



<p>Project: Memorial Hospital of Union County, New Heart Center</p> <p>Commission Number: 1122.00</p>	<p>Addendum No.: BP-3 ADDENDUM 1</p>	<p>Date: January 17, 2012</p>
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TO ALL BIDDERS:

This Addendum forms a part of the Contract Documents and modifies the original Bidding Documents as well as previously issued Addenda as noted below. Acknowledge receipt of this Addendum in the space provided on the Form of Proposal. Failure to do so may subject the Bidder to disqualification.

Incorporate the following changes to the indicated documents:

GENERAL

ITEM 1: Attendance sheet from the Prebid Conference on January 13th is included with this Addendum.

ITEM 2: Site visit of the existing OR space has been rescheduled to Wednesday 1-18-12 at 5:00 PM with Brian Porteus with Messer Construction, Phone # (614) 206-4494. Contractors to meet at the Messer Field Office at Memorial Hospital.

PROCUREMENT AND CONTRACTING REQUIREMENTS:

ITEM 3: SECTION 00 21 23, INSTRUCTIONS TO BIDDERS
A. Article I.3.g: Delete the words "the Ohio Prevailing Wage laws".

ITEM 4: SECTION 00 24 00, DESCRIPTIONS OF WORK
A. Revise Section 00 24 00 Section C, Note 54. The Owner will purchase the Union County General Building Permit. All other state or local permits and inspection fees must be included in the work scope of the contractor requiring them. Plumbing contractor is responsible for the plumbing permit, as it is separate from the county issue building permit. Each contractor shall call for all inspections as required to facilitate their work even if permit was secured by the Construction Manager, i.e. drywall contractor is responsible for scheduling framing inspections. Each contractor shall keep copies of permits, inspections, and signatures in the Construction Manager's office.
B. Add to each contractor's scope of work in 00 24 00 the following:

TC-06

- o Include Specification 088000 Glazing (as related to this scope of work)
- o Include Specification 310000 Earthwork (as related to this scope of work)
- o Include Specification 312500 Erosion and Sediment Control (as related to this scope of work)
- o Add - Note 66. Provide temporary stairs at each stairwell from 3-1-12 to 5-31-12. Coordinate installation, removal, and schedule with CM and Misc. Metals Contractor.
- o Add – Note 67. Provide GL-7 @ Nurse Station per 8/A9-8.
- o Update – Note 40. Provide Fry TCM-625-50 per details on A9-14.
- o Add – Note 68. Provide manual override switch per note 29 on A1-1 co. Contractor is to provide all low voltage controls as needed for a complete system and as shown on the drawings.
- o Add – Note 69. Provide granular backfill per section 310000 around all exterior foundation walls. Carry an allowance of 140 yards of material.



- Add – Note 70. Contractor shall remove access road material at the exterior foundation wall to provide the TC-07 Masonry room to install CMU scope. Existing conditions are two access roads 25' wide.

TC-07

- Add – Note 32. This contractor must obey all scaffold regulations in the Messer Safety Manual and must engage/maintain one OSHA recognized competent person on-site to erect and maintain the scaffold at all times. The owner may retain a third party inspector to verify proper scaffold erection.
- Add – Note 33. This contractor will have one location on-site to store materials and mix mortar due to other on-site work proceeding at the same time. This location will be coordinated and approved by the CM.
- Add – Note 34. Tops of all masonry walls will be covered and protected at the end of each work day to prevent moisture and debris from getting into the cavity. Secure cover to prevent wind from blowing it off.
- Add – Note 35. Building temporary electric is reserved for the interior construction. Contractor shall provide electric as necessary to complete this scope of work.
- Add – Note 36. Contractor is responsible for coded notes 7 & 8 on A0-1.
- Add – Note 37. Provide air barrier noted 7.17 per details 4/A5.1, 1/A5-5, and 4/A5-5.
- Add – Note 38. Contractor is responsible to clean off muck, soil, etc. from foundations prior to installing grout bed and CMU block. Contractor is also responsible for any additional soil grading or removal needed for access to install CMU at exterior foundations beyond what has been left by previous TC.

TC-08

- Update – Note 6. Provide metal support items clouded on S series drawings along with the details in the architectural drawings. Corresponds with Structural Steel Specification Listed. Includes coded notes 4-7 on S2-1 and details F,G,and H on S4-6.

TC-09

- Add – Note 14. Temporary power and water are as indicated in the Temporary Utilities & Hoisting Section 01 51 13. Anything needed above or beyond the scope provided for temporary power or water shall be provided by this contractor or this contractor shall procure the additional utility needs directly from the Electrical Contractor or Mechanical Contractor.

TC-10

- Update – Note 20. TC-12 is to provide FRY Glazing extrusion DRM-150-75 per detail 8/A9-6. This contractor is to coordinate sizes and locations of openings with TC-12 prior to installation.
- Add – Note 27. TC-06 to provide GL-7 at the Greeters Desk per 10/A9-6 and at the Nurses station per 8/A9-8, all other glazing listed in the drawings and specification 08 80 00 is by this contractor.

TC-11

- Add – Note 27. Where new expansions tie into existing building, this contractor shall coordinate with the TC-06, TC-12, and CM with regard to the scope of demolition. All patching of existing roofing, coordination of expansion joint installation, and any other tie in accessories required to provide a water tight connection are part of this scope.
- Add – Note 28. Contractor shall provide 1/2" MRT Plywood under Standing Seam Metal Roof as indicated on 1/A5-4.
- Add – Note 29. Provide blocking at all parapets; including but not limited to, details 3&5/A5-1, 1&2/A5-2, and 2&7/A5-5.
- Add – Note 30. Provide notes 6.2 and 7.12 on detail 4/A5-2, 7.12 on detail 3/A5-2 and 7.12 at any location noted on top of note 7.5.
- Add – Note 31. Provide all notes 7.5 and 7.25 on A3 and A5 series drawings.



TC-12

- Include specification 05 40 00 Cold-Formed Metal Framing
- Modify – Note 38. Provide FRY Drywall Glazing Extrusion DRM-150-75 per detail 8/A9-6. Coordinate sizes and locations of openings with TC-10 prior to installation.
- Add – Note 70. This Contractor shall review completed coordination drawings prior to ductwork or piping being installed parallel to the walls that would cause the walls to be inaccessible to topping out. These "trapped" walls will be framed, topped out, and finished before any ductwork or piping is installed. Any wall inspections needed in this sequence will need to be coordinated with the CM. This activity will also need to be coordinated with hard ceiling and soffit/bulkhead framing.
- Add – Note 71. This contractor is responsible for constructing and maintaining proper UL designed smoke/fire barriers in drywall partitions as detailed on A7-1 and A7-2.
- Add – Note 72. This contractor to coordinate with other contractors for built-in trash receptacles, fire-extinguisher cabinets, toilet accessories, etc. that will require special framing.
- Add – Note 73. Do not dump waste water from this scope of work into the building plumbing system. Cleanup of drywall compound and equipment shall be contained and a location for disposal coordinated with the CM.
- Update – Note 69. Provide \$5,000 allowance for labor and material used in fire proofing/patching at existing conditions not otherwise covered in this or other scope. To be directed by CM. All expenditures shall be tracked by material tickets signed daily.
- Add – Note 74. Provide vapor barrier as indicated by note 9 on A1-2 dim.
- Add – Note 75. Provide coded note 19 on A2-1.
- Add – Note 76. Provide brake metal closure with hold-downs fastened to sill as shown on 1/A5-1 and typical throughout at similar condition.

TC-13

- Add – Note 20. Reference specification 03 30 00 Cast-in-Place Concrete for slab-on-deck tolerances. Any preparation beyond these specifications will be the responsibility of this contractor. This will be considered "minor" floor preparation.
- Add – Note 21. All floors will be rough broom cleaned by other contractors prior to this scope of work. Final cleaning of floors prior to the installation of flooring materials is included in this scope of work.
- Add – Note 22. Do not dump waste water from this scope of work into the building plumbing system. Cleanup of glue, buckets, and equipment shall be contained and a location for disposal coordinated with the CM.

TC-14

- Add – Note 22. There will be no overspray allowed on the floors in this project. This contractor shall prevent overspray and protect surfaces from paint and overspray (i.e. flooring, ceilings, MEP devices, etc.) Remediation and cleanup of any overspray will be the responsibility of this contractor.
- Add – Note 23. Any plywood required at electrical and communication closets shall be painted as a part of this scope.
- Add – Note 24. Do not dump waste water (vinyl wall covering adhesive, cleanup of painting buckets, pans, rollers, etc.) from this scope of work into the building plumbing system. Cleanup of painting equipment shall be contained and a location for disposal coordinated with the CM.

TC-15

- Add – Note 28. Provide Hose Valve Cabinets as indicated by note 30 on A1-1 co.
- Add – Note 29. Provide 4" water line to building as shown on C4-0. Include Siamese Vault as shown on C4-0 and detailed in F series.

TC-16

- Update – Note 38. All work of this Contractor is to be performed in complete compliance with all Local, State, and Federal codes and regulations. The owner will provide the Union County Building



Permit. All other permits that are required for a complete installation of this scope of work shall be provided by this contractor.

- Add – Note 50. Contractor responsible for the insulation and drywall called out in detail C on H5-3.
- Add – Note 51. Provide concrete pad per note 6 on P7-3 and specification 20 05 80 and also shown as detail F on H5-3.
- Add – Note 52. Provide Temporary Utilities per specification 01 51 13.
- Add – Note 53. Provide demolition as needed per note 28 on A1-1 co.

TC-17

- Add – Note 34. Provide Temporary Utilities per specification 01 51 13.
- Update – Note 20. Provide floor pedestal in Cath Lab per the drawings and section 11 70 00 listed above. Also indicated by note 31 on A1-1 co.

End of Section 00 24 00 Revisions

ITEM 4.1: SECTION 00 41 00, BID FORM

- A. Replace the Bid Form with the attached (added alternate H-3)

SPECIFICATIONS:

ITEM 5: SECTION 01 23 00 Alternates

- A. Replace section with the attached.

ITEM 5.1: SECTION 04 20 13

- B. Article 2.2.A.3: Add Glen-Gery Hometown Salem as an acceptable manufacturer.
- C. Article 2.3.B: Revise “Krete Gard” to read “Krete BGP”.

ITEM 6: SECTION 05 40 00, COLD FORMED METAL FRAMING

- A. Paragraph 1.03.A.2.b, revise to read as follows: “Exterior Walls: Wind Speed 90 mph; Exposure B, Importance Factor 1.15.”
- B. Delete Paragraph 1.04.B.1.
- C. Paragraph 1.04.A.6, add the following: “Provide design calculations sealed by a registered engineer in the State of Ohio.”

ITEM 7: SECTION 06 22 00

- A. Article 2.2.H.1, revise to read as follows: “1. Particle Board: ANSI A 208.1, **M2** Industrial Grade, average 47 pound density.”

ITEM 8: SECTION 07 42 43

- A. Article 2.1.A.4, add the following: “4. Intrabond”

ITEM 9: SECTION 07 53 23

- A. Article 2.3.A, revise the membrane to “60 mil non-reinforced.”

ITEM 10: SECTION 08 41 13

- A. Replace the section with the attached section.

ITEM 11: SECTION 08 44 13

- A. Replace the section with the attached section.



B. Waltek is added to the list of approved manufacturers.

ITEM 12: SECTION 08 80 00

A. Article 2.1.A.3.c, add the following: "c. Vetrotech Saint Gobain."

ITEM 13: SECTION 12 24 00

A. Article 2.1.A.3, add the following: "c. Draper."

B. Article 2.1.A.4, add the following: "d. Sun Or Shade."

ITEM 14: SECTION 21 05 02 FIRE PROTECTION SPECIALTIES

A. Paragraph 2.12.A Add: Fire Department Connection shall be Stortz.

ITEM 15: SECTION 20 05 80, VIBRATION ISOLATORS

A. Add specification section attached.

ITEM 16: SECTION 22 71 02, INTERIOR NATURAL GAS PIPING

A. Paragraph 1.01B, delete "new". Delete reference [indicated on drawing – 5 feet outside building]. Connect to existing gas line. Rework existing piping as required and as shown on drawings.

B. Paragraph 1.01D, delete [required, unit is not supplied with a regulator]. Add: Boilers and rooftop unit supplied with factory installed pressure regulators. Provide additional gas pressure service regulators as required based on equipment maximum pressure requirements.

C. Paragraph 1.02A, change code reference from NFPA 54 and International Fuel Gas Code.

ITEM 17: SECTION 23 33 14, FIRE AND SMOKE DAMPERS

A. Paragraph 2.02A, change "24 volt" to "120 volt".

B. Paragraph 2.03A, change "24 volt" to "120 volt".

C. For wiring of the dampers, refer to Detail B on Sheet E7.1.

ITEM 18: SECTION 23 75 14, ROOFTOP AIR HANDLING UNIT

A. Add specification section attached.

ITEM 19: SECTION 23 90 00, HVAC ALTERNATES

A. Replace with revised specification section attached.

ITEM 20: SECTION 23 90 71, VARIABLE FREQUENCY DRIVES

A. Delete Paragraph 1.01B.

B. Delete Paragraph 2.01I.

C. Delete Paragraph 2.01J.

D. Clarification: The VFDs for the rooftop unit are to be furnished with the rooftop equipment to allow for a single point electrical connection to the equipment.

ITEM 21: SECTION 26 32 10, EMERGENCY GENERATOR

A. Add the following to Paragraph 2.01N: Add a float switch for a critical high level alarm.

B. Add the following to Paragraph 2.06: The outdoor housing shall be Type 2 sound attenuated enclosure with integral 208 volt electric heaters to maintain a 40 degree F temperature.



C. 5 year warranty shall include parts, labor, and travel.

ITEM 22: SECTION 26 36 23, AUTOMATIC TRANSFER SWITCHES

- A. Add the following to Paragraph 2.01A: Switches shall be 3 cycle rated.
- B. 5 year warranty shall include parts, labor, and travel.

ITEM 23: SECTION 27 10 05, VOICE/DATA/COMMUNICATION/AUDIO/VIDEO WIRING SYSTEM

- A. Paragraph 1.04B Wiring, add Hitachi Cable Manchester as an acceptable manufacturer for Items 1, 2, and 3.

DRAWINGS & SCHEDULES:

ITEM 24: Door Schedule

- A. Delete the lead lining in the door and the lining from the hardware on doors associated with room 244.
- B. Door 233 to be 90 minute rated

ITEM 25: S Series Sheets.

- A. Add note to each "S" series (structural) sheet stating the following: "THIS DRAWING SHEET IS INCLUDED FOR REFERENCE ONLY EXCEPT WHEN THE SCOPE IS SPECIFICALLY INCLUDED BY SECTION 00 24 00 DESCRIPTIONS OF WORK."

ITEM 26: C Series Sheets.

- A. Add note to each "C" series (civil) sheet stating the following: "THIS DRAWING SHEET IS INCLUDED FOR REFERENCE ONLY EXCEPT WHEN THE SCOPE IS SPECIFICALLY INCLUDED BY SECTION 00 24 00 DESCRIPTIONS OF WORK. SITE RELATED MECHANICAL AND ELECTRICAL ITEMS ARE REPEATED ON THIS SHEET FOR COORDINATION PURPOSES, SEE THE MECHANICAL AND ELECTRICAL DRAWINGS FOR SITE RELATED WORK REQUIRED BY THOSE CONTRACTORS."

ITEM 27: Architectural Sheets.

- A. Replace the following drawing sheets with the attached: BC-1, BC-2, PH-1, A1-1co, A1-1dim, A1-2co, A1-2dim, A1-3, A2-1, A5-1, 5-A5-2, A5-6, A6-1, A6-2, A6-3, A7-1, A9-5, A9-8, A9-9, A9-10, A9-14, A10-1, A10-2, A10-4.

ITEM 28: SHEET S4-3, SECTIONS H AND J

- A. The bottom flange of the W24 beam (Line A, between Lines 1 and 2) can be used to laterally brace the metal studs with a vertical sliding connection at each stud.

ITEM 29: SHEET P2-2, PLUMBING SECOND FLOOR

- A. Roof drain and emergency overflow roof drain at Columns D/2 and D/3 have 4" pipe connections. Storm downspout as noted in Coded Note 4 is 6". Emergency outlet piping at D/3 extending south to exterior wall is 6".
- B. Add Electric Water Cooler, EWC1 in Room 201. Provide 1/2" supply, 1 1/2" waste, and 1 1/2" vent. Refer to revised Sheet A1-2 issued with this addendum for new location.

ITEM 30: SHEET P7-1, FUEL OIL SYSTEM DETAILS

- A. SCHEMATIC A: Delete fusible link valve shown in return piping coming from boiler loop prior



to exiting building. Supply and return piping to boilers shall be 1" in lieu of 2".

- ITEM 31: SHEET H1-1, FIRST FLOOR HVAC DUCTWORK PLAN
A. Refer to attached sheet for additional fire/smoke dampers and ductwork modifications.
- ITEM 32: SHEET H1-2, SECOND FLOOR HVAC DUCTWORK PLAN
A. Refer to attached sheet for additional fire/smoke dampers and ductwork modifications.
- ITEM 33: SHEET H2-2, SECOND FLOOR HVAC PIPING PLAN
A. Delete humidifier piping from Mechanical Room to RTU2.
- ITEM 34: SHEET H3-1, ENLARGED MECHANICAL ROOM PLAN
A. PLAN A: Delete all work associated with Humidifier H2.
B. Provide a temperature control panel in Room 233.
- ITEM 35: SHEET H4-1, HVAC SCHEDULES
A. HOT WATER BOILER SCHEDULE: Boiler fuel type shall be "Gas/Fuel Oil".
- ITEM 36: SHEET H4-2, HVAC SCHEDULES
A. ELECTRIC HUMIDIFIER SCHEDULE: Delete Humidifier H2.
- ITEM 37: SHEET H5-3, HVAC DETAILS
A. SCHEMATIC A: The thermal break casing shall be 3" in accordance with the specification and shall extend from the second cooling coil to the reheat coil section.
B. SCHEMATIC B: Delete the humidifier and associated stainless steel drain pan requirement from the RTU2.
- ITEM 38: SHEET E2-1, FIRST FLOOR LIGHTING PLAN
A. Revise lighting at canopy and add under counter lights. See attached revised Drawing E2-1.
- ITEM 39: SHEET E2-2, SECOND FLOOR LIGHTING PLAN
A. Add under counter lights. See attached revised Drawing E2-2.
- ITEM 40: SHEET E3-2, SECOND FLOOR POWER PLAN
A. Delete feed to Humidifier H2. Add GFI outlet for electric water cooler in waiting area 201, connect to general receptacle circuit.
- ITEM 41: SHEET E5-1, LUMINAIRE SCHEDULE
A. Revise luminaire types R6, R6A, S7, S8, R10, R16, W19, W21, and U22. See attached revised Drawing E5-1.
- ITEM 42: SHEETS E5-2 and E5-3
A. Add general note as follows: "THIS CONTRACTOR TO INCLUDE FINAL ROOM NUMBERS IN PANELBOARD DIRECTORY BRANCH CIRCUIT DESCRIPTIONS".
- ITEM 43: SHEET E6-1
A. Revise feeders to panelboards, add load information, notes regarding grounding and existing conductors. See revised Drawing E6-1.



ITEM 44: SHEET E6-2, ONE LINE DIAGRAM FEEDER SCHEDULE

A. Revise feeder schedule for numbers 50 through 54. See attached revised Drawing E6-2.

Attachments:

- Prebid Conference attendance sheet (3 pages)
- Bid Form
- Specification Sections 01 23 00, 08 41 13, 08 44 13, 20 05 80, 23 75 14, 23 90 00.
- Architectural Drawing Sheets: BC-1, BC-2, PH-1, A1-1co, A1-1dim, A1-2co, A1-2dim, A1-3, A2-1, A5-1, 5-A5-2, A5-6, A6-1, A6-2, A6-3, A7-1, A9-5, A9-8, A9-9, A9-10, A9-12, A9-14, A10-1, A10-2, A10-4
- PME Drawing Sheets: H1-1, H1-2, H3-1, E2-1, E2-2, E3-2, E3-3, E5-1, E5-2, E5-3, E6-1, E6-2, E7-1, E7-2

END OF BP-3, ADDENDUM 1



Project: New Heart Center – Memorial Hospital of Union County Commission Number: 1122.00	Meeting Topic: Prebid Meeting – Bid Package #3	Date: January 13, 2012 Time: 1:00 PM Location: MHUC Village/Civic Room
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- Initial name if listed correctly below. (Please note any needed corrections.)
- Enter name and email below if not listed.

Initial	Name	Company	Email Address
<i>TC</i>	<i>TOM CUSTER</i>	<i>KORDA</i>	<i>tom.custer@korda.com</i>
<i>T.C.D.</i>	<i>Trent Dennis</i>	<i>Capital Fire Prot.</i>	<i>trent@capfire.com</i>
<i>RRM</i>	<i>RANDY MILLER</i>	<i>CAPITAL FIRE</i>	<i>RANDYM@CAPFIRE.COM</i>
<i>BR</i>	<i>Bill Linberry</i>	<i>Brigade Fire</i>	<i>blinberry@brigadefire.net</i>
<i>MMS</i>	<i>Shelly DeNoma</i>	<i>Denion Electric</i>	<i>sdenoma@denion.com</i>
<i>CT</i>	<i>CRAIG TURON</i>	<i>GUTKNECHT CONST.</i>	<i>C.FISH@GUTKNECHT.COM</i>
<i>RCW</i>	<i>RON WILBURN</i>	<i>Limbach Co.</i>	<i>ronald.wilburn@limbachinc.com</i>
<i>SB</i>	<i>Susan Bruckmanridge</i>	<i>MHUC</i>	<i>susanbruckmanridge@mhuc.org</i>
<i>BG</i>	<i>BRIAN GIFFORD</i>	<i>Limbach</i>	<i>brian.gifford@limbachinc.com</i>
	<i>RANDAL KNOX</i>	<i>WILLIAMSON BUILDERS</i>	<i>RKNOX@WILLIAMSON-BUILDERS.COM</i>
	<i>Derek Williamson</i>	<i>Williamson Builders Inc.</i>	<i>derek@williamson-builders.com</i>
<i>DZ</i>	<i>DAVE ZITELLO</i>	<i>CHEMCOATE REG.</i>	<i>DZITELLO@CHEMCOATE.COM</i>

SECTION 00 41 00 - BID FORM

1.01 BID SUBMITTED BY:

All Blanks Shall Be Filled In

TC - _____
Trade Contract(s)

Contractor Name

Memorial Hospital of Union County
New Heart Center
Marysville, Ohio

Bids Received By: 1:00 P.M. EDT
Date: January 26, 2012

Bids Delivered To: Memorial Hospital of Union Co.
500 London Avenue
Marysville, OH 43040
Attn: Office of the Chief Operations Officer

TO: Memorial Hospital of Union County, Owner

1.02 DELIVER TO:

Memorial Hospital of Union County
500 London Avenue
Marysville, Ohio 43040
Attention: Office of the Chief Operations Officer

1.03 Having carefully reviewed the Instructions to Bidders, Drawings, Specifications and other Contract Documents for the Project entitled:

**Memorial Hospital of Union County - New Heart Center
Bid Package #3 – Exterior Skins & Interior Fit-out**

for Project, including having also received, read and taken into account the following Addenda:

- Addendum No. _____, dated _____
- Addendum No. _____, dated _____
- Addendum No. _____, dated _____
- Addendum No. _____, dated _____
- Addendum No. _____, dated _____

and likewise having inspected the site and the conditions affecting and governing the Project and confirmed the location of the site utilities and all existing structures, the undersigned hereby proposes to furnish all materials and to perform all labor, as specified and described in the said Specifications and/or as shown on the said Drawings for all Work necessary to complete the Project on a timely basis and in accordance with the Contract Documents regardless of whether expressly provided for in such Specifications and Drawings.

1.04 Before completing the Bid Form, the undersigned represents that it has carefully reviewed the Legal Notice, Instructions to Bidders, this Bid Form, Form of Bid Guaranty and Contract Bond, Contractor's Affidavit (O.R.C. 5719.042), Owner-Contractor Agreement, General Conditions of the Contract (AIA Document A232, 2009 edition) (as modified), Plans, Project Specifications, and other Contract

BID FORM

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BF-1

Documents. Failure to comply with provisions of the Contract Documents may be cause for disqualification of the bid.

1.05 BONDS AND CONTRACT: If the undersigned is notified of bid acceptance, it agrees to furnish required bonds as indicated in the Instructions to Bidders.

1.06 COMPLETION OF WORK: In submitting a bid, the undersigned agrees to execute the Owner-Contractor Agreement in the form included in the Contract Documents and to Substantially Complete its Work as required by the Contract Documents.

NOTE A: The wording of the Bid Form shall be used throughout, without change, alteration, or addition. Any change may cause it to be rejected.

NOTE B: Bidder is cautioned to bid only on the Brands or Standards specified.

2.01 BID:

Include the cost of all labor and material for the contracts listed below. Bidder is to fill in all blanks related to the Bid Package for which a bid is being submitted. If no bid is submitted for an item, leave the item blank or insert "NO BID" in the blank. For alternate items, indicate whether the amount stated is in addition to or a deletion from the base bid amount (if there is no indication whether the amount for an alternate is an addition or a deletion, the amount shall be an addition).

ITEM 1. TRADE CONTRACT TC-06 General Trades

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 2. TRADE CONTRACT TC-07 Masonry

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 3. TRADE CONTRACT TC-08 Miscellaneous Metals

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 4. TRADE CONTRACT TC-09 Sprayed Insulation & Fireproofing

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 5. TRADE CONTRACT TC-10 Curtain Wall, Composite Panels, Storefronts & ICU Entrances

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 6. TRADE CONTRACT TC-11 Roofing

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 7. TRADE CONTRACT TC-12 Exterior Framing, Sheathing, EIFS, Drywall & Ceilings

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 8. TRADE CONTRACT TC-13 Flooring & Tile

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT and SUPERVISION for the sum \$ _____

Sum in words: _____

_____ and _____/100 dollars.

ITEM 9. TRADE CONTRACT TC-14 Painting

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 10. TRADE CONTRACT TC-15 Fire Suppression

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ITEM 11. TRADE CONTRACT TC-16 Plumbing & HVAC

BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ALTERNATES for TC-16 Plumbing & HVAC:

Alternate H-1 Vacuum Pump Sound Absorption Blanket

ADD or DEDUCT (circle one) the following amount to or from the Base Bid:

ALL LABOR, MATERIAL, EQUIPMENT and SUPERVISION for the sum \$ _____

Alternate H-2A Andover Continuum Building Automation System

ADD or DEDUCT (circle one) the following amount to or from the Base Bid:

ALL LABOR, MATERIAL, EQUIPMENT and SUPERVISION for the sum \$ _____

Alternate H-2B Delta Controls Building Automation System

ADD or DEDUCT (circle one) the following amount to or from the Base Bid:

ALL LABOR, MATERIAL, EQUIPMENT and SUPERVISION for the sum \$ _____

Alternate H-3 RTU2

ADD or DEDUCT (circle one) the following amount to or from the Base Bid:

ALL LABOR, MATERIAL, EQUIPMENT and SUPERVISION for the sum \$ _____

List RTU2 Manufacturer / Exceptions _____

See Specification Section 01 23 00 for Alternate Descriptions

ITEM 12. TRADE CONTRACT TC-17 Electrical, Communications, Electronic Safety & Security
BASE BID TOTAL:

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

ALTERNATES for TC-17 Electrical, Communications, Electronic Safety & Security:

Alternate E-1 Intego Nurse Call/Code Blue System

ADD or DEDUCT (circle one) the following amount to or from the Base Bid:

ALL LABOR, MATERIAL, EQUIPMENT and SUPERVISION for the sum \$ _____

See Specification Section 01 23 00 for Alternate Descriptions

Bidders may bid a bid for any combination of Items 1 through 12. Each bidder submitting a Combined Bid must submit a separate bid for each bid item included in the Combined Bid. The sum of the separate bids may be (and is expected to be) different than the combined bid amount. The combined bid amount is to include only Base Bid items. The Bidder must complete the alternate information under each Bid Item for any alternates or unit prices that it wishes to include with its combined bid. Do not include any alternate bid items in the combined bid amount. If the Owner accepts an alternate, the amount of the combined bid will be increased or decreased by the amount of the alternate, or alternates, accepted as that alternate amount is stated under the individual bid item.

ITEM 13. COMBINED BID. This combined bid includes the following Trade Contracts:

TC- _____, TC- _____, TC- _____, TC- _____, TC- _____, TC- _____, TC- _____, and TC- _____.

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

The bid amount for the alternate items stated for each individual bid item that the Bidder wishes to include with its bid is included under the bid item in the Bid Form.

ITEM 14. COMBINED BID. This combined bid includes the following Trade Contracts:

TC- _____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, and TC-_____.

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

The bid amount for the alternate items stated for each individual bid item that the Bidder wishes to include with its bid is included under the bid item in the Bid Form.

ITEM 15. COMBINED BID. This combined bid includes the following Bid Items:

TC- _____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, and TC-_____.

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

The bid amount for the alternate items stated for each individual bid item that the Bidder wishes to include with its bid is included under the bid item in the Bid Form.

ITEM 16. COMBINED BID. This combined bid includes the following Bid Items:

TC- _____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, and TC-_____.

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

The bid amount for the alternate items stated for each individual bid item that the Bidder wishes to include with its bid is included under the bid item in the Bid Form.

ITEM 17. COMBINED BID. This combined bid includes the following Bid Items:

TC- _____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, and TC-_____.

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

The bid amount for the alternate items stated for each individual bid item that the Bidder wishes to include with its bid is included under the bid item in the Bid Form.

ITEM 18. COMBINED BID. This combined bid includes the following Bid Items:

TC- _____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, TC-_____, and TC-_____.

ALL LABOR, MATERIAL, EQUIPMENT, SUPERVISION and ALLOWANCES for the sum of:

\$ _____

Sum in words: _____ and _____/100 dollars.

The bid amount for the alternate items stated for each individual bid item that the Bidder wishes to include with its bid is included under the bid item in the Bid Form.

2.02 LABOR RATES

- A. Complete the attached Labor Rate summary for **all** classifications of work. These rates will be utilized for work performed against allowances as directed by the CM and for scope changes.

3.01 INSTRUCTIONS FOR SIGNING

- A. The person signing for a sole proprietorship must be the sole proprietor or his authorized representative. The name of the sole proprietor must be shown below.
- B. The person signing for a partnership must be a partner or his authorized representative.
- C. The person signing for a corporation must be the president, vice president or other authorized representative; or he must show authority, by affidavit, to bind the corporation.
- D. The person signing for some other legal entity must show his authority, by affidavit, to bind the legal entity.

4.01 BIDDER CERTIFICATIONS. The Bidder hereby acknowledges that the following representations in this bid are material and not mere recitals:

1. The Bidder acknowledges that this is a public project involving public funds, and that the Owner expects and requires that each successful Bidder adhere to the highest ethical and performance standards. The Bidder by submitting its bid pledges and agrees that (a) it will act at all times with absolute integrity and truthfulness in its dealings with the Owner, Construction Manager and the Design Professional, (b) it will use its best efforts to cooperate with the Owner, Construction Manager and the Design Professional and all other Contractors on the Project and at all times will act with professionalism and dignity in its dealings with the Owner, Construction Manager, Design Professional and other Contractors, (c) it will assign only competent supervisors and workers to the Project, each of whom is fully qualified to perform the tasks that are assigned to him/her, and (d) it has read, understands and will comply with the terms of the Contract Documents.
2. The Bidder represents that it has had a competent person carefully and diligently review each part of the Contract Documents, including the Divisions of the Specifications and parts of the Drawings that are not directly applicable to the Work on which the Bidder is submitting its bid. By submitting its bid, each Bidder represents and agrees, based upon its careful and diligent review of the Contract Documents, that it is not aware of any conflicts, inconsistencies, errors or omissions in the Contract Documents for which it has not notified the Design Professional in writing at least seven (7) days prior to the bid opening. If there are any such conflicts, inconsistencies, errors or omissions in the Contract Documents, the Bidder (i) will provide the labor, equipment or materials of the better quality or greater quantity of Work; and/or (ii) will comply with the more stringent requirements. The Bidder will not be entitled to any additional compensation for any conflicts, inconsistencies, errors or omissions that would have been

discovered by such careful and diligent review, unless it has given such prior written notice to Design Professional.

3. The Bidder represents that it has had a competent person carefully and diligently inspect and examine the entire site for the Project and the surrounding area, including all parts of the site applicable to the Work for which it is submitting its bid, including the location, condition and layout of the site and the location of utilities, and carefully correlate the results of the inspection with the requirements of the Contract Documents. The Bidder agrees that its bid shall include all costs attributable to site and surrounding area conditions that would have been discovered by such careful and diligent inspection and examination of the site and the surrounding area, and the Bidder shall not be entitled to any Change Order, additional compensation, or additional time on account of conditions that could not have been discovered by such an investigation.
4. The Bidder represents, understands and agrees that a) the Claim procedures in the Modified General Conditions are material terms of the Contract Documents, b) if it has a Claim, it will have its personnel provide complete and accurate information to complete and submit the Notice of Claim form on a timely basis, c) the proper completion and timely submission of a Notice of Claim form is a condition precedent to any change in the Contract Sum or the Contract Time(s), and d) the proper and timely submission of the Notice of Claim form provides the Owner, Construction Manager and the Design Professional with necessary information so that the Owner may investigate the Claim and mitigate its damages.
5. The Bidder represents that the bid contains the name of every person interested therein and is based upon the Standards specified by the Contract Documents.
6. The Bidder and each person signing on behalf of the Bidder certifies, and in the case of a bid by joint venture, each member thereof certifies as to such member's entity, under penalty of perjury, that to the best of the undersigned's knowledge and belief: (a) the Base Bid, any Unit Prices and any Alternate bid in the bid have been arrived at independently without collusion, consultation, communication or agreement, or for the purpose of restricting competition as to any matter relating to such Base Bid, Unit Prices or Alternate bid with any other Bidder; (b) unless otherwise required by law, the Base Bid, any Unit Prices and any Alternate bid in the bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder prior to the bid opening, directly or indirectly, to any other Bidder who would have any interest in the Base Bid, Unit Prices or Alternate bid; (c) no attempt has been made or will be made by the Bidder to induce any other Person to submit or not to submit a bid for the purpose of restricting competition; and (d) the statements made in this Bid Form are true and correct.
7. The Bidder will execute the form of Owner/Contractor Agreement in the form included with the Contract Documents, if a Contract is awarded on the basis of this bid, and if the Bidder does not execute the Contract Form for any reason, other than as authorized by law, the Bidder and the Bidder's Surety are liable to the Owner.
8. The Bidder certifies that the upon the award of a Contract, the Contractor will ensure that all of the Contractor's employees, while working on the Project site, will not purchase, transfer, use or possess illegal drugs or alcohol or abuse prescription drugs in any way.
9. The Bidder agrees to furnish any information requested by the Construction Manager, Design Professional or the Owner's authorized representative to evaluate that the Bidder is the best bidder and that the bid is responsive to the specifications.
10. The Bidder certifies that it has no unresolved findings for recovery issued by the Auditor of State.
11. The Bidder certifies that it is aware of and in compliance with the requirements of Ohio Revised Code Section 3517.13 regarding campaign contributions.

LEGAL NAME OF BIDDER: _____

BIDDER IS: _____
(sole proprietor, partnership, corporation or other legal entity)

NAME & TITLE OF PERSON LEGALLY AUTHORIZED TO BIND BIDDER TO A CONTRACT:

Name Title

DATE SIGNED: _____ SIGNATURE: _____

ADDRESS: _____

TELEPHONE: _____

FAX: _____

FEDERAL TAX I.D. # _____

When the Bidder is a partnership or a joint venture, state name and address of each partner in the partnership or participant in the joint venture below:

Name

Address

Name

Address

Name

Address

Name

Address

Name

Address

**LABOR RATE ATTACHMENT
(DUPLICATE & SUBMIT AS REQUIRED FOR EACH TRADE CLASSIFICATION)**

Submitted by: _____

Trade Classification: _____

Item	Base Rate	Premium Rate	Double Time Rate
Base rate			
Taxes: FICA (____%)			
FUTA (____%)			
SUTA (____%)			
Insurance			
Workers Comp			
General Liability			
Other (specify)			
Benefits (specify)			
Other incidentals (specify)			
TOTAL			

END OF SECTION

SECTION 01 23 00 — ALTERNATES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies administrative and procedural requirements for Alternates.
- B. Definition: An Alternate is an amount proposed by Bidders and stated on the Bid Form for certain construction activities defined in the Bidding Requirements that may be added to or deducted from Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems or installation methods described in Contract Documents.
- C. Coordinate related Work and modify or adjust adjacent Work as necessary to ensure Work affected by each accepted Alternate is complete and fully integrated into the project at no additional cost to the Owner.
- D. Immediately following the award of the Contract, prepare and distribute to each party involved, notification of the status of each Alternate. Indicate whether Alternates have been accepted, rejected or deferred for consideration at a later date. Include a complete description of negotiated modifications to Alternates.
- E. Schedule: A "Schedule of Alternates" is included at the end of this Section.
 - 1. Include as part of each Alternate, miscellaneous devices, accessory objects and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 ALTERNATE SCHEDULE

- A. Alternate H-1 – Vacuum Pump Sound Absorption Blanket: Add/Deduct cost to provide Sound Absorption Blanket for the medical vacuum pump as specified in Section 20 05 80 and as shown on the drawings.
- B. Alternate H-2A – Alternate Building Automation System: Add/Deduct cost to provide a Building Automation System as manufactured by Andover Continuum by Schneider-Electric as specified in Section 23 09 23 and as shown on the drawings. Base bid work includes American Automatrix by CFS Building Automation System as specified in Section 23 09 23 and as shown on the drawings.
- C. Alternate H-2B – Alternate Building Automation System: Add/Deduct cost to provide a Building Automation System as manufactured by Delta Controls by BCI as specified in Section 23 09 23 and as shown on the drawings. Base bid work includes American Automatrix by CFS Building Automation System as specified in Section 23 09 23 and as shown on the drawings.
- D. ***Alternate H-3 – If alternate H-3 is accepted, provide all material, labor and equipment for the provision of a complete and functional rooftop unit RTU2 in accordance with the Specification Section 23 75 14, "Rooftop Air-Handling Unit". Indicate the manufacturer of the unit that is proposed to be furnished. Any exceptions to the bid must be stated at the time of bid. Refer to sections listed in the reference section for additional information.***

- E. Alternate E-1 – Alternate Nurse Call System: Add/Deduct cost to provide a Nurse Call/Code Blue System as manufactured by Intego as specified in Section 27 52 23 and as shown on the drawings. Base bid work includes Rualand Borg Corporation Nurse Call/Code Blue System as specified in Section 27 52 23 and as shown on the drawings.

END OF SECTION 01 23 00

SECTION 08 41 13 — ALUMINUM ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes aluminum entrance and storefronts. Work includes:
 - 1. Exterior entrance doors and frames.
 - 2. Interior entrance doors and storefront type framing systems.
- B. Related Sections:
 - 1. Automatic entrance doors - Ref: Section 08 42 29.
 - 2. Glazed aluminum curtain wall - Ref: Section 08 44 13.
 - 3. Entrance door hardware and lock cylinders - Ref: Section 08 71 00.
 - 4. Glass and glazing. Ref: Section 08 80 00.

1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide aluminum entrance and storefront assemblies that comply with performance characteristics specified, as demonstrated by testing the manufacturer's corresponding stock assemblies according to test methods indicated.
- B. Thermal Movement: Design the aluminum entrance and storefront framing systems to provide for expansion and contraction of the component materials. Entrance doors shall function normally over the specified temperature range.
 - 1. The system shall be capable of withstanding a metal surface temperature range of 180 degrees F without buckling, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, stress on glass, or other detrimental effects.
- C. Design Requirements: Provide aluminum entrance and storefront systems that comply with structural performance, air infiltration, and water penetration requirements indicated.
 - 1. Wind Loads: Provide aluminum entrance and storefront assemblies capable of withstanding wind pressures of 20 psf inward and 20 psf outward acting normal to the plane of the wall.
 - 2. Air Infiltration: Provide aluminum entrance and storefront framing system with an air infiltration rate of not more than 0.06 CFM per sq. ft. of fixed area (excluding operable door edges) when tested in accordance with ASTM E 283 at an inward test pressure differential of 1.57 psf.
 - 3. Water Penetration: Provide framing systems with no uncontrolled water penetration (excluding operable door edges) as defined in the test method when tested in accordance with ASTM E 331 at an inward test pressure differential of 6.24 lbf per sq. ft.
 - 4. Condensation Resistance: Where framing systems are "thermal-break" construction, provide units tested for thermal performance in accordance with AAMA 1503 showing condensation resistance factor (CRF) of not less than 45.
 - 5. Thermal Transmittance: Provide framing systems that have an overall U-value of not more than 0.65 BTU/(hr. x sq. ft. x deg. F) at 15 mph exterior wind velocity when tested in accordance with AAMA 1503.

1.3 SUBMITTALS

- A. Submit product data for each type of aluminum entrance and storefront system required, including:

1. Manufacturer's standard details and fabrication methods.
 2. Data on finishing, hardware and accessories.
 3. Recommendations for maintenance and cleaning of exterior surfaces.
- B. Submit shop drawings for each type of aluminum entrance and storefront system required, including:
1. Layout and installation details, including relationship to adjacent work.
 2. Elevations at 1/4-inch scale.
 3. Detail sections of typical composite members.
 4. Anchors and reinforcement.
 5. Hardware mounting heights.
 6. Provisions for expansion and contraction.
 7. Glazing details.
- C. Submit pairs of samples of each specified color and finish on 12 inch long sections of extrusions or formed shapes.
- D. Submit certified test reports from a qualified independent testing laboratory showing that aluminum entrance and storefront systems have been tested in accordance with specified test procedures and comply with performance characteristics indicated.

1.4 QUALITY ASSURANCE

- A. **Installer Qualifications:** A firm with not less than 5 years successful experience who has completed installations of aluminum storefront and entrances similar in design and extent to those required for the project and whose work has resulted in construction with a record of successful in-service performance.
- B. **Fabricator Qualifications:** Provide aluminum entrances and storefront systems fabricated by a firm experienced in producing systems that are similar to those indicated for this Project, and that have a record of successful in-service performance. The fabricator shall have sufficient production capacity to produce components required without causing delay in progress of the Work.
- C. **Single Source Responsibility:** Obtain each type of aluminum entrance and storefront systems from one source and from a single manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver aluminum entrance and storefront components in the manufacturer's original protective packaging.
- B. Store aluminum components in a clean dry location away from uncured masonry or concrete. Cover components with waterproof paper, tarpaulin or polyethylene sheeting in a manner to permit circulation of air.
1. Stack framing components in a manner that will prevent bending and avoid significant or permanent damage.

1.6 PROJECT CONDITIONS

- A. Check openings by accurate field measurement before fabrication. Show recorded measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of the work.
1. Where necessary, proceed with fabrication without field measurements, and coordinate fabrication tolerances to ensure proper fit.

1.7 WARRANTY

- A. Submit a written warranty, executed by the manufacturer, agreeing to repair or replace units that fail in materials or workmanship within 3 years after the date of Substantial Completion. Failures include, but are not necessarily limited to:
1. Structural failures including excessive deflection, excessive leakage or air infiltration.
 2. Faulty operation.
 3. Deterioration of metals, metal finishes and other materials beyond normal weathering.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: YKK. Subject to compliance with requirements, provide comparable systems manufactured by one of the following:
1. Efco.
 2. Kawneer Company, Inc.
 3. Tubelite Division of Indal, Inc.
 4. Vistawall.
- B. Storefront System: YKK YWW 45 TU, high performance thermally broken window wall system.
- C. Entrance Doors: Modified **Wide** Stile door with 10 inch bottom rail, thermally broken with welded corner construction.

2.2 MATERIALS

- A. Aluminum Members: Alloy and temper recommended by the manufacturer for strength, corrosion resistance, and application of required finish; comply with ASTM B 221 for aluminum extrusions, ASTM B 209 for aluminum sheet or plate, and ASTM B 211 for aluminum bars, rods and wire.
- B. Carbon Steel Reinforcement: ASTM A 36 for structural shapes, plates and bars, ASTM A 611 for cold rolled sheet and strip, or ASTM A 570 for hot rolled sheet and strip.
- C. Glass and Glazing Materials: Comply with Section 08 80 00 requirements.
- D. Fasteners: Aluminum, non-magnetic stainless steel, zinc plated steel, or other material warranted by the manufacturer to be non-corrosive and compatible with aluminum components, hardware, anchors and other components.
1. Reinforcement: Where fasteners screw-anchor into aluminum members less than 0.125 inches thick, reinforce the interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard non-corrosive pressed-in splined grommet nuts.
 2. Exposed Fasteners: Do not use exposed fasteners except for application of hardware. For application of hardware, use Phillips flat-head machine screws that match the finish of member or hardware being fastened.
- E. Concealed Flashing: 0.0179 inch (26 gage) minimum dead-soft stainless steel, or 0.026 inch thick minimum extruded aluminum of alloy and type selected by manufacturer for compatibility with other components.
- F. Brackets and Reinforcements: High-strength aluminum brackets and reinforcements; where use of aluminum is not feasible provide non-magnetic stainless steel or hot-dip galvanized steel complying with ASTM A 123.

G. Concrete and Masonry Inserts: Cast iron, malleable iron, or hot-dip galvanized steel inserts complying with ASTM A 123.

H. Hardware and Weatherstripping: Specified in Section 08 71 00.

2.3 COMPONENTS

A. Storefront Framing System: Provide storefront and entrance framing systems fabricated from extruded aluminum members of size and profile indicated. Include subframes and other reinforcing members of the type indicated. Provide for flush glazing storefront from the exterior on all sides without projecting stops. Shop-fabricate and preassemble frame components where possible. Provide storefront frame sections without exposed seams.

1. Mullion Configurations: Provide pockets at the inside glazing face to receive resilient elastomeric glazing. Mullions and horizontals shall be one piece. Make provisions to drain moisture accumulation to the exterior.

B. Entrance Door Frames: Tubular and channel frame entrance door frame assemblies, as indicated, with welded or mechanical joints in accordance with manufacturer's standards. Reinforce as necessary to support required loads.

C. Stile-and-Rail Type Entrance Doors: ~~Modified Wide Stile~~ doors, 1-3/4 inch thick, thermally broken type construction, formed from tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts.

1. Glazing: Fabricate doors to facilitate replacement of glass or panels, without disassembly of stiles and rails. Provide snap-on extruded aluminum glazing stops, with exterior stops anchored for non-removal.

2.4 FABRICATION

A. Fabricate aluminum entrance and storefront components to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes and profile requirements are indicated on the drawings. Variable dimensions are indicated, with maximum and minimum dimensions required, to achieve design requirements and coordination with other work.

1. Thermal-Break Construction: Fabricate storefront framing system with an integrally concealed, low-conductance thermal barrier, located between exterior materials and exposed interior members to eliminate direct metal-to-metal contact. Use manufacturer's standard construction that has been in use for similar projects for period of not less than 3 years.

B. Complete fabrication, assembly, finishing, hardware application, and other work to the greatest extent possible before shipment to the Project site. Disassemble components only as necessary for shipment and installation.

1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.

2. Preglaze door and frame units to greatest extent possible.

C. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.

1. Welding behind finished surfaces shall be performed in such a manner as to minimize distortion and discoloration on the finished surface.

D. Install reinforcing as required for hardware and as necessary for performance requirements, sag resistance and rigidity.

- E. Separate dissimilar metals with bituminous paint, or a suitable sealant, or a non-absorptive plastic or elastomeric tape, or a gasket between the surfaces. Do not use coatings containing lead.
- F. Maintain accurate relation of planes and angles with hairline fit of contacting members.
- G. Fasteners: Conceal fasteners wherever possible.

2.5 FINISHES

- ~~A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.~~
- ~~B. Fluoropolymer 3-Coat Coating System: Manufacturer's superior performance 3-coat thermocured system, complying with AAMA 2605-98, composed of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF fluoropolymer (Kynar 500/Hylar 5000) resin by weight.~~
 - ~~1. Color: Selected by Architect from manufacturer's full color range.~~
- C. Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607.1.**

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and supports, with the Installer present, for compliance with requirements indicated, installation tolerances, and other conditions that affect installation of aluminum entrances and storefronts. Do not proceed with aluminum entrance and storefront installation until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Install each type of aluminum entrance and storefront system in accordance with the manufacturer's written installation instructions and recommendations and final shop drawings.
- B. Set units plumb, level, and true to line, without warp or rack of framing members, doors, or glazing panels. Install components in proper alignment and relation to established lines and grades indicated. Provide proper support and anchor securely in place.
- C. Construction Tolerances: Install aluminum entrance and storefront to comply with the following tolerances:
 - 1. Variation from Plane: Do not exceed 1/8 inch in 12 feet of length or 1/4 inch in any total length.
 - 2. Offset from Alignment: The maximum offset from true alignment between two identical members abutting end to end in line shall not exceed 1/16 inch.
 - 3. Diagonal Measurements: The maximum difference in diagonal measurements shall not exceed 1/8 inch.
 - 4. Offset at Corners: The maximum out-of-plane offset of framing at corners shall not exceed 1/32 inch.
- D. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
 - 1. Zinc or cadmium plate steel anchors and other unexposed fasteners after fabrication.

2. Paint dissimilar metals where drainage from them passes over aluminum.
 3. Paint aluminum surfaces in contact with mortar, concrete or other masonry with alkali resistant coating.
- E. Drill and tap frames and doors and apply surface-mounted hardware items. Comply with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.
- F. Set sill members and other members in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide weathertight construction. Comply with Section 07 92 00 requirements for sealants, fillers, and gaskets.

3.3 ADJUSTING

- A. Adjust operating hardware to function properly, for smooth operation without binding, and for weathertight closure.

3.4 CLEANING

- A. Clean the completed system, inside and out, promptly after installation, exercising care to avoid damage to coatings.
- B. Clean glass surfaces after installation, complying with requirements contained in Section 08 80 00 for cleaning and maintenance. Remove excess glazing and sealant compounds, dirt and other substances from aluminum surfaces.

3.5 PROTECTION

- A. Protect aluminum entrances and storefronts from damage or deterioration throughout the remainder of the construction period.

END OF SECTION 08 41 13

SECTION 08 44 13 — GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes a stick-framed glazed aluminum curtain wall system with interior and exterior metal framing. Primary components of the glazed curtain wall system include:
1. Aluminum curtain wall framing system with internal steel reinforcement.
 2. Structural silicone glazed aluminum curtain wall framing with internal steel reinforcement.
 3. Glazing gaskets.
 4. Anchors, shims, fasteners, inserts, accessories, and support brackets.
- B. Related Sections:
1. Unit masonry - Ref: Section 04 20 00.
 2. Cold formed metal framing - Ref: Section 05 40 00.
 3. Building insulation - Ref: Section 07 21 00
 4. Composite aluminum panels - Ref: Section 07 42 43.
 5. Joint sealers - Ref: Section 07 92 00.
 6. Aluminum entrances and storefronts - Ref: Section 08 41 13.
 7. Automatic entrance doors – Ref: Section 08 42 29.
 8. Glass and glazing - Ref: Section 08 80 00.

1.2 SYSTEM DESCRIPTION

- A. Aluminum Stick-Type System: The glazed aluminum curtain wall system shall consist of individual members erected separately. Major components consist of aluminum vertical exterior mullions, horizontal rails, and vision glass panels.
1. The system shall be designed for glazing from the exterior.

1.3 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide manufacturer's stock curtain wall system, adapted to the application indicated, that complies with performance requirements specified as demonstrated by testing the manufacturer's corresponding stock systems according to test methods indicated. Unless specifically indicated otherwise, the performance standards apply to both curtain wall systems required.
1. Furnish all assemblies to meet wind loading requirements of the Ohio Building Code and a minimum speed of **90 mph, exposure B, Importance factor 1.15**
- B. Air and Water Infiltration: Design and install the glazed curtain wall system for permanent resistance to air and water leakage through the system in accordance with the following.
1. Air Infiltration: No more than **0.02** CFM per sq.ft. of fixed area at 6.24 psf pressure differential per ASTM E 283.
 2. Water Resistance: No uncontrolled water leakage at a static test pressure of **20** psf when tested in accordance with ASTM E 331.
 3. Dynamic Water Resistance: No uncontrolled water leakage at a dynamic test pressure of 15 psf when tested in accordance with AAMA 501.1-83.

- C. Structural Performance: Design, engineer, fabricate, and install the glazed aluminum curtain wall system to withstand the effects of a wind load of **not less than 30** psf acting inward and **not less than 25** psf acting outward, normal to the plane of the wall, when tested in accordance with ASTM E 330, with no material failures or permanent deformation of structural members. **but not less than the calculated load per 1.3,A,1.**
1. Structural test pressure shall be equal to 150 percent of the inward and outward acting design wind pressures.
 2. Deflections: The curtain wall system shall be capable of withstanding building movements including wind loading and of performing within the following limitations:
 - a. Deflection of framing members perpendicular to the plane of the wall shall not exceed 1/240 of its clear span or 3/4 inch, whichever is less.
 - b. Deflection of members parallel to the plane of the wall, when carrying its full dead load, shall not exceed an amount that will reduce glass bite by less than 75 percent of the design dimension and shall not reduce edge clearance between itself and the panel, glass, or other fixed member immediately below to less than 1/8 inch.
- D. Thermal Movements: The glazed aluminum curtain wall system shall be capable of withstanding thermal movements resulting from an ambient temperature differential of 120 degrees F, which may result in a metal surface temperature range of 180 degrees F within the curtain wall framing without causing buckling, stresses on glass, failure of joint sealants, damaging loads on fasteners, or other detrimental effects.
- E. Condensation Requirements: The glazed aluminum curtain wall system shall be of thermal-break construction that has been tested in accordance with AAMA 1502.7 and certified by the manufacturer to provide a condensation resistance factor (CRF) of at least **70**.

F. **Thermal Resistance Transmittance U value: .042 BTU / HR / FT² / F or less**

1.4 SUBMITTALS

- A. Submit product data for each system required, including manufacturer's specifications for materials and fabrication, installation instructions, and recommendations for maintenance. Include test reports showing compliance with project requirements where test methods are indicated.
- B. Submit shop drawings for each system required, include typical unit elevations at 1/2 inch scale and details at 3 inch scale. Show dimensions, profiles of members, anchorage system, interface with building construction, and glazing.
1. Include setting drawings, templates, and directions for the installation of anchor bolts and other anchorages installed as a unit of work under other sections.
- C. Samples:
1. Submit a finish sample on a 12 inch long section of extrusions or formed shapes and on a 6 inch square of aluminum sheet or plate.
 2. When requested by the Architect, submit fabrication samples showing the following:
 - a. Prime members.
 - b. Joinery.
 - c. Anchorage.
 - d. Expansion provisions.
 - e. Glazing and similar details.
 - f. Profiles.
 - g. Intersections.
- D. Submit installer certificates signed by the manufacturer certifying installers of the glazed aluminum curtain wall system comply with requirements indicated.

- E. Submit test reports from a qualified independent testing laboratory showing compliance of the aluminum curtain wall system with performance requirements indicated based on comprehensive testing of the system by the laboratory within the last 3 years current production of the system by the manufacturer.

1.5 QUALITY ASSURANCE

- A. **Installer Qualifications:** A firm who has successfully completed installation of glazed curtain wall systems similar in material, design, and extent to that indicated for the Project and who is acceptable to the curtain wall manufacturer.
- B. **Single Source Responsibility:** Provide glazed aluminum curtain wall system for the project from one source from a single manufacturer.
- C. **Pre-Installation Conference:** Before start of curtain wall installation, conduct a pre-installation conference at the project site with the curtain wall system manufacturer, installer, and other interested parties. Review methods and procedures related to glazed aluminum curtain wall system including, but not limited to, the following:
 - 1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - 2. Review structural loading limitations.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review required inspecting, testing, and certifying procedures.
 - 5. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.
- D. **Sample Wall Panel:** Before start of the exterior wall work, construct a sample wall panel to verify selections made under sample submittals and to demonstrate material and workmanship qualities as well as aesthetic effects. Build the sample wall panel as indicated on the drawings using materials indicated for final unit of Work.
 - 1. Erection of the sample panel shall allow time for construction of the panel, mortar and sealant to dry to its final color, cleaning of panel, and acceptance of panel by Architect. Panel brick units shall be laid up for visual approval before mortaring of brick. Rebuild rejected sample panel walls until acceptance by Architect.
 - 2. Locate sample panel on site where indicated or, if not indicated, as directed by the Construction Manager.
 - 3. Build the sample panel full wall thickness of typical wall area including each type of designated exterior material and back-up construction, including framing, exterior gypsum sheathing, sprayed insulation, through-wall flashing and masonry accessories, and flashing and sheet metal. Include control joints where indicated.
 - 4. Clean exposed masonry faces of the sample panel with cleaning materials and methods proposed for the project.
 - 5. Notify Architect one week in advance of the dates and times when the sample panel will be constructed.
 - 6. Protect accepted sample panel from the elements with weather-resistant membrane.
 - 7. Retain and maintain accepted sample panel during construction in an undisturbed condition as a standard for judging the completed work.
 - a. Acceptance of sample panel is to demonstrate the workmanship proposed for the project and for color, texture, and blending of other material and construction qualities specifically approved by Architect in writing.
 - b. Acceptance of sample panel does not constitute approval of deviations from the Contract Documents contained in the sample panel unless the deviations are specifically approved by Architect in writing.

- c. When directed by the Construction Manager, demolish and remove sample panel from Project site.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.7 PROJECT CONDITIONS

- A. Take field measurements before fabrication; show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.
- B. Schedule installation of the glazed aluminum curtain wall system in sequence with related elements of the Work specified in other Sections to ensure wall assemblies, including flashing, trim, and joint sealers, are protected against damage from effects of weather, age, corrosion, and other causes.

1.8 WARRANTY

- A. Submit a written warranty signed by the curtain wall system manufacturer and authorized representatives of the Contractor and installer warranting that portions of the Work involving glazed aluminum curtain wall are of good quality, free from defects, and in conformance with the requirements of the Contract Documents and further promising to repair or replace defective Work during a 5 year period following completion of that portion of the Work.
 - 1. Defective is defined to include the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Failure of system to meet performance requirements.
 - d. Deterioration or discoloration of metals, metal finishes, and other materials beyond normal weathering.
 - e. Failure of operating components to function normally.
 - f. Water leakage.
 - g. Glazing breakage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer: YKK. Subject to compliance with requirements, provide comparable products by one of the following:
 - 1. EFCO.
 - 2. Tubelite Div. of Indal Inc.
 - 3. Vistwall.
 - 4. Kawneer.
 - 5. **Walteck**
- B. Structural Silicone Glazed Curtain Wall: YKK YCW 750 SSG structural silicone glazed curtain wall system. Intermediate vertical mullions shall be structural silicone glazed with no exposed exterior aluminum.
- C. Glazed Curtain Wall: YKK YCW 750 OG glazed curtain wall system.

2.2 MATERIALS

- A. Aluminum: Alloy, temper, and thickness recommended by the manufacturer for the type of use and finish indicated and with not less than the strength and durability properties of the alloy and temper designated below for each aluminum form required.
 - 1. Extruded Bar and Shapes: Comply with ASTM B 221 requirements, with a minimum wall thickness of 0.093 inches.
 - 2. Plate and Sheet: Comply with ASTM B 209 requirements.
- B. Steel: Hot-rolled, complying with ASTM A 36 requirements and ASTM A 123, Grade 35, hot-dip galvanized coating requirements.
- C. Glass: Provide glass types and thicknesses specified in Section 08 80 00. Glass sizes as required for openings indicated with edge clearances and tolerances complying with manufacturer's recommendations.
- D. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing or wedge-lock dry glazing system of black, resilient elastomeric glazing gaskets, setting blocks and shims or spacers as required, hardness as selected by manufacturer.
 - 1. Gasket Material: Extruded or molded neoprene gaskets complying with requirements of ASTM D 2000, classification as selected by the manufacturer for performance and permanence.
- E. Glazing Sealants and Fillers, Typical: Comply with Section 08 80 00 requirements.
- F. Structural Silicone Glazing Sealants: Dow Corning Corp. "995 Silicone Structural Adhesive", one-component self-priming, shelf stable, neutral cure, elastomeric adhesive specifically formulated for silicone structural glazing. Provide manufacturer's 20 year performance warranty. Color: Black.
- G. Framing System Gaskets and Joint Fillers: Manufacturer's standard permanent framing system gaskets and joint fillers, depending on joint movement and sealing requirements, such as sliding joints, compression joint translation, or non-moving joints.
- H. Sealants and joint fillers, both for joints within the curtain wall construction and for joints at the interface of curtain wall construction and other work, shall comply with Section 07 92 00 requirements.
- I. Concealed Flashing: Dead-soft 26 gage stainless steel concealed flashing of type selected for compatibility by the manufacturer.
- J. Brackets and Reinforcements: Manufacturer's standard high strength aluminum or non-magnetic stainless steel brackets and reinforcements.
 - 1. Brackets not exposed to weather or abrasion may be hot-dip galvanized steel complying with ASTM A 386.
 - 2. Provide non-staining, non-ferrous shims for installation and alignment of curtain wall work.
- K. Fasteners and Accessories: Provide manufacturer's standard non-corrosive fasteners and accessories compatible with materials used in the framing system and with exposed portions that match finish of the curtain wall system. Where movement is expected, provide slip-joint linings of sheets, pads, shims, or washers of fluorocarbon resin or a similar material recommended by the manufacturer.
 - 1. Where fasteners anchor into aluminum less than 0.125 inch thick, provide non-corrosive pressed-in splined grommet nuts or other type reinforcement to receive fastener threads.
 - 2. Limit exposed fasteners to the least amount possible. Exposed fasteners shall be countersunk.

- L. Concrete or Masonry Inserts: Cast-iron, malleable iron or hot-dip galvanized steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

2.3 FABRICATION

- A. Fabricate glazed aluminum curtain wall system according to final shop drawings. When assembled, components shall have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
 - 1. Conceal welds on aluminum members in accordance with AWS recommendations or methods recommended by the manufacturer. Members showing welding bloom or discoloration on finish or material distortion will be rejected.
 - 2. Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.
 - 3. Prepare components to receive concealed fasteners and anchor and connection devices.
 - 4. Fabricate components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.
- B. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to Section 08 80 00 requirements.
- C. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- D. Frame Units: Factory assemble frame units according to final shop drawings to greatest extent possible. Rigidly secure non-movement joints. Seal joints watertight, unless otherwise indicated. Assemble components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.
 - 1. Install glazing according to final shop drawings. Comply with Section 08 80 00 requirements unless otherwise indicated.
- E. Fabrication Tolerances:
 - 1. Material Cuts: Square to 1/32 inch off square, over largest dimension.
 - 2. Maximum Offset Between Two Consecutive Members: 1/64 inch in alignment between two consecutive members in line, end to end.
 - 3. Maximum Offset at Glazing Pocket Corners: 1/64 inch between framing members at glazing pocket corners.
 - 4. Joints between Adjacent Members in Same Assembly: Hairline square to adjacent member.
 - 5. Variation in Squaring Diagonals for Fabricated Assemblies: 1/16 inch.
 - 6. Flatness for Fabricated Assemblies: Plus or minus 1/16 inch off neutral plane.

2.4 FINISHES

- A. Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of glazed aluminum curtain wall system. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.2 PREPARATION

- A. Furnish inserts at proper times for setting in masonry and similar work indicated to support curtain wall work.

3.3 INSTALLATION

- A. Install curtain wall systems in accordance with manufacturer's installation instructions and final shop drawings. Comply with manufacturer's written instructions for protecting, handling, and installing glazed aluminum curtain wall system. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints watertight, unless otherwise indicated. Provide means to drain water to the exterior to produce a permanently weatherproof system.
- B. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.
- D. Install framing members plumb and true in alignment with established lines and grades.
- E. Install factory assembled frame units plumb and true in alignment with established lines and grades.
- F. After system components are positioned, fix connections to building structure as indicated on final shop drawings. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- G. Install glazing according to final shop drawings. Comply with Section 08 80 00 requirements unless otherwise indicated.
- H. Install sealant according to final shop drawings. Comply with Section 07 92 00 requirements unless otherwise indicated.
- I. Erection Tolerances: Install glazed aluminum curtain wall system to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet ; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch; where a reveal or protruding element separates aligned surfaces by less than 2 inches, limit offset to 1/2 inch.
 - 4. Location: Limit variation from plane or location shown on shop drawings to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 CLEANING AND PROTECTION

- A. Clean the completed system, inside and out, promptly after erection and installation of glass and sealants.
- B. At the time of Substantial Completion, clean curtain wall system thoroughly and polish glass. Demonstrate proper cleaning methods and materials to the Owner's maintenance personnel.
- C. Protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure glazed aluminum curtain wall system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 44 13

SECTION 20 05 80 - VIBRATION ISOLATORS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide a complete vibration isolation system to isolate motorized equipment, piping, ductwork, and appurtenances from the building structure and ceiling construction.
- B. Include concrete for bases and pads.
- C. Provide vibration isolation devices with motion limiters, sway struts, limits stops, shock absorbing devices and/or snubbers to control the horizontal and vertical movement of equipment during seismic events. These devices shall be supplied based on the seismic design data included in the other sections of this specification or listed on the drawings. This data includes Site Class, Seismic Design Category and Design Spectral Response Acceleration for short period.

1.02 QUALITY ASSURANCE

- A. Expected noise levels in various parts of the building shall conform to noise criteria recommendations as set forth in the current edition of ASHRAE Guide and Fundamentals. The midpoint of the range of noise criteria curves shall apply and become part of these Specifications.
- B. Sound and vibration control design criteria for mechanical systems for this building shall conform to the chapter in Sound and Vibration Control in the current edition of ASHRAE Guide, HVAC Systems and Applications.
- C. Vibration isolation devices, including auxiliary steel bases and pouring forms, shall be designed and furnished by a single manufacturer or supplier.

1.03 MANUFACTURERS

- A. Kinetics, Korfund Dynamics Corporation, Vibration Eliminator Company, Inc., Vibration Mountings and Controls, Inc., or Mason Industries, Inc.

PART 2 PRODUCTS

2.01 VIBRATION ISOLATORS

- A. Type 1 - Pad Mounts: Precompressed molded fiberglass isolation pads, neoprene jacketed and stabilized during manufacturing. Pads shall be sized for loading from 40 to 60 psi.
 - 1. Kinetics Model KIP
- B. Type 3a - Spring Hanger Mounts: Vibration isolators shall be hangers consisting of a freestanding, laterally stable steel spring and elastomeric washer in series, assembled in a stamped or welded steel bracket. Springs shall have a lateral stiffness greater than 0.8 times the rated vertical stiffness and shall be designed to provide up to 50% overload capacity. Springs shall be selected to provide operating static deflections shown on the Vibration Isolation Schedule or as indicated on the project documents. Springs shall be color coded or otherwise identified to indicate load capacity.
 - 1. Kinetics Noise Control Type SH

- C. Type 3b - Spring Hanger Mounts: Vibration isolators where both high and low frequency vibrations are to be isolated, shall be hangers consisting of a laterally stable steel spring in series with a pre-compressed molded fiberglass insert, complete with load transfer plates and assembled in a stamped or welded steel bracket. Vibration isolators shall be pre-compressed molded fiberglass pads individually coated with a flexible, moisture impervious elastomeric membrane. Vibration isolation pads shall be molded from glass fibers with fiber diameters not exceeding 0.00027 inches and with a modulus of elasticity of 10.5 million PSI. Natural frequency of fiberglass vibration isolators shall be essentially constant for the operating load range of the supported equipment. Vibration isolators shall be color coded or otherwise identified to indicate the load capacity. Springs shall have a lateral stiffness greater than 0.8 times the rated vertical stiffness and shall be designed to provide up to 50% overload capacity. Springs shall be selected to provide operating static deflections shown on the Vibration Isolation Schedule or as indicated on the project documents. Springs shall be color coded or otherwise identified to indicate load capacity.
1. Kinetics Noise Control Type SFH
- D. Type 3 - Spring Floor Mounts: Vibration isolators shall be freestanding, unhooused, laterally stable springs wound from high strength spring steel. Springs shall have a lateral stiffness greater than 0.8 times the rated vertical stiffness and shall be designed to provide up to 50% overload capacity. Springs shall be selected to provide operating static deflections shown on the Vibration Isolation Schedule or as indicated on the project documents. Springs shall be color coded or otherwise identified to indicate load capacity. In capacities up to 5,000 lbs., springs shall be replaceable. In capacities over 5,000 lbs., springs shall be welded to the top and bottom load plate assemblies. Springs shall be assembled between a top and bottom steel load plate. The upper load plate shall be provided with a steel leveling bolt lock nut and washer for attachment to the supported equipment. The lower load plate shall have a non-skid noise isolation pad bonded to the bottom and have provisions for bolting the isolator to the supporting structure.
1. Kinetics Noise Control Type FDS
- E. Type 4 - Spring Limit Floor Mounts: Similar to Type 3 Spring Floor Mounts, but include neoprene and steel vertical limit stops to assure a constant spring mount. Vibration isolators shall consist of large diameter laterally stable steel springs assembled into formed or welded steel housing assemblies designed to limit vertical movement of the supported equipment. Housing assembly shall be formed or fabricated steel members and shall consist of a top-load plate complete with adjusting and leveling bolts, vertical restraints, isolation washers and a bottom plate with non-skid noise stop pads and holes provided for anchoring to supporting structure. Housing shall be hot dipped galvanized. Make provisions to prevent mechanical short-circuiting by isolating the limit stops.
1. Kinetics Noise Control Type FLS.
- F. Type D - Roof Curb Isolation Rails: Prefabricated extruded aluminum rail system incorporating 1 inch deflection freestanding stabile springs for vibration isolation and a continuous foam neoprene air and water seal. The aluminum rail shall include an integral slot anchoring springs to the bottom section, but allowing horizontal adjustment. Provide accessories as needed to adjust for roof slope to mount unit level.
1. Kinetics Model ASR
- G. Type E - Floating Floor: Roll out isolation mat system shall consist of 2 inch thick fiberglass pads spaced as needed for load in a 1 1/2 inch thick, low density fiberglass absorption material. Provide 1/2 inch, Grade C plywood sheathing, 3/4 inch closed cell, expanded polyethylene perimeter isolation board (Kinetics Type PIB), 4 inch thick concrete topping with welded wire mesh, and two layers of 6 mil polyethylene.
1. Kinetics Model RIM.

2.02 MASS-LOADED VINYL WRAP

- A. Type F - Limp, reinforced loaded vinyl with lead-free and asbestos-free fillers, with high-strength polyester fabric reinforcement, 1 lb. per square foot face weight. Material shall have a continuous operating range of -40 degrees F to +180 degrees F, and shall be resistant to water, oil, weak acids, alkalies, mold, and fungi. Material shall not rot, shrink or cause metal corrosion. Provide Class A fire-rating where required. Provide heavy duty grommets and Velcro closures. STC=33.
- B. Type KNC by Kinetics, or equal by other listed manufacturers.

2.03 SEISMIC

- A. Provide sway struts, limits stops and/or shock absorbing devices to control the movement of equipment during seismic events. Each equipment manufacture shall designate the required restraints for the specific equipment items being supplied based on equipment construction and required seismic restraint. The equipment and the restraints, as a combined assembly, are to be tested or analysis and a certificate of compliance for both the restraints and the equipment item shall be provided. The testing and/or dynamic analysis methods shall comply with the building code requirements.

2.04 ISOLATOR SCHEDULE

- A. Furnish isolator types as follows:

Equipment Item	Base Type	Isolator Type	Deflection (Inches)
Rooftop units (base bid)	---	RIS pad 4" pad	0.75
Boilers	---	1	---
Small suspended fans	---	3a	0.75
Large suspended fans (5 Hp & above)	---	3b	0.75
Unit heaters	---	3a	0.50
Base-mounted Pumps	G ---	1 3	1.00
Air cooled condenser	A ---	3 4	0.25
Piping	---	3b	0.50
Ductwork	---	3a	0.50
Vacuum pump base	G, E	4---	1.00---
Vacuum pump noise surround	F---	F	---
Rooftop units (Alternate RTU2)	D	---	1.00

* (Isolation for fan and motor only, provided by Unit Manufacturer)

PART 3 EXECUTION

3.01 PREPARATION

- A. Use steel components that are phosphated and painted. Use only nuts, bolts, and washers that are zinc-electroplated.
- B. Thoroughly clean structural steel bases of welding slag and prime them with zinc-chromate or metal etching primer.

- C. All isolators exposed to the weather, located outdoors, or within manholes or tunnels shall have all steel parts either PVC-coated or hot-dip galvanized.
- D. Use aluminum components that are etched and painted.

3.02 INSTALLATION

- A. Equipment: All motorized heating and air-conditioning equipment, including pumps, fans and other equipment, shall be mounted on, or suspended with, vibration isolators.
- B. Piping and Ductwork:
 - 1. All piping over 1 inch outside diameter located in mechanical equipment rooms shall be isolated from the building structure by means of noise and vibration isolation hangers. The only exclusions are roof and floor drain piping, and all sprinkler piping.
 - 2. All piping located less than 50 feet (or 100 pipe diameters - whichever is greater) from any connection to vibration isolated mechanical or electrical equipment, shall be isolated from the building structure by means of noise and vibration isolation hangers. All piping in the building, which is connected to vibration-isolated equipment, shall be isolated at these connections to the building structure.
 - 3. All ductwork located in mechanical equipment rooms, and for a minimum of 50 feet from any connection to vibration-isolated air moving equipment shall be isolated from the building structure by means of noise and vibration isolation guides and supports.
 - 4. Isolate all ductwork vertical risers from the building structure by means of noise and vibration isolation guides and supports.
 - 5. Use vibration and noise isolating expansion hangers to isolate vertical pipe risers from the structure. The hangers shall have a minimum rated deflection of four times the anticipated pipe expansion and shall be enclosed in a housing for fail-safe operation.
 - 6. All piping and ductwork to be isolated according to this Section of the Specifications shall freely pass through walls and floors without rigid connections. Penetration points shall be sleeved or otherwise formed to allow passage of piping or ductwork, and maintain a minimum of 3/4 inch and maximum of 1 1/4 inches clearance around the outside surfaces. This clearance space shall be tightly packed with 1.58 PCF glass fiber and shall be caulked airtight after installation of the piping or ductwork, to form an acoustic seal.
- C. The installed vibration isolation system for each floor or for ceiling supported equipment shall have a maximum lateral motion under equipment start-up or shutdown conditions of 1/4 inch. Motions in excess shall be restrained by approved spring-type thrust restraints as specified or approved by submittal Drawing.

END OF SECTION 20 05 80

SECTION 23 75 143 - ~~SEMI-CUSTOM~~ ROOFTOP AIR-HANDLING UNITS (ALTERNATE RTU2)

PART 1 GENERAL

1.01 DESCRIPTION

- A. **RTU2 Only:** Provide a completely factory assembled and tested outdoor air handling unit of the type and arrangement as shown on the Drawings and as described in the Specifications.
- B. Temperature control dampers and operators to be provided by the Unit Manufacturer.
- C. All temperature control and VFD components shall be as specified in sections referenced below. All temperature sensors in the unit shall be averaging type.
- D. Provide a factory representative to provide system start-up and control system integration with the BAS. The use of a "factory trained" personnel is not acceptable.

1.02 QUALITY ASSURANCE

- A. Standards:
 - 1. American Refrigeration Institute (ARI), Air Moving and Control Association (AMCA), and National Fire Protection Association (NFPA).
 - 2. AIR 410: Forced circulation air-cooling and air heating coils.
 - 3. ARI 530: Central station air handling units.
 - 4. AMCA 300: Sound ratings.
 - 5. Fan ratings shall be based upon test performance in strict accordance with the AMCA Standard 210-74 - ASHRAE Standard 51-75. Each fan shall bear the seal authorized by AMCA indicating that the ratings are certified. Fans not bearing this seal will not be accepted.

1.03 RATING AND CAPACITIES

- A. These units shall be in accordance with the following specifications and be of the size, type, capacity and components as shown on the schedule and Drawings. The unit manufacturer shall be held responsible for the proper operation and performance of this equipment.

1.04 REFERENCE

- A. Section 20 05 46 "Hangers, Supports and Inserts for Seismic Requirements"
- B. Section 23 09 93, "Sequences of Operation"
- C. Section 23 09 23, "Temperature Control" (Hardware)
- D. Section 23 90 71, "Variable Frequency Drives"

1.05 WARRANTY

- A. Provide parts and labor warranty for one year from the date of completion. ~~Provide a full parts warranty for two years from shipment. Provide a compressor parts warranty for five years from date of shipment.~~

1.06 MANUFACTURERS

- A. Engineered Air, Governair, ~~or~~ Energy Labs, **Trane Intellipak II, or McQuay Roofpak.**

PART 2 PRODUCTS

2.01 ROOFTOP UNITS

- A. General Design:
1. Arrangement and components as called for on the Drawings.
 2. The Manufacturer shall accept total responsibility for the construction and performance of the complete air-handling unit including fans, coils, filters, etc. Unit performance shall be as shown in the schedule. The unit manufacturer shall submit certified test curves for each unit at rated performance of the fan when operating within the air handling cabinet.
 3. Submit certified sound data of the units at rated capacity, including inlet and outlet sound components. Data shall be presented as sound power levels, reference power 10-12 watts for all eight-octave bands. Sound data shall be obtained from tests made in accordance with AMCA Standard 300.
 4. Unit sections are to be furnished with mill galvanized casings mounted over channel bases fabricated of welded structural steel. All parts of the units not fabricated of mill galvanized steel, including all interior and exterior parts of the fans, and all channel bases shall be factory-primed and painted.
 5. Each unit with all its components and accessories shall be operationally tested at the factory and adjusted throughout and certified to be correct and comply with all requirements as specified before shipment.
- B. Unit Casings:
1. Unit casing for all sections shall be minimum 2 inches thick, double wall design with 22 gauge galvanized steel inner skin, ~~16~~ 44 gauge galvanized steel outer skin and have 2 inches thick fiberglass insulation having density of ~~1 1/2~~ 3 pcf **or 2 inch double wall with foam insulation.** ~~The casing for RTU1, downstream of the cooling coil, shall be 3 inch thick walls with thermal break.~~ Outside air intake, **and DX coil and humidifier sections shall have solid 22 gauge galvanized inner liners.** Roof exterior material shall be ~~16~~ 44 gauge minimum, and shall be sloped for positive drainage. Insulation and adhesive shall meet the requirements of ~~NF~~EPA 90A. All casings, except drain pans, shall be minimum G90 mill galvanized steel.
 2. Unit manufacturer shall furnish and install where indicated, ~~bell-mouth~~ fittings of the size required, ~~with exact locations determined by the HVAC Contractor~~ **or the HVAC Contractor shall provide 30 degree transitions.**
 3. Casings shall be designed for structural rigidity, air tightness and deflection equal to 1/200 of span at unit operating pressure.
 4. Casing exterior shall be finished with two (2) coats of an acrylic air-dry enamel.
 5. Wall shall be fabricated from self-supporting brake-formed panels, with all external joints stitch-welded and continuously caulked.
- C. Unit Base:
1. The entire unit shall be supported on a welded structural steel channel base around the perimeter of each section with intermediate channels as required to support major components. Perimeter channels shall be 6 inch or 8 inch as appropriate - 11.5#/ft. (min) structural steel. The unit floor shall be ~~rigid 44 gauge tread plate~~ steel welded to the structural steel base **to prevent 'oil-canning'** and painted with iron grip paint. The underside of the floor sheet shall be insulated with 2 inch – 3-pcf-fiberglass blanket held in place by a 22 gauge galvanized steel underliner. All steel members shall be coated with two (2) coats of primer. Provide heavy welded steel lifting lugs at the corners of each shipping section.
 2. Provide continuously welded stainless steel drain pan floor design under all coiling coil sections, humidifier sections or where otherwise noted. Drain pans shall have 2 inch drain connection on each side of unit, and shall be dual sloped.

- D. Access Doors:
1. Where shown provide double wall, insulated, nominal 18 inches x 60 inches or 24 inches x 60 inches walk-in access doors, designed for flush mounting on the units, gasketed to provide positive seal and furnished with ~~stainless steel continuous piano hinges~~ and a minimum of two (2) LeverLok handle and locking latches. All latch and handle mounting fasteners shall be stainless steel. Doors to open against pressure. Each door to have a ~~Model #699 Ventlok Instrument Test Port, double pane window, and factory installed tiebacks.~~
- E. Lights:
1. Provide and mount vapor-proof, fluorescent lights, wired in heavy aluminum conduit to a switch and pilot light **in an accessible location.** ~~at the supply fan entryway.~~ Seal all junction box entrances to eliminate moisture migration. ~~Provide single point power connection for all lighting.~~
- F. Fan Section:
1. The fan section shall contain housed DWDI centrifugal fans as indicated, having non-overloading horsepower characteristics.
 2. The fan wheel shall have single or double thickness, airfoil shaped blades, continuously welded to the flange and riveted to the back plate. The wheel shall have a cast iron hub and be secured to the shaft with a key and two (2) set screws. Blade type and AMCA Class of fan to be as indicated in the schedule.
 3. The fan shaft shall be solid, cold finished steel, turned, ground and polished. The complete rotating assembly shall be designed so that the first critical speed is at least 25% specified. The fan shall be statically and dynamically balanced at the factory and given a final test with motor and drive in place.
 4. Bearings: Cast iron, pillow block type, grease lubricated double row spherical roller bearings, supports mounted from base of unit.
 5. Drive: Multiple belts with fixed sheaves on motor and fan, belt guard. Drive to have a minimum service factor of 1.5 times the rated nameplate motor horsepower. Full coverage OSHA belt guard with tachometer opening.
 6. Motors: 3 phase, 60 hertz, TEFC, NEMA design "B" 1,750 RPM, adjustable motor base, premium high efficiency suitable for use with variable frequency drives. Motor size shall include starting torque.
 7. The fan and motor shall be integrally mounted within the casing on a structural steel vibration isolation base with free standing springs selected to provide a minimum of 95% isolation efficiency, based on fan RPM or for 2 4 inch deflection, whichever is greater. The base shall be furnished with motor slide rails for 2-screw adjustment ~~and concrete inertia base for 1.5 times the rotating mass. Concrete shall be furnished by the installing contractor.~~ Tie-down bolts to limit movement during shipment, shall be provided by Manufacturer, with removal of same, by Installing Contractor. Provide thrust restraints and seismic design.
 8. A flexible connection shall be furnished and factory-mounted between the fan inlet and the cabinet panel, along with thrust restraints.
 9. Provide mounting brackets and variable speed drives for supply and return fans.
 10. Provide piezometric type air flow monitoring station on the fan inlet cones.
 11. Unit isolators and construction shall be seismic rated per values given in Section 20 05 46, "Hangers, Supports and Inserts for Seismic Requirements."
- G. Coil Section:
1. Coil sections to be of mill galvanized steel, with blank-off pieces as required to prevent air by-pass around the coils. Drain troughs with down spouts shall be a minimum of 6 inches in direction of airflow and be installed whenever coils are more than one section high. Coils shall be mounted on ~~304 stainless steel~~ slide racks, and shall be removable through an end panel, bolted and gasketed to the unit casing. Coil sections may be removed without disturbing any other coil.
 2. The cooling coils shall be rated in accordance with ARI, face areas and friction losses as shown in the schedules. Air friction losses to be for 100% wetted coil.

- ~~3. Rtu1 shall include a dual set of DX coil Sections with access plenums for the first and second stages of cooling.~~
- ~~4. Provide pipe chase on either side of coil for piping risers.~~
3. Provide an insulated stainless steel drain pan sloped in two directions to one side of the unit for all cooling coils.
4. The DX coils shall be intertwined circuited, 1/2 inch OD copper tubes, aluminum fins, headers with vent and drain and 16 gauge (minimum) galvanized steel casing. Coils shall be tested at 450 psig.

~~H. Humidifier Unit:~~

- ~~1. Humidifier of the size, type and rating shown in the schedule shall be provided by the HVAC Contractor. The humidifier section of the unit shall be 14 gauge 304 stainless steel floor with drain.~~
- ~~2. Refer to Section 23 84 13, "Humidifiers," for information concerning humidifier unit.~~
- ~~3. Provide an insulated stainless steel drain pan sloped in two directions to one side of the unit.~~

H. Filter Section:

1. Filter boxes to be furnished by unit manufacturer and shall include galvanized steel filter frames with mounting clips, close-off pieces to prevent by-pass of air, bracing between frames per filter manufacturer's recommendations and filter media per sizes and types shown in the schedules.
2. All filter media, temporary and final, shall be provided by the Contractor, not the RTU manufacturer. Refer to Section 23 41 05, "Filters."

I. Mixing Box

1. Mixing box shall be arranged for inlets as shown on plans. Dampers shall be of low leakage, extruded aluminum airfoil design, opposed blade type with metal compressible jamb seals and extruded vinyl blade edge seals on all blades. The dampers shall be mechanically linked together. Leakage shall be limited to 6-cfm/sq. ft. **at 1.0 inch w.c. pressure**, based on tests in accordance with AMCA 500. Dampers shall have opposed blades. Louvers shall be provided for weather protection for openings on the unit exterior. Louvers shall have drainable blades. Provide galvanized birdscreen. Provide an insulated stainless steel drain pan sloped in two directions to one side of the unit, within the outside air plenum.
2. **Do not provide air blender indicated.**

- J. Condenser: The condenser section shall be integral to the unit and shall include propeller type, direct drive fans with TEAO motors. Condenser coil shall be 3/8 inch seamless copper tubes with mechanically bonded aluminum fins and integral subcooler. Compressors shall be hermetic scroll type with refrigerant charge and over-temperature and over-current protection. Each compressor shall have sight glass and discharge check valve and vibration isolators.

K. RTU2-Gas Fired Heating Section:

1. All units must exceed the ASHRAE 90.1 requirement of steady state efficiency at low fire and carry an ETL Label. Operating natural gas pressure at the unit manifold shall be 14 inches w.c. Gas fired units shall be approved for operation in -40 degrees F.
2. Heat exchanger shall be a primary drum and multi-tube secondary assembly constructed of titanium stainless steel ~~with multi-plane metal turbulators~~ and shall be of a floating stress relieved design. ~~Heat exchanger shall be provided with condensate drain connection.~~ The heat exchanger casing shall have 1 in. of insulation between the outer cabinet and inner heat reflective galvanized steel liner. Unit blower location shall be engineered to improve the required air flow pattern around the heat exchanger. Using duct type furnaces and closed coupled blowers are not acceptable.

3. Units shall have **80% efficient** ~~high efficiency~~ heat exchanger (~~DJEDJX~~) and shall be tested and certified to ANSI/CSA standards ~~to provide a minimum of 90% efficiency~~ throughout the entire operating range as required by ASHRAE 90.1. The manufacturer shall be routinely engaged in the manufacture of this type of ~~high efficiency~~ equipment. The heat exchanger/burner assembly shall be a blow through positive pressure type. Unit shall have an interrupted pilot ignition system to provide increased safety. Units using continuous ~~or intermittent~~ pilots are not acceptable.
4. Flame surveillance shall be from the main flame after ignition not the pilot flame. The burner and gas train shall be in a cabinet enclosure. Atmospheric burners or burners requiring power assisted venting are not acceptable. The heat exchanger/burner assembly shall include 15:1 turndown ~~for all input ranges with increasing efficiency throughout the modulation.~~ The high turn down heat exchanger/burner assembly minimum input shall be capable of controlling 6.7% of its rated input, excluding the combustion of air.
5. The indirect fired gas heating section shall be factory tested.
6. Outdoor venting flue will be provided by manufacturer.
7. Electronic ~~DJM~~ module (~~Modulating Fuel w/ Modulating Combustion Air~~) complete with proportional and integral control with discharge air sensor to maintain set point temperature and provide rapid response to incremental changes in discharge air temperature. ~~Combustion air motor speed varies proportionally in response to the modulation of gas flow to the modulation of gas flow to provide optimum fuel/air mixture and efficiency at all conditions. Combustion blower RPM shall be proved using a speed sensor. Two speed or step speed combustion blowers are not acceptable.~~

L. Electrical:

1. RTU1 shall have variable frequency drives (VFD) on the supply and return fans to maintain constant air flow through the unit as the filters load from clean to dirty. The VFDs shall be compliant with Section 23 90 71 except the manual bypass shall be external to the drive, but within the electrical components for of the unit. Provide additional starter and components as required to allow unit operation with the drive completely removed.
2. RTU2 shall have (VFD) on the supply and return fans to alter air flow as required by the external BAS system input based on static pressure control and fan tracking respectively. The VFD shall modulate fan speed down to a minimum of 50% supply air flow with clean filters. The VFD shall be compliant with Section 23 90 71. The VFDs are not required to have a manual bypass.

M. Controls - Provide the following or coordinate with the BAS provider to include the cost for additional work:

1. Each unit shall be equipped with a complete microprocessor based control system. The unit control system shall include all required temperature and pressure sensors, input/output boards, main microprocessor and operator interface to perform the described sequence. All boards shall be individually replaceable for ease of service. All microprocessors, boards, and sensors shall be factory mounted, wired and tested.
2. The unit control system shall perform all unit control functions as indicated in the Sequence of Operation herein.
3. The microprocessor shall be a stand-alone DDC controller not dependent on communications with any on-site or remote PC or master control panel. The microprocessor shall maintain existing setpoints (if not set by BAS system) and operate stand alone if the unit loses either direct connection or network communications. The microprocessor memory shall be protected from voltage fluctuations as well as any extended power failures. All factory and user set control points shall be maintained in nonvolatile memory. No settings shall be lost, even during extended power shutdowns.
4. All digital inputs and outputs shall be protected against damage from transients or wrong voltages.
5. The microprocessor memory shall be protected from all voltage fluctuations as well as any extended power failures.

6. Each unit shall also have the ability to accept inputs described via BAS network communications.
 7. Each unit shall also have the ability to accept a discharge air temperature setpoint and duct static pressure setpoint via BAS network communications.
 8. Open Communications Protocol: The unit control system shall have the ability to communicate to an independent Building Automation System (BAS) through a direct BACnet MSTP. It shall use only standard BACnet projects, proprietary BACnet objects shall not be allowed. BACnet communications shall conform to the BACnet protocol (ANSI/ASHRAE 135-2001). A BACnet Protocol Implementation Conformance Statement (PICS) shall be provided. BAS Contractor to wire communication bus to the RTU control panel. Final termination to be by the RTU manufacturer. Addressing of points shall be coordinated by BAS and RTU manufacturers.
 9. The independent BAS system shall have access to "read only" variables and "read and write" variables. Communications shall not require field mounting of any additional sensors or devices at the unit.
- N. Roof curb: In lieu of non-isolation type curb with R-I-S strip, provide roof isolation curb per Section 20 05 80.** Curb shall be 12" high full perimeter roof curb of heavy gauge sheet metal, and complete with a wood nailer, neoprene sealing strip, Z-Bar flashing to provide complete seal against the elements. ~~The curb will also include R-I-S 2 layer isolation strip mounted on top of the roof curb.~~

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install air handling unit as shown on the Drawings. Make all connections.
- B. Provide vibration isolation curb and flexible connections at ductwork.**
- C. Extend trapped condensate drain line from drain pan indirect to nearest roof drain.
- D. After units have been operating for forty-eight (48) hours, all bearings shall be checked and tightened on shaft.
- E. At final completion, replace all filters with clean, new filters, and turn one complete set of replacement filters over to the Owner.
- F. Drive belts to be properly tensioned and aligned.
- G. Provide selection of fixed sheaves and belts, as required, to Balancing Contractor for proper final balancing.
- H. The unit manufacturer's control technician shall perform all pre start-up and post start-up adjustments. The unit manufacturer's control technician shall perform final terminations of BAS inputs/outputs and BACnet MSTP communication bus. Coordinate with BAS Contractor to ensure integration and control setup per specifications.

3.02 OPERATING DURING CONSTRUCTION

- ~~A. RTU1 shall not be used during construction.~~
- A.** If the units ~~is~~ **are** operated during construction, provisions shall be made to:
 1. Operate on 100% outside air and all return air duct sealed.
 2. Operate on return and outside air as scheduled with a MERV 8 filter on each return air duct opening/inlet.

- B.** The units shall not be operated at any time without a full set of filters throughout the unit equivalent in efficiency to each filter bank specified for completion. Filters shall be monitored during construction and changed when the filter pressure differential exceeds that recommended by the filter manufacturer.

END OF SECTION 23 75 143

SECTION 23 90 00 - HVAC ALTERNATES

PART 1 GENERAL

1.01 GENERAL

- A. The following HVAC work shall be included as indicated below, and identified as an alternate:
1. Alternate H-1:
 - a. If Alternate H-1 is accepted, provide all materials, labor and equipment for the complete installation of the sound absorbing blanket around the vacuum pump in the mechanical room and all associated equipment for the scope of work indicated on the Drawings. Provide hanging tracks to allow blanket panels to slide to allow access to the equipment.
 2. Alternate H-2a:
 - a. If Alternate H-2a is accepted, provide all material, labor and equipment for the provision of a complete and functional control system, as specified by Andover Continuum by Schneider-Electric.
 3. Alternate H-2b:
 - a. If Alternate H-2b is accepted, provide all material, labor and equipment for the provision of a complete and functional control system, as specified by Delta Controls by BCI.
 4. **Alternate H-3:**
 - a. **If Alternate H-3 is accepted, provide all material, labor and equipment for the provision of a complete and functional rooftop unit RTU2 in accordance with Specification Section 23 75 14, "Rooftop Air-Handling Unit". Indicate the manufacturer of the unit that is proposed to be furnished. Any exceptions to the specifications as written must be stated at the time of bid. Refer to sections listed in the reference section for additional information.**

END OF SECTION 23 90 00