**

- A. Milestone Schedule: This schedule is prepared by the Construction Manager and is included as part of the base bid contract. It will include start and completion dates, as well as any interim dates important to the Owner, such as partial turnovers, etc. It will also include internal milestones, which will be the basis for other Subcontractor's to start their work.
- B. Construction Schedule: This is the schedule developed by each Subcontractor for the work in their own bid package. The initial version of this is submitted to the Construction Manager for incorporation into the Project Schedule.
- C. Project Schedule: This is a compilation of all the Construction Schedules produced by the Subcontractors and is created by the Construction Manager.
- D. Subcontractor: Company who has a direct contract with the Construction Manager for a singular Bid Category and is responsible to produce a Construction Schedule for their work allowing all the work of the Project to be done.

### **3. GENERAL REQUIREMENTS FOR SCHEDULE SUBMITTALS**

- A. The Construction Manager has prepared a Milestone Schedule. This schedule shall be related to the entire Project to the extent required by the Contract Documents and shall provide for expeditious and practical execution of the Work as required to meet the Owner's needs.
- B. Each Subcontractor shall submit to the Construction Manager their Construction Schedule with complete logic relationships. These must be submitted within 14 days of the issuance of the contract or the notice to proceed. This schedule is preferred to be submitted on computer scheduling software as approved by the Construction Manager. Activities in this schedule shall be as follows:
  - 1) Generally, durations not longer than 45 days.
  - 2) Each activity shall be broken down by floor, areas, building, CSI division, or other grouping to allow the above durations.
  - 3) Include delivery of major pieces of equipment and materials.
  - 4) Include detailed plans for owner training and inspections.
  - 5) Each activity shall be resource loaded, which includes manpower and equipment requirements for the Subcontractors Work.
- C. The Construction Manager will compile all the Construction Schedules into one overall Project Schedule. In the event that this compilation results in a completion date beyond that of the Milestone Schedule, the following steps will take place:
  - 1) A scheduling meeting will be held with key individuals from each Subcontractor to resolve the time overage or schedule conflicts.
  - 2) The results of the meeting will be incorporated into the Project Schedule and distributed by the Construction Manager. If there is any further disagreement, the Subcontractor must notify the Construction Manager within 5 working days. Adjustment may be made with a timely notice and if in the sole opinion of the Construction Manager that the balance of work can be completed within the Milestone Schedule. After these discussions and changes, the Project Schedule will be deemed acceptable by all Trade Subcontractors. This will be considered as part of the contractual obligations for each Trade Contract.
  - 3) Failure to adhere to the Project Schedule may be considered by the Construction Manager to be a partial or complete breach of contract by the Subcontractor, and such breach may result in the Construction Manager using any of the remedies available to them in ARTICLE 19 TERMINATION of the subcontract, for such a breach. Examples of these remedies are:
    - a) Direct that the labor force be increased.

- b) Direct that overtime be instituted for key activities, including hours beyond the established hours of work, Saturdays, Sundays and Holidays.
  - c) If the above measures do not correct the delay or the Subcontractor does not institute the above, the Construction Manager, may at its discretion and with due notice, take over the work at the expense of the Subcontractor.
- D. The Construction Manager shall periodically update the schedule and display same at the jobsite. Each Subcontractor will be responsible to be familiar with the schedule and how it will affect or modify his operations, including his coordination with the activities of other Subcontractors. Each Subcontractor shall cooperate fully in providing detailed schedule input each week at a minimum, at scheduled jobsite progress meetings or at other times as required by the Construction Manager. Commitments made by Subcontractors to updated schedule shall be part of the Contract and incorporated into the Project Schedule.
- E. Construction Manager shall select and identify from Project Schedule approximately 10% to 20% of the activities shown for monitoring of timely completion of the work. If any one of those monitored activities are not completed according to the Project Schedule, then any Subcontractor causing the delay in the sole opinion of the Construction Manager shall, upon discovery of likely failure to complete a monitored activity on schedule or upon notice of such likely delay by the Construction Manager, immediately prepare and submit to the Construction Manager, a plan for curing the delay at least before the next scheduled monitored activity is due to be complete. The Construction Manager shall create a revision of the Project Schedule demonstrating the plan for curing the delay.
- F. Work Sequence:
- 1) Start Work immediately upon execution of Contract or upon receipt of Binding Letter of Intent and complete Work in accordance with Contract Documents.
  - 2) Manage the execution of the Work to meet the referenced schedule, and be responsible for all steps, procedures, and policies necessary thereto. The Construction Manager may advise and suggest ways and means for facilitation of the Work; however, the full responsibility for management of the Work shall remain with the Subcontractor.
  - 3) Subcontractor agrees that changes in the Project Schedule logic, durations, and dates may be made after start of the project as Construction Manager deems necessary and beneficial to the project. These changes will be accepted by the Subcontractor without claim for additional cost to the Owner or Construction Manager.

#### 4. MILESTONE SCHEDULE

- A. This schedule will be the basis for the working Construction Schedule. Subcontractors will review and include provision for completion of all work within the stated timeline. The schedule follows immediately after this page.
- B. All work areas must be available for occupancy no later than those dates shown for each area.
- C. Completion of the Work will be defined as substantial completion per the General Conditions of the contract.

MILESTONE	DATE/S	TIME
Bid Documents Available	March 3, 2022	
Pre-bid Meeting	March 10, 2022	2:00 p.m.
Pre-bid Questions Deadline	March 14, 2022	12:00 p.m.
Bids Due	March 18, 2022	2:00 p.m.
Submittals/Material Procurement Start	April 12, 2022	
Construction	TBD	
Punchlist Review and Completion	TBD	

END OF SECTION

## **Section 01 3301 Submittal Procedures**

1. SECTION INCLUDES
  - A. Related Sections
  - B. Submittal Procedures
  - C. Construction Progress Schedules
  - D. Shop Drawings
  - E. Product Data
  - F. Samples
  - G. Manufacturers' Certificates
  - H. Material Allowances
2. RELATED SECTIONS
  - A. Section 01 3210 Project Scheduling
  - B. Section 01 3300 Electronic Submittal Procedures
  - C. Section 01 7700 Closeout Procedures
3. SUBMITTAL PROCEDURES
  - A. Transmit each submittal with TMP Submittal Form
    - 1) General: Package each submittal appropriately for transmittal and handling to the Construction Manager. Transmit each submittal from Subcontractor to Construction Manager using a transmittal form. Submittals received by the Architect which have not been reviewed by the Construction Manager or are from other sources other than the Subcontractor will be returned without action.
    - 2) Recording Information: On the transmittal, record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Subcontractor's certification that information complies with Contract Document requirements.
  - B. Sequentially number the transmittal forms
  - C. The following information must be included with each submittal for processing and recording action taken:
    - 1) Project number (Architect's and Construction Manager's).
    - 2) Project name.
    - 3) Date.
    - 4) Name and address of Architect: do not include logo.
    - 5) Name and address of Subcontractor.
    - 6) Name and address of Supplier.
    - 7) Name of Manufacturer.
    - 8) Name of drawing preparer (initials are not acceptable).
    - 9) Submittal Number and title of appropriate Specification Section.
    - 10) Drawing number and detail references, as appropriate.
  - D. Schedule submittals to expedite the work and deliver to Construction Manager at business address. Coordinate submission of related items. Allow 14 days for Architect's review of each submittal.
  - E. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
  - F. Provide space for Contractor and Architect/Engineer review stamps.
  - G. Revise and resubmit submittals as required, identify all changes made since previous submittal.
  - H. Distribute reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.

- I. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule. Coordinate submittal schedule with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule. Prepare the submittal schedule in chronological order. Provide the following information:
  - 1) Scheduled date for each submittal
  - 2) Related Specification Section number
  - 3) Submittal Name & Number
  - 4) Name of subcontractor/supplier and contact information
  - 5) Description of the part of the Work covered
  - 6) Expected delivery of products after approval. Subcontractor is responsible for highlighting long lead items that require expedited approvals to prevent project delays.
4. CONSTRUCTION PROGRESS SCHEDULES
  - A. The Construction Manager will prepare and update the master Construction Schedule. Refer to Section 01 3210 Project Scheduling.
5. SHOP DRAWINGS
  - A. Submit in electronic form, or as required by the Architect/Engineer or Owner.
  - B. After review, the electronic file will be returned with Architect's comments for the Subcontractor to distribute in accordance with the procedures above and for record documents described in Section 01 7000 Execution Requirements.
6. PRODUCT DATA
  - A. Submit electronic file to the Construction Manager.
  - B. Mark the electronic file to identify applicable products, models, options, and other data specific to the Project. Supplement manufacturers' standard data to provide information unique to this Project.
  - C. After review, distribute in accordance with Article on Procedures above and provide copies for Record Documents described in Section 01 7000 Execution Requirements.
7. SAMPLES
  - A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - B. Submit samples of finishes from the full range of manufacturers' standard colors, textures, and patterns for Architect/Engineer's selection.
  - C. Include identification on each sample, with full Project information.
  - D. Submit the number or samples specified in individual specification Sections; one of which will be retained by Architect/Engineer.
8. MANUFACTURER'S CERTIFICATES
  - A. When specified in individual specification Sections, submit manufacturers' certificate to Architect/Engineer for review, in electronic format.
9. MATERIAL ALLOWANCES
  - A. Selection of product/material: The Architect/Engineer will consult with Contractor in consideration of product/material and suppliers, make selection, designate product or material to be used and notify the Contractor in writing to designate product size, color and texture, supplier, and cost. The Contractor shall assist and make appropriate recommendations to the Architect/Engineer in determining qualified suppliers. The Contractor will also obtain proposals from suppliers when requested by the Architect/Engineer. The Contractor will notify the Architect/Engineer, in writing, of the anticipated effect the selection will have on contract sum and duration. The Contractor is responsible for arranging delivery, unloading, prompt inspection of product for damage and defects, and submitting claims for transportation damage.

END OF SECTION

## **Section 01 3520 Safety Requirements**

1. The safety requirements herein do not, in any way, relieve the Subcontractor or their employees, agents, or subcontractors of any safety responsibility. It does not relieve the Subcontractor of liability for negligence which would apply in the absence of this material. The Subcontractor shall assure compliance of their subcontractors or agents to site, Federal, State and Local regulations. A Subcontractor shall at all times use good judgment and discretion about safety.
2. The following safety information is supplementary to both the information contained in the General Conditions and Granger Construction Company's Safety & Health Program and does not intend to take precedence over same. See Section 00 2113 Instructions to Bidders and Section 00 3100 Available to Project Information for additional information relating to Granger Safety & Health Program.
3. Compliance with the current revision of the Granger Safety & Health Program is required of each contractor and/or sub-subcontractor in addition to compliance with all Federal and State OSHA standards. Bidders shall take specific note of the following points of emphasis in the most recent revision of the Granger Safety & Health Program: 100% Eye Protection Eye protection shall be worn at all times by all personnel on the project site.
  - Acknowledgment of Granger Safety & Health Program – All subcontractors shall submit a safety policy acknowledgment signed at minimum by both the subcontractor's project manager and on-site supervisor/foreman.
  - Mandatory Site Specific Safety Planning – All subcontractors shall prepare & submit for approval a Site Specific Safety Plan.
  - Mandatory Job Safety Task Analysis – All subcontractors shall prepare and submit activity task analyses and shall train employees for all hazards identified prior to starting work on a given task.
  - Mandatory Jobsite Safety Orientation – All subcontractors and employees shall complete a brief jobsite safety orientation prior to starting work on the project site.
  - 100% Fall Protection The 6ft fall rule shall be implemented by all personnel on the project site.
  - Disciplinary plan for disregard of safety policies – 1<sup>st</sup> offense = written reprimand, 2<sup>nd</sup> = written reprimand and suspension, 3<sup>rd</sup> = termination. The CM reserves the right to escalate discipline to the 3<sup>rd</sup> step for acts of sufficient disregard for safety, in the sole opinion of the CM.
4. Under no circumstances are Bidders to disturb Asbestos Containing Materials (ACM) or other hazardous materials without appropriate engineering controls. The Owner's Hazard Communication Program and MSDS sheets appropriate to the facility are available at the site.
5. The Subcontractors and subcontractor supervision unable or unwilling to secure safe performance by their employees are not acceptable. Unacceptable persons shall be removed from the project at the request of the Construction Manager.
6. Subcontractors and their subcontractor employees, who exhibit a poor attitude toward safe work practices or procedures will be removed and replaced by the Subcontractor at the request of the Construction Manager.
7. The requirements of the Michigan Occupational Safety and Health Act (MIOSHA) absolutely will be adhered to or the Subcontractor will furnish the Construction Manager with a written variance from the MIOSHA authority.
8. SUBCONTRACTOR REQUIREMENTS: "Each Sub contractor shall ..."
  - A. Require that the Subcontractor's employees and all employees of the Subcontractor's subcontractors and agents performing work at the project site shall attend weekly 10–15 minute tool box safety meetings as required by the Construction Manager's Safety Program.
  - B. Promote safe working performance on the part of their employees. Each Subcontractor will conduct safety programs tailored to their own particular needs.
  - C. Be responsible for recording and reporting injuries and illnesses in accordance with OSHA rules and regulations.
  - D. Inform all employees of the location and use of fire extinguisher, rescue equipment, first aid equipment, etc.

- E. Provide in each trailer window, a legible printed sign listing emergency telephone numbers, including local public fire and police departments, ambulance services and other emergency numbers as well as the address of the worksite.
  - F. Inspect their working areas to detect and correct hazardous conditions and unsafe working procedures.
  - G. Notify the Construction Manager immediately of an accident.
  - H. Immediately report any property loss accidents to the Construction Manager.
  - I. In the event of an on-site emergency, immediately account for all employees and report to the Construction Manager.
  - J. Submit a written investigative report to the Construction Manager within 24 hours following an accident which results in employee fatality or injuries requiring hospitalization.
  - K. Designate an on-site safety representative in writing to the Construction Manager.
  - L. Provide two 24 hour emergency phone numbers to the Construction Manager.
  - M. Adequate first aid equipment, supplies and facilities are the responsibility of each Subcontractor for their personnel.
  - N. A first aid log book shall be maintained which documents every first aid case. When first aid must be administered, a description of the accident shall be entered in the Subcontractor's daily report which shall contain the following information:
    - 1) Date of injury. Indicate with an asterisk (\*) if the date of injury is different than the time of treatment.
    - 2) Time of injury.
    - 3) Name and discipline/craft of injured employee.
    - 4) Description of the accident including narration of the event.
    - 5) Type of injury (burn, cut, bruise, etc.)
    - 6) Part of body injured (lower back, left knee, etc.)
    - 7) Description of the accident including narrative of the event.
    - 8) When first aid is given for non-job related symptoms (aspirin for headache, Band-aids, etc.), the treated employee shall initial the "description" part of the log. A full account is not necessary.
  - O. Medical Attention: A responsible party shall determine whether the care of a physician is necessary and proceed. If medical care appears necessary, but perhaps not urgent, do not wait until the end of a shift to obtain treatment. Immediate medical attention should be given to help ascertain and prevent health hazards. A "wait and see" attitude will do little to help specify hazards in specific areas (such as carbon monoxide or chemical exposure).
9. Accident Reporting
- A. Notify the Construction Manager immediately of an accident.
  - B. Immediately report any property loss accidents to the Construction Manager.
  - C. In the event of an on-site emergency, immediately account for all employees and report to the Construction Manager.
  - D. Submit a written investigative report to the Construction Manager within 24 hours following an accident, which results in employee fatality or injuries requiring hospitalization.
  - E. Submit a copy of the First Aid Log book report to the Construction Manager.
10. School Safety Initiative Requirements
- A. Unoccupied Buildings: The parties acknowledge the existence of the laws commonly known as the "School Safety Initiative Legislation." While the parties do not believe that the School Safety Initiative Legislation is applicable to this Agreement, Owner reserves the right to determine at a later date that the School Safety Initiative Legislation is applicable or could be applicable to this Agreement. In the event Owner so determines, Owner reserves the right to impose such requirements on Contractor as may be necessary to ensure compliance with the School Safety Initiative Legislation. Such requirements may include, but are not limited to: (1) requiring Contractor to provide Owner with the fingerprints of all individuals assigned to the project under this Agreement, (2) not assigning any individual to work on the

project under this Agreement until the individual's criminal history check and criminal records check has been obtained by Owner, (3) not assigning any individual to work on the project under this Agreement if the reports on such individual's criminal history check or criminal records check disclose that the individual has been convicted of a "listed offense", as that term is defined in Section 2 of the Sex Offenders Registration Act, and (4) not assigning any individual to work on the project under this Agreement if the reports on such individual's criminal history check or criminal records check disclose that the individual has been convicted of a felony other than a "listed offense", unless the Superintendent and the Board of Education of Owner each specifically approve of the work assignment in writing.

B. Occupied Buildings: The parties acknowledge that the laws commonly known as the "School Safety Initiative Legislation" may be deemed to apply to this Agreement. Pending clarification of their applicability, Owner intends to comply with the provisions of the School Safety Initiative Legislation as they pertain to this Agreement and reserves the right to impose such requirements on Contractor as may be necessary to ensure such compliance. Without limiting the generality of the foregoing, Contractor agrees as follows:

- 1) Contractor shall not employ an individual required to be registered under Article 2 of MCLA 28.721 et seq., as amended (the "Sex Offenders Registration Act") who will be assigned or permitted to work within a Student Safety Zone, as that term is defined in the Sex Offenders Registration Act.
- 2) As used in this Section, "Personnel" means any individuals assigned or employed by Contractor or any subcontractor, consultant, supplier or other party working directly or indirectly under Contractor with respect to the Project, who is or will be assigned or allowed to work in any of Owner's schools.
- 3) Within ten (10) days after the execution of this Agreement Contractor shall provide to Owner, in writing, the names and fingerprints of all Personnel. The fingerprints shall be separated by names, shall be taken by an authorized law enforcement agency and otherwise shall be acceptable to Owner. Upon receipt of such information, Owner may request from the Criminal Records Division of the Michigan State Police: (i) a criminal history check, and (ii) a criminal records check through the Federal Bureau of Investigation on each of the Personnel and receive from the Michigan State Police reports concerning the same. Contractor shall reimburse Owner for the cost of each criminal history check and criminal records check performed relative to the Personnel, and Contractor shall be responsible for the cost of providing the fingerprints of the Personnel. Unless otherwise indicated in writing by Owner, no Personnel shall be allowed to work in any of Owner's schools until Owner has received from the Michigan State Police the criminal history check and the criminal records check for the individual and has confirmed that the applicable individual is not debarred from working in the school.
- 4) If Contractor wishes to add any individuals as Personnel (i.e., assign them to work or permit them to work in any of Owner's schools) after the date of this Agreement, it must provide the information set forth in subsection (c), and the procedures set forth therein shall apply. Unless otherwise indicated in writing by Owner, no Personnel shall be allowed to work in any of Owner's schools until Owner has received from the Michigan State Police the criminal history check and the criminal records check for the individual and has confirmed that the applicable individual is not debarred from working at the school.
- 5) Contractor shall not assign any individual to work in any of Owner's schools, or otherwise allow any individual to work in any of Owner's schools, if such individual's criminal history check or criminal records check discloses (or a proper check would disclose) that the individual has been convicted of a "listed offense", as that term is defined in Section 2 of the Sex Offenders Registration Act.
- 6) Contractor shall not assign any individual to work in any of Owner's schools, or otherwise allow any individual to work in any of Owner's schools, if the reports on such individual's criminal history check or criminal records check discloses (or a proper check would disclose) that the individual has been convicted of a felony other than "listed offense", unless the Superintendent and the Board of Education of Owner each specifically approve of the work assignment in writing.
- 7) Owner reserves the right to refuse Contractor's assignment of any individual, agent or employee of Contractor (or any subcontractor, consultant, supplier or other party working directly or indirectly below Contractor) to render services under this Agreement in any of the Owner's schools where the criminal history of that individual (including any pending charges) indicates, in Owner's sole judgment, unfitness to perform services under this Agreement.
- 8) Violation of any provision of this Section by Contractor shall be a basis for, among other remedies, immediate termination of this Agreement. Furthermore, Contractor hereby agrees to indemnify and

hold harmless Owner and its Board, Superintendent, employees, administrators, agents and consultants from and against any claims, causes of action, judgments, losses, liabilities, damages (including incidental and consequential damages) or expenses, including attorney fees, arising out of or resulting from a breach by Contractor of any provision of this Section or a failure of Contractor or its subcontractors, consultants, suppliers or other persons working directly or indirectly under Contractor to comply with the School Safety Initiative Legislation, including but not limited to MCL 380.1230, 380.1230a, 380.1230c, 380.1230d and 380.1230g.

END OF SECTION



## **Section 01 4001 Quality Requirements**

### **1. SECTION INCLUDES**

- A. Related Sections
- B. Quality Assurance and Control of Installation
- C. Dimensional Responsibility
- D. References
- E. Inspection and Testing Laboratory Services
- F. Soil Compaction Testing
- G. Bituminous Paving Testing
- H. Inspection of Reinforcing Steel Placement
- I. Concrete Testing
- J. Concrete Materials & Mix Design
- K. Test for FF/FL
- L. Tests for Mortar
- M. Test for Grout
- N. Test of Concrete Masonry Prisms
- O. Masonry Inspection
- P. Welding Quality Control
- Q. Bolted Structural Connections Quality Control
- R. Structural Steel Alignment Quality Control

### **2. RELATED SECTIONS**

- A. General and Supplementary Conditions – Article 13.5.1
- B. Section 01 3300 Electronic Submittal Procedures
- C. Section 01 3301 Submittal Procedures
- D. Section 01 6000 Product Requirements (TMP)
- E. Section 01 6001 Product Requirements (GCC)

### **3. QUALITY ASSURANCE/CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply fully with manufacturers' instructions, including each step in sequence. Perform all steps required by manufacturer to properly install the Work regardless of whether every step is called out in this specification.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform work by persons qualified to produce workmanship of specified quality. Subcontractors who utilize unskilled workers to perform skilled trades work will be required to bear the burden of proof and certify in writing that the quality of the work in place, exceeds or equals the specified minimum standard.
- F. Secure Products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

- G. Whenever a Subcontractor intends to depart from normal work hours, he shall notify the Construction Manager at least 24 hours in advance for approval. Failure of the Subcontractor to give such timely notice may be cause for the Construction Manager to require the removal or uncovering of the Work performed during such time without the knowledge of the Construction Manager. Special arrangements can be made for emergency work or shutdowns as may be required.
- H. Upon completion of inspection, testing, sample-taking, and similar services performed on work, repair damaged work and restore substrates and finishes to eliminate deficiencies, including defects in visual qualities of exposed finishes. Except as otherwise indicated, comply with requirements of Contract Documents for "Cutting and Patching." Protect work exposed by or for service activities and protect repaired work.

#### 4. DIMENSIONAL RESPONSIBILITY

- A. Thoroughly examine existing conditions and be familiar with work to be performed as hereinafter specified and as shown on drawings.
- B. Before performing work or ordering materials, verify relevant dimensions of existing and new work and be responsible for their occurrence. Any differences found shall be reported to Construction Manager and Architect for consideration before proceeding with work. If Subcontractor inadvertently or knowingly, proceeds with his work on dimensionally inaccurate work of another, he will be liable for cost of all corrections to his work when error is corrected.

#### 5. REFERENCES

- A. Conform to reference standard by date of issue current on date of Contract Documents.
- B. Should specified reference standards conflict with Contract Documents, request clarification for Architect/Engineer before proceeding.
- C. The contractual relationship of the parties to the Contract Agreement shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

#### 6. INSPECTION AND TESTING LABORATORY SERVICES

- A. Owner will appoint, employ, and pay for services of an independent firm to perform inspection, sampling, testing, air monitoring, and certification of products and mill test reports.
- B. The independent firm will perform inspections, tests, and other services specified in individual specification Sections and as required by the Architect/Engineer and public authorities.
- C. Subcontractor shall notify Construction Manager and independent firm a minimum of 24 hours prior to expected time for operations requiring services. In general, coordinate activities which require testing at weekly progress meetings to allow all parties efficient manpower utilization. The independent firm shall make efforts to comply with the changing progress of the job given reasonable notice, however should the Subcontractor fail to schedule or fail to cancel testing or laboratory services, all costs incurred will be borne by the Subcontractor.
- D. Reports will be submitted by the independent firm within 5 days to the Architect/Engineer, electronically, indicating observations, results of tests and indicating compliance or non-compliance with Contract Documents. Reports of discrepancy between the observed test values and the specified criteria in the contract documents are to be made within 24 hours or sooner to the Construction Manager and the Architect/Engineer.
  - 1) The independent firm's reports will include the following information at a minimum: date of inspection/sampling, date report issues, date test performed, project name and Construction Manager job number, lab name, address, phone and fax, name and original signature of inspector, record of weather and temperature, description of product, applicable specification section, and type of inspection/test, and location in project.
  - 2) Independent firm shall test concrete, masonry, asphalt and structural steel and shall interpret the test results in every case to explain compliance or noncompliance with the Contract Documents.
- E. Retest Responsibility: Where results of required inspection, test, or similar service are unsatisfactory (do not indicate compliance of related work with requirements of Contract Documents), retests are responsibility of Subcontractor, regardless of whether original test was Subcontractor's responsibility.

Retesting of work revised or replaced by Subcontractor is Subcontractor's responsibility, where required tests were performed on original work.

- F. Responsibility for Associated Services: Subcontractor is required to cooperate with independent agencies performing required inspections, tests, and similar services. Provide auxiliary services as reasonably requested, including access to work, the taking of samples or assistance with the taking of samples, delivery of samples to test laboratories, and security and protection for samples and test equipment at project site.
- G. Coordination: Subcontractor and each engaged independent agency performing inspections, tests, and similar services for project are required to coordinate and sequence activities so as to accommodate required services with minimum delay of work and without the need for removal/replacement of work to accommodate inspections and tests.
- H. Sampling and testing is required for the following Sections of Work or similarly identified sections and shall be performed by an independent testing lab and paid for by the Owner.
  - 1) Earthwork – soil testing and inspection service during earthwork operations for subgrades and fill.
  - 2) Asphaltic Concrete Paving – quality control testing of uncompacted asphalt concrete mix and in-place compacted pavement.
  - 3) Cast-In-Place Concrete – field quality control of concrete.
  - 4) Cast-In-Place Concrete – tests for concrete materials and mix design tests.
  - 5) Cast-In-Place Concrete – testing of FF/FL floor tolerances.
  - 6) Mortar – field quality control of mortar.
  - 7) Grout – field quality control of grout.
  - 8) Unit Masonry – field quality control of unit masonry and masonry assemblies.
  - 9) Structural Metal Framing – field quality control for welds.
  - 10) Structural Metal Framing – field quality control for high strength steel torqued bolted connections.
  - 11) Structural Metal Framing – field quality control for structural steel alignment.

## 7. SOIL COMPACTION TESTING

- A. The Contracts incorporating Earthwork shall cooperate and coordinate with the soil testing and inspection service for quality control testing during earthwork operations as follows:
  - 1) Field density test reports.
  - 2) One optimum moisture-maximum density curve for each type of soil encountered.
  - 3) Arrange for soils engineer to be on the site for observation and testing during times when the following operations are being performed:
    - a) Proof-rolling.
    - b) Compaction of subgrades and fill. During compaction operations, the Soils Engineer shall carefully monitor existing foundations to detect possible foundation movements. If movement is detected, Work shall be stopped and the Architect immediately notified.
- B. Percentage of Maximum Density Requirements: Provide not less than the following percentages of maximum density of soil material compacted at optimum moisture content, for the actual density of each layer of soil material in place (coordinate with soils report) and scope description.
  - 1) Foundations: Compact top 12 inches of subgrade and each 8 inch layer of backfill or fill material to 100 percent Standard Proctor maximum dry density.
  - 2) Building Slabs & Steps: Compact top 12 inches of subgrade and each 8 inch layer of backfill or fill material to 95 percent Standard Proctor maximum dry density.
  - 3) Lawn, Unpaved Areas & Borrow Pit: Compact top 6 inches of subgrade and each 8 inch layer of backfill or fill material to 90 percent Standard Proctor maximum dry density.
  - 4) Walkways: Compact top 6 inches of subgrade and each 8 inch layer of backfill or fill material to 90 percent Standard Proctor maximum dry density.
  - 5) Pavements: Compact top 12 inches of subgrade and each 8 inch layer of backfill or fill material to 95 percent Standard Proctor maximum dry density.
  - 6) Underground Utilities: Provide the preceding requirements for the respective utility location(s).

- C. Quality Control Testing During Construction: Testing service must inspect and approve subgrades and fill layers before further construction work is performed thereon. Tests of subgrades and fill layers will be taken as follows:
- 1) Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Architect, except that a minimum of one test shall be performed for each 15,000 square foot of buildings area.
  - 2) Paved Areas & Building Slab Subgrade: Make at least one field density test of subgrade for every 2,000 square feet of paved area or building slab, but in no case less than 3 tests. In each compacted fill layer, make one field density test for every 2,000 square foot of overlaying building slab or paved area, but in no case less than 3 tests.
  - 3) Foundation Wall Backfill: Take at least 2 field density tests, at locations and elevations as directed.
  - 4) Trench Backfill: For each compacted backfill layer make one field density test between each drainage structure.
- D. If, in the opinion of the Architect, based on reports of testing service and inspection, subgrade or fills which have been placed are below specified density, additional compaction work and testing shall be provided by the Subcontractor for the Section of the Work involved at no additional expense, until subgrades or fills meet or exceed specified density.

#### 8. BITUMINOUS PAVING TESTING

- A. Field quality control testing shall be performed during paving operations. Perform the following sampling or testing of asphalt concrete mixtures for quality control during paving operations. Record the locations where samples are taken to correlate with subsequent testing.
- B. Test uncompacted asphalt concrete mix and report the following:
- 1) Sampling: ASSHTO T168 (ASTM D979).
  - 2) Asphalt Cement Content: AASHTO T164 (ASTM D2172).
  - 3) Perform at least one initial test for paving, unless otherwise specified or directed.
- C. Test in-place, compacted pavement for density and thickness, as herein specified. Perform one test for each 500 square yards but not less than one test per day, unless otherwise specified or directed.
- D. The Subcontractor shall pay for and perform additional Work and testing as may be required if any of the previous tests indicate insufficient values or if directed by the Architect. Continue Work and testing until specified values have been attained.
- E. Asphalt concrete material not complying with specified requirements will not be acceptable. The Subcontractor shall repair or remove and replace defective paving as directed by the Architect, at no additional cost to the Owner.

#### 9. INSPECTION OF REINFORCING STEEL PLACEMENT

- A. The Subcontractor incorporating Cast-In-Place Concrete – shall cooperate and coordinate with the testing laboratory to perform field inspection of the placement of reinforcing steel prior to, and in some specified instances during, the placement of concrete in all reinforced concrete structures, unless specifically noted otherwise.
- B. Inspection shall include the following:
- 1) All structures
    - a) Size of reinforcing bars.
    - b) Measurement of bar laps.
    - c) Spacing of reinforcing bars.
    - d) Measurement of reinforcing concrete cover.
    - e) Adequacy of reinforcement ties to prevent movement during concrete placement.
    - f) Placement of reinforcing chairs, bolsters and concrete blocks supporting reinforcement.

- g) Condition of reinforcing free of corrosion scale, grease, oil and other foreign materials which would reduce bond of concrete to reinforcement.
- 2) Slabs-On-Grade
  - a) Nominal size of welded wire fabric.
  - b) Measurement of fabric lap.
  - c) Type, size and spacing of supports for welded wire fabric.
  - d) Adequacy of maintaining welded wire fabric in correct position during the concrete placement, and lifting fabric back in to correct position prior to set of concrete (THE TESTING LABORATORY SHALL BE PRESENT DURING THE PLACEMENT OF SLABS-ON-GRADE WHICH USE WELDED WIRE FABRIC OR REINFORCING STEEL BARS).
  - a) Slabs-On-Grade with fibrous reinforcement do not require this inspection.
- C. Report inspection results in writing to the Architect, Construction Manager and Subcontractor the same day that tests are made. Reports shall indicate the specific structural items inspected and the location, with column grid references, where possible to clearly identify the inspected items.
- D. Additional Inspections: Where inspections indicate deficiencies and concrete placement is made prior to correction and retesting of these deficiencies or where concrete placement of any structural item is made without this required inspection, the testing laboratory shall conduct additional tests, including concrete coring, magnetic detection devices, sonic testing devices and other methods as required to verify the conformance of the reinforcing steel placement to the Contract Documents. The Subcontractor shall pay for such inspections conducted and other additional inspections as may be required when unacceptable or uninspected reinforcing steel placement is verified.

## 10. CONCRETE TESTING

- A. The Subcontractor for the Work: Cast-In-Place Concrete, shall cooperate and coordinate with the testing laboratory to perform field quality control testing during concrete work.
- B. Quality Control Testing During Construction: Perform sampling and testing for field quality control during the placement of concrete as follows:
  - 1) Sampling Fresh Concrete: ASTM C172, except modified for Slump to comply with ASTM C94.
  - 2) Slump: ASTM C143, one test for each concrete load at point of discharge, and one for each set of compressive strength test specimens.
  - 3) Air Content: ASTM C231, pressure method; one for every other concrete load at point of discharge or when the indication of change requires.
  - 4) Compression Test Specimens: ASTM C31, one set of 6 standard cylinders for each compressive strength test, unless otherwise directed.
    - a) Cast and store 3 cylinders for laboratory cured test specimens and 3 field-cured test specimens as specified in STM C31.
  - 5) Concrete Temperature: Test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above; and each time a set of compressive test specimens is made.
  - 6) Compressive Strength Tests: ASTM C39, one set for each 100 cubic yards or fraction thereof, of each mix design placed in a day or for each 5,000 square feet of surface area placed; 2 specimens (one field cured and one lab cured) tested at 7 days, 2 specimens (one field cured and one lab cured) tested at 28 days, and 2 specimens (one field cured and one lab cured) retained in reserve for later testing if required.
    - a) When the frequency of testing will provide less than 5 strength tests for a given mix design, conduct testing strength tests for given mix design, conduct testing from at least 5 randomly selected batches or from each batch if fewer than 5 are used.
    - b) When the total quantity of a given mix design of concrete is less than 50 cubic yards, the strength tests may be waived by the Architect if, in his judgment, adequate evidence of satisfactory strength is provided.

- c) When the strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.
- C. Report test results in writing to the Architect, Contractor, and ready-mix supplier on the same day that tests are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of Subcontractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, type and amount of fibrous reinforcement, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.
- D. Additional Tests: The testing service will make additional tests of in-place concrete as directed by the Architect, when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure. The testing service shall conduct tests on cored cylinders complying with ASTM C42 or by load testing specified in ACI 318 or other acceptable nondestructive testing methods, as directed. The Subcontractor shall pay for such tests conducted and other additional testing as may be required, when unacceptable concrete is verified.
- E. Evaluation of Quality Control Tests: Do not use concrete delivered to the final point of placement which has slump or total air content outside the specified values.
  - 1) Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type or class of concrete; and no individual strength test falls below the required compressive strength by more than 500 psi.
  - 2) Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.
    - a) Provide improved means and procedures for protecting concrete when the 28 day compressive strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders.
    - b) When laboratory cured cylinder strengths are appreciably higher than the minimum required compressive strengths, field cured cylinder strengths need not exceed the minimum required compressive strengths by more than 500 psi even though the 85 percent criterion is not met.
    - c) If individual tests of laboratory cured specimen produce strength or if tests of field cured cylinders indicated deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.
  - 3) If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength.
- F. Deficient concrete shall be removed and replaced by the Subcontractor without additional cost to the Owner.

## 11. CONCRETE MATERIALS & MIX DESIGN

- A. Concrete Materials and Mix Design: The Subcontractor(s) for Cast-In-Place Concrete shall provide the following in conformance with the requirements of the technical specification for Cast-In-Place Concrete.
  - 1) Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94.
  - 2) Project Data: Submit electronic copies of manufacturer's specifications with application and installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.
  - 3) Laboratory Test Reports: Submit electronic copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Subcontractor's responsibility.

- 4) Mix Design: Submit electronic copies of concrete mix designs for each type of mix required by the Concrete Schedule indicating the amount of each ingredient (by weight) in one cubic yard of concrete, the calculated water/cement ration, and the slump.
  - B. Tests for Concrete Materials
    - 1) For normal weight concrete, test aggregates by the methods of sampling and testing of ASTM C33.
    - 2) For light weight concrete, test aggregates by the methods of sampling and testing of ASTM C330.
    - 3) For portland cement, sample the cement and determine the properties by the methods of test of ASTM C33.
    - 4) Submit written reports for each material sampled and tested, prior to the start of Work. Provide the project identification name and number, date of report, name of Subcontractor, name of concrete testing service, source of concrete aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.
  - C. Submit signed statement from ready-mix plant that concrete furnished for the Project will exactly conform on the approved design mixes.
12. TESTS FOR FF/FL Refer to the technical specifications for cast-in-place concrete.
13. TESTS FOR MORTAR
- A. For colored and non-colored mortars, test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.
  - B. Provide a minimum of one set of cubes for testing per 5,000 sq. ft. of masonry wall construction and as directed by Architect.
  - C. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of Subcontractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.
  - D. If the compressive strength tests fail to meet the minimum requirements specified, the mortar represented by such tests will be considered deficient in strength.
  - E. Deficient mortar shall be removed and replaced by the Subcontractor without additional cost to the Owner.
14. TESTS FOR GROUT
- A. Grout for filling reinforced or unreinforced concrete masonry cores or brick cavities test for compressive strength by methods as described in the technical specifications for Masonry Grout.
  - B. Provide a minimum of one set of 3 test specimens for testing per 5000 sq. ft. of masonry wall construction or for each ready mix truck load of grout and as directed by the Architect.
  - C. Submit written reports for each material sampled and tested. Provide the project identification name and number, date of report, name of Subcontractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, specified location where material represented by sample is used and test results. Indicate whether or not material is acceptable for intended use.
  - D. If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests shall be considered deficient in strength.
  - E. Deficient grout shall be removed and replaced by the Subcontractor without additional cost to the Owner.
15. TEST OF CONCRETE MASONRY PRISMS
- A. When required by the Technical Specifications, construct a set of 3 masonry prisms using mortar and concrete masonry units to be used in the masonry work. Unless otherwise noted, construct prisms 8 inches by 8 inches by 16 inches high (nominal) in compliance with ASTM E447, Method B.

- B. When prism tests are required to establish the strength of masonry in lieu of Masonry Inspection, provide a minimum of one set of 3 masonry prisms for testing for each 5,000 sq. ft. (gross) of masonry wall construction.
- C. Submit written reports for each prism tested. Provide the project identification name and number, date of reports, name of Subcontractor, name of testing service, name of material suppliers, specific location where masonry represented by the prism is used, compression test strength results, and specified required strength.
- D. If the compressive strength tests fail to meet the minimum strength specified in the Plans, the masonry represented by the tests shall be considered deficient.
- E. When tests indicating deficient masonry represent masonry already constructed, such masonry shall be removed and replaced by the Subcontractor without additional cost to the Owner. In lieu of removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

#### 16. MASONRY INSPECTION

- A. Provide masonry construction inspection of concrete or brick masonry walls indicated as requiring inspection on the Masonry Plans to ensure that masonry construction is in conformance with Contract Documents. Masonry inspection is required for those masonry elements which must be constructed to attain high design strengths.
- B. Inspection shall use NCMA-TEK 18-3 Quality Assurance as a guideline.
- C. The individual(s) who will perform the masonry inspection shall be present for the Pre-masonry Conference.
- D. The Masonry Inspector(s) shall prepare a written report or reports for each day of inspection. Masonry Inspection Report Form (DIV.1-MIR.-1) shall be used for all inspection reports.
- E. The masonry inspector shall be present and observe all masonry construction operations in walls requiring inspection. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the Contract Documents and that grouting may proceed. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

#### 17. WELDING QUALITY CONTROL

- A. Welding operators shall be qualified under the provisions of the AWS Structural Welding Code on test pieces in positions and with clearances equivalent to those actually to be encountered in construction. Welders shall make only those types of welds for which they are specifically certified.
- B. Welds requiring inspection shall be so indicated in the Drawings. Welds indicated as requiring visual inspection shall be visually inspected by an independent inspector, acceptable to the Architect and Construction Manager prequalified to make the weld being inspected. Welders and inspectors shall be prequalified by the American Welding Society Qualification Test.
- C. Submit written reports for each weld tested. Provide project identification and number, date of report, name of Welding Subcontractor, name of testing services, location of weld, type of weld, and test results. Indicate whether or not weld is acceptable for intended use.
- D. If by inspection, welds fail to meet minimum acceptable criteria, the welds shall be cut out and replaced.

#### 18. BOLTED STRUCTURAL CONNECTIONS QUALITY CONTROL

- A. The Subcontractor for the Work of Structural Metal Framing, shall coordinate with a separate testing laboratory, employed and paid by the Owner, to perform field quality control inspection of slip-critical and snug-tight bolted connections.
  - 1) Inspection of slip-critical connections shall be visual. The inspector shall be present at the beginning of steel erection to ensure that the erector is conforming to the Contract Documents and AISC Specifications. The inspector shall verify that the erector is marking the bolts and nuts prior to the turn-of-nut procedure. Ten percent of all slip-critical bolted connections shall be observed as they are installed. Any connections which, in the opinion of the inspector, do not meet the tightening requirements of the Contract Documents shall be corrected by the erector.



- 2) Inspection of snug-tight connections shall be made by use of a spud wrench. Ten percent of all snug-tight bolted connections selected randomly over the entire limits of the building structure shall be tested to verify tightness. If more than 20 percent of the bolts tested do not meet the General Requirements of the Contract Documents, the erector shall be required to retighten all snug-tight bolted connections on the Project.

#### 19. STRUCTURAL STEEL ALIGNMENT QUALITY CONTROL

- A. The Subcontractor for the Work of Structural Metal Framing shall coordinate, with a separate testing laboratory, to perform field measurement of structural steel beams, columns, joist, and deck alignment.
- B. Alignment shall be measured and compared to AISC "Code of Standard Practice for Steel Buildings and Bridges."
- C. The Testing Agency shall submit, to the Architect, a written report summarizing the measurements performed and the equipment used in the field work. Where alignment fails to meet AISC requirements, the Subcontractor for the work in the technical specifications for Structural Metal Framing shall make the required corrections.

END OF SECTION

## **Section 01 5000 Temporary Facilities and Controls**

### **1. SECTION INCLUDES**

- A. Related Work
- B. Compliance
- C. Temporary Access
- D. Temporary Openings for Trades
- E. Project Office
- F. Telephone
- G. Scaffolding & Hoisting
- H. Temporary Stairs, Ladders, Ramps, Runways, and Barricades
- I. Utility Protection
- J. Temporary Barriers
- K. Security
- L. Temporary Toilet Facilities
- M. Temporary Electrical Power and Light
- N. Temporary Heating After Building Enclosure
- O. Temporary Ventilation
- P. Temporary Water Service
- Q. Temporary Fire Protection
- R. Environmental Protection
- S. Moisture, Sediment Control, and Pumping
- T. Debris and Dust Control

### **2. RELATED WORK**

- A. The Work of this Section shall be included as a part of the Contract Documents of each Subcontractor on this Project. Where such work applies only to one Subcontractor, it shall be defined as to which Subcontractor the Work belongs. Each Subcontractor as defined herein shall provide such temporary facilities as specified and as indicated on the Drawings.
- B. The Subcontractor responsible for installing and maintaining such temporary facilities shall remove from the premises temporary work erected by him at the completion of the Project, or when requested to do so by the Construction Manager. Temporary structures and facilities become the property of the party furnishing them. Leave premises clean and in acceptable conditions as approved by the Construction Manager and Architect.
- C. Use of Existing Facilities. Construction personnel will not be allowed the use of any adjacent Owner's facilities including, but not limited to, the cafeteria, toilet facilities, tools, equipment, etc. The other buildings and facilities of the Owner's complex shall be off limits to all construction personnel without prior approval of the Construction Manager.

### **3. COMPLIANCE**

- A. All materials, procedures, installations, etc., shall be in full compliance with requirements of Rules for Construction Safety issued pursuant to Michigan Occupational Safety and Health Act.

### **4. TEMPORARY ACCESS**

- A. New or existing driveways, parking areas, or other pavements may only be used for access and staging if approved by the Construction Manager. Otherwise, temporary access shall be installed and used as directed by the Construction Manager.

- B. Each subcontractor shall be responsible for access to the work area from site access roads and lots shown or described in the Contract Documents. The use of equipment suitable for the site conditions is the responsibility of each subcontractor. Each subcontractor shall also be responsible for immediately restoring the site to an evenly graded condition to allow for proper water drainage and unencumbered use by other subcontractors.
- C. Construction parking on or adjacent to site will be on a limited basis only. Construction Manager shall approve any onsite parking. Each Subcontractor shall be responsible for transportation to the site of its employees.
- D. Each Subcontractor shall be held responsible for damage to the existing surfaces resulting from operations relative to Work being performed under this Contract; and repair damaged areas to their original condition, as approved by the Construction Manager and Architect, at no cost to the Owner.
- E. All Subcontractors shall limit their use of the premises for work and for storage, to allow for:
  - 1) Work by other Subcontractors
  - 2) Owner occupancy
  - 3) Public use and safety
  - 4) Use of corridors at all times

## 5. TEMPORARY OPENINGS FOR TRADES

- A. Temporary openings not called for on the Drawings, which may be required for the purpose of bringing equipment into the buildings or for placing same, shall be performed as approved by the Construction Manager. The Subcontractor shall perform the Work of providing and maintaining such openings and of restoring the structure.
- B. The Subcontractor whose equipment or work requires temporary openings is to bear the cost involved in providing such openings and restoring the structure. The Subcontractor requiring the opening shall give ample notice of its size and location.
- C. Holes provided in general construction work to permit installation of lines for temporary mechanical and electrical services shall be restored by the Subcontractor doing the affected construction work, after removal of such lines, at no extra cost.

## 6. PROJECT OFFICE

- A. The Construction Manager shall provide and maintain during the construction of the Project, adequate construction office facility at the site solely for use by Construction Manager, Architect and Owner.
- B. Subcontractors may also supply mobile offices and storage facilities for their use under the same conditions, if approved by the Construction Manager. Remove from, clean, and restore premises when directed by Construction Manager.
  - 1) Temporary utilities, electrical service, and telephone service shall be provided by each Subcontractor for their respective construction trailers, offices, work areas, etc., and shall be located at the discretion of the Construction Manager.
  - 2) As required by the Construction Manager, due to construction requirements and phasing, moving and relocating of trailers and offices will be the responsibility of the Subcontractor involved, including costs associated therewith.
- C. Construction Manager shall designate a location for construction trailers. The Construction Manager shall coordinate placement and scheduled duration of their presence on the site. Each Subcontractor is responsible to verify that field offices, trailers, and storage sheds shall be in accordance with the local fire marshal having jurisdiction.
- D. Temporary offices and sheds including foundations must be removed within seven (7) days of written notice from the Construction Manager including restoration of grade. The Construction Manager, at the Subcontractor's expense, will remove structures not removed in a timely manner.
- E. Construction Manager will coordinate a temporary electric service at the location of temporary office trailers for use by Subcontractors. No electric heat devices are to be connected to this service. Subcontractor shall arrange for connection and disconnection of this service at their own expense.

- F. Project Sign. If required by the Owner, the Construction Manager shall provide a painted job identification sign, professionally lettered and maintained, giving name of Project, the name and address of the Owner, the Architect, and the Construction Manager.

## 7. TELEPHONE

- A. Subcontractors and other parties shall provide their own temporary telephone service as they may require at no cost to the Owner or Construction Manager. Use of the Construction Manager phone is prohibited, except in the event of an emergency.

## 8. SCAFFOLDING AND HOISTING

- A. Each Subcontractor is responsible to provide and maintain ladders, aerial lifts, scissor lifts, scaffolds, and other staging equipment required to complete his work. Each Subcontractor, in accordance with all applicable safety regulations, shall maintain such ladders, scaffolds, and staging equipment.
- B. Each Subcontractor is responsible for his own hoisting of materials or equipment at his own cost to complete the Work of his Contract.
- C. Permanent elevators cannot be used for construction hoisting.

## 9. TEMPORARY STAIRS, LADDERS, RAMPS, RUNWAYS, AND BARRICADES

- A. Each Subcontractor is to provide and maintain all necessary temporary stairs, ladders, ramps, and runways to facilitate conveyance of men, materials, tools, and equipment for proper execution of their work. Each Subcontractor shall provide protection and safety barricades, devices, covers, etc., as it relates to the safe conduct of his work in accordance with OSHA requirements.
- B. Subcontractors performing excavation work shall be responsible to furnish, install, and maintain temporary barricades and/or fencing of all open excavations until such a time that backfilling is complete. Flasher lights shall be provided on barricades and fencing in accordance with OSHA Standards.
- C. As a minimum, all barricades across roads and walks shall have lights on them in working condition and shall, at a minimum, comply with MDOT standards.
- D. The CM will assign to one of the Work Categories the installation of temporary guardrails at the building floor perimeters, interior shafts, roof areas, or other openings. These temporary guardrails or barricades shall be left in place until no longer required. The Subcontractor shall maintain and remove said guardrails. Each Subcontractor that disturbs temporary protection to facilitate his work is responsible to reinstall to its original condition the guardrail or barricade system for the protection of the workers and others until final construction of perimeter exterior wall or shaft openings is completed. The individual Subcontractors shall provide other protection and safety barricades, devices, covers, etc., as it relates to their work in accordance with local, state, and federal regulations.

## 10. UTILITY PROTECTION

- A. Existing utility lines and structures indicated or known, and utility lines constructed for this Project shall be protected from damage during construction operations.
- B. Work categories that include excavation shall locate and flag all lines and structures before beginning excavation and other construction operations.
- C. When utility lines and structures that are to be removed or relocated are encountered within the area of operations, notify the Construction Manager and affected utility in ample time for the necessary measures to be taken to prevent interruption of the service.
- D. Damage to existing utility lines or structures not indicated or known shall be reported immediately to the Construction Manager and the affected utility.
- E. Each Subcontractor shall provide and maintain proper shoring and bracing for existing underground utilities, sewers, and building foundations, encountered during his excavation work, to protect them from collapse or movement or other type of damage until such time as they are to be removed, incorporated into the new work, or can be properly backfilled upon completion of new work. All such disruptions of services shall be limited to a maximum of 4 hours with prior permission of the Construction Manager and Owner. Prior to beginning any excavation, the Subcontractor shall contact MISS DIG and utility companies for the location of all existing underground services.

- F. Utilities and/or other services which are shown, or not shown but encountered, shall be protected by the Subcontractor from any damage from any work and operations of the contract, unless or until they are abandoned. If the utilities or services are not abandoned at time of damage, the Subcontractor shall immediately repair any damage from his work or operations and restore the utilities and services to an equal or better condition than that which existed prior to the damage.
- G. Each Subcontractor shall be responsible for all damage to the Project including the existing building and grounds due to his operations under this Contract. Repair or replacement of damaged items shall be to the satisfaction of the Owner.

#### 11. TEMPORARY BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Protect stored materials and structures from damage.
- C. Each Subcontractor shall provide and pay for the construction and removal of temporary barricades as required for safety and security for his specified portion of the Work.

#### 12. SECURITY

- A. Every Subcontractor shall maintain the buildings in a secured condition at all times.
- B. The Subcontractor is to provide for all his security needs, including that needed for all tools, equipment, devices, etc., required or otherwise used for construction of this project, and for all materials which have been paid for by the Owner, but not yet incorporated into new construction.
- C. The Subcontractor shall also provide adequate security and traffic control to protect the public from his operations.
- D. Site parked equipment, operable machinery, and hazardous parts of the new construction subject to mischief and accidental operation shall be inaccessible, locked, or otherwise made inoperable when left unattended.
- E. Subcontractors shall advise the Construction Manager of any theft or damage which might delay the execution of the Work and furnish the Owner and Construction Manager with a copy of any theft report filed with local, county, or state agencies.
- F. The Construction Manager is not responsible for damage, liability, theft, casualty, or other hazard to the automobiles or other vehicles, nor to injury including death to occupants of automobiles or other vehicles on the Owner's property.
- G. The Construction Manager or Owner may establish additional security policies and procedures intended to protect the Owner's property and the liability interest of the Owner. All Subcontractors will be required to cooperate with the Construction Manager in implementing these procedures.

#### 13. TEMPORARY TOILET FACILITIES

- A. The Construction Manager shall provide temporary toilet facilities of an approved chemical type or as required by law, and in the quantity Construction Manager determines necessary. Temporary toilets shall be for use by all trades on the job.

#### 14. TEMPORARY ELECTRICAL POWER AND LIGHT

- A. The Owner shall pay for the cost of electrical energy used on this project.
- B. The Electrical Subcontractor shall furnish, install, maintain, connect and disconnect the temporary electric service, main disconnect means, wiring, and distribution equipment for temporary lighting and power tool usage during the construction. Source of temporary power and light distribution is to be from existing electric distribution systems where available. If existing power source not available, Construction Manager will arrange for other.
- C. Temporary service shall be 120/240 volt, single phase, three wire plus ground. Temporary electric service distribution panel shall be located in a weather tight enclosure with globe and guard **LED or CFL** lighting fixture, light switch, receptacle, and locked doors by the Subcontractor. The size and capacity of service,

(i.e., 120/208 or 120/240 volt) is to be reviewed with the Construction Manager and Owner for approval prior to installation.

- D. Electrical Subcontractor shall provide the following temporary lighting and power distribution system for this Project.
  - 1) Prior to the start of work, the Electrical Subcontractor shall provide and maintain service locations throughout the building such that any point in the building may be reached with a 100 ft. extension cord. As partitions are completed, service locations shall be added and/or relocated to maintain the capacity of reaching any point in the building with a 100 ft. Extension cord. Each service location shall have a minimum of eight (8) ground fault protected duplex receptacles, and fed by a minimum of four (4) 20 amp circuits.
  - 2) As the building structure is completed, Electrical Subcontractor shall provide and maintain throughout the building, 20 amp, 120 volt grounded circuits of non-metallic sheathed cable supplying one (1) lamp holder for each 500 square feet of floor area. As partitions are completed, lamp holders shall be added and/or relocated to provide (1) each for each 100 square feet of floor area with a minimum of (1) per room. Each lamp holder shall be furnished with a 150 watt equivalent lamp and guard with no more than (12) such outlets per circuit. Provide timers and lighting controls. Assume LED or fluorescent lighting goes off when no work is underway.
  - 3) The Electrical Subcontractor shall provide and maintain temporary electrical service to the mechanical equipment rooms as required by that Subcontractor for the operation of their equipment for testing.
  - 4) All wire and cable shall be sized to hold voltage drop at all outlets to a maximum of 5% total from transformer.
  - 5) Appropriately rated ground fault detection and interruption devices shall protect circuits and feeders.
- E. Lamps for temporary lighting shall be provided and maintained by the Electrical Subcontractor at his expense. Every temporary lamp outlet must be properly lamped throughout the construction; dark or burned out lamps shall be immediately replaced. Use rough service lamps.
- F. Wiring and associated costs of Subcontractor's offices, trailers, storage facilities, etc., used during construction, shall be the responsibility of the individual Subcontractors requiring same.
- G. Where a Subcontractor requires the use of energy at places other than those herein specified or of an amount greater than would be available from the specified temporary service, the Subcontractor shall make independent arrangement with the Electrical Subcontractor for the service at his own expense.
- H. When permanent facilities are ready for operation, they may be used for temporary light and power if approved by the Construction Manager.
- I. Upon approval of use and completion of the changeover to the permanent electrical system, the Electrical Subcontractor shall remove portions of the temporary electrical service, including power and lighting, distribution and/ or utilization, equipment, and wiring and install firestopping or other approved parching product once temporary systems are removed. Additionally, Electrical Subcontractor shall continue to maintain temporary lighting and shall provide a minimum of one duplex outlet per room throughout the building.
- J. Should the demolition of existing facilities require that the facilities which are to remain be interrupted for a duration of time exceeding one hour, the Electrical Subcontractor for this Project shall provide proper and adequate temporary electrical service to the facilities remaining until such time as permanent service to the remaining facilities can be restored.
- K. It is the intent of the Construction Manager that this temporary power and lighting service be installed immediately upon award to the Electrical Subcontractor. Subcontractors needing power prior to the time that this temporary power service is available shall provide their own temporary power generator equipment at their own expense.

#### 15. TEMPORARY HEATING AFTER BUILDING ENCLOSURE

- A. Heating required after enclosure of the additions or designated portion thereof shall be subject to the approval of the Construction Manager and Architect.

- B. After the building or designated portion have been enclosed and temporary heat is required, as directed by the Architect and the Construction Manager, the HVAC/Mechanical Subcontractor shall provide temporary heat using one or both of the 2 following methods:

1) Method 1 The use of a Permanent Heating System

- a) The permanent heating system may be used for temporary heating where available and if approved by the Architect. If the permanent system is used, the Mechanical Subcontractor shall have installed in their permanent location such fan systems, heating coils, convectors, etc., as approved by the Architect Provide such controls as are necessary to maintain the temperatures required.
- b) Temporary filters shall be used in the permanent system and be replaced with new, permanent, filters at Substantial Completion.
- c) Equipment so used shall be cleaned and restored to new conditions except for ordinary wear, prior to final acceptance, and its use shall in no way negate the Owner's one year warranty specified to commence on the date of Substantial Completion. The HVAC Subcontractor must include costs required for an extended warranty given the above use conditions.

2) Method 2 The use of Individual Portable Units

- a) If the permanent system is not fully operable or does not have sufficient controls to maintain the necessary heat in light of existing conditions, the Mechanical Subcontractor shall provide, maintain, and supervise the operation of Construction Manager approved temporary portable units, such as oil or gas fired unit heaters, furnaces, direct fired make up air units, or similar equipment, no electric heat permitted. Such units shall be properly vented, piped, and wired and shall be provided with thermostat for temperature control and with required safety controls.
- b) Electrical wiring required for temporary heating shall be provided by the Mechanical Subcontractor from temporary wiring service, except that the Electrical Subcontractor will need the wiring to permanent equipment mounted in its permanent location that is used for temporary heating.

C. Cost of Temporary Heating System

- 1) The cost of installing the temporary heating systems in accordance with Method 1 above shall be by the Mechanical Subcontractor. The Mechanical Subcontractor shall include in his base bid the total amount required for the operation and maintenance of the temporary heating system. This cost shall include the equipment, personnel labor, parts, operation, and the maintenance, including periodic checking and operation of the system each night during the work week and during the day and night on Saturdays, Sundays, and holidays for the duration of the actual heating period. The operation and maintenance of the temporary heating system shall be provided from the time of authorization and requirements to start as determined by the Construction Manager until it is determined that temporary heat is no longer required in the building or designated areas.
  - a) The cost of an extended warranty on the heating system components shall be borne by the Mechanical Subcontractor, and included in his base bid as necessary to guarantee that the Owner receives the entire specified warranty for the equipment, commencing on the date of Substantial Completion for the Project.
- 2) The cost of installing the temporary heating systems in accordance with Method 2 above shall be borne by the Mechanical Subcontractor.
- 3) The Owner will pay for the cost of fuel and energy used to operate the temporary heating system in accordance with Method 1 and Method 2 as described above.

16. TEMPORARY VENTILATION

- A. Once building enclosure is obtained, the HVAC/Mechanical Subcontractor shall ventilate enclosed areas to assist in the cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. Each Subcontractor must provide required ventilation to exhaust toxic fumes generated by their work.
- B. Utilize existing ventilation equipment if safe and prudent and only after obtaining Construction Manager approval. Extend and supplement equipment with temporary fan units as required to maintain clean air

for construction operations. Otherwise, provide such temporary ventilation as may be necessary for Subcontractor's operations.

- C. Permanent equipment shall not be used for temporary ventilation unless maintained and operated as follows:
- 1) Return air ducts shall not be used.
  - 2) Supply air to each unit shall be filtered.
  - 3) Permanent filters should be removed, temporary filters used during construction and then replaced prior to turn over.
  - 4) Temporary filters shall be constantly checked and changed when necessary.
  - 5) System is turned over in a clean condition at substantial completion. Provide mechanical duct cleaning if inspection shows evidence of debris or dirt.
  - 6) Operation of permanent equipment for ventilation shall not negate the Owner's warranty specified to commence on the date of Substantial Completion.
  - 7) The cost of an extended warranty on the ventilation system components shall be borne by the Mechanical Subcontractor, and included in his base bid as necessary to guarantee that the Owner receives the entire specified warranty for the equipment, commencing on the date of Substantial Completion for the Project.

#### 17. TEMPORARY WATER SERVICE

- A. The Mechanical Subcontractor for each building shall connect to existing water supply, install permanent meter, and extend temporary water service to temporary taps at locations as directed by the Construction Manager. The Owner shall be responsible for the cost of water used on Project.
- B. The Mechanical Subcontractor shall provide a minimum of 2 (or more if required by Construction Manager) hose bibs with vacuum breakers at each temporary tap. Distribution piping shall be sized to provide sufficient pressure at outlet of 100 ft. hose attached to hose bib. Mechanical Subcontractor shall maintain and service temporary water supply. This shall include, but not limited to, replacement and repair of damaged pipe and equipment due to freezing or other causes.
- C. Mechanical Subcontractor shall install permanent water service as soon as possible and use to supply temporary taps.
- D. Each Subcontractor shall provide his own means of conveying water from temporary water taps to his work.

#### 18. TEMPORARY FIRE PROTECTION

- A. Each Subcontractor shall at all times exercise every precaution for prevention of smoke hazard and fire. Further, each shall make timely and adequate provisions for protection and safety of persons and property in event of fire.
- B. The Subcontractor for the General Trades Work Category shall provide and maintain in working order during construction not less than 4 fire extinguishers conveniently located for proper protection for each new or existing building or separate building addition with floor area having 50,000 sq. ft. or less. One additional fire extinguisher will be provided for each additional 15,000 sq. ft. of floor area. A minimum of two (2) fire extinguishers shall be provided at every floor.
- C. Fire extinguishers provided by the Subcontractor of the General Trades Bid Category and other Subcontractors shall be "all purpose" and not a water type to meet the approval of the Fire Underwriter's laboratory and will be inspected at regular intervals and recharged if necessary.
- D. No open fires shall be permitted. Subcontractors shall not be allowed to start fires with gasoline, kerosene, or other highly flammable materials.
- E. Only fire resistant tarpaulins shall be used on this project.
- F. The permanent fire protection water supply, fire extinguishing equipment, and fire protection system shall be installed at the earliest possible date. Shut down for a minimum period of time as approved by the Construction Manager and Owner. As each sprinkler system is completed and placed in service, the control valve shall be sealed. Permission to break seals and close sprinkler valves shall be given only by the Construction Manager with approval of the Owner.



- G. Subcontractors are notified that combustion engine equipment, tar kettles, and other items causing noxious odors or fumes will not be allowed in the building or near air intake louvers. If location of intake louver locations are in doubt, consult with the Construction Manager.
- H. Whenever work of particularly hazardous nature is being done, party doing such work shall provide additional and/or special fire protection and extended fire watches may be required.
- I. Gas welding equipment may only be used upon written permission of the Construction Manager. Gasoline torches or burners will not be permitted. When welding or flame cutting is permitted, Subcontractor shall provide full time stand-by watchman with fire extinguisher mounted on cart or other means of transportation located immediately adjacent to work and ready for immediate use. This requirement shall be STRICTLY observed and enforced by all Subcontractors.
- J. All combustible trash, refuse, etc., must be removed from site and legally disposed of after each day's work. If Subcontractor fails to comply, Construction Manager will have it removed at Subcontractor's expense. The decision of the Construction Manager shall be final without recourse in that matter.

#### 19. ENVIRONMENTAL PROTECTION

- A. In order to prevent and to provide for abatement and control of environmental pollution arising from the construction activities of the Subcontractor and his subcontractors in the performance of this Contract, they shall comply with applicable federal, state, and local laws, and regulations concerning environmental pollution control and abatement as well as the specific requirements stated elsewhere in the Contract Documents.
- B. No Subcontractor shall pollute water resources with fuels, oils, bitumen's, calcium chloride, acids or harmful materials. It is the responsibility of each Subcontractor to investigate and comply with applicable federal, state, county, and municipal laws concerning pollution of rivers and streams. Work under this Contract shall be performed in water resources through or adjacent to the project areas.
- C. No burning of debris or other material on site will be allowed.

#### 20. MOISTURE, SEDIMENT CONTROL, AND PUMPING

- A. Each Subcontractor shall furnish necessary equipment, take necessary precautions, and assume the entire cost of sediment control, also handling and properly disposing of sewerage, seepage, storm surface, floor, and underground water, and water flows which may be encountered during the construction of his work. The manner of providing sediment control and handling of water or water flows shall meet with the approval of the Owner, and the entire cost of Work shall be included in the Base Bid of Work to be done under each Contract.
- B. Install approved temporary erosion control devices when discharge velocity of pumping equipment causes soil erosion at the point of discharge.
- C. Pumping and disposal of surface water and ground water at foundation excavations is the responsibility of the Subcontractor for excavation of those foundations.
- D. Snow Removal:
  - 1) Subcontractors performing Work under exposed conditions shall cover, protect from, and remove snow and ice as required for the protection and execution of their Work.
  - 2) The CM will arrange for the removal of snow from parking areas and access roads.

#### 21. DEBRIS AND DUST CONTROL

- A. All Subcontractors must exercise caution to prevent debris or dust from blowing onto adjacent areas of the project site, properties or streets. These controls must be exercised from start of construction operations until contract is determined to be complete by Construction Manager and Architect/Engineer.
- B. Prevent empty bags, cartons, or other wrappings from blowing around project site and onto adjacent properties and/or streets.
- C. The Subcontractor assumes all liability for the generation of dirt, dust, sediment, soil or other debris which blow, drift, fall or are otherwise found on any property and which arise from or are in any manner connected with Subcontractor's work on jobsite.

- D. At least once each week or more often as the Construction Manager shall direct, all Subcontractors shall contribute labor and/or funds to thoroughly clean the worksite of trash, debris, dirt, etc.
- E. Refer to Section 01 7000 Execution Requirements

END OF SECTION

## **Section 01 6001 Product Requirements**

1. SECTION INCLUDES
  - A. Related Sections
  - B. Products
  - C. Transportation and Handling
  - D. Storage and Protection
  - E. Product Options
  - F. Substitutions
2. RELATED SECTIONS
  - A. Section 00 2113 Instructions to Bidders
  - B. Section 01 4001 Quality Requirements
  - C. Section 01 5000 Temporary Facilities and Controls
3. PRODUCTS
  - A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
  - B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.
  - C. Provide interchangeable components of the same manufacturer, for similar components.
4. TRANSPORTATION AND HANDLING
  - A. Transport and handle products in accordance with manufacturer's instructions.
  - B. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.
  - C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.
5. STORAGE AND PROTECTION
  - A. Store and protect products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight, climate controlled enclosures.
  - B. Provide off-site storage and protection when site does not permit on-site storage or protection.
  - C. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
  - D. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
  - E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.
6. PRODUCT OPTIONS
  - A. Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:
  - B. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated.
  - C. Semi-proprietary Specification Requirements: Where two or more products or manufacturers are named, provide one of the products or manufacturers indicated. Where one product and manufacturer is named and other manufacturers are listed, the other manufacturer's equivalent product may be acceptable

subject to compliance with Contract requirements, including specifications of the named product, as determined by the Owner's Representative.

- D. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Subcontractor to use of these products or manufacturers only, the Subcontractor may propose any available product that complies with contract requirements. Comply with Contract Document provisions concerning "substitutions" to obtain approval for use of an unnamed product.
- E. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.
- F. Performance Specification Requirements:
  - 1) Where Specifications require compliance with performance requirements, provide products that comply with the requirements, and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.
  - 2) Manufacturer's recommendations may be contained in published product literature, or by the manufacturer's certification of performance.
- G. Compliance with Standards, Codes and Regulations: Where the Specifications only require compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.
- H. Visual Matching: Where Specifications require matching an established Sample, the Owner's Representative decision will be final on whether a proposed product matches satisfactorily.
- I. Visual Selection: Where specified product requirements include the phrase ". . . as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Owner's Representative will select the color, pattern and texture from the product line selected.

## 7. SUBSTITUTIONS

- A. Architect/Engineer will consider requests for Substitutions 10 days prior to bid.
- B. Substitutions may be considered after bids when a product becomes unavailable through no fault of the Subcontractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Subcontractor:
  - 1) Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
  - 2) Will provide the same warranty for the Substitution as for the specified product.
  - 3) Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner or other affected Subcontractors.
  - 4) Waives claims for additional costs or time extension which may subsequently become apparent.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1) Submit electronic copy of the Request for Substitution form for consideration. Limit each request to one proposed Substitution.
  - 2) Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence.
  - 3) The Architect/Engineer will notify the Subcontractor in writing, through the Construction Manager, of their decision to accept or reject request.

END OF SECTION

## Section 01 7001 Execution Requirements

### 1. SECTION INCLUDES

- A. Protection and Restoration
- B. Cutting and Patching
- C. Alteration Project Procedures
- D. Construction Cleaning
- E. Construction Waste Management
- F. Punch List

### 2. PROTECTION & RESTORATION

- A. This section includes, but is not necessarily limited to, responsibilities for the protection, restoration and notification requirements for surface and subsurface structures, underground facilities and surface improvements as indicated on the drawings, as specified herein and as necessary for the proper and complete performance of the work.
- B. Subcontractor whose operations necessitate notifications, protection, or restoration shall be responsible for the work described in this section inclusive of all coordination and cost.
- C. Related Sections: Documents affecting work of this section include, but are not necessarily limited to; General Conditions, Supplementary Conditions and sections in Division 1 of these specifications
- D. Prior to start of construction responsible Subcontractor shall:
  - 1) Notify MISS DIG in advance.
  - 2) Arrange for the identification of the locations of existing underground facilities at or contiguous to the site.
- E. Utility Interruptions:
  - 1) For any period exceeding 2 hours: Provide standby utility service.
  - 2) Provide 48 hours notice to the affected occupants of the time and duration of the anticipated shut off.
  - 3) Notify Fire Department in advance if water main or fire supply line shut off is required.
  - 4) Pay all costs relating to utility interruptions.
- F. Be responsible for:
  - 1) Protection of structures and utilities at or contiguous to the site in accordance with the project General Conditions
  - 2) Cost of cleaning, repair, relocation, raising, lowering, or replacement of structures and utilities which interfere with new work or are damaged as a result of Subcontractor's operations.
  - 3) Temporary sheeting, bracing, poles, cables, sand fill or other means used to support a structure or utility exposed or endangered by Subcontractor's operations.
  - 4) Relocating, raising or lowering of a structure or utility for Subcontractor's convenience.
- G. Relocation of poles and structures:
  - 1) Be responsible for temporary and permanent relocation of power, light, telephone and other service poles and appurtenant structures.
  - 2) Make necessary arrangements with the owner of the pole or structure and pay all costs involved.
- H. Acceptable standards for restoration:
  - 1) Restore to the better of:
    - a) Original condition
    - b) Requirements of the Contract Documents
    - c) Current MDOT Standards
    - d) Property corners, Government survey corners, and plat monuments:
  - 2) Protect from damage or disturbance:
  - 3) Protect discovered points until Engineer or Owner has witnessed or otherwise referenced their locations.

- 4) Replace if disturbed or removed as a result of construction:
    - a) Arrange for replacement by a Registered Land Surveyor
    - b) Pay all costs
    - c) Driving surfaces and similar improvements:
    - d) Repair or replace damaged or removed surfaces as indicated on the drawings and specified herein.
  - 5) Adjust to temporary or final grade all new and existing castings (water valve boxes, manholes, catch basins and similar structures) for all gravel, bituminous or concrete surfacing or resurfacing.
    - a) Landscaping and miscellaneous improvements:
  - 6) Protect from damage by construction operations. In event of damaged, replace any damaged items with one of equivalent type and size.
  - 7) Includes, but is not limited to, topsoil, seeded areas, sodded areas, shrubs, trees, decorative plantings, fences, mailboxes, signs, guard posts and other similar items.
3. Cutting and Patching
- A. Each Subcontractor shall make arrangements with other Subcontractors and the CM for fitting his Work into the general construction. Where the Subcontractor was given sufficient information as to required openings prior to construction, the cost for additional cutting and restoring shall be paid for by the Subcontractor failing to provide the required openings.
    - 1) Each Subcontractor shall be responsible for cutting, fitting, and patching that may be required to complete his work. Subcontractors shall not endanger Work of other Subcontractors by cutting, excavating, or otherwise altering Work: and shall not cut or alter the work of another Subcontractor except with written consent of the CM. Costs caused by defective or ill-timed work shall be borne by the party responsible.
    - 2) Submit written request in advance of cutting or alteration which affects:
    - 3) Structural integrity of any element of Project.
    - 4) Integrity of weather-exposed or moisture-sensitive element.
    - 5) Efficiency, maintenance, or safety of any operational element.
    - 6) Visual qualities of sight exposed elements.
    - 7) Work of Owner or separate contractor.
  - B. Include in request:
    - 1) Identification of Project.
    - 2) Location and description of affected work.
    - 3) Necessity for cutting or alteration.
    - 4) Description of proposed work, and products to be used.
    - 5) Alternatives to cutting and patching.
    - 6) Effect on work of Owner or separate contractors.
    - 7) Written permission of affected separate contractors.
    - 8) Date and time work will be executed.
  - C. Primary Products: Those required for original installation.
  - D. Inspect existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.
  - E. Beginning of cutting or patching means acceptance of existing conditions.
  - F. Provide protection from elements for areas which may be exposed by uncovering work.
  - G. Execute work by methods to avoid damage to other Work, and which will provide appropriate surfaces to receive patching and finishing.
  - H. Cut rigid materials using masonry saw or core drill. Pneumatic tools are not allowed without prior approval. Do not pound or make openings with hammers without approval of Construction Manager.
  - I. Restore work with new products in accordance with requirements of Contract Documents.
  - J. Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

- K. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material to full thickness of the penetrated element, and provide escutcheon plates where exposed.
- L. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit. Patchwork is subject to Construction Manager or Architect approval.
- M. Subcontractors shall coordinate cutting and patching with other Subcontractors to avoid duplication of efforts and to avoid recutting completed work.
- N. Requirements for Structural Work:
  - 1) Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.
  - 2) Prior to removing existing construction, provide temporary sheeting, underpinning, shoring, and bracing to carry the loads and stresses withstood by any removed items. Subcontractor is responsible for the adequacy of same, as well as for any damage to the existing building, or contents thereof, resulting from inadequate sheeting, underpinning, shoring, and bracing.
  - 3) Obtain acceptance of the cutting and patching procedure before cutting and patching structural elements.
- O. Operational and Safety Limitations:
  - 1) Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.
  - 2) Obtain Owner's and/or governing agency approval of the cutting and patching procedure before cutting and patching operating elements of safety related systems.
- P. Visual requirements:
  - 1) Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Owner's Representative's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Work that is cut and patched in a visually unsatisfactory manner shall be removed and replaced.

#### 4. ALTERATION PROJECT PROCEDURES

- A. Verify that demolition is complete, and areas are ready for installation of new Work.
- B. Beginning of restoration Work means acceptance of existing conditions.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, such as rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Subcontractor shall remove existing construction items, materials, etc., noted on drawings to be removed or otherwise required to be removed in order to properly execute any and all remodeling, new construction and related work required for respective work category.
- G. Prepare surface and remove surface finishes to provide for proper installation of new work and finishes.
- H. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Insulate ductwork and piping to prevent condensation in exposed areas.
- I. Coordinate work of alternations and renovations to expedite completion.
- J. Refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat transition to adjacent finishes. Patch or replace portions of existing surface which show imperfections prior to re-finishing.
- K. Where new Work abuts or aligns with existing, perform a smooth and even transition. Patched Work to match existing adjacent Work in texture and appearance.

- L. When finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect/Engineer.
  - M. Where a change of plane of 1/4 inch or more occurs, submit recommendation for providing a smooth transition for Architect/Engineer review.
5. CONSTRUCTION CLEANING
- A. The Work of this Section shall be included as a part of the Contract Documents of each Subcontractor on this Project. Where such Work applies to only one Subcontractor, it shall be defined within the Specification as to which Subcontractor the Work belongs.
  - B. Recognizing that construction processes create large amounts of debris, waste material, dirt and other rubbish and that the accumulation of these products impedes works progress and are a safety hazard, an eyesore, and a violation of local regulations, each Subcontractor who bids and accepts a contract for any portion of the work, accepts the positive responsibility of keeping the work site clean as defined herein and agrees to comply with the spirit as well as the letter of this specification. If in the sole opinion of the Construction Manager, the Subcontractor does not perform clean up satisfactorily, the Construction Manager will order clean up to be done by another source and deduct cost thereof from moneys due to the Subcontractor or among various Subcontractors proportionately in such a manner as seems proper to the Construction Manager.
  - C. The Construction Manager reserves the right to act on behalf of the Owner pertaining to the cleanup responsibility that is a part of each Subcontractor's Work. The cleaning up included in the General Conditions and the statement concerning cleanup which is included in each Subcontractor's Scope of Work will serve as the required notice called for in the General Conditions.
  - D. DAILY DEFINABLE CLEANING
    - 1) Each Subcontractor shall effectively confine dust, dirt, and noise to the actual construction area as approved by the Construction Manager. As debris is created, it will be the responsibility of each Subcontractor to place his recyclables, rubbish and debris into dumpster type containers provided by the Construction Manager. On a daily basis, identifiable debris and waste or recyclable materials will be cleaned up by the Subcontractor responsible for generation of the waste.
    - 2) Housekeeping Directives for definable debris (see sample at the end of this section) will be issued to all Subcontractors not fulfilling their definable debris clean-up responsibilities. If this cleanup is not performed to the satisfaction (evaluating both quality and timing) of the Owner or the Construction Manager, it will be performed by others at the Subcontractor's expense. All charges, including related administrative costs (including a markup of 15%) as incurred by the Construction Manager for definable cleanup completed by the Construction Manager or at their direction will be deducted from the current progress payment due the Subcontractor.
    - 3) Cleaning Equipment (Brooms, Shovels, Barrels, etc.) and accessories (dust masks, etc.,) will be the responsibility of each Subcontractor to provide for their clean up.
  - E. COOPERATIVE CLEANING
    - 1) One day each week (day to be determined by the Construction Manager) and more often if necessary, each Subcontractor shall perform an overall cooperative cleanup of the project, as directed by the Construction Manager. This cooperative cleaning is for purpose of cleaning debris and material from the jobsite. The clean-up will be completed under the direction of the CM in the locations designated by the CM. Cooperative cleanup efforts will involve the required amount of resources from the trades on site during the subject week as determined by the CM.
    - 2) Each Subcontractor working on this Project will provide 4 manhours for each 200 manhours expended per week or fraction thereof. This labor is to be dedicated to indefinable cleanup under the supervision of the Construction Manager. For example:
      - 3) 100 Man hours/wk = 2 hrs. Cleanup.
      - 4) 200 Man hours/wk = 4 hrs. Cleanup.
      - 5) 400 Man hours/wk = 8 hrs. Cleanup.
    - 6) Each Subcontractor will be responsible for providing broom(s) and necessary cleaning equipment (including sweeping compound) for their participant(s) in the cooperative clean ups.



- 7) All Subcontractors failing to participate in the cooperative cleanup will be assessed a financial penalty equivalent to the number of man hours for which they are responsible at a rate of \$50/hour. Subcontractors with tardy participants will be assessed a penalty of \$50. The Construction Manager will supplement the labor for any Subcontractor failing to have a participant at the cooperative cleanup as required.
- 8) The time and location of the cooperative cleanup will be arranged at the Weekly Contractor Meetings. Each Subcontractor will provide to the Construction Manager the names of their participant(s) for the cooperative cleanup.

F. HAZARDS CONTROL

- 1) Store volatile wastes and any other hazardous wastes in covered metal containers, and remove from premises and legally dispose of these wastes daily.
- 2) Prevent accumulation of wastes which create hazardous conditions.
- 3) Provide adequate ventilation during use of volatile or noxious substances.

G. Conduct cleaning and disposal operation to comply with local ordinances and anti-pollution laws.

- 1) Do not burn or bury rubbish and waste materials on project site.
- 2) Do not dispose of volatile wastes (mineral spirits, oil, or paint thinner) or any other hazardous materials in storm or sanitary drains or in any other illegal fashion.
- 3) Do not dispose of any wastes into streams or waterways.

H. Use only cleaning materials recommended by manufacturer of surface to be cleaned. The use of "Green Certified", nonpolluting, low V.O.C. cleaning materials is required.

I. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

J. Each Subcontractor shall perform his respective final clean up and shall leave the project in a clean, neat condition, prior to final acceptance of their work. Scheduling of final cleaning will be at the direction of the Construction Manager.

K. The following are examples, but do not define limits, of cleaning levels required:

- 1) Remove labels which are not required as permanent labels. Clean all permanent labels.
- 2) Clean reflecting and transparent materials, including mirrors and window/door glass to a polished condition, removing substances which are noticeable as vision obscuring materials. Replace broken glass and damaged reflecting and transparent materials.
- 3) Clean exposed exterior and interior hard surfaced finishes, to a dirt free condition, free of dust, stains, films, and similar noticeable distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflection condition.
- 4) Wipe surfaces of mechanical and electrical equipment, ductwork, piping and raceways clean, including elevator equipment and similar equipment; remove excess lubrication and other substances.
- 5) Remove debris and surface dust from limited access spaces including roofs, plenums above ceilings, shafts, chases, trenches, equipment vaults, manholes, attics, and similar spaces.
- 6) Clean concrete floors in non-occupied spaces fine-broom clean.
- 7) Vacuum clean carpeted surfaces and similar soft surfaces. Vacuum, mop, damp wipe and clean all finished hard surfaces.
- 8) Clean plumbing fixtures to a sanitary condition, free of stains, including those resulting from water exposure.
- 9) Clean light fixtures, lenses, and lamps so as to function with full efficiency.
- 10) Clean project site (yard and grounds), including landscaped areas, of litter and foreign substances. Sweep paved areas to a broom clean condition; remove stains, chemical spills, and other foreign deposits by power-washing or as required to achieve a clean surface. Remove all erosion control systems, temporary fencing, and barricades and rake the areas smooth to provide smooth regular transition to adjacent surfaces. Seed said transition area thereafter. Rake grounds, which are neither planted nor paved, to a smooth, even textured surface.

6. CONSTRUCTION WASTE MANAGEMENT

- A. The Construction Manager shall provide and pay for dumpster type rubbish and recycling containers adequate for the project recyclables, waste, debris and rubbish for the life of the project for all

Subcontractors, unless this work is specifically assigned to another trade contractor within their scope of work

- B. Recycled waste and discarded waste are to be tracked, and documented. The responsibility for tracking and documentation will rest with the CM, or be assigned as a specific work category; every Subcontractor at the site is responsible to cooperate with the waste management plan.
- C. Every Subcontractor will plan their work to:
  - 1) Minimize packaging and import of non-essential materials to the site
  - 2) Transport waste to the location(s) designated by the CM as a repository for waste and recyclables
  - 3) Compact or consolidate materials in the collection containers until removal from the site
- D. Recycling is required for all materials as designated by the Construction Manager, minimally: concrete, asphalt, masonry, cardboard, masonry, plastic, and metals.
- E. No demolition material is allowed in the dumpster. Removal of demolition material from the site is the responsibility of the Subcontractor performing said demolition, and when stipulated, demolition debris must be recycled.

#### 7. PUNCH LIST

- A. Each Subcontractor shall prepare and keep his own room by room, item by item, detailed punch list on the job prior to the Architect/Construction Manager's preparation of a project punch list. This punch list is for use by his employees and subcontractors to facilitate completion of the Work. Subcontractor shall submit copy of punch list to Construction Manager within seven (7) days of request or substantial completion whichever is sooner and shall notify Construction Manager upon completion of work.
- B. The Subcontractor's inspection shall be as thorough as possible, in accordance with his desire to provide first class workmanship and maintain good reputation and shall include all Work under his Contract, including that of his subcontractors.
- C. The Architect and/or the Construction Manager shall observe the Work, providing Work on the Subcontractor's punch list has been completed, and prepare the Project Punch List, utilizing PlanGrid Issues, for use by the Subcontractors and their subcontractors to expedite proper completion of the Work.
- D. Each Subcontractor must accomplish his initial and subsequent Project Punch List corrective items within fourteen (14) calendar days of notification of such work. Each Subcontractor shall notify the Construction Manager of his intended schedule to accomplish such Punch List items. If the Subcontractor, for any reason, does not expect to complete his work within this time frame, he shall notify the Construction Manager, in writing, within seven (7) days. On such notification, the Subcontractor must explain his reasons for such delay. Lack of response by the responsible Subcontractor in accomplishing such work will be cause for his work to be assigned to others and all costs expended shall be charged to that Subcontractor. In the interest of the Owner, and to accommodate other Subcontractors, the above procedure will be strictly enforced.

END OF SECTION

# \_\_\_\_\_

## HOUSEKEEPING DIRECTIVE FOR DEFINABLE DEBRIS

PROJECT: \_\_\_\_\_ DATE: \_\_\_\_\_

LOCATION: \_\_\_\_\_ PROJECT NO.: \_\_\_\_\_

TO: \_\_\_\_\_

SUPT: \_\_\_\_\_

The Michigan Occupational Safety and Health Act of 1991, Part 1, Paragraph R408.40119, Rule 119 requires that all projects be kept free from unnecessary debris. The Contract Documents (Section 01 7000) also state that you are required to remove your own debris daily and as directed by Granger Construction.

Accordingly, you are hereby directed to take the following Housekeeping Action.

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If this directive is NOT satisfied by \_\_\_\_\_ o'clock on \_\_\_\_\_, the debris will be removed by others and all costs associated thereto will be deducted from your current partial payment due.

Thank you for your immediate cooperation.

By: \_\_\_\_\_

GRANGER CONSTRUCTION

### Acknowledgment of Completion

Subcontractor: \_\_\_\_\_

Date: \_\_\_\_\_

Granger Construction \_\_\_\_\_

Date: \_\_\_\_\_

## **Section 01 7700 Closeout Procedures**

1. This Section Includes:
  - A. Related Sections
  - B. Starting Systems
  - C. Project Record Documents
  - D. Operations and Maintenance Manuals
  - E. Owner Training and Demonstration
  - F. Guarantees & Warranties
  - G. Substantial Completion
  - H. Final Completion and Final Payment
2. Related Sections
  - A. Section 01 1100 Summary of Work and Use of Premises
  - B. Section 01 3210 Project Scheduling
  - C. Section 01 5000 Temporary Facilities and Controls
  - D. Section 01 7001 Execution Requirements
3. Starting Systems
  - A. Coordinate schedule for start-up of various equipment and systems.
  - B. Notify Architect/Engineer seven days prior to start-up of each item.
  - C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage. Record evidence and data.
  - D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer. Record evidence and data.
  - E. Verify wiring and support components for equipment are complete and tested. Record evidence and data.
  - F. Execute start-up in accordance with manufacturer's instructions. Record evidence of full compliance with C, D, and E above, in a written start-up test report for each piece of equipment and for each system as a whole, within the O & M manual required in Section 01 7700 Closeout Procedures.
  - G. Employ, and pay for services of an independent firm to perform testing, adjusting and balancing.
  - H. Adjust operating products and equipment to ensure smooth and unhindered operation, operating within tolerances/ranges and in full compliance with manufacturers printed operating instructions.
  - I. Provide manufacturers' printed instructions for start-up, adjusting, include description of equipment, method of operation and control including motors, pump units, signals, and special or non-standard features provided.
  - J. Provide schematic diagrams covering electrical equipment installed, including changes made in final work, with symbols listed corresponding to identity of markings on equipment.
  - K. Compile information as required by provisions of Section 01 7001 Execution Requirements.
  - L. Provide factory authorized representative training services to the Owner's designated personnel.
4. Project Record Documents
  - A. Refer to Section 01 3000 Administrative Requirements for maintaining project records documents during construction.
  - B. Maintain within PlanGrid, the following record documents; record actual revisions to the Work:
    - 1) Contract Drawings
    - 2) Specifications

- C. Store Record Documents separate from documents used for construction.
  - D. Each Subcontractor shall update "Project Record" drawings within PlanGrid using the Mark-up Tool. Drawings shall incorporate changes made in the Work of the respective trades during the construction period. Such changes shall be indicated at the time they occur.
  - E. Each Subcontractor also shall maintain one copy of specifications, addenda, approved shop drawings, change orders, field orders, other contract modifications, and other approved documents, product data and samples submitted by the Subcontractor, in compliance with various sections of the specifications.
  - F. Specifications: Legibly mark and record at each Product section description of actual Products installed, including the following:
    - 1) Manufacturer's name and product model and number.
    - 2) Product substitutions or alternates utilized.
    - 3) Changes made by Addenda and Modifications.
  - G. Each of these project record documents shall be clearly marked "Project Record Copy"; maintained in good condition; available for observation by the Architect; and shall not be used for construction purposes. Mark up the document to show:
    - 1) Significant changes and selections made during the construction process; date each notation
    - 2) Significant detail not shown in the original Contract Documents including change orders;
    - 3) The physically measured location of underground utilities and appurtenances dimensionally referenced to permanent surface improvements;
    - 4) The location of internal utilities and appurtenances concealed in building structures, referenced to visible and accessible features of the structures;
    - 5) When elements are placed exactly as shown on Drawings, so indicate; otherwise show location and including dimensions of all elements whose location has changed from the design.
  - H. Prior to final payment on the Project, submit through the Construction Manager to the Architect the "Project Record" Drawings for changes recorded for the Work of Civil, Structural, Architectural (including Finishes and Elevations).
  - I. Prior to final completion, the Subcontractors for Mechanical Work and Electrical Work shall update their working drawings with changes made in his Work.
    - 1) Each drawing shall show final location routing of piping, ductwork (including size), conduits, circuitry, valves, operators, actuators, etc.
5. Operation and Maintenance Manuals
- A. Immediately upon receipt of approved shop drawings/product data, each Subcontractor shall submit to the Construction Manager an electronic copy of a comprehensive Maintenance and Operating Manual, presenting complete directions and recommendations for the proper care and maintenance of visible surfaces as well as maintenance and operating instructions for equipment items which he has provided.
  - B. At a minimum, the Operation and Maintenance Manuals will contain:
    - Manual index cross referencing specification numbers for each item
    - Operating instructions
    - Emergency instructions
    - Spare parts list
    - Copies of warranties
    - Wiring diagrams
    - Recommended maintenance procedures and "turn around" cycles
    - Manual index cross referencing specification numbers for each item
    - Operating instructions
    - Emergency instructions
    - Spare parts list
    - Copies of warranties
    - Wiring diagrams
    - Recommended maintenance procedures and "turn around" cycles
    - Inspection and system-test procedures
    - Copies of applicable Shop Drawings

- Copies of applicable Product Data
  - Fixture lamping schedule
  - Maintenance drawings and diagrams
  - Listing of required maintenance materials
  - Precautions against improper maintenance
  - Names and addresses of nearest service outlets, distributors, or factory outlets for each piece of equipment.
- C. Operating instructions shall include necessary printed directions for correct operations, adjustment, servicing, and maintenance of movable parts. Operating instructions must include complete integration of new systems with existing systems and how they are to operate together, in series, sequence, etc. Also included shall be suitable parts lists, approved shop drawings, and diagrams showing parts location and assembly.
- D. Finished manuals shall be electronic documents with bookmarks identifying each particular portion or item of the Work.
- E. For each titled item or work portion, manual must provide the names, addresses, and phone numbers of the following parties:
- 1) Subcontractor/installer
  - 2) Manufacturer
  - 3) Nearest dealer/supplier
  - 4) Nearest agency capable of supplying parts and service
- F. Each electronic file shall indicate the following information on the first page.
- 1) Project name and address
  - 2) Owner's name
  - 3) Name and address of Architect
  - 4) Name and address of Construction Manager
  - 5) Name and address of Subcontractor
  - 6) Date of submission
6. OWNER TRAINING AND DEMONSTRATION
- A. Owner Training shall minimally include a detailed review of the following items:
- Maintenance manuals
  - Record documents
  - Spare parts and materials
  - Special Tools
  - Lubricants
  - Fuels
  - Identification Systems
  - Control sequences
  - Hazards
  - Cleaning
  - Warranties and bonds
  - Maintenance agreements & similar continuing commitments
- B. As part of instruction for operating equipment, demonstrate the following procedures:
- Start-up
  - Shutdown
  - Emergency operations
  - Noise and vibration adjustments
  - Safety procedures
  - Economy and efficiency adjustments
  - Effective energy utilization
7. Guarantees and Warranties

- A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturer's standard warranties on products and special warranties.
  - 1) Refer to the Supplementary General Conditions for terms of the Subcontractor's special warranty of workmanship and materials.
  - 2) Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Specification Divisions 2 through 33.
  - 3) Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.
- B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Subcontractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Subcontractor.
- C. The Term "Warranty": As defined in the AIA "Glossary of Construction Industry Terms", May 1991 edition: "A warranty is a legally enforceable assurance of quality or performance of a product or Work, or the duration of satisfactory performance".
- D. Standard Product Warranties: Standard Project Warranties are preprinted written warranties published by individual manufacturers for particular products and where indicated are specifically endorsed by the manufacturer to the Owner.
- E. Special Warranties: Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the Owner. Refer to "Form of Special Warranty" elsewhere herein.
- F. General Warranty Requirements and Guarantee Requirements
  - 1) All materials and workmanship provided under this contract shall be guaranteed and warranted for a period of not less than one year (unless specified for a different duration herein) to perform, function and appear as specified.
  - 2) Provide written guarantee covering all correction of work required by General Conditions and Supplementary Conditions. Also provide all special guarantees required per specification Divisions 2 through 33.
  - 3) Unless specifically stated otherwise in the specifications, the time period for all guarantees, warranties, etc., required by Contract Documents shall begin on date indicated for Certificate of Substantial Completion. If permanent equipment is to be used for temporary service (heating, cooling, ventilation, etc.) during construction, include in your base contract the purchase of extended warranty(ies).
  - 4) Subcontractor must review, endorse and countersign all written guarantees provided by his sub-subcontractors and/or material suppliers, and shall be fully bound to and obligated by all conditions thereof.
  - 5) Subcontractor shall submit letter to Construction Manager stating requirements to maintain warranty. Letter to include requirements of periodic inspections schedule by manufacturing representatives, notification process and common items that may void warranty
- G. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.
- H. Reinstatement of Warranty: When Work covered by a warranty has failed and has been corrected by replacement or building, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty.
- I. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Subcontractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.
- J. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty

periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

K. Rejection of Warranties:

- 1) The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.
- 2) The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitment are willing to do so.
- 3) In the event repairs become necessary, written notice will be given to the Subcontractor to make same. Failure of the Subcontractor to commence such repairs within 48 hours for environmental equipment, such as heating, air conditioning, air handling, water systems, and within 30 days for all other work, except as noted in specific sections; after such notice, the Owner/CM may make the repairs either by its own employees or by independent contract and may thereupon recover from the Subcontractor and its sureties, the cost of the repairs so made together with the cost of the supervision and inspection thereof. The Owner will have sixty (60) days after the expiration of said warranty period in which to notify the Subcontractor of any such repairs necessary on the date of such expiration. The determination of the necessity for repairs shall rest entirely with the Owner's Representative whose decision upon the matter shall be final and obligatory upon the Subcontractor.
- 4) Warranty Issues will be assigned and tracked using PlanGrid Issues. All Subcontractors must maintain their PlanGrid subscription for the complete duration of the warranty period.

L. Submit sample warranty with all original submittals at the beginning of the project for review with product data as per Section 01 3300 Electronic Submittal Procedures and Section 01 3301 Submittal Procedures.

M. Submit final written warranties endorsed by the manufacturer and the Subcontractor to the Construction Manager prior to the date determined for Substantial Completion. These final written warranties will include all specific warranties, whether they are "special" or "standard".

N. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Construction Manager.

O. When a special warranty is required to be executed by the Contractor, or the Contractor and subcontractor, supplier or manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Construction Manager for approval along with original submittal prior to final execution.

P. Form of Submittal:

- 1) At Final Completion, compile electronic copies of each required warranty and bond properly executed by the Subcontractor, or by the Contractor, subcontractor, supplier, or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.
- 2) When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

8. Substantial Completion

A. Prior to requesting Architect/Engineer inspection for certification of Substantial Completion (for either entire Work or portions thereof), complete the following and list known exceptions in request:

- 1) Provide certification that Work is substantially complete along with Subcontractor's punch list specifying incomplete items, reasons the Work is incomplete, by what date and what action is being taken to complete any open items.
- 2) Advise Owner of pending insurance changeover requirements.
- 3) Submit specific warranties, workmanship/maintenance bonds, maintenance agreements, agreements, final certifications, and similar documents.
- 4) Obtain and submit releases enabling Owner's full and unrestricted use of the work and access to services and utilities, including occupancy permits, final inspection certificates, Fire Marshal Affidavits, and similar releases. e.g. Certification of code compliance, certificates of inspection and approvals for: mechanical, electrical, boilers, public health, and others as required.
- 5) Deliver tools, spare parts, extra stocks of materials, and similar physical items to CM.



- 6) Make final changeover of locks and transmit keys to CM and advise CM/Owner's personnel of changeover in security provisions.
  - 7) Complete start up testing of systems and instructions of Owner's operating/maintenance personnel. Discontinue and remove from project site, temporary facilities and services, along with construction tools and facilities, mock-ups, and similar elements.
  - 8) Complete final cleaning requirements.
  - 9) Submit record drawings and similar record information.
  - 10) Submit certification stating that no materials containing asbestos or other recognized hazardous materials were incorporated into the Work.
- B. Upon request by the Owner, the Architect will make an inspection to determine the status of completion.
  - C. When the Architect, on basis of inspection, concurs that the work is substantially complete, he will:
    - 1) Prepare a Certificate of Substantial Completion of AIA Form G704, accompanied by Contractor's list of items to be completed or corrected, as verified and amended by the Architect.
    - 2) Submit the Certificate to Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.
9. Final Completion and Final Payment
- A. Refer to Payment and Completion Article of Supplementary Conditions.
  - B. Meet all requirements for Substantial Completion listed above.
  - C. When the Contractor considers that the work is complete, he shall submit written notice to the Architect that the Work is ready for final inspection and acceptance, include a final Application for Payment.
  - D. Prior to requesting Architect/Engineer inspection for final completion and final payment, complete the following:
    - 1) Final itemized punch list of work to be completed or corrected, certifying that each item has been completed or otherwise resolved for acceptance.
    - 2) Record drawings and similar final record information.
    - 3) Certification of code compliance. Submit certificates of inspection and approvals for: mechanical, electrical, boilers, public health, and others as required.
    - 4) Submit certification stating that no materials containing asbestos or other recognized hazardous materials were incorporated into the Work.
    - 5) Complete Construction Manager accounting department final close-out requirements including, but not limited to:
      - a) final payment request
      - b) final waivers
      - c) release of all claims
      - d) consent of bonding surety to final payment
      - e) Final Reconciliation of Accounts accounting for changes to the Contract Sum and payments
    - 6) All guarantees and warranties
    - 7) Evidence of continuing insurance coverage complying with insurance requirements.
  - E. The Architect will make an inspection to verify the status of completion with reasonable promptness.
  - F. When the Architect finds the Work acceptable under the Contract Documents, he will issue a Project Certificate for Payment that will approve the final payment due the Contractor.

END OF SECTION



DEXTER COMMUNITY SCHOOLS

## **Specifications Manual**

**Dexter Multi-Building  
Mechanical Renovations**

**Issued for Pre-Purchase**



**Peter Basso Associates Inc**  
CONSULTING ENGINEERS

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**PBA Project No. 2022.0011.00  
February 14, 2022**

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Division	Section Title
----------	---------------

**SPECIFICATIONS GROUP**

***Facility Services Subgroup***

**DIVISION 20 – MECHANICAL GENERAL REQUIREMENTS**

- 20 0513 MOTORS
- 20 2923 VARIABLE FREQUENCY CONTROLLERS

**DIVISION 22 - PLUMBING**

- 22 3410 CONDENSING FUEL-FIRED DOMESTIC WATER HEATERS

**DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC)**

- 23 2123 HYDRONIC PUMPS
- 23 3423 POWER VENTILATORS
- 23 5216 CONDENSING BOILERS
- 23 6416 CENTRIFUGAL WATER CHILLERS
- 23 7333 INDIRECT- FIRED H&V UNITS
- 23 7600 CLOSED CIRCUIT FLUID COOLERS
- 23 8121 COMMERCIAL ROOFTOP AIR CONDITIONERS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 "Mechanical General Requirements."
  - 2. Division 20 Section "Mechanical Vibration Controls" for mounting motors and vibration isolation devices.
  - 3. Division 20 Section "Variable Frequency Controllers".
  - 4. Division 21, 22, and 23 Sections for application of motors and reference to specific motor requirements for motor-driven equipment.
  - 5. Division 26 Section "Enclosed Switches and Circuit Breakers".
  - 6. Division 26 Section "Enclosed Controllers".
  - 7. Division 26 Section "Fuses".

1.2 SUMMARY

- A. This Section includes basic requirements for factory-installed and field-installed motors, enclosed controllers, disconnect switches, and fuses.

1.3 DEFINITIONS

- A. ABMA: American Bearing Manufacturers Association. (Formerly AFBMA: Anti-Friction Bearing Manufacturers Association.)

- B. Factory-Installed Motor: A motor installed by motorized-equipment manufacturer as a component of equipment.
- C. Field-Installed Motor: A motor installed at Project site and not factory installed as an integral component of motorized equipment.
- D. Packaged Self Contained Equipment: Equipment which includes component mechanical and electrical equipment mounted on common bases, skids or frames or in common enclosures with internal control and power wiring factory installed and ready to accept a single electrical service connection. Provide the equipment complete with enclosed controllers, main disconnect switches, control transformers, control devices, wiring and accessories as required.

#### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.

#### 1.5 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices. Provide motors that are:
  - 1. Compatible with the following:
    - a. Magnetic controllers.
    - b. Multispeed controllers.
    - c. Reduced-voltage controllers.
    - d. Solid-state controllers.
    - e. Variable frequency controllers.
  - 2. Designed and labeled for use with variable frequency controllers, and suitable for use throughout speed range without overheating.
  - 3. Matched to torque and horsepower requirements of the load.
  - 4. Matched to ratings and characteristics of supply circuit and required control sequence.
- B. Coordinate electrical scope of work to be provided by Division 20, 21, 22, and 23 with this Section, related Division 20, 21, 22, and 23 Specifications, Division 26 Specifications and the Drawings.
- C. Electrical work provided under Division 20, 21, 22, and 23: Furnish UL Listed components in accordance with this section, Division 26, and applicable NEMA and NEC (ANSI C 1) requirements. Provide wiring, external to electrical enclosures, in conduit.
- D. Furnished, installed and wired under Division 20, 21, 22, and 23 unless otherwise indicated:
  - 1. Disconnected components in packaged self-contained equipment that are so constructed that components of wiring must be disconnected for shipment and reconnected after installation.
- E. Furnished and installed under Division 20, 21, 22, and 23 and wired under Division 26 unless otherwise indicated:
  - 1. Motors required for mechanical equipment
  - 2. Packaged Self-Contained Equipment:

- a. Provide equipment ready to accept a single electrical service connection.
  - b. For equipment with remote mounted control panels, provide mounting of the control panel and external wiring from the control panel to the package self-contained equipment.
3. Variable frequency controllers.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:

1. Dayton.
2. Toshiba Intl.
3. Baldor Electric/Reliance.
4. Rockwell Automation/Allen-Bradley.
5. Nidec Motor Corporation; U.S. Electrical Motors.
6. Regal Beloit/GE Commercial Motors.
7. Regal Beloit/Leeson.
8. Regal Beloit/Marathon.
9. Siemens.

### 2.2 MOTOR REQUIREMENTS

- A. Motor requirements apply to factory-installed motors except as follows:
1. Different ratings, performance, or characteristics for a motor are specified in another Section.
  2. Manufacturer for a factory-installed motor requires ratings, performance, or characteristics, other than those specified in this Section, to meet performance specified.
  3. Submersible motors integral to pumps and excluded from NEMA and EISA standards.
- B. Electrical Power Supply Characteristics: Coordinate electrical system requirements with Division 26.
- C. Electrical Power System Characteristics: As scheduled on the Drawings.
- D. Electrical Connection: Conduit connection boxes, threaded for conduit. For fractional horsepower motors where connection is made directly, provide screwed conduit connection in end frame.

### 2.3 MOTOR CHARACTERISTICS

- A. Motors 1/2 HP and Larger: Three phase, unless otherwise indicated.
- B. Motors Smaller Than 1/2 HP: Single phase, unless otherwise indicated.
- C. Frequency Rating: 60 Hz.
- D. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected.
- E. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 3300 feet above sea level.

- F. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
- G. Brake Horsepower Input: Shall not exceed 90 percent of the rated motor horsepower.
- H. Enclosure: Open dripproof (ODP) for motors installed indoors and out of the airstream. Totally-enclosed fan-cooled (TEFC) for motors installed outdoors or within the airstream.

## 2.4 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Fire pump motors, C-face motors, JP and JM frame motors, and motors over 200 horsepower shall be energy efficient motors. Efficiency of the motor shall be determined based on the NEMA MG1. The minimum efficiencies, nominal efficiencies and shall meet or exceed Table 12-11.

1800 RPM OPEN DRIP-PROOF MOTORS 4 POLE			1800 RPM ENCLOSED MOTORS 4 POLE	
HP	NOMINAL EFF	MINIMUM EFF	NOMINAL EFF	MINIMUM EFF
1	82.5	81.5	82.5	81.5
1.5	84	82.5	84	82.5
2	84	82.5	84	82.5
3	86.5	85.5	87.5	86.5
5	87.5	86.5	87.5	86.5
7.5	88.5	87.5	89.5	88.5
10	89.5	88.5	89.5	88.5
15	91	90.2	91	90.2
20	91	90.2	91	90.2
25	91.7	91	92.4	91.7
30	92.4	91.7	92.4	91.7
40	93	92.4	93	92.4
50	93	92.4	93	93
60	93.6	93	93.6	93
75	94.1	93.6	94.1	93.6
100	94.1	93.6	94.5	94.1
125	94.5	94.1	94.5	94.1
150	95	94.5	95	94.5
200	95	94.5	95	94.5

1200 RPM OPEN DRIP-PROOF MOTORS 6 POLE			3600 RPM OPEN DRIPPROOF MOTORS 2 POLE	
HP	NOMINAL EFF	MINIMUM EFF	NOMINAL EFF	MINIMUM EFF
1	80	78.5	--	--
1.5	84	82.5	82.5	81.5
2	85.5	84	84	82.5
3	86.5	85.5	84	82.5
5	87.5	86.5	85.5	84
7.5	88.5	87.5	85.5	86.5
10	90.2	89.5	88.5	87.5
15	90.2	89.5	89.5	88.5
20	91	90.2	90.2	89.5

1800 RPM OPEN DRIP-PROOF MOTORS 4 POLE			1800 RPM ENCLOSED MOTORS 4 POLE		
HP	NOMINAL EFF	MINIMUM EFF	NOMINAL EFF	MINIMUM EFF	
25	91.7	91	91	90.2	
30	92.4	91.7	91	90.2	
40	93	92.4	91.7	91	
50	93	93	92.4	91.7	
60	93.6	93	93	92.4	
75	93.6	93	93	92.4	
100	94.1	93.6	93	92.4	
125	94.1	93.6	93.6	93	
150	94.5	94.1	93.6	93	
200	94.5	94.1	94.5	94.1	

- C. Efficiency: Motors 1 horsepower to 200 horsepower shall be premium efficient motors meeting requirements of NEMA Premium Efficiency Motor Program. Efficiency of the motor shall be determined based on the NEMA MG1. The nominal efficiencies shall meet or exceed Table 12-12.

Nominal Efficiencies For "NEMA Premium™" Induction Motors  
Rated 600 Volts or Less (Random Wound)

Open Drip-Proof				Totally Enclosed Fan-Cooled		
HP	6-pole	4-pole	2-pole	6-pole	4-pole	2-pole
1	82.5	85.5	77.0	82.5	85.5	77.0
1.5	86.5	86.5	84.0	87.5	86.5	84.0
2	87.5	86.5	85.5	88.5	86.5	85.5
3	88.5	89.5	85.5	89.5	89.5	86.5
5	89.5	89.5	86.5	89.5	89.5	88.5
7.5	90.2	91.0	88.5	91.0	91.7	89.5
10	91.7	91.7	89.5	91.0	91.7	90.2
15	91.7	93.0	90.2	91.7	92.4	91.0
20	92.4	93.0	91.0	91.7	93.0	91.0
25	93.0	93.6	91.7	93.0	93.6	91.7
30	93.6	94.1	91.7	93.0	93.6	91.7
40	94.1	94.1	92.4	94.1	94.1	92.4
50	94.1	94.5	93.0	94.1	94.5	93.0
60	94.5	95.0	93.6	94.5	95.0	93.6
75	94.5	95.0	93.6	94.5	95.4	93.6
100	95.0	95.4	93.6	95.0	95.4	94.1
125	95.0	95.4	94.1	95.0	95.4	95.0
150	95.4	95.8	94.1	95.8	95.8	95.0
200	95.4	95.8	95.0	95.8	96.2	95.4

Nominal Efficiencies For "NEMA Premium™" Induction Motors  
Rated Medium Volts for 5kV or Less (Form Wound)

Open Drip-Proof				Totally Enclosed Fan-Cooled		
HP	6-pole	4-pole	2-pole	6-pole	4-pole	2-pole
250	95.0	95.0	94.5	95.0	95.0	95.0
300	95.0	95.0	94.5	95.0	95.0	95.0
350	95.0	95.0	94.5	95.0	95.0	95.0
400	95.0	95.0	94.5	95.0	95.0	95.0
450	95.0	95.0	94.5	95.0	95.0	95.0
500	95.0	95.0	94.5	95.0	95.0	95.0



- D. Stator: Copper windings, unless otherwise indicated.
  - 1. Multispeed motors shall have separate winding for each speed.
- E. Rotor: Squirrel cage, unless otherwise indicated.
- F. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA 9, L-10 life of 120,000 hours. Calculate bearing load with NEMA minimum V- belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- G. Temperature Rise: Match insulation rating, unless otherwise indicated.
- H. Insulation: Class F, unless otherwise indicated.
- I. Code Letter Designation:
  - 1. Motors 10 HP and Larger: NEMA starting Code (KVA Code) F or G.
  - 2. Motors Smaller Than 10 HP: Manufacturer's standard starting characteristic.
- J. Enclosure: Cast iron for motors 7.5 hp and larger; rolled steel for motors smaller than 7.5 hp.
  - 1. Finish: Gray enamel.
- K. Sound Level: Not to exceed NEMA MG-1 12.54.

## 2.5 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

- A. Motors Used with Reduced-Inrush Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
  - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
  - 2. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
- C. Shaft Grounding: Provide a means to protect motor from common mode currents.
  - 1. Required for:
    - a. Motors used with variable frequency controllers.
    - b. Motors 100 HP and larger.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Electro Static Technology, Inc.; Aegis SGR Conductive Microfiber.
- D. Severe-Duty Motors: Totally enclosed, with 1.25 minimum service factor, greased bearings, integral condensate drains, and capped relief vents. Windings insulated with nonhygroscopic material.
  - 1. Finish: Chemical-resistant paint over corrosion-resistant primer.
- E. Source Quality Control: Perform the following tests on each motor according to NEMA MG 1:

1. Measure winding resistance.
2. Read no-load current and speed at rated voltage and frequency.
3. Measure locked rotor current at rated frequency.
4. Perform high-potential test.

## 2.6 SINGLE-PHASE MOTORS

- A. Type: One of the following, to suit starting torque and requirements of specific motor application:
1. Permanent-split capacitor.
  2. Split-phase start, capacitor run.
  3. Capacitor start, capacitor run.
- B. Shaded-Pole Motors: For motors 1/20 hp and smaller only.
- C. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.
- D. Bearings: Ball type for belt-connected motors and other motors with high radial forces on motor shaft; sealed, prelubricated-sleeve type for other single-phase motors.

## 2.7 ENCLOSED CONTROLLERS

- A. Provide enclosed controllers in accordance with requirements specified in Division 26 Section "Enclosed Controllers".

## 2.8 ENCLOSED SWITCHES AND CIRCUIT BREAKERS

- A. Provide enclosed switches and circuit breakers in accordance with requirements specified in Division 26 Section "Enclosed Switches and Circuit Breakers".

## 2.9 FUSES

- A. Provide fuses in accordance with requirements specified in Division 26 Section "Fuses".

# PART 3 - EXECUTION

## 3.1 FIELD QUALITY CONTROL

- A. All three phase motors 1/2 HP and above shall be tested by the Testing Agency.
- B. Prepare for acceptance tests as follows:
1. Check motor nameplates for horsepower, speed, phase and voltage.
  2. Check coupling alignment and shaft end play.
  3. Run each motor with its controller. Demonstrate correct rotation, alignment, and speed at motor design load.
  4. Test interlocks and control features for proper operation.
  5. Verify that current in each phase is within nameplate rating.

- C. Testing: Engage a qualified testing agency to perform the following field quality-control testing:

### 3.2 ADJUSTING

- A. Align motors, bases, shafts, pulleys and belts. Tension belts according to manufacturer's written instructions.

### 3.3 CLEANING

- A. After completing equipment installation, inspect unit components. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.
- B. Clean motors, on completion of installation, according to manufacturer's written instructions.

END OF SECTION 20 0513

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 01 specification sections, apply to work of this section.

1.2 REFERENCES

- A. ABMA 9 - Load Ratings and Fatigue Life for Ball Bearings.
- B. ABMA 11 - Load Ratings and Fatigue Life for Roller Bearings.
- C. ANSI/IEEE 112 - Test Procedure for Polyphase Induction Motors and Generators.
- D. ANSI/NEMA MG 1 - Motors and Generators.
- E. ANSI/NFPA 70 - National Electrical Code.
- F. IEEE 519 (1992) - Applicability to Adjustable Frequency Controllers.

1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. EMI: Electromagnetic interference.
- C. LED: Light-emitting diode.
- D. RFI: Radio-frequency interference.
- E. THD: Total harmonic disturbance.

- F. VFC: Variable frequency controller. Variable frequency controllers may also be referred to as variable speed drives, variable frequency drives, VSDs, or VFDs in other Specification Sections or on the Drawings.

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 20 Section "Mechanical General Requirements" and as supplemented in this section.
- B. Submit for review, drawings indicating power, control and instrument wiring including ladder diagrams for field work as well as factory assembled work. Manufacturer's drawings are acceptable only when modified and supplemented to reflect project conditions. The drawings shall include:
  - 1. Overall schematic (elementary) diagram in JIC form of the entire system of power and control circuitry. Indicate interfaces with control wiring by temperature controls contractor.
  - 2. Wiring diagrams showing the wiring layout of component assemblies or systems.
  - 3. Interconnection wiring diagrams showing terminations of interconnecting conductors between component assemblies, systems, control devices, and control panels complete with conductor identification, number of conductors, conductor and conduit size.
  - 4. Sequence of operation for components, assemblies or systems.
  - 5. Dimensional data.
- C. Shop drawings for motor-driven equipment shall be accompanied by complete information concerning the respective motors including the following.
  - 1. Principal dimensions.
  - 2. Weights.
  - 3. Horsepower.
  - 4. Voltage, phase, frequency.
  - 5. Speed.
  - 6. Class of insulation.
  - 7. Enclosure type.
  - 8. Frame.
  - 9. Bearings including AFBMA Rating Life (L-10 basis).
  - 10. Design letter.
  - 11. Manufacturer.
  - 12. Service Factor
- D. Descriptive data shall include catalogues, guaranteed performance data with efficiency and power factor indicated at 75 percent and 100 percent of rated load and verification of conformance with other requirements of the Contract Documents. The information enumerated under NEMA MG1 Paragraph MG1-10.38, shall be arranged on one sheet for each motor.

#### 1.5 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Comply with NFPA 70.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

1.7 COORDINATION

- A. Coordinate with temperature controls contractor for interfaces with temperature controls wiring.

1.8 WARRANTY

- A. Warranty shall be 36 months from date of project acceptance. The warranty shall include all parts, labor, travel time and expenses.

PART 2 - PRODUCTS

2.1 GENERAL

- A. For Electrical Work Provided under Division 20, 21, 22, and 23 Specifications: Furnish UL Listed components, in accordance with Division 26 Specifications and applicable NEMA and NEC (ANSI C1) requirements. Provide wiring, external to electrical enclosures, in conduit.
- B. Electrical Power Supply Characteristics: 480 volts, 208 volts, 3 phase, 60 hertz (Hz).
- C. Provide Electrical Work required for the operation of components and assemblies provided as part of the Work under Division 20, 21, 22, and 23 Specifications.
- D. Mount line voltage (120 VAC) control components specified as part of the Work under Division 20, 21, 22, and 23 Specifications.
- E. Refer to ELECTRICAL DRAWINGS and Division 26 Specifications for specified information regarding provisions for the arrangement of electrical circuits and components and for interface with Work specified under Division 20, 21, 22, and 23 Specifications.
- F. The controller(s) shall be suitable for use with any standard NEMA-B squirrel-cage induction motor(s) having a 1.15 Service Factor. At any time in the future, it shall be possible to substitute any standard motor (equivalent horsepower, voltage and RPM) in the field.
- G. Electrical testing of motors is specified as part of the Work under Division 26 Specifications.
- H. The mechanical contractor shall furnish and install the variable frequency controller. Electrical trades shall make power connections to both load and line side of the VFC.

2.2 MOTORS

- A. Refer to Division 20 Section "Motors."

2.3 VARIABLE FREQUENCY CONTROLLERS

- A. Variable Frequency Controller Manufacturers:
  - 1. ABB Group.
  - 2. Danfoss.
  - 3. Eaton Corporation.
  - 4. General Electric.
  - 5. Hitachi America, Ltd.
  - 6. Johnson Controls Incorporated (Private labeled ABB).

7. Mitsubishi Electric Automation, Inc.
  8. Square D; Schneider Electric.
  9. Toshiba International Corporation.
  10. Yaskawa Electric America, Inc.
- B. Provide variable frequency controllers as scheduled including coasting motor restart, and step over frequency.
1. The ratio of the total impedance to common system impedance shall be greater than or equal to 10.
  2. The voltage notch area shall be limited to 16-400 volt microseconds.
  3. The total harmonic disturbance (THD) as a result of voltage notching shall be 3 percent or less at the point of common coupling.
  4. The THD as a result of current notching shall be 100 percent or less at the point of common coupling.
- C. Standards: VFC shall comply with IEEE Standard 519 (1992 version) applicability to Adjustable Frequency Controllers (AC Line Disturbances).
- D. Provide 3 percent AC input line reactors sized appropriate for each current rating variable frequency controller.
- E. The variable frequency controller (VFC) shall comply with all applicable provisions of the National Electrical Code.
- F. The line side of the VFC shall have a displacement power factor of 0.95 or greater when motor is operating at 50 to 100 percent motor speed.
- G. The VFC shall have an efficiency greater than 85 percent when motor is operating at 50 to 100 percent motor speed.
- H. Each variable frequency controller shall consist of an adjustable frequency converter which shall convert 460 volt (+10 percent -5 percent), 3-phase, 60 hertz (+2 hertz) input power into an adjustable frequency output in an ambient temperature of zero to 40 deg C. Output power shall be of suitable capacity and waveform to provide stepless speed control of the specified horsepower motor throughout the required speed range under variable torque load not exceeding the motor's full-load rating.
- I. Provide fault detection and trip circuits to protect itself and the connected motor against line voltage transients, power line under voltage, output overvoltage and overcurrent. A disconnect with padlockable door interlocked external handle shall be supplied to conveniently disconnect the incoming 460 VAC. Minimum short circuit design shall be 22,000 amperes symmetrical. Criteria in Paragraph B shall be met without the use of isolation transformers. Variable frequency controller will be accepted only if criteria can be met without isolation transformers.
- J. The minimum output frequency shall be the lowest frequency at which the connected motor can be operated without overheating.
- K. The inverter shall contain current limiting circuitry, adjustable to 100 percent of motor full-load current to provide soft start, acceleration, and running without exceeding motor rated current. The current limit circuit shall be of the type for variable torque load, which acts to diminish output frequency while limiting, without directly causing shutdown.
- L. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts. For safety, drive shall shut down and require manual reset and restart if automatic reset/restart function is not successful within three attempts.
- M. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.

- N. Isolate signal circuits from the power circuits and design to accept a speed signal from a remote process controller in the automatic mode and from the speed control potentiometer in the manual mode. A door-mounted switch shall provide mode selection. The selected signal shall control the motor speed between the adjustable minimum and maximum speed settings. Maximum speed shall be field adjustable to 100 percent of rated speed. The speed signal shall follow a linear time ramp, adjustable from 4-20 seconds to provide acceleration from zero to minimum speed. When minimum speed is reached, the speed signal shall follow the linear time ramp for acceleration and deceleration control.
- O. Mount the adjustable frequency inverter and other electrical components that provide the operation specified in a NEMA 1 enclosure. Equipment shall have external heat sinks or air filters on all vents. The enclosure shall have hinged, front access doors with latch. Cabinet to cabinet interconnecting wiring shall be factory dressed, tagged and harnessed, and shipped with one end attached.
- P. The controller shall have the ability to step-over certain set frequencies that may cause a system to resonate. The controller shall have at least two manually set points of frequency in which the controller shall step-over during operation.
- Q. Operating and monitoring devices for the inverter shall be door mounted and shall include the following:
1. Manual Speed Control to set speed in the hand (manual) mode.
  2. Speed indicating meter, either in revolutions per minute, proportional to the applied frequency and voltage to indicate speed of the converter-powered motor or frequency (hertz).
  3. VFC "fault/reset" pilot light pushbutton combination with dry contact for external alarm. Fault alarm shall not actuate upon normal shutdown.
  4. Inverter "control power" indicator.
  5. Motor "running" indicator and two (2) dry contacts that close when motor is running.
  6. Output current meter calibrated in "AC amps."
  7. Operating selector switches and indicating light to perform the following functions:
    - a. One hand-off-auto switch for the VFC with indicating lights (red-running, green-energized). In hand position, unit (VFC or bypass starter) shall start. In auto position, unit (VFC or bypass starter) shall start when remote dry contact is closed.
    - b. Unit shall be capable of being padlocked in the off position.
  8. Output voltmeter (0 - 600 V.A.C) (analog or digital).
- R. The VFC is to be provided with isolated 4-20 mA DC output signals proportional to speed, current and voltage for connection by others.
- S. The VFC shall be provided with the ability to communicate (monitoring) through RS485 connector.
- T. Remote speed control shall be a 3-15 psig pneumatic signal from a remote controller. Provide a pressure transducer in the VFC enclosure to convert the pneumatic signal to an electrical signal for automatic speed control.
- U. Remote speed control shall be +4 to 20 mA control signal from a remote controller.
- V. Variable frequency controller shall not cause motor to produce noise levels exceeding 80 dBA measured at a distance of 3 feet from the motor. If noise level of motor exceeds this amount, the contractor shall be responsible for correcting the problem.
- W. Provide connection points for system safety controls such as smoke detectors, freeze stats, damper end switches, etc. as shown on mechanical temperature control drawings. Opening of a contact on safety controls wired to the drive shall shut down the motor(s).
- X. VFCs specified on the drawings to have contactor motor selection, in order to operate "either one or both" motors connected to the VFC, shall have the separate motors controlled by horse power rated contactors. These contactors shall be capable of being controlled locally (by a switch in the panel door) or remotely. The contactors shall also have two (2) convertible auxiliary contacts in order to sense contactor position.



- Y. VFCs specified on the drawings to operate "either" motor with contactor motor selection shall have separate horse power rated contactors to control each motor.
- Z. The contactors shall be interlocked in order that only one motor may run at a time. These contactors shall be capable of being controlled locally (by a switch in the panel door) or remotely. The contactors shall also have two (2) convertible auxiliary contacts in order to sense contactor position.
- AA. Provide in each VFC, a relay, that upon loss of the automatic speed control signal, shall automatically set the motor rpm to half speed. This loss of signal relay shall be manually adjustable to be able to set default speed to some other value than half speed if required later in the field.
- BB. Coordinate with the Temperature Controls Contractor for the interface of control wiring to the drive as required to meet the requirements of the temperature control drawings. Drive shall be furnished with internal control wiring configured in the factory so as to allow single connections of field wiring to terminal blocks in the drive by the Temperature Controls Contractor.
- CC. All indicating lights shall be push to test or LED.

## 2.4 SOURCE QUALITY CONTROL

- A. Factory Tests: The controller shall be subject to, but not limited to, the following quality assurance controls, procedures and tests:
  - 1. Power transistors, SCRs and diodes shall be tested to ensure correct function and highest reliability.
  - 2. All printed circuit boards shall be tested at 50 deg C for 50 hours. The VFC manufacturer shall provide certification that the tests have been completed.
  - 3. Every controller will be functionally tested with a motor to ensure that if the drive is started up according to the instruction manual provided, the unit will run properly.

## PART 3 - EXECUTION

### 3.1 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- B. Upon completion of each installation, conduct complete acceptance tests in the presence of duly notified authorities having jurisdiction and the Owner to demonstrate component, assembly or system performance in accordance with the requirements of the Contract Documents.
- C. In the event that a test demonstrates that a component assembly or system performance is deficient, the Owner may require additional tests after corrective work.
- D. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.
- E. Component assembly and systems acceptance is predicated upon completion of specified work and receipt by the Owner of data specified under "Submittals."

3.2 DEMONSTRATION

- A. The VFC supplier/support group shall provide the following additional services:
1. On-site training of customer personnel in operation and maintenance of variable frequency controllers.
  2. Provide four copies of a troubleshooting manual and factory training manuals to help the building operator determine what steps must be taken to correct any problem that may exist in the system.
  3. Coordinate enrollment of customer personnel in factory-held service schools.

END OF SECTION 20 2923

SECTION 22 3410 - CONDENSING, FUEL-FIRED DOMESTIC WATER HEATERS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Section includes the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 20 Section "Basic Mechanical Materials and Methods."
  - 3. Division 23 Section "Breechings, Chimneys, and Stacks."

1.2 DEFINITIONS

- A. LP Gas: Liquefied-petroleum fuel gas.

1.3 SUBMITTALS

- A. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail water heater assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection
  - 1. Wiring Diagrams: Power, signal, and control systems. Differentiate between manufacturer-installed and field-installed wiring.
- C. Product Certificates: For each type of water heater, signed by product manufacturer.
- D. Source quality-control test reports.

- E. Field quality-control test reports.
- F. Operation and Maintenance Data: For water heaters to include in operation and maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain same type of water heaters through one source from a single manufacturer.
- B. Product Options: Drawings indicate size, profiles, and dimensional requirements of water heaters and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- D. ASME Compliance:
  - 1. Where ASME-code construction is indicated, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
  - 2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
  - 3. Where ASME-code construction is indicated, fabricate and label commercial direct-fired storage water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV, HLW.
- E. ASHRAE Standards: Comply with performance efficiencies prescribed for the following:
  - 1. ASHRAE 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings," for commercial water heaters.
  - 2. ASHRAE 90.2, "Energy Efficient Design of New Low-Rise Residential Buildings," for household water heaters.
- F. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9" for all components that will be in contact with potable water.

#### 1.5 COORDINATION

- A. Coordinate size and location of concrete bases with Architectural and Structural Drawings.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

#### 2.2 COMMERCIAL, GAS WATER HEATERS

- A. Commercial, Dual-Component, High-Efficiency, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
  - 1. Manufacturers:

- a. Lochinvar Corporation; Armor AWH Series.
  - b. Laars Heating Systems; a Subsidiary of Bradford White Corporation; Summit and Neotherm Series.
2. Description: Manufacturer's proprietary design with boiler, storage tank, pump, piping, and controls to provide at least 95 percent thermal efficiency at optimum operating conditions. Following features and attributes may be modified or omitted if water heater otherwise complies with requirements for performance.
3. Boiler Construction: ASME code with 160-psig working-pressure rating for hot-water-boiler-type water heater.
  - a. Modulating, Condensing Heat Exchanger: Stainless steel, built to ASME Section IV requirements.
  - b. Connections: Factory fabricated of materials compatible with boiler. Attach to boiler before testing.
    - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
    - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
4. Boiler Appurtenances:
  - a. Insulation: Comply with ASHRAE/IESNA 90.1.
  - b. Jacket: Steel with enameled finish.
  - c. Burner: For use with finned-tube water heaters and for natural-gas fuel.
  - d. Temperature Control: Adjustable, storage tank temperature-control fitting and flow switch, interlocked with circulator and burner.
  - e. Safety Control: Automatic, high-temperature-limit cutoff device or system.
  - f. Automatic Ignition: Intermittent electronic ignition complying with ANSI Z21.20.
5. Energy Management System Interface: Normally closed dry contacts for enabling and disabling water heater.
6. Support: Leveling legs, certified for installation on combustible floors.
7. Sealed Combustion/Direct Vent: Combustion air is ducted to the combustion chamber from the outdoors.
8. Hot-Water Storage Tank: Connected with piping to circulating pump and water heater.
  - a. Construction: According to ASME Boiler and Pressure Vessel Code: Section VIII, steel with 150-psig working-pressure rating.
  - b. Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
    - 1) NPS 2 and Smaller: Threaded ends according to ASME B1.20.1.
    - 2) NPS 2-1/2 and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
  - c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
  - d. Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
  - e. Jacket: Steel with enameled finish.
  - f. Anode Rods: Factory installed, magnesium.
  - g. Drain Valve: Corrosion-resistant metal complying with ASSE 1005, factory installed.
  - h. Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

9. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, 125-psig minimum working-pressure rating, and 225 deg F continuous-water-temperature rating.
10. Piping: Copper tubing; copper, solder-joint fittings; and brazed or flanged joints.
11. Capacity and Characteristics: Refer to Schedule on Drawings.

## 2.3 EXPANSION TANKS

- A. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
  1. Manufacturers:
    - a. AMTROL Inc.
    - b. Armstrong Pumps, Inc.
    - c. Bell & Gossett; Xylem Inc.
    - d. Taco, Inc.
    - e. Wessels Co.
  2. Construction:
    - a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
    - b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
    - c. Air-Charging Valve: Factory installed.
  3. Capacity and Characteristics: Refer to Schedule on Drawings.

## 2.4 WATER HEATER ACCESSORIES

- A. Gas Shutoff Valves: ANSI Z21.15/CGA 9.1, manually operated. Furnish for installation in piping.
- B. Gas Pressure Regulators: ANSI Z21.18, appliance type. Include pressure rating, capacity, and pressure differential required between gas supply and water heater.
- C. Gas Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.
- D. Combination Temperature and Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select each relief valve with sensing element that extends into storage tank.
  1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.
- E. Pressure Relief Valves: Include pressure setting less than working-pressure rating of water heater.
  1. Gas Water Heaters: ANSI Z21.22/CSA 4.4.
- F. Water Heater Stands: Water heater manufacturer's factory-fabricated steel stand for floor mounting and capable of supporting water heater and water. Provide dimension that will support bottom of water heater a minimum of 18 inches above the floor.
- G. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.

H. Flue Side Condensate Neutralizer:

1. Description: Designed to raise the PH level of flue side condensate to near neutral prior to condensate entering the sanitary drainage system.
2. Materials: Neutralizer constructed of PVC pipe and fittings mounted on channel strut base with galvanized or stainless steel clamps and hardware; and charged with calcium carbonate.
3. Manufacturers:
  - a. BKI Industries, Inc.; Acid Neutralizer Kits.
  - b. J.J.M. Boiler Works; JM Neutralizing Tubes.
  - c. Any of the approved water heater manufacturers.

2.5 SOURCE QUALITY CONTROL

- A. Test and inspect water heater storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
- B. Hydrostatically test water heater storage tanks before shipment to minimum of one and one-half times pressure rating.
- C. Prepare test reports.

PART 3 - EXECUTION

3.1 WATER HEATER INSTALLATION

- A. Install commercial water heaters on concrete bases.
  1. Exception: Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.
  2. Concrete base construction requirements are specified in Division 20 Section "Basic Mechanical Materials and Methods."
- B. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
- C. Install gas water heaters according to NFPA 54.
- D. Install gas shutoff valves on gas supplies to gas water heaters without shutoff valves.
- E. Install gas pressure regulators on gas supplies to gas water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
- F. Install automatic gas valves on gas supplies to gas water heaters, if required for operation of safety control.
- G. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

- H. Install water heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 20 Section "Valves" for hose-end drain valves.
- I. Install thermometer on outlet piping of water heaters. Refer to Division 20 Section "Meters and Gages" for thermometers.
- J. Install pressure gage(s) on inlet and outlet piping of commercial, fuel-fired water heater piping. Refer to Division 20 Section "Meters and Gages" for pressure gages.
- K. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.
- L. Fill water heaters with water.
- M. Install expansion tanks with isolation and drain valves. Charge expansion tanks with air.

### 3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 22 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
- C. Connect vent to full size of water heater flue outlet. Refer to Division 23 Section "Breechings, Chimneys, and Stacks" for venting materials.
- D. Ground equipment according to Division 26 Section "Grounding and Bonding."
- E. Connect wiring according to Division 26 Section "Conductors and Cables."

### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
- B. Perform the following field tests and inspections and prepare test reports:
  - 1. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
  - 2. Operational Test: After electrical circuitry has been energized, confirm proper operation.
  - 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain water heaters. Refer to Division 20 Section "Mechanical General Requirements."

END OF SECTION 22 3410



SECTION 23 2123 - HYDRONIC PUMPS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 20 Section "Basic Mechanical Materials and Methods."

1.2 DEFINITIONS

- A. Buna-N: Nitrile rubber.
- B. EPT: Ethylene propylene terpolymer.

1.3 SUBMITTALS

- A. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
- B. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
  - 1. Wiring Diagrams: Power, signal, and control wiring.

- C. Operation and Maintenance Data: For all pumps and accessories to include in Operation and Maintenance manuals.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain hydronic pumps through one source from a single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- C. UL Compliance: Comply with UL 778 for motor-operated water pumps.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
- B. Store pumps in dry location.
- C. Retain protective covers for flanges and protective coatings during storage.
- D. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
- E. Comply with pump manufacturer's written rigging instructions.

#### 1.6 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

### PART 2 - PRODUCTS

#### 2.1 GENERAL PUMP REQUIREMENTS

- A. Pump Units: Factory assembled and tested.
- B. Motors: Comply with requirements in Division 20 Section "Motors".
- C. Selection:
  - 1. Base non-overloading characteristics for pumps upon nameplate horsepower, at any point on performance curve.
  - 2. Shaft first critical speed shall not be less than 25 percent greater than operating speed.
  - 3. Maximum impeller diameter shall not be greater than 90 percent of "cut water" diameter for a given casing and no smaller than the smallest published diameter for casing. Do not base acceptable maximum diameter calculation on percentage of impeller diameter range for a given casing.
  - 4. Pump speed shall be limited to 1800 RPM except as scheduled.
  - 5. Select at the point of maximum efficiency for a given impeller-casing combination. Deviations shall be within 3 percent of maximum efficiency on the increasing capacity side of the maximum efficiency point and 7 percent on the decreasing capacity side of the maximum efficiency point.
  - 6. Select pump at a point no greater than 85 percent of end of curve flow.

7. Maximum pump suction velocity:

- a. In-line: 12 fps.
- b. End suction: 13 fps.
- c. Double suction: 15 fps.

2.2 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.3 FLEXIBLY COUPLED, HORIZONTAL, IN-LINE CENTRIFUGAL PUMPS

- A. Manufacturers:

- 1. Armstrong Pumps Inc.; Series S, H, 1050, 1060.
- 2. Bell & Gossett; Xylem Inc.; Series 60.
- 3. Grundfos Pumps Corporation.
- 4. Taco, Inc.; Series 1600.

- B. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally. Rate pump for 175-psig minimum working pressure and a continuous water temperature of 225 deg F.

- C. Pump Construction:

- 1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, and threaded companion-flange or flanged connections.
- 2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
- 3. Pump Shaft: Hardened alloy steel, with copper-alloy shaft sleeve.
- 4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N seal for all glycol systems and all water systems 225 deg F and below; EPT seals for water systems above 225 deg F. Include water slinger on shaft between motor and seal.
- 5. Pump Bearings: Permanently lubricated ball bearings.

- D. Flexible Shaft Coupling: Molded rubber insert with interlocking spider or Interlocking frame with interconnecting springs capable of absorbing vibration.

- E. Motor: Single speed, with permanently lubricated ball bearings, unless otherwise indicated; and resiliently mounted to pump casing. Comply with requirements in Division 20 Section "Motors".

2.4 FLEXIBLY COUPLED, BASE-MOUNTED, END-SUCTION CENTRIFUGAL PUMPS

- A. Manufacturers:

- 1. Armstrong Pumps Inc.; Series 4030.
- 2. Aurora Pump; Division of Pentair Pump Group; Series 3340.
- 3. Bell & Gossett; Xylem Inc.; Series e-1510.
- 4. Grundfos Pumps Corporation/PACO.
- 5. Taco, Inc.; Series FI.

- B. Description: Factory-assembled and tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for 175-psig minimum working pressure and a continuous water temperature of 225 deg F.
- C. Pump Construction:
1. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and flanged connections. Provide integral mount on volute to support the casing, and attached piping to allow removal and replacement of impeller without disconnecting piping or requiring the realignment of pump and motor shaft true back pullout. Provide receptacle bronze wear rings for all pumps with pump shaft L/D ratios greater than 6.0.
  2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
  3. Pump Shaft: Steel, with copper-alloy shaft sleeve or stainless steel.
  4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N seal for all glycol systems and all water systems 225 deg F and below; EPT seals for water systems above 225 deg F. Include water slinger on shaft between motor and seal.
  5. Pump Bearings: Permanently or grease-lubricated ball bearings contained in cast-iron housing with grease fittings.
- D. Flexible Shaft Coupling: Molded rubber insert and interlocking spider capable of absorbing vibration. Couplings shall be center drop-out type to allow disassembly and removal without removing pump shaft or motor. Provide EPDM coupling sleeve for all motors 40 HP and below and all variable-speed applications.
- E. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
- F. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.
- G. Motor: Single speed, with permanently lubricated or grease-lubricated ball bearings, unless otherwise indicated; secured to mounting frame, with adjustable alignment. Comply with requirements in Division 20 Section "Motors".
- H. Capacities and Characteristics: Refer to Schedule on Drawings.

## 2.5 FLEXIBLY COUPLED, BASE-MOUNTED, DOUBLE-SUCTION CENTRIFUGAL PUMPS

### A. Casing Style

1. Vertical Split Case Double Suction Pumps
  - a. Horizontal split case pumps are not acceptable where vertical split case pumps are specified, unless prior written approval is obtained from the Engineer.
  - b. Manufacturers:
    - 1) Bell & Gossett; Xylem Inc.; VSC and VSCS.
    - 2) Taco, Inc.; TC Series.
2. Horizontal Split Case Double Suction Pumps
  - a. Manufacturers:
    - 1) Armstrong Pumps Inc.; Series 4600.
    - 2) Aurora Pump; Division of Pentair Pump Group; Series 431B.
    - 3) Bell & Gossett; Xylem Inc.; HSC<sup>3</sup>.

- 4) Grundfos Pumps Corporation/PACO.
- 5) Taco, Inc.; Series TA.

- B. Description: Factory-assembled and tested, centrifugal, impeller-between-bearings, separately coupled, double-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for 175-psig minimum working pressure and a continuous water temperature of 225 deg F.
- C. Pump Construction:
1. Casing: Cast iron with threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and ASME B16.1, Class 125 flanges. Casing supports shall allow removal and replacement of impeller without disconnecting piping. Provide replaceable bronze wear rings for all horizontal split case pumps with pump shaft L/D ratios greater than 9.0.
  2. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
  3. Pump Shaft: Stainless steel.
  4. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N seal for all glycol systems and all water systems 225 deg F and below; EPT seals for water systems above 225 deg F. Include water slinger on shaft between motor and seal.
  5. Pump Bearings: Grease-lubricated ball bearings contained in cast-iron housing with grease fittings.
- D. Flexible Shaft Coupling: Molded rubber insert and interlocking spider capable of absorbing vibration. Couplings shall be center drop-out type to allow disassembly and removal without removing pump shaft or motor. Provide EPDM coupling sleeve for all motors 40 HP and below and all variable-speed applications.
- E. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
- F. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.
- G. Motor: Single speed, with grease-lubricated ball bearings, unless otherwise indicated; secured to mounting frame, with adjustable alignment. Comply with requirements in Division 20 Section "Motors".
- H. Capacities and Characteristics: Refer to Schedule on Drawings.

## 2.6 PUMP SPECIALTY FITTINGS

- A. Suction Diffuser: Angle pattern, minimum 175-psig pressure rating, cast-iron body and end cap for NPT or flanged connections or ductile iron body and end cap for grooved connections, pump-inlet fitting; with bronze startup and bronze or stainless-steel permanent strainers; bronze or stainless-steel straightening vanes; drain plug; and integral locating boss for field-fabricated support.
1. Manufacturers:
- a. Bell & Gossett; Xylem Inc. (Base Bid)
  - b. Anvil International, Inc. (grooved only).
  - c. Victaulic Co. of America (grooved only).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine equipment foundations and anchor-bolt locations for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before pump installation.
- C. Examine foundations and inertia bases for suitable conditions where pumps are to be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PUMP INSTALLATION

- A. Comply with HI 1.4.
- B. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.
- C. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
- D. Support in-line centrifugal pumps greater than 1/2 HP independent of piping. Use continuous-thread hanger rods and hangers of sufficient size to support pump weight. Do not support pump from motor housing plate.
- E. Refer to Division 20 Section "Mechanical Vibration Controls" for vibration isolation devices.
- F. Refer to Division 20 Section "Hangers and Supports" for hanger and support materials.
- G. Set base-mounted pumps on concrete bases. Disconnect flexible coupling before setting. Do not reconnect flexible couplings until alignment procedure is complete.
  - 1. Support pump baseplate on rectangular stainless steel blocks and shims, or on wedges with small taper, at points near foundation bolts to provide a gap of 3/4 to 1-1/2 inches between pump base and foundation for grouting.
  - 2. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.
  - 3. Install pumps on inertia bases where required. Refer to Division 20 Section "Mechanical Vibration Controls" for vibration isolation devices.
- H. Automatic (Cooling Coil) Condensate Pump Units: Install units for collecting condensate and extend to open drain.

### 3.3 ALIGNMENT

- A. Align pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.
- B. Comply with pump and coupling manufacturers' written instructions.

- C. Adjust pump and motor shafts for angular and offset alignment by methods specified in HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation." Laser align to a tolerance of 0.0005 inches maximum.
- D. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.

### 3.4 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to machine to allow service and maintenance.
- C. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
- D. Install check valve and throttling valve on discharge side of pumps. Triple-duty valves are not allowed.
- E. Install Y-type strainer or suction diffuser and shutoff valve on suction side of pumps as indicated on drawings.
- F. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.
- G. Install pressure gages on pump suction and discharge or at integral pressure-gage tapings, or install single gage with multiple-input selector valve.
- H. Install check valve and gate or ball valve on each condensate pump unit discharge.
- I. Install electrical connections for power, controls, and devices.
- J. Ground equipment according to Division 26 Section "Grounding and Bonding."
- K. Connect wiring according to Division 26 Section "Conductors and Cables."

### 3.5 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service for each pump supplied. Written report of the start-up shall be provided to the Owner and Engineer upon completion of services.
  - 1. Complete installation and startup checks according to manufacturer's written instructions.
  - 2. Check piping connections for tightness.
  - 3. Clean strainers on suction piping.
  - 4. Perform the following startup checks for each pump before starting:
    - a. Verify bearing lubrication.
    - b. Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
    - c. Verify that pump is rotating in the correct direction.
  - 5. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
  - 6. Start motor.
  - 7. Open discharge valve slowly.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain hydronic pumps.

END OF SECTION 23 2123



SECTION 23 3423 - POWER VENTILATORS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 20 Section "Motors."
  - 3. Division 20 Section "Variable Frequency Controllers."
  - 4. Division 23 Section "Common Work Results for HVAC" for common mechanical drive requirements for fans and air moving equipment.

1.2 PERFORMANCE REQUIREMENTS

- A. Classify according to AMCA 99.

1.3 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
  - 1. Certified fan performance curves with system operating conditions indicated.
  - 2. Certified fan sound-power ratings.
  - 3. Motor ratings and electrical characteristics, plus motor and electrical accessories.
  - 4. Material thickness.

5. Dampers, including housings, linkages, and operators.
6. Roof curbs.
7. Fan speed controllers.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  1. Wiring Diagrams: Power, signal, and control wiring.
  2. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
  3. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
- B. Coordination Drawings: Reflected ceiling plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
  1. Roof framing and support members relative to duct penetrations.
  2. Ceiling suspension assembly members.
  3. Size and location of initial access modules for acoustical tile.
  4. Ceiling-mounted items including light fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.
- B. Operation and Maintenance Data: For power ventilators to include in operation and maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- B. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
- C. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.
- D. UL Standard: Power ventilators shall comply with UL 705.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
- B. Disassemble and reassemble units, as required for moving to final location, according to manufacturer's written instructions.
- C. Lift and support units with manufacturer's designated lifting or supporting points.

1.8 COORDINATION

- A. Coordinate size and location of structural-steel support members.
- B. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- C. Coordinate delivery and placement of roof curbs, and equipment supports. Installation of roof curbs, equipment supports, and roof penetrations is specified in Division 07 Section "Roof Accessories."

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Belts: One set for each belt-drive unit.

PART 2 - PRODUCTS

2.1 KITCHEN HOOD EXHAUST FANS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acme Engineering & Manufacturing; Acme Fan Group; Models PDURG and PNURG.
  - 2. Aerovent; a Twin City Fan Company.
  - 3. Greenheck Fan Corporation; CUBE Series.
  - 4. JencoFan; Soler & Palau Ventilation Group.
  - 5. Loren Cook Company.
  - 6. Moffitt Corporation.
  - 7. PennBarry; Division of Air System Components; Fumex with Fatrap.
- B. Description: UL 762 labeled belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, heat baffle, curb base, and accessories.
- C. Housing: Spun-aluminum construction with square, one-piece, aluminum base with venturi inlet cone. Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains, grease collector, and drain connection.
  - 1. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
- D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
- E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
  - 1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
  - 2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
  - 3. Sheaves: Cast-iron, adjustable-pitch motor sheave.
  - 4. Fan and motor isolated from exhaust airstream.
  - 5. Refer to Division 23 Section "Common Work Results for HVAC" for additional requirements.
- F. Accessories:
  - 1. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.

2. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.

G. Provide prefabricated roof curbs for each fan. Provide vented curb extension as required to locate fan discharge at a minimum of 40 inches above the roof.

H. Capacities and Characteristics: Refer to schedule(s) on Drawings.

## 2.2 UPBLAST CENTRIFUGAL ROOF VENTILATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acme Engineering & Manufacturing; Acme Fan Group.
2. Aerovent; a Twin City Fan Company.
3. Greenheck Fan Corporation; CUBE Series.
4. Loren Cook Company.
5. Moffitt Corporation.
6. PennBarry; Division of Air System Components; Fumex.

B. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

C. Housing: Spun-aluminum construction with square, one-piece, aluminum base with venturi inlet cone. Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains.

D. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.

E. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:

1. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
2. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
3. Sheaves: Cast-iron, adjustable-pitch motor sheave.
4. Fan and motor isolated from exhaust airstream.
5. Refer to Division 23 Section "Common Work Results for HVAC" for additional requirements.

F. Accessories:

1. Variable Frequency Controller: Refer to Division 20 Section "Variable Frequency Controllers."
2. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.
3. Bird Screens: Removable, 1/2-inch mesh, aluminum or brass wire.
4. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
5. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.

G. Provide prefabricated roof curbs for each fan.

H. Capacities and Characteristics: Refer to schedule(s) on Drawings.

## 2.3 ROOF CURBS AND ACCESSORIES

A. Construction: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch chemically treated wood nailer. Size as required to suit roof opening and fan base.

1. Manufacturers: Roof curbs shall be provided by the fan manufacturer, or one of the following:

- a. Creative Metals.
    - b. The Pate Company.
    - c. Roof Products & Systems.
    - d. Thybar Corporation.
    - e. Any of the approved roof mounted exhaust fan manufacturers.
  2. Configuration: Self-flashing without a cant strip, with mounting flange, and suitable for flat roofs with tapered insulation.
  3. Height: Curb shall extend a minimum 18 inches above top surface of roof insulation.
  4. Sound Curb: Curb with sound-absorbing insulation matrix.
  5. Metal Liner: Galvanized steel.
  6. Burglar Bars: Minimum 1/2-inch- thick steel bars welded in place to form 6-inch squares.
  7. Mounting Pedestal: Galvanized steel with removable access panel.
- B. Construction: Galvanized steel; mitered and welded corners; 1-1/2-inch- thick, rigid, fiberglass insulation adhered to inside walls; and 1-1/2-inch chemically treated wood nailer. Size as required to suit roof opening and fan base.
1. Manufacturers: Roof curbs shall be provided by the fan manufacturer, or one of the following:
    - a. Creative Metals.
    - b. The Pate Company.
    - c. Roof Products & Systems.
    - d. Thybar Corporation.
    - e. Any of the approved roof mounted exhaust fan manufacturers.
  2. Configuration: Built-in raised cant with step dimension matching insulation thickness, with mounting flange, and suitable for sloped roofs with uniform insulation thickness.
  3. Height: Curb shall extend a minimum 18 inches above top surface of roof insulation.
  4. Sound Curb: Curb with sound-absorbing insulation matrix.
  5. Pitch Mounting: Manufacture curb for roof slope, top of curb shall be level.
  6. Metal Liner: Galvanized steel.
  7. Burglar Bars: Minimum 1/2-inch- thick steel bars welded in place to form 6-inch squares.
  8. Mounting Pedestal: Galvanized steel with removable access panel.
- C. Roof Curb Extensions and Adapters:
1. Manufacturers: Roof curbs shall be provided by the fan manufacturer, or one of the following:
    - a. Creative Metals.
    - b. The Pate Company.
    - c. Roof Products & Systems.
    - d. Thybar Corporation.
    - e. Any of the approved roof mounted exhaust fan manufacturers.
  2. Curb Extensions: Constructed of minimum 18 ga. galvanized steel.
    - a. 4-inch high construction with no damper shelf and no damper access.
    - b. 8-inch high construction with damper shelf; and removable panel, or access door.
    - c. 12-inch high construction with damper shelf; and removable panel, or access door (minimum required for motorized damper).
  3. Curb Adapters: Constructed of minimum 18 ga. galvanized steel and designed to adapt or reduce curb cap dimensions to match new fans to existing roof curbs.

## 2.4 MOTORS

- A. Comply with requirements in Division 20 Section "Motors."

## 2.5 SOURCE QUALITY CONTROL

- A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install power ventilators level and plumb.
- B. Install floor-mounting units as specified in Division 20 Section "Mechanical Vibration Controls."
- C. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 07 Section "Roof Accessories" for installation of roof curbs.
- D. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
- E. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of 1 inch. Vibration-control devices are specified in Division 20 Section "Mechanical Vibration Controls."
- F. Install units with clearances for service and maintenance.
- G. Label units according to requirements specified in Division 20 Section "Mechanical Identification."

## 3.2 CONNECTIONS

- A. Duct installation and connection requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Duct Accessories."
- B. Install ducts adjacent to power ventilators to allow service and maintenance.
- C. Ground equipment according to Division 26 Section "Grounding and Bonding."
- D. Connect wiring according to Division 26 Section "Conductors and Cables."

## 3.3 FIELD QUALITY CONTROL

- A. Perform the following field tests and inspections and prepare test reports:
  - 1. Verify that shipping, blocking, and bracing are removed.

2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
10. Shut unit down and reconnect automatic temperature-control operators.
11. Remove and replace malfunctioning units and retest as specified above.

- B. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

#### 3.4 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust belt tension.
- C. Refer to Division 23 Section "Testing, Adjusting, and Balancing" for testing, adjusting, and balancing procedures.
- D. Replace fan and motor sheaves as required to achieve design airflow.
- E. Lubricate bearings.

END OF SECTION 23 3423

SECTION 23 5216 - CONDENSING BOILERS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 20 Section "Basic Mechanical Materials and Methods."
  - 3. Division 23 Section "HVAC Water Treatment" for corrosion inhibitors required for modular cast-aluminum condensing boilers.
  - 4. Division 23 Section "Breeching, Chimneys, and Stacks."

1.2 SUMMARY

- A. This Section includes packaged, factory-fabricated and -assembled, gas-fired, modular aluminum stainless steel vertical fire-tube stainless steel water-tube condensing boilers, trim, and accessories for generating hot water.

1.3 SUBMITTALS

- A. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.



1. Design calculations and vibration isolation base details.
    - a. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
    - b. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
  2. Wiring Diagrams: Power, signal, and control wiring.
- C. Source quality-control test reports.
- D. Field quality-control test reports.
- E. Operation and Maintenance Data: For boilers to include in operation and maintenance manuals.
- F. Other Informational Submittals:
1. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.

#### 1.4 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
- C. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
- D. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
- E. UL Compliance: Test boilers for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a NRTL acceptable to authorities having jurisdiction.

#### 1.5 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.

#### 1.6 WARRANTY

- A. Standard Warranty: Boilers shall include manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.
  1. Warranty Period for Condensing Boilers
    - a. The pressure vessel/heat exchanger shall carry a 15-year from shipment, non-prorated, limited warranty against any failure due to condensate corrosion, thermal stress, mechanical defects or workmanship.

- b. The burner shall be conditionally guaranteed against any failure for (5) five years from shipment.
- c. Manufacturer labeled control panels are conditionally warranted against failure for (3) three years from shipment.
- d. All other components, with the exception of the igniter, flame detector and O<sub>2</sub> sensor, are conditionally guaranteed against any failure for (2) two years from shipment.

## PART 2 - PRODUCTS

### 2.1 STAINLESS STEEL VERTICAL FIRE-TUBE CONDENSING BOILERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. AERCO International; Benchmark Platinum Series.
  - 2. Cleaver-Brooks; CFC Series.
  - 3. Fulton Boiler Works, Inc.; Endura Series.
  - 4. Lochinvar Corporation; Crest Series
- B. Description: Factory-fabricated, -assembled, and -tested, vertical fire-tube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Water heating service only.
- C. Heat Exchanger: Corrosion-resistant stainless steel combustion chamber.
- D. Pressure Vessel: Stainless steel with welded heads and tube connections.
- E. Burner: Natural gas, forced draft.
- F. Blower: Centrifugal fan to operate during each burner firing sequence and to prepurge and postpurge the combustion chamber.
  - 1. Motors: Comply with requirements specified in Division 20 Section "Motors."
    - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- G. Gas Train: Combination gas valve with manual shutoff and pressure regulator.
- H. Ignition: Spark ignition with 100 percent main-valve shutoff with electronic flame supervision.
- I. Casing:
  - 1. Jacket: Sheet metal, with snap-in or interlocking closures.
  - 2. Control Compartment Enclosures: NEMA 250, Type 1A.
  - 3. Finish: Baked-enamel or powder-coated protective finish.
  - 4. Insulation: Minimum 2-inch- thick, mineral-fiber or polyurethane-foam insulation surrounding the heat exchanger.
  - 5. Combustion-Air Connections: Inlet and vent duct collars.
  - 6. Mounting base to secure boiler.
- J. Combustion Process Monitoring: Automatically adjust air/fuel ratio throughout combustion range to provide optimal oxygen levels.
- K. Characteristics and Capacities: Refer to Schedule on Drawings.

## 2.2 HOT-WATER BOILER TRIM

- A. Aquastat Controllers: Operating, firing rate, and high limit.
- B. Safety Relief Valve: ASME rated.
- C. Pressure and Temperature Gage: Minimum 3-1/2-inch- diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
- D. Boiler Air Vent: Automatic.
- E. Drain Valve: Minimum NPS 3/4 hose-end gate valve.

## 2.3 CONTROLS

- A. Refer to Division 23 Section "Temperature Controls."
- B. Boiler operating controls shall include the following devices and features:
  - 1. Control transformer.
  - 2. Set-Point Adjust: Set points shall be adjustable.
  - 3. Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At 0 deg F outside-air temperature, set supply-water temperature at 200 deg F; at 60 deg F outside-air temperature, set supply-water temperature at 140 deg F.
  - 4. Provide contacts for connection to remote shutdown switch(es). Activation of remote shutdown switch shall cut power to the burner controls. Refer to Division 23 Section "Temperature Controls" for remote shutdown switches.
- C. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
  - 1. High Cutoff: Automatic reset stops burner if operating conditions rise above maximum boiler design temperature.
  - 2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be automatic-reset type.
  - 3. Blocked Inlet Safety Switch: Manual-reset pressure switch field mounted on boiler combustion-air inlet.
  - 4. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
- D. Building Management System Interface: Factory install hardware and software to enable building management system to monitor, control, and display boiler status and alarms.
  - 1. Hardwired Points:
    - a. Monitoring: On/off status, common trouble alarm, low water level alarm.
    - b. Control: On/off operation.
  - 2. A communication interface with building management system shall enable building management system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building management system.

## 2.4 ELECTRICAL POWER

- A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 26 Sections.
- B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
  - 1. House in NEMA 250, Type 1 enclosure.
  - 2. Wiring shall be numbered and color-coded to match wiring diagram.
  - 3. Install factory wiring outside of an enclosure in a metal raceway.
  - 4. Field power interface shall be to factory provided, lockable, nonfused disconnect switch.
  - 5. Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker.
  - 6. Provide each motor with overcurrent protection.

## 2.5 VENTING KITS

- A. Kit: Complete system, ASTM A 959, Type 29-4C stainless steel, pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.
- B. Combustion-Air Intake: Complete system, stainless steel, pipe, vent terminal with screen, inlet air coupling, and sealant.
- C. Boiler flue mufflers as recommended by boiler manufacturer for installations below 25 feet of stack.

## 2.6 ACCESSORIES

- A. Flue Side Condensate Neutralizer:
  - 1. Description: Designed to raise the PH level of flue side condensate to near neutral prior to condensate entering the sanitary drainage system.
  - 2. Materials: Neutralizer constructed of PVC pipe and fittings mounted on channel strut base with galvanized or stainless steel clamps and hardware; and charged with calcium carbonate.
  - 3. Manufacturers:
    - a. BKI Industries, Inc.; Acid Neutralizer Kits.
    - b. J.J.M. Boiler Works; JM Neutralizing Tubes.
    - c. Any of the approved boiler manufacturers.

## 2.7 SOURCE QUALITY CONTROL

- A. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- B. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- C. Allow Owner access to source quality-control testing of boilers. Notify Architect 14 days in advance of testing.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.
  - 1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- B. Examine mechanical spaces for suitable conditions where boilers will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 BOILER INSTALLATION

- A. Install boilers level on concrete base. Concrete base is specified in Division 20 Section "Basic Mechanical Materials and Methods," and concrete materials and installation requirements are specified in Division 03.
- B. Vibration Isolation: Elastomeric isolation pads with a minimum static deflection of 0.25 inch. Vibration isolation devices and installation requirements are specified in Division 20 Section "Mechanical Vibration Controls."
- C. Install gas-fired boilers according to NFPA 54.
- D. Assemble and install boiler trim.
- E. Install electrical devices furnished with boiler but not specified to be factory mounted.
- F. Install control wiring to field-mounted electrical devices.

### 3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Install piping adjacent to boiler to allow service and maintenance.
- C. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
- D. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Division 20 Section "Pipe Flexible Connectors, Expansion Fittings and Loops."
- E. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
- F. Connect hot-water piping to supply- and return-boiler tapplings with shutoff valve and union or flange at each connection.
- G. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tapplings with shutoff valve and union or flange at each connection.

- H. Install piping from safety relief valves to nearest floor drain.
- I. Install piping from safety valves to drip-pan elbow and to nearest floor drain.
- J. Boiler Venting:
  - 1. Install flue venting kit and combustion-air intake.
  - 2. Connect full size to boiler connections. Comply with requirements in Division 23 Section "Breechings, Chimneys, and Stacks."
- K. Ground equipment according to Division 26 Section "Grounding and Bonding."
- L. Connect wiring according to Division 26 Section "Conductors and Cables."

### 3.4 FIELD QUALITY CONTROL

- A. Perform tests and inspections and prepare test reports.
  - 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- B. Tests and Inspections:
  - 1. Perform installation and startup checks according to manufacturer's written instructions.
  - 2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
  - 3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
    - a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature.
    - b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Remove and replace malfunctioning units and retest as specified above.
- D. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
- E. Performance Tests:
  - 1. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
  - 2. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
  - 3. Perform field performance tests to determine capacity and efficiency of boilers.
    - a. Test for full capacity.
    - b. Test for boiler efficiency at low fire 20, 40, 60, 80, 100, 80, 60, 40, and 20 percent of full capacity. Determine efficiency at each test point.
  - 4. Repeat tests until results comply with requirements indicated.
  - 5. Provide analysis equipment required to determine performance.
  - 6. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.

7. Notify Architect in advance of test dates.
8. Document test results in a report and submit to Architect.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 23 5216

## SECTION 23 6416 - CENTRIFUGAL WATER CHILLERS

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### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Variable Frequency Controllers."

#### 1.2 SUMMARY

- A. This Section includes packaged, water-cooled, electric-motor-driven, centrifugal water chillers with the following features:
  - 1. Variable frequency controller.
  - 2. Microprocessor-based controls complying with ASHRAE 135.
- B. Products Specified But Not Installed Under This Section:
  - 1. Furnish and deliver to project site, factory assembled and tested, packaged, water cooled liquid chiller(s) consisting of compressor(s), compressor motor(s), condenser, evaporator, refrigeration



- accessories, instrumentation and controls, gauges, indicating lights, auxiliary components and accessories, and motor starter. Construction and ratings shall be in accordance with AHRI Standard 550/590.
2. Provide commissioning services to assure optimal performance and Owner satisfaction. Furnish engineering support services, instructions and drawings for installation and field erection, coordination with installation contractor, pre-commissioning tests, start-up services, final commissioning, debugging, 16 hours of training for Owner's operating and maintenance personnel, and equipment operating and maintenance manuals.
  3. Provide "total system responsibility" to the Owner including furnishing manufacturer's recommended procedures for system layout, installation and controls. Examine design documents for chiller installation furnished by Owner and examine actual equipment installation and set-up by installation contractor and provide sign-off letters for each for compliance with manufacturer's requirements. Chiller manufacturer shall be responsible for the performance of the installed equipment as specified.
- C. Receive, handle, and install centrifugal water chillers that will be delivered FOB jobsite.

### 1.3 DEFINITIONS

- A. BAS: Building automation system.
- B. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
- C. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in terms of Btu/h to the total power input given in terms of watts at any given set of rating conditions.
- D. IPLV: Integrated part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by AHRI 550/590 and referenced to AHRI standard rating conditions.
- E. kW/Ton: The ratio of total power input of the chiller in kilowatts to the net refrigerating capacity in tons at any given set of rating conditions.
- F. NPLV: Nonstandard part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by AHRI 550/590 and intended for operating conditions other than the AHRI standard rating conditions.
- G. SCCR: Short circuit current rating.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Condenser-Fluid Temperature Performance:
  1. Startup Condenser-Fluid Temperature: Chiller shall be capable of starting with an entering condenser-fluid temperature of 55 deg F and providing stable operation until the system temperature is elevated to the minimum operating entering condenser-fluid temperature.
  2. Minimum Operating Condenser-Fluid Temperature: Chiller shall be capable of continuous operation over the entire capacity range indicated with an entering condenser-fluid temperature of 60 deg F.
  3. Make factory modifications to standard chiller design if necessary to comply with performance indicated.
- B. Site Altitude: Chiller shall be suitable for altitude at which installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.

1.5 SUBMITTALS

- A. Product Data: Include refrigerant, rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Complete set of manufacturer's certified prints of water chiller assemblies, control panels, sections and elevations, and unit isolation. Include the following:
  - 1. Assembled unit dimensions.
  - 2. Disassembled unit dimensions for largest section.
    - a. Number of sections prior to onsite reassembly.
  - 3. Operating weight and load distribution.
  - 4. Required clearances for maintenance and operation.
  - 5. Size and location of piping and wiring connections.
  - 6. Wiring Diagrams: Power, signal, and control wiring.
- C. Certificates: For certification required in "Quality Assurance" Article.
- D. Source quality-control test reports.
- E. Complete the accompanying "Pre-Purchase Chiller Performance Work Sheet" Excel file.
- F. Additional Line Item Pricing: Provide line item pricing for the following:
  - 1. On-site reassembly of chiller by factory authorized personnel.
  - 2. 5-year parts, labor, and refrigerant warranty in lieu of base bid two year warranty specified below.

1.6 QUALITY ASSURANCE

- A. AHRI Certification: Signed by manufacturer certifying compliance with requirements in AHRI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."
- B. AHRI Rating: Rate chiller performance according to requirements in AHRI 550/590.
- C. ASHRAE Certification: Signed by manufacturer certifying compliance with ASHRAE 15 for safety code for mechanical refrigeration. Comply with ASHRAE Guideline 3 for refrigerant leaks, recovery, and handling and storage requirements.
- D. ASHRAE Compliance:
  - 1. ASHRAE 15 for safety code for mechanical refrigeration.
  - 2. ASHRAE 147 for refrigerant leaks, recovery, and handling and storage requirements.
- E. ASHRAE Compliance: Water chillers shall comply with ASHRAE 90.1, "Energy Standard for Buildings Except Low-Rise Residential Buildings."
- F. ASME Compliance: Fabricate and label chillers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, as applicable to chiller design. For chillers charged with R-134a refrigerant, include an ASME U-stamp and nameplate certifying compliance.
- G. Comply with NFPA 70.
- H. Comply with requirements of UL and UL Canada, and include label by an NRTL showing compliance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Ship water chillers from the factory fully charged with refrigerant or nitrogen.

1.8 COORDINATION

- A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03.
- B. Coordinate sizes, locations, and anchoring attachments of structural-steel support structures.

1.9 WARRANTY

- A. Special Warranty: Two year manufacturer's standard form in which manufacturer agrees to repair or replace components of water chillers that fail in materials or workmanship. Warranty shall cover all parts, labor, and refrigerant and start after factory authorized startup is performed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Daikin Applied.
  - 2. Johnson Controls, Inc.; York Chiller Products.
  - 3. Trane.

2.2 PACKAGED WATER CHILLERS

- A. Description: Factory-assembled and -tested water chiller complete with compressor, evaporator, condenser, controls, interconnecting unit piping and wiring, indicated accessories, and mounting frame.
  - 1. Disassemble chiller into major assemblies as required by the installation after factory testing and before packaging for shipment.
  - 2. Components must fit through 56" by 88" louver opening for field reassembly onsite by factory personnel.
- B. Water Chiller Characteristics and Capacities:
  - 1. Refer to Schedule on Drawings.
  - 2. Sound Power Level: 85 dBa.

2.3 COMPRESSORS

- A. Description: Variable displacement with dual direct-drive, semi-hermetically sealed motor.
  - 1. Where indicated, provide oil-free compressor technology using a permanent magnet synchronous motor, magnetic bearings, integral variable frequency controller, and digital electronic controls.
  - 2. Casing: Cast iron, precision ground.
  - 3. Impeller: High strength, cast-aluminum alloy on carbon- or forged-steel shaft; dynamically balanced.

- B. Capacity Control: Variable-inlet guide-vane assembly for stable operation without hot gas bypass, that is free of surge, cavitation, or vibration throughout throttling range from 100 to 15 percent of full load.
- C. Refrigerant Compatibility: Seals, O-rings, motor windings, and internal water chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.

## 2.4 REFRIGERATION

- A. Refrigerant:
  - 1. Type: Refer to Schedules.
  - 2. Compatibility: Chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
- B. Refrigerant Flow Control: Manufacturer's standard refrigerant flow-control device satisfying performance requirements indicated.
- C. Pressure Relief Device:
  - 1. Comply with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
  - 2. For Chillers Using R-134a: ASME-rated, spring-loaded, pressure relief valve; single- or multiple-reseating type. Pressure relief valve(s) shall be provided for each heat exchanger. Condenser shall have dual valves with one being redundant and configured to allow either valve to be replaced without loss of refrigerant.
- D. Refrigeration Transfer: Provide service valves and other factory-installed accessories required to facilitate transfer of refrigerant from chiller to a remote refrigerant storage and recycling system. Comply with requirements in ASHRAE 15 and ASHRAE 147.
- E. Refrigerant Isolation for Chillers Using R-134a: Factory install isolation valves in the compressor discharge line to the condenser and the refrigerant liquid line leaving the condenser to allow for isolation and storage of full refrigerant charge in the chiller condenser shell. In addition, provide isolation valve on suction side of compressor from evaporator to allow for isolation and storage of full refrigerant charge in the chiller evaporator shell.

## 2.5 HEAT EXCHANGERS

- A. Evaporator:
  - 1. Description: Shell-and-tube design, ASME labeled.
  - 2. Shell Material: Carbon steel.
  - 3. Tube Construction: Externally enhanced and individually replaceable, expanded into tube sheets.
    - a. Material: Copper.
    - b. Minimum Size: 3/4-inch OD; minimum 0.025-inch wall thickness and provide 0.050-inch thickness at plain lands contacting the intermediate tube supports and end sheets.
    - c. Internal Finish: Enhanced.
  - 4. Water Box: Hinged, marine, with design working pressure of 150 psig, and having grooved mechanical-joint coupling water-nozzle connections with a thermistor-type temperature sensor factory installed in each nozzle.
- B. Condenser:

1. Description: Shell-and-tube design, ASME labeled.
2. Shell Material: Carbon steel.
3. Tube Construction: Externally enhanced and individually replaceable, expanded into tube sheets.
  - a. Material: Copper.
  - b. Minimum Size: 3/4-inch OD; minimum 0.025-inch wall thickness and provide 0.050-inch thickness at plain lands contacting the intermediate tube supports and end sheets.
  - c. Internal Finish: Enhanced.
4. Water Box: Hinged marine, with design working pressure of 150 psig, and having grooved mechanical-joint coupling water-nozzle connections with a thermistor-type temperature sensor factory installed in each nozzle.

## 2.6 INSULATION

- A. Closed-cell, flexible elastomeric thermal insulation complying with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
  1. Thickness: 3/4 inch.
- B. Adhesive: As recommended by insulation manufacturer.
- C. Factory-applied insulation over all cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator shell and end tube sheets, evaporator water boxes including nozzles, refrigerant suction pipe from evaporator to compressor, cold surfaces of compressor, refrigerant-cooled motor, and auxiliary piping.
  1. Apply adhesive to 100 percent of insulation contact surface.
  2. Before insulating steel surfaces, prepare surfaces for paint, and prime and paint as indicated for other painted components. Do not insulate unpainted steel surfaces.
  3. Seal seams and joints to provide a vapor barrier.
  4. After adhesive has fully cured, paint exposed surfaces of insulation to match other painted parts.

## 2.7 ELECTRICAL

- A. Factory installed and wired, and functionally tested at factory before shipment.
- B. Single-point, field-power connection to nonfused disconnect switch. Minimum SCCR shall be as required by electrical power distribution system, but not less than 65,000 A.
  1. Branch power circuit to each compressor circuit shall be equipped with a 5% line reactor.
  2. NEMA ICS 2-rated motor controller for auxiliary motors, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller for each variable-speed motor furnished.
  3. Control-circuit transformer with primary and secondary side fuses.
- C. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.

## 2.8 CONTROLS

- A. Factory installed and wired, and functionally tested at factory before shipment.
- B. Standalone, microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.

- C. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.
- D. The control center shall include an alphanumeric display showing all system parameters in the English language with numeric data in English (or metric) units. The chiller control panel shall provide control of chiller operation and monitoring of chiller sensors, actuators, relays and switches.
- E. Microprocessor shall have the capability of starting and stopping remote chilled water primary and condenser water pumps.
- F. Digital programming of essential setpoints through a color coded, tactile-feel keypad shall include:
  - 1. Leaving chilled water temperature
  - 2. Percent current limit
  - 3. Pull-down demand limiting
  - 4. Seven-day time clock for starting and stopping the chiller, pumps, and tower (complete with holiday schedule)
  - 5. Remote reset temperature range
  - 6. Chilled water primary pump(s) start/stop control
  - 7. Condenser water pump(s) start/stop control
- G. System operating information shall include:
  - 1. Return and leaving chilled water temperatures
  - 2. Return and leaving condenser water temperatures
  - 3. Evaporator and condenser refrigerant pressures
  - 4. Differential oil pressure
  - 5. Percent motor current
  - 6. Compressor discharge temperature
  - 7. Oil reservoir temperature
  - 8. Compressor thrust bearing position and oil temperature (HFC-134a machines only)
  - 9. Operating hours
  - 10. Number of compressor starts
- H. Control center shall be able to interface with a building automation system with an available RS-232 port to provide the following:
  - 1. Remote chiller start and stop
  - 2. Reset of chilled water temperature
  - 3. Reset of current limit
- I. Additionally, the control center shall provide status message indicating:
  - 1. Chiller is ready to start
  - 2. Chiller is operating
  - 3. Chiller is shut down on a safety requiring reset
  - 4. Chiller is shut down on a recycling safety

## 2.9 MOTORS

- A. Comply with requirements in Division 20 Section "Motors."
  - 1. Open-drive motors shall have flanged or flexible coupling suitable for direct connection to compressor.

2.10 MOTOR CONTROLLERS (VFC)

- A. Variable Frequency Controller: Factory installed and wired variable frequency controller meeting the requirements specified in Division 20 Section "Variable Frequency Controllers."

2.11 FINISH

- A. Paint chiller, using manufacturer's standard procedures. Color of finish coat to be manufacturer's standard.
- B. Provide Owner with quart container of paint used in application of topcoat to use in touchup applications after Project Closeout.

2.12 ACCESSORIES

- A. Differential Pressure Sensors: For evaporator and condenser to prove fluid flow through evaporator and condenser.
- B. Vibration Isolation:
  - 1. Chiller manufacturer shall furnish vibration isolation for each chiller.
  - 2. Neoprene Pad:
    - a. Two layers of 0.375-inch- thick, ribbed- or waffle-pattern neoprene pads separated by a 16-gage, stainless-steel plate.
    - b. Fabricate pads from 40- to 50-durometer neoprene.
    - c. Provide stainless-steel square bearing plate to load the pad uniformly between 20 and 40 psig with a 0.12- to 0.16-inch deflection.

2.13 SOURCE QUALITY CONTROL

- A. Factory test and rate water chillers, before shipping, according to AHRI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle." Stamp with AHRI label.
- B. Factory test heat exchangers hydrostatically in accordance with ASME requirements.
- C. Factory test and inspect evaporator and water cooled-condenser according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Stamp with ASME label.
- D. Factory test and inspect water boxes in accordance with ASME requirements.
- E. Rate sound power level according to AHRI 575 procedure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine chillers before installation. Reject chillers that are damaged.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 STARTUP SERVICE

- A. Engage a factory service representative to perform startup service.
- B. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
- C. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
  - 1. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
  - 2. Verify that pumps are installed and functional.
  - 3. Verify that thermometers and gages are installed.
  - 4. Operate water chiller for run-in period according to manufacturer's written instructions.
  - 5. Check bearing lubrication and oil levels.
  - 6. Verify that refrigerant pressure relief is vented outside.
  - 7. Verify proper motor rotation.
  - 8. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
  - 9. Verify and record performance of chilled- and condenser-water flow and low-temperature interlocks.
  - 10. Verify and record performance of water chiller protection devices.
  - 11. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
- D. Prepare a written startup report that records results of tests and inspections.
- E. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose.

### 3.3 DEMONSTRATION

- A. Engage a factory service representative to train Owner's maintenance personnel to adjust, operate, and maintain water chillers.

END OF SECTION 23 6416



SECTION 23 7333 - INDIRECT-FIRED H&V UNITS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 23 Section "Common Work Results for HVAC" for mechanical drive requirements common to fans and air moving equipment.
  - 3. Division 23 Section "Breeching, Chimneys, and Stacks" for vent piping.

1.2 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, furnished specialties, and accessories.

1.3 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, and methods of field assembly, components, and location and size of each field connection.
  - 1. Design Calculations: Calculate requirements for selecting vibration isolators and for designing vibration isolation bases.
  - 2. Mounting Details: For securing and flashing roof curb to roof structure. Indicate coordinating requirements with roof membrane system.

3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
  4. Wiring Diagrams: Power, signal, and control wiring.
- B. Coordination Drawings: Roof-mounted units and roof-curb mounting details drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Size and location of rooftop unit mounting rails and anchor points and methods for anchoring units to curb.
  2. Required roof penetrations for ducts, pipes, and electrical raceways, including size and location of each penetration.
- 1.4 CLOSEOUT SUBMITTALS
- A. Startup service reports.
- B. Operation and Maintenance Data: For indirect-fired H&V units to include in operation and maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. Product Options: Drawings indicate size, profiles, and dimensional requirements of indirect-fired H&V units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a NRTL acceptable to authorities having jurisdiction, and marked for intended use.
- C. Comply with NFPA 70.
- D. Comply with ASHRAE Standard 90.1.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Comply with applicable requirements in Division 20 Section "Basic Mechanical Materials and Methods."
- B. Deliver equipment in original crates, boxes, and shipping containers.
- C. Do not lift air handling equipment by slings placed over shaft ends, and do not drop equipment off truck beds.
- D. Store air handling equipment in a manner to prevent windmilling.
- E. Rotate shafts periodically to prevent puddle corrosion of bearing races.
- F. Close openings of air handling equipment to prevent entry of dirt and foreign matter.
- G. On air handling equipment expected to be stored or to remain unused for extended periods, protect bearings from corrosion and contamination using method recommended by bearing manufacturer.

1.7 COORDINATION

- A. Coordinate size, location and installation of unit manufacturer's roof curbs and equipment supports with roof Installer.
- B. Coordinate installation of restrained vibration isolation roof-curb rails, which are specified in Division 20 Section "Mechanical Vibration Controls."

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Filters: One set for each unit.
  - 2. Fan Belts: One set for each unit.

PART 2 - PRODUCTS

2.1 COMMERCIAL INDIRECT-FIRED H & V UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Ventrol; Nortek Air Solutions.
  - 2. Trane; a Trane Technologies Brand.
  - 3. Sterling HVAC Products; Mestek, Inc.
  - 4. RuppAir.
  - 5. Reznor HVAC.
  - 6. Modine Manufacturing Company; Commercial HVAC systems.
  - 7. Greenheck Fan Corporation.
  - 8. Duo-Aire
- B. Description:
  - 1. Factory-assembled, prewired, self-contained unit consisting of cabinet, supply fan, controls, filters, and indirect-fired gas furnace to be installed outside the building.
  - 2. Discharge: Horizontal or vertical-pattern as indicated, galvanized-steel assembly with diffusers incorporating individually adjustable vanes.
- C. Cabinet (Outdoor Units):
  - 1. Cabinet: Double-wall galvanized-steel panels, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs. Cabinet shall be fully weatherized for outside installation.
  - 2. Access Panels: Lift-out or piano hinged with cam-lock fasteners for furnace and fan motor assemblies on both sides of unit.
  - 3. Internal Insulation: Fibrous-glass duct lining, comply with ASTM C 1071, Type II, applied on complete unit.
    - a. Thickness: 1 inch
    - b. Insulation Adhesive: Comply with ASTM C 916, Type I.
    - c. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to casing without damaging liner when applied as recommended by manufacturer and without causing air leakage.
  - 4. Finish: Heat-resistant, baked enamel.

D. Supply-Air Fan:

1. Fan Type: Centrifugal, rated according to AMCA 210; statically and dynamically balanced, galvanized steel; mounted on solid-steel shaft.
2. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly.
3. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with elastomeric isolators.
4. Refer to Division 23 Section "Common Work Results for HVAC" for additional requirements.

E. Outdoor-Air Intake:

1. Outdoor-Air Hood: Galvanized steel with bird screen, and finish to match cabinet; and sized to supply maximum 100 percent outdoor air.

F. Air Filters:

1. Comply with NFPA 90A.
2. Disposable Panel Filters: 1-inch- thick, factory-fabricated, pleated-panel type air filters with holding frames, with a minimum efficiency report value of 6 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1.
  - a. Media: Interlaced glass fibers.
  - b. Frame: Galvanized steel.

G. Dampers:

1. Outdoor-Air Damper: Galvanized-steel, opposed-blade dampers with vinyl blade seals and stainless-steel jamb seals, having a maximum leakage of 10 cfm/sq. ft. of damper area, at differential pressure of 2-inch wg.
2. Damper Operator: Direct coupled, electronic with spring return or fully modulating as required by the control sequence.

H. Indirect-Fired Gas Furnace:

1. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.8 and CSA 2.6, and NFPA 54, "National Fuel Gas Code."
  - a. CSA Approval: Certified by and bearing label of CSA International.
  - b. Burners:
    - 1) Gas Control Valve: Staged, number of stages as scheduled on the Drawings.
    - 2) Gas Control Valve: Modulating, turndown ratio as scheduled on the Drawings.
    - 3) Fuel: Natural gas.
    - 4) Minimum Thermal Efficiency: 80 percent.
    - 5) Ignition: Electronically controlled electric spark with flame sensor.
2. Venting: Gravity vented.
3. Power Vent: Integral, motorized centrifugal fan interlocked with gas valve.
4. Combustion-Air Intake: Separate combustion-air intake and vent terminal assembly.
5. Heat Exchanger: Stainless steel construction including secondary tubes.
6. Heat-Exchanger Drain Pan: Stainless steel.
7. Safety Controls:
  - a. Gas Train: Control devices and control sequence shall comply with ANSI standards and AXA XL GAPS (formerly IRI).
  - b. Purge-Period Timer: Automatically delays burner ignition and bypasses low-limit control.
  - c. Airflow Proving Switch: Differential pressure switch senses correct airflow before energizing pilot.

- d. Automatic-Reset, High-Limit Control Device: Stops burner and closes main gas valve if high-limit temperature is exceeded.
- e. Safety Lockout Switch: Locks out ignition sequence if burner fails to light after three tries. Controls are reset manually by turning the unit off and on.
- f. Control Transformer: 24-V ac.

I. Controls:

1. Factory-wired, fuse-protected control transformer, connection for power supply and field-wired unit to remote control panel.
2. Control Panel: Surface-mounted remote panel, with engraved plastic cover, and the following lights and switches:
  - a. On-off-auto fan switch.
  - b. Summer-winter-off switch.
  - c. Supply-fan operation indicating light.
  - d. Heating operation indicating light.
  - e. Thermostat.
  - f. Damper position potentiometer.
  - g. Dirty-filter indicating light operated by unit-mounted differential pressure switch.
  - h. Safety-lockout indicating light.
3. Refer to Division 23 Section "Temperature Controls" for control equipment. Sequence of operation is indicated on the Drawings.
4. Fan Control: Interlock fan to start with exhaust fan(s). Refer to Division 23 Section "Power Ventilators" and Sequence of Operation on the Drawings for exhaust fan controls.
5. Outdoor-Air Damper Control, 100 Percent Outdoor-Air Units: Outdoor-air damper shall open when supply fan starts, and close when fan stops.
6. Mixed Outdoor- and Return-Air Damper Control: When fan is running, outdoor- and return-air dampers shall modulate to supply minimum outdoor air as follows:
  - a. Minimum 30 percent outdoor air.
  - b. Outdoor-air quantity adjusted by potentiometer on control panel.
  - c. Outdoor-air quantity to maintain minimum building static pressure.
7. Temperature Control: Operates gas valve to maintain supply-air temperature.
  - a. Operates gas valve to maintain discharge-air temperature with factory-mounted sensor in blower outlet.
  - b. Operates gas valve to maintain space temperature with wall-mounting, field-wired sensor.
  - c. Timer shall select remote setback thermostat to maintain space temperature at 50 deg F.
  - d. Furnace Control: Two or four steps of control using one or two furnace sections in series.
  - e. Furnace Control: 20 to 100 percent modulation of the firing rate. 10 to 100 percent with dual furnace units.
8. DDC: Stand-alone control module for link between unit controls and DDC system. Control module shall be compatible with temperature-control system specified in Division 23 Section "Temperature Controls."
  - a. Provide start and stop interface relay, and relay to notify DDC system alarm condition.
  - b. Provide hardware interface or additional sensors as follows:
    - 1) Room temperature.
    - 2) Discharge-air temperature.
    - 3) Furnace operating.

## 2.2 ROOF CURB

- A. Manufacturer's standard full-perimeter curb of sheet metal, with wood nailer, neoprene sealing strip, and welded Z-bar flashing. Top of curb shall be level and extend a minimum of 10 inches above top of roof insulation.

## 2.3 MOTORS

- A. Comply with requirements in Division 20 Section "Motors."

## 2.4 CAPACITIES AND CHARACTERISTICS

- A. Refer to Schedule on Drawings.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation of indirect-fired H&V units.
- B. Examine roughing-in for piping, ducts, and electrical systems to verify actual locations of connections before equipment installation.
- C. Examine roof curbs and equipment supports for suitable conditions where rooftop replacement-air units will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Install gas-fired units according to NFPA 54, "National Fuel Gas Code."
- B. Hoist, transport, and rig units or their shipping sections into position following procedures recommended by manufacturer.
- C. Install units level and plumb, maintaining manufacturer's recommended clearances. Install according to AHRI Guideline B.
- D. Deliver roof curbs and equipment supports to site for installation under Division 07. Install rooftop H&V units on equipment curbs and supports specified. Secure units to curb support with anchor bolts.
- E. Install suspended units from spring hangers with minimum 1-inch static deflection; refer to Division 20 Section "Mechanical Vibration Controls."
- F. Install floor-mounted units on spring isolators with minimum 1-inch static deflection; refer to Division 20 Section "Mechanical Vibration Controls."
- G. Install controls and equipment shipped by manufacturer for field installation with indirect-fired H&V units.

### 3.3 CONNECTIONS

- A. Piping Connections: Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to machine to allow service and maintenance.
  - 1. Gas Piping: Comply with requirements in Division 23 Section "Fuel Gas Piping." Connect gas piping with shutoff valve and union and with sufficient clearance for burner removal and service. Provide CSA-approved flexible connectors.
- B. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts." Drawings indicate the general arrangement of ducts. Connect supply ducts to indirect-fired H&V units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Duct Accessories."
- C. Ground equipment according to Division 26 Section "Grounding and Bonding."
- D. Connect wiring according to Division 26 Section "Conductors and Cables."

### 3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
  - 1. Inspect for visible damage to furnace combustion chamber.
  - 2. Inspect casing insulation for integrity, moisture content, and adhesion.
  - 3. Verify that clearances have been provided for servicing.
  - 4. Verify that controls are connected and operable.
  - 5. Verify that filters are installed.
  - 6. Purge gas line.
  - 7. Inspect and adjust vibration isolators.
  - 8. Verify bearing lubrication.
  - 9. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
  - 10. Adjust fan belts to proper alignment and tension.
  - 11. Start unit according to manufacturer's written instructions.
  - 12. Complete startup sheets and attach copy with Contractor's startup report.
  - 13. Inspect and record performance of interlocks and protective devices; verify sequences.
  - 14. Operate unit for run-in period recommended by manufacturer.
  - 15. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
    - a. Gas Burner:
      - 1) Measure gas pressure at manifold.
      - 2) Measure combustion-air temperature at inlet to combustion chamber.
      - 3) Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
  - 16. Calibrate thermostats.
  - 17. Adjust and inspect high-temperature limits.
  - 18. Inspect dampers, if any, for proper stroke and interlock with return-air dampers.
  - 19. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
  - 20. Measure and record airflow. Plot fan volumes on fan curve.
  - 21. Verify operation of remote panel, including pilot-operation and failure modes. Inspect the following:

- a. High-limit heat.
- b. Alarms.

22. After startup and performance testing, change filters, verify bearing lubrication, and adjust belt tension.

- C. Remove and replace malfunctioning components that do not pass tests and inspections and retest as specified above.
- D. Prepare written report of the results of startup services.

### 3.5 ADJUSTING

- A. Adjust initial temperature set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

### 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain indirect-fired H&V units.

END OF SECTION 23 7333



SECTION 23 7600 - CLOSED CIRCUIT FLUID COOLERS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Related Sections include the following:
  - 1. Division 20 Section "Mechanical General Requirements."
  - 2. Division 20 Section "Basic Mechanical Materials and Methods."

1.2 SUMMARY

- A. Section includes closed circuit evaporative cooler including:
  - 1. Sump/fan section.
  - 2. Fans.
  - 3. Fan motor and drive.
  - 4. Control cabinet.
  - 5. Coil section.
  - 6. Water distribution system.
  - 7. Water recirculation pumps.
  - 8. Drift eliminators.
  - 9. Accessories.

1.3 REFERENCES

- A. ANSI/ABMA 9 - Load Rating and Fatigue Life for Ball Bearings.
- B. ANSI/ABMA 11 - Load Rating and Fatigue Life for Roller Bearings.

- C. ASME PTC-23 - Atmospheric Water-Cooling Equipment.
- D. Cooling Tower Institute (CTI) ATC-105 - Acceptance Test Code for Water Cooling Towers.
- E. Cooling Tower Institute (CTI) - Certification Standard STD-201.
- F. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).

#### 1.4 SUBMITTALS

- A. Submit under provisions of Division 20 Section "Mechanical General Requirements" and as supplemented in this section.
- B. Submit shop drawings indicating required structural steel supports including dimensions, sizes, and locations for mounting bolt holes.
- C. Submit product data indicating rated capacities, dimensions, weights and point loadings, accessories, required clearances, electrical requirements and wiring diagrams, and location and size of field connections. Submit schematic diagram indicating capacity controls.
- D. Submit performance curve plotting leaving water temperature against wet bulb temperature.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Certified by CTI.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. ASME Compliance: Fabricate and label heat-exchanger coils to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. CTI Certification: Cooling tower thermal performance according to CTI STD 201, "Certification Standard for Commercial Water-Cooling Towers Thermal Performance."
- E. FMG approval and listing in the latest edition of FMG's "Approval Guide."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Factory assemble entire unit. If required for shipping, disassemble into as large as practical sub-assemblies so that minimum amount of field work is required for re-assembly.
- B. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.

#### 1.7 EXTRA MATERIALS

- A. Provide one set of matched fan belts, three spray nozzles for each cell, one gasket for each access door, one valve seat for each make-up or control valve.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS - CLOSED CIRCUIT EVAPORATIVE COOLERS

- A. Evapco.
- B. Baltimore Air Coil.

### 2.2 GENERAL

- A. Provide industrial induced draft counter flow closed circuit fluid cooler with axial propeller fans, motor, drives, basin, water distribution system, inlet louvers, drift eliminators, cooling coil, sump heaters, fill valves, bleed valves, discharge hood and discharge dampers. Fan assemblies shall have all moving parts factory mounted and aligned.

### 2.3 COMPONENTS

- A. Casing shall be constructed of heavy gauge G-235 hot-dipped galvanized steel. During fabrication all panel edges shall be coated with 95% pure zinc-rich compound. The casing shall be provided with 1" foam insulation to reduce heat loss during winter operations. Foam insulation shall consist of a protective top coat and a layer of paint to prevent UV damage.
- B. Sump and all components subject to corrosion shall be constructed of Type 304 stainless steel. Sump shall be open and easily accessible from grade to allow service and cleaning removable inlet louvers. A depressed sump area shall be provided to collect accumulated dirt and debris. Sump accessories shall include removable Type 304 stainless steel strainer of anti-vortexing design, overflow, drain, waste water bleed line with valve, brass make-up valve with large diameter polystyrene filled plastic float arranged for easy adjustment and electric immersion sump heaters. Sump heaters shall maintain basin water temperature at 40°F with a 0°F outdoor air temperature. Provide sump heater control system to cycle heater on and off as required and to prevent energizing heater when heater elements are not completely submerged.
- C. Fans shall be heavy duty aluminum alloy axial propeller type statically and dynamically balanced. Fans shall be enclosed in a close fitting, corrosion protected, venturi shaped cowl for efficient operation. A galvanized shell screen shall be mounted over fan discharge for safety.
- D. Fan Motors and Drives: Fan motors shall be totally enclosed fan cooled (TEFC) or totally enclosed air over ball bearing (TEAO) inverter duty motors with 1.15 service factor. Motors shall be mounted on an adjustable base designed to allow motor and drive service from outside of the unit. Motor bases shall have adjustment locking mechanism for positive adjustment. For additional motor requirements refer to Division 20 Section 20 0513 - Motors. Drives shall be multigroove, v-belt type with taper lock aluminum alloy sheaves designed for 150% of motor nameplate horsepower. Belt material shall be neoprene reinforced with polyester cords. Fan and motor sheaves shall be mounted on shafts with specially coated bushings to provide maximum corrosion protection. Belt adjustment shall be accomplished from the exterior of unit. Bearings shall be heavy duty self-aligning ball type with grease fittings and lube lines extended to the outside of unit. Bearings shall be designed for ABMA L-10 life of 75,000 hours. Motor and drive shall have a 5 year warranty.
- E. Provide discharge hood with positive closure dampers to reduce heat loss through the cooler during winter operation. Discharge hood shall be factory insulated with 1" foam insulation, coated with a protective top coat and a layer of paint to prevent UV damage. Discharge hood and dampers shall be constructed of heavy gauge G-235 hot dipped galvanized steel. Discharge hood shall be complete with isolation dampers, electric damper actuators and damper linkages all factory assembled. For additional damper, actuator and linkage requirements refer to Division 23 Section 23 0933 - Temperature Controls.

- F. The heat transfer coil(s) shall be all prime surface steel and encased in a heavy steel frame. The heat transfer coil(s) shall be removable for service and cleaning. Coil(s) shall be designed for low pressure drop with sloping tubes for free drainage of liquid. Coil(s) shall be pneumatically tested at 350 psig, under water to make sure it is leak free. After fabrication and pressure testing the complete coil assembly shall be dipped in molten zinc (hot dipped galvanized).
- G. The water distribution system shall distribute water uniformly over the coils at a flow rate which shall ensure complete wetting of the coils at all times. The spray header and branches shall be constructed of Schedule 40 polyvinyl chloride (PVC) pipe. All spray branches shall be removable for cleaning. Spray nozzles shall be precision molded ABS plastic with internal sludge ring to prevent clogging. Nozzles shall be threaded into spray branches to provide easy removal for service.
- H. The water recirculation pump shall be a closed coupled, bronze fitted centrifugal pump with mechanical seal. Pump shall be mounted vertically and completely piped to the suction strainer and the water distribution system. The pump shall be installed vertically to permit free drainage of pump and water distribution system.
- I. Drift eliminators shall be constructed of inert polyvinyl chloride (PVC) in easy to handle sections. The eliminator shall incorporate a minimum of three changes in air direction, and limit drift loss to less than 0.001% of the circulating water flow rate.
- J. Provide inlet louvers to prevent splash out and block direct sunlight. Louvers shall be constructed of polyvinyl chloride (PVC) in easy to handle sections. Mount louvers in easy to remove frames to permit access to sump for service. Louver shall incorporate a minimum of two changes in air direction. Louver inward pass shall slope down towards sump to eliminate splash out, and outward pass shall slope up to block direct sunlight.

## 2.4 ACCESSORIES

- A. Provide each unit with electric immersion pan heaters, size and voltage as scheduled, and control panel with a probe combination heater thermostat/low water cutout, heater contactor with control transformer and fused disconnect mounted on unit in NEMA 4 enclosure. Heaters shall be sized to maintain 40°F pan water temperature with fan and pump off to prevent pan freeze-up to 0°F and shall be interlocked with spray pump so heaters are de-energized when spray pump is running.
- B. Provide each unit with external working platform outside of unit's access door to allow service of fan motor, mechanical equipment, fan drive and water distribution system. The platform shall be constructed of galvanized steel grating with galvanized handrails and toe boards. Access to the platform shall be provided by aluminum ladder which shall extend to the unit base, ladder and platform assembly shall be supported by the unit.
- C. A jib boom shall be mounted on the side of the unit to assist in removing the motor, mechanical equipment, and fan for repair. The jib boom shall consist of a bracket and davit arm. The assembly shall have the ability to support a maximum vertical load of 1,000 pounds.
- D. Provide brass make-up float valve with adjustable plastic float.
- E. Vibration Isolation: Refer to Division 20 Section 20 0547 – Mechanical Vibration Control.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install unit on vibration isolators. Refer to Division 20 Section "Mechanical Vibration Controls."
- C. Connect make-up water piping with flanged or union connections to cooler. Pitch to cooler.
- D. Pipe overflow, bleed, and drain, to floor drain.

### 3.2 FIELD QUALITY CONTROL

- A. Test under actual operating conditions in accordance with CTI ATC-105 and verify specified performance.

### 3.3 MANUFACTURER'S FIELD SERVICES

- A. Inspect units after installation and submit report prior to start-up, verifying installation is in accordance with specifications and manufacturer's requirements.

### 3.4 CLOSED CIRCUIT FLUID COOLER PENALTY CLAUSE

- A. Should performance tests show a deficiency, the manufacturer shall make alterations to the closed circuit cooler to overcome deficiency. Failing in this, the Owner shall be compensated by either, or a combination of both of the following:
  - 1. Installation of additional capacity.
  - 2. A percentage refund of the closed circuit fluid cooler contract price proportional to the percentage of deficiency established.
- B. Compare the resulting arithmetic averages of the measurements for each test period, with the curves called for in CTI ATC-105. Interpolation between curves shall give a guaranteed water rate, "W.R." in GPM, that will correspond to the range, wet bulb, and cold water temperature obtained during the test.
- C. Compute percentage capacity of closed circuit fluid cooler as follows:
  - 1. Actual measured W.R. in GPM by 100 = % of Design Capacity
  - 2. Guaranteed W.R. from curves in GPM

END OF SECTION 23 7600

SECTION 23 8121 - COMMERCIAL ROOFTOP AIR HANDLING UNITS

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes outdoor-mounted air conditioning units.
- B. Products supplied but not installed under this Section:
1. Roof curbs and equipment rails.

1.3 DEFINITIONS

- A. DDC: Direct-digital controls.
- B. BAS: Building Automation System.
- C. Modulating: As applied to gas-fired heat exchangers, infinite or finely stepped regulation of burner output within a specified range.

1.4 ACTION SUBMITTALS

- A. Product Data: Include manufacturer's technical data for each model indicated, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection. Prepare the following by or under the supervision of a qualified professional engineer:

- 1. Wiring Diagrams: Power, signal, and control wiring.

1.6 CLOSEOUT SUBMITTALS

- A. Field quality-control test reports.
- B. Operation and Maintenance Data: For rooftop air conditioners to include in operation and maintenance manuals.

1.7 QUALITY ASSURANCE

- A. AHRI Compliance:
  - 1. Comply with AHRI 210/240 and AHRI 340/360 for testing and rating energy efficiencies for RTUs.
  - 2. Comply with AHRI 270 for testing and rating sound performance for RTUs.
- B. ASHRAE Compliance:
  - 1. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
- C. UL Compliance: Comply with UL 1995.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by an NRTL acceptable to authorities having jurisdiction, and marked for intended use.

1.8 COORDINATION

- A. Coordinate size and locations of roof curbs, equipment supports, and roof penetrations. Framing, flashing, and attachment to roof structure are specified under Division 07.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Filters: One set of filters for each unit.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

### 2.2 COMMERCIAL ROOFTOP AIR HANDLING UNITS

- A. Manufacturers:
1. Daikin Applied; a member of Daikin Industries, Ltd.; OAH series.
  2. Johnson Controls Incorporated/YORK; Engineered Systems Group
- B. Description: Factory assembled and tested; designed for exterior installation; consisting of heating coils, cooling coils, supply-air fan, filters, dampers, and temperature controls or interface specified for unit controls.
- C. Maximum Temperature Distribution Across Supply Air Outlet:
1. 10 deg F Heating.
  2. 5 deg F Cooling.
- D. Casing: Double-wall galvanized sheet metal construction with exterior enamel paint finish. Units having single-wall casing construction are not acceptable.
1. Finish able to withstand minimum 500-hour salt spray test in accordance with ASTM B117.
  2. Hinged access doors with neoprene gaskets for inspection and access to internal parts.
  3. Minimum 1-inch- thick thermal insulation.
  4. Perforated-metal liner on supply-air fan discharge section.
  5. Knockouts for electrical and piping connections.
  6. Exterior condensate drain connection.
  7. Lifting lugs.
- E. Supply-Air Fan: Fan type and quantity as scheduled.
1. Direct-drive plenum fan, grease-lubricated ball bearings, and motor. Mount fan and motor assembly on base with spring isolators having 2-inch deflection. Provide with variable frequency controller and motor shaft grounding ring.
- F. Drain Pan: Under cooling coils. Formed of stainless-steel sheet and complying with requirements in ASHRAE 62.1. Fabricate pans with slopes in two planes to collect condensate from cooling coils (including coil piping connections and return bends) and when units are operating at maximum design face velocity across the coils.
1. Drain Connections: Both ends of pan.
  2. Units with stacked coils shall have an intermediate stainless steel drain pan or drain trough to collect condensate from top coil.
- G. Filters: Size, type, and rating as scheduled on the Drawings, in filter racks or galvanized-steel frames as required by filter type.
1. Air Filter and Filter-Holding System Manufacturers:



- a. AAF | Flanders.
  - b. AAF International.
  - c. Camfil.
- H. Water Heating Coils: Aluminum-plate fin and seamless copper tube in galvanized-steel casing, tested to 300 psig and leak tested to 200 psig with air under water; with modulating control valve and actuator. Insulate coil section. Complete with pipe vestibule.
- I. Chilled Water Coils: Aluminum-plate fin and seamless copper tube in galvanized-steel casing, tested to 300 psig and leak tested to 200 psig with air under water; with modulating control valve and actuator. Insulate coil section. Complete with pipe vestibule.
- J. Economizer: Return- and outside-air dampers with neoprene seals, bird screen, and hood.
  - 1. Leakage: Maximum leakage 2.5 percent at nominal airflow of 400 cfm per ton with 1-inch wg pressure differential.
  - 2. Actuators to be provided by Division 23 Section "Temperature Controls".
- K. Electrical:
  - 1. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection.
  - 2. House in a unit-mounted, NEMA 250, Type 3R enclosure with hinged access door with lock and key or padlock and key.
  - 3. Wiring shall be numbered and color-coded to match wiring diagram.
  - 4. Field power interface shall be to NEMA KS 1, heavy-duty, nonfused disconnect switch.
  - 5. Minimum SCCR according to UL 508 shall be as indicated on the Drawings or 42,000 A, whichever is greater.
  - 6. Each motor shall have branch power circuit and controls with one of the following disconnecting means having SCCR to match main disconnecting means:
    - a. NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
    - b. NEMA KS 1, heavy-duty, nonfusible switch.
    - c. UL 489, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
  - 7. Each motor shall have overcurrent protection.
- L. Unit Controls: To be provided by Division 23 Section "Temperature Controls" in construction documents.
- M. Accessories:
  - 1. Service Outlets: 115-V, ground-fault, circuit-interrupter type, factory wired such that outlet shall remain energized even if the unit main disconnect is open.
- N. Roof Curb: Curb adaptor by unit manufacturer, steel with corrosion-protection coating, gasketing, and factory-installed wood nailer; complying with NRCA standards; minimum height as scheduled on the Drawings.

## 2.3 MOTORS

- A. Comply with requirements in Division 20 Section "Motors."

## 2.4 FIELD VERIFICATION BY UNIT MANUFACTURER

- A. Prior to submittals, manufacturer's representative shall visit the site and field measure existing unit, curb, duct openings, and pipe vestibule locations/dimensions.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hoist, transport, and rig air conditioning units or their shipping sections into position following procedures recommended by the manufacturer.
- B. Install units level and plumb, maintaining manufacturer's recommended clearances. Install according to AHRI Guideline B.
- C. Deliver roof curbs and equipment supports to site for installation under Division 07. Install rooftop air conditioners on equipment curbs and supports specified. Secure units to curb support with anchor bolts.
- D. Unit Support: Install unit level on structural curbs. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.

### 3.2 CONNECTIONS

- A. Piping installation requirements are specified in other Division 20 and 23 Sections.
- B. Install piping adjacent to machine to allow service and maintenance.
  - 1. Hot-Water Heating Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping." Connect to supply and return coil tapings with shutoff or balancing valve and union or flange at each connection.
- C. Duct installation requirements are specified in other Division 23 Sections. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
  - 1. Install ducts to termination in roof curb.
  - 2. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
  - 3. Connect supply ducts to rooftop unit with flexible duct connectors specified in Division 23 Section "Duct Accessories."
  - 4. Terminate return-air duct through roof structure and insulate space between roof and bottom of unit with 2-inch- thick, acoustic duct liner.
- D. Electrical System Connections: Comply with applicable requirements in Division 26 Sections for power wiring, switches, and motor controls.
- E. Ground equipment according to Division 26 Section "Grounding and Bonding."
- F. 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.

### 3.3 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections. Report results in writing.
- B. Perform the following field quality-control tests and inspections and prepare test reports:
  - 1. After installing rooftop air conditioners and after electrical circuitry has been energized, test units for compliance with requirements.
  - 2. Inspect for and remove shipping bolts, blocks, and tie-down straps.
  - 3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
  - 4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- C. Repair malfunctioning units and retest as specified above; or remove malfunctioning units, replace with new units and retest as specified.

### 3.4 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
- B. Complete installation and startup checks according to manufacturer's written instructions and do the following:
  - 1. Inspect for visible damage to unit casing.
  - 2. Inspect internal insulation.
  - 3. Verify that labels are clearly visible.
  - 4. Verify that clearances have been provided for servicing.
  - 5. Verify that controls are connected and operable.
  - 6. Verify that filters are installed.
  - 7. Adjust vibration isolators.
  - 8. Inspect operation of barometric dampers.
  - 9. Lubricate bearings on fan.
  - 10. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
  - 11. Adjust fan belts to proper alignment and tension.
  - 12. Start unit according to manufacturer's written instructions.
    - a. Complete startup sheets and attach copy with Contractor's startup report.
  - 13. Inspect and record performance of interlocks and protective devices; verify sequences.
  - 14. Operate unit for an initial period as recommended or required by manufacturer.
  - 15. Check control interface wiring.
  - 16. Adjust and inspect high-temperature limits.
  - 17. Inspect outside-air dampers for proper stroke and interlock with return-air dampers.
  - 18. Inspect and verify operation of controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
  - 19. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.
    - a. Supply-air volume.
    - b. Return-air volume.
    - c. Relief-air volume.
    - d. Outside-air intake volume.
  - 20. Simulate maximum cooling demand and inspect the following:
    - a. Short circuiting of air through outside coil or from outside coil to outside-air intake.

21. Record all final adjustments and control settings.
22. After startup and performance testing, change filters, vacuum heat exchanger and cooling and outside coils, lubricate bearings, adjust belt tension, and inspect operation of power vents.

### 3.5 ADJUSTING

- A. Adjust initial temperature and humidity set points.
- B. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

### 3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain rooftop air conditioners. Refer to Division 20 Section "Mechanical General Requirements."

END OF SECTION 23 8121